

PREMATURE RUPTURE OF THE MEMBRANES*

Y. B. GORDON, M.B., B.CH. AND R. FREEDMAN, M.B., B.CH., *University of the Witwatersrand, Johannesburg*

SUMMARY

A total of 554 cases in which membrane rupture occurred prematurely at Queen Victoria Maternity Hospital, Johannesburg during a 3½-year period is analysed in 4 groups according to birthweight, to elucidate which factor—prematurity or intra-uterine infection—carries the greater risk to the foetus. The conclusion is that pregnancy should be terminated if intra-uterine infection occurs if the foetus is judged to be over 34 weeks' gestation and that conservative treatment without antibiotics be employed when the rupture occurs between 28 and 34 weeks.

In patients presenting with premature rupture of the membranes there are two factors which influence the foetal morbidity and mortality. These factors are prematurity and intra-uterine infection. The purpose of this analysis was to elucidate which factor carried the greater risk to the foetus. Recently there has been a spate of articles which recommend immediate termination of pregnancy, irrespective of the period of gestation, as soon as the first drop of liquor appears in the vagina.^{1,2} Another series of articles advocates trying to prolong the pregnancy until the foetus has reached 34-36 weeks' gestation in the belief that the risk of prematurity is greater than that of infection.³⁻⁵ Most authors however agree that all pregnancies should be terminated if the membranes rupture after 36 weeks' gestation.

During a 3½-year period (1 January 1966-30 June 1969) there were 14 671 deliveries at Queen Victoria Maternity Hospital, Johannesburg. The membranes ruptured prematurely in 554 cases, an incidence of 3.8%. The incidence in the literature varies from 4.0% to 15.8%.^{1,4} In premature deliveries alone early membrane rupture occurs in 23.0%-34.0% of cases, a 3-4-fold increase as compared with mature deliveries.

METHOD OF ANALYSIS

The cases of premature membrane rupture were analysed in 4 groups according to the birthweight. The gestation period of the infants was calculated according to the

intra-uterine growth chart published by Lubchenko *et al.* in 1963.⁶ The various birthweights were compared with one another to assess the incidence of complications in each group.

TABLE I. RELATIONSHIP BETWEEN BIRTHWEIGHT AND GESTATIONAL AGE

No. of cases	%	Birthweight		Gestational age (weeks)
		Pounds	Grams	
16	2.9	2.4-3.4	: 1 000-1 499	26-30
18	3.3	3.5-4.6	: 1 500-1 999	31-33
107	19.3	4.7-5.8	: 2 000-2 499	34-36
413	74.5	5.8+	2 500+	36+

Only patients in whom liquor was observed to be draining from the cervix or the vagina for more than 1 hour before the onset of labour were included in this study.

The age and parity of the patients conformed with the normal obstetric population at our hospital. We did not find an increased incidence or prematurity in patients under 20 or over 35 years of age as reported by Abramowitz and Kass in 1966.⁷ High parity did not predispose women to early membrane rupture.

Prematurity

In our series of 554 cases, the incidence of prematurity was 25.5%. In those pregnancies productive of a premature infant (141 cases), 32.6% had a previous history of premature delivery. When the infant was mature (413 cases) only 9.7% had a previous history of a premature delivery.

Presentation

The incidence of malpresentations and multiple pregnancy was not increased in the membrane rupture group as compared with the general obstetric population at the same period of gestation. The over-all incidence of twin pregnancy was 1.3%. However, when the birthweight was under 4.6 lb (2 000 g) the incidence was 6.0%.

Breech delivery accounted for 4.8% of the total series. The incidence in the premature group, however, was 14.0%. Transverse lie complicated 1.6% of the pregnancies. There was no difference between the mature and premature groups.

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Cord presentation was diagnosed in 0.5% of the series and was most common in babies that weighed under 3.4 lb (1 500 g). This association paralleled the high incidence of breech presentation in this group.

Labour (Fig. 1)

Labour was induced by using intravenous oxytocins. The incidence of induced labour increased with increasing foetal maturity, the over-all incidence being 54.0% of the total series. The graph indicates the policy at our hospital of trying to attain a mature infant *in utero* before induction of labour, but if there is evidence of intra-uterine infection the pregnancy is terminated forthwith.

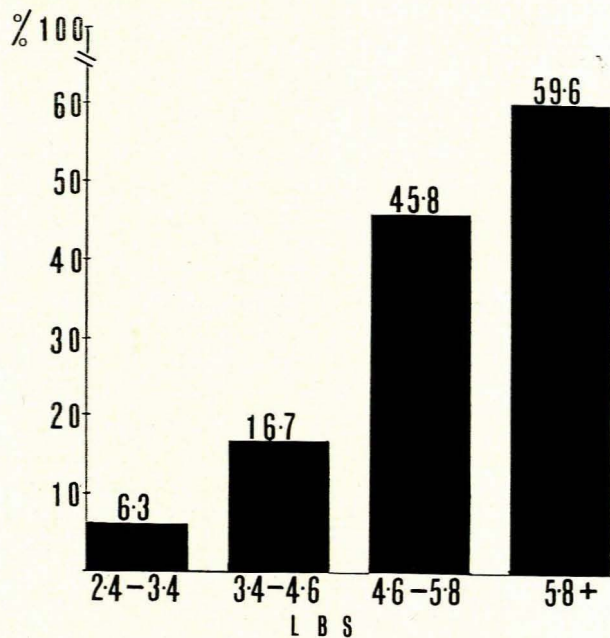


Fig. 1. Incidence of induction (based on 554 cases).

Caesarean section was performed on 41 patients (7.4%), of whom 18 cases were repeat elective caesarean sections and 23 cases were emergency caesarean sections. The caesarean section rate was not increased in the premature rupture of the membranes group as compared with the over-all rate at our hospital. Internal version and breech extraction was performed on two patients, in both of whom the infant was grossly premature and foetal viability was in doubt.

Foetal Prognosis and Birthweight (Fig. 2)

The over-all foetal loss was 4.5% (25 cases, two of which were macerated stillbirths). Fig. 2 shows that the perinatal loss diminishes as the birthweight rises. The foetal loss is maximal under 4.6 lb (2 000 g) and tends to remain constant above this birthweight.

According to Gillibrand¹ and Townsend *et al.*² the latent interval before delivery lessens with increasing gestational age. If membrane rupture occurs after 36 weeks' gestation the average latent interval is 48 hours,² and if under 36 weeks it is 14 days.³ Our findings are presented in Table II.

Infection

Maternal infection. The over-all incidence of maternal infection was 5.1% (28 cases). The majority consisted of

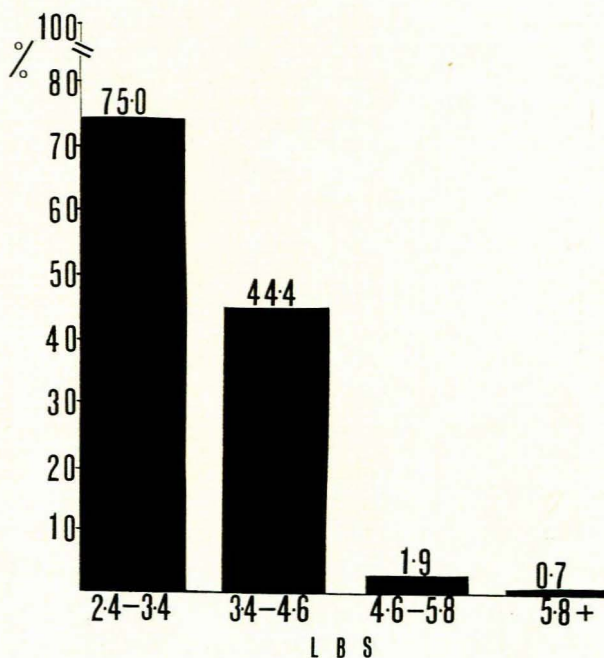


Fig. 2. Perinatal mortality rate (based on 554 cases).

TABLE II. DURATION OF MEMBRANE RUPTURE BEFORE DELIVERY.

Time in hours	No. of cases	%
0 - 12	198	36
12 - 24	149	27
24 +	207	37

endometritis. There were two cases of generalized peritonitis following the 41 caesarean sections. All infections were easily controlled on antibiotic therapy, except the two patients with peritonitis where prolonged intravenous therapy, nasogastric suction and intravenous antibiotics were administered.

Foetal infection. The over-all incidence of foetal infection was 6.1% (34 cases), but one-half consisted of a positive umbilical cord histology or conjunctivitis only. The other half comprised serious infection in the form of pneumonitis or septicaemia. The above incidence of 6.1% is probably falsely low because in the 2.4-3.4-lb group the high perinatal mortality probably masked overt clinical foetal infection. Routine blood cultures and umbilical cord histology have been introduced only recently and 94 infants were examined in this way. These parameters will increase the number of subclinical foetal infections that are diagnosed. The perinatal loss in the 34 cases of proved foetal infection was 5.9%—all deaths occurring in the premature group.

Infection and duration of membrane rupture (Fig. 3). Maternal infection alone occurred in 28 cases, 67.9% of whom were draining liquor for less than 24 hours. Foetal infection occurred in 34 cases, 55.9% of whom were draining liquor for less than 24 hours. In 61.3% of all cases of infection, the membranes had been ruptured for less than 24 hours.

Prophylactic antibiotics (penicillin or ampicillin) were administered to half of the patients in whom the membranes had been ruptured for over 24 hours. There was no difference in the rate of infection in those patients who

received antibiotics as compared with those that did not receive antibiotics. In our series 75.0% of the organisms cultured were Gram-negative bacilli or anaerobic streptococci, and only 25.0% were staphylococci or other Gram-positive organisms.

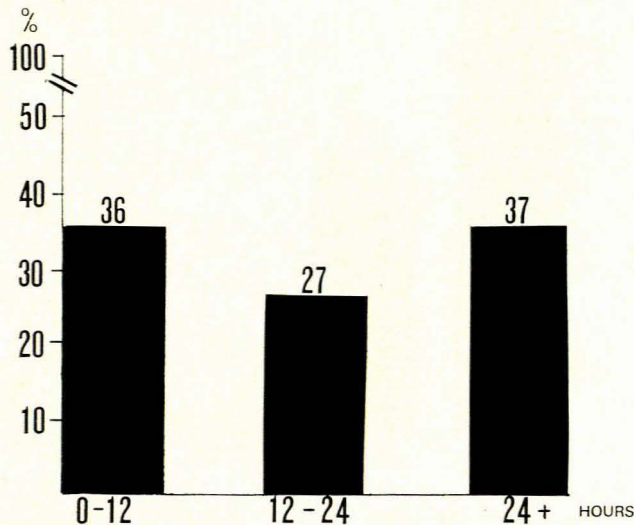


Fig. 3. Duration of membrane rupture (based on 554 cases).

DISCUSSION

We agree with Greenhill⁸ that the clinical assessment of premature membrane rupture is the most accurate diagnostic index.

Papanicolaou smears taken from the posterior vaginal fornix are a valuable diagnostic aid. Many authors^{3,9} consider that the incidence of false negative reports is high, but if foetal squames are observed, then the obstetrician is certain that the membranes have indeed been breached. Prematurity tends to recur in subsequent pregnancies, according to Abramowitz and Kass,⁷ and our findings are in agreement with this statement. Malpresentations, according to Gillibrand,⁴ occur with the same frequency after the membranes have ruptured.

The perinatal mortality is influenced by the birthweight. Our own series confirms that the perinatal loss drops from 44.0% in the group below 4.6 lb, to 2.0% in the group above 4.6 lb. A birthweight of 4.6 lb corresponds, according to Lubchenko *et al.*,⁵ to a gestational age of 34 weeks.

When foetal infection complicated membrane rupture the perinatal loss was 5.9%, which represented a smaller risk to the foetus than did gross prematurity. Townsend *et al.*³ found no reliable method of diagnosing the 'foetus at risk' *in utero*. Vaginal cultures, serial maternal white blood cell counts, maternal pyrexia and uterine tenderness were all inadequate parameters of infection. All pregnancies complicated by premature rupture of the membranes should be induced after 34 weeks' gestation as the risks of intra-uterine infection outweigh the risks of prematurity after this time.

Leucocytic infiltration of the umbilical cord was frequently observed in the absence of neonatal infection.¹⁰ It is well known that the longer the delay before delivery, the greater the incidence of intra-uterine infection.^{3,11}

However, our series shows that significant infection can occur where the membranes have been ruptured for less than 24 hours. If the obstetrician decides to terminate the pregnancy by medical induction of labour, then the induction should be performed as soon as the diagnosis is established.

The maternal mortality in our series was nil. In an excellent review of 54 maternal deaths, by Webb,¹¹ the dangers of prolonged drainage of liquor were analysed. In his series, maternal death occurred in one of every 5 400 cases of premature rupture of the membranes. He stressed the importance of maternal infection which complicated 46 of the 54 deaths, and of amniotic fluid embolism in 7 of the 54 cases. The conclusion reached was that where there is any evidence of intra-uterine infection the pregnancy must be terminated immediately, by caesarean hysterectomy if necessary, and prompt massive parenteral antibiotic and resuscitative therapy must be instituted. We agree with Townsend *et al.*³ that the organisms isolated from vaginal cultures are not necessarily the organisms which infect the foetus. In our series 75.0% of organisms were Gram-negative bacilli or anaerobic streptococci. Only 25.0% were staphylococci or other Gram-positive organisms. The use of penicillin alone is therefore probably incorrect. In severe infection ampicillin or a combination of penicillin and kanamycin are probably the agents of choice initially. Prophylactic antibiotics were only administered after 24 hours of ruptured membranes, but 61.0% of all infections occurred in patients draining liquor for less than 24 hours. Infection may, therefore, already have occurred before starting therapy. Leberz *et al.*¹² showed that maternal morbidity is reduced on antibiotics. However, most authors^{1,3,8} agree that prophylactic therapy is of no value.

CONCLUSIONS

We consider that conservative treatment, without antibiotic cover, should be employed when premature rupture of the membranes occurs between 28 and 34 weeks. The pregnancy should be terminated immediately if intra-uterine infection occurs or if the foetus is judged to be over 34 weeks' gestation.

All cases of proved infection must be carefully monitored and treated on a broad-spectrum parenteral antibiotic cover.

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