

# 11

## Miscarriage and abortion

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Abortion or miscarriage is defined as the expulsion of a fetus before it reaches viability. Because of different definitions of viability in different countries, the World Health Organization (WHO) has recommended that a fetus is viable when the gestation period has reached 22 weeks or more, or when the fetus weighs 500 g or more. As the term abortion does not differentiate between spontaneous and induced abortion the term miscarriage is widely preferred, abortion being used when the pregnancy is deliberately terminated before fetal viability. Most miscarriages occur naturally between the sixth and 10th weeks of pregnancy.

Data from several countries estimate that between 10 and 15% of clinically diagnosed pregnancies end in miscarriage. Miscarriage is more frequent among women over the age of 30 and increases further among women over the age of 35, the risk being nine times greater than for women aged 20–29. Paternal age over 40 also increases the risk, albeit not as strongly as maternal age. The risk also increases in frequency with increasing gravidity: 6% of first or second pregnancies terminate as a miscarriage; with third and subsequent pregnancies the rate increases to 16%.

### AETIOLOGY OF SPONTANEOUS MISCARRIAGE

The causes of miscarriage are:

- Implantation
- Ovocfetal
- Maternal.

### Implantation

Implantation occurs 8–10 days after ovulation in most healthy pregnancies. The proportion ending in early loss increases when implantation is later. A refractory period after the time of uterine receptivity may provide a natural mechanism that eliminates impaired embryos. In 20% of miscarriages the trophoblast has failed to implant adequately.

In the early weeks of pregnancy (0–10 weeks) ovofetal factors account for most miscarriages; in the later weeks (11–22 weeks) maternal factors become more common (Table 11.1).

### Ovocfetal factors

Ultrasound examination of the fetus and subsequent histological examination show that in 70% of cases the fertilized ovum has failed to develop properly or the fetus is malformed. In 40% of these cases chromosomal abnormalities are the underlying cause of the miscarriage.

**Table 11.1** Aetiological factors in 5000 abortions

Factor	
<b>Fetal or ovular</b>	<b>Percentage</b>
Defective ovofetus	60
Defective implantation or activity of trophoblast	15
<b>Maternal</b>	
General disease	2
Uterine abnormalities	8
Psychosomatic	?15

## Maternal factors

Systemic maternal disease (e.g. systemic lupus erythematosus), and particularly maternal infections, account for 2% of miscarriages. A further 8% are associated with uterine abnormalities, such as congenital defects, uterine myomata, particularly submucous tumours, or cervical incompetence (see p. 108). Psychosomatic causes have been suggested as leading to miscarriage, but the evidence is difficult to evaluate. Women who smoke 10 cigarettes or more per day double their risk.

## MECHANISMS OF MISCARRIAGE

The immediate cause of miscarriage is the partial or complete detachment of the embryo by minute haemorrhages in the decidua. As placental function fails uterine contractions begin, and the process of miscarriage is initiated. If this occurs before the eighth week the defective embryo, covered with villi and some decidua, tends to be expelled en masse (the so-called blighted ovum), although some of the products of conception may be retained either in the cavity of the uterus or in the cervix. Uterine bleeding occurs during the expulsion process.

Between the eighth and 14th weeks the above mechanism may occur or the membranes may rupture, expelling the defective fetus but failing to expel the placenta, which may protrude through the external cervical os or remain attached to the uterine wall. This type of miscarriage may be attended by considerable haemorrhage.

Between the 14th and 22nd weeks the fetus is usually expelled followed, after an interval, by the placenta. Less commonly the placenta is retained. Usually bleeding is not severe, but pain may be considerable and resemble a miniature labour.

It is clear from this description that miscarriage is attended by uterine bleeding and pain, both of varying intensity. Although miscarriage is the cause of bleeding per vaginam in early pregnancy in over 95% of cases, less common causes, such as ectopic gestation, cervical bleeding from the everted cervical epithelium or from an endocervical polyp, hydatidiform mole, and, rarely, cervical carcinoma, must be excluded.

## VARIETIES OF SPONTANEOUS MISCARRIAGE

For descriptive purposes the miscarriage is classified according to the findings when the woman is first examined, but one kind may change into another if the aborting process continues. If infection complicates the miscarriage, the term septic miscarriage is used. The various types of miscarriage are shown in Figure 11.1 and each will be considered separately later.

## Threatened miscarriage

Threatened miscarriage is diagnosed when a pregnant woman develops uterine bleeding with or without painful contractions; other causes of bleeding in early pregnancy should be excluded. A vaginal examination (or vaginal speculum examination) shows that the cervix is not dilated.

A real-time pelvic ultrasound examination will clarify the diagnosis. This may show:

- A normally sized amniotic sac and a fetus whose heart is beating
- An empty amniotic sac
- A missed or incomplete miscarriage.

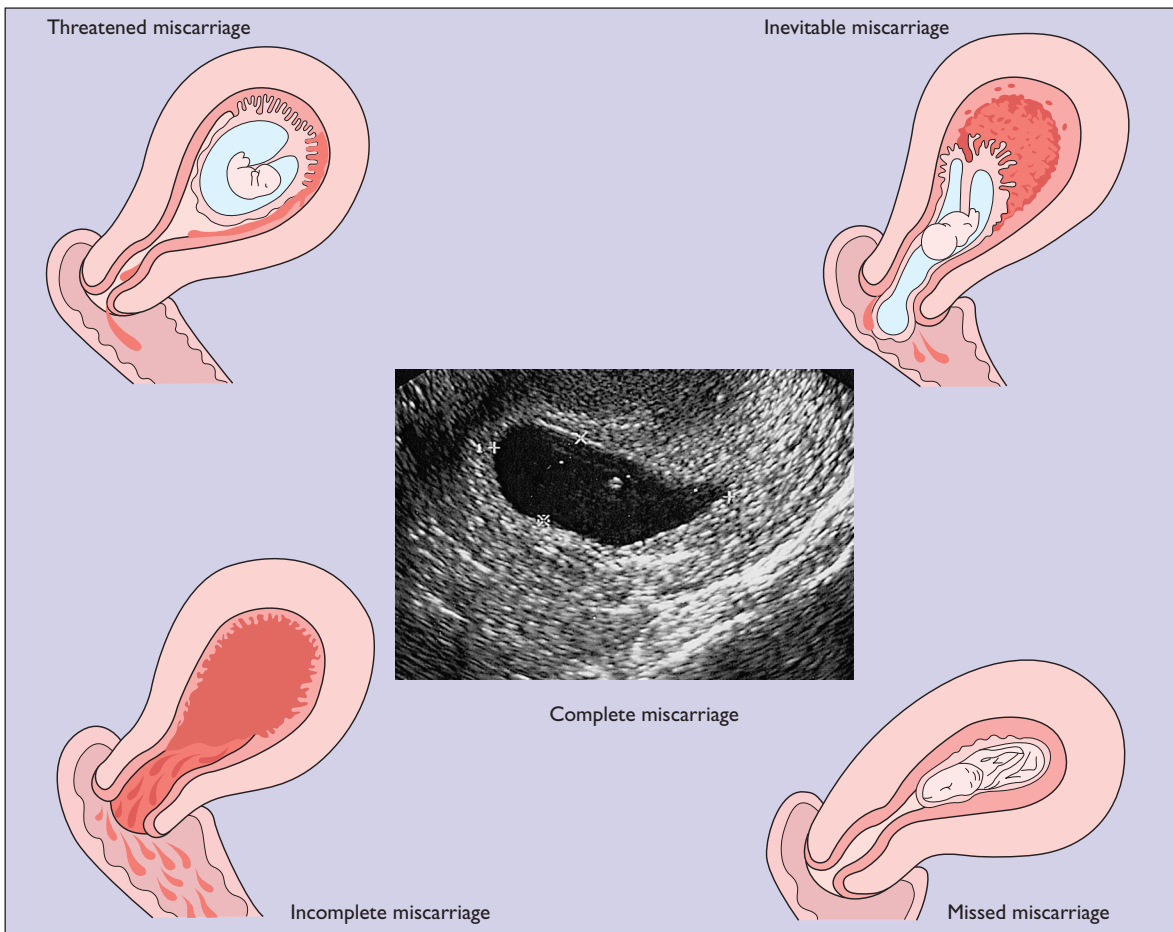
Only if the first finding is obtained is the diagnosis confirmed. The ultrasound finding also provides the information that the pregnancy will continue (in 98% of cases), and the patient can be reassured. If a subchorionic haematoma is detected the pregnancy should be monitored more closely, as there is a greater risk of spontaneous miscarriage, placental abruption, premature labour, intrauterine growth restriction and fetal death.

The use of ultrasound examination has meant that the treatment of threatened miscarriage has changed in recent years. It is no longer normal practice to insist that the woman remain in bed until the bleeding has ceased. However, if she feels more comfortable there, she may do so. Drugs, hormones (e.g. progesterone) and sedatives have no effect except as a placebo, and should be avoided.

## Inevitable, incomplete and complete miscarriage

Miscarriage becomes inevitable if uterine bleeding is associated with strong uterine contractions that cause dilatation of the cervix. The woman complains of severe colicky uterine pains, and a vaginal examination shows a dilated cervical os with part of the conception sac bulging through. Inevitable miscarriage may follow signs of threatened miscarriage or, more commonly, starts without warning.

Soon after the onset of symptoms of inevitable miscarriage, the miscarriage occurs either completely, when all the products of conception are expelled, or incompletely when either the pregnancy sac or the placenta remains, distending the cervical canal. In most cases the miscarriage is incomplete. Unless the doctor has been able to inspect all the material expelled from the uterus, or has had an ultrasound examination that shows an empty uterus (or one containing less than 10mm of tissues or blood clots), the miscarriage should be considered incomplete. This is treated by curettage; an alternative is to give misoprostol 400 µg 4-hourly for three doses.



**Fig. 11.1** The types of miscarriage that may be seen. In complete miscarriage the sac contains a small amount of debris.

### **Treatment**

A woman who is diagnosed as having an inevitable or an incomplete miscarriage and who is not in hospital should be transferred to one without delay. Before effecting the transfer, the examining doctor should give an analgesic to the patient (if required) and should make a vaginal examination. Any products of conception found protruding from the cervix should be removed by finger or sponge forceps, as leaving them may lead to vasovagal shock. If the woman is bleeding heavily an intramuscular injection of 0.5 mg ergometrine should be given.

In hospital, intervention is required unless the miscarriage is proceeding quickly and with minimal blood loss. On admission of the patient a vaginal examination is performed and any products of conception remaining in the cervix are removed by finger or sponge forceps.

If there is any doubt about the completeness of the miscarriage the patient should be taken to the operating theatre and the uterus evacuated using

a sponge forceps (Fig. 11.2), followed by a careful suction curettage. Towards the end of the curettage, an injection of ergometrine 0.25 mg is given intravenously.

### **Follow-up**

Following a complete miscarriage, or one which has been completed surgically, bleeding usually ceases within 10 days. If placental remnants have been left in the uterus the bleeding may persist beyond this time, varying in severity, and may be accompanied by uterine cramps. Examination will show a bulky uterus with a patulous os. Treatment is to perform an ultrasound, recuretting the uterus carefully. The tissue removed should be sent for histopathology, as very rarely a choriocarcinoma is present.

In a woman who is Rhesus negative, a Kleihauer test should be performed to determine the amount of fetal blood cells in the circulation, and then a prophylactic injection of anti-D gammaglobulin should be given.

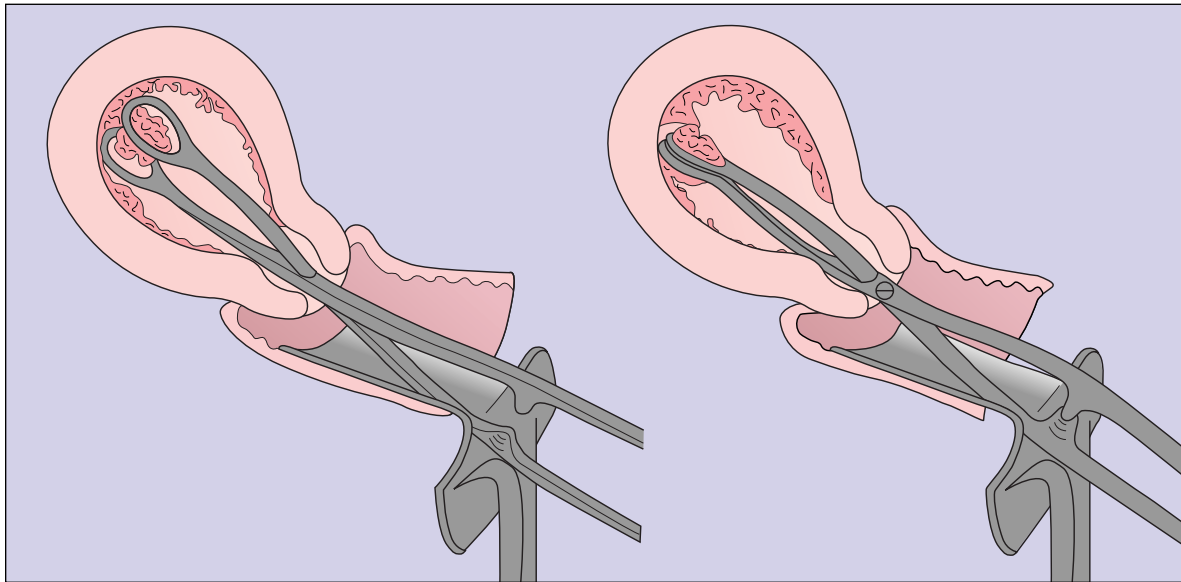


Fig. 11.2 The use of sponge forceps for clearing placental tissue from the uterus.

### Septic miscarriage

Although less common than formerly, because of better care in hospital and fewer 'backyard' abortions, infection may complicate some spontaneous and induced abortions. In 80% of cases the infection is mild and localized to the decidua. The organisms involved are usually endogenous and are, most commonly, anaerobic streptococci, staphylococci or *Escherichia coli*. In 15% of cases the infection is severe, involving the myometrium, and may spread to involve the Fallopian tubes. If the infection spreads from the cervix it may involve the parametrium or the pelvic cellular tissues. In 5% of cases there is generalized peritonitis or vascular collapse, which is due to the release of endotoxins by *E. coli* or *Clostridium welchii* and is termed endotoxic shock.

#### Clinical features

In infections limited to the decidua the production of a malodorous, pink vaginal discharge is usual and the patient may develop pyrexia. In more severe, spreading infections pyrexia occurs, but its extent may not be related to the severity of the infection. Tachycardia usually develops: a pulse rate of more than 120 bpm indicates that spread has occurred beyond the uterus. Examination may show a tender lower abdomen; vaginal examination shows a boggy, tender uterus with evidence of extrauterine spread.

#### Investigations

A high vaginal or cervical swab is made and, if the temperature is higher than 38.4°C, a blood culture should

be taken. In severe infections serum electrolytes and coagulation studies should be undertaken.

#### Treatment

Antibiotics are administered at once, the precise one chosen depending on local conditions, but in general a broad-acting antibiotic and one effective against anaerobes are selected. Twelve hours after starting antibiotics, or sooner if haemorrhaging is severe and the uterus is not empty, its contents are evacuated by careful curettage. If the infection is not controlled in spite of these measures hysterectomy may be indicated.

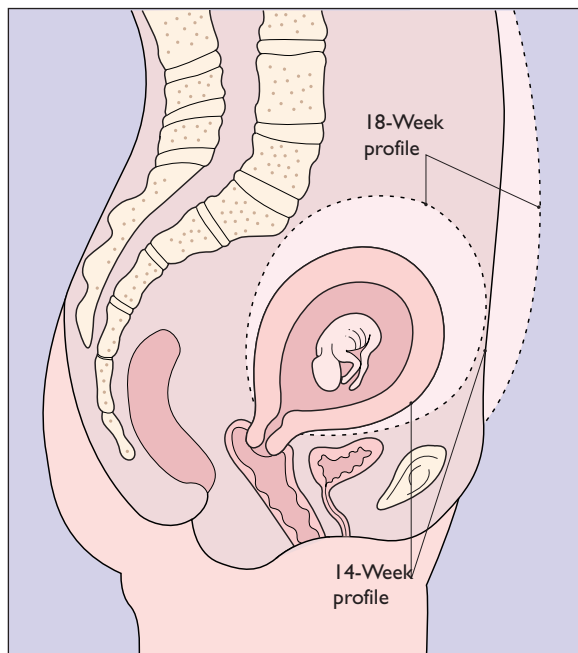
#### Endotoxic shock

As already mentioned, this life-threatening condition follows 5% of septic miscarriages. Endotoxins released by *E. coli* and *Cl. welchii* are neutralized initially by phagocytes, but if this protection fails vasoconstriction of the postcapillary vessels occurs, with resulting pooling of blood, a failure of venous blood to reach the heart and a reduced cardiac output. In addition, the Gram-negative endotoxins may act directly on the blood vessels and heart, releasing substances that profoundly affect the cardiovascular system.

Clinical signs include pyrexia, rigors, hypotension, tachycardia and hypoventilation. A patient with these signs is acutely ill and should be transferred to an intensive care unit without delay.

#### Missed miscarriage/abortion

In a few cases of miscarriage the dead embryo or fetus and placenta are not expelled spontaneously. If the



**Fig. 11.3** Missed miscarriage. The duration of the pregnancy is 18 weeks but the uterus has failed to enlarge beyond the size of a 14-week gestation. Note that the abdomen is flat.

embryo dies in the early weeks it is likely to be anembryonic or blighted. In other cases a fetus forms but dies. Multiple haemorrhages may occur in the choriodecidual space, which bulge into the empty amniotic sac. This condition is called a carneous mole. It is thought that although the fetus has died, progesterone continues to be secreted by surviving placental tissue, which delays the expulsion of the products of conception (Fig. 11.3).

If the fetus dies at a later stage of the pregnancy, but before the 22nd gestational week, and is not expelled, it is either absorbed or mummified. The liquor amnii is absorbed and the placenta degenerates. Fetal death after the 22nd week is discussed on page 208.

#### **Clinical aspects**

The patient usually has a history of threatened miscarriage, which settles down, but she complains of a dirty, brown discharge which persists. Examination at intervals shows that the uterus fails to grow (Fig. 11.3) and symptoms indicating early pregnancy disappear.

The diagnosis cannot usually be made clinically for about 21 days, but can be established earlier by ultrasound examination.

#### **Treatment**

There is no medical need to treat missed miscarriage urgently as most cases end in a spontaneous miscarriage. Information and support must be given to the

parents once they become aware that the fetus has died in utero, as this can be a very traumatic experience. The reason for delaying evacuation of the uterus if the uterine size is greater than 12–14 weeks' gestational size must also be explained. Some women remain anxious after an explanation has been given and request that the miscarriage be completed. This is best effected using mifepristone and misoprostol or prostaglandins, as described on page 110.

If a spontaneous miscarriage has not occurred within 28 days the pregnancy should be terminated, as coagulation defects may result.

The termination procedure depends on the size of the uterus. If it is less than 12 weeks' gestational size the uterus can be evacuated by sponge forceps and curette after cervical dilatation. If the uterus is more than 12 weeks' gestational size the methyl ester of PGE<sub>1</sub>, gemeprost (Cervagem), 1 mg placed in the posterior vaginal fornix every 3 hours for a maximum of five doses in 24 hours is effective.

#### **Recurrent (habitual) miscarriage**

A few women (less than 1%) have the misfortune to miscarry successively. It has been estimated that after one miscarriage the risk of another is 20%; after two miscarriages it is 25%, and after three miscarriages 30%. A woman who has three or more successive miscarriages is termed a recurrent miscarrier. As well as having a 30% chance of miscarrying again, she is at greater risk than a non-miscarrier of delivering a preterm baby, but has at least a 75% chance of delivering a healthy infant at term.

The aetiological factors in recurrent miscarriage vary depending on the population studied, but two large series, of over 100 subjects in each, offer some idea of the aetiology (Table 11.2). In Table 11.2 the causes marked with a query are speculative.

**Table 11.2** Recurrent miscarriage

Possible aetiology	Percentage of miscarriages occurring	
	<12 weeks	>12 weeks
Not known	62	35
Uterine malformations or abnormality	3	10
Cervical incompetence	3	30
Chromosome abnormality	<5	<4
?Endometrial infection	15	15
Endocrine dysfunction	3	3
Systemic disease	1	1
?Sperm factors	3	1
?Immune factors	?	1



**Investigation and treatment of a recurrent miscarrier**

A careful medical and obstetric history may reveal systemic disease or suggest cervical incompetence. A vaginal examination may show uterine myomata or cervical incompetence, and the diagnosis can be clarified if a transvaginal ultrasound image is made. Ultrasound will also detect uterine malformations. Submucous myomata or uterine septa may be removed by abdominal surgery or under hysteroscopic vision. Cervical incompetence is discussed later.

If endometrial infection is considered a causative factor (as is the case with some specialists), endometrial tissue cultures may be made. However, it is doubtful whether toxoplasmosis, cytomegalovirus, herpes virus, rubella or listeria are causes of recurrent miscarriage. Currently the role of bacterial vaginosis is being investigated.

Endocrine dysfunctions, for example polycystic ovarian disease (see p. 227), may be excluded by transvaginal ultrasound scanning and blood tests. Other endocrine disorders, such as thyroid disease and diabetes, are no longer believed to be causes of recurrent miscarriage unless they are poorly controlled.

Although it is usual to investigate both parents for chromosome abnormalities, such aberrations account for only 5% of recurrent miscarriages at the most, and no treatment is available.

Immunological causes for recurrent miscarriage have been sought. The theory is that if the two parents share several human leucocyte antigen (HLA) sites the fetus may not be able to provide a sufficient stimulus to enable the mother to produce blocking antibodies to the allogenic fetus, with the result that the fetus is aborted. However, clinical trials that entail immunizing the woman between pregnancies with paternal leucocytes, pooled donor cells or trophoblast membrane preparations to enhance her immune system, have failed to show any benefit.

A few women with an autoimmune disease, especially the antiphospholipid syndrome and systemic lupus erythematosus (SLE), have a strong blocking antibody reaction which, it is believed, may lead to recurrent miscarriage. SLE must be excluded before immunotherapy is used as SLE may be aggravated. If SLE is identified by laboratory tests, treatment with low-dose aspirin and low-dose heparin improves the livebirth rate from 10% to 70%.

**General measures**

Women who are recurrent aborters need considerable support and care. They should be advised to stop smoking, to avoid sexual intercourse and not to travel. The results from this regimen are as good as those following the use of multivitamins, hormones (including human chorionic gonadotrophin), metallic chemicals,

thyroid extract and acupuncture, all of which are advocated from time to time.

**Cervical incompetence**

About 20% of women who have recurrent miscarriages in the second quarter of pregnancy will be found to have cervical incompetence. The diagnosis is based on:

- A history of recurrent miscarriages occurring after the 12th week of gestation, usually starting with painless leaking of amniotic fluid.
- The easy passage of a size 9 cervical dilator through the internal os of the cervix when the woman is not pregnant, and the absence of a 'snap' on its withdrawal.
- The gradual dilatation of the internal cervical os to more than 3 cm during pregnancy, as detected by ultrasound or repeated vaginal examinations.

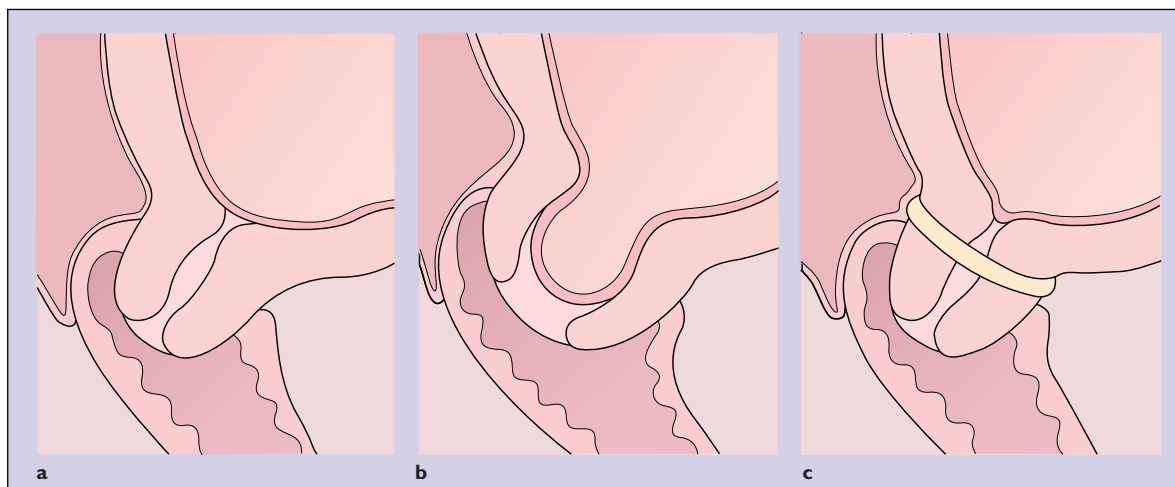
If cervical incompetence is diagnosed, treatment entails placing a soft unabsorbable suture (such as Mersilk 4) around the cervix at the level of the internal cervical os (Fig. 11.4). The patient may return home the same night or stay in hospital for a day, depending on the circumstances. There is no place postoperatively for the use of progesterone, uterine relaxants or narcotics. If there is doubt about the diagnosis, then surveillance with ultrasound is undertaken, cerclage being performed if there are signs of cervical shortening and/or beaking of the membranes through the internal os.

Following cervical cerclage 10% of women abort, 10% give birth prematurely, and the remainder give birth after the 36th week of pregnancy. Cervical cerclage should not be performed if the membranes have ruptured. If miscarriage or premature rupture of the membranes occurs or premature delivery becomes inevitable following cerclage, the suture must be cut. In all other cases the suture is left until about 7 days prior to term, at which time it is cut, and the woman may then be expected to give birth vaginally.

**PSYCHOLOGICAL EFFECTS OF SPONTANEOUS MISCARRIAGE**

For most women a spontaneous miscarriage is a distressing occurrence: over 90% express a grief reaction, which persists for a month in 20% of cases. During the period when the miscarriage threatens or is occurring many women are distressed by not knowing what the outcome will be; others are distressed by being told to rest in bed without any further explanation.

Too little information is given by many doctors (both in general and hospital practice) after a miscarriage has occurred, about the reason for the miscarriage and the outcome of a future pregnancy. Women need counselling on these matters and need to have an opportunity



**Fig. 11.4** Cervical incompetence. (a) Normal cervix at 16 weeks. (b) Incompetent cervix at 16 weeks. (c) Cerclage with an unabsorbable suture.

to express their feelings. There are three main questions to which most women require answers:

- Why did the miscarriage occur?
- Is there anything that I did or did not do that caused the miscarriage?
- Is my next pregnancy likely to end in a miscarriage?

The doctor should provide answers sensibly and sympathetically even if the questions are not asked. This will reduce the period of grief and distress that usually follows a spontaneous miscarriage.

## INDUCED ABORTION

In many countries induced (therapeutic) abortion is now legal. The exact conditions vary, but the purposes of legalizing abortion are:

- To enable women, irrespective of social or economic status, after counselling to obtain an abortion performed by a trained health professional in hygienic surroundings.
- To reduce the frequency of illegal abortions performed in unhygienic surroundings, which are often associated with high morbidity and mortality.

The main reasons for abortion are shown in Box 11.1. In most developed countries where abortion is legal, over 95% are performed for social or psychiatric reasons. It should be stressed that women rarely seek an abortion without considerable thought, and are receptive to and welcome counselling during this difficult time. It is also evident that in many cases the pregnancy could have been prevented if effective contraceptive precautions had been taken.

### Box 11.1 Indications for therapeutic abortion

#### Social

#### Psychiatric

Severe neuroses, psychoses

#### Medical

Severe cardiac disease; heart failure

Severe chronic renal disease; renal failure

Malignant disease, especially of breast or uterine cervix

#### Fetal

Viral infections

Haemolytic disease

Genetic defects

Congenital defects incompatible with normal life (e.g. anencephaly, spina bifida)

### Technique of induced abortion

Abortion is safest when it is performed between the sixth and 12th gestational weeks. Only between 5 and 10% of terminations are made after the 12th week of pregnancy. Termination of the pregnancy may be surgical or medical.

The surgical approach is to evacuate the uterus using a suction curette, under local or general anaesthesia. Following curettage uterine bleeding persists for about 6 days, often being light in the first 2 days after the termination. Most gynaecologists give the woman a course of doxycycline to prevent infection.

Medical methods of termination can be used if the pregnancy is less than 9 weeks' gestation. These include the administration of a single dose of the progesterone antagonist mifepristone (200–600 mg). The mifepristone tablet is followed 36–48 hours later by a prostaglandin

# 11

## Miscarriage and abortion

E<sub>1</sub> vaginal pessary (gemeprost) 1 mg every 6 hours for four doses. If the abortion has not started within 24 hours, gemeprost 1 mg is given 3-hourly for up to four more doses. (An alternative is oral misoprostol 200 µg repeated after 2 hours.) Bleeding usually starts during the interval between the mifepristone and the gemeprost vaginal pessary or oral misoprostol, and uterine contractions start within 4 hours of the administration of either drug. The pain may be severe and most women require narcotics. Nausea or vomiting affects one-third of patients. Bleeding persists for about 9 days, with a mean loss of 75 mL (20–400 mL). Over 98% of women abort using this regimen, but 10% require curettage for persistent heavy bleeding.

In countries where mifepristone is not available two commonly used drugs may be prescribed. Methotrexate 50 mg/m<sup>2</sup> body surface is given intramuscularly. This prevents folate from entering the fetal tissues, with resultant death. Misoprostol 800 µg is given intravaginally 5–7 days later, and following this 75% of women abort within 24 hours. If the abortion does not occur, the misoprostol is repeated.

After the 12th gestational week the uterus may be evacuated using the following:

- Misoprostol 100–200 µg given intravaginally every 12 hours for up to four doses
- Prostaglandin F<sub>2a</sub> (Dinoprost) vaginal pessaries
- The mifepristone/gemeprost regimen mentioned earlier.

These regimens induce an abortion in 80–95% of patients and may replace dilatation of the cervix and uterine evacuation using sponge forceps and a curette, which can be a bloody and prolonged procedure.

Over 80% of women require narcotics for pain, and nausea or vomiting occurs in 30%. Following the abortion, one-third of women require evacuation of the uterus for retained products of conception.

### Sequelae of induced abortion

An induced abortion performed before the 12th gestational week in a well-equipped and staffed clinic is followed by few complications. Less than 1% of women develop infection, and the mortality rate is less than 1 per 100 000 abortions. After the 12th gestational week the rate of complications rises to 3–5% and the mortality increases to 9–12 per 100 000. There is no reduction of the woman's fertility or any increase in the risk of spontaneous miscarriage, preterm birth or fetal loss in a subsequent pregnancy.

### PSYCHOLOGICAL EFFECTS OF INDUCED ABORTION

Most studies have concluded that legal abortion of an unwanted pregnancy does not pose a psychological hazard for most women. Most women feel grief and guilt after a termination, but less than 10% show evidence of anxiety or depression persisting for more than a month. Most of the women adversely affected were ambivalent about having the abortion, or were pressured by parents or partner into terminating the pregnancy. This finding emphasizes that a woman seeking an abortion should be counselled before the procedure takes place, and should continue to receive support (if she chooses) during and after the operation.