

PLACE OF LOW RUPTURE OF MEMBRANES IN INDUCTION OF LABOUR**

by

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Introduction

Artificial rupture of membranes as a means of induction of labour is of considerable antiquity. It is certainly the oldest of the methods usually mentioned in the text-books. It is popularly referred to as the "English method", although it is more ancient than British civilization itself (Chassar Moir, 1964). After a striking popularity during the 18th century, the method fell into disrepute. It is only during the last 25 years that rupture of membranes has regained its popularity.

Material

In the present study, value of low rupture of membranes as a method of induction of labour has been assessed. A series of 1062 consecutive inductions by low rupture of membranes is reviewed. This represents an incidence of 4.2 per cent amongst 25,117 patients delivered in Eden Hospital, Medical College, Calcutta, between January 1963 and December 1964.

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Indications

TABLE 1

Indications for low rupture of membranes as induction of labour

Indications	No. of cases	Per cent
Pre-eclampsia	480	45.2
Prolonged pregnancy	220	20.7
Essential hypertension	106	9.9
Placenta praevia	84	7.9
Accidental haemorrhage	52	4.8
Hydramnios	46	4.3
Rh. incompatibility	18	1.6
Elective induction	56	5.3
Total	1062	100.00

The Method

Every case for low rupture of membranes was thoroughly scrutinized and the indications and contra-indications were carefully considered. The operation was carried out only when the vertex was presenting and there was no doubt about cephalo-pelvic disproportion, and the cervix was preferably ripe, i.e. soft, partially taken up with at least 2 cm. dilatation of the internal os of the cervix. In every case the operation was done with full aseptic and antiseptic technique. The membranes were swept as a routine from the lower uterine segment and the region of the internal os before rupturing the membranes. The fore-

waters were ruptured with long Kocher's forceps (low rupture), taking care not to cause any bleeding. The cervix was not traumatised by stretching. General anaesthesia was never used excepting in neurotic cases. Considerable amount of liquor amnii was drained (about 500 ml.) to ensure satisfactory engagement of the presenting part, to minimise the risk of prolapse of the cord and to shorten the duration of induction/delivery interval. Prophylactic chemotherapy was used in such cases as a routine.

Results

Table 2 shows the incidence of

TABLE 2
Incidence of A.R.M. in relation to parity

Parity	No. of cases	Per cent
Primiparae	370	34.9
Para 2 to Para 4	412	38.8
Para 5 and above	280	26.3

TABLE 3
Incidence of A.R.M. in relation to duration of pregnancy and parity

Parity	Total	Below 36 wks.		36-38 wks.		38-40 wks.		40-43 wks.	
		No.	%	No.	%	No.	%	No.	%
Primiparae	370	11	2.9	202	54.7	122	32.9	35	9.5
Para 2 to 4	412	24	5.8	232	56.3	50	12.1	106	25.8
Para 5 and above	280	15	5.3	88	31.5	66	23.5	111	39.7

TABLE 5
Incidence of latent period in relation to parity

Latent period	Parity					
	Primiparae		Para 2 to 4		Para 5 & above	
	No.	%	No.	%	No.	%
Within 24 hours		91.3		82.4		86.2
Over 24 hours		6.7		14.6		9.6

artificial rupture of membranes in relation to parity.

Table 3 shows the incidence in relation to duration of pregnancy and parity.

Table 4 shows the incidence of induction/delivery interval in these cases.

TABLE 4
Incidence of latent period

Latent period	No. of cases of ARM	Per cent
Within 24 hours	850	79.1
24-48 hours	95	9.2
48-72 hours	20	2.5
72-96 hours	—	—
Above 96 hours	—	—
Total success rate	965	90.8

The incidence of induction/delivery interval in relation to parity is enumerated in Table 5.

Duration of pregnancy at the time of rupture of membranes considerably

influenced the induction-delivery interval. Parity was found to have very little influence on the ripeness of the cervix but the maturity at induction undoubtedly had.

Table 6 shows the incidence of induction/delivery interval in relation to the duration of pregnancy.

Table 7 shows the success rate of induction by low rupture of membranes in relation to the state of the cervix.

Table 8 shows the incidence of interference and complications develop-

ing during labour in the induced group of cases.

Maternal hazards

In the present series there were two maternal deaths attributable to induction (0.18 per cent) — one from post-partum haemorrhage and the other from eclampsia. The maternal morbidity rate was 12.6 per cent in the induced group, whereas the same for the non-induced cases during the same period was 6.6 per cent. The longer the induction/delivery in-

TABLE 6

Incidence of latent period in relation to duration of pregnancy

Duration of pregnancy	Total No.	Latent period within 24 hours		Latent period above 24 hours	
		No.	%	No.	%
Below 36 weeks	52	38	74.3	14	25.7
36-40 weeks	758	629	82.8	129	17.2
40-43 weeks	252	236	94.2	16	5.6

TABLE 7

Success rate of induction in relation to the state of the cervix

	Favourable	Intermediate	Unfavourable	Total
Total number	758	252	52	1062
Successful cases (Labour within 48 hours)	712	221	32	965
Success rate	94%	88%	60%	90.8%

TABLE 8

Incidence of interference and complications during labour

Interference and complications of labour	Hospital population Per cent	A.R.M. (Low) Per cent
Forceps	12.5	13.1
Episiotomy	10.6	8.4
Ventouse	3.1	2.5
Manual removal of placenta	3.5	3.2
Lower segment caesarean section	2.5	3.1
Post-partum haemorrhage	3.4	2.5
Cord prolapse	0.6	0.8

terval, the greater was the maternal morbidity rate (Table 10). moderate or severe degree of toxæmia not responding to conservative

TABLE 10
Maternal morbidity in relation to latent period

Induction-delivery interval	No. of cases	Morbid cases	Per cent
Within 24 hours	850	75	8.8
24-48 hours	95	32	36.6
48-72 hours	20	8	40

Foetal outcome

Total number of perinatal deaths was 160, making the perinatal death rate in induced cases as 15.1 per cent whereas in non-induced cases the same was 7.5 per cent. This increased foetal loss in the induced group represents the loss due to primary conditions like pre-eclampsia, antepartum haemorrhage, post-maturity etc.

Table 11 shows the causes of perinatal deaths in the induced cases.

TABLE 11
Causes of perinatal deaths

Cause	Number	Per cent
Prematurity	58	36.2
Intra-cranial haemorrhage	24	15.0
Anoxia due to prolapse cord	12	7.6
Anoxia due to accidental haemorrhage after induction	14	8.7
Atelectasis lung	6	3.8
Pulmonary infection	8	5.0
Congenital malformations	10	6.2
Intra-uterine infection	28	17.5
Total	160	100.0

Discussion

In this continuous series of 1062 inductions by low rupture of membranes the commonest indication was toxæmia of pregnancy (480 cases — 45.2 per cent). Patients with

treatment up to a reasonable length of time were induced surgically by low rupture of membranes. Even when toxæmia was of mild degree the patients were subjected to premature induction of labour once the pregnancy was near 38 weeks.

If cases of essential hypertension are added to the toxæmia group the total incidence of induction for hypertension as a whole rises to 55.1 per cent, of which 9.9 per cent were due to essential hypertension. Multigravidae were more often induced for these two indications than primigravidae due to the fact that in the latter group of cases spontaneous onset of labour occurred much more frequently than in multigravidae. Due to a shorter induction/delivery interval low rupture of membranes was preferred to high rupture in these cases. There were 102 perinatal deaths — largest number of deaths from these two indications, forming 64.5 per cent of the total perinatal deaths—(160) in this series.

This depressing result indicates that surgical induction, although perhaps the treatment of 'choice' at present in cases of toxæmia and essential hypertension, is far from satisfactory. By premature induc-

tion, intra-uterine foetal death may be prevented but that at the cost of high neonatal death rate from prematurity, particularly in the institutions where management of premature babies is not satisfactory.

Next common indication for induction in the present series was prolonged pregnancy (220 cases — 20.7 per cent), — the diagnosis of which is so controversial. The advantage of low rupture of membranes in these cases is that if the liquor amnii is found meconium-stained and scanty the foetus may be considered to be in great danger due to anoxia. Further steps may be undertaken — even caesarean section in such emergency—to obtain better salvage of the babies.

Elective induction was performed in 56 cases (5.3 per cent) in the present series — all being multiparae with satisfactory results. This number of cases is too small to come to any conclusion.

Induction was not advocated in this series for cephalo-pelvic disproportion, malpresentation like breech presentation and unstable lie, for fear of increased foetal loss from higher incidence of cord prolapse in such cases.

Induction/Delivery interval

In the present study, the latent period was within 24 hours in 88.2 per cent, between 24 to 48 hours in 9.3 per cent and between 48 to 72 hours in 2.5 per cent cases. Incidence of latent period, within 24 hours, in relation to parity was 91.3 per cent in primigravidae, 82.4 per cent between para 2 to para 4 and 86.2 per cent in above para 4, whereas the same above 24 hours was 6.7, 14.6

and 9.6 per cent respectively. In the series of Tennent and Black (1954), 74.8 per cent primigravidae and 72.5 per cent multigravidae started labour within 24 hours. So in both the studies it is apparent that parity did not influence the induction/delivery interval. On the other hand patients' age was an important guiding factor in this aspect. Patients below the age of 35 years responded better than the patients above that age.

Induction/delivery interval was mainly guided by duration of pregnancy, which again decided the state of the cervix. Between 40-43 weeks of pregnancy, the latent period was within 24 hours in 94.2 per cent cases. This compares favourably with the findings of Tennent and Black (1954) and Gibson (1952).

Average duration of first stage of labour was reduced by 4.6 hours for primigravidae and by 2.8 hours for multiparae by low rupture of membranes. Duration of labour depended on the period of gestation and state of cervix at which the membranes were ruptured. It had no relation to the indication for which labour was induced. Duration of labour was shorter when artificial rupture of membranes was done for toxemia, and the same with prolonged pregnancy. Low rupture of membranes was definitely followed by a shorter latent period than high rupture. The same finding was observed by other workers, e.g. Smyth and Thomson 1937, Bellingham, 1954; Nixon *et al.* 1959.

Interference and Complications Following Induction

There was no incidence of prolonged labour in the present series.

Rather, duration of labour was shorter when membranes were ruptured artificially than when the same were intact.

Fitzgibbon (1931) was of the opinion that forewaters did not play any part in dilatation of the cervix. Theobald (1959) was more emphatic in this aspect. He is of the opinion that intact bag of water is a legacy and not an essential factor for smooth progress of labour.

In the present series, incidence of post-partum haemorrhage was 2.5 per cent, whereas the average hospital figures for the same was 3.2 per cent. The better result in the former group of cases was possibly due to constant observation and prophylactic use of ergometrine as a routine with the delivery of the anterior shoulder of the baby.

Prolapse of the cord occurred in three cases after low rupture of membranes making the incidence as 0.3 per cent. During the same period, the incidence of cord prolapse in average hospital population was 0.32 per cent. This study does not prove that low rupture of membranes predisposes to prolapse of the cord.

Maternal results

Although the maternal deaths in this series directly attributable to this procedure was not high (2 in 1062 cases) the incidence of maternal morbidity was high. It was 12.6 per cent in the induced group, whereas the same for the non-induced cases during the same period was 6.8 per cent. The longer the induction/delivery interval, the greater was the morbidity rate. Of those cases delivered within 24 hours of induction, the morbidity

rate was 8.4 per cent; the same for the latent period more than 48 hours was 17.6 per cent—almost double that for the first group.

Foetal results

The perinatal death rate was 15.1 per cent in the induced group whereas the same for the average hospital population was 7.5 per cent. It is difficult to assess the hazard to the foetus from the surgical induction of labour, as in nearly every case the operation was performed for some abnormal condition, e.g. toxæmia of pregnancy, prolonged pregnancy or ante-partum haemorrhage (Evans 1954). These conditions do themselves affect the salvage of the foetus. So the foetal loss in induced cases actually represents the loss due to the primary condition plus that loss resulting from the surgical induction.

Summary

A consecutive series of 1062 inductions by low rupture of membranes is reviewed. The method and indications are briefly described.

The influence of various factors, e.g. maternal age, parity, duration of pregnancy, state of cervix on the induction/delivery interval has been critically analysed.

The maternal and foetal hazards in the induced group of cases have been compared with those of non-induced cases. The greatest single factor influencing the onset of complications after artificial rupture of membranes was found to be the station of the foetal head at the time of induction. If the head was not engaged there was greater danger of maternal morbidity due to prolonged induction/

delivery interval and an increased foetal loss due to a higher incidence of prolapse of cord.

A plea has been made to perform low rupture of membranes to induce labour surgically. There is no evidence that low rupture of forewaters is associated with higher risk of maternal or foetal hazards than that in rupture of hind waters.

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