ROUTINE INDUCTION OF LABOUR AT TERM IN DOMICILIARY OBSTETRIC PRACTICE

The dangers of postmaturity

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THE risk to the foetus from postmaturity is a well-known problem which has been adequately documented (Ballantyne,[1] Clayton[2]). Browne,[3] basing his figures on the perinatal mortality survey carried out in 1958 showed that prolongation of pregnancy beyond 42 weeks constitutes a significant risk to the foetus, an effect antedated by one week if toxaemia is or has been present. In the past, surgical induction has been considered a dangerous procedure due to the risk of intra-uterine infection if the induction delivery interval (IDI) is prolonged beyond 48 hours. The use of buccal oxytocin combined with amniotomy has greatly reduced if not eliminated the chance of the IDI exceeding 48 hours.

As it seemed that the dangers arising from induction were less than the risks of postmaturity it seemed logical to induce all maternity patients at or about the calculated expected date of confinement. Where there is doubt about the expected date of confinement a radiological examination of the foetus at 38 weeks will show the epiphysis at the lower end of the femur. If this is absent then the foetus has not reached 36 weeks maturity and the calculated expected date of confinement should be revised.

Apart from the dangers of postmaturity there is the difficulty for the general-practitioner obstetrician of being available during labour, so that the rapport which has been built up during the antenatal period may not be wasted. Until recently, district midwives managed to attend most of their own booked cases by having little regular off-duty time. Their shorter working week, with the great increase in the number of deliveries for which each midwife is responsible, makes this no longer possible, so that the patients delivered at home may not fare any better than those delivered in a large maternity

unit as regards being cared for by a midwife and doctor in whom they have developed confidence.

There is a growing demand from the public for better psychological treatment of pregnant women, especially during labour. This cheerful childbirth cult has led to the proliferation of para-medical organizations, such as the Grantly Dick Read classes, the society for improvement of maternity services, psychoprophylactic clinics, the natural childbirth trust, classes for expectant fathers and so forth. Although these organizations are chiefly aimed at relieving the tension in hospital labour wards, there is no room for complacency among those who are responsible for home confinements. One would not wish to return to the era of twilight sleep in labour, but it would be a pity if mothers were made to feel guilty and that they had failed because they had delivered a normal healthy infant with the help of analgesics rather than without the aid of modern therapeutics.

The problem of the general-practitioner obstetrician always being available at the time when his or her patient happens to go into labour is likely to become more acute in the future with the increase in the number of doctors working in group practices, with increasing specialization and regular off duty for general practitioners. It is obvious that successful induction of labour in suitable cases would make it easier for the obstetrician and midwife to be present at delivery.

Induction of labour

Amniotomy. In patients at term 85 per cent should be delivered within 48 hours.

Intravenous drip. Pitocin given by intravenous drip either before or after amniotomy is a very successful method of induction of labour but it is unsuitable for domiciliary practice.

Buccal oxytocin. Tablets containing oxytocin citrate, which is absorbed through the buccal mucous membrane, have been used in hospitals since 1960. There is now a considerable literature on their use and abuse. The use of linguets for administration of oxytocin is now accepted as a reliable alternative to administration by the intravenous route.

Until recently all articles on the use of buccal oxytocin contained warnings against their use outside well-staffed maternity units where the patient was under constant medical supervision. This supervision was considered to be necessary in case foetal distress or uterine spasm was caused by an overdose of oxytocin. Recently the safety of this method of administration has become more apparent. Ritchie and Brudenell[4 5] have drawn up a dosage chart

for use by nurses and in their second paper stress the safety of this method where continuous medical supervision is not possible.

Material

Through the kindness of Messrs. Parke Davies & Co. a supply of buccal oxytocin tablets became available early in 1964. After a short trial it became obvious that this was a most valuable method of raising the success rate of surgical induction at term to 100 per cent. The patients in this series are not comparable to those in other published accounts of the use of pitocin in hospital on patients requiring a surgical induction, in whom, often before term, there was some complication of pregnancy.

The cases described here were selected for domiciliary confinements in accordance with the criteria laid down by the Royal College of Obstetricians and Gynaecologists and the Ministry of Health. All abnormal cases were referred to hospital.

The indication for induction in all cases was the avoidance of postmaturity. In a small number of cases there was a very mild toxaemia, a history of postmaturity or large babies, or some other factor which might have been used as an indication for induction but these were not the primary indications for induction.

Amniotomy followed by buccal oxytocin. Rupture of the forewaters has been used in all cases. This was done at 8.30 a.m. in the patients' homes. The patients ensured that they had a bowel motion on the morning of induction by using a glycerine suppository. The vulva was cleaned with antiseptic cream and antiseptic cream poured into the vagina. Two fingers were introduced into the vagina and the middle finger was used to guide the instrument (a uterine sound from which the terminal centimetre has been removed to leave a sharp point) through the cervical canal until it reached the membranes. A hole was scratched in the membranes and this was enlarged with the finger. As much liquor as possible was allowed to drain away by pushing the head up with the finger in the cervical canal and down with the abdominal hand. This prevented an unsuspected prolapse of the umbilical cord by preventing a sudden gush of liquor during the course of labour.

Administration of oxytocin. The patients were given a supply of buccal oxytocin tablets with instructions for their use.

Dosage. It is in the control of dosage of oxytocin that this method differs from other methods so far described. The number of tablets used and the variation in the dosage was controlled entirely by the patient. The patients were told to put half a tablet (100 units) in the labial sulcus in the region of the upper incisor teeth, immediately after rupture of the membranes. They were told that this would be absorbed in an indefinite time, which might be half an hour or two hours. When the half tablet had been absorbed, and not before, a whole tablet was introduced, then two tablets, then three tablets and

finally four. Four tablets at once was the maximum dosage used.

The patients were told that they must not lie down, but should continue to do their normal housework. If contractions became too strong for them to stay up and about, they were to remove the tablets and wash out their mouth with cold water. This would reduce the strength of the contractions in 10 or 15 minutes. If strong contractions continued then no further tablets were to be used. If the contractions became too weak or stopped altogether some or all of the tablets which had been removed were replaced in the labial sulcus. If the contractions again became too strong for comfort the tablets were again removed. This ability to control the strength of the contractions by removing or replacing tablets gave the patients great confidence, especially when they realized that labour was progressing all the time they were having regular contractions.

Rate of absorption. The rate of absorption varied greatly. Some patients absorbed half a tablet in under an hour, while others took $2\frac{1}{2}$ to 3 hours.

Acceptability of linguets. The presence of the tablet behind the upper lip caused no discomfort. Food and drink were taken as usual. Some patients were so unaware of the tablet that they did not realize it had been absorbed until their attention was drawn to the fact or their contractions began to weaken.

Variation in dosage. In some patients where labour was about to begin when the membranes were ruptured, the first half tablet was removed very soon after its insertion and labour proceeded quickly without further oxytocin. Other patients continued to use oxytocin for 10 or 12 hours as labour stopped every time oxytocin was withdrawn and a small dose had to be continued until the end of the second stage.

Ritchie and Brudenell[5] found that by delaying administration of oxytocin for three hours 13 per cent of patients went into labour unaided by medication.

Control of dosage of oxytocin in the unsupervised patient. There is no set dosage. In this lies the safety of this drug for domiciliary use. The patients were given the tablets and told to control the dosage within the limits set by the necessity to keep out of bed. If the patient felt that she must lie down then she must do so after she had removed the tablets and washed out her mouth. There was thus no risk of a patient lying in bed with tablets in her mouth suffering the very severe pain which is inseparable from rupture of the uterus or tonic uterine spasm.

The patients were visited at frequent intervals of not less than $1\frac{1}{2}$-2 hours in the early stages to ensure that the instructions were carried out. It was quite astonishing to find that pupil midwives

and relatives who had no knowledge of this preparation changed the instructions. One patient used 16 linguets in two hours. A midwife had visited her and told her to chew the tablets and swallow them. Fortunately, they are inactive in this way. The most outrageous effort was by a relative with a little nursing experience who thought she recognized the tablets as S.V.C. pessaries (they are a similar shape and size) and insisted on the patient putting them in the vagina.

Results

Onset of labour. Following artificial rupture of the membranes at or near term the onset of labour may be delayed for up to 48 hours or in exceptional cases a longer time. Using oxytocin tablets as described, labour had failed to become established within 12 hours in only two patients.

Induction delivery interval and duration of labour. For the purpose of this study the induction delivery interval is taken as the duration of labour. The duration of labour was shorter than normal. In primiparae the average duration of labour was eight hours and in multiparae five hours. This reduction in the length of labour may be attributed to several factors. The most important was the good psychological attitude of the patients and their relatives to a labour which had a definite planned course. One of the most common fears of pregnant women was eliminated—the fear of not starting in labour for days or weeks after the expected date.

The small difference, only three hours between the average duration of labour in primiparae and multiparae was due to the tendency of the primiparae to continue to use oxytocin tablets during most or all of the first stage whereas the multiparae stopped using the oxytocin as soon as labour had started. In some cases the contractions did not continue and they only replaced the oxytocin after several hours whereas the primiparae would have replaced the tablets immediately if contractions stopped or came at long intervals.

Details of 200 cases

	Total number	*Labour induced*	*Spontaneous onset of labour*	*Age range*	*Parity*
Primiparae	60	56	4	17–30 yrs	0
Multiparae	140	136	4	18–46 yrs	1–4

Outcome of eight cases of spontaneous onset of labour

Primiparae	2 normal mature infants. 2 normal immature infants (below 5½ lbs).
Multiparae	3 normal mature infants. 1 transverse lie with prolapsed arm. Normal infant delivered by caesarean section.

Outcome of 192 cases of induced labour

	Number	Home deliveries	Hospital deliveries
Primiparae	56	51	5
Multiparae	136	133	3

Outcome of eight hospital deliveries

	Hospital deliveries	Caesarean section	Labour spontaneous
Primiparae ..	5	1	4
Multiparae ..	3	1	2

There were no forceps deliveries in hospital or at home.

Foetal mortality and morbidity

Stillbirths None
Neonatal deaths 4

There were four deaths:

1. Pneumonia on the fifth day following an operation for congenital atresia of the oesophagus.
2. Inoperable congenital atresia of the oesophagus.
3. Multiple atresia of the small intestine following successful operation for atresia of the oesophagus.
4. Congenital absence of the gall bladder and bile ducts.

Induction delivery interval (IDI)

Cases in which the IDI exceeded 24 hours. In those cases, apart from the two patients who had caesarean sections, in which the IDI exceeded 24 hours the cause was almost always a failure to use the oxytocin tablets properly or the failure to increase the dosage to an adequate level.

When labour was not well established 12 hours after induction a strong sedative was given at night. This usually resulted in several hours sound sleep. Some patients wakened in strong labour, and proceeded to a rapid delivery. Others had not begun labour and resumed the use of oxytocin in the morning.

The second stage. The second stage in both primiparae and multiparae was not allowed to exceed two hours. This was achieved by application of a vacuum extractor in any case where it appeared there might be some delay due either to inadequate forces or an unfavourable position. The shortening of the second stage by this method was a routine in my practice before the introduction of routine induction. Where the contractions are not regular and frequent, oxytocin can continue to be used as in the first stage, provided careful watch is kept to detect foetal distress, or signs of an obstructed labour.

The third stage. There were no complications of the third stage attributable to the induction. Intravenous ergometrine was administered to all patients at the time of the crowning of the head.

Prematurity and immaturity

Two babies weighing less than 5½ lbs were delivered following induction at what was believed to be full term. There was no evi-

dence that the patients had been induced prematurely. Both babies were vigorous and healthy and were nursed at home. Two of the eight patients who went into labour spontaneously delivered babies under 5½ lbs which were healthy and normal. These four cases may be examples of the 'small baby syndrome'. It may be that induction of labour in the two cases which were induced was the correct treatment to avoid foetal damage due to anoxia.

Maternal mortality and morbidity

There were no maternal deaths. There were no cases of puerperal morbidity referrable to the inductions of labour. Most patients were delivered in less than 12 hours so that they reached the second stage while still fresh and fit. This resulted in a short second stage, assisted in some cases by the application of the vacuum extractor.

No patients who had an induction in one labour refused to have subsequent labours managed in the same way. Patients who had had an unpleasantly prolonged labour in a previous pregnancy were delighted with the success of this method. They were emphatic that the great advantage was the absence of a period of doubtful labour or false labour during which they became exhausted through worry and lack of sleep only to be told after 24–48 hours that they were not in labour. This absence of a period of doubtful labour accounts in part for the small difference in IDI between multiparae and primiparae. It is usually in the first pregnancy that this is most troublesome.

Failure to deliver at home

The failures fall into two groups:

1. Six patients who failed to deliver at home despite good contractions. On admission to hospital the cervix dilated rapidly and spontaneous delivery occurred.

In one patient both labours followed this pattern, probably due to a psychological inhibition caused by the presence of her mother and father in the house. One multipara was an Italian who had previously had normal confinements at home. Her mother, who spoke no English became completely hysterical when she found a nurse and doctor coming to see her daughter. The patient then became hysterical and unmanageable but was delivered within one hour of admission to hospital. The other three patients followed a similar pattern of failure to progress at home, despite strong contractions, followed by rapid dilatation and delivery in hospital.

2. Two patients who required caesarean section.

The first patient was a young primipara who had good contractions and dilated slowly to half dilatation. No further progress was made after 12 hours at home. She was admitted to hospital where despite continued good contractions until

three-quarters dilated, the head did not descend below the ischial spines. A living female infant weighing 7 lbs 4 oz was delivered by caesarean section. X-ray pelvimetry after delivery showed the pelvis to be quite adequate. The measurements were true conjugate—10.6 cms; available transverse—14.7 cms; lower antero-posterior—12 cms; interspinous—10.6 cms; posterior sagittal—9 cms; sub-pubic angle—84 deg.

The second was a Polish woman having her third baby. She had had two normal confinements, the babies weighing 7 lbs 12 oz and 8 lbs 2 oz. She was in labour for 14 hours at home and eight hours in hospital. Despite the fact that the cervix became almost fully dilated the head did not descend beyond mid pelvis. A living male child weighing 9 lbs 10 oz was delivered by caesarean section.

If this patient had gone several days past her expected date it is probable that the baby would not have survived. Despite the presence of disproportion no harm resulted from induction of labour.

Discussion

The state of the cervix. When the cervix is ripe and partly taken up, rupture of the membranes is easy and labour almost invariably begins after a very short time. In some cases of this type the onset of labour is so rapid that it is fair to assume that the onset of labour has been prevented by the intact membranes. Nothing is known as to what causes the membranes to be weak in some patients and tough in others.

The unripe undilated cervix. This condition may be met with in both multiparous and primiparous patients. The cervix feels like that of a patient in the middle trimester of pregnancy. There is a natural tendency to postpone induction in such cases until a more favourable cervix has developed. Provided the patient has reached full term by other criteria, including radiological estimation of foetal maturity in doubtful cases; induction should not be postponed on account of the unripe cervix. The causes of the cervix becoming ripe at term are not known but there is no doubt that patients with a hard unripe cervix have a greater tendency to postmaturity with its attendant dangers. The introduction of oxytocin has made induction of labour a practical and safe procedure in this group of patients above all others. Where the cervix was very tight or the patient nervous a small dose of methohexatal was given intravenously. This has no respiratory depressant effect and gives about two to three minutes anaesthesia.

The risk of sepsis. The risk of introducing serious infection is very slight. In this series the liberal use of antiseptic cream in the vagina, on the hands and on the instrument the incidence of infection was nil. Rupture of the fore-waters is much less likely to be associated with sepsis than rupture of the hind-waters. This is because there is no possibility of injury to the maternal tissues or separation of a low lying placenta. Both of these accidents can occur in rupture of

the hind-waters and it is in damaged muscle or blood clot that serious sepsis can occur. Infection of the liquor may occur if the IDI is prolonged. When delivery had not taken place within 24 hours the patients were given large doses of antibiotics as a prophylactic measure.

Advantages to the patient and her family

Far too little attention has been given to the convenience of the expectant mother and her husband at the time of confinement. It is quite common for husbands to take one or two weeks' holiday so that they can look after their wives and families after delivery. If the baby does not arrive at the expected date the husband's holiday may have been wasted to no purpose. The mother and baby may then be left without adequate help. Having the baby on a pre-arranged day makes it easy to plan for adequate domestic help. If in addition delivery is during the day instead of at night everyone is so much happier. Only Theobald[6] has suggested that the convenience of the mother might be an indication for induction of labour at term.

Advantages to the obstetrician

For the general-practitioner obstetrician the advantages of successful induction of labour are immense. One day a week can be set aside for delivery and all patients can be induced and delivered on one day. This leaves the remainder of the week free for other work without interruption. Night work is almost completely eliminated. It is easy to supervise all labours and be present at the delivery in every case. In this series of 184 home deliveries 162 were induced on Tuesday morning and 158 delivered before midnight on the same day. Two patients were delivered after midnight and two on Wednesday afternoon.

Of the remaining 22, four were induced and delivered on Wednesday and 18 on Thursday. There were no deliveries on Friday, Saturday, Sunday or Monday. The advantages of being able to organize one's work and avoid loss of sleep are too obvious to need elaboration.

Conclusions

The continuation of pregnancy beyond 41 weeks is associated with increasing placental insufficiency. This results in an increased incidence of stillbirth, perinatal mortality, foetal distress and operative delivery.

Induction of labour at term avoids these dangers as the stillbirth rate and perinatal mortality rate are lowest during the few days before and after the calculated date of expected confinement.

Induction of labour at term by rupture of the fore-waters com-

bined with buccal oxytocin has been shown to be successful with an IDI of less than 48 hours in all patients.

There were no stillbirths or neonatal deaths attributable to the method of induction or delivery. A scheme of management has been described in which each patient controls her own dosage of oxytocin. The advantages to the foetus, the mother and the general-practitioner obstetrician have been outlined.

The risks of failure of induction, puerperal sepsis and intra-uterine pneumonia have been almost completely eliminated by the assurance of a rapid onset of labour.

Finally, planned induction helps the general practitioner in that delivery takes place at a convenient time, probably in office hours.

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Medical Music

Music and the sounds of instruments, says the lively Vigneul de Marville, contribute to the health of the body and the mind; they quicken the circulation of the blood, they dissipate vapours, and open the vessels, so that the action of perspiration is freer. He tells the story of a person of distinction, who assured him, that once, being suddenly seized by a violent illness, instead of a consultation of physicians, he immediately called a band of musicians; and their violins played so well in his inside, that his bowels became perfectly in tune, and in a few hours were harmoniously becalmed. I once heard a story of Farinelli, the famous singer, who was sent for to Madrid, to try the effect of his magical voice on the king of Spain. His majesty was buried in the profoundest melancholy; nothing could raise an emotion in him; he lived in a total oblivion of life; he sat in a darkened chamber, entirely given up to the most distressing kind of madness. The physicians ordered Farinelli at first to sing in an outer room; and for the first day or two this was done, without any effect on the royal patient. At length it was observed, that the king, awakening from his stupor, seemed to listen; on the next day tears were seen starting in his eyes; the day after he ordered the door of his chamber to be left open—and at length the perturbed spirit entirely left our modern Saul, and the *medicinal voice* of Farinelli effected what no other medicine could.

From *The curiosities of literature* by Isaac Disraeli. 1839.