# Lectures in Obstetrics, Gynaecology and Women's Health

Gab Kovacs
Paula Briggs

Springer

Lectures in Obstetrics, Gynaecology and Women's Health

Gab Kovacs • Paula Briggs

# Lectures in Obstetrics, Gynaecology and Women's Health

Springer

Gab Kovacs
Department of Obstetrics
and Gynaecology
Monash University
Clayton, Victoria
Australia

Paula Briggs
Sexual and Reproductive Health
Southport and Ormskirk Hospital
Southport
UK

ISBN 978-3-319-14862-5 ISBN 978-3-319-14863-2 (eBook)
DOI 10.1007/978-3-319-14863-2

Library of Congress Control Number: 2015940566

Springer Cham Heidelberg New York Dordrecht London


Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media (www.springer.com)

*The 30 topics you need to know to pass O & G*

# Acknowledgements

We would like to thank Naomi Ockersz and Josh Wright from Sonoa Health for drawing the illustrations, Dr. Agnes Bankier for helping with genetics, and Dr. John Campbell for checking the *Obstetrics* chapters.

I would also like to thank and pay tribute to Professor William A. W. Walters, whose enthusiasm for teaching launched me on an academic career.

Clayton, Victoria, Australia Gab Kovacs

# Contents

## Part III Obstetrics

# Part I

# Introduction

# Basic Physiology: The Menstrual Cycle

1

Understanding menstrual physiology is the basis for understanding the whole concept of fertility including the mechanism of action of contraception. It is also the basis for natural family planning.

## Hormonal Control of Ovulation

The menstrual cycle is controlled by the hypothalamo- pituitary axis. The pituitary is a small gland the size of a cherry that sits at the base of the brain, behind the bridge of the nose. It is stimulated by Gonadotrophin Releasing Hormone (GNRH), a deca-peptide (a hormone made up of ten amino acids). GNRH is secreted from the hypothalamus via venous channels in a pulsatile manner (Fig. 1.1). It is the frequency and the amplitude of these pulses which determines the response from the pituitary gland. Follicle Stimulating Hormone (FSH), is secreted by the anterior pituitary gland and stimulates the Graafian follicles. FSH levels are higher in the early follicular phase of the menstrual cycle (initiating follicular development) than in the luteal phase. It has a small peak, which accompanies the very important Luteinising Hormone (LH) peak, just prior to ovulation. The anterior pituitary also secretes LH, which remains at basal levels throughout the cycle with the exception of the LH peak. The LH peak commences about 36 h prior to ovulation, and it last for 24 h, with the peak occurring 24 h prior to ovulation.

## Development of the Graafian Follicle

As the follicles start to develop from Day 1 of the cycle, the granulosa cells of the follicles start to secrete the hormone oestrogen. Oestrogen has an effect on many parts of the body and also has the effect of regulating the release of gonadotrophins. As the oestrogen level rises, the FSH secretion is reduced, so that usually only one follicle matures. This is a negative feedback. Various follicles have different sensitivity to FSH, and it is the most sensitive follicle, which becomes dominant, the one destined to ovulate. The other developing follicles undergo atresia. The hormone Inhibin (type A and B) is also secreted from the ovary and it too has an inhibitory effect on the pituitary with respect to FSH secretion.

## The Effect of Oestrogen and Progesterone on the Endometrium

Circulating oestrogen causes both the glands and the stroma of the endometrium to proliferate. Following ovulation progesterone, is released resulting in secretory changes in the endometrium with tortuous glands containing lots of glycogen able to provide a welcoming nutritional environment should an embryo arrive.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_1, 

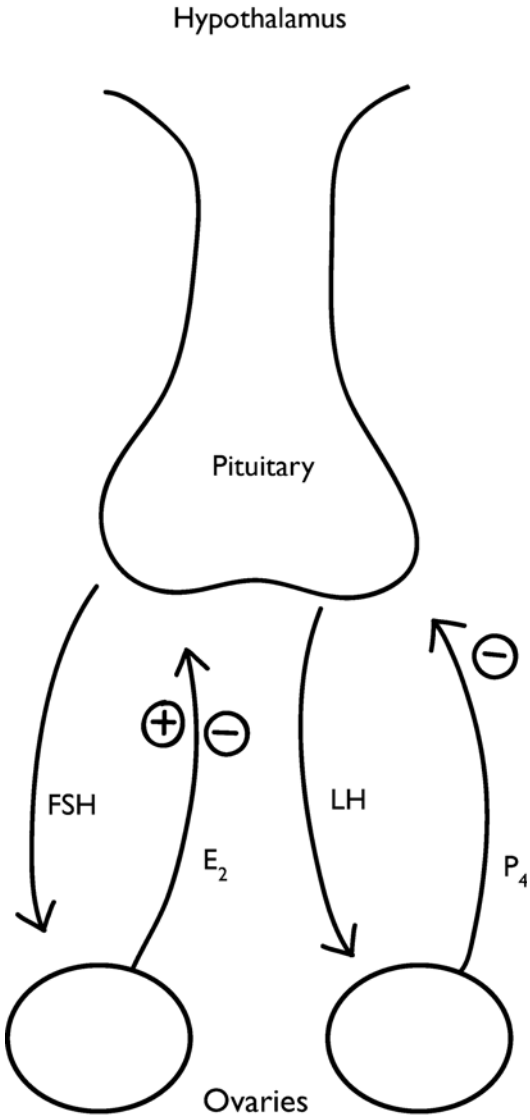



**Fig. 1.1** The hypothalamo-pituitary-ovarian axis

## Ovulation of the Follicle

When the follicle is ready to ovulate, oestrogen primes the pituitary gland to release LH. in a peak. This is responsible for the release of the ovum from the follicle about 36 h after the start of the rise, and 24 h after the LH peak. The hormone would more accurately be called "Ovulating Hormone" and that is what Luteinising Hormone means (as it induces the Corpus Luteum – yellow body- after ovulation).

The Graafian follicle, as well as providing the gamete to form a new embryo, is also responsible for the secretion of the steroid hormones, oestrogen and progesterone. At the beginning of each menstrual cycle, several follicles start to develop, but usually only one matures, with the other follicles degenerating, a process called atresia.

As the leading follicle matures, it reaches a diameter of nearly 20 mm, and bulges out from the surface of the ovary. It is similar to a hen's egg where the yolk corresponds to the ovum and the egg white the granulosa cells. The "egg shell" in the Graafian follicle is represented by the outer covering of theca interna and theca externa.

When the follicle reaches 16–18 mm in diameter, ovulation occurs in response to the LH peak. The shell of the egg is cracked and the yolk (the ovum) is released to find its way into the Fallopian tube where fertilization may occur if sperm are present.

During the development of the Graafian follicle, the female germ cell also has to mature and to reduce its chromosome compliment from 46 (diploid) to 23 (haploid).

When the mature oocyte is released from the ovary, it is about 135 μm (0.135 mm) in diameter and is surrounded by cells called the Cumulus Oophorus.

The tissue forming the theca interna and externa (the human equivalent to the egg shell) remain as the corpus luteum. The yellow colour comes from the deposition of carotene in the cytoplasm of the thecal cells. The corpus luteum is responsible for secretion of hormones essential for a pregnancy to be established (oestrogen and progesterone). These hormones stimulate the uterine lining (endometrium) to prepare, in anticipation of an embryo arriving in a few days time, if a sperm has fertilised the ovum.

It is the combined secretion of oestrogen and progesterone that induces the secretory changes in the endometrium.

## The Corpus Luteum and Pregnancy

The corpus luteum has an inherent life span of about fourteen days, and as it succumbs, in the absence of a pregnancy, the levels of oestrogen

and progesterone decline, resulting in an influx of inflammatory white blood cells (leucocytes) and the release of chemicals called prostaglandins and cytokines. This results in the endometrium sloughing off, and the commencement of the next menstrual period. The first day of bleeding is defined as "day one" of the next cycle. However if fertilisation occurs, the early embryo secretes beta Human Chorionic Gonadotrophin (bHCG), which has a stimulatory effect on the corpus luteum, rescues it, and maintains its hormonal function, so that the levels of oestrogen and progesterone no not decline, but continue to increase. This maintains the endometrium, and prevents the onset of the next menstrual period. It is the role of the corpus luteum to secrete adequate oestrogen and progesterone during the first three months of the pregnancy, a role then adopted by the placenta at about 3 months.

## Basal Body Temperature

Progesterone is thermogenic, elevating body temperature by a small and sustained amount. Measuring a woman's basal body temperature on waking on a daily basis will show an elevation of about half a degree centigrade once ovulation has taken place and progesterone is secreted. Whilst the pattern is not always clear, in many women it is a useful method of determining if and when ovulation has occurred. This phenomenon of luteal temperature rise is the basis of the "temperature method" of natural family planning, and can also be used for assessing whether, when and how well ovulation is taking place, in the assessment of a subfertile couple, and in the management of ovulation stimulation with clomiphene citrate (see Chapter 16).

## Cervical Mucous Changes and the Basis of the Billings Method of Natural Family Planning

Another very important effect of oestrogen and progesterone is on the secretions of the cervical glands- the cervical mucous. Following the observations of the Billings, we can use the changes in cervical mucous as a bioassay of the menstrual cycle, thus pinpointing fertile and infertile days.

The quantity and quality of cervical mucous varies depending on the circulating levels of oestrogen and progesterone.

The effect of oestrogen is to stimulate the production of copious amounts of mucous from the cervical glands. The physical composition of cervical mucous depends on its water and salt concentration. Oestrogen encourages slippery mucous referred to in the Billings method of natural family planning (NFP) as "Basic Fertile Pattern (BFP)". When progesterone is secreted and reaches the cervical glands, it changes the salt concentration to result in "Basic Infertile Pattern (BIP)" mucous. It is this defined change from BFP to BIP that defines the time of ovulation, and enables couples to use it for NFP.

These physiological changes are logical, as at the time just prior to ovulation, it is important that the mucous facilitates the passage of the sperm through the cervix and the Fallopian tubes. After ovulation the thickened BIP mucous is protective, not allowing sperm (which no longer have any physiological function), and maybe micro-organisms, from entering the uterus.

## Fertilisation

The human ovum is released from the surface of the ovary at ovulation and finds its way into the Fallopian tube with the help of the finger like projections on the tubes called fimbriae. The ovum then progresses along the Fallopian tube with fertilisation taking place in the lateral one third (called the ampulla). The window of opportunity for fertilisation is of the order of a few hours. It is therefore important that the oocyte is exposed to fertile sperm early in its journey in the Fallopian tube. Sperm deposited in the vagina enter the cervical canal, where they are protected by the mucous from the acidic environment of the vagina. To maximize the chance of fertilisation, sperm need to be deposited into the vagina prior to ovulation. It is believed that sperm will survive

for several days in the mucous environment, so couples who want to conceive are advised to have sexual intercourse at least every second day from when menstruation finishes until ovulation is thought have occurred.

Conversely, couples using NFP must abstain around the ovulatory period. The problem is that it is uncertain how long a sperm may survive, and pregnancy has been documented even when sexual intercourse did not occur for several days prior to ovulation.

Fertlisation commences with contact between the oocyte and sperm, and climaxes with the fusion of their two haploid pronuclei (each containing 23 chromosomes) resulting in a diploid embryo (with 23 pairs of chromosomes (46)). After the attachment of the sperm to the ovum, the acrosomal cap of the sperm releases the enzyme hyaluronidase, which helps to break through the zona pellucida membrane surrounding the oocyte. As the successful sperm enters the oocyte, it stimulates the zona pellucida to undergo

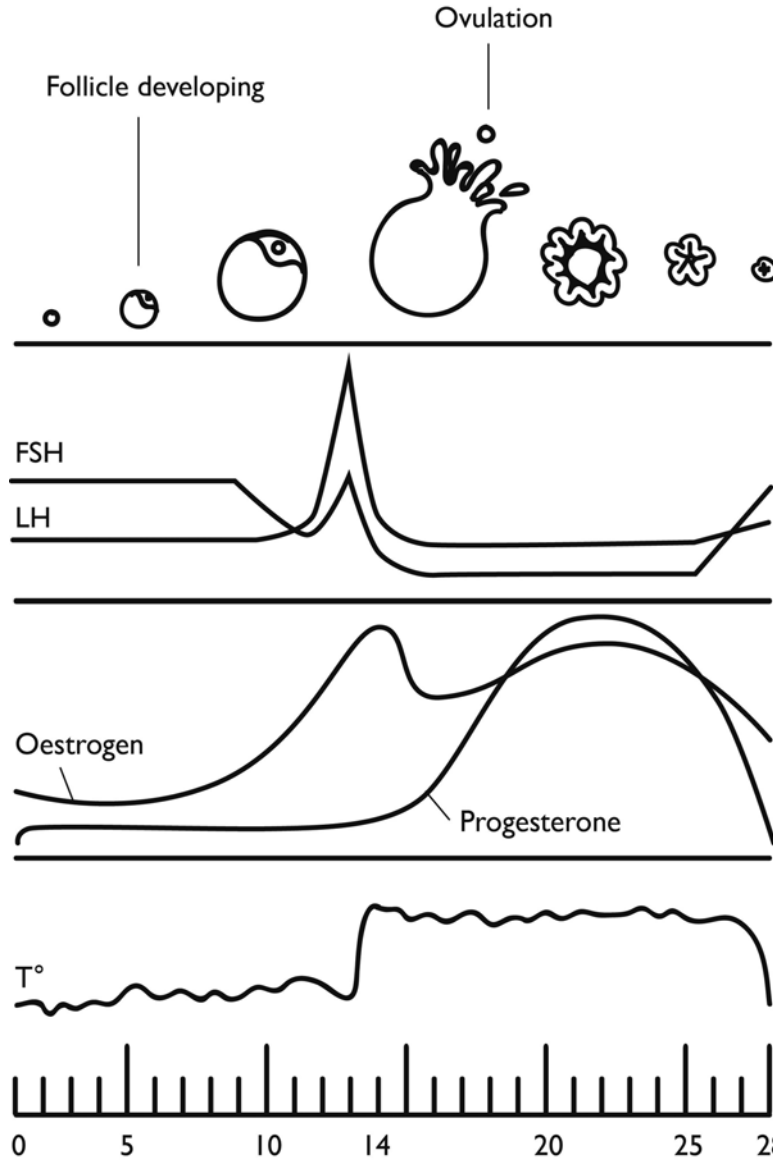



**Fig. 1.2** The menstrual cycle

the acrosome reaction, which prevents any further sperm from entering the oocyte.

## Early Embryonic Development and Implantation

After fertilisation, the embryo undergoes repeated cell division known as cleavage and segmentation, which transforms it into a solid clump of cells. At the sixteen cell stage it is called the "morula". Our understanding of this stage of human embryo formation is now much improved due to in vitro fertilisation and the ability to observe embryos in the laboratory. Division into two cells usually occurs by 24 h after fertilisation, with the embryo reaching four to eight cells by 48 h (Fig. 1.2).

As the embryo keeps dividing it is also travelling along the Fallopian tube towards the uterine cavity. This movement is accomplished by both the movement of the fine hairs (cilia) lining the tube as well as contractions of the muscles within the tubal walls. The clump of embryonic cells on about the fifth day undergoes cavitation, and accumulates fluid to become a *blastocyst*. This is around the same time that it reaches the uterine cavity. The cells then differentiate into the *inner cell mass* which will form the embryo, and the *trophobalst* which forms the placenta and membranes. Nutrition during this journey is provided by the tubal and uterine secretions. The trophobalst then burrows into the superficial layer of the endometrium, and starts to establish the placenta, which will provide nutrition to the embryo, as well as the source of oestrogen and progesterone during the pregnancy.

# Basic Embryology: The Development of the Foetus

2

With the joining of the oocyte and the sperm an embryo is created (Fig. 2.1). As both the oocyte and the sperm (gametes) contribute 23 chromosomes (haploid), the embryo now is made up of 23 pairs of chromosomes (46). The developing embryo inherits half its genetic material from each of its parents, thus it is diploid, and its genetic makeup is determined for life. As the cells continue to divide rapidly, each nucleus contains an identical chromosomal template. By the time it reaches the uterine cavity, the embryo has developed to the blastocyst stage (Fig. 2.2). The blastocyst differentiates into outer cells, the trophoectoderm or *trophoblast*, which will form the placenta as it combines with the uterine endometrium, and inner cells which form the *inner cell mass* (Fig. 2.3). These will form the embryo, as well as the amnion and yolk sac. This is the stage at which the process of implantation commences. By the eighth day, the cells of the inner cell mass proliferate into a rounded bilaminar structure. The embryo will develop from, this and a small slit like space forms to become the amniotic cavity. The *ectoderm* develops from the floor of this cavity and makes up one of the layers of the bilaminar embryonic disc, the other layer being the *endoderm*. The *mesoderm* develops as a further layer between the ectoderm and endoderm. As it grows outwards, in combination with the trophoblast, the *chorion* is formed. The cells continuous with the endoderm extend along the inner aspect of the blastocyst producing another fluid filled sac – the primary yolk sac. Ultimately the ectoderm will form the skin, nervous system and parts of the eyes, ears and nose. The endoderm is the origin of the linings of the gut and respiratory system, whereas the mesoderm is the origin of muscle, bone, blood tissues and connective tissue.

Between the yolk sac and the trophoblast, tissue is present, which is called the extra embryonic mesoderm. Within the extra embryonic mesoderm, cavities appear which become confluent, and as the embryo folds, it is surrounded by what is now called the extra embryonic coelom. The part of the extra embryonic mesoderm joining the early

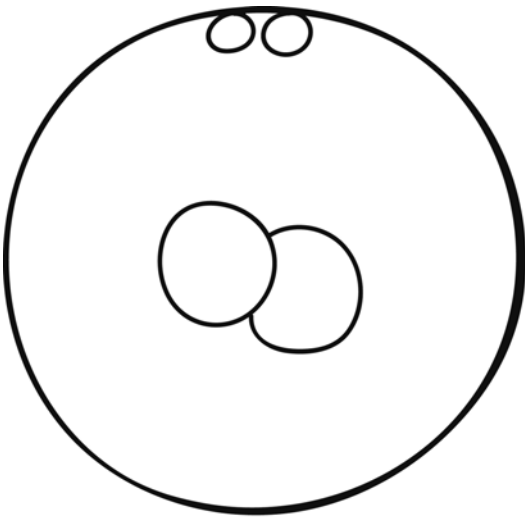



**Fig. 2.1** The fertilised oocyte

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_2, © Springer International Publishing Switzerland 2015

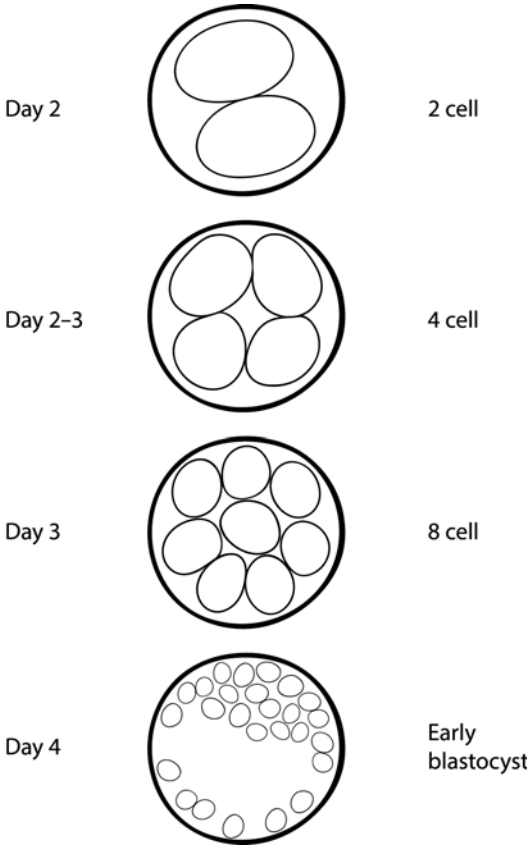



**Fig. 2.2** Early embryonic development

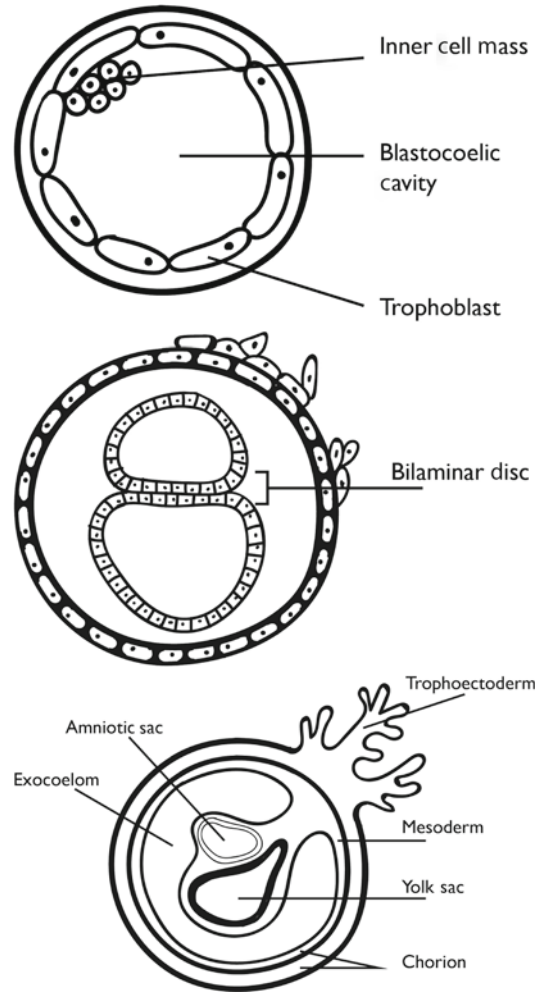



**Fig. 2.3** Development of the embryo after implantation

embryo to the trophoblast forms the body stalk, which will subsequently form the umbilical cord of the fetus. By about 15 days of age, the embryo becomes oriented in a longitudinal axis with the development of a keel-like thickening of the ectoderm known as the *primitive streak*. The anterior end of the primitive streak forms a clump of cells, which will give rise to the brain of the fetus. The embryo then rapidly elongates with the head process growing quickly and becoming larger than the streak itself. As the cells proliferate, a third layer develops between the ectoderm and the endoderm, the intra-embryonic mesoderm. A longitudinal inpouching of the ectoderm then takes place and this gives rise to the neural tube which will develop into the central nervous system. This neural tube will develop three dilations at its cephalic end, which give rise to the ventricles of the brain.

By about 21 days after fertilisation (5 weeks of age) the blood vessel plexuses within the embryo and the mesoderm form the primitive heart, with circulation developing to supply the brain (future carotid arteries). The vitelline vessels to the gut, the blood supply to the nervous system, and umbilical vessels to the placenta all develop from these plexuses.

By week 6 the heart is formed, and can be seen beating using ultrasound, an important sign to confirm that the embryo is alive and well. The limbs and genital system develop by week 8, the liver and kidney with its drainage system by week 12. The eyes and spinal cord develop by 20 weeks, with the gastrointestinal system and respiratory system developing by week 24–28.

As all the organs are now formed, the last 3 months of intrauterine development will consist of maturation and growth of the systems.

# Basic Genetics for the Obstetrician

# 3

The basic makeup for every individual is determined by their genes. Genes are made up of a sequence of nucleotides, which are aggregated into chromosomes. The Human Genome is believed to be made up of about 23,000 genes, located in 23 pairs of chromosomes. Each species is unique in respect of the number of chromosomes that it is comprised of. The chromosomes are contained within the nucleus of every cell. In any individual the chromosomes are identical in each of its 37.2 trillion cells. As the 23,000 pairs of genes can form an infinite number of combinations and permutations (23,000 × 23,000), each individual is genetically unique with the exception of identical twins, who are formed by the splitting of an embryo, and thus start with identical genetic makeup.

## Chromosome Structure

Chromosomes are a joined by a centromere. As the centromere is closer to one end, the shorter arms are called p arms and the longer arms q, and the end region is the telomere (Fig. 3.1).

Within the nucleus, the chromosomes are in pairs, one of each pair from each parent, containing the genes present, one inherited from the male partner via the sperm and one from the female partner via the oocyte. These genes determine our characteristics. All cells of the body (somatic cells) contain these 46 (23 pairs) of chromosomes (diploid) except the germ cells (oocyte and spermatid) which contain only 23 chromosomes (haploid).

All oocytes carry 22 autosomes, with the 23rd chromosome always being an X. In contrast, sperm carry either an X or a Y bearing 23rd sex chromosome, and the 22 autosomes. Sperm that carry the Y chromosome are destined to produce a male offspring when it combines with an

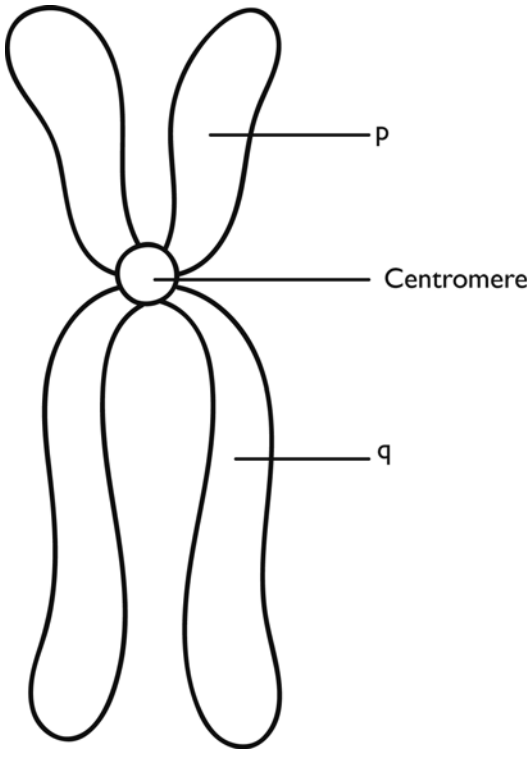



**Fig. 3.1** Chromosome structure

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_3, © Springer International Publishing Switzerland 2015

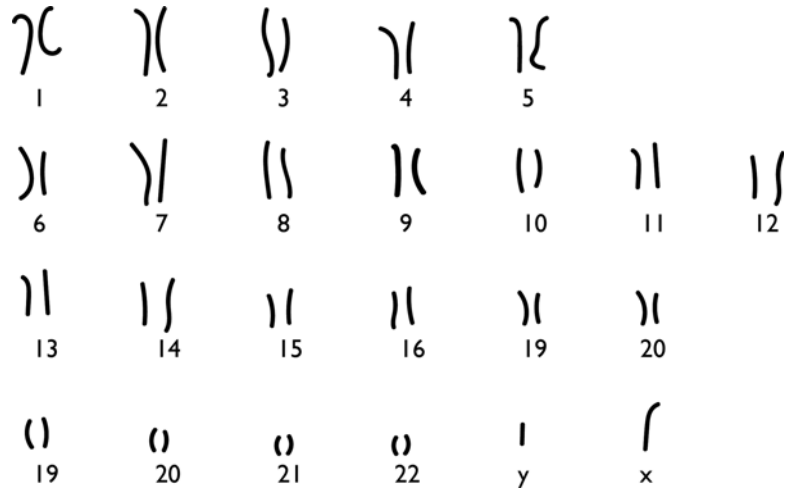



**Fig. 3.2** Karyotype

ovum, whereas and X bearing sperm will produce female offspring. The Y chromosome is significantly shorter than the X chromosome (Fig. 3.2).

The crucial difference between germ and somatic cells is that the former reduces the diploid (46 chromosome) compliment to haploid (23 chromosome) form, thus enabling the joining of two haploid germ cells to form one new diploid individual.

During the proliferation of germ cells, we have two types of cell division, mitosis (or replication division) and meiosis (reduction division).

In the male germ cell, this reduction division occurs during its progression from the primary to secondary spermatocyte, whilst in the female from the primary oocyte to the secondary oocyte.

The female gamete is unique in that division of the primary oocyte results in uneven division of the cytoplasm, with most going to the daughter cell, the secondary ooctye, with only a very small amount going to the other daughter cell, which becomes the primary polar body. Similarly, when the secondary oocyte divides by mitosis, replicating its 23 chromosomes, one of the daughter cells again is disadvantaged with respect to the amount of cytoplasm, and it becomes the second polar body, whereas the other part becomes the mature oocyte. The polar bodies are not capable of being fertilized.

The sex of an embryo is determined at the time of fertilization and depends on whether an X bearing or Y bearing sperm has entered the ovum.

## Genetic Abnormalities

Genetic abnormalities may result from loss or extra chromosomal material or an abnormality of a single gene. Chromosome abnormality may involve part of or an entire chromosome. For example Down Syndrome, where the child inherits an extra chromosome 21, known as trisomy 21. Genes can be altered in a variety of ways. The outcome depends on where the change is in the gene, how it effects gene function and how the gene change is inherited.

## Single Gene Defects

Single gene defects can be dominant or recessive. With a recessive disorder, both genes (one from each parent) have to be altered in order for the abnormality to be manifest (phenotype). If only one parent has passed on the defective gene, and the same gene from the other parent is normal, the child will not be affected, but will be a carrier. In contrast, with a dominant single gene defect it is sufficient for just one gene change to be inherited, and that gene will be responsible for the phenotype, e.g. Huntington's disease.

If the gene is on the X chromosome, the outcome is gender specific. For example the Haemophilia Gene. In females, if the X chromosome carries the defective gene, there is a second X chromosome which caries a normal gene and the carrier has normal clotting. A male however, only has one X chromosome nd if his Haemophilia gene is altered, he has Haemophilia.

(If a person carries two altered genes he/she is said to be homozygous, whereas if they carry one normal and one abnormal gene, they are said to be heterozygous.)

### Autosomal Dominantly Inhherited Single Gene Defects

- One altered gene is sufficient to cause the phenotype
- An affected offspring may have an affected parent unless the gene change is a new mutation
- Male and female offspring have the same chance of inheriting it
- If an affected person has a child with an unaffected person, the risk of affected children is 1:2
- Unaffected children of an affected parent will not carry or pass on that gene.

### Autosomal Recessively Inherited Single Gene Defects

- Both parents are carriers and both copies of the gene are altered in the child and disease to be manifest
- Heterozygous carriers are phenotypically normal, but carry and may pass on, the altered gene
- If normal parents have an affected child, they must both be heterozygotes- 1:4 children will be affected, 1:2 carriers, 1:4 not carriers, -or conversely 3:4 will be unaffected.
- If both parents affected, all their children are affected
- If an affected parent (homozygous) has a child with a heterozygous carrier- 1:2 children will be affected, 3:4 carriers
- X linked recessive traits, will be manifest in all males, as they only have one X chromosome
- Heterozygous females are nearly always normal, but are carriers and pass on the gene to 1:2 of offspring
- Of a carrier female, there is a 1:2 chance that sons will be affected and 1:2 chance that the daughters will be carriers
- An affected male never passes the gene on to a male offspring, since it is the Y chromosome (not the X) that he passes to his son
- All daughters of an affected male are carriers
- The female child of a carrier female and a normal father has a 1:2 chance of being affected

## Aneuploidy

These abnormalities arise when the number of chromosomes is less or more than 46.

### Trisomies

The most common type of aneuploidy is Downs Syndrome, Trisomy 21, occurring in about 1:650. The aetiology is thought be an abnormal separation of chromosomes during the first and sometimes second meiotic division in the ovum. It is maternal age dependent with the incidence at various ages shown in Table 3.1

Other common trisomies are of chromosome 13, 16, 18 and 22, but most of these are incompatible with life and result in early pregnancy loss.

A special trisomy is that of 47XXY or Klinefelter Syndrome, with an incidence of 1:450 of males. The phenotype is variable. They may first come to attention as adults because of infertility. Men with Klinefelter syndrome may be tall, with breast development, and they may have problems with learning and language and because

**Table 3.1** Age at conception by incidence of Trisomy 21 (USA)

| Age at conception | Incidence |
|---|---|
| 20 | 1:1,600 |
| 25 | 1:1,300 |
| 30 | 1:1,000 |
| 35 | 1:365 |
| 40 | 1:90 |
| 45 | 1:30 |

of testosterone deficiency, have minimal facial hair, decreased libido, and lack of energy.

On examination they usually have small testes (as little as 3cc in volume), high serum FSH and low testosterone.

### Monosomies

Monosomy, where there is a missing chromosome is incompatible with life, except for when it occurs in the sex chromosome, presenting as 45 X, or Turner Syndrome. It is estimated that 90 % of babies with Turner Syndrome are spontaneously aborted in early pregnancy. It effects about 1:2,000 girls at birth. These girls are usually short in stature (average height only 143 cm), have delayed puberty, and often primary amenorrhoea, or very infrequent periods. They often have webbed neck, and may have learning difficulties. They are almost always sterile. About 50 % have an associated congenital cardiac defect, and some have hearing problems. They may have puffy hands and feet, pigmented moles, soft spooned nails and a low hairline. Frequently they have XO/XX mosaicism, meaning that some cells have a 46XX karyotype, while others have the true 45 X.

### Translocations

In this congenital abnormality, part of one chromosome becomes attached to or interchanged with another chromosome or segment thereof. If there is a rearrangement, but no loss or gain of genetic material, it is called a balanced translocation, and may have no phenotypic significance. However if genetic tissue is lost or gained, resulting in an unbalanced translocation, this often results in an early pregnancy loss (EPL). In the event that the pregnancy continues the degree of severity of any congenital anomality depends on the specific break points involved, and the amount of unbalanced genetic tissue.

## Multifactorial Congenital Abnormalities

There are some abnormalities that are believed to have a combined inherited and environmental mode of transmission. Although no specific single gene has been identified, these abnormalities do run in families. An example is neural tube defects, where the neural tube does not close properly, resulting in anencephaly (at cephalic end) and spina bifida (at caudal end). These are the second commonest group of congenital abnormalities after cardiac defects. With the use of antenatal ultrasound examination, these abnormalities are usually diagnosed in the late first or mid trimester, thus allowing the option of therapeutic termination of pregnancy (TOP).

## Antenatal Screening for Chromosmal Problems (Prenatal Diagnosis –PND)

During the last two decades antenatal diagnosis has seen many new options, and widespread availability in developed countries. These tests can be divided into screening tests and diagnostic tests.

Screening tests are directed at predicting the risk of aneuploidy, principally trisomy 21, but also other chromosomal aneuploidies. The most popular is a combined first trimester blood test measuring two hormones in the blood, (free-BhCG and PAPP-A), in conjunction with ultrasonic measurement of the fetal nuchal thickness. A computer program, then uses the results, together with maternal age to estimate the likely risk. If the risk is elevated, a diagnostic test is recommended.

Non Invasive Prenatal Screening (NIPS/ Non Invasive Prenatal Testing (NIPT) has recently been introduced, where blood taken from the mother is processed to isolate cell free foetal DNA that has passed through the placenta. This test can diagnose most trisomies and monosomy for chromosmes 18 (Edwards Syndrome) and X (Turner's Syndrome). Although all tests do have false positive and false negative results, NIPS is estimated to identify 98 % of Downs Syndrome, with a false positive rate of less than 0.5 %.

### Diagnostic Tests

If the screening test is suggestive of a significant risk of a chromosomal abnormality.

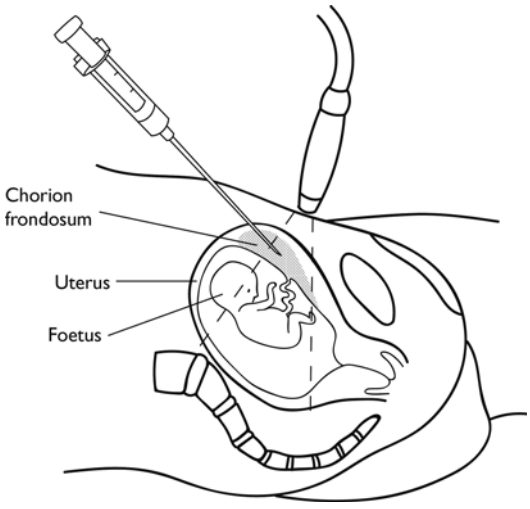



**Fig 3.3** Chorionic villus sampling

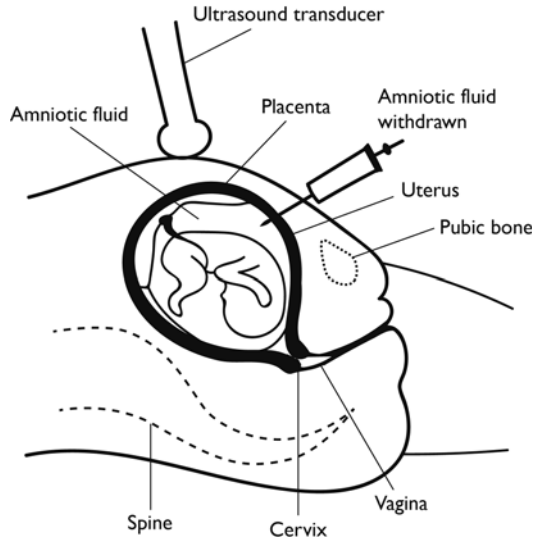



**Fig 3.4** Amniocentesis

A confirmatory diagnostic tests is recommended and most will return a normal result.

### Chorionic Villus Sampling (CVS)

(Fig. 3.3)

This procedure is performed at 11–12 weeks of gestation under ultrasound guidance and enables a sample of the chorionic villi to be biopsied. Foetal cells are then isolated, with subsequent confirmation of euploidy (normal chromosome complement) or aneuploidy. The estimated risk of pregnancy loss after the procedure is about 1:100.

### Amniocentesis (Fig. 3.4)

This technique is similar to CVS, except that it is performed after 13 weeks of pregnancy, and a sample of amniotic fluid (rather than placental tissue) is collected. Analysis is similar to CVS, and the risk of pregnancy loss post procedure is 1:200.

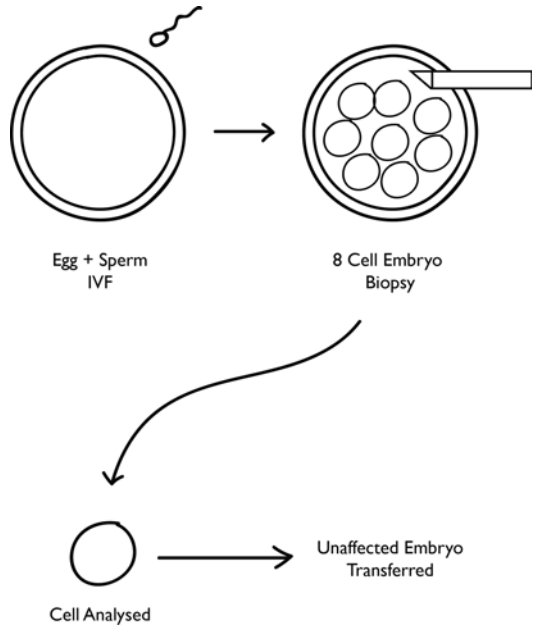



**Fig 3.5** Embryo biopsy for preimplantation genetic diagnosis

### Preimplantation Genetic Diagnosis

(Fig. 3.5)

Waiting till a pregnancy is achieved, and then undertaking PND means that if the foetus is affected, then therapeutic TOP may have to be undertaken. Many couples find this unacceptable and prefer not to establish a pregnancy with an abnormal foetus. The alternative is to produce embryos in vitro, using conventional in vitro fertilization (IVF) treatment, biopsying the early embryo, and then carrying out genetic diagnosis, either looking for chromosomal abnormalities, or

single gene defects, if there is a known gene defect in the family. Only embryos which are diagnosed to be unaffected are then transferred. Sometimes the embryos have to be frozen and replaced in a subsequent cycle.

This is a simplified review of genetic diagnosis, but genetic counselling is complicated and is best carried out by a multi-disciplinary team, including geneticists, genetic counsellors, obstetricians and midwives.

# The Gynaecological History and Examination

# 4

## History

Whilst a gynaecological consultation is a specialist referral, it is important to consider the patient as a whole, and to have an overall understanding of her medical history. Therefore a general medical history should be obtained, followed by a gynaecological history.

The administrative staff will confirm the patient details prior to the consultation. This is important to ensure that the notes match the patient, but should also be confirmed by the clinician at the start of the consultation. Personal details must be treated confidentially.

It is also important to make a note of anyone else present during the consultation e.g. partner, health care assistant or medical student!

When the woman presents (or couple if it is a joint consultation, such as for subfertility) it is useful to enquire about occupation. This not only gives a clue as to how to explain things, but also acts as an ice breaker.

## Menstrual History

This is the most important part of the consultation.

These are the important questions to ask:

- Menarche (age of first menses)
- Regularity of cycles. This is abbreviated as K = a – b/c – d, and X
  - a is the shortest number of days of bleeding
  - b is the longest number of days of bleeding
  - c is the shortest cycle (counting from the first day of one bleed to the first day of the next bleed)
  - d is the longest cycle
  - X is the average cycle length
- Last normal menstrual cycle (LNMP)
- The amount of menstrual bleeding (is it excessive – passing clots, flooding, the frequency of changing pads/tampons)
- Are "periods" painful (dysmenorrhea)
  - Is it worse pre-menstrually and relieved by bleeding – (*spasmodic dysmenorrhoea)*
  - Does it get worse as menstruation progresses (suggestive of endometriosis)
- Intermenstrual bleeding (IMB) or postcoital bleeding (PCB)?

Remember that women using hormonal contraception do not have a menstrual cycle. Women using combined hormonal contraception have withdrawal bleeds associated with a hormone free interval.

## Contraceptive History

The use of contraception, including past and current methods should be recorded.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_4, © Springer International Publishing Switzerland 2015

## Obstetric History

Any previous pregnancies including their outcome; delivery, pregnancy loss, therapeutic termination of pregnancy (TOP).

The abbreviation used is $P_xG_y$- where P = Parity means the number of times the woman has given birth to a baby of at least 28 weeks gestation.

G = Gravidity and means the number of times the woman has been pregnant.

The outcome of pregnancies should be summarised (See Chap. 5).

## Cervical Cytology

When was her last cervical smear test and what was the result.

## General Medical History

- Illnesses
- Operations
- Medications
- Allergies
- Social history – smoking/alcohol/recreational drug use

## Presenting Problem

The appropriate questions for specific complaints will be covered in the relevant chapters. Examples of the correct questions to ask for frequently occurring conditions are given here.

**Heavy Menstrual Bleeding (HMB)**
- When did the pattern change?
- Precipitating factors, such as the use of intrauterine contraception (IUC)
- Details regarding the woman's cycle, as described above.

**Intermenstrual Bleeding (IMB)**
- When did it start?
- Are there any precipitating cause, such as sexual intercourse (post coital bleeding – PCB)
- Relationship to menses

**Subfertility**
- Duration without contraception – "trying"
- Frequency and adequacy of sexual intercourse (timing, erections, penetration, ejaculation)
- Symptoms and signs of ovulation (menstrual pattern, mucous changes, premenstrual breast changes, bloating, ovulation pain (Mittelschmerz))
- Any history suggesting tubal disease (appendicitis, sexually transmitted infections (STIs))
- History suggesting endometriosis (dysmenorrhoea)
- Partner's reproductive history, testicular injury, STIs, mumps

**Urogynaecology**
- Complains of "something coming down"
- Urinary frequency, urgency, incontinence, stress incontinence, dysuria, nocturia

**Menopause**
- Regularity of "periods"
- Symptoms of hormone imbalance/oestrogen deficiency. Classically this includes hot flushes and night sweats.

## The Gynaecological Examination

The examination should be problem orientated, bearing in mind that the patient will have undergone a general examination by their GP prior to referral.

If hormones are to be prescribed (contraception or HRT) then checking the blood pressure (BP) is mandatory and it may be appropriate to offer breast examination.

Listening to the heart and lungs may be appropriate, if a surgical procedure requiring general anaesthesia is contemplated. Examining the thyroid in HMB may be indicated.

## Abdominal Examination

Before commencing an examination, it is important that the patient empties her bladder.

This is particularly desirable before embarking on a pelvic examination. A many time repeated gynaecological urban myth is the story

of the woman who had an operation for uterine prolapse, and at operation it was found she had a large ovarian cyst pushing down the uterus. To avoid such mismanagement, one must always palpate the abdomen first. Any masses should be noted and further investigation arranged. Ultrasound would be the first line investigation.

## Speculum Examination

The most popular instrument for inspecting the vagina and the cervix is a Bivalve Speculum (Fig. 4.1) also known as Cusco's/Cosco's speculum.

The original speculum was a Sims's speculum, modeled after a bent spoon, as first developed by J Marion Simms in the mid 1800s to help him visualize the vagina during the fistula operations that he pioneered (Fig. 4.2). The use of this type of speculum necessitates the woman being examined lying on her side and whilst it has a place in women with prolapse, some women may feel uncomfortable being examined from behind.

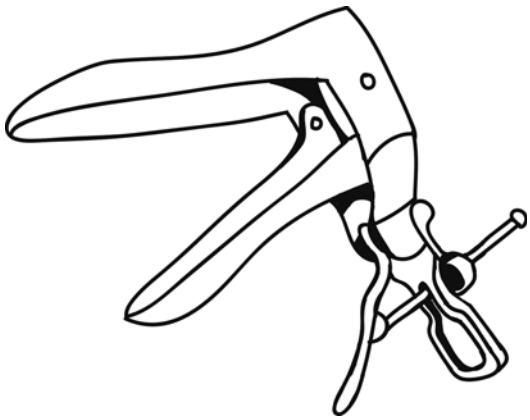


**Fig. 4.1** Bivalve vaginal speculum

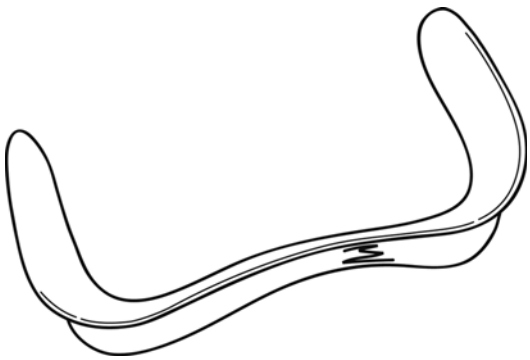


**Fig. 4.2** Sim's vaginal speculum

The advantage of the bivalve speculum is that after proper insertion, the speculum can be opened, and the vaginal muscles will keep it in place, allowing the operator to have two free hands to carry out procedures such as a cervical smear test, endometrial sampling, or IUC insertion. This may not be the case in women with atrophic vaginitis, where insertion may be difficult, or in women with prolapse, where muscle tone may be insufficient to keep the speculum in position.

The woman is asked to lie supine on the examination couch, with her knees apart. The labia are parted with the left hand, so that the pink vaginal skin can be seen, whilst the speculum is gently introduced, passing it backwards and upwards. Applying lubricant to the outside of the blades helps this process. Once inserted, the handle can be turned upwards or downwards (some operators have a preference for one or the other and the type of examination couch precludes turning downwards in some cases). The blades are opened allowing visualization of the cervix and vaginal walls. The blades are then fixed in place by tightening the locking screw.

Following the dictum of inspection before palpation, the cervix should be inspected, and any abnormalities such as an ectropion, polyps, or tears should be noted. If indicated a cervical smear test should be taken at this stage.

The speculum should then be removed, by loosening the screw and then gently withdrawing the blades.

## The Bimanual Examination

This should be carried out in the same dorsal position as the speculum examination. The second and third fingers of the gloved right hand should be lubricated, and the left hand again used to part the labia as for the speculum examination. Two fingers (index and middle) should then be introduced into the vagina, until the cervix is felt. The cervix can be classified into "firm"- normal, "soft" during pregnancy, or "hard" if it is infiltrated by carcinoma – although this would be

an unlikely way to make the diagnosis. Pelvic infection or blood in the Pouch of Douglas may be associated with extreme tenderness, known as cervical excitation. In this situation, cervical motion is associated with extreme pain, so bad that your patient will want to "hit the roof".

The dominant hand is the "manipulating" hand, whilst the fingers of the other hand, placed on the abdomen is the "palpating" hand. If one imagines that the uterus is on an axle at the utero-sacral ligaments, and it can be rocked forwards or backwards, then the anterior lip of the cervix needs to be pushed backwards to try and antevert the uterus (Fig. 4.3). If the uterus is palpable between the palpating and manipulating hands, the uterus is anteverted. If however despite efforts to rotate the uterus forwards, there is nothing between the two hands (Fig. 4.4a), then the uterus must be retroverted, in which case, putting the fingers into the posterior vaginal fornix, may facilitate palpation (Fig. 4.4b).

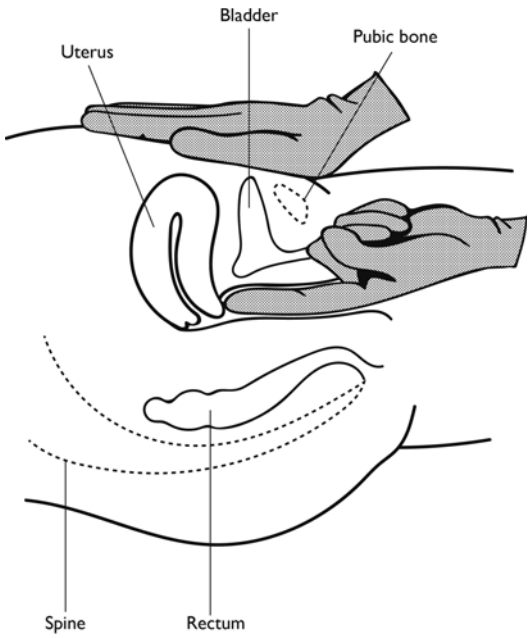



**Fig. 4.3** Anteverted uterus on bimanual examination

Once the uterus has been palpated, and it is decided whether it is anteverted (65 % of women) or retroverted (25 % of women), or sometimes axial (10 %) of women, an assessment can then be made whether it is of normal. If the uterus is enlarged, it is most logical to describe it as equivalent to the number of weeks of pregnancy (See Chap. 5). Sometimes, it is described as the size of an orange, grapefruit etc, but this is less reliable.

An assessment should then be made regarding the mobility of the uterus. It may be fixed and retroverted, if there is extensive endometriosis in the Pouch of Douglas. It should also be noted if there are any specific enlargements, e.g. fibroids.

The final part of the bimanual examination is to examine the part of the pelvis beside the uterus – called the fornices. This assesses the ovaries and the Fallopian tubes. One may detect ovarian cysts, or inflammation of the tubes, manifest as tenderness (Table 4.1).

## Special Tests

The traditional way to exclude uterine pathology involves carrying out a dilatation and curettage (D & C) under general anaesthetic. Over the last two decades, the technique of hysteroscopy has become more common place and D&C is rarely done any longer.

Hysteroscopy requires the insertion of a narrow telescope through the cervix, distending the uterine cavity with fluid, and connecting the telescope to a light source and a video monitor. This enables inspection of the uterine cavity, with the potential to diagnose pathology such as polyps, submucous fibroids and uterine septae.

**Table 4.1** Summary of gynaecological bimanual examination

| | | | | |
|---|---|---|---|---|
| **The cervix** | Soft | Firm | Hard | |
| **The uterus** | Anteverted | Retroverted | Erect | Unsure |
| Uterine size | Not enlarged | Enlarged: weeks of pregnancy | | Any discreet lumps |
| | Tender | Non-tender | | |
| **Fornices** | Masses palpated | Tenderness detected | | |

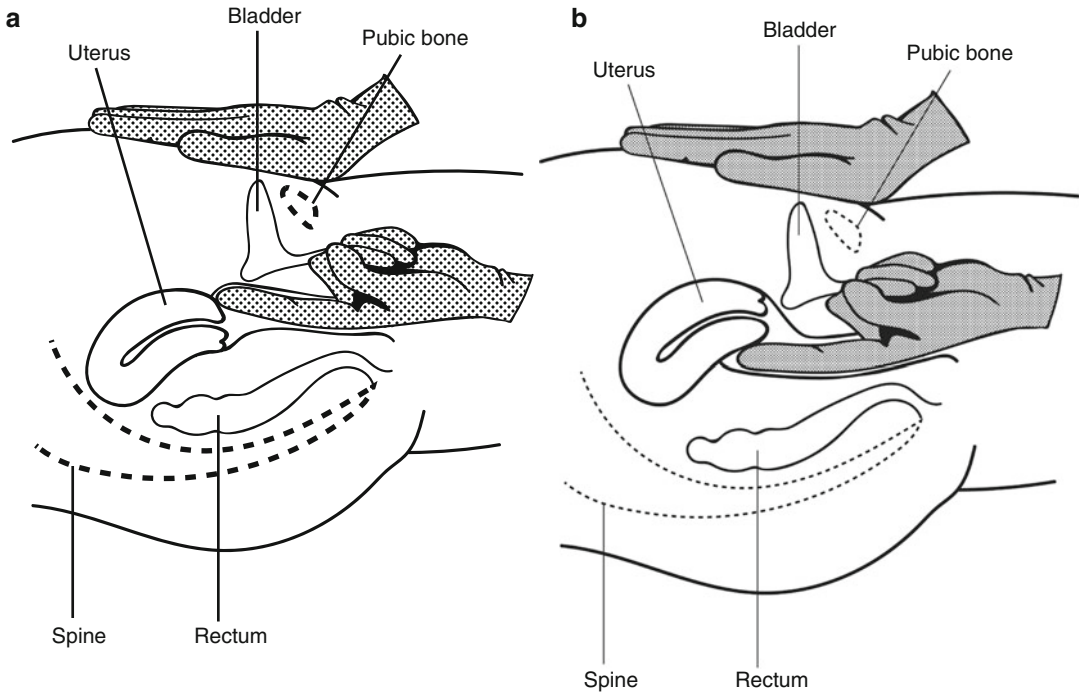



**Fig. 4.4** (**a**) Retroverted uterus on bimanual examination. (**b**) Retroverted uterus with vaginal fingers in posterior fornix

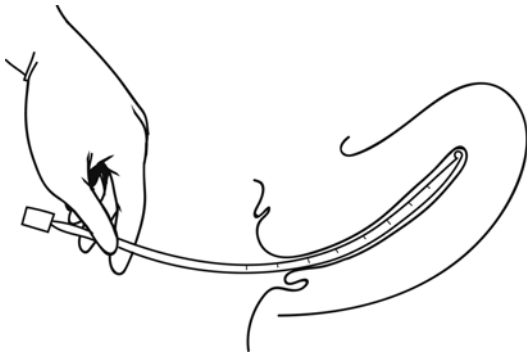


**Fig. 4.5** Endometrial sampling

One can compare D & C to hysteroscopy, so that D &C is like walking around a dark room and feeling the walls, whereas hysteroscopy is like standing at the door, turning the light on, and looking around.

The degree of inconvenience can be decreased by carrying out hysteroscopy as an outpatient procedure without anaesthesia. Nevertheless this still requires expensive equipment, a degree of expertise, and a degree of discomfort for the patient.

Another option to investigate patients with abnormal bleeding is to sample the endometrium by endometrial biopsy. This can be performed alone or at the time of hysteroscopy and involves passing a narrow tube with a sampler into the endometrial cavity, similar to the insertion of an IUC (Fig. 4.5). Depending on the type of sampler, it aspirates or scrapes off a representative sample of the endometrium. This allows histological examination of the endometrium, to exclude cancers or pre-cancers. The disadvantage of endometrial sampling over hysteroscopy is that polyps may not be diagnosed, or that the sample obtained may not be representative of the whole endometrium. Nevertheless, combined with imaging techniques (see below) it is an effective investigation.

## Ultrasound

There is no doubt that transvaginal ultrasound imaging of the pelvic contents has revolutionised assessment of the reproductive organs. Excellent views of the uterus and ovaries can be obtained

(Fig. 4.6). Many gynaecologists and sexual and reproductive health physicians use ultrasound as an extention of the clinical examination.

Uterine pathology: Ultrasound can be used to identify fibroids and to describe the position of fibroids in relation to the uterus e.g. submucous, intramural or subserosal or pedunculated (Fig. 4.7).

Ultrasound can also give an indication as to whether a polyp might be present and the views achieved can be further improved by instilling saline or an alternative negative contrast medium into the uterine cavity during the ultrasound examination.

Ovarian pathology: Functional cysts are commonly seen, particularly in association with progestogen only contraception. These can become quite large, but commonly resolve without any treatment. Women with functional ovarian cysts sometimes present with pelvic pain in association with unscheduled bleeding. They should be offered a repeat ultrasound examination in 2–3 months time, particularly if there is a septum present.

Dermoid cysts are identifiable due to the various components which might include teeth and hair!

Endometriosis cannot be seen on ultrasound unless there are endometriomata. These have a very specific ultrasound appearance (Fig. 4.8). In women with severe endometriosis the pelvic organs may be adherent to one another and this can be apparent when moving the transvaginal probe.

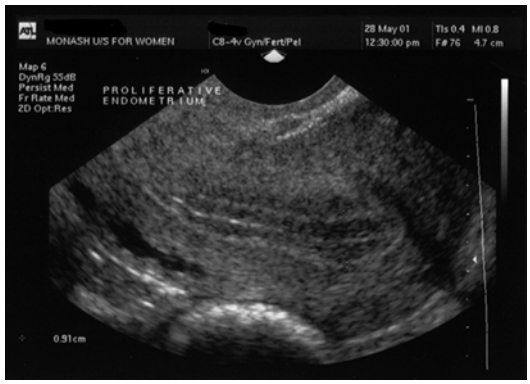



**Fig. 4.6** Ultrasound view of the uterus, longitudinal section

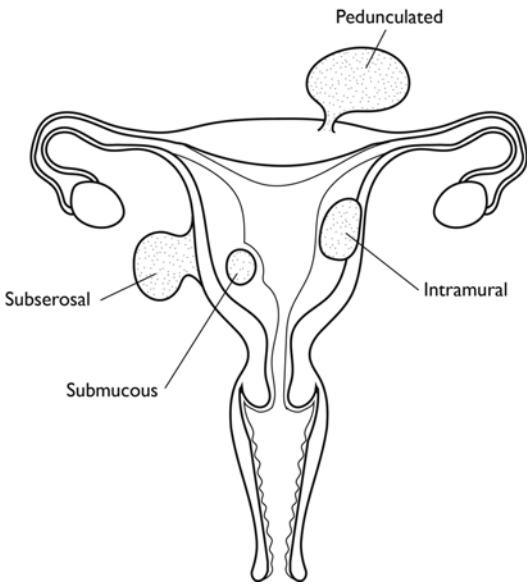



**Fig. 4.7** Uterine fibroids

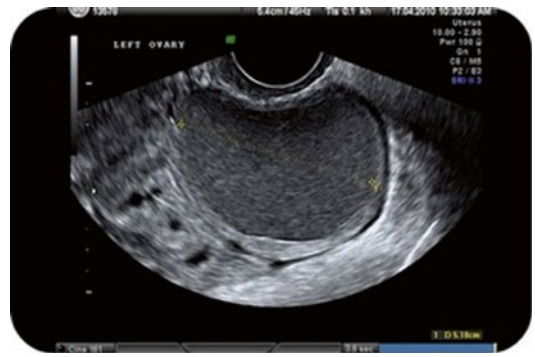



**Fig. 4.8** Endometriotic ovarian cyst on ultrasound

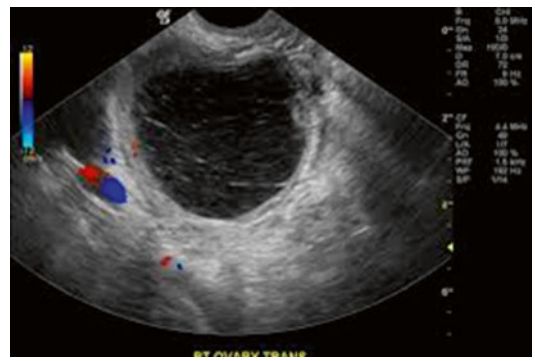


**Fig. 4.9** Haemorrhagic cyst

Haemorrhagic cysts can occur at the time of ovulation and again these have a specific appearance (Fig. 4.9).

Ovarian cancer is not a common finding and where there is a suspicion of such pathology on scan, blood should be taken to measure Ca125.

Using the technique of Hysterosalpingo-contrast-sonography (HyCoSy), the patency of the Fallopian tubes can be confirmed using ultrasound technology.

There is no doubt that ultrasound is now a vital part of the gynaecological examination.

# The Obstetric History and Examination

# 5

## Obstetric History

When taking an obstetric history, commence with the gynaecological history, as described in Chap. 4. Then expand on the details of pregnancies and confinements.

For each pregnancy document whether it:

Ended in a live birth

Gestation at delivery

Duration of labour

Any complications

Normal delivery, assisted delivery (forceps or venteuse), or Caesarean Section (CS). If CS then what was the reason?

Any post natal problems e.g. post partum haemorrhage, infection, thrombosis

Breast fed and for how long

**For this pregnancy:**

Last Normal Menstrual Period (LNMP)

Whether the cycles prior to conception were regular

Any complications e.g. bleeding, nausea and vomiting, infection etc.

The woman's history should be organised in the following way:

| Age | Gravidity/parity | Gestation |
|---|---|---|
| The woman's previous obstetric history: if this is simple, present as a summary/if it is complicated, present it chronologically | | |
| The history of this pregnancy: if simple summarise/if complicated list chronologically | | |

Example of a simple history:

| | | |
|---|---|---|
| Mrs x, 28 years old | G 3 P2 | 32 weeks of gestation |
| Her two previous pregnancies resulted in normal deliveries near term | | |
| This pregnancy has been uneventful except for an episode of bleeding at 11 weeks | | |

Example of a complicated history:

| | | |
|---|---|---|
| Mrs Y, 28 years old | G5 P2 | 32 weeks of gestation |
| Her first pregnancy, at the age of 21, ended in an early pregnancy loss at 8 weeks, requiring curettage. | | |
| Her second pregnancy, at the age of 23, resulted in an emergency CS for an antepartum haemorrhage at 34 weeks, resulting in a healthy baby. | | |
| Her third pregnancy, at the age of 25, resulted in a tubal ectopic pregnancy requiring surgery at 8 weeks. | | |
| Her fourth pregnancy, ended in an elective CS at 38 weeks with a healthy baby. | | |
| The current pregnancy has been complicated by bleeding between 6 and 9. | | |
| At 14 weeks, she developed appendicitis requiring surgery. | | |
| At 18 weeks, she developed a UTI requiring antibiotics. | | |
| Since 24 weeks she has had elevated blood pressure. | | |

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_5, © Springer International Publishing Switzerland 2015

## The Obstetric Examination

A "first visit" examination, should involve a general examination, including blood pressure, thyroid, heart, lungs, abdominal and a pelvic examination – as discussed above. The size of uterus should be confirmed.

The ankles and/or fingers should be examined for any oedema.

The patient should be weighed and her urine tested for glucose and protein.

Examination of the pregnant abdomen **up to 28 weeks of gestation:**

Between 12 and 28 weeks of gestation, the uterus is palpable on abdominal examination, and its size should be correlated according to landmarks. It should be documented whether the uterus is growing as expected. Prior to 28 weeks, foetal parts cannot be felt sufficiently well to comment. It is normal practice to measure the height of the uterine fundus, in centimetres (cm) from the symphysis pubis.

Examination of the pregnant abdomen **from 28 weeks onwards:**

Once the pregnancy has reached 28 weeks, the foetal parts should be palpable.

The following features of abdominal palpation should be determined and recorded:

Fundal height – with reference to the landmarks (Table 5.1, Fig. 5.1) or as measured in cm from the symphysis pubis.

Foetal lie – this is the relationship of the long axis of the foetus, with respect to the long axis of the uterus. If one is certain, then the side on which the foetal spine is located, can be stated and recorded, but this is not essential.

Presenting part – this is the part of the foetus within the pelvic brim.

Station of the presenting part – this is how far the presenting part has entered the pelvic cavity, with respect to the pelvic inlet (antenatally). During labour it is also assessed with respect to the ischial spines (See Chap. 19).

The station is important in assessing the degree of descent of the presenting part. This is explained in detail in Chap. 19. It is sufficient to say here that there are the three options listed in Table 5.2.

**Table 5.1** Normal uterine growth during pregnancy (Fig. 5.1)

| | |
|---|---|
| 12 weeks | Just palpable above the pubis |
| 16 weeks | Half way from symphysis pubis to the umbilicus |
| 20 weeks | At the umbilicus |
| 30 weeks | Half way from umbilicus to the xiphysternum |
| At 40 weeks | At the xiphysternum |

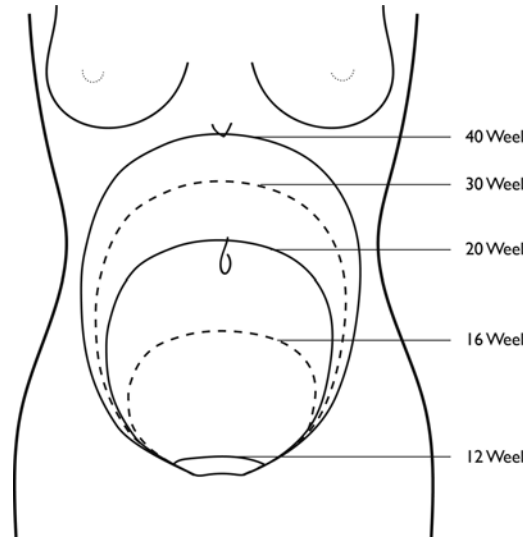



**Fig. 5.1** The enlarging uterus during pregnancy

**Engaged** means that the widest diameter of the foetal head has passed through the pelvic inlet. This can be accurately diagnosed in a lateral X-ray with the woman standing, but of course this is rarely done. The clinical indication antenatally that the "head is engaged" is that less than three finger breadths of the foetal head are palpable above the pelvic brim (See Chap. 19).

After 28 weeks of gestation, the foetal heart should be audible using a foetal stethoscope, or Doppler.

As part of the antenatal examination the blood pressure should be checked, and fingers and ankles inspected for oedema. Finally, the urine should be tested for glucose and protein.

The antenatal findings should be summarized:

Mrs Z is a 28 year old G3, P2 at 32 weeks of gestation.

Her two previous pregnancies were uneventful, with normal vaginal deliveries at term.

This pregnancy has been uneventful apart from some vaginal bleeding at 11 weeks.

Her BP is 120/75.

The fundal height is just above midway from the umbilicus to the xiphysternum (or 30 cm from the symphysis pubis).

The foetal lie is longitudinal with a cephalic presentation.

The head is mobile in the pelvic brim.

The foetal heart is audible and is regular at 120 beats per minute.

There is no peripheral oedema.

Her urine is clear.

**The obstetric aetiological shopping list.**

When considering the reason for an obstetric abnormality, it is good to have a system.

Passengers/Passages/Powers: (an example of this framework is given in Chap. 23).

Passangers

- Foetus
- Liquor
- Placenta
- Membranes
- Cord

Passages

- Boney – the pelvic bones
- Soft tissues – cervix, vagina, perineum

Powers

- Primary – the uterine muscles
- Secondary – the abdominal and intercostal muscles

**Table 5.2** Descriptors of foetal orientation

| | | | | |
|---|---|---|---|---|
| **Fundal height** | With respect to landmarks | | Or in cm from symphysis pubis | |
| **Foetal lie** | Longitudinal | Transverse | Oblique | Unstable |
| **Presenting part** | Cephalic | Breech | Shoulder | Unsure |
| **Station** | Mobile in the brim | Fixed in the brim | Engaged | |

# Part II

# Gynaecology

# An Outline of How to Think About Each Gynaecological Syndrome

# 6

Learning about gynaecology and obstetrics (and most of medicine) is about understanding and organising thoughts, and not just about memorizing. To understand any condition, we need a framework on which to build. In order to do this logically, we have devised a series of headings to describe certain conditions.

Let us use *endometriosis* as an example

- **Definition –** This defines the condition. *Endometriosis* is when the endometrial tissue grows outside the uterine cavity.
- **Incidence** – *Endometriosis* most commonly presents in the third decade. It can be associated with subfertility. In comparison, if we were talking about *endometrial cancer we would say that the incidence in the UK is 1 in 4,000 because all cases of cancer are recorded*.
- **Aetiology and pathogenesis** – This explains the cause of the condition, and how the disease develops. In the case of *endometriosis*, theories include, retrograde menstruation and spread of endometrial cells, lymphatic dissemination of endometrial cells, spread through blood vessels, or local metaplasia. An immunological abnormality is necessary to allow the ectopic endometrium to proliferate. Pain may be caused by the endometriotic lesions "menstruating" into themselves, causing pressure or adhesions. Subfertility may be caused by adhesions or the release of prostaglandins interfering with gamete transport, fertilisation or implantation.
- **Clinical Assessment**
  - **History** – The golden rule is always to take a thorough history first.
  - **Examination** –
    Remember: Inspection/palpation/percussion/auscultation. It is important to examine the patient thoroughly.
    Inspection: There is little one would see on inspection – very rarely there can be endometriosis on the cervix or vagina.
    Palpation: In endometriosis, it is unlikely that anything can be felt on abdominal examination. On vaginal examination, one may feel nodules in the pouch of Douglas, a fixed retroverted uterus, or an ovarian cyst if there is an endometrioma.
    Percussion and auscultation are not relevant.
  - **Investigations** – whilst investigations can be helpful in reaching a diagnosis, they should be undertaken if the test result will influence patient management. Remember they are expensive and can be unpleasant, so only do those that are indicated. In *endometriosis*, an ultrasound may be helpful to detect possible *endometriomata* – with the characteristic "ground glass" appearance. Otherwise ultrasound is relatively unhelpful in managing endometriosis. A blood test measuring the Ca 125 hormone may be elevated. The ultimate gold standard investigation is laparoscopic inspection of the pelvis and biopsy of any suspicious lesions.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_6, © Springer International Publishing Switzerland 2015

- **Treatment**
  - **Medical**
    - **Hormonal** – In endometriosis this could include combined hormonal contraception (CHC), progestogens, or hormones that switch off the pituitary FSH, and inhibit oestrogen production (GNRH analogues).
    - **Other medical** – Analgesia may be used required.
  - **Surgical**
    - **Minor** – Laparoscopy. A diagnostic laparoscopy and biopsy is the only way to make a definitive diagnosis.
    - **Major** – This would include major operative laparoscopic surgery or laparotomy, hysterectomy with or without oophorectomy. In endometriosis either laparoscopic or open surgery may involve bowel resection.
- **Complications** – Consider potential problems. *Endometriosis* may cause subfertility, *fibroids* may cause heavy menstrual bleeding.
- **Prognosis** – This describes the natural history of the disease, the chance of recurrence, and the possibility of deterioration.

The second check list is useful in organising one's thoughts about any clinical situation. This is the "pathological shopping list".

This gives a check list to ensure that all possible causes of a particular clinical situation are considered.

The "shopping list" consists of:

- Congenital
- Traumatic
- Inflammatory/Infective
- Vascular/Haematogenous
- Denegenerative
- Endocrine
- Neoplastic
  - Benign
  - Malignant
- Psychogenic
- Iatrogenic
- Toxic

In order to remember all the items on the shopping list the an acronym "C TIVDENPIT" could be used.

Let us now use this shopping list to identify all possible causes of heavy menstrual bleeding (HMB).

**Congenital** – Any congenital abnormality that will increase the surface area of the uterine cavity will result in more endometrium being shed. This includes a bicornuate or septate uterus.

**Traumatic** – The introduction of a foreign body, for example a copper intrauterine device (IUD)- could cause HMB.

**Inflammatory/Infective** – Pelvic Inflammatory Disease would result in increased blood flow to the uterus, and may result in HMB.

**Vascular/Haematogenous** – An abnormality of the coagulation system such as von Willebrand's Disease could result in excessive menstrual bleeding. A vascular malformation is a rare potential cause of HMB.

**Denegenerative** – The peri menopause reflects degeneration of the menstrual cycle and specifically loss of regular ovulation. Subsequent progesterone deficiency may result in heavy irregular bleeding.

**Endocrine** – Dysfunction of the thyroid gland, particularly hypothyroidism can result in heavy bleeding.

**Neoplastic**

**Benign** – Fibroids (benign growth of fibromuscular tissue) are a common cause of heavy bleeding. Endometrial polyps may also cause troublesome bleeding.

**Malignant** – Endometrial cancer should be excluded where risk factors exist.

**Psychogenic** – The mind can have an effect on body systems, and it is possible that stress may cause HMB.

**Iatrogenic –** This means due to medical intervention. HMB after the insertion of an IUD could be considered iatrogenic. Administration of hormones may also cause HMB.

**Toxic** – There is no toxic cause of HMB.

By running through this pathological shopping list, a checklist is provided which provides a failsafe that no possible cause has been forgotten.

# Abnormal Uterine Bleeding (AUB) 7

A number of different types of bleeding problem fall under the umbrella of AUB.

## Definition

Heavy menstrual bleeding (HMB) is excessive menstrual bleeding.

Intermenstrual bleeding (IMB) is bleeding between periods.

Post coital bleeding (PCB) is bleeding after sex.

Post menopausal bleeding is bleeding at least 1 year after the last menstrual period.

## Incidence

AUB is one of the commonest reasons for referral to see a gynaecologist.

## Aetiology and Pathogenesis

Using the "pathological shopping list" all possible potential aetiological factors will be covered. To make this more logical, from a clinical perspective, possible factors will be considered in order of frequency.

**Degenerative** – The peri-menopause could be considered, "a degenerative condition of ovulation", with subsequent deficiency in progesterone resulting in disruption of the menstrual cycle with possible HMB.

**Neoplastic Benign** – Leiomyomata or fibroids are a common cause of HMB. These benign growths are composed of fibromuscular tissue. The propensity for fibroids to cause HMB is dependent upon the position of the tumour in the uterus (see Fig. 13). Fibroids are classically described as sub-serous (on the outer aspect of the uterus), intramural (embedded in the muscle) or submucous (distorting the uterine cavity). As a result of the proximity to and the associated distortion of the endometrial cavity, submucous fibroids are the most likely fibroids to be associated with HMB.

**Congenital** – Any congenital abnormality that increases the surface area of the uterine cavity can result in an increase in the amount of endometrium shed, e.g. bicornuate uterus.

**Traumatic** – The introduction of a foreign body, for example an intrauterine device (IUD) can be associated with HMB, particularly in the first few months following insertion.

**Inflammatory/Infective** – Pelvic Inflammatory Disease (PID) can result in increased blood flow to the uterus, with possible HMB.

**Vascular/Haematological** – Any abnormality of coagulation has the potential to result in excessive bleeding at the time of menstruation. Although rare, a vascular malformation in the uterus, can result in HMB.

**Neoplastic Malignant –** Endometrial cancer may present as HMB, and needs to be excluded, particularly if there are risk factors present. Potential risk factors include,

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_7, © Springer International Publishing Switzerland 2015

nulliparity, polycystic ovarian syndrome, obesity and diabetes. Endometrial cancer is becoming commoner in association with the global rise in obesity.

Ovarian cancer can also be associated with HMB, although the presenting symptom is more commonly pain and abdominal distension.

**Endocrine** – Hypothyroidism can be associated with HMB.

**Psychogenic** – The mind can have a wide and varied effect on body systems, and it is possible that stress may be associated with HMB.

**Iatrogenic** – This means a cause due to medical intervention. HMB after the insertion of an IUD would be considered iatrogenic. Administration of exogenous hormones may also a cause HMB.

## Clinical Assessment

### History

It can be difficult to assess the extent of the bleeding suffered by an individual woman. Some women who have significant blood loss don't complain of HMB, whereas other women who perceive that they have HMB, do not actually lose all that much blood when assessed quantitatively. For this reason, NICE Clinical Guideline 44 stresses that if the woman feels that her blood loss is excessive, then it is. Measuring the amount of blood lost is regarded as old fashioned and is no longer considered relevant as it has no place in clinical management. Questions which might be helpful when trying to determine the impact of bleeding on the individual woman include enquiring as to whether clots are passed, and whether the patient has to use more than one method of sanitary protection e.g. towels and tampons.

A lifelong history of HMB (since menarche) in association with excessive bleeding during other operations e.g. on tooth extractions, or easy bruising may suggest an inherited coagulopathy such as von Willebrands Disease. This is a rare condition, but von Willebrand factor should be checked for if the history is suggestive.

### Examination

Pallor of skin and conjunctivae can assess the possibility and degree of anaemia, although this can only be reliably determined by measuring a full blood count (FBC). Otherwise examination is directed towards determining any of the aetiological factors described above. The size of the uterus, and any localised enlargements due to fibroids may be detected on bimanual examination.

### Investigations

Haematology – Full Blood Count.

Coagulation profile is only indicated if there is a chronic history of bleeding, or a family history of a coagulation defect. Liaison with a haematologist may be helpful.

Ultrasound examination of the uterus (preferably transvaginal TV U/S) is the most helpful investigation. It can be used to exclude intrauterine pathology, and accurately detect any uterine abnormality including structural defects such as the presence of fibroids.

The introduction of a negative contrast medium e.g. saline, can be used to facilitate the detection of endometrial polyps.

Endometrial biopsy – this can be done using a variety of samplers with the patient awake. All of the available sampling techniques are based on suction. In association with TV U/S, endometrial sampling is as sensitive as hysteroscopy, historically viewed as the gold standard investigation for HMB.

Hysteroscopy – if ultrasound suggests a uterine abnormality, hysteroscopy may be considered to allow visual inspection and possible treatment, by removal of any pathology identified.

Dilatation and curettage (D & C). This is a far less common procedure now, due to the development of out patient investigation using U/S and hysteroscopy.

## Treatment (NICE Clinical Guideline 44 "guidance.nice.org.uk/cg44")

### Medical

Intra-uterine the insertion of a levonorgesterel intrauterine system (LNG-IUS) Mirena® is the first line recommended treatment. This is fitted like any other intrauterine device, but delivers levonorgestrel directly to the endometrium, causing it to become atrophic. The majority of women will continue to ovulate, but will benefit from this "end organ" effect. This can be inserted in a variety of different settings including General Practice and its availability since 1995 has changed gynaecological practice dramatically. It has become increasingly possible to manage women in an out patient setting. The use of the LNG-IUS has revolutionised the treatment of HMB and has made hysterectomy a far less common procedure. It is effective in the majority of women and its triple license means that it can be used to provide contraception, to manage HMB and to provide endometrial protection for women who require hormone replacement therapy (HRT). This can facilitate bleed free HRT in the perimenopause and has the potential to reduce symptoms during the menopause transition. Occasionally women using a LNG-IUS to control HMB have troublesome persistent unscheduled bleeding, requiring default to one of the surgical options, starting with the least invasive procedure.

The combined oral contraceptive pill (COC) can be considered.

Oestradiol valerate combined with dienogest, in a variable dosing regime, marketed as Qlaira® has a license to manage HMB in women also requiring contraception. This will be dependent on a risk assessment to exclude contraindications to oestrogen e.g. a history of focal migraine, a family history of venous thromboembolism, hypertension, smoking over the age of 35, obesity and concomitant use of enzyme inducing medication.

Qlaira® results in an 88 % reduction in medial menstrual blood loss, as compared with an average reduction of 90 % with Mirena®. As a class effect the combined oral contraceptive pill results in a 40 % reduction in bleeding.

Where there is a contraindication to oestrogen, progestogens alone can be used. Historically in the UK, norethisterone has been given in a dose of 5 mg three times daily during days 5–26 of the cycle, although this treatment could be given continuously, until such time as a more definitive treatment can be provided. Other progestogens, such as Provera (10 mg two to three times daily), can also be used for this purpose.

Injectable long acting progestogens, such depot medroxyprogesterone acetate, can also be used. This is commonly associated with amenorrhoea, but can cause troublesome side effects such as weight gain.

#### Other Medical Treatments

Non steroidal anti inflammatory drugs (NSAIDS) may be administered just before and during menstruation.

This not only reduces bleeding due to the effect on the prostaglandin receptor, but also has the added benefit of reducing pain (dysmenorrhea), which may be associated with HMB.

Tranexamic acid, administered during menstruation, in a dose of 1 G tds for 4 days, can also be effective in reducing blood loss for some women.

### Surgical

#### Minor

Endometrial ablation destroys the endometrium. The early techniques required elctrocoagulation and resection using either a resecting loop or roller ball. Newer methods of ablation, either using a balloon filled with saline solution that has been heated to 85 °C (thermal balloon ablation, Thermachoice® – takes 8 min to complete) or Novasure®, an automated technique using diathermy, which takes less than 90 s to complete, are safer and do not require general anaesthesia. Novasure® is contraindicated where there is significant distortion of the endometrial cavity. It may be possible to use Thermachoice® in women with endometrial distortion due to fibroids,

although this is a less effective method of ablating the endometrium.

### Major

This would entail hysterectomy. Total hysterectomy means removal of the uterine body and cervix, whereas sub-total hysterectomy means removal of the uterus with conservation of the cervix. Hysterectomy can be performed abdominally, laparoscopically or vaginally.

## Complications

The major complication of HMB is anaemia due to blood loss and consequent iron deficiency. This can be counteracted by recommending iron supplements to women with HMB, as part of their treatment. Some women may require blood transfusion.

## Prognosis

There are a number of effective treatments available for women with HMB. One of the greatest challenges is providing treatment early, before women suffer potential complications. Anaemia can cause depression and this can adversely affect the whole family.

# Intermenstrual Bleeding (IMB)

## Definition

This is bleeding at any time except during menstruation.

## Incidence

It is not uncommon as an isolated occurrence, but if persistent, it needs to be investigated.

If it occurs whilst using hormonal contraception it is called unscheduled bleeding.

## Aetilogy and Pathogenesis

Neoplastic – This is the most likely cause
Benign – cervical or endometrial polyp
Malignant – cancer of endometrium or cervix
Iatrogenic – Administration of exogenous hormones, either as part of a contraceptive regime or as a treatment of AUB.
Traumatic – this can occur in association with an intrauterine contraceptive device.
Inflammatory/Infective – this is an unlikely cause.
Vascular/Haematological – a cervical vascular lesion could cause IMB.
Congenital – NIL
Degenerative – NIL
Endocrine – NIL
Psychogenic – NIL
Toxic – NIL

## Clinical Assessment

### History

How long has it been present?
How often does it occur?
Any precipitating cause (if it occurs after sexual intercourse), it is postcoital bleeding (PCB)- see below

### Examination

Abdominal palpation should always precede vaginal examination
– Speculum examination- the cervix should be visualised and polyps, or other lesions excluded.
– Bimanual examination- whilst this should be performed, it **is unlikely to help with the diagnosis.**

### Investigations

A cervical smear test may be indicated as dictated by the national screening programme. Referral directly to colposcopy may be deemed more appropriate if the cervix has a suspicious appearance.

Transvaginal ultrasound is not always helpful in detecting endometrial polyps or other endometrial lesions. The introduction of a negative contrast medium can be useful to clarify potential endometrial pathology.

Hysteroscopy allows direct visualisation of the uterine cavity and would be regarded as the gold standard investigation.

Endometrial sampling or curettage may be undertaken to allow histological examination of the endometrium.

## Treatment

### Medical

Hormonal- If there is no pathology detected, the bleeding is likely to be due to a hormone imbalance. The use of combined hormonal contraception, or administering a progestogen can be tried. The commonly administered progestogens are Norethisterone 5 mg tds or Provera 10 mg bd.

In the case of unscheduled bleeding occurring whilst using hormonal contraception, potential causes include poor absorption, increased metabolism or missing pills. Changing either the hormonal content or the delivery route may help, although this is not always the case. For some women it is necessary to change the method altogether e.g. changing from the combined pill to an intrauterine device.

Other medical – there are no other available treatment options.

### Surgical

Minor – if a cervical polyp is detected this should be removed using polyp forceps and a TV U/S undertaken to determine whether there is a suspicion of any endometrial polyps. Endometrial polyps can be removed during out patient hysteroscopy if they are small. Larger polyps are removed under general anaesthetic. Newer technology such as Myosure®, has simplified polypectomy. This is a form of morcelator which "gobbles" up polyps and submucous fibroids and can be used in an out patient setting.

Occasionally the appearance of columnar epithelium on the ectocervix, an ectropian (erronously called an erosion) may cause IMB, or PCB. This can be treated using cauterisation, although it is likely to recur and therefore this form of treatment is not recommended by all clinicians.

Major – this is not indicated

## Complications

Endometrial polyps may develop malignant change, although this is uncommon.

## Prognosis

Polyps may recur.

# Postcoital Bleeding (PCB)

## Definition

Vaginal bleeding following sexual intercourse.

## Incidence

This is a common symptom, and although it could be the presentation of cervical cancer, this is rarely the case.

## Aetilogy and Pathogenesis

Neoplastic

Benign
- Cervical ectropion
- Cervical polyp

Malignant – Cervical cancer

Endocrine – Could be IMB

Traumatic – Could be due to friction associated with vigorous sexual intercourse
Inflammatory/Infective – an inflamed cervix is more vascular and therefore more likely to bleed
Vascular/Haematogenous – a cervical haemangioma may cause PCB, but this is rare
Denegenerative – NIL
Psychogenic – NIL
Congenital – NIL
Iatrogenic – NIL
Toxic – NIL

### Clinical Assessment

#### History
Bleeding/spotting after sexual intercourse.

#### Examination
Speculum examination and visualisation of the cervix.

#### Investigations
Cervical smear test, if indicated by the relevant screening programme or referral to colposcopy if the cervix has a suspicious appearance. If referring to colposcopy in the UK, the recommendation is not to take a cervical smear test prior to referral.

Ultrasound

An endometrial sample may be indicated, particularly for women over the age of 45.

Hysteroscopy, dependent upon any potential intrauterine pathology noted on U/S examination.

### Treatment

#### Hormonal
Rarely needed or helpful.

#### Other Medical
NIL.

#### Surgical
Minor – polypectomy, cauterisation of cervix if indicated
Major – NIL
Complications – Unlikely
Prognosis – Following treatment it is possible that the problem will recur

## Post Menopausal Bleeding (PMB)

### Definition

Vaginal bleeding, 12 months or longer after the last menstrual period.

### Incidence

It is the commonest presentation of endometrial carcinoma, which is becoming commoner. Endometreial cancer is the third most common cause of death from a female cancer.

### Aetilogy and Pathogenesis

Neoplastic
Benign- cervical polyp
Malignant – endometrial cancer – PMB is endometrial cancer until proven otherwise.
Vascular/Haematogenous – a cervical haemangioma may cause PMB, but is rare.
Iatrogenic – Intermittent administration of oestrogens may result in PMB.
Traumatic – Could be due to atrophic changes
Degenerative – Atrophic vaginitis may result in PMB, especially after trauma/sexual intercourse.
Endocrine – NIL
Inflammatory/Infective – Unlikely, although this can occur in association with atrophic vaginitis
Psychogenic – NIL
Congenital – NIL
Toxic – NIL

### Clinical Assessment

#### History
Date of last menstrual period (LMP)
Duration, frequency and quantity of PMB

Any medication used, including Hormone Replacement Therapy (HRT)
Any precipitating causes

### Examination

Abdominal palpation – unlikely to be helpful
Speculum examination – looking for local lesions, e.g. cervical polyp
Bimanual examination – unlikely to be helpful

### Investigations

Ultrasound – the endometrium should be 3–5 mm or less in a post menopausal woman and it is important that there are no suspicious features.
Endometrial sampling – If there is concern an endometrial sample should be taken.
Hysteroscopy if either of the above fail to reassure.

## Treatment

### Medical

Hormonal – If the PMB is thought to be due to "atrophic" changes, local oestrogen can be used. This can be provided in a variety of different forms, including creams, pessaries and via a vaginal ring impregnated with oestrogen.
Other medical – NIL

### Surgical

Minor: D & C – to obtain tissue for histology. This is only likely to be undertaken if endometrial sampling is not possible as an out patient.
Major: If endometrial cancer is detected, the treatment is total abdominal hysterectomy with bilateral oophorectomy (TAH BSO).

## Complications

Disseminated cancer.

## Prognosis

The cause can almost always be found, and managed with appropriate treatment. The prognosis is dependent upon the underlying cause and the length of time that it has been present prior to diagnosis.

# Endometriosis

# 8

## Definition

Endometriosis is the growth of endometrial tissue outside the uterine cavity.

- Endometriosis interna is within the wall of the uterus – *also known as adenomyosis*
- Endometriosis externa is outside the uterus – the pelvic wall, the Pouch of Douglas and the ovaries (*called endometriomata)* are the commonest sites, but deposits of endometriosis can be anywhere, including the lungs and brain!

## Incidence

The true incidence of endometriosis is not known.

- It is often associated with subfertility
- It is more common in the 20s and 30s

## Aetilogy and Pathogenesis

There are several theories for the aetiology:

- Retrograde spread of menstruation
- Coelomic metaplasia
- Lymphatic spread
- Vascular spread
  - But no-one actually knows

The common factor is thought to be a change in immunological tolerance, where the ectopic endometrium is not attacked by the immune system.

The way that endometriosis interferes with fertility is not well understood. The pathogenesis is thought to be through the excessive release of prostaglandins, which in turn interfere with fertilisation and implantation.

## Clinical Assessment

### History

The most common symptom of endometriosis is **pain**. Classically this increases as menstruation progresses (in contrast to spasmodic dysmenorrhoea which is at its worst just before the start of, and on the first day of menstruation). The degree of pain is not helpful. Often women with severe endometriosis have minimal pain, whereas some women with minimal endometriosis report debilitating pain, that is not relieved by over-the counter pain medications and prevents them from performing daily activities.

Pelvic pain resulting from endometriosis is not restricted to menstruation. The site of the endometriotic deposits can determine the nature of the pain experienced. For example, endometriosis in close proximity to the bowel can result in pain on defaecation (dyschezia), deposits in the Pouch of Douglas may result in pain during sexual intercourse (deep dyspareunia) and deposits in and around the bladder can cause dysuria and cyclical haematuria.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_8, 

The pain often radiates through to the back and down the legs.

It may be associated with pre-menstrual spotting, diarrhoea, nausea or vomiting.

A significant number of women with endometriosis will present with heavy menstrual bleeding (HMB). Many women who complain of HMB will have undiagnosed endometriosis. Where there is a suspicion that there may be underlying endometriosis, it is reasonable to undertake a therapeutic trial (see below) as definitive invasive investigations have an element of risk associated with them.

## Examination

- Abdominal examination may reveal nothing to assist with the diagnosis.
- Speculum examination can occasionally reveal endometriotic deposits in the vagina or on the cervix.
- Bimanual examination may detect nodules in the Pouch of Douglas and possibly enlargement and/or tenderness of the ovaries if endometriomata are present. The uterus may be enlarged and/or tender. A retroverted uterus, especially if "fixed" may indicate adhesions in association with endometriosis in the Pouch of Douglas.

## Investigations

- Biochemistry – whilst CA125 is often elevated in endometriosis, it is not diagnostic. There are other causes for a raised CA 125, especially epithelial ovarian tumours, although the levels seen in association with ovarian cancer are often significantly higher than those seen in association with endometriosis.
- Ultrasound – this is best performed transvaginally and is only really helpful in detecting endometriomata (chocolate cysts). Other endometriotic deposits are not detected using ultrasound, although it may be possible to detect adhesions.
- The "gold standard" for diagnosing endometriosis is to visualise it laparoscopically and then confirm it by biopsy and histology. However not all suspected areas of endometriosis are positive on biopsy and some types of endometriosis are difficult to detect visually.
- Endometrial histology with special stains – there is some early work suggesting that the detection of nerve fibres within the endometrium (between the basal and stromal layer) may be suggestive/diagnostic of endometriosis. However this still needs to be confirmed by further studies.
- Staging – a number of scales for staging endometriosis have been described.
- The following is recommended (Fig. 8.1):
- **Stage 1 (minimal)**
- Stage 1 endometriosis is classified as minimal, as there are only a few small isolated patches of tissue growing outside of the uterus. These deposits are often located on the peritoneum.
- **Stage 2 (mild)**
- Stage 2 endometriosis is considered mild and is usually diagnosed when there are several small patches of endometriosis, a few of which are associated with areas of adhesions or scar tissue. These deposits, as with minimal disease are often located on the peritoneum.
- **Stage 3 (moderate)**
- In stage 3 endometriosis there are areas of both superficial and deep disease. There are usually several well defined areas of adhesions or scar tissue. This stage commonly involves endometriomata (chocolate cysts).
- **Stage 4 (severe)**
- Stage 4 endometriosis is the most severe. Women have both superficial and deep disease associated with adhesions and may also have involvement of the bowel and other organs.

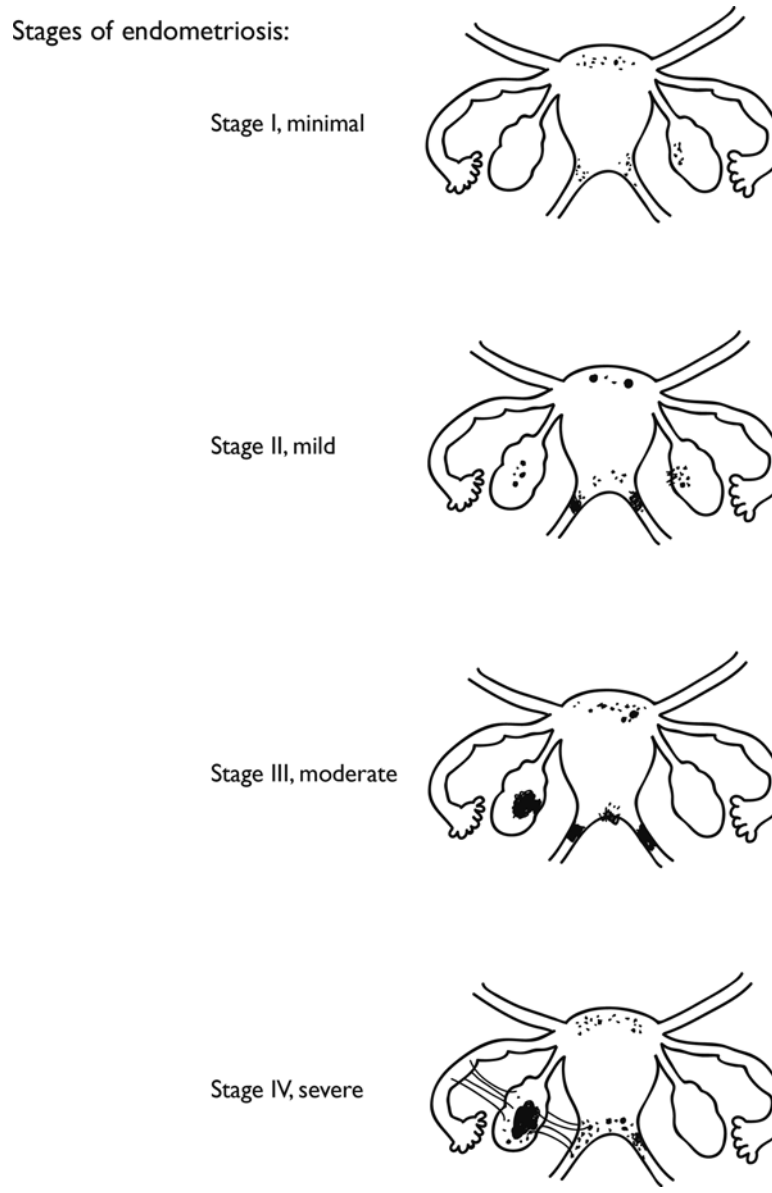



**Fig. 8.1** Staging of endometriosis

## Treatment

### Medical

#### Hormonal

- **Withdrawl of oestrogen – Under the influence of oestrogen the endometrium proliferates.** The same process occurs within endometriotic deposits. Consequently, if the circulating level of oestrogen decreases, the endometriotic deposits regress.
- The use of GnRH agonists to suppress the secretion of gonadotrophins will achieve this, but at the price of side effects of oestrogen deprivation (menopausal symptoms).

- **Administration of progestogen.** Progestogens suppress the endometrium and can be used to treat endometriosis. This requires long term administration.
  - Desogestrel progestogen only pills result in anovulation and this eventually results in amenorrhoea in most women. Unscheduled bleeding in the intervening period can result in discontinuation of treatment before the desired effect can be achieved.
  - Medroxyprogeterone acetate can be provided orally or used in depot form to achieve anovulation and amenorrhoea (Depoprovera®). Like the POP, the depot product is licensed for contraception, but it is also recommended (but not licensed) to manage heavy menstrual bleeding (NICE Clinical Guideline 44), a common presenting complaint in women with endometriosis.
  - Dienogest, marketed as Visanne®, is an orally active progestin licensed to treat endometriosis and approved in the European Union, but not available in the UK. It has been shown to be as effective as a GNRH analogue in treating endometriosis..
  - The use of combined hormonal contraception (CHC) – pills, patches and rings, results in an inactive endometrium with few glands. Omitting the hormone free interval with any one of these products, reduces potential bleeding and will result in an improvement in control of symptoms related to endometriosis in some women.

### Other Medical

In women with mild symptoms of endometriosis, even without a definitive diagnosis the use of simple analgesics, antispasmodics and non-steroidal anti-inflammatory drugs may be sufficient to control symptoms.

- A new class of drug known as selective progesterone receptor modulators look promising as a treatment option for endometriosis. This class of drug is already used as a method of emergency contraception in a stat dose and more recently as a treatment to shrink uterine fibroids. Notably women using this treatment, marketed as Esmya®, become amenorrhoeic, and logically this would be helpful in reducing and controlling symptoms associated with endometriosis.

### Surgical

- **Minor** – this involves laparoscopic excision or ablation of endometriotic lesions. Care has to be taken not to damage underlying structures, especially the ureter.
- **Major** – this may require extended surgery for extensive endometriosis possibly involving the bowel or bladder. This type of surgery is difficult and time consuming and women with severe disease are better managed by tertiary referral to a sub-specialist.

Total hysterectomy including removal of the ovaries (*pelvic clearance*) (TAHBSO) is sometimes necessary in an attempt to manage chronic pelvic pain associated with endometriosis. However, such radical surgery is avoided where possible.

## Complications: Subfertility

The association between endometriosis and subfertility is well recognised, but the mechanism is poorly understood.

## Prognosis

During the reproductive years endometriosis is a recurring disease. Treatment depends on the severity of the disease and an attempt is made to avoid radical surgery if possible. However, a small number of women may require surgical intervention in order to improve their quality of life. Following pelvic clearance, hormone replacement therapy will be required and the possibility of residual endometrial deposits should not be for-

gotten. Despite removal of the uterus, endometrial protection should be provided in order to prevent endometrial hyperplasia in any deposits of endometriosis not removed at the time of surgery.

Once a woman reaches the natural menopause, and circulating oestrogen levels are insignificant any remaining deposits of endometriosis are likely to resolve.

# Pelvic Organ Prolapse (POP) 9

## Definition

Pelvic organ prolapse can be divided into three types (Fig. 9.1):

- **Anterior prolapse –** prolapse of the bladder through the anterior vaginal wall (or less commonly the urethra).
- **Posterior prolapse –** prolapse of the rectum or small bowel (*enterocoele*) through the posterior vaginal wall.
- **Vault prolapse –** prolapse of the uterine body (or the vaginal vault after hysterectomy).

## Incidence

It is estimated that about 50 % of women over 50 experience some degree of prolapse.

## Aetiology and Pathogenesis

The aetiology of POP is multifactorial and only a few items on the aetiological shopping list are relevant:

- Congenital – there are genetic factors related to connective tissue quality, which predispose to the development of a POP.
- Traumatic – the excessive stretching of the ligaments, fascia and other connective tissue during childbirth results in collagen breakdown, with the new collagen being less resilient. The more deliveries, the bigger the babies, the longer the second stage of labour, the greater the potential damage to the tissues.
- Denegenerative – with advancing age, skeletal muscle tone and volume are reduced. This can contribute to the development of POP.
- Obestity which can become more common with advancing age is also a contributory factor.
- Endocrine – the ligamentous structures, pelvic muscles and fascia all contain oestrogen receptors, and lack of oestrogen after the menopause has some effect on POP. Progesterone receptors are fewer, and lack of progesterone is less significant.
- Iatrogenic – complicated operative deliveries and previous pelvic floor repair operations may be a contributory factor.

## Clinical Assessment

### History

The principal symptom experienced is the sensation of "something coming down".

Discomfort is sometimes reported as a "dragging feeling".

Whether there are associated urinary or bowel symptoms depends on the type of prolapse. A rectocoele may be associated with difficulty with defaecation.

Urinary symptoms are described in detail in Chap. 10.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_9, © Springer International Publishing Switzerland 2015

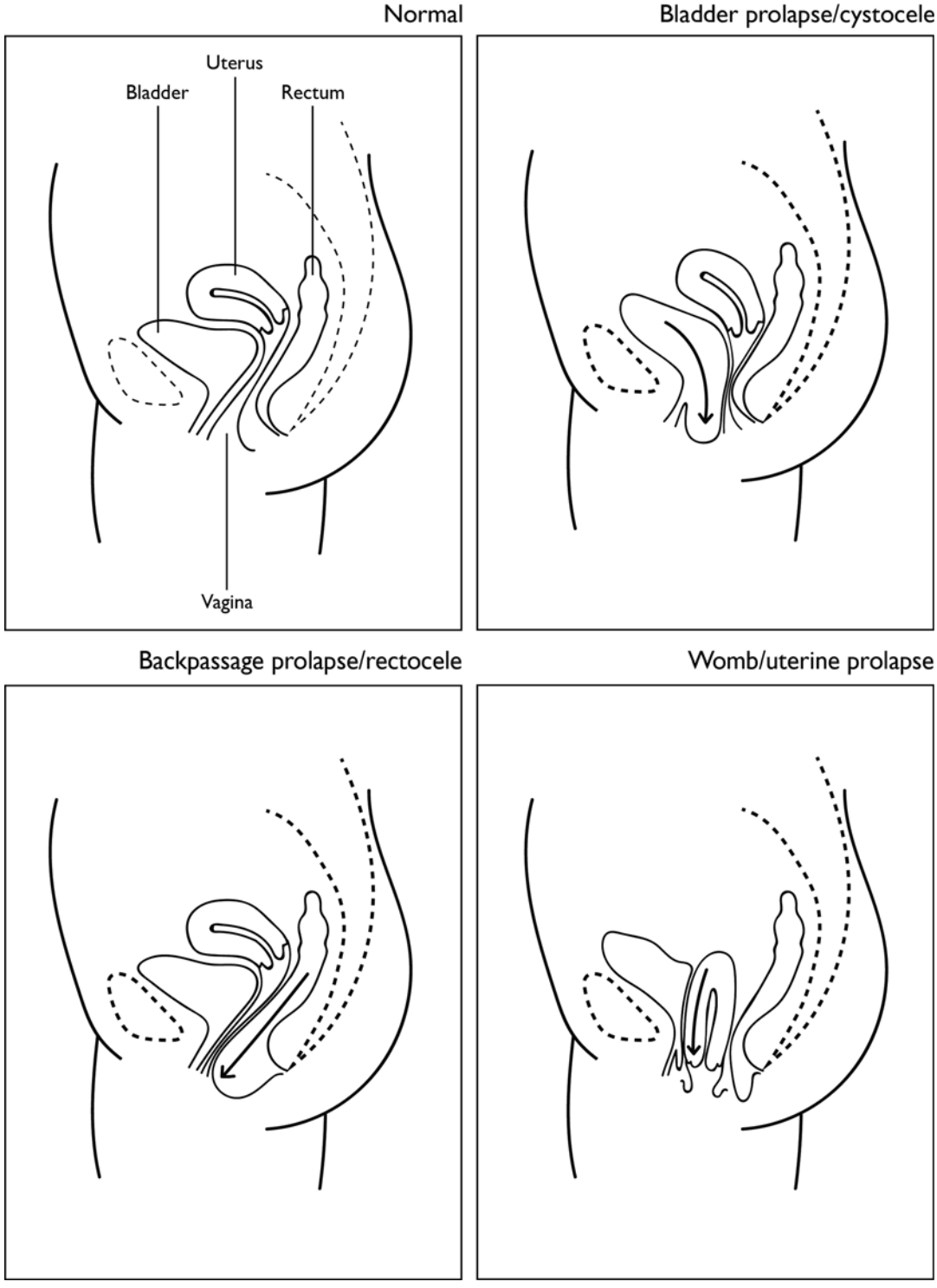



**Fig. 9.1** Types of utero-vaginal prolapse

## Examination

### Abdominal Examination

Should always precede vaginal examination to exclude an abdominal or pelvic mass pushing the pelvic organs down.

### Speculum Examination

This is usually carried out in the dorsal position, although using a Sim's speculum, in the left lateral position, may have a place. The vagina is inspected for anterior or posterior bulges. It is often not possible to diagnose whether an enterocoele (the bulge contains small bowel) is present until the time of surgery.

The degree of uterine prolapse/descent is determined according to the Pelvic Organ Prolapse Quantification System (POP- Q) as:

Stage 0 – No prolapse

Stage I – descent of the cervix. Cervix more than 1 cm above the hymen.

Stage II – descent within 1 cm above or below the hymen.

Stage III – descent more than 1 cm past the hymen..

Stage IV – complete vault eversion- also called procidentia.

The presence of stress incontinence can be diagnosed by asking the patient with a full bladder to cough – a swab in a sponge holder should be held at the ready near the urethra to catch any urine before spraying the examiner.

### Bimanual Examination

A routine bimanual examination should be undertaken, assessing the size of the uterus, its mobility, and the presence of any pelvic lesions, e.g. ovarian cysts.

## Investigations

There are no investigations required for POP per se. Investigations to assess urinary symptoms are discussed in Chap. 10.

## Treatment

### Conservative Management

**Conservative management** of POP should be considered prior to surgical intervention.

- In women who are overweight, weight loss should be recommended as a first line treatment.
- Pelvic floor exercises – "Kegel's" exercises, are recommended several times a day. In order to do these exercises, women need to identify the appropriate muscles by stopping the flow of urine mid stream. They should then learn to contract these muscles for 10 s, relax for 10 s and repeat ten sets at least three times daily.
- Directed pelvic floor physiotherapy is highly recommended. Pelvic floor exercises have a positive effect on prolapse symptoms and severity, as reported in a Cochrane analysis.
- Pessaries can be used to manage POP. There are many different types of pessaries available made of either silicone or inert plastic. Ring pessaries are the first line option as they are easy to insert and remove. More advanced-stage prolapse may require the use of a space occupying pessary. These pessaries are not suitable for women who are sexually active.

Hormonal -

- Local oestrogen (delivered directly to the vagina) is a useful treatment for women with atrophic vaginitis. It may also be helpful for women suffering from incontinence. This treatment is suitable for all women.
- There are a variety of different ways of delivering this form of therapy including creams, tablets and via a vaginal ring impregnated with a low dose of oestradiol which is released at a steady rate over a period of 3 months.

## Surgical

Surgical management of prolapse is determined by the compartment affected, the size of the prolapse and most importantly by informed patient choice.

A variety of options are available including fascial repairs or ligamentous anchors. The repair operation is usually done by a vaginal approach, but laparoscopic pelvic floor repair is gaining in popularity.

## Complications

This depends on the type of POP and its severity. Rectocoele may cause difficulty with defaecation, and cystocoele may cause urinary symptoms (see Chap. 10). A uterine prolapse may cause cervical ulceration, discharge and bleeding.

## Prognosis

POP without treatment may get worse with time and age.

# Urinary Problems

# 10

## Incontinence

### Definition

Incontinence is the involuntary loss of urine. It is divided into:

- **Stress incontinence –** The involuntary loss of urine in association with raised intra-abdominal pressure, e.g. on coughing, sneezing, jumping, running etc.
- **Urge incontinence –** The need to pass urine with little warning and occasional accidents. This is often associated with urinary frequency and having to pass urine at night (nocturia). Women with urgency will often "toilet map". They also leak in specific situations e.g. putting the key in the lock of the front door or turning on the tap.
- **Mixed incontinence –** This is when both stress and urge incontinence co-exist and this is not uncommon (Fig. 10.1).
- Asking simple questions can determine whether a woman has stress, urge or mixed incontinence.
- **Persistent incontinence-** This occurs if there is a fistula of the urethra or the bladder with a constant leak of urine.
- **Incontinence with overflow –** This is when there is a neurological or mechanical obstruction of the bladder, with the bladder over-distending and then leaking due to a build up of pressure.

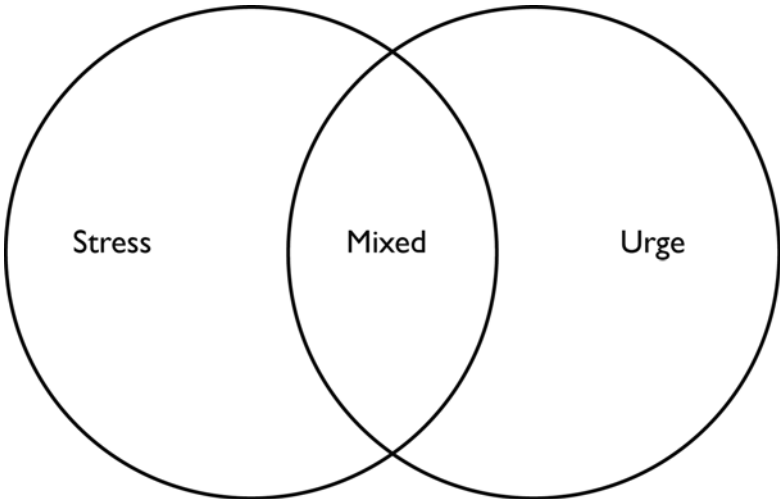



**Fig. 10.1** Types of incontinence

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_10, © Springer International Publishing Switzerland 2015

## Incidence

Approximately half of postmenopausal women report urogenital symptoms. These generally appear soon after the menopause transition and worsen with time.

## Aetilogy and Pathogenesis

The aetiological shopping list is less appropriate for these symptoms. Oestrogens have a significant physiological effect on the genitourinary tract, with receptors in the bladder and urethra. Oestrogen can also affect the neurology of micturition on a central and peripheral level, by influencing the autonomic nervous system. Oestrogen affects collagen metabolism in the lower genitourinary tract. Progesterone generally adversely affects female urinary tract function, typically decreasing the tone in the ureters, bladder and urethra. This may be the reason why urinary symptoms worsen during the secretory phase of the menstrual cycle, and during pregnancy.

### Stress Incontinence

The primary problem here is that the proximal urethra becomes extra-abdominal (Fig. 10.2). Whilst the proximal urethra is within the abdominal cavity, any increase in abdominal pressure, acting on the bladder will be neutralised by pressure on the proximal urethra. Once the proximal urethra is extra abdominal, there is no neutralisation, and consequently there is a pressure gradient along the urethra, and urine escapes.

- **Urge incontinence** – at birth, there is a simple reflex arc through the spinal cord, so that as soon as the bladder distends, it empties.. As supratentorial influences develop, this reflex is inhibited, resulting in continence. With advancing age and lack of oestrogen, this reflex tends to want to take over again, requiring the bladder to be emptied more frequently and urgently.
- **Persistent incontinence** as a result of a fistula is obvious and urine leaks continuously . Most fistulas are due to iatrogenic surgical complications, or occasionally due to an obstetric injury.

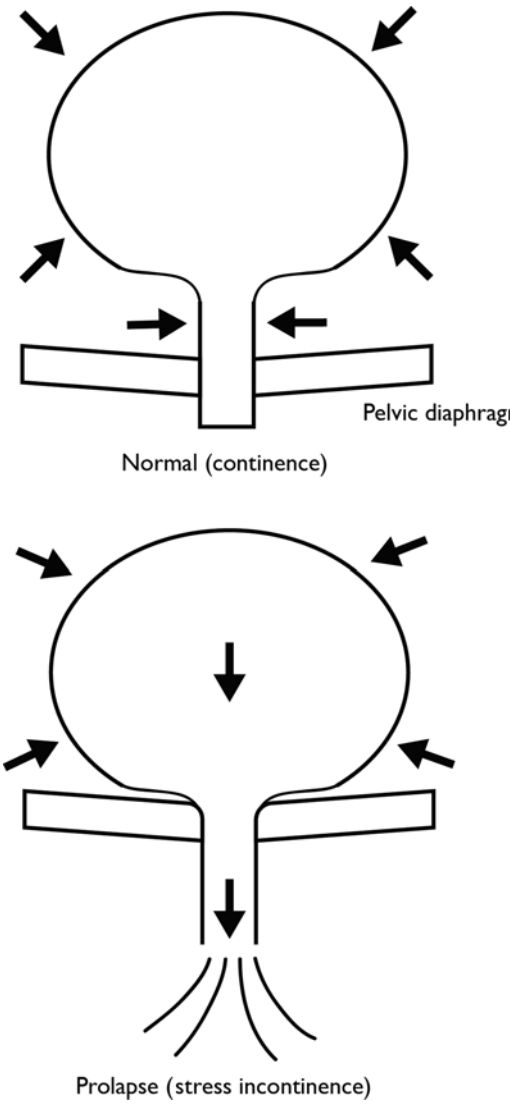



**Fig. 10.2** Pathogens is if stress incontinence

- **Incontinence with overflow** – This is associated with a neurogenic bladder, where the efferent arm of the reflex arc is malfunctioning, and the bladder cannot empty.

## Clinical Assessment

### History

The duration of the symptoms needs to be ascertained, together with any possible precipitating factor.

The frequency of micturition during the day and the night should be documented.

Is there a history of incontinence associated with an increase in intra-abdominal pressure?

Enquire about the degree of urgency, accidents, and possible incomplete bladder emptying.

Symptoms of urinary tract infection- frequency and dysuria?

### Examination

- **Abdominal examination** should always precede vaginal examination in case there is an abdominal or pelvic mass displacing the pelvic organs.

**Speculum examination** is usually carried out in the dorsal position.

The presence of stress incontinence can be diagnosed by asking the patient with a full bladder to cough.

- **Bimanual examination-** A routine bimanual examination should be undertaken, assessing the size of the uterus, its mobility, and the presence of any pelvic masses e.g. ovarian cysts.

## Investigations

- Urinalysis using a dip stick can be undertaken at the time of the initial presentation and urine microscopy and culture
- arranged if there is suspicion of a urinary tract infection.
- Urodynamic studies – these are "volume: pressure" measurements of the bladder. The pattern of contractions can differentiate between genuine stress incontinence and urge incontinence. If there are doubts on clinical history, a urodynamic assessment should be performed. Prior to incontinence surgery a urodynamic assessment should be undertaken.

## Treatment

### Conservative

- Weight loss,
- Fluid management e.g. not drinking before bedtime.
- Avoidance of diuretics such as tea, coffee and alcohol.
- Bladder re-training including timed voiding. This requires keeping a diary of the time of each voiding, and the measurement of the urine volume passed. This teaches the woman that her bladder does not have to be emptied when there is only a small volume of urine present.
- Treatment of a chronic cough or constipation has been shown to be of benefit in patients with urinary incontinence.
- Pelvic floor exercises can benefit bladder control.

Stress incontinence (SUI) and Urge Incontinence (UUI) are managed differently.

SUI does not respond to drug therapy. Use of a ring pessary with a knob, which alters the angle of the junction between the bladder and the urethra, may be helpful, but surgery is the mainstay of treatment.

### Hormonal

HRT is unlikely to help with SUI

– It may have some effect in some women with UUI
– It will have no effect on fistula, or retention with overflow.

### Other Medical

UUI can be managed successfully using antimuscarinic drugs, These drugs reduce detrusor muscle contraction and increase bladder capacity. Contraindications to their use include having a history of acute angle closure glaucoma and cardiac arrhythmias.

There are different options ranging from drugs such as oxybutynin, which is inexpensive, but often associated with intolerable side effects (most frequently dry mouth, gastrointestinal disturbance, blurred vision, dizziness, drowsiness, difficulty voiding, palpitations/arrhythmias and skin reactions) to newer more expensive drugs, which result in less side effects.

The use of an oxybutynin slow release patch is a useful option for women who have side effects with any of the oral preparations. The most recent addition to the range of treatments available is a selective beta 3-adrenoceptor agonist. It has a different mode of action to the antimuscarinic

agents, relaxing the smooth muscle in the bladder and enhancing urine storage and is unlikely to interfere with the urine voiding phase as it is predominantly the activity of acetylcholine on the muscarinic receptors that induces bladder contraction. This is a good drug to use for women who are unable to tolerate the side effects of any of the antimuscarinic agents.

Patients with refractory overactive bladder can be treated with sacral neuro-modulation. This can provide effective relief of overactive bladder symptoms and also neurogenic retention.

Another, non surgical treatment is percutaneous tibial nerve stimulation.

### Surgical

**Minor –** Cystoscopically directed intravesicular (into the detrusor muscles) injection of Botulinum toxin is an option to treat overactive bladder. Women need to be aware of the risk of urinary retention and the need for repeated injections every 6–9 months.

For women with urodynamically proven stress urinary incontinence with a stable bladder, synthetic mid-urethral slings form the mainstay of treatment. This is a minimally invasive procedure, and the sling can be placed via a retropubic, trans-obturator or minimally invasive 'inside-out' mini-sling approach. Success rates are comparable with all these modalities, however for patients with 'intrinsic sphincter deficiency' the retropubic approach remains the gold standard.

Women with SUI in whom mid-urethral slings have either been ineffective, or are only partly effective, may be suitable for treatment with urethral bulking injections. These are also appropriate for elderly women, women who cannot undergo surgery, those who require continued anticoagulation therapy or have poor bladder emptying. These act by improving urethral mucosal co-aptation and restoring the mucosal seal mechanism of continence.

### Complications

Urinary **i**ncontinence can be very embarrassing and in some cases socially isolating.

### Prognosis

Urinary problems may get worse with time.

## Recurrent Urinary Tract Infections

Whilst this is not really a gynaecological problem, UTIs can be a cause of incontinence and diagnosis and treatment may prevent unnecessary surgery. If diagnosed, a predisposing cause should be looked for, and prophylactic antimicrobial treatment can be instituted.

# Gynaecological Cancers 11

## Cancer of Cervix

### Definition

Approximately 90 % of cervical cancers are squamous in origin (arising from the stratified squamous epithelium of the cervix). The remaining 10 % are adenocarcinomas (arising from the endocervical columnar cells).

### Incidence

In the UK, cervical cancer accounts for approximately 2 % of all cancers in women. Cervical cancer is the 12th commonest cancer in females with an incidence of 8/100,000.

Due to screening programs, the incidence of cervical cancer has decreased by roughly 50 % during the last four decades.

Cervical cancer is most common in women aged 30–34.

### Aetilogy and Pathogenesis

Squamous cell carcinoma is caused by oncogenic subtypes of Human Papilloma Virus (HR-HPV), the commonest of which are type 16 and 18. Ninety eight percent of infections will resolve spontaneously due to the immune system. When the immune system is unable to prevent viral replication, precancerous changes develop, which may lead to cervical cancer. This is more likely to occur in the presence of co-factors such as cigarette smoking.

It has also been recognised for many years that cervical dysplasia develops over a number of years, long before a woman develops cancer. Recognisable graded abnormalities may be detected on cervical cytology during this time and these abnormalities are known as dyskaryosis (graded as mild, moderate and severe). Cervical cytology, first described by Papanicolaou in 1943 is used to detect these precancerous changes, and has reduced mortality.

Adenocarcinoma arises in the glands of the cervical canal. It is becoming more common in association with HPV type 18.

### Clinical Assessment

#### History

The most significant symptom is abnormal bleeding. This can be post-coital or inter-menstrual bleeding.

#### Examination

A speculum examination may detect a cervical lesion (squamous cell) or abnormal tissue arising from the endo cervix (adenocarcinoma).

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_11, © Springer International Publishing Switzerland 2015

### Investigations

Women with dyskaryosis on cervical cytology, in association with HR-HPV infection need to be investigated by colposcopy.

This is a non invasive inspection of the cervix with a binocular magnifying microscope (colposcope), often with the use of acetic acid or iodine staining, to determine the site, nature and the extent of any lesions.

A cervical biopsy should be performed for histological confirmation of any abnormality. On histological examination the changes are graded as Cervical Intraepithelial Neoplasia (CIN) I, II and III.

Low grade CIN often regresses without treatment. However in some women the changes may progress to moderate or high grade CIN, necessitating excision biopsy (large loop excision of the transformation zone (LLETZ)).

If invasive changes are diagnosed on biopsy, the cancer is staged. The woman is examined under anaesthesia, including cystoscopy and proctoscopy. A full evaluation involves a chest X-ray, a CT scan, MRI, and sometimes PET scanning.

Staging is carried out using the T (tumour extent), N (lymphatic spread) and M (metastasis) scale.

### Treatment

#### Medical

**Hormonal** – There is no hormonal treatment for CIN or cervical cancer.

**Other medical** – Whilst neither CIN or cancer can be treated with anti-viral therapy at present, the incidence of HPV has significantly decreased since the introduction of HPV vaccination programs.

#### Surgical

**Minor** – In cases of CIN the abnormal cells are removed to prevent progression of disease. The tissue is then sent to pathology for examination.

**Major** – If frank invasive cervical cancer is detected, then major surgery comprising of hysterectomy, with pelvic node dissection is usually undertaken. In premenopausal women the ovaries may be conserved.

### Complications

May occur due to local invasion of tissues – bladder, obstruction of the ureters and/or infiltration of the rectum, or distal metastases e.g. lung, liver, or distant lymph nodes.

### Prognosis

The 5 year survival rate depends on the stage of the disease when it is diagnosed. It ranges from 93 % with low grade cancers, to 35 % for advanced cervical cancer.

## Endometrial Cancer

This is usually adenocarcinoma.

### Incidence

In the UK, endometrial cancer accounts for about 5 % of all cancers in women, and it is the 4th commonest cancer in females. Its incidence is about 20/100,000 women.

Endometrial cancer is most common in postmenopausal women, with 75 % being diagnosed over the age of 40.

It is more common in women who have not had children, who are obese, who have polycystic ovarian syndrome, hypertension and diabetes.

In contrast to cervical cancer, the incidence of endometrial cancer is increasing in line with the obesity epidemic.

### Aetilogy and Pathogenesis

Endometrial cancer is thought to be caused by unopposed/excessive oestrogen exposure. The combined administration of oestrogen along with

a progestogen as with combined oral contraception (COC) has a protective effect on the endometrium.

## Clinical Assessment

### History

The commonest presenting symptom is heavy menstrual bleeding (HMB) for women who are pre-menopausal, or post menopausal bleeding (PMB) in women who are menopausal.

A family history of bowel, breast or ovarian cancer is relevant.

As mentioned under incidence, nuliparity, obesity, hypertension and diabetes are all associated problems.

### Examination

A speculum examination is usually normal, as is a bimanual examination.

### Investigations

An ultrasound (transvaginal) may shows an abnormally thickened endometrium, with an increase in colour flow.

Endometrial sampling should be undertaken in order to obtain tissue for histological examination.

Staging is undertaken in a similar way to cervical cancer.

A hysteroscopy and possibly further biopsies should be undertaken to inspect the uterine cavity, and obtain tissue for diagnosis and staging.

## Treatment

This will depend on the stage of the cancer, the size of the uterus, and the woman's age and medical condition.

### Medical

**Hormonal** – As progestogens have an inhibitory effect on endometrial cancer, they may be used in recurrent disease where the tissue is positive for progesterone receptors.

**Other medical** – radiotherapy (external deep x-ray therapy – DXRT, or internal radon) is sometimes used.

Chemotherapy is also sometimes used as an adjunct to surgery.

### Surgical

**Minor** – D & C or hysteroscopy and biopsy is part of the staging process.

**Major** – This is the usual primary treatment, with total hysterectomy, and salpingo-oophorectomy being undertaken, sometimes with lymph node dissection.

## Complications

Endometrial cancer can spread locally to bladder or bowel, and can obstruct the ureters. Distal metastases can also occur to lymph nodes, lung, liver, bones, brain and vagina.

## Prognosis

Again, this depends on the stage of the cancer. Five year survival rates can be as high as 90 % for early cancers, to as low as 15 % for more advanced stage cancer.

# Ovarian Cancer

## Definition

Most of the ovarian cancers (90 %) arise from the epithelial layer on the outside of the ovary, and are epithelial cancers. The other types of ovarian cancer arise from the germ cells or from the sex-cord stromal cells.

## Incidence

In the UK, ovarian cancer accounts for about 4 % of all cancers in women, and is the 5th commonest cancer in females. Its incidence is about 22/100,000 women.

Ovarian cancer is most common in postmenopausal women, with 75 % of women being diagnosed over the age of 55.

## Aetilogy and Pathogenesis

There appears to be a link between ovulation and epithelial ovarian cancer. Using combined hormonal contraception reduces the risk of ovarian cancer by approximately 50 %. Having a first degree relative with ovarian cancer is a risk factor. Being a carrier of BRCA 1 and 2 genes is also a risk factor. Being overweight, tall, a smoker and using talcum powder have all been postulated to increase the risk of ovarian cancer. Taking COC, having children, breast feeding and having the tubes ligated have all been suggested to be protective against ovarian cancer.

## Clinical Assessment

### History

Unfortunately ovarian cancer does not have any early symptoms. When the disease spreads it may cause pain, a feeling of bloating or fullness, abdominal distention, urinary frequency, or constipation. Sometimes ovarian cancer presents with symptoms of metastasis, including nausea, tiredness, or shortness of breath.

Ovarian cancer is often diagnosed as an incidental finding on ultrasound, laparoscopy or laparotomy.

### Examination

There is usually nothing to be found on examination until the disease has spread.

### Investigations

- CA 125 levels in blood- This hormone is often raised in women with ovarian cancer (50 % in the early stages and up to 90 % in advanced stages). It is not diagnostic and can also be raised in women with endometriosis, fibroids, PID, and pregnancy.
- Ultrasound-although both abdominal and vaginal scanning should be performed, the vaginal view gives better resolution to asses ovarian pathology. Abnormalities detected with complex changes are more indicative of cancer. Abdominal scanning is helpful for identifying ascites.
- CT Scan- This may be undertaken if cancer is suspected. A CT scan may give a clearer view of the ovaries.
- Chest X-ray- This is undertaken to look for any lung metastases.
- Laparoscopy- sometimes a laparoscopy is undertaken to inspect the ovaries, and this may be combined with therapeutic surgery-ovarian cystectomy or oophorectomy.

## Treatment

### Medical

**Hormonal** – tamoxifen may be used where other treatment is deemed inappropriate.

**Other medical** – Chemotherapy is often used in combination with surgery (see below). Occasionally chemotherapy alone is used.

- Radiotherapy is not usually used for treating ovarian cancer. It may be used in early stage cancer post-operatively, or in advanced cancer as "palliative radiotherapy".

### Surgical

**Minor**- nil

**Major** –The principal behind surgery for ovarian cancer is to remove as much tumour as possible. Total hysterectomy, with bilateral salpingo-oophorectomy and omentectomy is the basic operation. Lymph nodes are sometimes removed, and if there is any other tumour in the abdominal cavity, then debulking should be undertaken. If total removal can be undertaken that gives a better prognosis.

## Complications

As ovarian cancer is often not diagnosed until it is advanced, it may only come to light when it causes a complication. This could include ascites, bowel obstruction, bladder infiltration causing haematuria, or as a result of secondary deposits in liver or lung.

## Prognosis

The prognosis depends on the cancer type and the stage of the disease at the time of diagnosis. For epithelial tumours, 5 year survival is as high as 90 % for early disease, but as low as 17 % for advanced disease. For ovarian stromal tumours, the range is 95–35 %, and germ cell tumours, 98–69 %.

# Ovarian Cysts

# 12

## Definition

Every woman who ovulates makes a "cyst" every month – a follicle that usually ruptures and then disappears. Cysts can be physiological (functioning cysts) or pathological (benign or malignant).

## Incidence

Ovarian cysts are a common reason for gynaecological referral.

– The use of CHC will limit folliculogenesis and inhibit ovulation, thus significantly reducing the incidence of functional cysts.

## Aetilogy and Pathogenesis

The simplest functional cysts are either **follicular cysts** or **luteal cysts**. Follicular cysts occur where the developing follicle does not rupture and grows beyond 3 cm. Luteal cysts arise when the corpus luteum becomes cystic. Functional cysts are more common at menarche and in the menopause transition, in the users of progestogen only contraception or in the presence of gestational trophoblast disease. They are classified by the cells from which they originate (Table 12.1).

## Clinical Assessment

### History

Many ovarian cysts are asymptomatic and are diagnosed as an incidental finding on ultrasound examination.

They may cause pelvic pain.

They may present due to one of the complications – see below (some of which present as an "acute abdomen").

The woman may complain of abdominal bloating.

### Examination

A pelvic mass may be palpated on abdominal/vaginal examination.

### Investigations

Imaging**:** An ultrasound examination is the most accurate way of diagnosing ovarian cysts. If the cyst contains solid areas, there is an increase in the risk of malignancy. The pattern of blood flow on Doppler can be helpful with regards to the probability of malignancy.

– CT or MRI can be used to assess ovarian cysts for potential malignancy.

  **Tumour markers** – CA-125 is particularly useful, especially post menopause. It can also

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_12, © Springer International Publishing Switzerland 2015

**Table 12.1** Pathological classification of ovarian tumours

| | |
|---|---|
| **Physiological** | |
| *These are due to unruptured follicles* | Follicular cysts |
| | Luteal Cysts |
| **Benign epithelial tumours** | |
| *Arise from ovarian surface epithelium* | Serous cystadenoma – *30–50 % bilateral* |
| | Mucinous cystadenoma – *usually multi-loculated and unilateral* |
| *More common after 40* | Endometroid cystadenoma -*infrequent* |
| | Transitional cell/ Brenner tumours |
| **Benign sex cord/stromal tumours** | Theca cell tumours – *rare, usually solid not cystic* |
| | Fibroma- *rare, usually solid not cystic* |
| | Sertoli-Leydig cell tumours |
| | Granulosa cell tumours – *In the post menopause – secrete oestrogen* |
| **Benign germ cell tumours** | Dermoid cysts – may *contain all three embryological layers- teeth, hair, skin, cartilage, intestinal or thyroid tissue (10 % bilateral)* |
| | *Rarely exceed 12 cm, more likely in younger women* |
| **Endometriomata** | This represents ovarian endometriosis |

be moderately elevated in endometriosis, PID, pancreatitis and cirrhosis of the liver.

## Treatment

### Medical

- The treatment of physiological cysts is watchful expectancy, unless they cause complications.
- **Hormonal –** The use of CHC can prevent the formation of functional cysts.

### Surgical

- **Minor –** The cysts could be aspirated with cytological examination of the fluid obtained. They often recur.
- Laparoscopic ovarian cystectomy
  - Cysts should be removed unruptured.
- **Major** – If the cysts are large, or malignancy is suspected, laparotomy may be the preferred approach.

**Table 12.2** Acronym for the complications of ovarian cysts

| | |
|---|---|
| T | Torsion |
| H | Haemorrhage |
| I | Infection |
| N | Neoplasia |
| R | Rupture |
| I | Incarceration |
| M | Metastasis |

## Complications

These can be remembered by the acronym "THIN RIM" See Table 12.2.

## Prognosis

Benign ovarian cysts may cause symptoms because of their size or due to a complication. Whilst some have a malignant potential, most have no long term implications. However, surveillance usually by repeat ultrasound examination until resolution is recommended.

# Fibroids: Fibroleiomyomata

# 13

## Definition

Fibroids are benign neoplastic lesions of the fibrous and muscle tissue of the uterus.

## Incidence

They occur commonly, especially between 25 and 45 years of age. They are 2–3 times more common in Afro-caribean women.

## Aetilogy and Pathogenesis

The cause of fibroids is unknown. The growth of fibroids depends on oestrogen, and they shrink after the menopause.

There is a familial tendency, but no specific genetic marker has been identified.

Fibroids are classified as *subserous* (on the peritoneal aspect of the uterus), *intramural* (within the wall of the uterus) and *sub-mucous* (distorting the uterine cavity), and pedunculated (Fig. 13.1).

## Clinical Assessment

### History

- Fibroids are often asymptomatic.
- Symptoms depend on the position and the size of the fibroid(s).
- Abnormal bleeding – HMB and IMB can occur.
- Pain
  - Dysmenorrhoea – pain due to passing clots.
  - Haemorrhage within the substance of the fibroid (red degeneration) can also cause pain (this is more common during pregnancy). Fibroids may cause pressure on pelvic nerves also causing pain, although this is uncommon.
- Pressure symptoms. Pressure on the bladder may cause frequency, urgency and occasionally

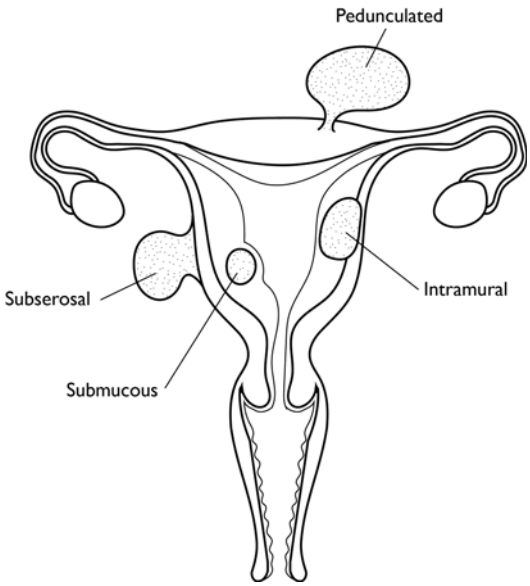



**Fig. 13.1** Uterine fibroids

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_13, © Springer International Publishing Switzerland 2015

urinary retention. Pressure on the bowel may result in constipation.
- Subfertility. Submucous fibroids may result in recurrent early pregnancy loss and/or subfertility.

## Examination

On bimanual examination an enlarged uterus may be detected. There may be irregular enlargement if there are large fibroids.

## Investigations

- **Full blood count –** Iron deficiency anaemia may result due to HMB.
- **Ultrasound examination –** Fibroids can be detected with U/S.
- **CT or MRI scan.** Fibroids can be accurately assessed using these imaging techniques, however they are not first line investigations.
- **Hysteroscopy –** This is most useful for submucous fibroids.
- **Laparoscopy –** this is good for assessing intramural and subserous fibroids.

## Treatment

- Many fibroids are asymptomatic and do not require treatment. Treatment is indicated if the fibroids cause significant symptoms- abnormal bleeding, pressure symptoms or associated subfertility.

## Medical

### Hormonal

As fibroids are oestrogen dependent, reducing or inhibiting oestrogen will limit their growth. They are composed of muscle and fibrous tissue, but it is only the muscle, which is hormone sensitive. Consequently whilst hormones can shrink a fibroid, they cannot make it disappear. Once the hormonal treatment is ceased, the muscle tissue within the fibroid usually regrows.
- Combined Hormonal Contraception- Whilst not decreasing fibroid size, pills, patches and rings may improve HMB.
- Progestins- these work by counteracting the effect of oestrogen on the fibroids:
  - Oral progestins – may decrease HMB, and result in some decrease in fibroid size.
  - Depot progestins (SDI, depot injection)- may decrease fibroid size and improve HMB, but can be associated with unscheduled bleeding.
  - Levonorgestrel intrauterine system (LNG-IUS)- unlikely to decrease fibroid size, but usually decreases HMB. Contraindicated if uterine cavity very large or irregular.
- GnRH agonists – these work by suppressing the release of FSH and consequent inhibition of follicular development, resulting in a hypo oestrogenic state. As fibroid growth depends on oestrogen stimulation of receptors, fibroids will shrink. Unfortunately this is only temporary, and the fibroids regrow once treatment is stopped.
- Ulipristal acetate (UPA). This is a progesterone receptor modulator administered orally in a dose of 5 mg daily for 3 months at time. Studies have shown a potential reduction in fibroid size of up to 50 %. Bleeding generally stops within 2 weeks of commencing treatment.

### Other Medical

- NSAIDs and Tranexamic acid- no effect on fibroid size, but may improve HMB.

## Surgical

### Minor

Hysteroscopic resection (Transcervical Resection of Fibroids (TCRF)). This is only suitable for submucous fibroids less than 7–10 cm in diameter.

– Myomectomy. This can be performed either laparoscopically or by laparotomy. The laparoscopic approach is possible if there are only one or two fibroids, not exceeding 7 cm in

diameter. Laparotomy is indicated if there are several or very large fibroids.
- Uterine artery embolisation (UAE). This technique is performed by interventional radiologists, using high definition x-ray, to deliver embolic particles (microspheres, gelatin foam or polyvinyl alcohol) via the uterine artery into the vessels supplying the fibroid. These particles then occlude the blood supply and the fibroid(s) undergo ischaemic necrosis.
- Myolysis – these methods are experimental. They use high frequency electric current or laser energy, directed by laparoscopic vision to destroy fibroid(s).
- MR Guided Focused Ultrasound Therapy (MrgFUS). This is another experimental technique which uses MRI and ultrasound to locate the fibroid. After measurement of the fibroid, the Ex-Ablate System® uses software to calculate the number and types of ultrasound generated energy pulses (sonications) to heat (up to 65–85 °C) and destroy it. MrgFUS can only be used if the ultrasound energy does not have to pass through bowel or bladder to access the fibroid.

### Major

Hysterectomy. This is usually performed via laparotomy and totally and permanently removes the uterus and fibroids.

## Complications

Fibroids may impair fertility or cause early pregnancy loss**.** Cervical fibroids may obstruct vaginal delivery. They may cause pressure symptoms- pain, frequency, urgency and constipation.

Sarcomatous change- this occurs very rarely (1/500). Whilst hard to diagnose clinically, rapid growth may be an indication.

## Prognosis

Fibroids usually continue to grow during reproductive life, but shrink post menopausally. Management depends on symptoms, and treatment is only required if “the risk benefit equation” justifies it.

# Termination of Pregnancy (TOP) 14

## Definition

Therapeutic termination of pregnancy is defined as the use of an instrument or a hormone or chemical to abort a pregnancy. This is also known as a therapeutic abortion.

## Incidence

TOP is a common procedure, with nearly 200,000 therapeutic abortions performed in the UK in 2011. It is not uncommon for women to have more than one abortion- more than one third of the women treated in 2011 had had a previous abortion.

## Aetiology and Pathogenesis

There are two separate "types of reasons" for a request for TOP:

- Abnormality of the foetus – e.g. chromosomal abnormality. This is not preventable, and with the recent advances in antenatal diagnosis, more abnormalities will be diagnosed in the early stages of pregnancy, providing the option for TOP to prevent the birth of an affected child.
- The woman feels that she cannot continue with the pregnancy for psychological reasons. The most common reason for this is that the pregnancy was not planned.
  - This might occur because:

No contraception was used or the method of contraception failed.

The efficacy rate of any contraceptive choice depends on method effectiveness, with perfect use and method effectiveness with typical use (that is the ability to use the method according to instructions).

## Clinical Profile

### History

When did the woman have her last normal menstrual period (LNPM)?

- Were her cycles regular? (the approximate date of conception, and therefore the estimation of gestation is more reliable if cycles were regular)

The use of previous contraception should be documented. This is not to apportion any blame, but to ensure the provision of a reliable method of contraception for the future.

**Part of the consultation for a TOP should include the provision of ongoing/future contraception to minimise the risk of a further unplanned pregnancy** (see Chap. 15)**.**

Any medical factors, which may effect whether a medical or surgical method is used, to terminate the pregnancy should be recorded.

A VTE risk assessment should be offered.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_14, © Springer International Publishing Switzerland 2015

## Examination

Routine abdominal, speculum and bimanual examination should still be undertaken, but has been superceded by the use of U/S as a clinical tool.

## Investigations

- Ultrasound**:** Gestation is best assessed using ultrasound. This is most commonly via the transvaginal route, but this does depend on dates.
- Screening for blood group, rhesus factor, blood borne viruses, including syphilis and HIV and also screening for chlamydia, and gonorrhea should be offered routinely to all women.
- For women with haematological disorders, a haemoglobin estimation and haemoglobinopathy screening should be undertaken.
- Opportunistic cervical screening can be offered, if appropriate within a screening programme.

## Treatment

## Medical

### Hormonal

Medical termination of a pregnancy is a licensed option up to 63 days gestation. The use of Mifepristone 200 mg, followed by misoprostol, 800 mg (delivered either vaginally or sublingually 24–48 h later), is a safe and effective method of terminating an unplanned pregnancy. The RCOG clinical practice guidelines recommend antibiotic prophylaxis for medical abortion.

Contraindications to medical abortion are few. Absolute contraindications include:

- known or suspected ectopic pregnancy
- previous allergic reaction to one of the drugs
- inherited porphyria
- chronic adrenal failure
- coagulation disorder/ treatment

Caution is required if the woman:

- is on corticosteroid therapy
- has severe anemia
- has pre-existing heart disease or cardiovascular risk factors
- has an IUD in situ

## Surgical

### Manual Vacuum Aspiration: Procedure Performed Under Local Anaesthetic

Following an initial consultation, determining that the woman/couple are unable to continue with the pregnancy, analgesia is administered.

There are a number of different options, but the following provides good pain relief: Diclofenac delivered rectally in a dose of 100 mg

The cervix is then prepared using the following regime:

Misprostol 400 mg sublingually or intravaginally

Instillagel via instillaquill – provides fundal pain relief and separates the gestation sac from the uterine wall

Three percent scandanest injected at 12 o'clock, 3 o'clock and 9 o' clock (cervical block)

Antibiotic prophylaxis is provided in the form of:

Metronidazole 1 G stat delivered rectally

Azithromycin 1 G stat orally

To reduce the risk of vomiting an antiemetic can be provided.

The cervix can then be gently dilated to minimise the risk of trauma, bleeding, retained tissue and infection.

Manual vacuum aspiration (MVA) can be used *up to 13 weeks gestation* dependent upon the views of the provider.

A hollow tube is inserted into the uterus, through the cervix, with suction being applied via a syringe, to evacuate the products of conception.

### Surgical Termination (STOP) Under General Anaesthesia

**Surgical termination (STOP) under general anaesthesia** can be performed up to 24 weeks gestation. However procedures undertaken at later gestations tend to be done in specialist centres under ultrasound control.

STOP up to 14 weeks gestation is similar to MVA, but it is necessary to identify body parts e.g. skull to ensure that the procedure is complete.

## Complications for Both Medical and Surgical Termination of Pregnancy

*Haemorrhage* (blood loss greater than 500 ml or bleeding requiring transfusion). Fewer than 1 % of procedures are complicated by haemorrhage. The risk is lower at earlier gestation.

Blood loss is less with local anaesthesia compared to general anaesthesia. Prolonged or heavier bleeding than experienced during menstruation is an expected effect of medical abortion.

*Injury to the cervix* is thought to occur in less than 0.2 % of cases due to the current practice of cervical preparation.

*Uterine perforation:* Reported rates are about 1:500. The risks are increased in higher parity and higher gestation and as with cervical injury, and are reduced by cervical preparation and operator experience.

*Continuing pregnancy:* this is about 1:500 after surgical TOP and the risk is greatest in very early procedures (gestation under 7 weeks), higher parity, multiple pregnancy, uterine abnormality, the use of a narrow cannula relative to gestational age and operator inexperience. In 0.5–1 % of women having a medical termination, treatment fails and the pregnancy continues.

*Retained products*: The incidence of this for 1st trimester surgical procedures has been reported at 1.8 %, less than for medical procedures at the same gestation. This can be tissue or blood clot. Two to five percent of women undergoing medical termination will require further medical treatment or surgery for incomplete abortion, to terminate a continuing pregnancy, or to control bleeding.

*Gastrointestinal side effects. The* side effects of medical TOP include gastrointestinal side effects such as nausea, stomach cramps, vomiting and diarrhoea.

*Upper genital tract infection:* is a recognised complication of surgical abortion (10 % of cases) and is associated with the presence of organisms in the genital tract, both sexually transmitted (e.g. Chlamydia and Gonorrhoea) and non-sexually transmitted infections (e.g. beta haemolytic streptococcus). Routine prophylactic microbial therapy should be considered in all women undergoing surgical TOP. Infection is a less common complication after medical TOP, although routine antibiotics are still recommended by RCOG in the UK, but not in other countries.

*Future reproductive health*: There is a reported increased risk of pre-term birth post surgical abortion, with this risk increasing for repeated abortions. There may be similar risks with surgical management of miscarriage.

*Mental health:* Many women undergoing an abortion by any method will suffer short term emotional distress tempered with feelings of relief. The fact that a pregnancy was unwanted is associated with an increased risk of mental health problems, irrespective of whether the woman has an abortion, or gives birth, and the most reliable predictor of post-abortion mental health problems is having a history of pre-existing mental health problems. If a woman has a negative attitude towards abortion, shows a negative emotional reaction to the abortion, or is experiencing stressful life events, professional support should be offered.

## Prognosis

There is no proven association between the following outcomes and surgical termination: breast cancer, placenta praevia, subfertility, ectopic pregnancy or miscarriage.

It is essential to provide effective contraception before the patient is discharged to reduce the risk of a further unplanned pregnancy occurring.

# Contraception 15

## Hormonal

### Combined Hormonal Contraception: Pills, Patches and Vaginal Rings

#### Introduction

These are methods containing two sex steroid hormones; an oestrogen and a progestin.

All sex steroid hormones are derived from cholesterol and both oestrogens and progestins share a structural similarity.

***Oestrogens*** are characterised by a C18 carbon skeleton.

The early "pills" all contained the synthetic oestrogen – ethinyl oestradiol (EE), or mestranol (which is metabolised to EE), but there are two newer combined oral contraceptives (COCs) which contain "natural" oestrogen, Qlaira® (oestradiol valerate/dienogest in a variable dosing regimen) and Zoely® (oestradiol/nomegestrol acetate).

***Progestins*** are characterised by a C21 carbon skeleton.

Progestogen is a hormone with a progestational effect on the endometrium, and synthetic progestogens are called progestins.

It is important to remember that as all sex steroid hormones share the basic "chicken wire" structure, it is possible for the hormones to "morph" between structural forms, hence sharing specific features of the different sex steroids (Fig. 15.1).

Naturally occurring progesterone interacts with the progesterone receptor in a "key in a lock fashion". Synthetic progestins interact in a "less perfect fit fashion". They also interact with other hormone receptors, either blocking or stimulating these receptors. These include all other steroid receptors, namely oestrogen, androgen, mineralocorticoid and glucocorticoid.

During the last 55 years, the progestins in COCs have been refined to maximize efficacy, and minimise side effects. They have been categorised into "generations".

**Table 15.1** Classification of contraceptives

| Abbreviation | | Contraceptive methods |
|---|---|---|
| LARCs | Long acting reversible contraception | Subdermal implants<br>Intrauterine LNG system Injectable progestin |
| MARCs | Medium acting reversible contraception | Vaginal ring<br>Patches |
| SARCs | Short acting reversible contraception | COC<br>Condoms |
| NARCs | Not actually reliable contraception | Diaphragms<br>Diaphragms<br>Natural methods |

##### First Generation Progestins

Norethisterone is a first generation progestin, still used frequently today for contraception and to manage gynaecological problems.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_15, 

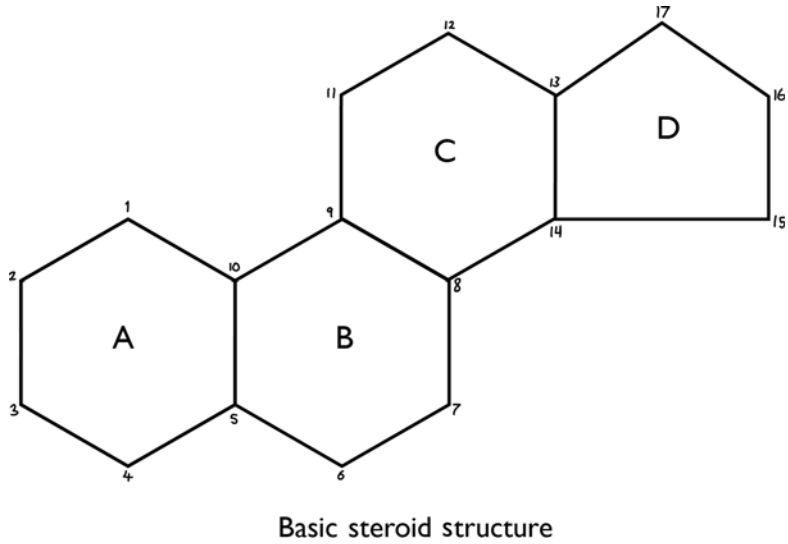



**Fig 15.1** Basic steroid hormone structure

Norethisterone also stimulates the oestrogen receptor to some degree, giving it an oestrogenic profile.

### Second Generation Progestins

Norgestrel was developed as a more potent progestin. This meant that smaller amounts could be used, to achieve the desired effect, hence minimising potential side effects. It is 20–30 times more potent, weight for weight than norethisterone. Initially a mixture of *d* and *l* isomers were used. However, as only the *levo* (*Levo*norgestrel) form is orally active, using this alone enabled the amount of hormone administered to be reduced by 50 %, thus potentially further reducing side effects.

### Third Generation Progestins

These include, Desogestrel, Gestodene and Norgestimate.

These progestins have minimal androgenic activity, with a more favourable effect on lipid profile and are twice as potent as levonorgestrel. They provide high efficacy with less side effects, but have been tainted by the venous thromboembolism (VTE) controversy of 1995.

### Fourth Generation Progestins

This group are in a class of their own, being derived from 17 alpha spironolactone and having a mild diuretic effect. This helps to reduce the fluid retaining effect of oestrogen when used in a COC. The pharmacological action of drospirenone is similar to progesterone and there is no androgenic activity associated with this synthetic hormone. Drospirenone blocks the androgen receptor – i.e. it is anti androgenic and in addition has anti-mineralcorticoid effects as described above. This reduces the risk of common side effects associated with taking the COC occurring, namely bloating, weight gain and acne.

### Cyproterone Acetate

This synthetic steroid hormone stimulates the progesterone receptor and also blocks the androgen receptor. In the UK, a combination of 35 micrograms of ethinyl oestradiol and 2 mg of cyproterone acetate (Dianette®) is licensed as a treatment for acne, but not as a method of contraception. However, it is known to be, and is used as, an effective method of contraception.

There are two regimens available for COC-monophasic and multiphasic.

In *monophasic* pills the same combination of oestrogen and progestin is administered every day for 21–24 days, followed by a pill free period of 4–7 days, during which time the woman gets a withdrawal bleed. Some women prefer to not have these bleeds and run the cycles together, "tailored pill taking". In the United States, commercially packaged preparations with a reduction in the

hormone free interval are available. A combination of drospirenone and ethinyl oestradiol (3 mg/20 ug) (YazFlex®) is available in a flexible extended regimen, allowing the woman a choice of when she bleeds. During days 25–120 a woman may decide to take a 4-day tablet-free break, but not before day 24. A tablet-free interval should not be longer than 4 days. A 4-day tablet free interval has to be taken after 120 days of continuous tablet-taking. YAZ Flex can only be used in combination with a dedicated CLYK tablet dispenser.

*Multiphasic* pills contain different concentrations of oestrogen and progestin over 21–26 days, with placebo pills making up the remainder of the 28 day pack in some preparations. This reduces the total amount of hormone administered and may improve cycle control. The quadra-phasic preparation Qlaira® has an additional license for the treatment of HMB in women requiring contraception.

Patches contain EE and Norelgestromin (Evra®) and are applied once a week, in a 3 weeks "on", 1 week "off" regime.

Vaginal ring (Etonogestrel/ EE; Nuvaring®) are inserted for 3 weeks, with a ring free week resulting in a withdrawal bleed.

Patches and vaginal rings have the same mode of action as the COC (inhibition of ovulation), and the same contraindications. The advantages include non-daily delivery, and avoidance of the entero-hepatic circulation. Direct absorption of the hormones into the systemic circulation, theoretically improves cycle control.

## Mechanism of Action

Combined hormonal contraceptives have three modes of action:

1. Supression of ovulation by inhibition of gonadotrophins- oestradiol principally inhibits FSH, whilst the progestin inhibits the LH rise.
2. Whilst oestrogen and progesterone are essential for the proliferation and maturation of the endometrium when secreted in a sequential manner, the administration of these hormones in a fixed pharmacological dose throughout the cycle has an anti-endometrial effect, and results in a typical "pill endometrium" which has few glands and does not support implantation of the embryo.
3. The progestin in CHC has an anti-mucous effect, thus obstructing sperm penetration.

## Eligibility

The Faculty of Sexual and Reproductive Healthcare (FSRH), has developed the Medical Eligibility Criteria (UKMEC) for contraceptive use:

**Category 1**: there is no restriction for use.

**Category 2**: the advantages of using the method out way risk.

**Category 3**: referral to a specialist contraceptive provider may be indicated as the associated risk may out way any advantage of using the method.

**Category 4**: indicates that the risks outweigh the benefits and the method should not be used.

For CHC MEC 3 and 4 conditions include: Obesity, smoking more than 15 cigarettes per day over the age of 35, VTE past or current, known thrombogenic mutations, hypertension (systolic >160, diastolic >95), ischaemic heart disease, complicated valvular congenital heart disease, history of stroke or TIAs, migraine with aura, diabetes with vascular complications, breast cancer, severe liver disease, SLE with antiphospholipid antibody , Raynauds with lupus anticoagulant, planning major surgery and the concomitant use of enzyme inducing medication.

These apply to all CHCs – pills patches and rings.

## Efficacy

Efficacy reflects how well fertility is controlled by a method of contraception. The failure rate is the sum of the *method failure* plus *user failure* i.e. failure rates with perfect and typical use. With the COC perfect use failure rates are low and may be associated with malabsorption or drug interactions. On the other hand, typical user failure rates are quite high due to women forgetting to take their pills. Overall the failure rate including both perfect and typical use, for CHC is approximately 9 %.

## Side Effects

Serious side effects include venous thrombo embolism (VTE) – deep vein thrombosis (DVT) and pulmonary embolism (PE) and arterial

thrombosis. The risk of VTE in COC users is approximately twice that in a comparable population not taking the "pill"- 9–10/10,000 vs 4.4/10,000 per year. The risk is highest in the first 3 months. There are specific risk factors, which can increase the likelihood of a cardiovascular event occurring – these include migraine with aura, hypertension and smoking over the age of 35. Use of CHC is a co-factor for cervical cancer. COCs appear to have little effect on the risk of breast cancer.

Nuisance side effects reported by women include weight gain, breast tenderness, acne, nausea and mood changes. Although these side effects are not life threatening, they may result in women discontinuing their contraceptive method and therefore should not be dismissed lightly.

### Non-contraceptive Benefits

The most important non-contraceptive benefit of the COC is its effect on the menstrual cycle. It regulates bleeding, allowing a woman to choose if and when she bleeds and blood loss is reduced by approximately 40 % with a corresponding reduction in dysmenorrhoea. There is also a significant decrease in ovarian and uterine cancer in COC users. Because ovulation is suppressed, functional ovarian cysts (follicular and luteal) occur less frequently. Acne usually improves with the use of CHCs, especially if anti-androgenic progestins are used.

## Progestin Only Methods: These Include Pills, Implants, Injections and Intrauterine Systems

### Introduction

Progestin only methods have none of the risks associated with the use of oestrogen, as described above. There are very few contraindications. The disadvantage is, that in contrast to CHC, they do not provide good cycle control, and irregular bleeding and/or amenorrhoea are common. This may result in some women discontinuing the method.

### Mechanism of Action

The primary action of progestins is to make the cervical mucous thick and impenetrable by sperm. Some progestins also inhibit ovulation by suppressing the LH surge.

Progestogen only pills (POP) – also called "mini-pills"

The first and second generation POPs acted mainly by their cervical mucous effects, although more than half of the cycles were anovulatory. This necessitated that each tablet was taken within a 3 h window.

In the UK a third generation POP is available containing desogesterel, which inhibits the LH surge and ovulation. It has a 12 h window, which is reflected in an decrease in failure rate.

Progestins can be administered by injection either intramuscularly (depot medroxyprogesterone acetate (DMPA- DepoProvera®)) 150 mg, or subcutaneously (Sayana Press®; 104 mg/0.65 ml MPA) every 12 weeks. MPA inhibits folliculogenesis by suppressing the release of gonadotrophins, thus inducing a hypo-oestrogenic state.

The subdermal progestogen only implant (SDI) contains etonogestrel impregnanted in a ethinyl vinyl acetate polymer with a rate limiting membrane, which secretes a small amount of hormone into the circulation each day (60–70 ug/day initially, decreasing to half that by end the third year), for 3 years. Its primary mode of action is ovulation inhibition (suppression of the LH peak), but there is still some follicular development, resulting in oestrogen levels in the mid follicular range. This is in contrast to the injectables, where oestrogen levels are suppressed, with no folliculogenesis in some women and a potential for reduction in bone mineral density. Progestogen only implants have secondary effects on cervical mucous and the endometrium, making it thin and non-receptive.

Levonorgestrel releasing Intra Uterine System (LNG-IUS)

There are two available options with different doses of levorgestrel released daily – 20 micrograms (Mirena®), licensed for up to 5 years or 12 micrograms (Jaydess®), licensed for use up to 3 years.

An IUS is fitted like an IUD, but that is the end of the similarity. Both intrauterine systems release progestin directly into the endometrial cavity, causing atrophy, which prevents implantation and reduces bleeding. They have a negative effect on sperm penetration through the cervical mucous. There is no effect on the hypothalamo-pituitary axis, and most women continue to ovulate.

### Eligibility

These methods are suitable for women who cannot take oestrogen and consequently there are fewer contraindications.

These include the presence of unexplained vaginal bleeding, and for intrauterine methods, pelvic inflammatory disease including TB, cervical or endometrial cancer, the presence of gestational trophoblastic disease and distortion of the endometrial cavity.

Nuliparity is not a contraindication to the use of intrauterine contraception.

### Efficacy

All long acting reversible contraceptive (LARC) choices, reduce user failure. These methods are described as "fit and forget".

The injectable has a higher typical failure rate, as women need to attend 3 monthly for their injection.

The LNG-IUS and SDI have no user failure once inserted, and are effective for 5 and 3 years respectively, with less than 1 % failure per year.

### Side Effects

The most common "side effect" for progestin only methods is unscheduled bleeding. With injectables (DMPA/MPA) up to 70 % of users are amenorrhoeic by 1 year of use. Some women experience weight gain whilst using injectable progestins, but there is no evidence to support weight gain for women using the POP, a SDI or IUS. There is no evidence for a causal relationship between the use of progestins and mood change, loss of libido or headaches. There is no causal relationship between progestin only contraception and cardiovascular disease, venous thromboembolism or breast cancer. However, women using injectable progestins may have a reduction in bone mineral density, which recovers when the method is stopped.

### Non Contraceptive Benefits

Progestins reduce bleeding. They also alleviate dysmenorrhoea, and have a beneficial effect on endometriosis.

The use of the LNG-IUS has revolutionised the treatment of HMB, virtually eliminating the need for surgical treatment due to a 90 % reduction in bleeding on average after 12 months. Mirena® has a license to treat heavy menstrual bleeding.

## Emergency Contraception

### Introduction

Post-coital contraception has been used to try and prevent pregnancies for many decades. Originally high dose norethisterone (50 mg) was administered with the aim of disrupting the endometrium and preventing implantation. The Yuzpe regimen of four 50 μg COCs taken within 72 h of coitus followed, but the side effects associated with such high oestrogen doses was poorly tolerated. The use of levonorgestrel 1500 ug is now widely available, and ulipristal acetate (UPA) 30 mg in a stat dose is also available in many countries. UPA is three times as effective as LNG. It can still delay or inhibit ovulation, even if the LH surge has already started.

The most effective method of emergency contraception is a copper IUD. This is effective up to 120 h after unprotected sex and can also be fitted up to 5 days after the predicted day of ovulation in a regular cycle. In addition to emergency contraception a CuIUD also provides ongoing contraception for up to 10 years.

### Mechanism of Action

Levonorgestrel (LNG) is thought to act by inhibiting the LH peak, and delaying or preventing

ovulation. UPA also principally works by inhibiting ovulation, but there is evidence that it still has some effect after the LH surge has started. Whilst it has some effect on the endometrium, there is no evidence to suggest that it prevents implantation.

The copper IUD is toxic to the ovum and sperm, inhibiting fertilization, but it also has an anti-implantation effect. There is no evidence that the LNG-IUS is effective for emergency contraception.

### Eligibility

There are no contraindications to the use of LNG for emergency hormonal contraception. The dose should be doubled for women taking an enzyme inducing drug (out of product license).

UPA should be avoided if there is a pre-existing risk of pregnancy, the woman is taking an enzyme inducing drug or is breast feeding.

### Efficacy

The most effective method of EC is the insertion of a Cu IUD within 5 days or up to 5 days after the predicted day of ovulation. Pregnancy rates are thought to be less than 1 %.

Comparative studies have shown a trend for greater effectiveness for UPA. Although LNG is licensed to be used up to 72 h after UPSI, historically it was used up to 120 h. There is a six-fold increase in the risk of pregnancy between 96 and 120 h. UPA is licensed to be used up to 120 h and there is no change in efficacy during that time.

### Side Effects

Insertion of an IUD may be accompanied by discomfort. At the time of insertion of intrauterine contraception, there is a sixfold increase in infection in the first 20 days, a risk of expulsion and a risk of perforation of the uterus (2/1,000).

The use of LNG or UPA can be associated with headache, nausea (less than 20 % of users), abdominal pain, dizziness, and an altered bleeding pattern.

### Non-contraceptive Benefits

None.

## Non-hormonal

## Barriers

### Introduction

Condoms have been in common usage for several centuries. Initially animal intestines and treated linen were used to prevent infection as well as pregnancy. Rubber condoms became available in the nineteenth century, and latex in the twentieth century.

### Mechanism of Action

The mechanism of action of barrier contraception is to separate the sperm from the ovum. Barriers can be separated into male methods – condoms and female methods – diaphragms and female condom.

### Eligibility

Virtually any couple can use a barrier method. Latex free condoms are available for people with latex allergies. Newer diaphragms do not require expert fitting but the user has to be comfortable with insertion and removal and with the use of a spermicide.

### Efficacy

An intact condom, properly used, is an effective method of contraception. Proper usage requires no genital contact, application onto an erect penis with no air bubble in the teat, withdrawal immediately on ejaculation, and safe disposal of the condom. Should a condom break or come off during sexual intercourse, emergency contraception should be used.

Female barrier methods are less reliable. Studies have reported around 20 % pregnancy rates for users per year

There are no side effects. Condoms may be a problem for an aging male who has difficulty maintaining an erection.

### Non-contraceptive Benefits

A great advantage of condoms is that an intact condom will decrease the risk of transmission for many infections.

## CuIUD

### Introduction

The first CuIUD to be used was the Grafenberg ring, which was introduced in 1929. It consisted of a copper spring wound into a coil. It had to be inserted with a hook, which pushed it into the uterine cavity, and it was "fished out blind", when it was time for removal! This was followed by a series of plastic IUDs, the most notorious of which was the Dalkon Shield, which resulted in a number of deaths, due to pelvic infection, because of the multifilament tail, which was thought to be a vehicle for organisms to reach the uterine cavity. These inert IUDs have now been superseded by copper or medicated devices.

### Mechanism of Action

Copper is toxic to both sperm and the ovum. Its primary action is to prevent fertilisation. It also has a toxic effect on the endometrium, inhibiting implantation, as well as having a negative effect on the cervical mucous to inhibit sperm penetration.

### Eligibility

Contraindications include introduction of a CuIUD in the presence of unexplained vaginal bleeding, pelvic inflammatory disease including TB, cervical or endometrial cancer, or continuing use in the presence of gestational trophoblast disease. Uterine fibroids disrupting the endometrial cavity, or an anatomical abnormality of the uterus are relative contraindications to insertion. CuIUDs can be used in nuliparous women.

### Efficacy

There are many copper IUDs on the market. In the UK there are 14 different models, licensed for use for between 5 and 10 years. After 5 years follow up pregnancy rates of less than 2 % are reported.

### Side Effects

The most sinister side effect following insertion of an IUD is pelvic inflammatory disease (PID). The risk of PID is increased sixfold during the first 20 days after insertion. Complications of insertion such as perforation are rare (2/1,000), but expulsion is more common (1 in 20 women), most commonly during the first 3 months after insertion.

### Non-contraceptive Benefits

None

## Natural Family Planning (NFP)

### Introduction

There are couples who do not want to use hormonal, chemical or mechanical contraception, and who wish to use natural methods to avoid pregnancy. These methods aim to avoid sexual intercourse around the time of ovulation. Sperm may live for several days within the cervical mucus, and couples require strong will power during this time.

### Mechanism of Action

The estimation of the time of ovulation is the main basis of NFP.

This can be done based on cycle rhythm (rhythm method), changes in body temperature, or by studying changes in the cervical mucus through the cycle (Billings method).

The *rhythm method* works on the basis that the luteal phase is usually about 14 days long, so that if one subtracts 14 days from the longest cycle and from the shortest cycle during the last 6 months, then the range of ovulation days can be predicted. The couple should then abstain from sexual intercourse for 4–5 days before the earliest possible day (to allow sperm to die), until after the latest day. The problem is that we are predicting ovulation on the basis of past cycles, and there is no guarantee that there may not be variation.

The *temperature method* relies on the thermogenic effect of progesterone. After ovulation the basal body temperature rises about 0.4 of a degree. A woman needs to take her temperature every morning on wakening, and when she detects a significant rise, she can presume she has

ovulated. Again, the couple need to abstain for several days before the temperature rise, until there is persistent elevation of the body temperature. This method at least actually detects presumed ovulation, rather than estimating it.

The *Billings method* based on the mucous changes is a "bio-assay" of the menstrual cycle. This was discussed in Chap. 1, but the principle is that a woman predicts when her follicles are ripening, abstains from sexual intercourse until signs of ovulation have been noted when the couple can resume having sexual intercourse.

### Eligibility

There are no medical contra-indications to the use of NFP. However, couples for whom an unplanned pregnancy would cause serious problems, should be encouraged to use a more reliable method of contraception.

### Efficacy

Whilst the principles of NFP are valid, it requires strong willpower and user compliance for it to be effective. Some clinical trials have reported efficacy rates above 90 % but widespread use has a much higher failure rate.

### Side Effects

None

### Non-contraceptive Benefits

Women who wish to conceive can use the principles of NFP in reverse to help time when sexual intercourse is most likely to result in pregnancy.

## Sterilisation (Male and Female)

### Introduction

Sterilisation literally means "to make sterile". It is only an option for couples who have completed their families and are 110 % certain they do not want any more children.

### Mechanism of Action

In women, it is usually accomplished by obstructing the fallopian tubes. Originally this required surgical ligation (known as tubal ligation), but with the introduction of laparoscopy to gynaecology, simpler options such as burning the tubes or applying clips and rings were developed. The most popular method today is applying Filshie clips (titanium and silastic) to the mid isthmus part of the tube under laparoscopic vision.

A hysteroscopic method of sterilisation (Essure®) is available. This involves the insertion of a self expanding microcoil containing Dacron fibres, which results in fibrosis and obstruction of the isthmus over 3 months, during which time on going contraception is required. In contrast to laparoscopy, which is usually performed under general anaesthetic, Essure® can be inserted as an outpatient.

In men sterilisation requires vasectomy – disruption of the vas deferens. It can be done under local anaesthetic as an outpatient procedure. The newer non- scalpel technique is associated with a lower failure rate and fewer complications.

### Eligibility

Anyone can be sterilised, but the aim is to avoid regret. Couples may require counselling.

### Efficacy

There is a failure rate associated with sterilisation. Following vasectomy semen analysis is required to ensure azoospermia after 10–15 ejaculations. Re-canalisation is very rare, and method failure is less than 1 %.

The failure rate with Filshie clip sterilisation is about 5 per 1,000 operations.

### Side Effects

Both female and male sterilisation cause no changes except for preventing the passage of sperm or ova. There is no reason why any other side effects should occur.

Both techniques can have operative complications. Vasectomy may be associated with haemorrhage and haematoma, or very rarely infection. Occasionally a granuloma may result at the operative site.

For laparoscopic sterilisation there are the usual although infrequent complications. These include anaesthetic problems (1:10,000), trauma to organs or blood vessels (1 in a 1,000) and gas embolism.

## Non-contraceptive Benefits

In some couples the fear of pregnancy causes stress. For these couples having an effective method of contraception may improve their general well being.

# Subfertility

# 16

## Definition

Failure to conceive after 12 months of unprotected sexual intercourse

## Incidence

It is said that 15 % of couples have subfertility. This seems to be true for most of the world, unless there are pockets of problems peculiar for a particular population, where the incidence rates can be higher.

## Aetilogy and Pathogenesis

Subfertility can be divided into the following potential causative factors (Fig. 16.1):

- SPERM- The right "number" of sperm have to be deposited, in the right place, at the correct time.
- OVULATION- The woman has to release an egg
- TUBES- The passages, cervix, uterine cavity and tubes have to be patent
- MIXED – more than one factor
- UNEXPLAINED (IDIOPATHIC) SUBFERTILITY
  - Transport problem
  - Fertilisation problem
  - Implantation problem

## Clinical Assessment

### History

If possible a couple should be seen together
Previous fertility history- both partners
Menstrual history
Medical History, including cervical smear history
Surgical History
Medications including alcohol, recreational drugs, and smoking
Family History, especially congenital abnormalities, endometriosis
Social History-
Sexual History- Intercourse timing and adequacy

### Examination

Routine abdominal, speculum and vaginal examination. Opportunistic cervical smear if indicated

### Investigations

**Female**

- Infection screens- Rubella and ?Varicella Immunity (dependent on country)
- Hormones: Mid luteal progesterone and oestradiol
  If cycles irregular: FSH, LH, Prolactin, TSH

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_16, © Springer International Publishing Switzerland 2015

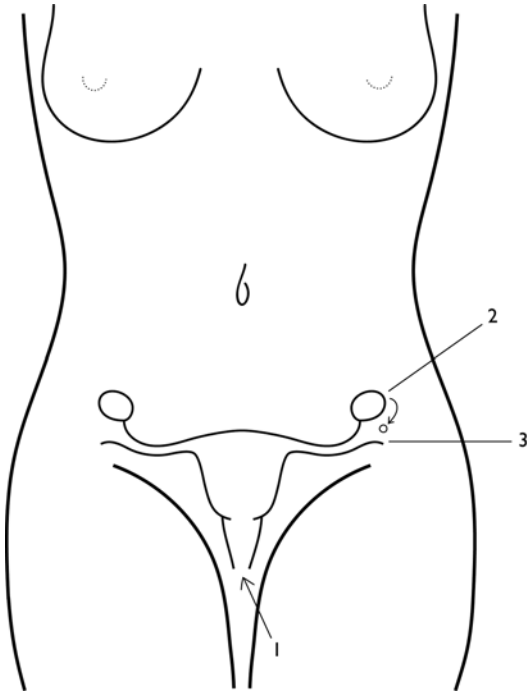



**Fig 16.1** Three basic fertility parameters

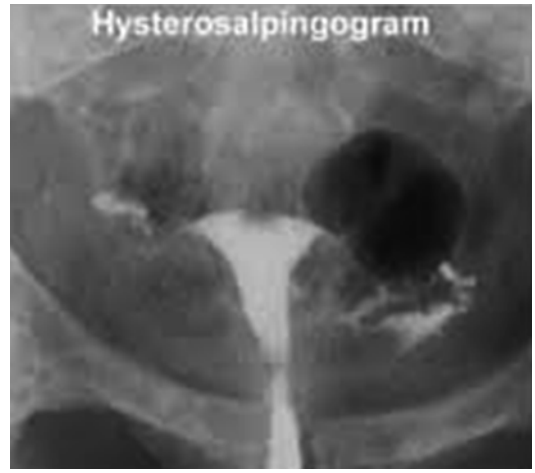



**Fig 16.2** Hysterosalpingigram

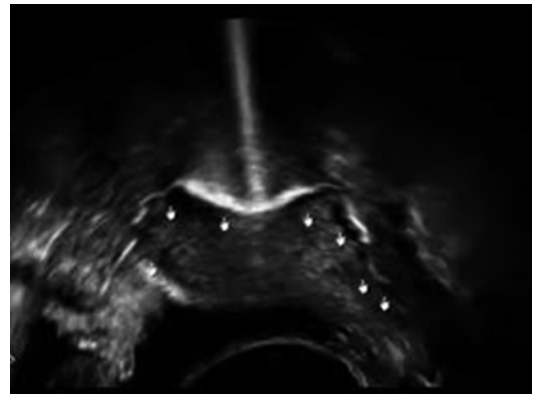


**Fig 16.3** HyCoSy

**Male**

- Semen analysis on a specimen produced by masturbation
- Antisperm antibodies
- A semen analysis should always be performed before undertaking tubal assessment of the female. If normal, consider tubal assessment
- Hysterosalpingogram (HSG)- (Fig. 16.2) An X-ray contrast test- cheap, widely available, painful, false positives and negatives, limited information.
- HyCoSy (Ultrasound with positive contrast) – (Fig. 16.3) an ultrasonic investigation- more expensive, less available, less uncomfortable, gives information on uterus and ovaries, won't diagnose endometriosis, will not assess the status of tubes any more than patent/blocked. False positives due to tubal spasm.
- Laparoscopy with dye studies (Fig. 16.4) – Most expensive, most invasive (GA, day surgery), "gold standard"- visualisation of tubes, ovaries and uterus. Provides potential diagnosis and opportunity to treat underlying disease e.g. endometriosis.

If ovulation, sperm and tubes all normal- unexplained subfertility.

Possible explanation:

- Transport problem
- Fertilisation problem
- Implantation problem

**Need IVF to diagnose and/or treat**

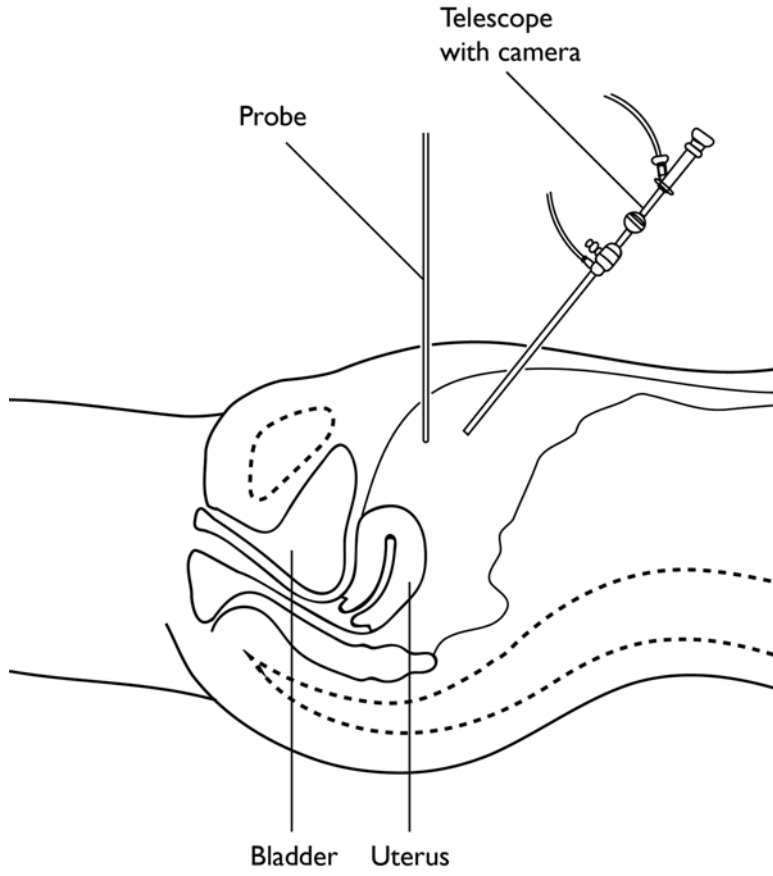



**Fig 16.4** Laparoscopy

## **Treatment** (Fig. 16.5 Flow Chart)

### Medical

#### Hormonal

- Women who do not ovulate regularly should have ovulation induction
- Check Prolactin level – if elevated normalise using bromocryptine or cabergoline. If significantly elevated (>4 times normal) investigate pituitary by imaging CT scan/MRI scan. Once ovulation is restored, conception should occur
- If prolactin is normal, use clomiphene citrate. Usually administered daily from Day 5 to 9 of a cycle or after a period or hormone induced bleed.

Commence with low dose (25 mg) and increase monthly until regular ovulation.

Monitor with mid luteal oestrogen and progesterone, and sometimes ultrasound

If no response to clomiphene at 150 mg/day progress to FSH injections

Sixty to eighty percent of women ovulate with clomiphene and about 50 % conceive.

- Ovulation induction with FSH injections needs to be undertaken in specialist centers. Daily injection of FSH, titrating the dose against the response as monitored by blood oestrogen levels and/or ultrasound scanning.

About 20–25 % pregnancy rate per cycle, but about one in four pregnancies are multiple, usually twins.

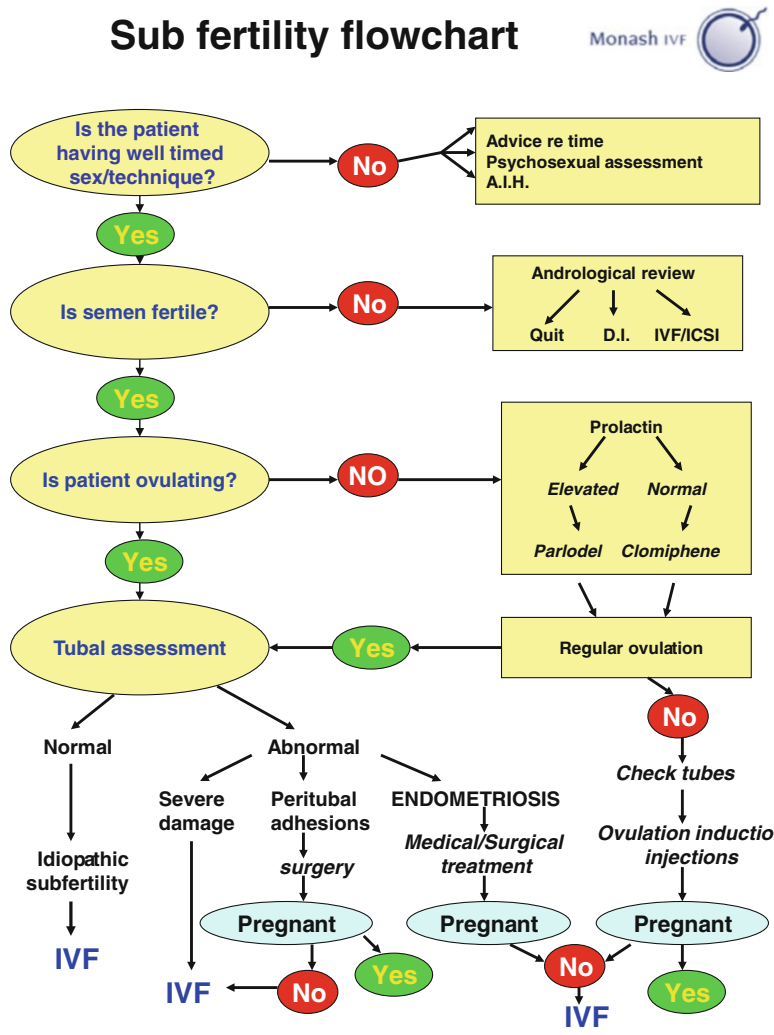



**Fig 16.5** Flow chart for investigating sub fertility

- It is infrequent that a hormone deficiency (hypo-gonadotrophic hypogonadism) is responsible for azoospermia (no sperm). This rare condition can be treated by injections of FSH over several months, and usually responds by sperm production.

## Other Medical

Metformin is sometimes used to improve ovulation in anovulatory women with Polycystic Ovarian Syndrome (PCOS), but clomiphene is more effective. Metformin and Clomiphene may be used together.

## Surgical

### Minor

- Women with PCOS who do not respond to clomiphene, may be suitable for laparoscopic ovarian cautery, where some of cysts on the ovarian surface are punctured and burnt. For reasons we do not understand this restores ovulation in about 50 % of women.
- Tubal surgery – If laparoscopy reveals a pelvic abnormality such as peri-tubal adhesions or endometriosis, then laparoscopic surgery can be carried out.

- In case of tubal disease, significant sperm problems, or unexplained subfertility, IVF is the treatment of choice (See Fig. 16.5 Flow Chart)
- In Vitro Fertilisation see below

## Complications

Anovulation is associated with amenorrhoea and infertility

Irregular ovulation results in oligomenorrheoa, and difficulty becoming pregnant- this can be remedied by inducing ovulation

Anovulation will result in persistent unopposed oestrogen which acting on the endometrium, will result in hyperplasia and an increased risk of endometrial cancer.

## Prognosis

Most couples can achieve a pregnancy one way or another in 2015.

IVF can overcome most fertility problems. Women who have ovarian insufficiency can use donor eggs, men with irreversible azoospermia can sometimes have sperm extracted from their testicle used for IVF, and failing that there is the potential to use donor sperm.

Women who have lost their uterus or are unable to carry a pregnancy for medical reasons can use a gestational surrogate.

## IVF

Because IVF is a common solution for all types of subfertility, a basic outline of what it involves will be described here. IVF consists of five basic steps:

1. Stimulation – FSH hormone is administered to stimulate the ovary to make several follicles, rather than just the one produced in a natural cycle – Controlled Ovarian Hypesrtimulation (COH)
2. The follicular development is monitored using ultrasound and sometimes hormone measurement to assess follicular maturation. This is then triggered by administering a hormone with LH like activity.
3. About 34–38 h later the oocytes are collected in the procedure room/operating theatre through the vagina using ultrasound control (Fig. 16.6.)

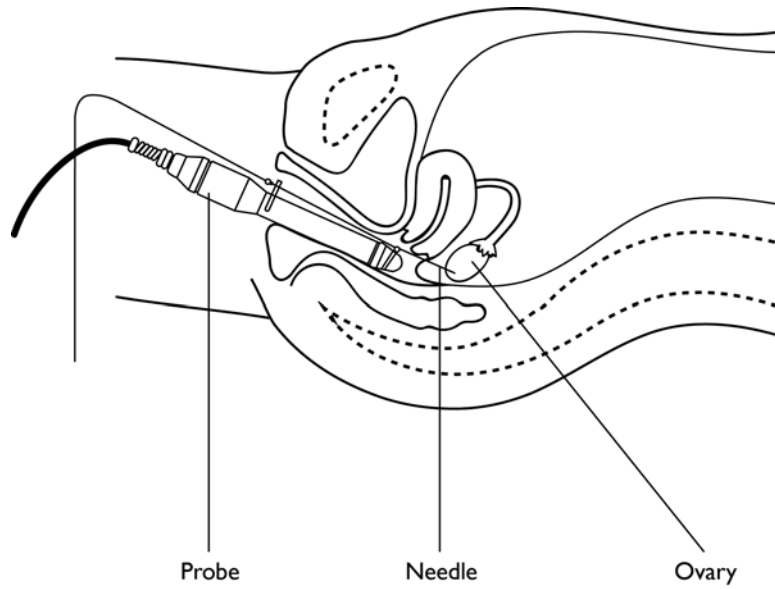
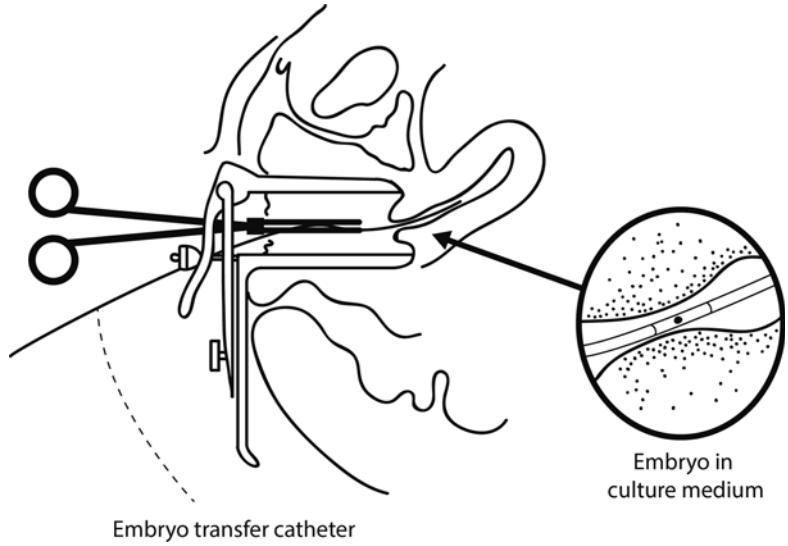



**Fig 16.6** Transvaginal oocyte collection

**Fig 16.7** Embryo transfer




4. The sperm is pre-prepared and is either mixed with the oocytes, or the oocytes are injected with a single sperm (Intracytoplasmic sperm injection-ICSI), after which the embryos are cultured in vitro for several days
5. An embryo is chosen and transferred into the uterus (ET). These days usually only a single embryo is transferred (Fig. 16.7)
6. Embryo cryopreservation- If there are embryos remaining which are good enough to freeze (that is they look like they will survive freezing and thawing) these can be frozen and stored in liquid nitrogen. Should the pregnancy not result with the fresh ET, the option of repeated attempt(s) using the frozen embryo(s), can be undertaken. If the fresh ET is successful, the embryo(s) can be stored for subsequent pregnancies.

The chance of success for an IVF treatment cycle: The chance of pregnancy depends on the age of the woman providing the oocytes. One would expect a pregnancy rate of 40 % per cycle under 35 years, 30 % for 35–39 years, about 25 % at 40, declining to less than 5 % at 44 years of age. In the case of egg donation, the chance of pregnancy depends on the age of the oocyte donor.

# 17 Polycystic Ovaries (PCO) and Polycystic Ovarian Syndrome (PCOS)

## Definition

PCO is an ultrasound diagnosis – If at least one ovary has 12 or more small peripheral cysts (2–8 mm) the woman is said to have PCO.

PCOS is present in a woman who has PCO on ultrasound, and has one or more of the symptoms of hyperandrogenism. This includes oligomenorrhoea, excess hair growth, pimples/acne. greasy skin.

## Incidence

Population studies have shown that Caucasian women have a 20–25 % incidence of PCO. In women from the Indian and Asian subcontinents, the incidence can be as high as 50 %.

## Aetilogy and Pathogenesis

The inheritance of PCO is poorly understood, but appears to be multifactorial. Whilst there is a familial trend, a PCO gene has not been identified.

Pathogenesis appears to commence with an excess of LH secretion, resulting in hyperandrogenism (encouraging the circulating steroids to be metabolised to androgens) which then promotes a degree of insulin resistance.

## Clinical Assessment

Fifty percent of women with PCO have no symptoms or signs. Gaining weight and becoming less active appear to be mechanisms which may precipitate the transition from PCO to PCOS.

### History

- Menstrual irregularity – this is the commonest and earliest symptom of PCOS. This can be oligomenorrhoea or secondary amenorrhoea. Women may present with subfertility (due to irregular/anovulation) as their primary concern.
- Acne/greasy skin- is the second commonest symptom, and the majority of teenage girls who are seen by dermatologists for acne have PCOS.
- Hirsuitism – women with PCOS often complain of excess hair growth and having to remove hair, especially from the upper lip, lower abdomen, and arms..
- Obesity – Many women with PCOS have a significant problem controlling their weight. Classically they have central obesity, with the distribution being apple rather than pear shape.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_17, © Springer International Publishing Switzerland 2015

## Examination

- General examination will reveal the manifestations of the symptoms identified on history.
- The degree of hirsuitism can be quantitated by using the Ferriman- Gallwey score. This is a quantitative assessment of hair growth, scoring one to four in 11 different body parts, namely the upper lip, chin, chest, upper back, lower back, upper abdomen, lower abdomen, arm, forearm, thigh, and lower leg.
- Vaginal examination is not helpful in the diagnosis. Although the ovaries are often enlarged, they are not palpable.

## Investigations

### Ultrasound

The definitive diagnostic investigation is ultrasound. Ideally this should be transvaginal. According to the criteria decided at a consensus conference of international experts (ESHRE-ASRM), PCO is diagnosed if twelve or more small follicles, 2–8 mm in diameter, are present in at least one ovary. In addition, the ovaries are usually enlarged (>10 $cm^3$), and there is increased stromal density.

### Hormone Levels

Classically there is an LH:FSH ratio greater than 2:1

Androgenic hormones – testosterone, dehydroepiandrostendione (DHEA) and androstenedione are often elevated. The results of these tests will not change the management, so their measurement is not essential.

### Glucose Levels/Insulin Resistance

Some women with PCOS, especially ones who are obese, have some degree of insulin resistance. This is diagnosed by a raised fasting blood sugar or an elevated HbA1c.

## Treatment

The treatment depends on what the problem is.

In general, the first line of treatment should be diet and exercise. In obese women with PCOS, weight loss will improve menstruation, acne and hirsuitism. Some studies have shown restoration of ovulation and resolution of subfertility in association with weight loss.

## Medical

### Hormonal

- Anovulation – If she wishes to conceive, then ovulation induction can be undertaken (see Chap. 16).
- Menstrual irregularity: to protect the endometrium – COC, cyclical progestogen, or LNG-IUS insertion (See Chap. 15)

### Acne and/or Hirsuitism

An anti-androgenic COC e.g. a "pill" containing cyproterone acetate or drospirinone and ethinyl oestradiol or high dose Cyproterone acetate (100 mg/day) for ten days a month, in conjunction adequate contraception.

## Surgical

### Minor

Ovarian cautery can be used to induce ovulation – see Chap. 16.

Various cosmetic approaches such as waxing, shaving, and laser therapy can be utilised to improve symptoms of hirsuitism.

### Major

Rarely women with PCOS and HMB which does not respond to conservative measures may require hysterectomy.

**Bariatric surgery** to reduce stomach capacity and limit eating can be successful in achieving weigh reduction, with a subsequent improvement in symptoms.

Surgical removal of the ovaries does not solve the problem, as PCOS is a metabolic condition affecting all organ systems, not just the ovaries.

## Complications

Women with PCOS are at a higher risk of developing diabetes and endometrial cancer. An increased risk of cardiovascular disease has not been proven unequivocally, although surrogate markers e.g. lipids are often elevated.

## Prognosis

PCO/PCOS cannot be cured because it is not a disease. However, the abnormality is imprinted in every cell of the body. The best one can do is to provide symptomatic treatment, or at least minimise the symptoms and signs.

# Menopause

# 18

## Definitions

**Menopause** is the cessation of ovarian function. A woman is "**post menopausal**" 12 months after her last menstrual period. Ovarian function declines in the 5 years running up to menopause, and this is known as the "**perimenopause**" or the "**menopause transition**". "**Premature menopause**", now known as "**premature ovarian insufficiency**" (**POI**), occurs when a woman's ovaries cease functioning under the age of 40.

## Incidence

Menopause affects 100 % of women, usually between the ages of 45–55.

## Aetilogy and Pathogenesis

During reproductive life, in regularly ovulating women, the menstrual cycle occurs repeatedly every 4 weeks. As described in Chap. 1, the cycle commences with a batch of follicles starting to develop, and during the follicular phase, oestrogen is secreted, resulting in endometrial proliferation. One follicle becomes the leading follicle, and in an ovulatory cycle, ovulates and then becomes the corpus luteum (CL), which produces progesterone as well as oestrogen. The CL has an inherent life span of about 2 weeks, when, in the absence of a pregnancy it succumbs, resulting in a drop in oestrogen and progesterone levels, which causes in the endometrium to slough (menstrual period). During the menopause transition, a woman has cycles where she makes follicles, but does not ovulate; the follicle still secretes oestrogen which causes endometrial proliferation, and when the follicle undergoes atresia, then oestrogen secretion ceases, and the endometrium is lost – still resulting in menstruation (although in an anovulatory cycle). Once ovarian function totally ceases, there is no folliculogenesis, no oestrogen secreted, no endometrial proliferation or shedding, and amenorrhoea results.

## Clinical Assessment

### History

The symptoms of the menopause/perimenopause can be divided into those due to hormonal fluctuation and those resulting due to the long term consequences of oestrogen deficiency. As these symptoms and signs are usually reported as a continuum, they are considered together, and classified into five types:

1. Vasomotor – this includes "hot flushes", palpitations, nights sweats, an altered sleep pattern and fatigue.
2. Neuromuscular and degenarative- this includes headaches, joint and muscle pain, hair and skin changes.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_18, © Springer International Publishing Switzerland 2015

3. Psychogenic- this includes poor concentration, forgetfulness, depression, anxiety, claustrophobia, agoraphobia, irritability, difficulty coping, tearfulness and lack of drive including sex drive.
4. Urogenital- symptoms of vaginal dryness, uterovaginal prolapse and urinary symptoms including urgency and urge incontinence/ overactive bladder. Although stress incontinence is more common in post menopausal women, the aetiology of this is probably not due to oestrogen deficiency.
5. Osteoporosis can result in fractures.

## Examination

A general examination including blood pressure, breast examination and bimanual examination including a cervical smear (if indicated) should be undertaken. Clinical signs are unlikely to be found, although signs of vaginal atrophy due to lack of oestrogen may be detected.

## Investigations

### Hormone Tests

These offer little benefit and can be confusing.

- FSH. FSH >30 MiU/ml suggests menopause. However, during the menopause transition the level of FSH can oscillate significantly. Therefore, one cannot diagnose a woman as "post menopausal" on a single FSH level.
- Anti Mullerian Hormone (AMH) – There is no place for measuring this in a woman who is thought to be menopausal. Its value is in predicting ovarian reserve in younger woman, but once in the perimenopause, AMH will always be low, and knowing its value does not change patient management.
- Oestrogen. Measuring oestrogen in a perimenopausal/post menopausal woman is of little benefit. The level of oestrogen does not reflect the degree of symptoms, nor does it help with assessing the effect of hormone replacement therapy (HRT).
- Thyroid Function Tests (TFTs) or fasting glucose or HbA1c should only be measured if medically indicated.
- Bone mineral density- Once a woman becomes post menopausal, she loses about 1 % of her bone mass per year. As osteoporosis is a significant problem in postmenopausal women, prevention is important. Knowing the baseline bone mineral density is useful.

## Treatment

### Medical

#### Hormonal

Menopausal women are oestrogen deficient. Hormonal treatment necessitates replacement of oestrogen. This can be oral, transdermal, vaginal or by subcutaneous implant.

**W**omen who have a uterus need endometrial protection. This is provided by using a progestin which can be oral, transdermal or intrauterine (Mirena®). Progestin therapy can be provided either sequentially or continuously.

#### Other Medical

Some women do not want to take oestrogen, whilst for others, oestrogen replacement is contra-indicated. For these women it is possible to provide symptomatic treatment with various degrees of success. These treatments include the use of antidepressants in the SSRI group, gabapentin and clonidine.

## Complications

These are either the consequences of oestrogen deficiency if HRT is not taken, or the complications of HRT- abnormal bleeding, hormonal side effects, venous thromboembolism, and possibly a small increase in the risk of some cancers (such as breast).

## Prognosis

The severity of symptoms is very variable. Some women experience virtually no symptoms, whilst other women find their symptoms debilitating.

Symptoms of the peri-menopause may last 5–10 years, during which time hot flushes decrease in frequency and severity.

If the symptoms are due to chronic oestrogen deficiency, they will be life-long eg atrophic vaginitis.

# Psychosexual Problems

# 19

## Sexual Pain Disorders: Vaginismus and Dyspareunia

Theses two symptoms are often interrelated, as dyspareunia can cause vaginismus.

### Definition

The inability to have penetrative sex due to spasm of the vaginal muscles. Primary is when it has been present from coitarche, secondary is when it develops where sex has previously been pain free.

### Incidence

It is a relatively uncommon problem, but is a relatively frequent presentation.

### Aetilogy and Pathogenesis

The vagina is a fibro-muscular structure lined by epithelium. The surface area is composed of ridges called rugae. The walls of the vagina are usually in apposition, but have the ability to be distended during sex and childbirth. The lower third of the vagina is under control of voluntary muscles – these muscles can be contracted consciously.

Possible causes of vaginismus include:

- Congenital- an anatomical abnormality such vaginal stenosis.
- Traumatic- a previous bad experience can result in contraction of the voluntary muscles as a defense mechanism.
- Inflammatory/Infective – Any cause of vaginitis, such as chronic thrush can cause painful sexual intercourse and consequent vaginismus.
- Denegenerative – lack of oestrogen during the menopause can cause atrophic changes in the vagina. The mucosa becomes less elastic.
- Neoplastic
  - Benign –Precancerous changes of the vulva and/or vagina can result in dyspareunia and possible vaginismus.
- Psychogenic – This is usually primary, and should be considered if no physical cause is identified.
- Iatrogenic – Vaginal atrophy as a result of radiotherapy

### Clinical Asessment

#### History

Women who have avoided using tampons or having sex may have vaginismus.

#### Examination

Speculum examination is often not possible.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_19, © Springer International Publishing Switzerland 2015

### Investigations
Not necessarily helpful.

## Treatment

### Medical
- **Hormonal –** If the problem is associated with menopause, HRT may improve it, particularly local oestrogen.
- **Other medical –** vaginal lubricants can be recommended.
- **Psychosexual counselling** is sometimes recommended, particularly where no physical abnormality is found.

### Surgical
- **Minor-** If vaginal stenosis is diagnosed, the introitus can be enlarged by a reverse posterior repair, where the posterior perineum is incised and repaired longitudinally (Fenton's operation).

  If vaginal adhesions have developed eg. in association with erosive lichen planus, division of adhesions followed by treatment using vaginal dilators may be appropriate.

## Complications

Inability to have penetrative sex may result in frustration and relationship difficulties.

## Prognosis

Many women with dyspareunia/vaginismus will improve with treatment.

# Loss of Desire

## Definition

This is a lack of interest in sex.

## Incidence

This is not uncommon, particularly as women age.

## Aetiology and Pathogenesis

### Hormonal
Lack of oestrogen and testosterone in postmenopausal women may be relevant.

### Psychogenic
Sexual desire varies during the course of life. Many factors can inhibit or enhance sexual desire such as tiredness, ill health, depressed mood, stress, as well as situational factors, such as economic hardship, or lack of privacy.

## Clinical Assessment

### History
A full medical, social, relationship and psychological history is required.

### Examination
The only associated physical abnormality is atrophic vaginitis.

### Investigations
Of little value. Measuring hormone levels is of no benefit.

## Treatment

### Medical
- **Hormonal –** If the problem is associated with menopause, HRT may improve it.
  The administration of testosterone by implant or gel may resolve loss of desire.
- **Other medical –** If there is clinical depression, anti-depressants may be helpful.

### Psychosexual/Relationship Counselling
Psychosexual/relationship counselling enables the woman/couple to understand any potential underlying problem.

## Complications

Lack of sexual intercourse may result in relationship difficulties, which initially may have been the cause of loss of desire- vicious circle.

### Prognosis

Counseling and understanding the underlying problem may help.

## Anorgasmia

### Definition

The inability to achieve orgasm.

### Incidence

This is not uncommon.

### Aetiology and Pathogenesis

#### Physical
Lack of direct stimulation of the clitoris.

#### Psychological
Negative association with sexual intercourse.

### Clinical Assessment

#### History
A full medical, social, relationship and psychological history is required.

#### Examination
Unhelpful.

#### Investigations
Of little value. Measuring hormone levels is of no benefit.

### Treatment

- Education of the woman regarding clitoral stimulation.
- Psychosexual/relationship counselling to facilitate the couples shared understanding.

### Complications

None

### Prognosis

Women may have a fulfilling sex life without necessarily achieving orgasm. However, with minimal intervention, achievement of orgasm may improve satisfaction.

## Male Sexual Problems: Loss of Libido, Erectile Dysfunction and Ejaculatory Problems

### Loss of Libido

As in females, there can be many causes for this. Libido may be affected by tiredness, ill health, depressed mood, stress, and situational factors, such as economic hardship, or lack of privacy. Testosterone deficiency is usually associated with a decrease in sexual desire. Whilst it is more common with advancing age, a direct correlation with hormone levels has not been demonstrated.

#### Treatment
- **Hormonal –** the administration of testosterone by gel, injection or implant may assist with resolution of the problem.
- **Other medical –** If there is clinical depression, anti-depressants may be helpful.
- **Psychosexual counselling**

### Erectile Dysfunction (ED)

This occurs in 30 % of men between 40 and 70 years of age and becomes more prevalent with advancing years. ED can be precipitated by certain medications used for treating hypertension or depression. However, it can be purely organic, for example in association with diabetic neuropathy. Treatment depends on the cause of the problem but generally use of a PD5 inhibitor is

effective for both physical or psychological problems. Psychosexual counselling may be helpful.

## Ejaculatory Problems

Premature ejaculation occurs when a man ejaculates and loses his erection before he or his partner is sexually satisfied. It is more likely to be due to a psychosexual cause than a physical cause, and psychosexual counselling may help. Antidepressants of the SSRI group may also be helpful.

Delayed ejaculation is less common, and its mechanism is poorly understood. It is often situational, and psychosexual counselling may help.

# Part III

# Obstetrics

# Antenatal Care

# 20

The Obstetric History and Examination and Antenatal Assessment are discussed in Chap. 5.

The aim of antenatal care is to ensure that the baby is delivered in the best condition, and that any problems are diagnosed as early as possible.

## At the First Visit

- Confirm pregnancy and establish the expected date of delivery. This is 9 months and 7 days after the Last Normal Menstrual Period (LNMP) – assuming day 14 ovulation. This is easily calculated: from January to March add 9 months; from April to December take away 3 months; then add 7 days.
  *This should be confirmed using ultrasound*
- Clinical assessment to identify any conditions that may be relevant during the pregnancy

## Routine Investigations at First Visit

### Haematology

- Full blood count (FBC) including Mean Corpuscular Volume (MCV) and Mean Corpuscular Haemoglobin Concentration (MCHC). If abnormal, haemoglobin electrophoresis should be undertaken to detect thalassaemia.
- Blood group and antibody screen (this includes Rhesus and other minor red blood cell antigens).

### Infection Screens

- Rubella immunity- check at the start of each pregnancy
- Varicella immunity –checking is recommended if there is not a definite history of previous infection
- Syphilis serology and HIV
- Hepatitis B and Hepatitis C serology is recommended
- CMV- not performed routinely
- Toxoplasma screening – if indicated
- Chlamydia screening – can be offered
- Midstream urine, microscopy and culture

### Hormone Tests

- TSH – uniform screening for subclinical thyroid disease is still controversial

### Vitamin D

Women at risk of deficiency should be screened (low exposure to sunlight)

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_20, © Springer International Publishing Switzerland 2015

## General Advice

- Advice about a healthy diet and sensible weight gain (ideally no more than a pound a week)
- Work plan
- Avoiding smoking and recreational drugs
- Avoiding any non-prescription medications
- Avoid exposure to X-rays and other radiation unless absolutely necessary
- Avoid alcohol if possible
- Exercise during pregnancy is not harmful but contact sports should be avoided
- The risk of listeria is reduced if high risk foods are avoided. These include unpasturised cheeses, uncooked meats, pate and undercooked prepared meals
- Herbal medicines should be avoided as few of these have been proven to be safe and/or effective in pregnancy
- Vitamin and mineral supplementation:
  - All women should commence **folic acid** (400 ug) before conception and this should be continued for the first 12 weeks of the pregnancy. Women who have previously conceived an affected child with neural tube defect (NTD) should be recommended to take 5 mg folic acid daily. This also applies to diabetic women.
  - **Iron Supplements –** should only be offered if iron deficiency is diagnosed (side effects outweigh benefits).
  - **Vitamin A –** Supplementation above 700 ug may be teratogenic and should be avoided.
  - **Vitamin D –** a supplement of 10 ug per day is recommended for all women.
  - **Iodine** 150 ug/day is recommended.

## Antenatal Visits

- The aim of these visits is to detect any pregnancy related problems that could be minimised by early intervention
- To undertake a risk analysis in order to compare the risk of delivery (prematurity) against the risk of continuing the pregnancy (to either or both the foetus and mother)
- Routine antenatal examination as described in detail in Chap. 5. Blood pressure measurement and urine testing for protein are essential and carried out at each visit to detect hypertension of pregnancy and pre-eclampsia
- Frequency of visits should be timed to correspond with investigations:
  - Ultrasound at 12 weeks to detect neural tube defects. This is undertaken in combination with biochemical testing to screen for aneuploidy.
  - Screening for aneuploidy, especially trisomy 21 and trisomy 18, is undertaken to identify women with increased risk. These women are then offered a diagnostic test (amniocentesis, chorionic villus sampling, tertiary ultrasound), with the option of termination of pregnancy if the couple choose.
  - *Combined first trimester screening* involves an ultrasound examination in combination with biochemical tests. The *nuchal thickness* and *crown-rump length* (CRL) are measured (when CRL is 45–84 mm corresponding to between 11 and 13 weeks 6 days). Biochemical analysis of maternal blood for *Pregnancy Associated Placental Protein (PAPP-A)* and *Free β hCG* is analysed. This information together with maternal age is analysed on a computer program using Fetal Medicine Foundation (FMF) software. The risk is then calculated as 1:X. A ratio higher than 1:300 is considered "increased", and confirmatory tests are indicated, ie CVS or amniocentesis, where the karyotype can be confirmed.
  - **Non Invasive Prenatal Testing (NIPT)** has recently become available. Women have a blood test after 10 weeks gestation which is analysed for cell free DNA, released from the placenta. This can be used to assess the genetic make up of the foetus. This technique has been validated in several clinical trials with an accuracy of 99 % for trisomy 18 and 21, and 80–90 % for trisomy 13.
  - A foetal **morphology scan** is recommended at 18–20 weeks
  - Screening for **gestational diabetes** should be performed at 26–28 weeks gestation. In

**Table 20.1** Criteria for diagnosing GDM and diabetes mellitus in pregnancy (DMP) (WHO definition)

| Diagnosis | Fasting glucose (mmol/l) | I hour after 75 g load (mmol/l) | 2 h after 75 g load (mmol/l) |
|---|---|---|---|
| Normal | <5.1 | <10.0 | <8.5 |
| GDM | 5.1–6.9 | >10.0 | 8.5–11.0 |
| DMP | >7.0 | | >11.1 |

women at high risk of Gestational Diabetes Mellitus (GDM), earlier screening may be considered, but should be repeated at 26–28 weeks even if the previous test is negative.

- The recommended test is a 2 h 75 g Pregnancy Oral Glucose Tolerance Test (POGTT). Abnormalities are classified as: (Table 20.1)
- **Rh antibody** measurement for Rh negative women and **haemoglobin** estimation for all women is undertaken at 28 weeks. For Rh negative women (with no antibodies), prophylactic Anti-D (125 mcg) should be administered routinely at 28 and 34 weeks gestation. It should also be administered if there is antenatal haemorrhage, amniocentesis, or External Cephalic Version (ECV) has been attempted, or any external abdominal trauma.
- The magnitude of any feto-maternal haemorrhage can be estimated using Kleinhauer testing of maternal blood.
- **Syphilis, HIV, Hepatitis B and C** re-screening is indicated in "high risk" individuals.
- **Group B streptococcus (GBS) screening**. Local protocols define whether GBS screening is universal, or risk based. Risk factors include labour commencing under 37 weeks, prolonged rupture of the membranes, or maternal fever. Screening should be undertaken at 35–37 weeks with both vaginal and rectal swabs for microscopy and culture.
- In women with previous GBS bacteruria during pregnancy, or previous GBS infection during pregnancy antibiotics should be administered during labour.
- Beyond 28 weeks the **growth of the foetus** and the quantity of liquor are assessed to detect any intrauterine growth restriction (IUGR). It is recommended that visits should be every 2 weeks until 36 weeks.

## Late Pregnancy Foetal Surveillance for IUGR

This should be undertaken if:

- There is clinical suspicion of IUGR on examination
- Poor past obstetric history
- Maternal conditions that can compromise the foetus eg hypertension of pregnancy
- Inability to clinically assess growth eg. maternal obesity

Monitoring includes antepartum foetal monitoring to study the reaction of the foetal heart to Braxton-Hicks contractions (CardioTocoGraphy – CTG).

This can be combined with a "biophysical profile" where ultrasound scanning is undertaken to measure the amniotic fluid volume, foetal body tone, foetal movements and foetal breathing pattern.

The ultimate decision during antenatal care is "**when is the baby safer outside than inside"** ie. when should it be delivered with either induction of labour or Caesarean section.

# The Labour

# 21

## Definitions

### The Stages of Labour

Labour is divided into three stages:

**Stage I** - From the onset of labour until full dilatation of the cervix.

**The precise onset of labour** is difficult to define. Technically, it starts with the commencement of dilatation of the cervix. In primagravida this is preceded by effacement (thinning of the cervix) and this is diagnosed by vaginal examination. Three imprecise "markers" can be used as possible milestones to gauge the onset of labour (Table 21.1):

1. The onset of **regular, painful, contractions.** "Regular" is debatable, but having three contractions in 10 min is interpreted as regular. Contractions are defined as "painful" in an attempt to differentiate them from Braxton-Hicks.
2. **A "show" is** the loss of the mucus plug from the cervix as dilatation commences.
3. **Rupture of the membranes.** This is less helpful, as some women have premature rupture of membranes, and in other women the membranes don't rupture until they are in established labour.

**Stage II** - From full dilation of the cervix, until the delivery of the baby.

**Stage III** - From delivery of the baby until delivery of the placenta and membranes.

**Table 21.1** Stages of labour

| | Onset | End |
|---|---|---|
| 1st stage | Onset of contractions | Full dilatation |
| 2nd stage | Full dilatation | Delivery of baby |
| 3rd stage | Delivery of baby | Delivery of placenta and membranes |

## The First Stage

Every labour should be considered as a "trial of labour". The goal for most women is a "normal vaginal delivery", but one needs to be prepared to proceed to a surgical delivery in the event of one of the following three complications arising:

1. Failure to progress
2. Foetal distress
3. Maternal distress

### Progress During the First Stage

This is assessed using both abdominal and vaginal examination.

The two "Key Performance Indicators" are **descent of the presenting part,** and **dilatation of the cervix.**

These two parameters are recorded on a partogram, which documents progress, and also highlights if there is a delay.

Descent of the presenting part during labour is monitored by both abdominal and vaginal

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_21, © Springer International Publishing Switzerland 2015

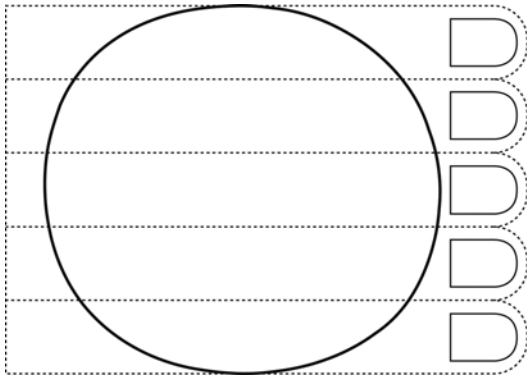


**Fig. 21.1** The feral head- five fingers

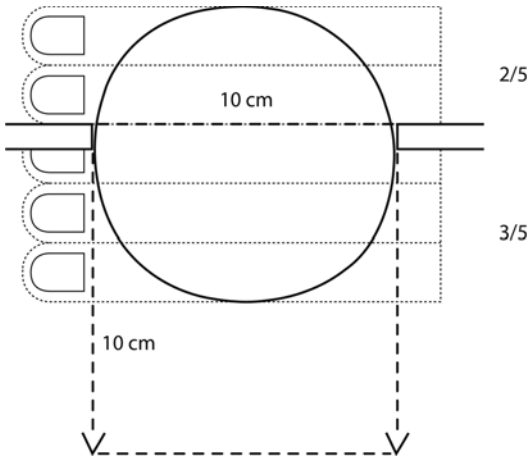



**Fig. 21.2** The foetal head "engaged"

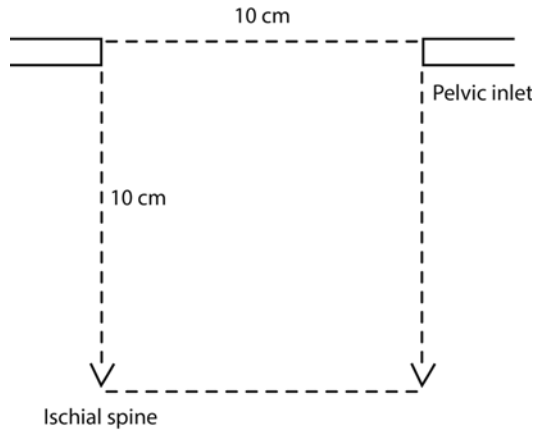



**Fig. 21.3** The pelvis as a "box"

examination. The **station** on abdominal examination is described as, "how many finger breadths of head are palpable above the pelvic brim". The foetal head measures approximately 10 cm in diameter. The foetal head can be divided into five fifths, corresponding to five finger breadths (Fig. 21.1). As the foetal head enters the pelvic brim, five finger breadths are palpable. During labour this reduces sequentially to one finger breadth and then nil.

Once the head is **engaged** – *the widest diameter of the presenting part has passed through the pelvic inlet*- only two fingers of head are palpable above the pelvic brim (Fig. 21.2).

In order to better understand the relationship between the pelvis and the foetal head, imagine that the pelvis is a "box" about 10 cm wide, and 10 cm long (Fig. 21.3).

Once the head is *engaged,* at least 6 cm of head are within the pelvis (the imaginary box) and the vertex is about 4 cm above the ischial spines (Fig. 21.2).

Once a primagravida has passed through the latent phase, the cervix should dilate at approximately a rate of 1 cm for each hour of labour. The latent phase precedes this and during this time the cervix effaces and dilates to 3 cm, which may take 8–12 h.

The foetal head (in a cephalic presentation) should steadily descend (as described in Chap. 5), so that by the end of the first stage, it is totally in the pelvis, with no foetal head palpable above the pelvic brim, and the presenting part at, or below, the ischial spines (Fig. 21.4).

Progress is **delayed**.

If the foetal head is not descending, and the cervix is not dilating at the expected rate, progress is "delayed".

A common cause for this is if the woman is not in established labour.

A woman's labour is assessed by timing her contractions over a representative 10 min period. For established labour, one would expect three to four contractions of medium to strong intensity lasting at least 60 seconds. When labour is assessed manually, the foetal heart should be auscultated and counted after each contraction, to detect decelerations.

The quality of contractions can be monitored electronically by external or internal pressure monitors. This can be combined with continuous

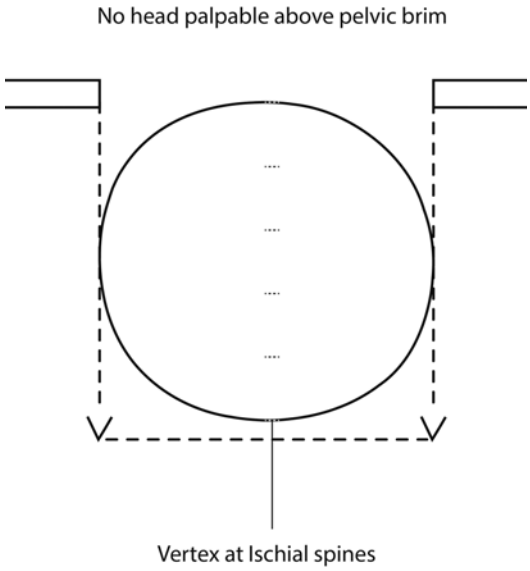



**Fig. 21.4** The foetal head in the pelvis at the end of the first stage of labour

foetal heart rate monitoring – cardiotocograph (see below).

If the woman is not in established labour, the labour may be augmented with a syntocinon infusion, unless there are contraindications. The concentration and rate of infusion of syntocinon is increased until three to four strong contractions occur every 10 min.

If there is "failure to progress" over a 4 h period despite established labour, a diagnosis of "obstructed labour" is highly likely, and operative delivery needs to be considered.

The duration of the first stage of labour in a primagravida should be under 20 h (8–12 h latent, 8 h active). In a multigravida this tends to last 8–10 h, but is far more unpredictable.

## Foetal Distress

The first sign that the foetus may be distressed (hypoxic due to some compromise of its oxygen supply) is the appearance of meconium in the liquor. This signifies that the foetus has passed meconium, similar to a person opening their bowels when severely stressed.

A more accurate assessment of the foetal condition can be obtained by assessing the pattern of the foetal heart rate. This can be auscultated, using a stethoscope or pinnard or more commonly with a hand held ultrasound (Doppler), or can be monitored electronically with a foetal heart monitor (cardiotocography CTG). There are both external monitors attached to the abdomen, which detect the foetal heart beat, or internal monitors, attached to the foetal scalp (used only after membranes are ruptured) – direct foetal ECG recording.

The important observation is the relationship between the foetal heart rate and uterine contractions. During uterine contractions, due to the raised intrauterine pressure, the foetal heart rate often slows, but recovers quickly as soon as the contraction ceases. If there is a degree of foetal distress, the recovery in heart rate is delayed.

CTG Patterns.

1. Baseline Foetal Heart Rate (FHR):
   - If the FHR is between 110 and 160 beats per minute (bpm) it is classified as "reassuring".
   - A FHR of 100–109 bmp, is "non-reassuring".
   - A FHR of less than 100 bpm or more than 180 bpm for over 10 min is "abnormal".
2. Variability: There should be beat to beat variability of at least 5 bpm. If the tracing does not show this variation (flat trace) and this persists for more than 30 min, it is classified as "abnormal".
3. Decelerations: If there is no deceleration with contractions, the trace is "reassuring". If there are decelerations with more than 50 % of contractions, or if the decelerations persist after the contraction has stopped, this is considered "abnormal". True early decelerations with rapid recovery are not "abnormal". Persistent decelerations lasting more than 3 min are "abnormal".
4. Accelerations: if these are present, they are reassuring. Their absence is not necessarily abnormal. A persistent tachycardia, especially in association with other "non reassuring" signs is abnormal.

What to do if the CTG is abnormal:

- Inadequate trace – check connections, apply foetal scalp electrode, compare foetal heart rate with maternal pulse.

- Excessive uterine contractions – if syntocinon has been given, stop or reduce flow.
- Consider using tocolytics eg. beta agonists, calcium channel blockers and prostaglandin synthetase inhibitors.
- Maternal tachycardia – check maternal temperature, hydration status and blood pressure.
- Consider other maternal adverse effects
  - Positional – roll onto left lateral position
  - Recent top-up of epidural
  - Recent use of bed pan or vomiting

If no reversible factor present and trace continues to be abnormal, either perform foetal blood sampling (FBS) or expedite delivery.

Foetal blood sampling is used if the foetal heart monitoring suggests distress, or if it does not give enough information about the well-being of the baby. This test is done through an examination cone, which is placed on the baby's head. The scalp is cleansed and is then punctured. The blood sample is aspirated via a thin plastic tube, and is sent to the laboratory, where the pH of the blood sample is determined. A level above 7.25 is considered normal, 7.20–7.25 borderline, and below 7.20 suggests the baby is not getting enough oxygen, and delivery should be expedited.

Possible future developments for foetal surveillance in labour:

Devices for continuous foetal blood oxymetry are being developed. Computerised programmes for interpreting FHR are also in development.

### Maternal Distress

It is unusual to have to terminate labour because of maternal distress.

Maternal pain can be controlled with nitrous oxide inhalation, narcotic analgesia, or epidural analgesia. Hydration, and nutrition can be controlled with intravenous infusion of glucose and/or saline.

Occasionally, if the woman has a medical condition, or can no longer cope the foetus will need to be delivered.

## The Second Stage

### Normal Vaginal Delivery

The role of the practitioner is to guide the foetus through the vagina and perineum without undue delay, and with minimal damage to the foetus or the mother.

This initially requires that the presenting part is controlled, so that as the mother pushes, the foetal head does not come out too quickly, which may damage the foetus or cause tears of the perineum. The practitioner needs to lean on the head to provide control against the woman pushing, which she does with each contraction.

Once the head is delivered, it is pushed downwards, so that cord around the baby's neck can be detected. If present it is either looped over the head, or clamped with forceps and cut. The baby's face is wiped and the nose and throat are usually aspirated to remove blood and mucus. The baby can now breathe, although the body is still within the pelvis, and expansion of the lungs is restricted.

The head is the rotated, and the anterior shoulder is delivered with downward traction. If there is difficulty delivering the anterior shoulder (shoulder dystocia), the bottom of the bed needs to be lowered to allow extra downward traction. Once the anterior shoulder is delivered the foetus is elevated to deliver the posterior shoulder, watching the perineum to avoid tearing. The foetus is then delivered, the cord is cut and clamped, and the Apgar score is recorded.

The baby is then wrapped in a cloth and kept warm. If spontaneous respirations are not immediately established, signified by the baby crying, resuscitation should commence immediately.

Sometimes a medio-lateral episiotomy is cut to increase the size of the introitus, and avoid tearing and facilitate delivery.

Once a tear starts, it cannot be controlled, and may extend into the skin or even through the muscle of the anus.

Tears are classified as first, second, third or fourth degree:

First degree – only involves the vaginal epithelium
Second degree – involves underlying muscle
Third degree – involves external anal sphincter muscles
Fourth degree – involves internal anal sphincter muscles and ano-rectal mucosa

The second stage should be completed within 3 h (1 h for descent, 2 h of pushing) in a primagravida unless there is foetal distress. In a woman who has had a previous vaginal delivery, the second stage should be significantly shorter.

### Lower Uterine Segment Caesarean Section (LUSCS)

If cervical dilatation has not reached 10 cm, and the presenting part has not descended to the ischial spines, with no progress over 4 h despite established labour, then Caesarean Section is indicated. This can be performed under epidural/spinal anaesthesia or less commonly under general anaesthesia.

### Assisted Delivery (Forceps or Vacuum)

Assisted delivery (forceps or vacuum) may be undertaken if the cervix has fully dilated.

The prerequisites for a vaginal instrumental delivery are:

1. The cervix must be fully dilated (vacuum delivery may be contemplated if the cervix is almost fully dilated and the presenting part is well down below the spines).
2. There must be no head palpable above the pelvic brim.
3. The presenting part must be at or below the ischial spines.
4. The operator must be certain of the position of the head (the relationship of the occiput to the symphysis pubis).
5. The bladder and rectum should be empty.
6. There should be adequate analgesia (Table 21.2).

**Table 21.2** An acronym for assisted delivery

| | |
|---|---|
| F | Fully dilated |
| O | Zero head above the brim |
| R | Right below spines |
| C | Certain of position |
| E | Empty bladder/bowel |
| P | Pain free |

## The Third Stage

The third stage is usually assisted. Once the baby is delivered and it is confirmed that the uterus is empty, an injection of syntometrine, which causes uterine contractions, is administered. This promotes the separation of the placenta. The signs suggesting that this has taken place are, the lengthening of the cord and a fresh show of blood. This facilitates delivery of the placenta with controlled traction with the right hand, whilst the left hand supports the uterine fundus above the symphysis.

Care has to be taken not to pull on an unseperated placenta as this can cause uterine inversion, hypotension and shock.

If the placenta is not be delivered with 30 min, manual removal should be considered.

Postpartum haemorrhage is discussed in Chap. 26.

# Multiple Pregnancy

# 22

## Definition

Multiple pregnancy is when there is more than one foetus. Two babies are twins, three babies are triplets, four babies are quadruplets and five babies are quintuplets and so on.

Twins can be mono-zygotic (MZ) (from one zygote – where an embryo splits) or di-zygotic (DZ) where they arise from two different fertilised oocytes. They can be mono-chorionic or di-chorionic. Chorionicity is critical for management. Mono-chorionic twins are always mono-zygotic.

Chorionicity is determined by ultrasound in the first trimester. Mono-chorionic twins need much closer surveillance. Most mono-chorionic twins are di-amniotic, each with its own amniotic sac, but occasionally they are mono-amniotic.

## Incidence

The incidence of natural twins is 1:90, triplets is $1:90 \times 90 = 1:8{,}100$, and quads $1:90 \times 90 \times 90 = 1:729{,}000$.

During the last few decades the incidence of multiple pregnancies has risen as a result of reproductive technology, ovulation induction and in vitro fertilization.

## Aetiology and Pathogenesis

Di-zygotic twins occur as a result of superovulation, but can also be due to the transfer of multiple embryos, resulting in non-identical twins. Monozygotic twins are due to the embryo splitting. It is suggested that embryos transferred during IVF at the blastocyst stage have a higher incidence of monozygotic twinning (incidence 2 %).

Whether twins are mono-amniotic or bi-amniotic, mono-chorionic or bi-chorionic depends on the gestation at which the embryo splits.

## Clinical Assessment

### History

Multiple pregnancy is suspected if the woman complains of excessive morning sickness or a bigger "bump" than expected.

### Examination

In early pregnancy, a uterus larger than dates is the first hint of a multiple pregnancy. Beyond 28 weeks, a multiple pregnancy may be suspected when more than two poles can be palpated.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_22, © Springer International Publishing Switzerland 2015

## Investigations

- Biochemistry – during the early first trimester, the level of quantitative beta HCG may be higher than expected for the stage of gestation.
- Ultrasound – the definitive test is ultrasound examination. It is also essential to in order to determine chorionicity.

## Treatment

### Antenatal

A twin pregnancy is considered "high risk" due to maternal and foetal factors.

The treatment of di-chorionic twins is not significantly different to a singleton pregnancy. The complications of preterm birth, APH, PPH, maternal hypertension, and the risk of congenital abnormality of the foetuses, is greater. Consequently, more frequent antenatal visits are required.

Women with mono-chorionic twins should have ultrasound surveillance for twin-to-twin-transfusion syndrome (TTTS) (which occurs in about ten per cent of monochorionic twins), and intrauterine growth restriction (IUGR) from the start of the second trimester. This includes assessing each twin for growth, amniotic fluid volume, bladder volume, and umbilical and middle cerebral artery doppler wave form.

Twin anemia/polycythemia syndrome (TAPS) occurs in 5 % of monochorionic twins, and is the result of a slow blood transfusion from the donor to recipient. As there is no discordance in amniotic fluid, this is diagnosed by measuring peak middle cerebral artery blood flow on ultrasound.

### Surgical

The possibility of "foetal reduction" should be considered for high multiples (triplets or greater). This is performed by injecting, under ultrasound control, the smallest of the fetuses with intra-cardiac potassium chloride, which causes cardiac arrest. The risk is that the other fetuses may also succumb.

If there is TTTS, laser ablation of vascular connections between the placentas should be considered.

It is also recommended that mono-chorionic twins be delivered at 37 weeks because of a higher rate of sudden still birth.

## Delivery

### Mode of Delivery

Many twin pregnancies are delivered by Caesarean Section. Nevertheless, the principles of how to deliver twins should be understood.

### Vaginal Delivery

Vaginal delivery should be undertaken in a setting where emergency CS can be undertaken at short notice. Both twins should be monitored with CTG. Anaesthetic backup should be available to provide adequate analgesia for the second stage of vaginal delivery. Having an epidural is advisable as this facilitates assisted delivery of the second twin.

Having the first twin present as a breech is a relative contra-indication to vaginal delivery.

The delivery of the first twin should be treated on its merits.

After delivery of the first twin, any syntocinon infusion should be stopped. It should be ascertained that the second twin is longitudinal, at which stage the syntocinon is recommenced, and the membranes are ruptured. If the second twin is cephalic either the mother can push, or an assisted delivery with vacuum or forceps can be carried out. If the second twin is breech, assisted breech delivery/or breech extraction should be carried out. If the lie of the second twin is **not** longitudinal, internal version and breech extraction should be undertaken. This is facilitated by the use of an epidural.

After delivery, the third stage should be managed actively, because of the risk PPH. The use of an oxytocic infusion post delivery is helpful in decreasing the risk of PPH.

## Prognosis

In a study of over 700 twin pregnancies, it was observed that about one in four diagnosed on an early ultrasound, spontaneously reduced to a singleton pregnancy. Whilst 6.6 % of women lost both twins, one in five went on to term (>37 weeks), whilst one in three delivered early between 33 and 36 weeks. Furthermore 20 % delivered before 33 weeks.

The perinatal mortality per 1,000 births was 6.5 for babies delivered over 37 weeks, 8.0 for babies delivered between 33 and 36 weeks, and 41.7 for babies delivered between 29 and 32 weeks, and 500 (one in two) for babies born under 28 weeks.

Spontaneous triplets are rare, and most are the result of ART. Consequently they almost always result from three different embryos.

Their management is similar to twins, but delivery is always by Caesarean Section.

# Malpresentation

# 23

## Breech, Transverse & Unstable Lie, Brow, Face & Compound Presentation

### Definition

Any presentation that is not a longitudinal lie with a vertex presentation is said to be a malpresentation.

A *Breech presentation* is when the baby's feet or buttocks are presenting in the pelvis.

A *transverse/oblique lie* is when the head is not in the pelvis and the fetus is in a horizontal position.

An *unstable* lie is when the presenting part changes position.

A *brow* presentation is when the head is deflexed and instead of the vertex, the brow presents.

A c*ompound* presentation is when there is a head or a breech plus a limb presenting.

### Incidence

Although one in five fetuses are a breech presentation at 28–32 weeks, by term most turn to a cephalic presentation, with only one in 25 persisting a breech presentation. Transverse and unstable lie are uncommon. Brow and compound presentations are only diagnosed in labour, and are vey uncommon.

### Aetilogy and Pathogenesis

Most babies are in a cephalic presentation as the natural shape of the foetus matches the shape of the uterine cavity (Fig. 23.1). Any factor that changes this "best-fit" relationship can predispose to malpresentation.

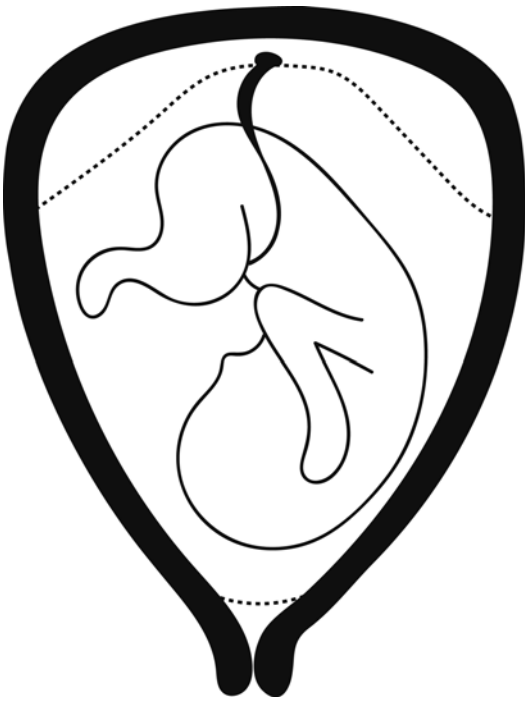


**Fig. 23.1** The shape of the foetus matching the shape of the uterus

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_23, © Springer International Publishing Switzerland 2015

To analyse possible causes one can use the "*Passengers/passages/powers*" framework.

Possible cause of malpresentation:

Passengers

- Foetus – any abnormality of the foetus which alters its usual shape
  - Anencephaly
  - Hydrocephaly
  - Extended head (possibly due to a thyroid tumour)
  - Undiagnosed prematurity
- Liquor- polyhydramnios – giving the foetus a chance to move around
- Placenta – Placenta praevia (probably the most serious) – if the placenta occupies the lower uterus, the head will be unable to engage.
- Membranes – not a cause
- Cord – not a cause

Passages

- Boney – severe restriction of pelvic inlet
- Soft tissue
  - Uterine abnormality eg septum
  - Lower segment or cervical fibroid deforming uterine cavity

Powers

- Primary – Lax floppy grand-multigravid uterus
- Secondary – these cannot effect presentation

## Clinical Assessment

### History

The woman may describe kicking low down in her abdomen, or the feeling of a hard lump (the head) under the ribcage.

### Examination

In a breech presentation, the head will not be palpable in the pelvis, and will be palpable in the upper abdomen.

In an *unstable lie,* the head will be detected in a different position at each examination or can be moved around the abdomen.

Compound and brow presentations will be diagnosed in labour only on vaginal examination.

### Investigations

The most useful investigation is ultrasound, which can eliminate the causes listed above. A specialist obstetric ultrasound should be arranged when a malpresentation is suspected.

## Treatment

### Medical

The only antenatal treatment for a breech presentation is external cephalic version (ECV). Performing ECV decreases the chance of Caesarean Section being required. If a Caesarean Section is indicated for other reasons, an ECV should not be performed. Usually ECV has a low complication rate, but about 1 in 200 attempts require immediate Caesarian Section for an adverse outcome (abruption of the placenta, or acute foetal distress). It should only be attempted with a normal uterus and no foetal contraindications eg intrauterine growth restriction.

For transverse or unstable lie diagnosed during labour, the only options is Caesarian Section.

With brow presentation the foetal head sometimes flexes, allowing vaginal delivery, similarly for compound presentation, the limb may move during labour. Otherwise Caesarian Section is required.

### Surgical

More than 90 % of breech presentations at term are now delivered by Caesarean Section. All other malpresentations need to be delivered by Caesarian Section if they persist at the onset of labour.

## Complications

The risk of serious perinatal morbidity or mortality is about 5 % for a breech delivery.

## Prognosis

In 2000, the "Term Breech Trial (TBT)" was published. This showed that both perinatal morbidity and mortality were significantly reduced by elective Caesarian Section. Since then most breech presentations have been delivered by Caesarian Section. There has been some criticism of the TBT methodology. Consequently a "trial of vaginal delivery" can be considered by an experienced obstetrician, subject to certain conditions. This requires appropriate infrastructure, especially the ability to perform immediate Caesarian Section.

Contraindications to trial of vaginal delivery

- Clinically inadequate maternal pelvis
- Any other obstetric complication eg hypertension
- Any foetal abnormality incompatible with vaginal delivery eg extended head
- Foetal growth restriction or macrosomia

Prerequisites for a trial of vaginal delivery

- Continuous foetal heart rate monitoring
- Ability to perform Caesarian Section without delay
- Immediate availability of an experienced obstetrician
- Appropriate counselling of the couple

Principles of breech delivery

- Any sign of foetal distress or delayed progress should be an indication for a Caesarian Section
- Appropriate analgesia should be provided to allow manipulation of the baby
- At full dilatation, when the perineum is distended an episiotomy should be performed and the woman encouraged to push until the legs and buttocks have been delivered
- Cover the breech with a warm nappy "breech cloth" and bring down a loop of umbilical cord
- Deliver the shoulders by repeated lateral rotation till the arms drop
- Once the shoulders are delivered let the body hang to allow the head to descend into the pelvis
- Once the hairs at the nape of the neck are visible, swing the body (wrapped in the breech cloth) over the pubis onto the abdomen. This extends the head and should bring the face onto the perineum.
- When the face is visible, suck out the nose and mouth
- Deliver the "after coming" head by forceps
- Manage the third stage as usual

# Early Pregnancy Loss and Ectopic Pregnancy

# 24

## Early Pregnancy Loss

### Definition

First trimester pregnancy loss is usually called a "miscarriage". However "early pregnancy loss"(EPL) is all encompassing as it also includes ectopic pregnancy.

### Incidence

The reported incidence for EPL varies with age.
12–19 years : 13 %
20–24 years: 11 %
25–29 years: 12 %
30–34 years: 15 %
35–39 years: 25 %
43–44 years: 51 %
>45 years: 93 %

In addition to the reported incidence described above, subclinical pregnancy loss is common and often occurs without the woman being aware of having been pregnant.

Increased paternal age is also a risk factor for early pregnancy loss.

### Aetilogy and Pathogenesis

#### Congenital

Most early pregnancy loss is unexplained. Chromosomal analysis is not usually carried out on the products of conception, unless the woman has had several pregnancy losses. A woman who has suffered three EPLs is called a "habitual aborter". However from examining the products of conception of spontaneous aborters it appears that one of the commonest causes for EPL is aneuploidy (chromosomal abnormality).

#### Traumatic

Surgical trauma can be a cause of early pregnancy loss. With ready access to legal abortion this is a rare cause of EPL.

#### Inflammatory

Many infections can result in EPL. These include rubella, toxoplasma, herpes infection, CMV, Listeria, Syphilis, or any febrile illness.

#### Vascular

Many women experience bleeding in early pregnancy, but this is not always associated with EPL. Implantation bleeding is a common cause of blood loss in early pregnancy. This occurs in the process of the placenta burrowing into the endometrium. If this results in disruption of placental function to a degree where survival of the embryo/foetus is not possible, EPL occurs.

#### Haematogenous

It is believed that thrombophilia (increased tendency for thrombosis) may be a cause for EPL. The hypothesis is that the small arterioles in

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_24, 

the placenta are blocked by blood clot, and hypoxia results.

### Endocrine
Thyroid disease, diabetes, and PCOS are associated with a higher risk of EPL.

### Psychogenic
Stress and emotional problems may be associated with EPL, but there is no evidence for this.

### Iatrogenic
Removal of the corpus luteum before 12 weeks of gestation will cause EPL. The placenta does not produce sufficient oestrogen and progesterone until that time, to maintain the early pregnancy.

## Clinical Assessment

### History
The important questions are:
- Gestation (time since last normal menstrual period)
- Amount of bleeding and whether tissue has been lost
- Presence of pain

### Examination
- Is the cervix is open or closed
- Uterine size
  - does this correspond to gestation

### Investigations
- Biochemistry – quantitative measurement of bHCG (each laboratory has its own normal range). Serial measurements of bHCG are useful as in a viable pregnancy, the level should double every 36 h.
- Ultrasound – this is the best diagnostic test to assess early pregnancy with bleeding. However a single ultrasound examination is not diagnostic especially if the time of conception is uncertain. A second scan 7 days later should show appropriate growth and development. The important diagnostic features include the gestational sac diameter, the presence of a yolk sac, crown-rump length and foetal heart beat and rate (Table 24.1).

## Treatment

### Threatened Abortion
There is no proven treatment for threatened abortion. The use of hormone supplements (eg. progesterone) is of no benefit. Bed rest is of no benefit.

### Inevitable Abortion/Incomplete Abortion/Missed Abortion
These can be managed conservatively, waiting for the products to be expelled, or actively with medical or surgical techniques.
- **Medical**
  - Hormonal:
    - Misoprostol (vaginally or orally)
    - Pain relief
    - Anti-emetics.

  A pregnancy test should be performed after 3 weeks.
- **Surgical – evacuation of retained products of conception (ERPC)**
  - **Minor** – Manual vacuum aspiration under local anaesthetic in an outpatient setting, or suction termination under general anaesthetic

  **Anti D prophylaxis should be provided to all Rh negative women**

**Table 24.1** Summary of the clinical features of threatened, inevitable, incomplete and missed EPL

| | Bleeding | Pain | Cervix | Ultrasound |
|---|---|---|---|---|
| Threatened | Slight | Nil | Closed | Foetal heart |
| Inevitable | Significant | Yes | Open | No fetal heart |
| Incomplete | Clots/tissue | Yes | Open | Products/clot |
| Missed | Nil | Nil | Closed | No foetal heart |

## Complications

These include infection, bleeding, hypotension, or Rh immunisation- in Rh negative women with a Rh positive foetus.

### Infection

If this is associated with an incomplete miscarriage, it is known as a *septic abortion*. This can be a serious complication. Symptoms include pain, fever, rigors and offensive discharge. On examination the uterus may be tender. Antibiotics should be administered as soon as possible once swabs for microscopy and culture have been taken. Blood cultures may be required if septicaemia is suspected.

### Bleeding

Bleeding is most common with an incomplete abortion, especially if placental tissue is extruded into the cervix. A speculum examination and removal of the tissue will decrease the pain, bleeding, and treat cervical shock (hypotension).

### Rh Immunisation

Rh immunisation can be prevented by administering anti D (250 IU) IM.

## Prognosis

EPL is common. Most women will go on to have a successful pregnancy.

# Recurrent Pregnancy Loss

## Definition

Three or more pregnancy losses up to 24 weeks gestation

## Incidence

About 1 % of couples (see age related data above regarding incidence with age) After three EPLs the risk of a fourth is 40 %.

## Aetiology and Pathogenesis

The risk factors for recurrent pregnancy loss include maternal age and the number of previous EPLs. Cigarette smoking caffeine and alcohol (>5 units per week) may be associated with EPL.

### Congenital

- Genetic factors – a balanced translocation on karyotyping is found in 2–5 % of couples with recurrent EPL. Embryonic aneuploidy occurs in 30–50 % of subsequent embryos.
- Uterine abnormalities – the incidence of uterine abnormalities in women with recurrent EPL varies from 2 to 40 %. It is not known whether these are causative.

### Inflammatory

- Antiphospholipid syndrome (lupus anticoagulant, anticardiolipin antibodies and anti-$b_2$ glycoprotein- 1 antibodies) is a treatable cause of EPL. The effect of this condition is to inhibit trophoblast function as a result of a local inflammatory response.
- Systemic infection with a bacteraemia or viraemia can cause EPL. Toxoplasma, rubella, CMV, herpes and listeria have all been implicate but there is no good evidence for these agents to be responsible for recurrent EPL.

### Vascular

Thrombophilia correlates better with late rather than early pregnancy loss. Both Factor V Leiden, and Prothrombin gene mutation have been associated with recurrent EPL.

### Endocrine

Thyroid disease, diabetes and PCOS are associated with recurrent EPL.

## Clinical Assessment

### History

Outcome of previous pregnancies

### Examination

Of little benefit

### Investigations

Thrombophilia screen

- Cytogenetics – on products of conception, and paternal and maternal karyotype
- Uterine ultrasound (looking for uterine structural abnormality)

### Treatment

#### Medical

- **Hormonal** –There is no proven benefit in progesterone supplementation
- **Other medical** – women with thrombophilias should be treated with low dose heparin and/or aspirin

#### Surgical

- **Minor**
  - Resection of uterine septa is logical, but there is no evidence to prove its efficacy
  - Suspected cervical weakness can be treated by cervical cerclage

### Complications

The same as EPL

### Prognosis

Many women with unexplained recurrent EPL have a good prognosis for future pregnancy outcome without intervention

## Ectopic Pregnancy

### Definition

A pregnancy outside the uterine cavity

### Incidence

Between 1 and 2 % of pregnancies

### Aetilogy and Pathogenesis

The most common site is the fallopian tube, but ectopic pregnancies can also occur on the surface of the ovary or anywhere in the peritoneal cavity. Ectopic pregnancy is caused by the failure of the fallopian tube to transport the embryo into the uterine cavity. It is sometimes associated with tubal damage following salpingitis, but often the tube looks macroscopically normal. A previous tubal ectopic increases the risk of recurrence.

### Clinical Assessment

#### History

- Amenorrhoea associated with a positive pregnancy test and symptoms of pregnancy
- Pain- this can be abdominal or pelvic. If there is intraperitoneal bleeding it can be referred to the shoulder tips. Sometimes the woman may feel faint due to blood loss
- Bleeding- this can be minimal or heavy

#### Examination

- Abdominal – there can be tenderness and if there is blood in the peritoneal cavity, guarding and rebound may be present
- Vaginal examination – there can be cervical motion tenderness (cervical excitation), adnexal and/or pelvic tenderness

#### Investigations

- bHCG – this confirms that there is a pregnancy "somewhere" but does not localise it. If the bHCG level exceeds 1,500 IU/l, an intrauterine pregnancy should be visualised on trans-vaginal ultrasound scanning
- Ultrasound examination. In the presence of a bHCG >1,500 IU/l, products of conception should be visible in the uterine cavity. It is not always possible to see an ectopic pregnancy. However, an empty uterus in association with a positive pregnancy test (>1,500 IU/l) is a pregnancy of unknown location and, should be treated as "ectopic pregnancy till proven otherwise". A CT scan may help identify the location of the pregnancy.

## Treatment

### Medical

- **Hormonal** – Theoretically an antiprogesterone such as mifepristone could be used to abort the pregnancy. However a therapeutic protocol is not yet available.
- **Other medical** – Systemic methotrexate is now a first line treatment for tubal ectopic, as long it has not ruptured, it measures less than 35 mm in diameter, there is no foetal heart beat, the bHCG is less than 5,000 IU/L, and there is not an intrauterine twin.

  The administration of methotrexate needs to be followed up with serial bHCG measurements.

### Surgical

- **Minor** – The usual treatment for ectopic pregnancy is operative laparoscopy. Whether the products of conception are aspirated through salpingostomy, or whether partial or total salpingectomy is undertaken, is a clinical decision depending on condition of the tube and that of the contralateral tube.
- **Major** – Laparotomy is undertaken if the woman's medical condition contraindicates a laparoscopy ie. severe hypotension.

## Complications

If the tube ruptures, massive haemorrhage can occur, resulting in an acute abdomen, shock, and this is a medical emergency.

Rh negative women require anti D to be administered.

## Prognosis

Whether methotrexate treatment results in a better outcome for future fertility than salpingostomy, is unknown.

# Gestational Trophoblast Diseases (GTD); Hydatiform Mole and Choriocarcinoma

## Definition

Abnormalities of the development of the placenta including hydatiform mole, partial mole and chorioncarcinoma, characterised by elevated levels of bHCG.

## Incidence

In the UK, 1/714 live births are associated with GTD. It is more common in Asian women. Neoplastic versions (choriocarcinoma) are very rare, 1:50,000 births.

## Aetilogy and Pathogenesis

### Complete Moles

These consist of diploid chromosomes and are androgenic in origin. There is no evidence of any foetal tissue. They result from the duplication of a single sperm following fertilisation of an empty ovum, or the dispermic fertilisation of an empty ovum

### Partial Moles

**These** are triploid and arise from two sets of haploid paternal genes (dispermic fertilisation) and a haploid set of maternal genes. There is usually a co-existing foetus.

## Clinical Asessment

### History

Vaginal bleeding and hyperemesis in the first trimester

### Examination

Uterus larger than dates

### Investigations

- Significantly raised bHCG
- Ultrasound
  - complete mole: anembryonic pregnancy
  - partial mole: cystic spaces within the placenta

## Treatment

### Medical

- Follow up evacuation with serial bHCG measurement
- The use of medical termination and oxytocics is contraindicated because of the potential to embolise abnormal trophoblast cells
- If there is evidence of neoplasia, methotrexate is the main chemotherapeutic agent used

### Surgical

- **Minor** – Suction curettage is the method of choice unless in a partial mole, foetal parts are too large.

## Complications

Choriocarcinoma can metastasise to lung, spleen, liver, kidney, brain and the gastrointestinal tract

## Prognosis

All women with GTD should be followed up with serial assays of bHCG

Once HCG reverts to normal, 6 months of follow up is recommended

Women should be advised not to conceive until their follow up is completed

Women who need chemotherapy should not conceive for 12 months

Women with GTD should be advised to use barrier contraception until follow up is completed

Women treated with methotrexate are likely to have an earlier menopause

HRT can safely be used in women with a history of GTD (Table 24.2)

**Table 24.2** Differential diagnosis of bleeding in early pregnancy

| | |
|---|---|
| 1 | Threatened/ inevitable/incomplete/complete EPL |
| 2 | Ectopic pregnancy |
| 3 | Hydatiform mole |

# Antepartum Haemorrhage (APH) 25

## Definition

This is defined as vaginal bleeding after 20 weeks gestation.

## Incidence

It occurs in 2–5 % of pregnancies. Together with postpartum haemorrhage, it is one of the commonest causes of maternal death, although fortunately these are very uncommon in the Western world (less than four per million births).

## Aetilogy and Pathogenesis

There are three causes of APH:

- Placenta praevea – including vasa praevia (when there is a blood vessel in the membranes which crosses the internal os)
- Retroplacental haemorrhage (known as placental abruption or accidental haemorrhage)
- Incidental causes from the cervix, vagina or vulva

Recurrent APH occurs when there is more than one episode of bleeding.

Predisposing factors for *abruption* are a previous pregnancy with abruption, pre-eclampsia, intrauterine growth restriction (IUGR), multiparity, advanced maternal age, low BMI, pregnancy after assisted reproductive technology (ART), polyhydramnios, premature rupture of membranes, abdominal trauma, smoking, and drug use. There is a suggestion that thrombophilias may also be associated with an increased risk of abruption.

For *placenta praevia*, risk factors include previous placenta praevia, previous caesarian section, previous termination of pregnancy, multiparity, multiple pregnancy, advanced maternal age, smoking, ART conception and a deficient endometrium (scar tissue, submucous fibroid(s), previous curettage and manual removal of the placenta).

## Clinical Assessment

### History

The degree of emergency depends on the amount of blood loss. Spotting noticed on underwear is the least critical, with minor haemorrhage being less than 50 ml. Loss of between 50 and 1,000 mls is a more major haemorrhage, and if the woman is shocked, or the loss is estimated in excess of 1,000 ml, it is described as massive.

The second important feature in the history is the presence or absence of pain. Placenta praevia is usually painless, whereas abruption is usually associated with abdominal pain.

Incidental causes are usually minor, and painless.

The presence of foetal movements should be questioned.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_25, © Springer International Publishing Switzerland 2015

## Examination

Abruption is often associated with uterine contractions and tenderness.

If placenta praevia is suspected on the history, a vaginal examination SHOULD NOT BE PERFORMED.

If placenta praevia and abruption have been excluded, a gentle speculum examination can be performed to diagnose a cervical or vaginal cause of the bleeding.

## Investigations

Ultrasound is the most important investigation. This will localise the placental site, and also visualise the retroplacental blood clot.

A full blood count should be performed to assess haemoglobin/haematocrit and platelet count. In Rh negative women a Kleihauer test should be considered.

The foetus should be monitored for signs of distress using CTG.

## Treatment

It has to be decided whether urgent intervention is indicated depending on

- amount of bleeding
- degree of pain
- haemodynamic stability
- foetal condition

## Medical

- The principles of resuscitation should be followed
  - ABC – **A**irway, **B**reathing, **C**irculation
  - Steroids should be administered at between 24 and 34 weeks of gestation as a single dose to mature the foetal lungs
  - There is no place for tocolytics in APH

## Surgical

- Minor – Artificial rupture of membranes and induction of labour
- Major – Emergency Caesarian Section

## Complications

- Maternal: shock, renal failure, coagulopathy, anaemia, blood transfusion, infection

  **APH is an important cause of maternal death**
- Foetal: IUGR, prematurity, hypoxia, foetal death

## Prognosis

Complications are more likely if the APH is due to a placental bleed (praevea or abruption), the heavier the blood loss, and the earlier in the pregnancy that it takes place.

Pregnancies which are complicated by an APH due to placenta praevia or abruption should be treated as “high risk”

# Post Partum Haemorrhage (PPH) 26

## Definition

Bleeding from the genital tract in excess of 500 ml, associated with delivery. Blood loss of over 1000 ml is classified as major, and more than 2,000 ml as severe.

PPH occurs within 3 months of delivery and is considered *primary* within 24 h and *secondary* after 24 h.

## Incidence

It is estimated globally that about one in ten births are associated with PPH. It is more common in primigravidae, after multiple pregnancy, in association with an APH, a large baby, prolonged or augmented labour, pre-eclampsia, previous APH, and is influenced by how the third stage of labour is managed (use of oxytocics decreases risk).

## Aetilogy and Pathogenesis

There are three broad causes of PPH:

1. Loss of tone of the uterine muscle (atony), with or without retained products of conception
2. Trauma to the genital tract, including ruptured uterus
3. Coagulation disorders

This is sometimes known as the four "T"s-Tone/Tissue/Trauma/Thrombosis

A number of steps should routinely be taken to decrease the risk of PPH:

- Active management of the third stage of labour – use of oxytocics, early cord clamping and controlled cord traction all reduce the risk of PPH.

## Clinical Assessment

### History

Did the placenta appear complete at delivery

### Examination

Vital signs (Pulse, BP, $O_2$ saturation)

### Investigations

- Full blood count
- Coagulation screen
- Consider baseline renal and liver function tests
- Monitor urine output (catheter and fluid balance)

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_26, © Springer International Publishing Switzerland 2015

## Treatment

### Primary PPH

#### Medical

- **Hormonal/Medical**
- Ergometrine 0.5 mg (if no hypertension) intramuscular injection or slow intravenous injection
- Syntocinon 5 Units IV if BP elevated (can be repeated)
- Syntocinon infusion to keep the uterus contracted (40 units in 500 ml at a 4 hourly rate)

**Ensure adequate intravenous access**

**Cross match blood and transfuse as needed**

If bleeding continues one or more of the following options can be used:

- Misoprostol 1,000 ug rectally
- Carboprost (a prostaglandin) 0.25 mg given intramuscularly every 15 min (maximum 8 doses)
- Carboprost 0.5 mg by intramyometrial injection (off license)

#### Surgical

- **Minor –** Examination under anaesthesia (EUA) and evacuation of retained products of conception (ERPC)
  - Balloon tamponade
- **Major** – Bilateral ligation of the uterine arteries
  - Hysterectomy

### Secondary PPH

This is almost always associated with infection (endometritis)

#### Medical

After appropriate swabs/?blood cultures have been taken, antibiotics should be administered

#### Surgical

EUA and ERPC with due care as there is an increased risk of perforation

## Complications

Hypovolaemic shock, renal failure, disseminated intravascular clotting (DIC), hepatic failure, adult respiratory distress syndrome and death.

## Prognosis

If adequate resuscitation and management is undertaken, there should be no long term sequelae.

# 27 Hypertension in Pregnancy, Gestational Hypertension, Pre Eclampsia, Eclampsia and HELLP Syndrome

## Definition

*Hypertension*:

Classified as: **mild** (140/90–149/99)

**Moderate** (150/100–159/109)

**Severe** (>160/110)

*Hypertension in pregnancy* is present at booking or in the first 20 weeks.

*Gestational hypertension* presents after 20 weeks.

*Pre-eclampsia* is gestational hypertension in association with significant proteinuria.

*Eclampsia* occurs when convulsions are associated with pre eclampsia.

*HELLP syndrome* is haemolysis, elevated liver enzymes, and a low platelet count.

## Incidence

In developed countries, pre-eclampsia and hypertensive diseases in pregnancy occur in about 5 % of births. It is more common in first pregnancies, or a first pregnancy with a new partner. Age (>40) is a risk factor, as is obesity and multiple pregnancy.

## Aetilogy and Pathogenesis

Unknown

## Clinical Assessment

### History

Symptoms include, headaches, visual disturbance, subcostal pain, vomiting and rapid onset oedema.

### Examination

Measure BP at least four times a day

### Investigations

Mild – FBC, renal function tests, lfts twice a week

Moderate – FBC, renal function tests, lfts three times a week

Severe – test for proteinuria daily. If proteinuria 1+ or more, measure urinary protein:creatinine ratio (significant if >30 mg/mmol) on a urine sample.

If elevated: measure 24 h urinary protein excretion (significant if >300 mg)

## Treatment

The only certain means of cure is delivery or termination of the pregnancy.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_27, © Springer International Publishing Switzerland 2015

The important decision is when to deliver. This depends on the prognosis for the foetus and whether it is "safer outside the womb than inside the womb".

## Medical

The aim is to control blood pressure

Maintain blood pressure at < 150/80–100

Mild – anti-hypertensive drugs not necessarily indicated

Moderate

- First line therapy is labetolol, methyldopa or nifedipine
- Second line therapy is hydralazine

Severe – Admit to hospital until blood pressure is controlled, consider commencing low dose aspirin and magnesium sulphate to prevent eclampsia

## Surgical

### Minor

Induction of labour

### Major

Caesarean Section

## Complications

Life threatening complications include stroke, cortical blindness, myocardial infarction, renal failure, liver failure, and hepatic rupture.

## Prognosis

Recovery is usually complete once the baby is delivered unless there are permanent effects of the complications e.g. stroke.

# Intrauterine Growth Restriction 28

## Definition

A Small for Gestational Age (SGA) foetus is one that is below the tenth percentile for age of gestation, as measured by weight or abdominal circumference (using ultrasound). A severe SGA foetus is below the 3rd percentile.

Foetal growth restriction implies a pathological reduction in growth. Some, but not all of these babies are small for gestational age, whilst 50–70 % of small for gestational age babies have normal growth, and are just constitutionally small.

## Incidence

By definition, 10 % of babies will be small for gestational age.

## Aetiology and Pathogenesis

Risk factors include:

Smoking, advanced maternal age, IVF pregnancy, vigorous exercise, previous SGA baby, previous pre-eclampsia, chronic hypertension, diabetes with vascular disease, renal impairment, anti-phospholipid syndrome, current pre-eclampsia, early pregnancy bleeding, placental abruption, low weight gain and excessive caffeine consumption.

Abnormal karyotype, infection with CMV, toxoplasma, syphilis and malaria can result in a small for gestational age foetus as early as 18–20 weeks gestation.

## Clinical Assessment

### History

Assess for risk factors as above

### Examination

Measurement of fundal height – pubic symphysis to fundus

Liquor volume – assess for oligohydramnios

### Investigations

- PAPP-A – low level in the first trimester is a risk factor
- Serial ultrasound assessment of foetal weight/abdominal circumference at least 3 weeks apart
- Uterine artery Doppler at 20–24 weeks
- Umbilical artery Doppler
- Middle Cerebral Artery Doppler
- Ductus venosus doppler
- Ultrasound assessment of amniotic fluid volume
- CTG monitoring, preferably computerised

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_28, © Springer International Publishing Switzerland 2015

## Treatment

### Medical

#### Other Medical

In women at high risk of pre-eclampsia, anti-platelet agents (for example aspirin) may have some beneficial effect, if started by 16 weeks

If delivery is contemplated between 24 and 35 weeks, steroids should be administered.

### Surgical

#### Minor

artificial rupture of membranes and induction

#### Major

Caesarean Section

## Complications

Intrauterine death

## Prognosis

By monitoring the foetus as described above and making an informed decision about when to deliver, a good outcome should be achieved

# 29 Infections During Pregnancy – Varicella, Herpes, Cytomegalovirus, Toxoplasma, Listeria, Group B Streptococcus

## Varicella (Chicken Pox)

### Definition

Varicella Zoster Virus (VZV) is a DNA virus of the herpes family. Infection results in a vesicular eruption of the skin.

### Incidence

It is estimated to occur in 3 in 1,000 pregnancies

### Aetilogy and Pathogenesis

The virus is transmitted by vesicular fluid from the blisters or respiratory fluid. The incubation period is 1–3 weeks. The person is infectious for 48 h before the rash appears and until after the lesions crust over. The virus remains dormant in the dorsal root ganglia of the sensory nerves, and can be reactivated along the nerve root distribution as shingles.

Infection can be prevented by immunisation before pregnancy using a live attenuated vaccine.

### Clinical Assessment

#### History

The primary infection is a typical viral illness associated with flu- like symptoms. A characteristic itchy maculo-papular rash develops.

#### Examination

The rash is maculo-papular initially, followed quickly by a vesicular eruption.

#### Investigations

- Blood sample for varicella zoster (IgG)
- Culture from the vesicular fluid
- PCR testing from maculopapular rash or scabs

### Treatment

#### Medical

- **Prevention** – Women pre-pregnancy should be asked about a history of chicken pox (this is 97 % reliable as an index of immunity). If this is negative, their immunity should be checked for varicella antibodies. If they are VZV negative, immunisation should be undertaken. As the immunisation is with an attenuated strain of live VZV, pregnancy should be avoided for 3 months following immunisation.
- **Contact during pregnancy** – If the contact is definitely confirmed, and the woman has no history of previous infection, her immunity should be checked as a matter of urgency. If it is confirmed that she is not immune, Varicella Zoster Immunoglobulin (VZIG) should be administered. This is effective up to 10 days after contact.

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_29, © Springer International Publishing Switzerland 2015

- **Developing chicken pox during pregnancy** – Women who develop chicken pox during pregnancy should commence antiviral therapy within 24 h of the rash appearing (Aciclovir 800 mg, five times a day for 7 days). VZIG is of no benefit once the chicken pox rash has established.

### Complications

Pneumonitis, neurological symptoms, haemorrhagic rash.

### Prognosis

The infection may be transmitted to the foetus resulting in Foetal Varicella Syndrome. This is uncommon, but can cause eye defects, limb deformity and neurological abnormalities.

## Genital Herpes

### Definition

Herpes is caused by Herpes Simplex Virus type 1 – (HSV-1) or type 2 (HSV-2). When present during late pregnancy, it can be transmitted to the foetus resulting in neonatal herpes.

### Incidence

In the UK, one in 60,000 live births results in neonatal herpes infection.

### Aetilogy and Pathogenesis

Transmission to the foetus is almost always by direct contact through infected secretions. The highest risk to the foetus is if the woman acquires the infection for the first time during late pregnancy.

### Clinical Assessment

#### History

Presentation is usually with painful vulval lesions, initially vesicles followed by ulceration.

#### Examination

– vesicles
– ulcers (which may become secondarily infected)

#### Investigations

PCR for HSV-1 and HSV-2

Viral Culture is possible

Blood immunological testing for HSV-1 and HSV 2 IgG and IgM

### Treatment

#### Medical

**Antiviral therapy** – aciclovir should be administered to a woman who contracts primary herpes in the late third trimester (after appropriate confirmation). For women who experience primary HSV in early pregnancy, there is no evidence for benefit of antiviral therapy at the time of delivery.

#### Surgical

**Major** – Caesarean section should be recommended to all women who have a confirmed primary HSV infection in the last **6** weeks of pregnancy. This reduces the risk of transmission to the baby, but does not offer complete protection against neonatal disease.

Women with secondary infection in late pregnancy, should be offered the option of caesarian section.

### Complications

If transmitted to the foetus, neonatal herpes has a high morbidity and mortality. There are three types of neonatal infection: skin and eye, central nervous system (CNS) infection, or disseminated multi-organ disease.

### Prognosis

The multi-organ disease has the worst prognosis with mortality of up to 30 %. CNS infections have a 70 % morbidity.

## Cytomegalo Virus (CMV)

### Definition

CMV is one of the herpes viruses. Once someone is infected they carry the virus for life, but it is usually harmless. However when it is acquired in utero, it can cause hearing loss or developmental delay.

### Incidence

About one third of women of childbearing age have not been infected with CMV. Of these, between 1 and 4 % have their first infection during pregnancy. One in three women who have their first CMV infection in pregnancy pass it onto their fetuses. Consequently, 1 in 150 children is born with congenital CMV and 20 % will have problems.

### Aetilogy and Pathogenesis

CMV is spread through body fluids such as blood, urine, saliva or breast milk. It is also sexually transmitted. Neonatal CMV infection is acquired through the placenta, with the virus passing into the foetus' circulation.

Infection after birth rarely causes problems

### Clinical Assessment

#### History

Most infections are asymptomatic. Sometimes symptoms of a viral illness: fever sore throat, fatigue lymphadenopathy may be detected.

#### Examination

Children known to be infected with CMV at birth should have regular checks of hearing and eyesight.

#### Investigations

- Virus can be detected in blood, saliva or urine confirming the presence of infection
- The presence of CMV antibodies will confirm that the person has been infected, but not when it occurred. Presence of CMV IgM is not solely indicative of primary infection.
- The diagnosis of neonatal infection is on the basis of isolating the virus.

### Treatment

#### Medical

There is no licensed treatment for CMV. The antiviral drug *acyclovir* may have some beneficial effect for children with CNS symptomatic infection, but can have serious side effects.

### Complications

These only occur in minority of women who acquire a primary infection whilst pregnant. Even then 80 % of infected fetuses show no ill effects.

### Prognosis

For the majority of fetuses who are infected with CMV the outcome is good.

## Toxoplasmosis

### Definition

Toxoplasmosis is spread by the parasite *toxoplasma gondii*. It usually only causes mild symptoms, but if contracted in pregnancy can be harmful to the foetus.

## Incidence

Of non-immune women about 5 per 1,000 get infected during pregnancy

The incidence of congenital toxoplasmosis in the UK is 3/100,000

## Aetilogy and Pathogenesis

Infected cats pass the parasites in their faeces. The woman may then be infected by contaminated soil, fruit or vegetables, or from raw meat that is contaminated by the excrement

The foetus is at risk if the mother acquires the infection during pregnancy. With chronic infection (>6 months) the mother's immunity protects the child.

## Clinical Assessment

### History
Most people infected are asymptomatic. Some may experience mild flu-like symptoms.

### Examination
There are no sigs

### Investigations
Antibodies to Toxoplasma can be measured in the blood

## Treatment

### Medical
Pyrimethamine and sulfadiazine plus folinic acid can be used, although the parasite is not complete eliminated as it is intracellular.

## Complications

- Toxoplasmosis increases the risk of early pregnancy loss
- Children with congenital toxoplasmosis may have cephalomegaly, or a small head
- Often there are no symptoms at birth, but develop symptoms of vision loss, intellectual disability and fits.

## Prognosis

The infection by the parasites is chronic and can be reactivated, especially if the person becomes immune-compromised

# Listeria

## Definition

Infection caused by *Listeria monocytogenes*

## Incidence

Whilst Listerosis is rare in the population (0.26 cases/100,000 individuals in the USA) pregnant women are ten times more likely to get listeria.

## Aetilogy and Pathogenesis

Women get infected by eating contaminated food e.g. Uncooked meat, cheeses, processed meat and smoked seafood.

## Clinical Asessment

### History
May experience flu like symptoms

### Examination
No specific signs

### Investigations
Isolation of listeria from blood, spinal fluid or amniotic fluid- the culture takes 48 h to grow

Gram stain and culture from genital tract

Serological tests are of little value

## Treatment

### Medical

Ampicillin for 14 days for mother

If neonate infected ampicillin and gentamycin at birth

## Complications

May cause early pregnancy loss, stillbirth, premature delivery, or life threatening infection in the newborn, meningitis and septicaemia in immune-comprimised adults.

## Prognosis

Whilst the infection can be treated by antibiotics, prevention is best

# Group B Strep

## Definition

Group B streptococcus (Streptococcus agalactiae) (GBS) is a common pathogen in the female genital tract. It is the commonest cause of neonatal sepsis.

## Incidence

Approximately 15–20 % of women are asymptomatic carries of GBS.

In the UK it is estimated that GBS infection affects 1 in 2,000 neonates.

## Aetilogy and Pathogenesis

The infection is acquired by the neonate during birth.

Risk factors include; prematurity (<37 weeks of gestation), prolonged rupture of membranes (>18 h), maternal fever (>38 ° C), previous GBS affected baby, or current GBS infection in vagina or urine.

## Clinical Asessment

### History

GBS carriers are asymptomatic

### Examination

There are no signs

### Investigations

- Risk based or universal screening by vaginal and and/rectal swabs at 37 weeks
- Women with GBS in their urine should be treated with antibiotics

## Treatment

### Medical

Penicillin >4 h before delivery; If allergic-clindamycin or erythromycin.

### Surgical

**Major** – If Elective Caesarean Section performed- chemoprophylaxis is not needed

## Complications

One in 200 women with asymptomatic GBS will have a neonate who develops sepsis.

## Prognosis

With appropriate chemoprophylaxis GBS infections of the neonate can be avoided

# Endocrine Disease and Pregnancy – Thyroid Disorders and Diabetes

30

## Thyroid Disease

### Definition

Overt hypothyroidism is defined as a raised TSH level in association with a decreased level of free T4.

Subclinical hypothyroidism is diagnosed when the TSH level is elevated, but T4 is still within the normal range.

### Incidence

Overt hypothyroidism is estimated in 0.3–0.5 % of women, and subclinical hypothyroidism in 2–3 % of pregnant women.

### Aetilogy and Pathogenesis

The thyroid gland has an important function in maintaining a viable pregnancy and in contributing to the development of a healthy offspring.

There are increased requirements for T4 in pregnancy, and the foetus is totally dependent on the placenta to provide thyroxine until about 18 weeks gestation.

The structure of HCG is similar to TSH and provides some stimulation to T4 production. This results in TSH being suppressed by the negative feedback, eventually resulting in a decrease of T4.

In general, iodine deficiency is the commonest cause of thyroid insufficiency worldwide. The second commonest cause is auto-immune thyroiditis (Hashimotos's disease).

### Clinical Assessment

#### History

Women with overt hypothyroidism often suffer from subfertility. Women with subclinical hypothyroidism are generally asymptomatic.

#### Examination

A goitre (enlarged thyroid gland) may be present.

#### Investigations

Thyroid function tests – TSH, T4, and thyroid antibodies can be measured in a sample of blood. Routine screening in the first trimester is not recommended. However, women with a family history of thyroid disease or other auto-immune diseases should be offered screening. Women living in iodine deficient areas or with a BMI > 40, should also be screened.

### Treatment

#### Medical

- It is recommended that women who are pregnant, planning a pregnancy or are breast feeding should receive 150 μg of iodine daily
- Women with subclinical hypothyroidism, should be treated with thyroxine, if the TSH is > 10 mIU/l

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_30, © Springer International Publishing Switzerland 2015

- Women with subclinical hypothyroidism, but positive thyroid auto antibodies should also be treated with thyroxine
- Women with overt hypothyroidism should be treated with thyroxine
- Women who are on thyroid replacement therapy pre pregnancy will often need to increase the dose of thyroxine being taken

### Surgical

If at all possible, thyroid surgery is not undertaken during pregnancy.

## Complications

Hypothyroidism is associated with an increased risk of EPL, hypertension, preeclampsia, placental abruption, anaemia and PPH. There are also adverse outcomes for the neonate including prematurity, low birth weight, increased perinatal morbidity and mortality, and cognitive and developmental impairment.

## Prognosis

Appropriately treated hypothyroidism avoids any of the complications discussed above.

# Diabetes

## Definition

Gestational diabetes mellitus (GDM) – diabetes that develops during pregnancy. This is diagnosed using a 2 h 75 g oral Glucose Tolerance Test (OGTT). Gestational diabetes can be diagnosed if the fasting glucose is > 5.1 mmol/l, or the level 2 h after the glucose challenge is > 8.5 mmol/l.

## Incidence

Approximately 5 % of women have diabetes during pregnancy. Nearly 90 % have gestational diabetes and the remainder have either Type 1 or Type 2 diabetes.

## Aetiology and Pathogenesis

Predisposing factors include obesity, and GDM in a previous pregnancy. Raised blood sugars predispose to macrosomia in the foetus.

## Clinical Assessment

### History

Assess for risk factors as described above

### Examination

BP, BMI, and urinalysis

### Investigations

It is recommended that screening for GDM should take place at 26–28 weeks gestation (OGTT).

## Treatment

The care of women with gestational diabetes should be provided by a specialist team.

### Medical

- Dietary advice with regular blood glucose monitoring
- Insulin may be needed if blood glucose levels are not controlled by diet alone
- Oral hypoglycaemics are **not** used in pregnancy

### Surgical

Plan elective induction or caesarian section for type 1 and 2 diabetics between 37 and 39 weeks

For women with GDM, deliver by the due date

## Complications

EPL, preeclampsia, preterm labour, macrosomia, birth injury, stillbirth and perinatal mortality are more common in women with diabetes. In

women with preexisting disease, congenital abnormalities are increased.

## Prognosis

An OGTT should be undertaken 6–12 weeks after delivery in all women with GDM. Most women with GDM will return to normal glucose metabolism following the birth. These should be advised regarding diet, weight control and exercise. However some will develop Type 2 diabetes.

Well controlled GDM reduces the risks to the mother and the baby.

# Medical Conditions – Cardiac Disease, Thrombophilias, Rhesus Immunisation

31

## Cardiac Disease

### Definition

This includes congenital cardiac abnormalities, rheumatic valvular heart disease, ischaemic heart disease, cardiomyopathy and pulmonary hypertension.

### Incidence

Congenital heart disease in pregnancy affects less than 1 % of women.

Pregnancy increases the risk of myocardial infarction (MI) three to four fold. The risk of MI in women over 40 years of age is 30 times that of younger women.

The risk of death from ischemic heart disease in pregnancy in the UK is 1 in 130,000.

### Aetilogy and Pathogenesis

The normal physiological changes of pregnancy result in additional demands on the heart. These include an increase in blood volume (plasma volume increasing more than red cell mass), peripheral vasodilatation and an increase in cardiac output (up to 40–50 % by 20–28 weeks). These demands increase even further during labour and immediately following delivery.

Patients with pre-existing risk factors include those with hypertension, pre-eclampsia, diabetes, smoking, obesity and hyperlipidaemia.

### Clinical Assessment

#### History

- Chest pain in pregnancy needs to be investigated (consider aortic dissection if severe)
- Shortness of breath (especially postural), should raise suspicion regarding cardiomyopathy

#### Examination

- Regular assessment of pulse rate and rhythm and blood pressure
- Cardiac auscultation to detect murmurs suggestive of valvular heart disease

#### Investigations

- ECG
- Chest X ray
- Echocardiogram
- CT scan of chest (to exclude aortic dissection)
- Oxygen saturation in women who are cyanosed

### Treatment

#### Medical

- Joint responsibility (cardiologists and obstetricians)

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_31, © Springer International Publishing Switzerland 2015

- Mode and timing of delivery should be planned at the 32–34 week visit

### Surgical

- **Minor** – Minimise cardiovascular stress by eliminating pushing during the second stage with elective assisted vaginal delivery
- **Major** – Caesarian Section is usually only required for obstetric indications

## Complications

Cardiac failure, death

## Prognosis

One in thirteen women who have a MI in pregnancy will die

# Rhesus Disease

## Definition

Rhesus immunisation of a woman who is Rhesus negative in response to blood from a Rhesus positive foetus entering her circulation.

There are also many other antigens on the surface of red blood cells, not as well known as Rhesus, such as Kell, MNS, and Kidd which may also cause iso-immunisation, but Rhesus is the most common and therefore the most relevant clinically.

## Incidence

Fifteen percent of women are Rhesus negative and are therefore at risk of Rhesus immunisation by a Rhesus positive foetus.

## Aetilogy and Pathogenesis

Everyone carries two genes for Rhesus, so one is either:

Heterozygous for Rhesus (carrying only one gene) or Homozygous (carrying both genes).

There are subsets of Rhesus including the D, Cc and Ee alleles, of which D is most important and determines Rhesus positivity or negativity.

Rhesus negative women carry neither of the genes. If a Rhesus negative woman conceives to a homozygous Rhesus positive partner (DD), all offspring will be Rhesus positive. If the male is heterozygous (only has a single D – and 55 % of men are), only one in two offspring will be positive. The chance of immunisation is reduced by ABO incompatibility between the parents.

During most of the pregnancy the foetal blood does not cross the placenta. However, in certain circumstances foeto-maternal haemorrhage can take place (antenatal haemorrhage, amniocentesis, External Cephalic Version (ECV), or trauma). This can be confirmed by the Kleihauer test which determines the number of foetal cells in the maternal circulation. If Rhesus positive red cells enter the maternal circulation, anti Rhesus antibodies will be produced. These antibodies are small enough to cross the placenta and attack the foetus' red cells causing haemolysis. The severity of this haemolysis will depend on the level of maternal antibodies. Consequently the foetus can become anaemic, and due to the raised level of bilirubin, can suffer from kernicterus which can cause hearing loss, permanent brain damage with intellectual disability or death. Hepatomegaly, ascites and polyhydramnios may be present in the mother.

## Clinical Assessment

### History

Allegedly 20–30 % of pregnancies result from fertilisation by someone other than the woman's regular partner and therefore the Rhesus status of the partner can be misleading

### Examination

There is usually little to be found on examination, but in severe cases hepatomegaly, ascites and polyhydramnios may be present in the mother.

### Investigations

All Rhesus negative women should be screened for Rhesus antibodies at the first visit, 28 and 34 weeks and then after delivery

In the presence of anti Rhesus antibodies in the maternal serum, the first sensitised pregnancy can be managed with repeat antibody titers. If the titer rises to 1:64, the foetus needs to be investigated by assessing the bilirubin level in the amniotic fluid. The clinical risk to the foetus is assessed by absorbance of the liquor at 450 nm wavelength, and then calculating from a Liley curve.

Percutaneous umbilical blood sampling can be performed to determine all blood parameters directly.

If the woman has had a previous pregnancy, foetal surveillance should commence 4–8 weeks earlier than the time that problems occurred in the previous pregnancy.

Assessment of blood flow in the middle cerebral artery of the foetus using doppler ultrasound has also been used as a risk assessment tool for severity of haemolytic disease.

### Treatment

#### Medical

Prevention of immunisation is undertaken by administering anti D antibodies within 72 h of the suspected foeto-maternal transfusion, as well as routinely at 28 and 34 weeks in all Rhesus negative un-immunised women, thus "mopping up" the red cells before the maternal immune system is activated to form anti bodies. Standard doses of Anti D (see Chap. 20) are used or the extent of transfusion can be assessed by estimating the number of foetal cells in the maternal circulation and the dose of anti D adjusted accordingly. The absence of antibodies in the maternal circulation should be checked, because once the woman is immunised, anti D is of no benefit.

Occasionally in very severe cases, intravenous immune serum globulin is administered.

#### Surgical

- **Minor** – Intrauterine transfusion of an anaemic foetus is sometimes undertaken. Induction of labour can be undertaken if the risk to the foetus is greater in utero than as a result of delivery.
- **Major** – Elective CS is undertaken if the foetus is judged to be too compromised to risk labour

### Complications

The raised bilirubin level in utero can cause kernicterus which manifests as hearing loss, permanent brain damage with intellectual disability or death

### Prognosis

Good, with active management following above principles

## Thrombosis in Pregnancy and Thrombophilia

### Definition

Thrombophilia is an increased tendency to develop blood clots

### Incidence

Pulmonary embolism is the leading cause of maternal death in the UK, accounting for 11 % of maternal deaths, or 1–2/1,000,000 births.

The highest risk is during the post partum period.

It is estimated that the risk of VTE post partum is increased 60 fold, compared to a non-pregnant woman.

### Aetiology and Pathogenesis

Risk factors for VTE include a previous venous thromboembolism, or having a thrombophilia. Thrombophilia can be inherited or acquired, and the incidence is shown in Table 31.1. Inherited

**Table 31.1** Incidence of thrombophilia in the Caucasian population

| Inherited thrombophilias | Acquired thrombophilias |
|---|---|
| Antithrombin deficiency 1:2,000–5,000 | Antiphospholipid syndrome- Lupus anticoagulant |
| Protein C deficiency 1:2,000–5,000 | Anticardiolipin antibodies |
| Protein S deficiency 1:200–5,000 | B2 glycoprotein |
| Factor V Leiden 1:20 | Plasma homocysteine |
| Prothrombin G20210A mutation 1:33 | |

thrombophilias include: antithrombin deficiency, Protein C or S deficiency, Factor V Leiden deficiency and Prothrombin gene mutation G20210. Acquired thrombophilias include the lupus spectrum, anticardiolipin antibodies, and β2 glycoprotein 1 antibodies.

Certain conditions also predispose to VTE. These include:
Obesity (BMI > 30 kg/m$^2$)
Smoking
Multiple pregnancy
Pre-eclampsia
Caesarean section
Prolonged labour
Operative delivery
PPH > 1 l
Ovarian hyperstimulation syndrome after ART
Immobility
Dehydration
Long-distance travel (>4 h).

## Clinical Assessment

### History
Past or family history of VTE

### Examination
In the event of a VTE, a red, hot swollen leg (DVT) or dullness to percussion and reduced air entry (PE)

### Investigations
Screening for thrombophilia is only undertaken as a result of a relevant history.

## Treatment

### Medical
All women with a history of previous VTE should receive postpartum thromboprophylaxis with low molecular weight heparin (LMWH).

Women with recurrent VTE associated with either antithrombin deficiency or the antiphospholipid syndrome are at very high risk and require thromboprophylaxis with LMWH antenatally and for 6 weeks postpartum or until they can be converted back to warfarin following delivery.

## Complications

There is a risk of pulmonary embolism and death if DVT occurs.

## Prognosis

Appropriate thromboprophylaxis and anticoagulant therapy reduce the danger of VTE. A haematologist will make the decision regarding long term anticoagulation.

# Thrombophilia and Pregnancy Complications

## Definition

Thrombophilia is the tendency to develop blood clots

## Incidence

As in Table 31.1

## Aetilogy and Pathogenesis

Pregnancy complications such as pre-eclampsia, placental abruption and small for gestational age and recurrent early pregnancy loss are associated with placental thrombi and infarction. It has therefore been postulated that thrombophilia may be a risk factor for these complications.

Although some case control studies (retrospective comparisons) have shown a slight increase in thrombophilias in women with these factors compared to normal pregnancies, prospective studies have not confirmed this. Whilst biologically plausible, (thrombophilia predisposing to thrombi in the venous circulation, promoting inflammation associated with pre-eclampsia, and placental insufficiency), conclusive evidence is lacking. The best evidence for this association is seen with antiphospholipid syndrome and recurrent early pregnancy loss.

## Clinical Assessment

### History
Previous VTE

### Examination
Nil

### Investigations
Thrombophilia screening is controversial. There is no place for population screening

## Treatment

### Medical
- low dose aspirin (75–100 mg/day) administered from early pregnancy has been shown to be of benefit to women with a history of placenta-mediated pregnancy complications
- Low molecular weight heparin is far more demanding then taking oral aspirin, and there is a lack of evidence that this improves outcome beyond aspirin for women with congenital thrombophilias. For women with recurrent early pregnancy loss, there is some evidence that LWMH improves outcome in acquired thrombophilias.

## Complications

Recurrent early pregnancy loss, prematurity, accidental haemorrhage, intrauterine growth restriction and pre-eclampsia.

## Prognosis

Management with aspirin, foetal monitoring and appropriate delivery usually results in a good outcome.

# Postnatal Care

# 32

## Definition

This is the care of the woman and baby(s) during the puerperium (6–8 weeks after delivery).

## Discussion About the Birth Experience

The woman should be given a chance to ask about any events or interventions that took place.

**Table 32.1** Potential problems with breast feeding

| | Solution |
|---|---|
| Nipple pain/cracking | Attachment adjustment/ barrier cream |
| Engorgement | support/massage/analgesia |
| Mastitis | ? antibiotics |
| Inverted nipples | Manually evert nipples if possible |
| Ankyloglossia (tongue tie) | Arrange for baby to be assessed |
| Sleepy baby | Baby should be assessed by paediatrician |

## Clinical Assessment

### History

The contents of the box below highlight the points, which are important to cover when taking a history from a woman in the puerperium

| | |
|---|---|
| Postpartum haemorrhage | Profuse blood loss |
| Infection | Feeling hot, shivering, abdominal/ pelvic pain, offensive lochia |
| Pre eclampsia/ eclampsia (women affected pre-delivery) | During the first few days following delivery, possible symptoms include – headaches, visual disturbances, nausea and vomiting |
| VTE (Deep venous thrombosis/ pulmonary embolism) | Unilateral calf tenderness, pain, redness, or swelling<br>Chest pain and/or shortness of breath |
| Postnatal depression/ Puerperal psychosis | Low mood, irritability, sleep disturbance, difficulty coping |
| Mastitis/breast abscess | Sore, swollen, hot, tender breast and/or fever |
| Breast feeding | **See Table 32.1** |

G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2_32, © Springer International Publishing Switzerland 2015

## Examination

The contents of the box below highlight potential important examination findings to reflect information gathered in the history

| | |
|---|---|
| Postpartum haemorrhage | Palor, pulse rate (high) blood pressure (low), fundal height |
| Infection | Temperature, inspect perineum, lochia (offensive), palpate abdomen and pelvis |
| Pre eclampsia/ eclampsia (women affected pre-delivery) | Blood pressure, urine output and urine analysis |
| VTE (Deep venous thrombosis/pulmonary embolism) | Palpate calf, assessing for pain, redness, or swelling<br>Dullness to percussion, decreased air entry |
| Postnatal depression/ Puerperal psychosis | Nil |
| Mastitis/breast abscess | Examine breasts |

## Investigations

The contents of the box below will help outline the possible investigations which will help confirm any potential diagnosis

| | |
|---|---|
| Postpartum haemorrhage | Full blood count (FBC) |
| Infection | FBE, ESR, CRP, swabs for culture and sensitivity, blood culture |
| Pre eclampsia/eclampsia (women affected pre-delivery) | Renal and liver function tests |
| VTE (Deep venous thrombosis/ pulmonary embolism) | Ultrasound of deep veins<br>Ventillation/ perfusion lung scan |
| Mastitis/breast abscess | Nil |

## Treatment

The contents of the box below highlights the treatment options available for the various post partum conditions

| | |
|---|---|
| Postpartum haemorrhage | Resuscitate, ? transfuse, iron |
| Infection | Antibiotics, Perineal care (salt baths, air drying) |
| Pre eclampsia/eclampsia (women affected pre-delivery) | Anti-hypertensives medication<br>Magnesium sulphate if at risk of eclampsia |
| VTE (Deep venous thrombosis/Pulmonary Embolism) | Anticoagulation therapy |
| Mastitis/breast abscess | Antibiotics |

## Prognosis

With appropriate treatment the majority problems resolve.

Potential problems highlighted in the table below should be identified and managed appropriately.

## Contraception

Should be offered to all women in the puerperium, ideally before discharge from hospital.

In women who are not breast feeding, fertility may return as early as day 21 post delivery. Consequently the contraceptive method of her choice following a risk assessment should be commenced by day 21.

In women who are breast feeding ovulation is usually inhibited while:

- Baby is totally breast fed
- Night feeds are continued
- Daily suckling time exceeds 60 min in total
- Combined hormonal contraception is contraindicated, as it reduces breast milk production, and oestrogen is secreted in the breast milk, which may affect the baby.

# Index



G. Kovacs, P. Briggs, *Lectures in Obstetrics, Gynaecology and Women's Health*,
DOI 10.1007/978-3-319-14863-2, © Springer International Publishing Switzerland 2015