Hospital Topics

Spontaneous preterm labour and delivery at under 34 weeks' gestation

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Abstract

The management and outcome of 242 infants delivered between 26 and 34 weeks' gestation in an obstetrical and neonatal regional referral centre as a result of spontaneous preterm labour were recorded prospectively. Results of the survey show that the decision to intervene and delay delivery will depend on the availability of neonatal intensive care facilities. Infants likely to require intensive neonatal care should be transferred in utero to a centre with these facilities. The use of steroids reduces the mortality of preterm infants. The maximum effect occurs between 30 and 32 weeks' gestation, and there is no benefit after 34 weeks. If the weight is over 1500 g the mode of delivery of the preterm infant presenting by the breech does not influence outcome; if under 1500 g a caesarean section improves survival over those infants born by vaginal breech delivery.

Introduction

Preterm delivery accounts for 7% of all births but is responsible for 75% of perinatal mortality. If fetal abnormality is excluded this figure rises to 85%.¹ Management of preterm labour varies among centres in the United Kingdom.² This study recorded prospectively the management and outcome of spontaneous preterm labour and delivery and makes recommendations for future management.

Patients and methods

Details of obstetric management and neonatal outcome were recorded prospectively by three successive perinatal research fellows with experience in both obstetrics and neonatal intensive care. All infants included in the analysis were delivered between 26 and 33 completed weeks of pregnancy as measured from the last normal menstrual period and by early sonar cephalometry, and confirmed by the Dubowitz gestational assessment.³ All were delivered as a result of spontaneous preterm labour. Between 1 August 1979 and 30 June 1982 225 pregnancies, including 30 sets of twins, resulted in 255 infants. Thirteen infants with congenital abnormalities died leaving 242 infants to be studied. Of these, 175 had been transferred in utero.

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The mode of presentation was uterine contractions in the mothers of 101 infants, contractions with ruptured membranes in the mothers of 103, and ruptured membranes alone in the mothers of 38.

Drugs to inhibit uterine activity were given to mothers of 164 infants, antepartum glucocorticoids to mothers of 183, and antibiotics to mothers of 75. The mothers of 107 infants received tocolytics as well as a full course of antepartum glucocorticoids, which was dexamethasone 12 mg intramuscularly on two consecutive days. Some 139 infants were delivered vaginally as cephalic presentation, 31 by breech presentation, and 72 by caesarean section.

Results

Figures 1 and 2 show survival by birthweight and gestational age. Survival was taken as discharge of the baby from the neonatal unit to either its home or to the referring hospital. Figures 3 and 4 show the incidence of intraventricular haemorrhage by birthweight and gestational age. On the neonatal unit intraventricular haemorrhage was diagnosed by real time ultrasonography, with the method described by Levene *et al.*⁴ Altogether 193 infants were scanned in this way.

FIGS 1 and 2—Survival by birthweight and by gestational age, preterm labour group 1 August 1979 to 30 June 1982.

Figure 5 shows the rate of survival of infants whose mothers presented with contractions only according to whether or not they received tocolytics, and fig 6 shows the rate of survival of infants whose mothers presented with contractions and ruptured membranes, according to whether or not they received tocolytics. Any woman who received oral or intravenous tocolytic drugs in the referring hospital or in Hammersmith Hospital, either with success or failure of inhibition of contractions, was included in the tocolytic group. In this way any attempt at delaying delivery was open to the assessment of possible benefit or harm.

Tables I and II show the incidences of idiopathic respiratory distress syndrome and of intraventricular haemorrhage related to the administration of corticosteroids. Only those infants whose mothers received dexamethasone 24 mg and who started the course over 24

FIGS 3 and 4—Incidence of known intraventricular haemorrhage by birthweight and by gestational age 1 August 1979 to 30 June 1982 preterm labour group.

TABLE I—Incidence of idiopathic respiratory distress syndrome (IRDS) requiring mechanical ventilation

Gestational age (completed weeks)	Complete course of steroids			Incomplete or no steroids		
	IRDS	No	%	IRDS	No	%
26 and 27	6	18	33	3	7	43
28 and 29	11	33	33	7	21	33
30 and 31	2	39	5	9	31	29
32 and 33	2	36	6	4	45	9
Total	21	126	17	23	104	22

Excluding stillbirths and deaths on the labour ward.

TABLE II—Incidence of intraventricular haemorrhage (IVH) in infants scanned (80% of all infants were scanned)

Gestational age (completed weeks)	Full course of steroids			Incomplete or no steroids		
	IVH	No	%	IVH	No	%
26 and 27	10	17	59	5	7	71
28 and 29	11	31	36	9	19	47
30 and 31	4	29	14	8	26	31
32 and 33	3	25	12	6	39	15
Total	28	102	27	28	91	31

TABLE III—Incidence of intraventricular haemorrhage of infants scanned and survival by mode of delivery and birthweight in infants presenting by the breech

	Survival						Intraventricular haemorrhage					
	LSCS			VB			LSCS			VB		
	Alive	No	%	Alive	No	%	IVH	No	%	IVH	No	%
<1500 g	12	12	100	12	19	63	2	9	22	10	17	59
≥1500 g	16	16	100	10	10	100	1	14	7	2	5	40
Total	28	28	100	22	29	76	3	23	13	12	22	55

LSCS = Lower segment caesarean section. VB = Vaginal breech.
Two stillborn infants delivered by the breech vaginally are excluded.

TABLE IV—Incidence of intraventricular haemorrhage of infants scanned and survival by mode of delivery and gestational age in infants presenting by the breech

Gestational age (completed weeks)	Survival						Intraventricular haemorrhage					
	LSCS			VB			LSCS			VB		
	Alive	No	%	Alive	No	%	IVH	No	%	IVH	No	%
26-29	9	9	100	5	12	42	2	9	22	6	10	60
30-33	19	19	100	17	17	100	1	14	7	6	12	50
Total	28	28	100	22	29	76	3	23	13	12	22	55

LSCS = Lower segment caesarean section. VB = Vaginal breech.
Two stillborn infants delivered by the breech vaginally are included.

hours and under seven days before delivery were considered as being within the treated group. Cases in which there was an incomplete course of steroids or in which delivery occurred outside these times were grouped with those who did not receive antepartum glucocorticoids.

Survival and the incidence of intraventricular haemorrhage, according to the mode of delivery of the preterm infant presenting by the breech, are shown for birthweight and gestational age in tables III and IV respectively. Two intrauterine deaths resulting from breech presentations delivered vaginally are excluded.

Thirty eight infants, whose mothers presented with ruptured membranes but no contractions, were randomly allocated to four treatment groups as part of a continuing study of the best management for these cases. All the mothers received a course of antepartum glucocorticoids. The mothers were then randomly allocated to four groups depending on whether or not they received oral tocolytics and whether or not they received oral antibiotics. The study continues, but preliminary results suggest that mortality and morbidity differ little among the groups, and the outcome for the infants is good in all four groups.

FIG 5—Rate of survival of infants whose mothers presented with contractions only according to whether or not they received tocolytics 1 August 1979 to 30 June 1982.

Discussion

Our policy in the management of spontaneous preterm labour is constantly under analysis and review. Based on the outcome of infants quoted in this paper, we make recommendations for management, especially for tocolytic intervention, the use of antepartum glucocorticoids, in utero transfer, and delivery of the preterm breech.

The decision to intervene and delay delivery will depend on the availability of facilities for neonatal intensive care. Each obstetric unit should know its own survival rates by birthweight and gestational age. Estimates of birthweight and gestational age and the presence of certain complications, such as severe intra-uterine growth retardation, antepartum haemorrhage, hypertension, intrauterine infection, or fetal abnormality, will influence the decision whether to allow labour to progress, to attempt tocolysis, or transfer the mother and fetus to a centre with neonatal intensive care facilities.⁵ Suitable ultrasound examination to assess fetal weight⁶ and possible congenital abnormality⁷ will reduce the incidence of unnecessary caesarean section.

ANTEPARTUM GLUCOCORTICOIDS

Idiopathic respiratory distress syndrome is intimately associated with intraventricular haemorrhage.⁸ In 1972 Liggins and Howie reported that administration of antepartum glucocorticoids could significantly reduce the incidence and severity of both.⁹ The overall effect of the action of steroids is to reduce the mortality of preterm infants. For them to be effective, delivery should take place over 24 hours and under seven days after the course of 24 mg dexamethasone given over two consecutive days. The maximum effect occurs between 30 and 32 weeks' gestation, and there is no benefit after 34 weeks.⁹ Our study supports the findings of Liggins and Howie, although the administration was not randomised (tables I and II).

Adverse neurological side effects have been reported in animals and man,¹⁰ but doses administered in these studies were between five and 300 times greater than that recommended by Liggins and Howie.⁹ The recommended dose of glucocorticoids given to the mother results in concentration of total and free cortisol in the neonate equal to those concentrations found in untreated infants recovering from idiopathic respiratory distress syndrome.¹¹ There is a risk of fetal or maternal infection when glucocorticoids are used in the presence of membranes that have been ruptured for a prolonged period,¹² but the benefits and risks should be considered for each individual case. In the presence of ruptured membranes, glucocorticoids significantly reduce the incidence of idiopathic respiratory distress syndrome compared with ruptured membranes alone.¹³

When draining liquor can be collected vaginally, the need for steroids may be assessed by measuring the lecithin: sphingomyelin ratio or, preferably, the phospholipid profile including phosphatidyl glycerol. The phospholipid profile is reliable even in contaminated vaginal specimens.¹⁴

The use of antepartum glucocorticoids in pregnancies complicated by severe hypertension and proteinuria was considered to add to fetal risks, but our evidence suggests that there is no additional risk and that both perinatal mortality and morbidity improve after the use of glucocorticoids.¹⁵

Female fetuses respond better than male fetuses to antepartum glucocorticoids.¹⁶ The reason for this is not known, but possibly testosterone induces enzymes that cause more rapid destruction of cortisol.

INTERVENTION AND DELAY OF DELIVERY

Attempts to delay delivery in the presence of ruptured membranes after 32 weeks do not improve survival of the fetus (fig 6). Although tocolytics are effective in delaying delivery,

this treatment was beneficial only before 32 weeks.¹⁷ As may be seen from table I and the data of Liggins and Howie,⁹ the effect of steroids in patients after 32 weeks with ruptured membranes is unlikely to be of sufficient benefit to the fetus to merit delay of delivery.

FIG 6—Rate of survival of infants whose mothers presented with contractions and ruptured membranes according to whether or not they received tocolytics 1 August 1979 to 30 June 1982.

It is between 30 and 32 weeks' gestation that antepartum glucocorticoids have their maximum effect⁹ (table I). Infants delivered during this period, where delay has been attempted, have an improved survival rate even in the presence of ruptured membranes (fig 6). The rate of survival rises from roughly 10% at 26 weeks' gestation to roughly 95% at 30 weeks. Concomitantly, the incidence of intraventricular haemorrhage falls from over 80% to about 30% respectively (fig 4). Whether the membranes are intact or not, those infants born before 30 weeks where delay has been attempted have an improved chance of survival (figs 5 and 6). Preterm labour after 30 weeks' gestation with intact membranes carries a good prognosis whether delayed delivery is attempted or not. Our recommendations for management of these otherwise uncomplicated pregnancies are given in table V.

TABLE V—Schematic approach to the management of preterm labour depending on gestation and state of the membrane

Completed weeks of pregnancy	Contractions and ruptured membranes	Contractions only
26 and 27	Tocolytics, steroids if delivery likely	Tocolytics, steroids if delivery likely
28 and 29	Tocolytics and steroids	Tocolytics and steroids
30 and 31	Tocolytics and steroids	Tocolytics and steroids
32 and 33	No tocolytics, no steroids	Tocolytics and steroids
34 and over	No tocolytics, no steroids	No tocolytics, no steroids

LABOUR AND DELIVERY

Intrapartum monitoring is essential. Late decelerations and severe variable decelerations, poor variability, and abnormal rates on the cardiotocograph are associated with increased mortality from the idiopathic respiratory distress syndrome.¹⁸ Infants who develop this syndrome, despite treatment with steroids, have an appreciably lower five-minute Apgar score than infants who received steroids but who did not develop the syndrome. There is no evidence that prophylactic application of forceps is advantageous in the delivery of the very low birth-weight infant presenting by the vertex.¹⁹ A generous episiotomy must be made to reduce the soft tissue resistance to a minimum.

Delivery of the preterm infant presenting by the breech is more controversial. Individual studies may be faulted for several reasons, but, from pooled data from 11 studies, certain suggestions may be made.²⁰ Over 1500 g, the mode of delivery of the preterm infant presenting by the breech does not influence outcome. Under 1500 g, caesarean section improves survival over those infants born by vaginal breech delivery. In preterm infants presenting by the breech, our policy has been to deliver by caesarean section if the birthweight was estimated to be between 1000 g and 2000 g. This would correspond to a gestational age range of 28-32 weeks. Where the estimated birthweight or gestational age was outside these ranges, the mode of delivery was at the discretion of the individual consultant.

Tables III and IV show the results of our policy. The figures are not directly comparable because of a disproportionate number of infants below 1000 g in the group delivered by the breech vaginally. Moreover, these figures are a result of our policy and not its foundation. We do not therefore make statistical comparison, but by observing these results we see no reason to divert from our present policy.

Before embarking on a widespread policy of caesarean section, it should be remembered that up to 18% of fetuses presenting by the breech have an abnormality and that caesarean section in the early part of the third trimester is technically difficult because of the thickness of the lower segment. This will potentially increase the maternal and infant mortality and morbidity. Caesarean section itself may be associated with an increase in the incidence of idiopathic respiratory distress syndrome in infants.

Three quarters of deaths of infants presenting by the breech and weighing under 1500 g are associated with footling breech presentation. A policy of caesarean section for these infants alone would be a major contribution to reducing mortality. An ultrasound scan, paying particular attention to possible congenital abnormality, is desirable before abdominal delivery.

IN UTERO TRANSFER

Attempts to compare the outcome of infants transferred in utero with those transferred neonatally are unsatisfactory because the groups cannot adequately be matched. Nevertheless, in another study from this hospital where the infants were well matched for birthweight and gestational age in utero transfer conferred significant benefit over neonatal transfer. The survival rate for infants delivered after in utero transfer was 83% and after neonatal transfer 71% ($p < 0.01$). The incidence of intraventricular haemorrhage was 30% among babies transferred in utero and 45% among those transferred after the delivery ($p < 0.01$). This would support the view of others that infants likely to require intensive neonatal care should be transferred in utero to a centre with these facilities.

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What relation is there between the obstructive sleep syndrome and cot deaths?

Cot deaths or sudden infant death syndrome by definition does not have any obvious cause. Up to one third of all such cases, however, do have evidence of gross disease at postmortem examination, despite the unexpected nature of the death. Another group show evidence of minor disease, such as respiratory tract infection, which in itself is not enough to account for the demise, while a remaining small proportion of cases are truly unexplained with only signs of asphyxiation at postmortem examination. Many theories have been advanced to explain the sudden infant death syndrome, among which is obstructive sleep apnoea. No single predominant cause, however, has been clearly delineated. Probably a combination of factors in a susceptible infant results in cessation of breathing and subsequent cardiac arrest. The factors that lead to susceptibility in infancy include low birth weight, poor socioeconomic state, and male sex. Secondary external triggers that seem to be associated temporarily with deaths include intercurrent viral infection, vomiting and aspiration, and possibly anaphylactic reaction in that IgE antibodies to various factors have been shown with increased frequency among cases. All these secondary external triggers might conceivably cause upper airways obstruction. If the respiratory centres respond poorly to the hypoxia and hypercapnia produced, which is more likely to be the case during rapid eye movement sleep, then apnoea will occur. Probably, also, a few cases have cardiac arrhythmias, and one particular syndrome of prolonged QT interval has been described in association with ventricular fibrillation and thus sudden unexplained death. Recent studies have focused on abnormal respiratory and cardiac rhythms as an antecedent defect in babies who subsequently suffer a cot death. A common underlying factor may be an abnormality of autonomic control, but it remains to be seen whether prospective investigation can identify accurately the susceptible cases. Having identified the cases, we still have to sort out an appropriate approach to treatment.—J O WARNER, consultant paediatrician, London.