ABORTION

J. A. STALLWORTHY, M.A., M.B., CH.B., F.R.C.S., F.R.C.O.G., HON.F.A.C.S.

Department of Obstetrics and Gynaecology, United Oxford Hospitals

Definition

ABORTION means the death or expulsion of the foetus before viability. The twenty-eighth week of pregnancy is generally accepted as the stage at which viability can be assumed. The Births and Deaths Registration Act, 1926, states:

'Stillbirth shall apply to any child which has issued forth from its mother after the twenty-eighth week of pregnancy and which did not at any time after being completely expelled from its mother breathe or show any other sign of life'.

If the foetus were expelled at the twentieth week of pregnancy this would be an abortion. If, however, it died *in utero* and was not expelled until, say, the thirtieth week of pregnancy, it might be considered a stillborn child according to the literal interpretation of the legal definition given above. In practice, however, it would be regarded as a 'missed abortion', a condition which will be discussed later.

Abortion is the most serious common complication of pregnancy. It is estimated that in Great Britain it occurs in 10-15% of all pregnancies while in countries in which abortion is legalized the incidence is very much higher. In England and Wales a 15% incidence of abortion would mean that approximately four times as many potential infants were lost through abortion as the total losses from stillbirth and neonatal death combined. This unfortunately is only part of the story. The Reports on Maternal Deaths in England and Wales for 1952-54, and 1955-57, recorded 153 and 141 maternal deaths from abortion but these figures are lower than the actual ones. Comment was made that among deaths not registered in the enquiry but recorded by the Registrar-General there were a high proportion due to abortion. McCormick (1944) estimated that 3,500 women died annually in America from this complication of pregnancy and a recent estimate in Turkey suggested that 10,000 women a year died from this cause in that country. Serious morbidity due to chronic inflammatory pelvic disease, and acquired sterility, are common sequels, particularly in those who survive criminal interference.

Etiology

In most cases no cause can be found while in others more than one factor would appear to share responsibility. A long list of causes, or alleged causes, could be given but would be of little help in clinical practice. Certain guiding principles, however, can be of use. Every case should be investigated carefully once the emergency is over in an endeavour to find why the abortion occurred and in this way provide information which might be useful in preventing a recurrence. In 75-80% the abortion occurs during the first 12 weeks of pregnancy and there is evidence to suggest that the danger is greatest during the days when menstruation would have occurred had the patient not been pregnant. The uterus appears to be more irritable at this time and more liable to respond excessively to stimuli which would on other occasions cause no trouble. This point is important because at their first ante-natal examination, when this is during the first trimester, women should be warned of the fact that intercourse, spirits, horse-riding, excessive fatigue, and long car journeys requiring several hours of uninterrupted sitting are liable to be followed by bleeding and in some cases abortion. If there is a retroverted gravid uterus the danger appears to be increased. Careful questioning of patients admitted to hospital with abortion reveals a high percentage in whom one or other of these factors seems to have been a contributory cause. The percentage of women in whom pregnancy continues undisturbed by these possible indiscretions is unknown so that the evidence is not conclusive but it is sufficiently suggestive to warrant advising women of the possible dangers.

When abortion occurs in the first 12 to 14 weeks of pregnancy the gestation sac is usually completely extruded as a result of death or disease of the ovum or excessive uterine irritability as described above, whereas in the middle trimester abortion resembles labour in miniature and the foetus may be expelled while placental or chorionic tissue is retained. When this occurs hæmorrhage and infection are likely sequels.

These two complications are the most common causes of maternal death following abortion.

For ease of description the etiological problem can be simplified by discussing abortion under two headings:—

Primary intra-uterine death of ovum or foetus.

Primary abnormal uterine activity.

Death of Ovum

The extent to which malformations of the foetus and membranes are responsible for abortion has not been precisely defined. Estimates vary from 15 to 50% of all spontaneous abortions. Hertig, Sheldon, and others have demonstrated developmental defects in aborted ova in a high proportion of cases, particularly when the abortion occurred in the early weeks of pregnancy. It is not uncommon in practice to find that the gestation sac is complete after abortion but with no evidence of a developing foetus inside. Sometimes the trophoblast is itself responsible and careful naked-eye examination of the aborted material will reveal cystic changes which can be confirmed histologically as due to hydatidiform mole formation. Seminal defects have been incriminated by some workers as a cause of foetal abnormality and there is experimental work with animals to support this view; while it would be unreasonable to assume that one ovum was as good as another and it would seem certain that lethal genes can be transmitted by either sex. The male has on occasions been unfairly incriminated during attempts to determine the cause of his wife's abortion on the inadequate evidence that he has an abnormal seminal analysis; a high proportion of abnormal spermatozoa in a husband's specimen can not be regarded as the explanation. Placenta prævia is a not uncommon cause of abortion during the middle trimester. It must be apparent that a placenta which is low-lying at term was in this position when it first developed.

Criminal interference is probably responsible for more abortions than any other single cause. It may take the form of administering drugs, injecting irritating material such as soap solutions into the uterine cavity, or attempts at destroying the foetus by inserting instruments. The response of both the ovum and the patient to these procedures varies tremendously. A pregnancy has been known to continue undisturbed even after curettage and a patient may become gravely ill from acute lead-poisoning following the ingestion of this substance as an abortive agent without abortion occurring. Sometimes when attempts at abortion have been unsuccessful the woman changes her mind and decides to continue with the pregnancy. It is not uncommon under these circumstances for her to worry excessively lest

the attempts at interference have damaged the foetus. On this point she can be reassured. There is no evidence to suggest that the foetus that has survived these attacks will be affected by them in its subsequent development. An occasional exception to this is where attempted abortion in the later weeks of the first trimester has resulted in damage to the developing placenta and subsequent relative placental insufficiency in the later weeks of pregnancy with intra-uterine foetal distress or even unexpected intra-uterine foetal death.

Syphilis transmitted from the mother to the developing embryo was once more common than it is today as a cause of abortion, particularly in the middle trimester. Nonetheless it still occurs even in Great Britain and every pregnant woman early in her pregnancy should have her W.R. tested. Chronic nephritis can produce sufficient placental endarteritis to cause intra-uterine death and abortion. Severe diabetes can also cause death of the foetus and abortion in the middle weeks of pregnancy although it is more liable to produce this complication after the twenty-eighth week. The same applies to toxæmia of pregnancy and immunization due to Rhesus incompatibility. The foetus appears particularly sensitive to maternal hyper-pyrexia and abortion can follow acute infections such as pneumonia, pyelitis and peritonitis. In all such cases it is wise to keep the temperature within reasonable limits by giving aspirin until such time as the infection is controlled by specific chemotherapy.

There is a small but definite group of patients in whom there is a recurrent tendency for abortion between the sixteenth and twenty-eighth week of pregnancy preceded by intra-uterine foetal death due to asphyxia. In these cases there is a small fibrous inadequate placenta. This may be due to inadequate pituitary gonadotrophins or be associated with disturbed function of other endocrine glands such as the thyroid.

Primary Abnormal Uterine Activity

Extreme degrees of uterine hypoplasia are associated with infertility. Less serious degrees of arrested uterine development can be characterized clinically by repeated abortion occurring at successively later stages of each pregnancy. During pregnancy there are large amounts of oestrogenic hormone and progesterone in circulation; these hormones bring about preparation of the endometrium and its change into the decidua during the early weeks of pregnancy and subsequently are responsible for the growth of the uterus and its response to the enlarging ovum. It has for long been believed, though without scientific proof, that progesterone, due to

sedative action on the activity of the uterine muscle, is responsible for decreasing uterine irritability and that in this way it lessens the chance of the growing uterus expelling the ovum which distends it. It is certainly a clinical fact that in degrees of hypoplasia as described above successive pregnancies can bring about an alteration in the environment of the ovum to such an extent that each pregnancy allows the foetus to develop until a later stage than the preceding one until finally a viable child is delivered.

Congenital malformations of the uterus increase the liability to abortion. When this occurs it is usually after the twelfth week but it should be remembered that even major developmental errors can be associated with full-term pregnancy. This would support the view that there is more than one factor responsible for abortion in these cases.

Displacements of the uterus, particularly retroversion, are commonly incriminated as a cause of abortion, but the relationship has almost certainly been over-emphasised. As already described certain indiscretions are more likely to stimulate expulsion of the ovum in a gravid uterus if it is retroverted but there is little evidence that retroversion itself causes abortion when due care is taken to avoid these stimuli. Nonetheless, when abortion is repeated and no factor other than a retroverted uterus is discovered it is reasonable to replace the uterus into the anteverted position before a further pregnancy is commenced. Attempts to replace a retroverted gravid uterus with the object of preventing abortion are more likely to produce it. On the rare occasions when impaction occurs at about the twelfth to fourteenth week with retention of urine catheterisation will not only give immediate relief but be followed usually within 24 hours by spontaneous correction of the retroversion. Manipulation is unnecessary and more traumatic than spontaneous correction.

Uterine fibroids are commonly found during pregnancy but seldom can be responsible for abortion. When a fibroid is sub-mucous the chance of abortion occurring is increased and sometimes in the process the tumour itself is extruded into the uterine cavity as a polyp. When abortion is associated with fibroids it is important to decide whether these were responsible as myomectomy would improve the prognosis for a future pregnancy. Once involution has occurred a hystrogram will reveal by filling defect and cavity distortion when a tumour is sub-mucous. Once a patient with fibroids becomes pregnant treatment should be conservative and myomectomy has no place during pregnancy itself.

Expulsive efforts by the uterus can be stimulated by over-distension such as is seen with hydatidi-

form mole, and in certain cases of multiple pregnancy, particularly if these are associated with hydramnios. The more acute the hydramnios the more likely the uterus is to respond by expelling its contents. When this occurs it is usually in the middle trimester.

In recent years an important cause of abortion during the middle trimester has been described by Shirodkar and others. It is due to what is commonly described as cervical insufficiency or incompetence although in many cases it can be demonstrated that there is a lesion in the region of the isthmus. This can be congenital in origin and manifest itself during the first pregnancy or more commonly is the result of trauma. This may follow excessive dilatation of the cervix for dysmenorrhœa, extensive cervical lacerations during childbirth, and even damage affecting the region of the internal os associated with precipitate delivery. When abortion occurs in these cases it is usually after the fourteenth week and may be delayed until the twenty-fourth or later. The characteristic clinical manifestations are a watery discharge, sometimes of sudden onset, and a bulging bag of membranes in the cervix or through this into the vagina. Although responsible for only a small percentage of the total number of abortions the recognition of this clinical entity has been a major contribution to obstetrics because its recognition prior to the rupture of the bag of membranes allows their replacement and suture of the cervix with a high percentage of success. It is logical to combine the surgical treatment with the administration of progesterone in the hope of reducing uterine activity. If a simple suture material such as nylon is used it can be divided easily at or near term and the cervix usually immediately dilates and allows the membranes to bulge through. In those cases in which the dilatation is associated with strong uterine contractions there is greater justification for using progesterone at the time of the suture.

Psychogenic causes appear to be of importance in many cases in the etiology of abortion. In repeated abortion excitability of the autonomic nervous system is likely to become a major factor whether it is the primary one or not. With each successive disappointment the anxieties of the woman who is anxious to have a baby increase and can affect the irritability of the uterus.

Types of Abortion

The process of abortion is labour in miniature. The cervix must be effaced before the external os dilates and dilatation precedes expulsion of the ovum. The following clinical types are recognized:

Threatened abortion.

Inevitable abortion.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

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Incomplete abortion.

Missed abortion.

In addition to the above basic clinical types reference will be made to the following:—

Septic abortion.

Repeated or habitual abortion.

Therapeutic abortion.

Criminal abortion.

The changes which occur as abortion progresses from the stage of being threatened to that of being complete are illustrated in Figures 1-4. Study of these will show that cervical signs are of importance in indicating the stage the abortion has reached. This is particularly true in distinguishing between threatened and inevitable abortion. Each variety will now be considered in more detail.

Threatened Abortion

Bleeding during pregnancy is usually due to

separation of the membranes or placenta. It may be profuse and red, or scanty and brown. It is customary to presume that abortion is threatened whenever painless vaginal bleeding or blood-stained discharge occurs. Approximately 20% of pregnant women have this symptom. It is important to remember however that vaginal 'spotting' or bleeding is not always an indication of threatened abortion. If it is associated with midline lower abdominal discomfort or recurring pains the diagnosis is more likely to be correct. When the bleeding is painless, as it usually is, it may arise from cervical polypi, erosions, and most serious of all occasionally from carcinoma of the cervix associated with pregnancy. It is wise to treat the bleeding initially as due to threatened abortion so that appropriate measures can be taken without delay. When the emergency is over and before the patient is allowed to return

normal activities the genital tract should be examined gently with a speculum and adequate light as well as with the finger.

If bleeding is associated with pain or discomfort in the hypogastrium or back and sometimes in both iliac fossæ, the patient is almost certainly threatening to abort. The site of the pain and its relative mildness helps to distinguish it from the unilateral pain of ectopic pregnancy. On rare occasions pain in the sites mentioned without bleeding is the first indication of a threatened abortion. This is most likely to occur with a sub-mucous fibroid, or with a patient who is emotionally tense and has an irritable uterus.

As a general rule vaginal examination should be postponed if bleeding is slight. Once the emergency has subsided the examination should be made. If examination is considered necessary gentle digital palpation of the cervix will give all the information required at this stage. Reference to Figure 1 will show that examination would reveal a closed uneffaced cervix.

Inevitable Abortion

This implies that nothing can prevent expulsion of the ovum. The clinical change from threat to inevitability is indicated by more or less arbitrary signs and symptoms. If the cervix is effaced and opened so that the lower pole of the ovum occupies the cervical canal, or if liquor amnii has escaped, the diagnosis is practically certain. It has been mentioned, however, that in the special group with cervical incompetence the membranes may be bulging through the cervix and yet be amenable to replacement with suture of the cervix. Bleeding is usually more severe than in threatened abortion but the amount of loss is not an infallible guide to inevitability. Many pregnancies will continue to term even after severe hæmorrhage and the passage of clots. This is most likely to happen when bleeding occurs during the middle trimester as a result of a low lying placenta. The association of recurring pains in the lower abdomen or sacrum with the passage of clots and considerable hæmorrhage is an indication that abortion is inevitable.

This stage usually terminates quickly. Expulsion of the ovum causes little distress and subsequent bleeding is minimal if no fetal products are retained. The material passed should be examined carefully. Failure to find an embryo does not necessarily mean that it has been retained *in utero*. This is in fact unlikely for if tissue is retained it is usually chorionic or placental, and absence of the embryo can be due to its faulty development or absorption. The retention of fetal products is more common after induced than after spontaneous abortion.

A useful clinical principle is that an empty uterus will not bleed. When abortion occurring during the first twelve weeks is completed bleeding should stop within two to three days and blood-stained discharge by the end of a week. If it persists longer or recurs the abortion should be regarded as incomplete. Complete abortion is followed by rapid involution of the uterus with reformation and closure of the cervix as illustrated in Figure 4.

Incomplete Abortion

An empty uterus is the only safe one. Retention of fetal products is associated with the risks of hæmorrhage and infection which are the two great causes of maternal death from abortion. In terms of both mortality and morbidity incomplete abortion is the most dangerous variety. It is responsible for more gynæcological emergencies than any other single condition and accounts for approximately 10% of the gynæcological admissions to a hospital in which there is no selection of patients.

Incomplete abortion is characterized by persisting or recurrent hæmorrhage which may be associated with lower abdominal discomfort and on occasions with severe pains due to uterine contractions. If the hæmorrhage is severe digital examination will often disclose placental tissue in the cervical canal. An open cervix suggests that the abortion is of recent occurrence but it is important to remember that a closed cervix does not necessarily exclude the presence of retained products within the uterus. The uterus will be enlarged but the normal variations particularly in the parous organ may make this sign of doubtful value. Even when no uterine enlargement is detected, if bleeding persists exploration of the cavity may reveal a surprising quantity of placental debris.

Missed Abortion

If a foetus dies *in utero* but the uterus fails to expel it there may be no pain and no bleeding. The condition is known as a missed abortion. Sometimes hæmorrhages occur in the space between the decidua and the chorionic covering of the ovum and result in its death. Recurrent hæmorrhages may occur resulting in layers of organized blood clot in the centre of which will be the original amniotic sac and foetus. These may both be absorbed. This constitutes an interesting variety of missed abortion known as a Carneous Mole.

Missed abortion may occur insidiously as in the case of a woman who observes that the sensations of pregnancy have ceased and her abdomen is decreasing in size rather than enlarging. On the

other hand it sometimes follows the signs of a threatened abortion with vaginal bleeding. Her breasts become smaller and sometimes a woman will complain of a sensation of coldness in her lower abdomen. On rare occasions she may feel ill with no definite symptoms and even develop skin rashes caused apparently by absorption of foetal products.

The pregnancy urine test is of little value in these cases. It can be negative even although the pregnancy is continuing normally and it can be positive with a missed abortion as long as placental tissue is retained.

Management of Abortion

Treatment of abortion demands more than the efficient handling of the emergency. When a woman loses a much-wanted baby she may require reassurance before she is physically and mentally fit to embark on another pregnancy. If a woman's life is endangered by criminal abortion she should not need to be exposed to this risk again if her problems are handled wisely and sympathetically. There are four guiding principles in the management of abortion. They are:—

- (a) Treatment is both immediate and remote. Once the emergency is over steps should be taken to find out why it occurred, and plans should be made to prevent its recurrence.
- (b) The aim of treatment in threatened abortion is to prevent it from becoming inevitable.
- (c) In all other types of abortion treatment aims at emptying the uterus, controlling hæmorrhage, and preventing sepsis.
- (d) No patient should be discharged from medical care until her health is fully restored. Anæmia is common. A post-abortion examination is as essential as a post-natal one. Menstruation should return normally within one to two months but recurrent or persisting bleeding or blood-stained discharge demands investigation. Chorion-epithelioma can follow abortion. The management of abortion based on these guiding principles will now be discussed in more detail.

Threatened Abortion

Treatment is aimed at arresting the process. Physical and mental rest are essential during the emergency. Calm reassurance can be of the greatest help to the patient. It should be reinforced by pethidine mg. 100–150 or morphine mg. 15. Complete rest in bed until bleeding ceases is advisable. Phenobarbitone 0.2 g. can be useful as an initial dose and sodium amytal 0.4 g. or seconal 0.2 g. at night will promote restful sleep. There has been much controversy over the use of

progesterone in these cases. Its use in threatened abortion has long since been abandoned in the Area Department of Obstetrics and Gynæcology at Oxford. It is, however, still used on occasions once the acute episode is over and before the patient is allowed to return to full activity. On these occasions a pellet of 100 mg. is implanted into the muscle of the buttock under local anæsthesia. Oestrogenic hormones have been advised in the treatment of threatened abortion by some workers but their use is not recommended. When recurring uterine discomfort or pain is the main symptom of threatened abortion dramatic relief can be given by the sublingual absorption of glyceryl trinitrate 1/100 gr. This should be used only when the patient is in bed as it can cause syncope in an ambulant patient and it should not be used if there is bleeding. In a threatened abortion which responds to treatment the initial hæmorrhage is usually followed for a few days by a decreasing brown discharge, the extent and duration of which is not related to the amount of external bleeding which took place. The patient should be advised of this development and assured that it is not a cause for anxiety. She is wise to remain in bed for two to three days after bright bleeding ceases and to restrict even her household activities for a period of a week. If the abortion was threatened during the first 12 weeks she should be warned to restrict activity as much as possible when the next suppressed period is due.

Inevitable Abortion

Treatment is aimed at emptying the uterus with minimal delay and blood loss. The uterus usually empties itself quickly and spontaneously and the stage of inevitability is brief. It can persist for hours or even days and on occasions requires help urgently because of severe bleeding. If hæmorrhage has been severe a further loss can prove fatal and a patient who has already bled heavily should not be transferred to hospital with the uterus unemptied. If bleeding is severe ergometrine 0.5 mg. should be given intravenously and careful aseptic digital exploration of the cervix will often reveal placental tissue lying in the canal. If the bladder is emptied before the examination this makes palpation of the uterus easier and promotes uterine contractions. In these cases the uterine cavity can usually be evacuated by gentle digital exploration. If the condition of the patient in domiciliary practice gave cause for alarm the wisest plan would be to give ergometrine 0.5 mg. intravenously and summon the nearest Flying Squad. If there was delay in obtaining this and hæmorrhage persisted, digital exploration would be indicated. Morphine 10 mg. relieves anxiety and improves uterine tone,

whereas a larger dose can have the opposite effect on the uterus.

If the uterus is excessively enlarged and particularly if there are associated ovarian tumours, either unilateral or bilateral, the diagnosis is almost certainly a hydatidiform mole with theca-lutein ovarian cysts. The latter will regress spontaneously after the mole has been evacuated. Posterior pituitary extract should not be given. Its action is not so constant as that of ergometrine, its effect is not so prolonged, and it can produce severe shock which may even be fatal. This applies to the whole extract of the posterior pituitary gland. The oxytocic principle is safer and can be used instead of ergometrine. It can be administered when necessary by intravenous infusion using the drip technique with 2.5 to 5 units per bottle of glucose saline.

Immediate steps should be taken to prepare for blood transfusion which will not only replace the blood which has been lost, but increase the safety margin should further hæmorrhage occur. It must be emphasised that on no account should a collapsed patient be transported to hospital. Resuscitation is more important than immediate removal and failure to appreciate this fact has caused many deaths. The Flying Squad has no better justification than its efficient handling of just this type of case. Until suitable blood is available it is wise to commence a slow saline or glucose saline infusion. This also avoids delay once suitable blood is available.

Prolonged or severe painless bleeding during the middle trimester suggests the diagnosis of placenta prævia for which hospital supervision is essential. Transfer of the patient should be entrusted to the Flying Squad service.

Incomplete Abortion

More deaths occur from incomplete abortion, including septic incomplete abortion, than from all other varieties combined. As in inevitable abortion, treatment aims at emptying the uterus. Hospital practice gives a wrong impression of the frequency of incomplete abortion and it should be remembered that most women who abort spontaneously at home during the first 12 weeks expel the complete ovum. When this occurs vaginal bleeding ceases in two or three days. The warning sign that abortion was incomplete is persisting or recurrent bleeding and this should not be treated lightly. The expectant attitude in these cases of waiting for tissue to be expelled and the administration of ergometrine and other oxytocic drugs often proves ineffective and is associated with the danger of further hæmorrhage and of infection. If bleeding persists after the administration of ergometrine 0.5 mg. intravenously, or 0.25 mg.

intravenously and 0.25 mg. intramuscularly, the uterus should be evacuated surgically. The decision when and where to operate is one on which the life of the patient may depend and is based on the following general principles. Although it is best to operate in a well-equipped theatre, lives will be saved in rural areas when bleeding is severe by using the services of an emergency obstetric team and evacuating the uterus in the patient's own home. In severe cases blood transfusion before and during operation can be life saving. The administration of ergometrine intravenously 0.25–0.5 mg. at the commencement of operation reduces blood loss, makes the uterus firmer and its wall thicker, and in this way reduces the chance of perforation. The detailed technique of evacuation is beyond the scope of this article but certain practical points should be emphasized. The bladder should be emptied and the exact position of the uterus should be confirmed before any instruments are passed to avoid perforating the anterior wall of a retroverted uterus. Narrow instruments such as uterine sounds, sharp dilators, and narrow curettes should be avoided. When the cervix is sufficiently dilated to permit of the index finger being inserted into the uterine cavity, the other hand can press the uterus down by abdominal manipulation on to the exploring finger and in this way the cavity can be emptied. In most cases, however, this technique is not possible. Sponge forceps are a useful means of removing larger pieces of placental tissue, and a blunt flushing curette irrigated with saline or a weak antiseptic solution at a temperature of 43–45°C. is a useful means of emptying the cavity and promoting contraction of the uterus. Twenty-four to 48 hours in hospital is usually all that is required when there is no infection. Discharge should cease within a week.

Septic Abortion

Infection can occur at any stage of abortion. Although it occurs most commonly after criminal interference there is no justification for assuming that because the genital tract is infected interference has necessarily occurred. Organisms can be introduced into the uterus by careless technique, ascend from the patient's vagina during the course of a spontaneous abortion, or be blood-borne as for example during an acute general infection. Septic abortion in most cases is associated with the incomplete variety of abortion. Uterine infection behaves like infection elsewhere and can remain localised, or spread to the tubes and pelvic peritoneum, into the parametrium especially if there have been lacerations of the cervix, and occasionally may cause general peritonitis or septicæmia. The advent of chemotherapy and

antibiotic drugs has completely changed the prognosis in these cases both in regard to mortality and morbidity. The condition is, however, still dangerous and certain basic facts must be remembered. They are:—

Sepsis and anæmia are often combined.

Wounds heal more cleanly and rapidly when dead tissue is removed.

Infection or hæmorrhage from the infected placental site can cause the patient's death.

Anæmia may be profound and can be caused either from blood loss or from toxæmia caused by the infecting organism, particularly the hæmolytic streptococcus and *C. welchii*. The latter infection can arise in a patient who has become anæmic after spontaneous abortion, lowered resistance leading to a fulminating and fatal infection. At least 25% of all septic abortions admitted to hospital need transfusing. When death occurs in these cases it is due either to infection or hæmorrhage, or a combination of both, so that treatment should aim at overcoming the infection and removing the threat of further bleeding. Which should be done first depends on the extent of the bleeding and unless hæmorrhage is severe it is wise to control the infection first. Both aerobic and anaerobic cultures are made from high vaginal swabs and from the blood if there is pyrexia. Streptococci and *E. coli* are usually responsible but anaerobic organisms are not uncommon. Until the organism and its sensitivity are known, antibiotics capable of dealing with both the former types of infection should be used. Penicillin, 1,000,000 units, and streptomycin, $\frac{1}{2}$ g., should both be given as an initial dose and be repeated within 12 hours. If the hæmoglobin is below 60% blood transfusion should be given. If anæmia is profound packed cells should be used in the first instance. Special nursing is necessary in the gravely ill patient, with frequent recordings of temperature, pulse rate, and blood loss. When mental distress is acute sympathetic nursing, sedative drugs, and adequate sleep are essential.

Once infection has been controlled the abortion should be treated according to the instructions already given. In most cases sepsis is associated with septic incomplete abortion and when this is so the uterus should be evacuated. With this plan of treatment there have been no deaths from septic abortion in the Oxford Department since 1954.

Occasionally a patient with septic abortion is bleeding badly when first seen. When this happens an initial dose of 1,000,000 units of penicillin and $\frac{1}{2}$ g. of streptomycin is given, ergometrine 0.5 mg. is given intravenously, a blood transfusion is commenced, and the uterus is evacuated as gently as possible.

Many maternal deaths would be prevented and considerable morbidity avoided if more women with incomplete abortions were treated promptly according to the methods advocated in this paper. Fœtal products retained *in utero* after the most innocent spontaneous abortion can become seriously infected by organisms ascending from the vaginal vault.

Gas Gangrene Infections

Special mention should be made of this fortunately rare but extremely serious complication of abortion. Its early clinical recognition was admirably described by Hill in 1936. Usually, but by no means always, there is a history of interference particularly of fluid injected into the cervix with a Higginson syringe. Within 12 hours the patient can appear moribund. Lower abdominal pain beginning in the hypogastrium and spreading over the whole abdomen indicates the onset of uterine infection with peritonitis. Either severe vaginal bleeding or a blood-stained discharge may be present in the early stages. The patient looks and feels gravely ill. The pulse at the wrist may be imperceptible. The systolic pressure is low and the diastolic unrecordable. The skin is cold and clammy and the peripheral circulation may be so impaired that the limbs are cold and blue. There is suppression of urine even to the stage of complete anuria and any that is excreted is heavily stained with blood pigment. This can be an early sign and should make one suspicious of a fulminating gas gangrene infection. Toxæmia is profound and hæmolytic anæmia develops rapidly. Icterus may be detected in a few hours in the conjunctivæ. Even when the patient is dying the mind remains clear and the eyes alert but there can be considerable mental distress. At this stage crepitus is seldom detected and x-ray examination of the pelvis will seldom show gas in the tissues. If the patient dies gas production in the tissues can be terrifyingly rapid. A vaginal swab reveals the presence of *C. welchii* either alone or with other organisms and blood cultures will be positive. Diabetic patients are prone to this infection. The principles of treatment are as follows:—

To combat the toxæmia.

To destroy the infecting organism.

To maintain life while the first two objects are being achieved.

Morphine 10 mg., or heroin 5 mg. are effective in relieving anxiety. An intravenous infusion is commenced but it is important that the volume of fluid should be restricted, particularly if there is anuria. The infusion provides a ready means of giving the necessary concentrated treatment. One million units of penicillin are given intra-

venously with 100,000 units of anti-gas gangrene serum. This is followed every four hours with 500,000 units of penicillin and 50,000 units of anti-gas gangrene serum until both toxæmia and infection are controlled. Urine will not be secreted until the blood pressure rises and this will not happen in the initial stages of treatment. Hydrocortisone 100 mg. should be added to the infusion fluid and subsequent administration varied according to the response of the blood pressure. If paralytic ileus is associated with peritonitis the stomach should be kept empty by constant or periodic suction and the administration of oxygen through a suitable mask can help in relieving respiratory distress.

Signs of improvement are the general appearance of the patient, rising blood pressure and falling pulse rate and an increased urinary output. Retained placental tissue is an ideal culture medium for anaerobic organisms and the uterus should be evacuated as soon as the condition of the patient justifies it. Evacuation of the uterus is also imperative if severe bleeding should occur or if in spite of the treatment outlined above the patient's condition deteriorates. Hysterectomy is not indicated. It must be re-emphasized that if anuria persisted the chance of survival would be decreased by giving excessive fluid intravenously.

Treatment of Missed Abortion and Carneous Mole

While it is distressing for a woman to know that her baby is dead within her womb she should be assured that this is not dangerous and that in most cases it will be safer for her to be patient and wait for nature to expel the uterine contents rather than to embark on ill-chosen surgical interference. If intra-uterine death occurs in the later weeks of the middle trimester and the foetus is retained for a fortnight or more there is the possibility of blood-clotting defects developing with spontaneous hæmorrhages, but this condition is rare in association with abortion. While it is usual for the uterus to empty itself within a few days of foetal death there are many instances in which the foetal products have been retained for many months. If, for any reason, it seems advisable to empty the uterus this is best done vaginally after gentle dilatation of the cervix. If the cervix is too firm to allow dilatation without tearing, or if the uterus is enlarged beyond the

size of a 14 weeks gestation a vaginal hysterotomy is preferable.

Repeated or Habitual Abortion

If every woman were investigated along the lines suggested above at the time of her first abortion there would be fewer examples of repeated or so-called habitual abortion. Responsible factors such as indiscretions, sub-mucous fibroids, or an incompetent cervix would be diagnosed and treated. The problem with repeated abortion is to try and determine the cause and to take the appropriate action. Once abortion is threatened it is treated along the lines indicated above.

Therapeutic Abortion

This is a difficult and controversial subject in which ethical and theological problems as well as medical ones are involved. Because of the many difficulties it is advisable that any doctor associated with a case of therapeutic abortion should take certain precautions. They are:—

He should never operate without the written support of a second colleague and in some instances, particularly when the mental health of the patient is in question, he is wiser to have the agreed opinion of two independent specialists.

Patients on whom therapeutic abortion is performed should be treated in hospital rather than in private nursing homes. There are occasions when if single rooms are not available it may add to the distress of the patient to admit her to a general ward, just as there are other occasions on which it may be to her advantage to do this.

If for good reason it is deemed in the patient's interests to admit her to a private room the chance of repercussions would be reduced for the surgeon if his fee were nominal rather than excessive.

In conclusion it is remarkable how often the latent maternal instinct of a patient will triumph over the initial shock and fear associated with an unwanted pregnancy. The chance of this happening will depend a great deal on the tact and sympathy with which she is handled by her medical practitioner. Reassurance and a clear statement of his attitude to the problems involved will do much to help the patient clarify her own views. The suggestion that 24 hours should be taken to reconsider the matter, and the provision of a sedative to guarantee a good night's sleep, will on occasions be all that is necessary to bring about a change of heart.