THE PARTURIENT WITH DELAY IN DELIVERY

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There is a heavy responsibility which may unobtrustively come to rest on the practitioner attending a woman with delay in labour, and real difficulty may arise in the management of such a case. The subject is beset with uncertainties. No dogmatic statement can be made about the duration of a labour which will go to end spontaneously. The average length of the first stage of labour is 16 hours in primiparae, and 12 hours in multiparae; the second stage lasts $1\frac{3}{4}$ to 3 hours in primiparae, and $\frac{1}{4}$ to $\frac{1}{2}$ hour in multiparae. Averages of the duration of the first stage however, do not give a satisfactory picture of the length of an individual labour, for extremes are not rare and may range from one hour to several days. There are a number of varieties of prolonged labour. The pains may be weak and infrequent throughout; they may be steady and progressive initially, but later pale off and become rare; they may be scarce to start with and then recur more frequently and increase in effect and power; they "may intermit, an interval of hours or days occurring after the pains have begun and dilatation of the os has been effected".

Several conditions which may delay delivery can be diagnosed by careful clinical and radiological examination, but in an important group of cases there is often uncertainty about the causative factors. This subject therefore is a very important one and calls for the best practice of the finesse and the finer points of the art of obstetrics. From students it is worthy of particular attention, because in a crowded curriculum, students seldom have the opportunity of following uninterruptedly such cases from onset to outcome, and also because in hospital they most likely see only those cases which have been grossly mismanaged before their admission.

During labour the uterine muscle fibres exhibit two most important phenomena, namely, contraction and retraction. Contraction is that function by means of which the cervix gets dilated during the first stage, and by means of which the foetus is progressively expelled through the birth canal. Retraction is that function by which the muscle fibres remain permanently shortened when the contraction has passed off, and it therefore maintains any advance of the foetus which the contraction has brought about.

The uterine contractions have certain characteristics: 1) they are involuntary although they are influenced by states of the mind; 2) they last from 30 to 90 seconds; 3) they are intermittent; the intermittence serves to aid the circulation in the uterus and in the foetus, and it brings about succulence of the cervix and vagina thereby acting as a means of "vital dilatation", also serving to provide sufficient rest for the contracting muscle; 4) they are rhythmic, the interval between the contractions being gradually shortened till the escape of the head from the vulva, when they become more or less continuous; 5) they exhibit three phases — increase, acme or apogee, and decrease; 6) they are painful and the first pains are felt in the back, "pains in the kidney"; the pain is mostly due to stretching of the cervical tissue and probably also to pressure on nerves in cervix and body; it is greatly influenced by emotion. As delivery is a physiological function, ob-

stetricians are at a loss to explain why labour contractions should be painful.

The term "delay in labour" is here used comprehensively to include those cases in which delivery is prolonged, whether during the first or second stage, or whether before or after the rupture of the membranes. The terms "primary uterine inertia" and "sluggish uterus" occur in text-books to denote feebleness of uterine contractions. The term here adopted, includes anomalies of uterine contractions due to functional or structural causes whereby contractions are infrequent, feeble, too short, irregular even though strong, or for any reason inadequate, as well as anomalies of the abdominal powers. It does not include cases of arrest of labour due to "uterine exhaustion"—often termed "secondary uterine inertia" — which is the result of gross mismanagement of obstructed labour, or the terminal phase of inherently weak pains.

Delay in labour is not due to impairment of retraction, but solely and independently to abnormality of the contractile forces. As a result the contractions are inefficient and the derangement may affect the force, frequency, duration or rhythm of contractions.

Now it is exactly because we have no truly reliable and uniform means of assessing clinically the measure of the strength of the uterine contractions, and because we do not know how they are initiated and what controls them, that the parturient, in whom the contractions do not run to type, presents often a difficult problem. Several attempts have been made to calculate the uterine forces by means of instruments, in which use is made of a balloon placed in adjacent organs, the uterus, the rectum, the bladder, the vagina. In other methods of investigation, instruments are placed on the abdomen over the distended uterus.

Pain — the subjective sensation of pain — is no indication of the strength of the uterine contractions; feeble contractions may in fact cause agonising pain whereas powerful and effective contractions may not cause undue distress to the patient. The clinical methods whereby information is obtained about the efficiency of the contractions are two: (i) abdominal palpation of the uterus; (ii) judiciously repeated vaginal examinations to observe the rate at which the cervix dilates.

By placing the hand on the uterus, one can estimate the degree of hardening brought about by a contraction, as well as the duration and frequency of the contractions. Three conditions can in this way be recognised, namely: (i) the *normal* labour pains, i.e. the uterus is contracting regularly; (ii) the *irritable* uterus. In this condition it is difficult to feel the foetus; there is incomplete relaxation between the pains. "Instead of the uterus contracting normally it is maintained in a state of irritable tonicity, superimposed on which are frequent wavering spasmodic contractions which, possessing but little force, are the cause of great pain." This condition occurs mostly in neurotic women. Miles Philip has made the following observation: with normal labour contractions, the sensation of pain stops before the actual contraction; with irritable uteri the painfulness of the uterine contraction lasts longer than the palpable hardening of the uterus; (iii) the *incoordinate* uterus. The uterus is almost entirely and continuously relaxed with sharp, strong, occasional and irregular contractions. The contractions cause much pain which leads to exhaustion of the patient. There is often spasm of the cervix, and the condition is sometimes referred to as "functional cervical dystocia." It occurs in the absence of the common causes of difficult labour, and often in women who exhibit the "dystocia dystrophia syndrome".

By vaginal examination one can note the rate of dilatation of the cervix. In assessing the efficiency of the uterine

contractions from the rate of dilatation of the cervix one must exclude other factors which in themselves are the cause of slow dilatation, such as, cicatrices of the cervix and under-development of the cervix. Munro Kerr draws attention to a simple clinical test. He states: "When examining a patient vaginally during labour one often feels the os externum contracting before the fundus and before the patient appreciates the contraction; when there is obstruction, as exists in the cervix at the commencement of labour, a peristaltic wave starts from the cervix, passes to the fundus, and then down the cervix. Most of the older writers direct attention to this clinical fact".

On digital vaginal examination three conditions can be recognised: (i) during a normal labour one finds that the cervix is dilating regularly, the membranes may not have ruptured, or if ruptured there are no signs of pressure; (ii) with delay in labour due to an obstruction, one finds signs of pressure, such as oedema of the cervical lips, moulding and fixity of the head; (iii) when delay is due to incoordination, one finds little or no dilatation, the cervix is flattened out to a thin rim, and there are no signs of pressure even if the membranes have been ruptured for 48 hours. Besides the dilatation of the cervix, one should examine carefully for information about the direction and flexion of the head as can be obtained from the sutures and fontanelles.

The rate of dilatation of the cervix can only be observed by frequent vaginal examinations, but unless precautions are taken such procedure is fraught with very real dangers.

A combination of unfortunate circumstances may arise which prejudice the health of the mother and of the foetus. As there is nothing present, or nothing that can be readily detected to herald the delay which will take place during labour, the midwife and the doctor may not observe the scrupulous ritual of antisepsis or asepsis. This pitfall at once limits the choice of the obstetrician, for he will not lightly undertake to perform Caesarean Section — when this is the only way, out of such an impasse — in a case so mismanaged. The patient may refuse food and does not sleep, and in this way the energy for the stiff exercise of labour is wanting and exhaustion, insidiously but steadily, sets in.

It is important to distinguish between a labour which has all the normal features except that it is slower, and a labour which, for defects of function or structure, is delayed or protracted. The one is similar to a smooth machine that is going at a slow speed, the other to a machine which is faulty and is breaking down. In labour which is simply slow, there is a regularity about the contractions and there is good relaxation in between; the contractions are not associated with undue pain and the general condition of the mother is satisfactory; the case is therefore one of mere slowness of the stages of labour, but with steady and progressive cervical dilatation and foetal advance. In delay due to faulty mechanism, the patient may have been long in labour and the general condition of the patient shows definite changes; her expression is one of anxiety; she looks very tired and her voice is subdued; she seems to have lost tone. The tongue may be dry, and the pulse and the temperature may have gone up. These changes occasionally take place before the patient has been an unduly long time in labour.

I. ANOMALIES OF UTERINE CONTRACTIONS.

To be efficient, uterine contractions should be strong, regular and sustained. There are several factors on which this efficiency depends, namely:

1) the local condition of the uterine muscle;

2) the hormonal influence;

3) the local or peripheral neuro-muscular mechanism;

4) the control by the Central Nervous System.

1. The local condition of the uterine muscle.

The uterine contractions may be inadequate because:

(a) the muscle fibres are stretched beyond the optimum, as in over-distension from hydramnios, plural pregnancy, pendulous abdomen;

(b) the muscle fibres are quantitively deficient in bulk; thus some observers find an extremely thin uterine wall in some cases of C.S. performed for primary uterine inertia;

(c) the muscle fibres may lack in tone, as in too frequent child-bearing, or occasionally in elderly primiparae;

(d) the muscle fibres may become mechanically inefficient from fibroids and scars;

(e) the lower uterine segment may be abnormally adherent to the membranes, so that these do not separate and form the bag of waters as they should;

(f) the cervix may be functionally or organically rigid. The organic causes may be due to scars resulting from amputation of the cervix, caustics or radium applied to the cervix. The functional causes are spasmodic rigidity and constitutional rigidity. In these cases the cervix does not dilate in spite of strong uterine contractions. By giving an anaesthetic, one can distinguish between "functional" spasm of the cervix and the "fibrous rigid cervix"; anaesthesia relaxes the functional spasm but not the true rigid cervix. One should not hesitate to explore the size of the os and its softness under anaesthesia.

2. The hormonal influence.

The contractions of the uterus are intimately influenced by hormones. The oxytocic component of the posterior pituitary hormones, and the oestrogens derived from the ovaries and the placenta increase the tone and the excitability of the uterine muscle, whereas the corpus luteum, the adrenals, and the anterior pituitary are considered to have an inhibitory effect. An imbalance of these various hormones is now thought to be the cause of sluggishness of the pains in the dystocia dystrophia syndrome.

3. The local or peripheral neuro-muscular mechanism.

The uterus can contract regularly and rhythmically even when severed from any central nervous influences. This phenomenon is achieved through the nervous cell structures probably scattered in the uterus itself and in the surrounding tissues, such as the paracervical ganglia on either side of the cervix. Afferent impulses arising from these nerve cell-stations, through pressure by the presenting and descending part into the lower segment and later in the vagina, provoke and reinforce uterine contractions. Anything which prevents the presenting part from pressing on the cervical ganglia will prolong labour. This may occur with: (i) contracted pelvis, android pelvis; (ii) large head; (iii) incomplete flexion of the head; (iv) malpresentation: occipito-posterior, breech, shoulder, face; (v) premature rupture of the membranes, in which case the dilating power is lost.

The neuro-muscular mechanism is also responsible for the coordination of uterine contractions, whereby the upper segment contracts while the lower dilates. If the work of these segments is imperfectly coordinated, progress of labour is delayed. Thus, in spite of forceful contractions of the upper segment, the cervix fails to dilate and there is severe colicky pain. Spasmodic rigidity of the cervix may also be due to impairment of the peripheral mechanism.

4. The Central Nervous Control.

But although the uterine contractions are not necessarily dependent on the

C.N.S. they are subject to important modification by this system. The pathways for this influence are: (i) centres in the spinal cord to uterus—thus a loaded rectum or a full bladder send inhibiting impulses which are readily corrected by emptying these viscera; (ii) brain to cord and thence to uterus, i.e. the highest centres as well as the hypothalamus initiate this influence thus nervousness, fear, dread, apprehensiveness slow down uterine contractions. Severe suffering delays contractions, and morphia, by allaying pain, may expedite them. Fear of an operation may hasten them.

II. ANOMALIES OF THE ABDOMINAL MUSCLES.

When the auxiliary efforts of the abdominal muscles are deficient, the second stage may be unduly prolonged. This may occur with:

1) pendulous abdomen — the abdominal muscles have only a weak hold on the uterus;

2) cardiac and pulmonary diseases with dyspnoea;

3) hernias;

4) tumours in the abdomen, such as fibroids, cysts, full bladder;

5) deep coma;

6) hypersensitive women do not bear down properly because they are afraid of pains;

7) the woman may not know how to make good use of the abdominal muscles, especially if she contracts spasmodically the muscles of the pelvic floor;

8) the woman may be too tired to bear down in the second stage, if she has expended her energy in fruitless bearing down efforts in the first stage;

9) the woman may have poorly developed abdominal muscles.

It is a profitable exercise to divide the causes of delay with reference to the stages of labour and to the rupture of the membranes.

In the *first stage,* labour may be prolonged because of:

(i) obvious causes, e.g. overdistension of the bowel or bladder; overdistension of the uterus from hydramnios or plural pregnancy; lack of tone of uterine muscles from frequent child bearing;

(ii) obscure causes, e.g. hormonal inhibiting influences, faulty innervation.

In the *second stage,* delay may be due to:

(i) faults in uterine contractions—the same conditions that impair the uterine pains in the first stage may cause faulty contractions in the second stage, e.g. overdistended bladder;

(ii) faults in the auxiliary or bearing down forces which are produced by reflexes induced by pressure of the presenting part on the pelvic floor — these reflexes may therefore be inhibited by: malposition or malattitude of the child; nervousness on part of the patient; weakness of the abdominal muscles themselves.

Before rupture of the membranes, delay is due either to weakness or to an erratic action of the contractions. *After rupture* of the membranes, labour is prolonged when the contractions are abnormally weak and infrequent, and when there is tonic contraction of the uterus, either general or local. What actually causes these abnormalities has been discussed already.

RISKS OF DELAY IN LABOUR

There are little risks to mother and child as long as the bag of waters is intact. Those cases where there is simply a slowing down of labour pains, carry no serious risk, except some distress to the patient and anxiety to the attendant, and natural termination is the most frequent outcome. The difficulty is to know when to desist, for premature intervention in these cases exposes the mother and the foetus to real danger. However, while the

temptation should be resisted, the patient should be continually watched. It is this factor of uncertainty which makes the management of these cases difficult.

In the more serious cases of delay, the risk is in proportion to the time that has lapsed after the membranes have ruptured.

The dangers to the foetus are: 1) asphyxia, from deficient circulation in the placenta due to the uterus having retracted on the placental site; 2) infection in utero, from bacteria invading the uterine cavity from the vagina and even if the child is born alive it may succumb shortly after birth, from the effects of the asphyxia or infection suffered in utero; 3) injury, from operative interference.

The dangers to the mother are: 1) infection, which most often occurs from vaginal bacteria invading directly the uterine cavity, or rarely from the foetus when this has been long dead and its tissues invaded by gas-forming bacteria; sepsis is favoured by too long waiting, too many internal examinations and manipulations, and injuries inflicted from operative interference; 2) exhaustion — both physical and mental — comes on after labour has lasted many days, may make the condition of the mother very grave and even desperate.

Interference may be forced upon the obstetrician at a very critical time, which he would have avoided were he not aware that the patient would die undelivered from sheer exhaustion. It is therefore incumbent on the attendant, that in patients whose labour is progressing very slowly after rupture of the membranes, "the urine should be examined from time to time for acetone, the pulse and the blood pressure taken, and the general appearance and sensations of the patient noted".

TREATMENT

The first thing to do in a case of delay in labour, is to carry out a thorough investigation.

If a gross abnormality is present — e.g. evident disproportion between the head and the pelvis — Caesarean section should of course be carried out before exhaustion or infection supervene.

If no gross abnormalities are detected the treatment is primarily expectant, but measures should be taken to make the patient rise to her ordeal. The measures to be adopted can be discussed under the following heads:

1. Sedation.
2. Ensuring sufficient intake of food and fluid.
3. Correcting any abnormalities that may delay labour.
4. Use of oxytocic drugs.
5. Operative interference.

Sedative drugs. Adequate sedation is a very important measure. It keeps off exhaustion from pain and lack of sleep.

Sedative drugs are indicated in circumstances of:

1) severe pain with inefficient contractions;

2) excessive fear and apprehension;

3) prolonged labour without at least some hours of restful sleep.

Strong sedative drugs should not be used in the second stage, and morphia is definitely contraindicated. But in the other circumstances mentioned, morphine has a most beneficial effect. When pain is extreme and contractions inefficient, it will allow the patient to get some rest, it quietens the uterus and the contractions appear to become more coordinated. After a few hours, the cervix will be found to be dilating well and delay is overcome. By abolishing dread and apprehension it may actually accelerate labour; in those cases where the parturient has been long in labour without getting sufficient sleep, it will probably stop the pain entirely, but at the same time it gives the patient

enough rest, so that the contractions start with renewed vigour. One should aim to provide at least 8 hours rest in 24 hours.

Morphine gr. ¼ may be administered alone or with hyoscine gr. 1/200, and when the effects begin to diminish chloral hydrate gr. 30 in 2 ozs of water may be given per rectum.

In resistant cases — where in spite of rest and further uterine contractions there is still no progress — paraldehyde 6-8 drs in olive oil or saline may be given 6-12 hours after the administration of the morphia.

Pethidine has been extensively employed with favourable results.

Food. Where labour is protracted for several days, steps should be taken to avoid starvation and dehydration. With tact and encouragement the patient should be made to have sufficient food and fluid especially as the patient often does not ask for any. Small carbohydrate meals should be given and frequent fruit juices with sugar. When the patient is vomiting and is unable to take anything by mouth, glucose solution should be given intravenously.

Correction of abnormalites. A loaded rectum or a full bladder should be voided, because very often, an enema or the use of the catheter are followed by an increase in the frequency and strength of the uterine contractions. Where the breech presents and there is no pelvic contraction, pulling down a leg will induce the half breech to press tightly on the lower segment and excite vigorous uterine contractions. If the vertex presents and the membranes have ruptured, a tight abdominal binder will also press the head against the lower segment and induce contractions. When the membranes are too tough and project through a fully dilated cervix, they should be punctured. If the membranes are abnormally adherent — i.e. they do not project through a fully dilated cervix — the finger should be passed through the internal os and swept round between the uterine wall and the membranes. A pendulous belly should be corrected with a binder. If hydramnios is the cause of the weak pains, the membranes should be ruptured, but only after the cervix is two-thirds dilated. Uterine massage, or letting the patient change her position or walk about, may affect an improvement in the contractions. The patient should be instructed as to the best way to bear down. The exaggerated lithotomy position is often helpful. When the head is low down, a modified Ritgen manoeuvre, episiotomy, or application of the forceps may be necessary.

Oxytocic drugs. These should be used only in cases of weak and infrequent pains, and never when the contractions though feeble and infrequent are none the less painful.

Oestrogens do not initiate uterine contractions, but are occasionally successful in increasing the sensitivity of the uterus to the natural mechanism. In selected cases Dimenformon, 20,000 units hourly for six doses is sometimes successful.

Acetylcholine, 3 grs 2 hrly, on the analogy of its stimulating effect on unstriped muscle, has been given in cases of inertia, but with doubtful success. It is supposed to stimulate the longitudinal fibres through the sympathetic nerves.

Small doses of quinine, e.g. a single dose of 3 grs of quinine sulphate or bihydrochloride by mouth, often succeed in increasing the strength of the uterine contractions and thus accelerating labour. Heavy or repeated doses of quinine may be dangerous to the foetus, as they may give rise to asphyxia owing to muscular spasm with incomplete relaxation between pains. It is also considered to be injurious to the auditory nerve of the foetus. Of oxytocic drugs which act during labour, posterior pituitary extract is certainly the most powerful but it has great limitations in the treatment of uterine inertia. It may provoke contrac-

tions so violent as rupture the uterus. It may also cause laceration of the cervix and perineum, shock, convulsions, or death of the child from asphyxia or cerebral haemorrhage. It should never be given unless the cervix is fully dilated and the head low down in the vagina. Any obstruction is an absolute contra-indication to its use. It should not be administered in cases where prolongation of labour is due to incoordination, rather than to weakness or infrequency of the pains, for at the least it will increase the distress to the patient. It is only indicated when a normal labour has come to standstill in the late phases of the second stage, with the head low down in the vagina. It should be given in small doses of 2 units.

Operative interference. As has already been stressed, the attendant is often confronted with this dilemma. The majority of cases of prolonged labour terminate spontaneously, but if labour is too long delayed the condition of the mother may become desperate. Should he perform injury by dilating the cervix and delivering, or should be wait longer and allow the patient to get more tired? The turning point in the mother's condition is most sudden, and definite rules cannot be laid down about the best time to interfere. It is unlikely however, that a safe or spontaneous delivery will occur when: 1) the pulse rate rises above 100; 2) there is severe mental anguish, and 3) locally the membranes have long been ruptured, dilatation of the cervix has come to a standstill and the oedema of the lips is increasing.

The nature of the interference depends, in addition to other important factors, on the amount of dilatation of the cervix.

According to A. Bourne, one should start worrying when membranes have been ruptured for 4 or 6 hours. In some cases, it will be found that in spite of adequate sedation there has not been sufficient progress, even 24 hours after the membranes have been ruptured; the os is probably half dilated and there is a little caput. In these cases, one is guided by the state of the mother (i.e. whether exhaustion is present or not) and by the state of the baby (i.e. whether the heart beat is beginning to get slower or not). In these cases one may give an anaesthetic and try and dilate the cervix; if the head is anterior and well flexed, forceps may be applied and the cervical rim is then pushed over the head and the child extracted. Cervical laceration is unavoidable. In a few cases there is no progress whatsoever. The cervix is found to be rigid, and the os will not dilate even after 3 or 4 days of labour. If in these cases, the occiput is placed anteriorly and the head flexed, one may perform Duhrssen's incision and apply forceps. The other alternative is a lower segment Caesarean section. This is a risk in spite of penicillin and sulphathiazol; moreover the child not infrequently does not survive long.

If in these cases, the occiput is placed posteriorly, or there is some degree of contraction, or there is some organic condition, the lower segment Caesarean section is indicated.

Cases of functional delay without signs of exhaustion should be left alone.