

## Section of Obstetrics and Gynæcology

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### Induction of Labour

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At the Simpson Memorial Maternity Pavilion of the Edinburgh Royal Infirmary, towards the end of 1955, a policy was evolved and three lines of attack were mounted to try to restart the downward trend of perinatal mortality, which had become halted in the early 1950s, after the spectacular drop that had occurred during the preceding decade. Thus induction of labour, delivery by the forceps and delivery by Cæsarean section were each used with increasing frequency. Although the emphasis in this paper is on induction of labour, the importance of the other two complementary factors cannot be forgotten when the results are considered, nor can the changing incidence of admissions to the hospital be left out of the reckoning. The demand for hospital care had increased steadily. From 1953 to 1963 the total number of births of infants weighing 2½ lb or more rose by 20%, booked cases increased by 13%, while nonbooked cases rose by 94%. In 1953, nonbooked cases were 11% of the total admissions, in 1963 they were 18%.

The incidence of induction of labour increased from 10.5% of all deliveries after the 28th week of gestation in 1955 to 33.3% in 1963. In the latter year, artificial rupture of the membranes was the method employed in 91%, supplemented in 24% of cases by an oxytocic drip. In 7% the drip alone was used, mostly in cases where the membranes had ruptured spontaneously in the last weeks of pregnancy or at term, but labour had not ensued after some forty-eight hours.

The indications for induction of labour and their relative incidence have changed during the nine years 1955 to 1963. Post-maturity is now the commonest and has risen from 126 to 474 cases per annum; pre-eclampsia 107 to 257 cases, hypertension other than pre-eclampsia 12 to 163 cases, iso-immunization 15 to 76 cases, no labour after spontaneous rupture of the membranes 9 to 75 cases, accidental hæmorrhage 13 to 54 cases,

placenta prævia 3 to 5 cases, bad obstetrical history 7 to 31 cases, unstable lie 4 to 26 cases, no weight gain 0 to 23 cases, hydramnios and/or foetal abnormality 14 to 31 cases, diabetes 2 to 12 cases, other indications 27 to 124 cases; contracted pelvis fell from 6 to 1 case.

In spite of the overall safety of induction of labour there are certain hazards inherent in its use. Did we not live in an antibiotic age and have the advantage of modern maternity hospitals we would not dare to practise what thirty years ago would have been described as meddling midwifery. Masterly inactivity can drift into useless procrastination and thus has been justified the move from conservatism to more frequent active intervention.

The risk of a maternal death directly due to the induction should be small. Of the 6,977 patients who had labour induced, 3 mothers died, but in none of these cases was the induction *per se* considered responsible for the fatality – pulmonary embolism, eclampsia and cerebral hæmorrhage were the causes of death.

Sepsis is still a risk that can be potentiated by the necessity for further operative interference to effect a successful delivery. In the nine years reviewed a total of 33,867 mothers were delivered after the 28th week of gestation. In 6,977 cases labour was induced. The incidence of notifiable pyrexia due to genital or urinary tract infection or presumptive sepsis was 27% higher in induced as compared with non-induced cases. Again, a baby occasionally dies from an infection acquired *in utero* following a surgical induction carried out to ensure the child's survival. In my unit my pædiatric colleagues give every baby 10 mg streptomycin per lb of body weight twice daily for five days if the mother's membranes have been ruptured for forty-eight hours or more. This practice, meantime at least, has practically eliminated serious infection of the newborn from this cause.

The incidence of operative delivery following induction of labour is, overall, greater than in non-induced cases. For example, in 1963, in

booked primigravidae, the incidence of delivery by Cæsarean section was 6.9% in non-induced cases and 8.1% in induced cases. In delivery by the forceps, for the same group, it was 33.5% compared with 35.7%. In this series the general policy to make greater use of operative delivery has to be remembered. Indeed in 1955, 5.8% of all deliveries were by Cæsarean section and 13.7% by the forceps, whereas in 1963 the corresponding figures were 7.9% and 19.5%.

Prolapse of the cord is a possible hazard. It occurred in 31 of the 6,977 cases of induced labour (0.4% or 1 in 230). Twenty, or two-thirds, of these cases were delivered successfully by Cæsarean section. There were 3 stillbirths and 2 neonatal deaths (16%), but in only one case of unstable lie could the induction be implicated, and even here the prolapse did not occur till the cervix was fully dilated.

A significant hæmorrhage provoked by artificial rupture of the membranes occurred in 17 of 1,228 cases induced in the one year 1963 (1.4% or 1 in 70). Four of these were delivered by Cæsarean section, one because of the severity of the hæmorrhage and 3 on account of foetal distress, apparently resulting from the bleeding. There was one neonatal death associated with severe maternal pre-eclampsia. The low perinatal mortality in these two complications, prolapse of the cord and hæmorrhage, was due to the immediate availability of facilities for Cæsarean section.

That there may be psychological repercussions associated with induction of labour was drawn to my attention in personal communications from G H Macafee and G Gibson of Belfast. They were disturbed 'at the number of women who would not have another child in case they should again have the experience of artificial rupture of the membranes, no response, and then an oxytocin drip . . . Husbands also took a poor view of the procedure'. I cannot say that this has been my experience on questioning a fair number of patients in recent months. Indeed many women appreciate the expedition resulting quite often from artificial rupture of the membranes.

There is, however, another psychological effect that merits attention – this is the attitude of mind bred in every member of the staff when a policy of more active interference is adopted. The policy gathers momentum – even the most conservatively-minded obstetrician finds that the active approach of other colleagues compels him to participate and enlarge the range of the indications, especially as these in many instances are not precise. An atmosphere is created whereby he feels he dare not not interfere lest he miss the boat and a stillbirth be blamed on his old-fashioned conservatism.

### *Results*

The overall results of these efforts to reduce the perinatal mortality in the hospital are briefly summarized:

In 1955, in 3,029 booked cases, where the birth weight in both single and multiple pregnancies was 2½ lb or over, the perinatal mortality rate was 35.9 per 1,000. In 1963, in 3,447 comparable deliveries, the rate was 32.4. For the most part the increased number of cases booked had a potentially greater risk as judged by the priority booking policy of the hospital.

In 1955, in 337 nonbooked cases in the same birth-weight group as above, the perinatal mortality rate was 157.3 per 1,000 compared with 105.4 in 607 deliveries in 1963. This improvement is the result of better team work between the family doctor and the hospital.

Nevertheless the total perinatal mortality rate for the hospital in cases with a birth weight over 2½ lb was only reduced from 47.8 per 1,000 in 3,366 deliveries in 1955 to 43.6 per 1,000 in 4,054 deliveries in 1963.

The experiment of increased interference, in which induction of labour had played a very important part, had contained the total perinatal mortality in spite of an increased load of potentially adverse cases. It was disappointing, however, that there had been no substantial reduction in the booked cases, for these had increased by only 13% in the nine years under review. It would seem that a still greater incidence of interference is unlikely to be beneficial.

As a reminder of the attainments of a more conservative era I have the permission of Dr E Chalmers Fahmy to present a summary of the results of 1,000 primigravidae delivered under the supervision of his team in the Simpson Pavilion between the years 1948 and 1951. These are contrasted with a comparable group of primigravidae delivered in 1963 in the same hospital.

The induction rate then was 2.8% compared with 31.3% in 1963.

The forceps rate was 13.2% compared with 34%.

The Cæsarean section rate then was 2.4% compared with 7.6%. The stillbirth rate per 1,000 total births was 23 compared with 21, the neonatal death rate per 1,000 live births was 15 compared with 17, the total perinatal mortality rate remained unchanged at 37.6.

In 110 of Dr Fahmy's cases (11%) the mothers were delivered after a 42 weeks' menstrual delivery interval. Only 2 of these cases were induced. There were 11 foetal fatalities in the group – 10% as compared with an overall 3.76%. Possibly with 2 additional inductions and 3 addi-

tional and 2 earlier Cæsarean sections the perinatal mortality could have been reduced to 31 per 1,000, which would have compared very favourably with the 1963 figure of 38.

A comparison of this short series of cases treated conservatively with a similar group managed much more actively raises the question as to just where the optimum rates of interference lie. There is little doubt that a substantial improvement in the perinatal figures would have followed a very modest move from rigid conservatism, especially in the management of mothers delivered after the forty-second week. The lessons and achievements of conservatism should not be forgotten when attempting to define with greater precision the indications for induction of labour and the necessity to expedite delivery in labour.

*Acknowledgments:* The facts and figures presented are drawn from the Annual Medical and Clinical Reports of the Simpson Memorial Maternity Pavilion prepared by Dr J C H Dunlop, who has the help of Dr John Thomson in the compilation of the pædiatric section. I acknowledge the help of these two colleagues. In that hospital, perinatal mortality is defined as stillbirths and all neonatal deaths.

#### REFERENCE

Medical and Clinical Report of the Simpson Memorial Maternity Pavilion of the Royal Infirmary, Edinburgh, 1955 to 1963 inclusive

#### **Professor Gordon Lennon** (*Southmead Hospital, Bristol*)

No induction of labour is done without what in my opinion appears to be a good reason. The reasons arise mostly from the various causes of placental insufficiency. These are: pre-eclampsia, hypertension, renal disease, postmaturity, diabetes, threatened miscarriage, ante-partum hæmorrhage and the second twin. Cephalopelvic disproportion may or may not be associated with placental insufficiency but even when it is not it constitutes in itself a reason. Remaining indications are rhesus iso-immunization and intra-uterine death of the fœtus. The commonest reason is pre-eclampsia and I have already described my criteria for interference (Lennon 1957). The most controversial reason is postmaturity in which I have believed for some long time and I have seen no reason to alter my opinion over the years.

Those who do not believe in intra-uterine lack of well-being on the part of the fœtus towards

term or after it will, of course, not rupture the membranes and will not find meconium staining of the liquor. Indeed, by induction of labour we set up for ourselves a worry and a clinical difficulty that does not exist for those who do not rupture the membranes until the dark liquor is seen through the bulging membranes at the introitus. They, of course, may get a live baby just as I do by induction of labour but they are not concerned that there might have been already some slight damage to the fœtal brain, which may later prevent that child passing the 11-plus examination: that this may be more important than previously thought is not unknown to the television viewer and is a challenge of proof to our pædiatric colleagues.

The following findings, however, may be relevant in this context:

For two five-year periods in Bristol, 1943–8 and 1948–53, the cerebral palsy rate per 1,000 live births was the same, 2.5. In the five-year period 1953–8 the incidence fell to 1.6, and since 1958 has again fallen to 0.9. These figures have been statistically analysed. Analysis shows that the declining incidence of all types of cerebral palsy in Bristol is highly significant (Woods 1963).

These figures have been statistically analysed by Miss E H L Duncan. The analysis shows that the declining incidence of all types of cerebral palsy in Bristol is highly significant (Woods 1963).

I would draw attention to the year 1953. This is precisely the year when we changed to a very much raised induction-rate policy, particularly in pre-eclampsia and postmaturity. Other and many factors must be involved in this improvement but I feel that the advantages gained by inducing labour – earlier management or avoidance of placental insufficiency, better uterine action resulting in quicker labours, fewer traumatic and difficult deliveries (Bainbridge *et al.* 1958) – must have played a part.

In a recent publication on indications for the induction of labour (Donald 1961) I read: 'A study of the last analysed nine months' cases shows that induction was performed in no less than 20 per cent of cases which is higher than most other people's figures, but it should be pointed out that, so far as possible, normal cases are filtered off. No less than 15.5 per cent of all those induced ultimately required delivery by Cæsarean section as against an incidence of 10 per cent of Cæsarean section in the hospital as a whole.' I have, therefore, investigated my figures for Cæsarean section (and oxytocin drip) for the past five years (Table 1).

One of my colleagues was so appalled at my 38% incidence that he went and found out his figures; his were 40%. (Most of my normal cases are filtered off.)