

### INCOORDINATE UTERINE ACTION IN LABOUR\*

T. N. A. Jeffcoate, M.D., F.R.C.S.(Edin.),  
F.R.C.O.G.

*Liverpool, England*

THERE is no general agreement as to what constitutes incoordinate uterine action. All recognize a "colicky uterus" and "constriction ring dystocia" but some regard them as distinct and separate entities, whereas others consider them closely related, often to be seen in the same patient, and representing different degrees of the same fundamental disorder. Here it is proposed to take a broad view and to

\* This paper formed the basis of a lecture given to postgraduates at the Royal College of Obstetricians and Gynaecologists, London, on March 4, 1947.

From the Department of Obstetrics and Gynaecology, University of Liverpool.

include all conditions in which the activity of one part of the uterus is independent and out of keeping with the purpose of the whole.

One feature common to all types of case is a state of spasm and increased tone in some part of the uterine wall. When the upper segment is affected the contractions of all or some part of it becomes colicky and, in severe cases, one area may remain in persistent spasm in between contractions proper. When the lower segment and cervix are involved the condition is manifested by increased tone and resistance to dilatation (*e.g.*, "rigid cervix"), or sometimes perhaps by active contraction. When an annular area of uterine wall is affected by persistent spasm, the typical constriction ring results. The commonest site for this, as might be expected, is at the meeting place of the two functionally different parts of the uterus, *i.e.*, at the junction of the upper and lower segments. When the primary error is a state of spasm or increased tone in the lower segment and cervix, or at least an absence of their normal readiness to dilate, this may well be reflected in the upper segment in the form of inertia. Inertia is often looked upon as always representing feeble action of the uterus as a whole, whereas it should be recognized that quite often the quiescence of the upper segment is the result of a functional resistance of the lower segment and cervix.

The propriety of including some types of inertia under the heading of incoordinate uterine action may be questioned by some, but it seems justified not only on academic grounds but also because, as emphasized by Miles Phillips, a uterus may show alternating phases of colicky action and inertia during the course of the same labour. Moreover it should be noted that even those who take the view that the two conditions are separate and unrelated, admit that both have the same etiological factors (primiparity, nervousness, posterior position, etc.), and that both require treatment on similar lines.

#### EFFECT ON LABOUR MATERNAL AND FETAL RISKS

Incoordinate uterine action, even to the extent of constriction ring formation, can occur during any stage of labour, before or after rupture of the membranes. In the third stage the typical example is "hour-glass contraction" of the uterus.

The general effect of incoordinate uterine action is to prolong the course of labour, especially of the first stage. The cervix dilates slowly but after a distressing and long first stage may become fully dilated. In the common but less serious cases, and especially if the fetal head rotates favourably, the second stage may be normal and delivery spontaneous. If the disturbance of function is more severe the woman is exhausted or the fetus is showing signs of distress by the time the second stage is reached, and forceps delivery becomes necessary. This may be difficult, especially if a constriction ring persists or forms during the second stage. Quite frequently the cervix never really attains full dilatation and "a rim" has to be slipped up over the presenting part before the forceps blades are applied. In the most serious cases the cervix may be only half dilated or less, even after several days of labour.

The maternal and fetal risks are considerable, but it is not easy to give figures to cover all forms of incoordinate action, mild and severe. In constriction ring dystocia the maternal mortality prior to the introduction of lower segment Caesarean section and chemotherapy was often as high as 20 to 30%, and the fetal loss was 40 to 60%. The chief dangers for the mother are injuries to the uterus, cervix, vagina and adjacent tissues from attempts to assist delivery; intrapartum infection; exhaustion and shock; and post-partum hæmorrhage associated with prolonged labour, continued uterine inefficiency and general anæsthesia. The uterus may undergo ischæmic pressure on some area but it never ruptures spontaneously, even though a constriction ring is present. Death or injury to the fetus may result from birth injury or from intra-natal asphyxia due to the interference with placental circulation by uterine spasm.\* Intra-natal infection with organisms from the amniotic cavity may also cause neo-natal death or disease.

The complete picture of the effect of incoordinate uterine action is perhaps best seen in a gynæcological clinic when, on asking a patient about her obstetric history, it is not uncommon to find that her first labour lasted two or three

\* In normal labour the intrauterine pressure in the intervals between contractions is 5 to 8 mm. Hg. during the first stage, and 10 to 12 mm. Hg. during the second stage. When uterine contractions are colicky the resting pressure may be raised to 15 to 18 mm. Hg. or more, and is often higher than the blood pressure in the placental sinuses.



days, was ended by a forceps delivery of a stillborn child, and was followed by a morbid puerperium. Examination then frequently shows a deeply torn cervix indicating that forceps had almost certainly been applied before full dilatation. Unfortunately it is not rare to find that the character of the labour left such a bad impression on the woman, or her husband, or both, that further pregnancies have been avoided and the woman is childless.

#### CLINICAL FEATURES

The overall clinical picture is one of prolonged labour in which there is no gross disproportion and in which progress is slow in spite of strong and distressing "pains". This is not to deny that a similar disturbance in uterine function can occur in the presence of real disproportion, but it then assumes a secondary importance. Some of the clinical features of incoordinate uterine action deserve mention in detail since they enable the diagnosis to be made without much difficulty.

*Pains.*—A common finding is that the "pains" are experienced in the back rather than the abdomen and the patient complains of wearisome low backache—intensified during a contraction but present to some extent all the time. If the pain is felt in the hypogastrium it may be unilateral, or worse on one side than the other.\* A valuable clinical test is to compare the duration of the uterine contraction as determined by palpation, with the patient's sensation of pain. In a normal contraction the hardening of the muscle can be felt an appreciable time before and after the patient experiences pain. Indeed, the sensation of pain is only present when the intra-uterine pressure is raised from the resting level of 5 mm. Hg. up to 25 or 30 mm. Hg. When the muscle is in spasm the interval pressure already approaches the critical level and pain is experienced at the very inception of a contraction, even before the hardening is perceptible to the observer. Similarly the sensation of pain persists for some time after the muscle appears to have ceased contracting. Irrespective of changes in intra-uterine pressure, however, it is probable that ischæmia of spasmodically contracted muscle plays a large part in the production of pain.

\* It is possible that unequal or unbalanced action of the two embryological halves may be a feature of some types of disordered uterine action, and this would explain a unilateral distribution of pain.

The contractions of the incoordinate uterus are often quite strong and frequent from the outset and their intensity and frequency tends to remain constant rather than to undergo a gradual increase as in normal labour. Sometimes, however, irregularity in strength and periodicity is noticed, whilst as mentioned previously, phases of colicky contractions may be interspersed with phases of inertia. Very often the patient is acutely conscious that her "pains" are ineffectual and that labour is not progressing as it should. She tends therefore to become more anxious and this makes matters worse. The contractions of false labour are probably incoordinate; they often have the characteristics of being intense, moderately frequent and regularly spaced; they are inefficient in that they do not dilate the cervix, and they can be very distressing to the patient. Occasionally after a long and trying phase of first stage pain the patient may have a desire to "bear down" although the cervix is not fully dilated. The bearing down effort can be surprisingly strong but is ineffectual and misguided. In some cases at least this false suggestion of the onset of the second stage appears to arise from spasm in the colon or rectum. It is of considerable practical importance in that it often deceives the attendant, who allows the woman to exhaust herself in fruitless efforts, and who may easily become committed to an attempt at forceps delivery before the time is ripe.

*Cervix and presenting part.*—Sometimes the cervix remains thick and resistant, and may even appear to contract during a pain. Sometimes it is quite slack and loosely applied to the head; this is particularly likely when there is a constriction ring situated above the presenting part. An interesting and by no means rare finding is a low presenting part with the cervix very thin and tightly stretched over it. It may even be visible at the vulva when the cervix is no more than one or two fingers dilated. In these cases the presenting part is usually engaged at the onset of labour and the difficulty is all the more unexpected.

The presenting part as a rule advances slowly or not at all. If a constriction ring is present the fetal head may feel "loose" both within the cervix and within the pelvis and may appear to retract with, or in between, uterine



contractions. If the cervix is loosely applied the caput succedaneum may not be well developed.

*Detection of an area of spasm.*—Unless a definite constriction ring is present the contractions are not visibly or palpably abnormal, but there is nearly always tenderness of the uterus and the patient objects to abdominal examination. Some writers have noted obliquity or asymmetry of the uterus and attach importance to it as a physical sign. A constriction ring can sometimes be felt on abdominal examination and is more obvious during a contraction. It can be difficult, however, to be certain of the presence of a ring unless it is felt during intra-uterine examination. Some constriction rings relax under general anaesthesia, others do not; the former variety may be missed at the time of operative delivery.

#### CAUSAL FACTORS

Although the etiology of incoordinate uterine action is by no means clear, there is little doubt about some of the factors concerned.

*Direct irritation of the uterus.*—Irritation of the uterus by intra-uterine manipulations or by oxytocic drugs is sometimes a cause, but incoordinate uterine action mostly arises spontaneously and without any interference by the attendant.

*Type of patient.*—The majority, variously assessed as between 50 and 75% cases of this condition, occur in primigravidae. Women of low fertility having their first baby at a relatively late age are particularly susceptible. One of the possible explanations is that it is the primigravida who is most fearful of labour and in whom nervous inhibition is likely to operate. This, however, cannot be the only explanation, for a woman who has once experienced disordered uterine action is likely to be even more anxious about her next labour, and yet the uterus usually behaves better on that occasion. Nevertheless, the part played by the nervous system is important and uterine spasm, like inertia, is more likely to occur in women who are apprehensive, and especially in those who suppress and hide their fears beneath a calm exterior. Incoordinate action of the uterus is also commonly seen as part of the dystocia dystrophica syndrome.

*Relationship of the presenting part and the pelvis.*—Gross malpresentations (e.g., breech), do not appear to influence the incidence of dis-

ordered uterine action, but a posterior or transverse position of the occiput, a high presenting part, a deflexed head, or any sort of mild cephalo-pelvic disproportion, are commonly associated. Moreover, the malrotation or late descent of the head seems to be the cause and not the result of uterine inefficiency because they are usually present *before* the uterus shows any evidence of faulty action. The effect of the position of the fetus on uterine function is borne out by the observations of intelligent patients with a knowledge of midwifery. They can often diagnose a posterior position of the occiput and know exactly when rotation takes place, merely by the character of their "pains".

*Maldevelopment of the uterus.*—Gross maldevelopment of the uterus is not sufficiently common to be an important cause of incoordinate uterine action, but the occasional association is of some interest. If the two halves of the uterus are completely separate (uterus didelphys) and both are well developed, each as a rule functions efficiently and labour is normal. The same is true of a unicornuate uterus. The malformation which most often causes incoordinate uterine contractions is the uterus bicornis unicollis. The faulty action, however, is particularly evident in the third stage of labour when placental separation is impeded in approximately 50% of cases.

*Premature rupture of the membranes.*—There is little evidence to support the view that early rupture of the membranes leads to uterine inefficiency. When the two occur together it is the factor which favours the escape of the forewaters, e.g., an occipito posterior position, which also causes either incoordinate or feeble uterine contractions.

#### BEHAVIOUR OF THE UTERUS IN SUBSEQUENT LABOURS

There is probably at least one important etiological factor which is unknown and the evidence for its existence is that incoordinate uterine action does not often recur in subsequent pregnancies. Sometimes it does, and constriction ring dystocia in successive labours is recorded. Usually, however, uterine efficiency improves with each pregnancy. The prognosis for a second confinement depends largely on the degree of dilatation reached by the cervix in the first. If the cervix becomes fully dilated and the child is delivered by the natural route,



even if it be a difficult instrumental delivery and the child be lost, then on the next occasion uterine function is usually good and an easy spontaneous delivery occurs. This sequence of events is a common experience. On the other hand, if the first labour is terminated by Caesarean section when the cervix is only partly dilated, uterine behaviour, although improved, may not be sufficiently good to bring about spontaneous delivery in the second labour. If given a chance, however, the cervix will dilate further and forceps delivery may be possible. The third labour is then likely to be easy. Physiological dilatation of the cervix would appear to be as effective in curing incoordinate uterine action and inertia as it is in correcting spasmodic dysmenorrhœa.

#### PHYSIOLOGICAL CONSIDERATIONS

Although little is known of the factors ordinarily responsible for the control of uterine action and polarity, it seems clear that uterine action as a whole is under the influence of (1) humoral factors (*e.g.*, inorganic salts and various hormones) and (2) by the central and peripheral nervous system. The part played by the nervous system is not easy to appreciate because it has been demonstrated both in the human being and in the lower animals that if all the nervous connections of the uterus are severed the course of labour is not materially affected. Such observations suggest that the nerve supply to the uterus is not essential to uterine efficiency, but it is perhaps dangerous to draw too many conclusions from limited evidence of this kind; diseases such as disseminated sclerosis do occasionally appear to influence the behaviour of the uterus in labour. A good deal of evidence has been brought forward to show that there is a uterine centre in the nervous system, and it is now suggested that the automatic nerve supply to the uterus consists only of "sympathetic" (adrenergic) fibres and that there are no "parasympathetic" (cholinergic) fibres as was at one time supposed. It is difficult to assess the effect of stimulating the sympathetic fibres to the uterus because it varies from animal to animal, and from time to time in the same animal. The same is true of the effect of the adrenalin itself. In the human being the evidence so far points to the fact that stimulation causes some degree of contraction of the uterine muscle, but that

the lower segment reacts more strongly than the upper segment. If the main excitatory effect is on the lower segment, expulsive action on the part of the upper segment is likely to be inhibited and this may explain clinical observations which go to show that adrenalin inhibits uterine action in labour. The nervous system may therefore influence labour in a negative rather than positive manner, and a nervous stimulus, or the liberation of adrenalin from the suprarenal, probably explains why fear and other emotions can disturb the action of the uterus in labour. The severance of all nervous connections may improve rather than impair uterine contractions.

Local mechanical factors also influence the behaviour of the uterus. Good uterine action at any stage is to some extent dependent on how well the presenting part fits and stimulates the lower segment, cervix, vagina and perineum.

The mechanism whereby the polarity of the uterus is assured is also obscure. One possibility is that there is some sort of balance between the adrenergic effects of nerve stimuli and the cholinergic effects of œstrogens, but an attractive explanation is put forward by Goertler and supported by Kreis: they suggest that the longitudinal muscle fibres of the upper segment, and the circular ones of the lower segment, act as single fibres arranged with a straight upper stem and a closely coiled root. Contraction of the upper part of the fibre then serves to uncoil and straighten out the spiral and this automatically brings about decreased resistance and dilatation of the lower segment.

#### TREATMENT

As mentioned earlier, incoordinate uterine action is sometimes associated with real disproportion and it is important that this be excluded before any decision is made as to treatment. The primary treatment of spasmodic uterine action unassociated with gross disproportion is of a conservative nature, and aims at allaying the patient's anxiety and nervous inhibitions and the relief of pain and muscle spasm. The earlier the condition is recognized and treated, the better is the result likely to be and, as Miles Phillips has emphasized, the prompt and intensive treatment of a colicky uterus may prevent the development of a constriction ring. The main indication for active



interference is the appearance of signs of fetal distress.

*Sedatives, analgesics and antispasmodics.*—Drugs to relieve pain and spasm should be given as soon as there is evidence that uterine action is abnormal. Morphia in  $\frac{1}{4}$  gr. doses is probably the best, but pethidine in 100 mgm. doses is also valuable and has the advantage of being less toxic to the fetus. These should be administered repeatedly so long as colicky contractions persist. Experimental and clinical evidence goes to show that whereas morphia inhibits faulty contractions, it is not deterrent to normal ones, and the same is probably true of pethidine and other analgesics given in reasonable amounts. The barbiturates and other sedatives are beneficial from the standpoint of allaying nervousness and ensuring the patient a period of sleep. The old-fashioned but nevertheless useful mixture of chloral hydrate and potassium bromide still has its enthusiastic advocates. Repeated inhalation of 5 m. amyl nitrite are said to relax an established constriction ring in many cases, and so are injections of liquor adrenaline hydrochloride. In view of what has been said of the action of adrenalin on the uterus it is difficult to understand how this works, if it does. Another line of treatment suggested is the intravenous administration of 20 c.c. of a 10% solution of magnesium sulphate. It may well serve to relax a constriction ring temporarily, but did not appear to have any appreciable effect when tried in two recent cases of incoordinate uterine action.

Deep anæsthesia with either ether or chloroform is desirable when delivery is to be completed, but cannot be relied upon to relax all cases of constriction ring. Moreover it should be recognized that deep anæsthesia at the end of a long labour involves real risks which must be guarded against. These are liver damage (chloroform poisoning), shock, and post-partum hæmorrhage.

*Active measures.*—Until the cervix is fully dilated there is little place for active intervention via the natural birth passage. Manual dilatation of the cervix or of constriction rings, although still advised, is only mentioned here to be condemned as dangerous. Artificial rupture of the membranes rarely influences the action of the uterus favourably. Continuous traction by Willett's forceps to the fetal scalp

may be useful in an occasional case, especially if the fetus is already dead. Dührssen incisions in the cervix are indicated only when the presenting part is low in the pelvis with the cervix stretched over it as a very thin membrane.

If when the cervix is fully dilated the patient is exhausted and can no longer co-operate by voluntary effort, or the fetus is showing signs of anoxæmia, forceps delivery is indicated; the operation is often difficult and may have to be preceded by rotation of the fetal head. To facilitate delivery and to limit the extent of soft tissue injury, episiotomy should always be carried out as well.

*Cæsarean section.*—Treatment of these cases by Cæsarean section was rarely justified in the days when the classical operation was the rule. The risk of general peritonitis in a patient already many hours or some days in labour was too great. The increased safety offered by the lower segment and extra-peritoneal operations and by chemotherapy has, however, changed the position. There is still prejudice against abdominal section in some quarters, but if it is not employed then the obstetrician must in many cases be prepared for intra-natal death of the fetus before the cervix becomes sufficiently dilated to permit vaginal delivery with safety to the mother. When signs of fetal distress develop during the first stage of labour, lower segment Cæsarean section is usually indicated. If the patient is an elderly primigravida it is often unjustifiable to wait for signs of fetal asphyxia; the life of the baby then has an added value and no risk should be taken once it is certain that the uterus is not responding readily to conservative treatment. It seems wise not to define too strictly the indication for Cæsarean section in these conditions; there are many cases in which, in the interests of the mother alone, it is clearly preferable to a further prolongation of labour. It is sometimes the best treatment even when the fetus is already dead. However, great care is necessary in the choice of anæsthetic if the risk of hæmorrhage is to be reduced to a minimum.

*General measures and prevention.*—The general care of the woman during her prolonged and exhausting labour is important. Any tendency to acidosis should be looked for and, if found, is an indication for administering more glucose, by the intravenous route if necessary.



The proper preparation of the expectant mother during pregnancy on the lines advocated by Read should help to prevent faulty uterine action, although the value of exercises in mental and physical relaxation has not yet been proved statistically. Analgesics should be given to all primigravidæ *early* in labour. Relief of pain is the best corrective to any undue fear, and the previous knowledge that she will receive analgesics during labour gives a woman confidence. It is equally important to give drugs to relieve the pains of "false labour", otherwise the patient may enter real labour already tired and apprehensive. There need be no fear that the administration of morphine in such cases will prevent the onset of labour.

#### SUMMARY AND CONCLUSIONS

Incoordinate uterine action is a common complication of labour but is not always recognized. It taxes the patience and endurance of the parturient woman to the utmost, and its management calls for skill, experience and judgment on the part of the obstetrician. It not only involves considerable risks for the mother, but is the primary cause of death of many babies and above all the especially valuable babies of the elderly primigravidæ. It cannot always be prevented or anticipated even by the most efficient ante-natal supervision, and one of its most disconcerting features is its occurrence when least expected. Its early recognition and treatment during labour does much to ensure a favourable outcome for mother and child, and may prevent the development of the condition in its most severe form—constriction ring dystocia. In its treatment the child as well as the mother should receive due consideration, and if the fetal mortality rate is to be kept low, lower segment Cæsarean section is not infrequently required. However, if a patient has had Cæsarean section for this disorder in one confinement she should as a rule be given a chance for natural delivery in the next. The uterus nearly always behaves better in subsequent labours, and future plans should be based on this assumption. Incoordinate uterine action is so distressing that it is one of the causes of a one-child family—a tragedy in itself. The patient's determination to avoid future child-bearing after one harrowing experience can often be prevented or modified by a timely word from the medical attendant.

#### BIBLIOGRAPHY

1. BROWN, W. E. AND WILDER, V. M.: *Am. J. Obst. & Gyn.*, 45: 659, 1943.
2. DE LEE, J. B. AND GREENHILL, J. P.: *The Principles and Practice of Obstetrics*, 8th ed., Philadelphia and London, 1943.
3. GILLIATT, W.: *J. Obst. & Gyn. Brit. Emp.*, 40: 1036, 1933.
4. GUNN, J. A. AND RUSSELL, C. S.: *J. Obst. & Gyn. Brit. Emp.*, 53: 205, 1946.
5. JOHNSON, H. W.: *Am. J. Obst. & Gyn.*, 52: 74, 1946.
6. KREIS, J.: *J. Obst. & Gyn. Brit. Emp.*, 41: 955, 1934.
7. MALPAS, P.: *J. Obst. & Gyn. Brit. Emp.*, 51: 112, 1944.
8. PHILLIPS, H. M.: *J. Obst. & Gyn. Brit. Emp.*, 45: 638, 1938.
9. REYNOLDS, S. R. M.: *Physiology of the Uterus*, London, 1939.
10. RUCKER, M. P.: *Am. J. Obst. & Gyn.*, 52: 984, 1946.
11. RUDOLPH, L.: *J. Obst. & Gyn. Brit. Emp.*, 42: 992, 1935.
12. WHITE, C.: *Am. J. Obst. & Gyn.*, 11: 364, 1926.