INFLUENCE OF RUPTURE OF MEMBRANES ON LABOUR***

by

V. KAMALA,* M.D.

J. J. MIRCHANDANI,** M.D.

It is no longer believed that premature rupture of membranes prolong labour. The beneficial effect of artificial rupture of membranes (ARM) in induction of labour is accepted. It acts either by the direct stimulation of the lower segment by the presenting part or by removing the abnormal adherence of membranes (Kreis, 1934; Johnson, 1946). Schulsmann (1966) considered that ARM reduces the resistence of the cervix as the shape and size of the uterus is altered by the escape of liquor. Recently, prostaglandins present in amniotic fluid are thought to be absorbed from the lower genital tract (Karim, 1966, 1967; Abraham, 1967). Amniotomy is also used to improve uterine forces in labour.

In the present study, it is proposed to review the course of labour when membranes ruptured before the onset of labour at various stages of cervical dilatation. The effect of rupture of membranes on uterine sensitivity to pitocin infusion in labour and on foetal and maternal morbidity is also reviewed.

Material and Methods

The course of labour in 1129 consecutive cases, with no mechanical obstruction or antepartum haemorrhage, was observed. Seventy parturients had premature rupture of membranes i.e. rupture before onset of labour. The data on degree of dilatation of cervix and state of membranes in first stage was available in 112 nulliparae. The course of labour in these was compared with that in 25 nulliparae who had ARM in first stage. The effect of intact or ruptured membranes on uterine response to oxytocin drip in spontaneous labour could be reviewed in 63 parturients. The response was graded 'good' if it took 2 hours from 4 cm. to 9 cm. cervical dilatation, one hour from 9 cm. to full dilatation, one and half hour from full dilatation to delivery. This corresponds to Friedmann's 'curve of labour' (Eastman 1966). Response was considered 'poor' if there was no acceleration of labour. The type of inertia in which amniotomy helps is also reviewed in cases of prolonged labour.

Observations

Effect of Premature Rupture of Membranes

(a) Higher percentage of patients with premature rupture of membranes had labour lasting less than 12 hours; irrespective of parity (Table I). The incidence of prolonged labour beyond 24 hours does not differ in the two groups of cases i.e. those with intact membranes and those with premature rupture of membranes.

*Asst. Surgeon, E.S.I. Hospital.

**Asst. Professor, Lady Hardinge Medical College & Hospital, New Delhi.

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TABLE I

Influence of Rupture of Membranes Before and After Onset of Labour on Duration of Labour

Time of rupture of membranes	Total No. of cases	Duration of labour in hours					
		0-12 hrs.		12-24 hrs.		24 hrs. & above	
		No.	%	No..	%	No.	%
Nullipara							
During labour	273	107	39.19	130	47.6	36	13.19
Before labour	26	14	53.84	8	30.77	4	15.39
	299						
Multipara							
During labour	786	462	58.72	301	38.29	23	2.93
Before labour	44	44	72.73	11	25.00	1	2.27
	830						

Effect of ARM During Labour

The effect of amniotomy during labour on uterine forces could be conveniently studied in nulliparae. In 137 nulliparae the time from onset of labour to 3 cm., 4 cm. and 6 cm. cervical dilatation was noted. The comparison of average time taken after amniotomy reveals that amniotomy did hasten labour at all stages of cervical dilatation, but more markedly after 3 and 4 cm. cervical dilatation than at 6 cm. dilatation (Table II a, b, c).

TABLE II a

Influence of Condition of Membranes on Average Duration of Labour Before and After 3 cm. Dilatation

Status of Memb. at 3 cm.	Total No. of cases	Average duration of labour in minutes	
		Before 3 cm.	3 cm. to full dilatation
Intact memb.	53	393.6	431.6
Spont. rupt.	25	480	593
A.R.M. at 3 cm.	9	540	229
Total	87		

TABLE II b

Influence of Condition of Membranes on Duration of Labour Before and After 4 cms. Dilatation of Cervix

Status of memb. at 4 cm. cx. dil.	No. of cases	Average duration in minutes	
		Before 4 cm.	4 cm. to full dilatation
Intact memb.	13	437.26	285.2
Spont. rupt.	6	325	245.0
A.R.M. at 4 cm.	10	738	193.3

TABLE II c
Before and After 6 cms. Dilatation

Status of Memb. at 6 cm. cx. dil.	No. of cases	Average duration in minutes	
		Before 6 cm.	6 cms. to full dilatation
Intact memb.	11	537.25	91
Spont. rupt. of memb. ..	4	551	125.5
A.R.M. at 6 cm.	6	620	94

This is of particular significance as in these cases of amniotomy, labour had been progressing slowly as revealed by longer average duration prior to ARM.

Effect of ARM on Uterine Inertia

Amniotomy was used for augmenting labour forces in 14 nulliparae with uterine inertia (Table III). It was found less effective in inco-ordinate type of uterine dysfunction.

ARM improves the response to oxytocin infusion. "Good" response was doubled in nulliparae if membranes had been ruptured, while 50% had "Poor" response if membranes were intact compared to 5% otherwise (Table IV). It is not clear why such difference in response to oxytocin was not observed in nulliparae.

Effect of Rupture of Membranes on Maternal and Neonatal Morbidity

Any rise of temperature above 100.4 F 24 hours after delivery was considered as an indicator of maternal morbidity. In 137 labour cases admitted with absent membranes maternal and neonatal sepsis was increased if labour lasted for more than 24 hours (Tables V & VI).

TABLE III
Effect of ARM in 14 Nulliparae With Prolonged Labour

Type of Uterine action***	Dilatation of cervix at A.R.M.	Duration of labour before A.R.M.	A.R.M. to delivery interval
Hypotonic	2 cms.	21-hours	5 hours
Incoordinate ..	„	31 hours	10 hours
Hypotonic	3 cms.	48 hours	4½ hours
Hypotonic	„	35 hours	3 hours
Incoordinate ..	4 cms.	31 hours	2½ hours C.S.**
„	4 cms.	37½ hours	8 hours
„	„	24 hours	10 hours
Hypotonic	6 cms.	26 hours	1½ hours
Incoordinate ..	„	48 hours	8*
„	„	39 hours	4½*
Hypotonic	Full	29½ hours	½ hour
Incoordinate ..	„	33 hours	1¼ hours
„	„	44 hours	1 hour
„	„	47 hours	1½ hours

* Labour terminated by manual rotation of head and forceps delivery.
** C. Section for foetal distress.
*** Type of uterine action as judged clinically before A.R.M.

TABLE IV

The Response to Oxytocin Drip Before and After Rupture of Membranes

	No. of cases	Effect of oxytocin					
		Good		Satisfactory		Poor	
		No.	%	No.	%	No.	%
Nullipara							
Intact memb. ..	10	3	30.0	2	20.0	5	50.0
Ruptured memb ..	20	12	60.0	7	35.0	1	5.0
Multipara							
Intact memb. ..	10	7	70.0	3	30.0	—	—
Ruptured memb ..	23	18	78.26	4	17.39	1	4.35

TABLE V

Relation of Maternal Morbidity to Duration of Rupture of Membranes Before Delivery

Rupture of membranes to delivery interval in hours	No.	Morbidity	
		No.	Percentage
Below 24 hours	65	23	35.38
24-48 hours	25	10	40.00
Above 48 hours	8	5	62.5

TABLE VI

Incidence of Maternal and Neonatal Pyrexia in Relation to Duration of Labour in Cases Admitted With Absent Membranes

	Labour less than 24 hrs. 105 cases	Labour more than 24 hrs. 32 cases
Maternal sepsis	18 (17.03%)	17 (53.12%)
Pyrexia	23 (21.7%)	12 (37.53%)
Neonatal sepsis	31 (29.53%)	15 (46.9%)
Pyrexia	9 (8.57%)	6 (18.75%)

Discussion

Amniotomy in labour could be used with benefit more frequently were it not for the fact that the foetal and maternal morbidity increases with the duration of rupture of membrane to delivery interval (Table V). The prophylactic administration of antibiotics in these cases, in the present study, was found to be of no use as also reported by Eastman and Hellman (1966), and Muldoon (1968). 18.8% of the group who had prophylactic antibiotic developed maternal sepsis compared to 16.6% in the group who received no antibiotic.

The timing of amniotomy in uterine inertia requires good judgement. ARM at 6 cm. cervical dilatation in normal nulli-

parae was found to shorten labour by Van Pragg and Hendrick (1964) and Wetrich (1970). In the present study (Table II a, b, c) beneficial effect of ARM was found to be more marked at 3 and 4 cm. cervical dilatation than at 6 cm. The shortening of average duration of ARM to delivery time is significant, as in these cases prior to ARM average duration upto similar dilatation of cervix had been longer than in other cases.

Keetel *et al*, (1940) had 78.6% success by ARM at 5 cm. cervical dilatation in 276 cases who had been in labour for an average of 34 hours. In the present study, 14 nulliparae with labour longer than 24 hours, had ARM at various stages of cervical dilatation (Table III). Amniotomy was found to be, in general, beneficial but more in hypotonic type of inertia than in inco-ordinate uterine action. Lewis (1965) indicated that it may be ineffective in inco-ordinate uterine inertia. There is general tendency to try initially oxytocin infusion in slow labour, in order to avoid increased maternal and neonatal sepsis. Both Keetel (1956) and Turnbull (1959) were impressed by the rapid dilatation of cervix after a period of oxytocin drip had produced no effect. Uterine sensitivity to oxytocin seems to be increased after rupture of membranes (Turnbull 1967). In the present study 50% of nulliparae had poor response to oxytocin stimulation in labour when it was given with intact membranes compared to only 5% 'poor' response when it was given with absent membranes. Actually 'good' response to oxytocin infusion was doubled in nulliparae when it was given after rupture of membranes (Table IV).

Douglas and Stander (1943) have demonstrated chorioamnionitis in presence of intact membranes in protracted labour. In order to avoid undue prolongation of labour as such and long interval after rupture of membranes, Goldman (1959) has advised oxytocin infusion if the cervical dilatation remained unchanged at 2 fingers or more for 6 hours, or if well established labour has existed for 12 to 20 hours and half dilatation is not reached. If good response to oxytocin infusion is not obtained, ARM is strongly recommended in hypotonic uterine inertia. If, in spite of sedation and reinfusion, inco-ordinate uterine action persists, ARM is justified. This, in addition, may reveal meconium staining and facilitate biochemical examination of blood.

Summary

The rupture of membranes before onset of labour does not prolong labour, more frequently it shortens the labour.

In general, delivery is hastened if membranes are ruptured at 3 or 4 cms. cervical dilatation.

It is a useful measure in the treatment of protracted labour, particularly if it is due to hypotonic uterine action. It increases the efficacy of oxytocin infusion.

Maternal and neonatal sepsis is increased with increased duration of labour and with increased duration of interval from rupture of membranes to delivery. The prophylactic antibiotic administration plays no role in prevention of intrauterine maternal or foetal infection.

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