

# Asphyxia Neonatorum—Neurological Status at One Year Follow-Up

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## SUMMARY

The neurological status at one year follow-up of a group of infants who had suffered from asphyxia neonatorum is described. The situation at the end of the first week is contrasted with that a year later.

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The association between asphyxia neonatorum and neurological deficit is well known. The exact incidence of such complications, however, has not been fully established. The purpose of this article is to document this incidence in asphyxiated infants born at the Groote Schuur Maternity Hospital.

## PATIENTS AND METHODS

Between 1 April 1971 and 31 March 1972 there were 3 167 live births in the Groote Schuur Maternity Hospital. Asphyxia neonatorum, defined as a 1-minute Apgar score<sup>1</sup> of 0-3, or the need for assisted ventilation in the first 10 minutes of life, occurred in 206 cases. During their first week all infants were neurologically assessed. No examinations were carried out in the presence of systemic illness, or within the first 48 hours of life. If any abnormality was found initially, at least two further examinations were carried out. All infants were examined by the main author (C.D.M.) midway between feeds, and as far as possible at the same time of day. The infants were placed naked on a firm surface in a warm nursery. Findings recorded on a prescribed form included the infant's gestational age, birth mass, temperature, total serum bilirubin when jaundiced, the predominant state, and any drugs which were being administered. Diagnoses in cases of abnormality were made according to the criteria laid down by Prechtel and Beintema.<sup>2</sup>

Of 179 infants who survived the first week, 126 were followed up over the first year of life. These were Coloured infants living in the Cape Town city area, selected so that they could all be examined by the author at their respective welfare clinics.

In addition, three high-risk groups were selected irrespective of residential area. They were all infants who had convulsed during the first week of life, who were abnormal at 1 week of life, or who weighed less than 1 500 g at

birth. The follow-up examinations were carried out as suggested by Illingworth.<sup>3</sup>

## RESULTS

The relevant details of the 10 infants found to be abnormal at the end of the first week are recorded in Table I. All but 1 were appropriate for gestational age, and 8 were over 37 weeks' gestation. Only 2 infants had a 5-minute Apgar score of 6 or more. Neonatal complications occurred in all of them—half had convulsions and the rest some form of respiratory distress. The outcome in the 126 infants is given in Table II, and details of those abnormal in Table III. Of the 7 abnormal infants at 1 year, only 4 had been abnormal at 1 week. The results of the high-risk cases are given in Table IV. Two infants who had convulsions were lost to follow-up since they left the area, and 1 in the less than 1 500-g birth mass group died of meningitis during the first year.

## DISCUSSION

The infants abnormal at 1 week were relatively mature, with a high incidence of intra-uterine asphyxia and low 5-minute Apgar scores. One of them was small for gestational age. Convulsions were common in this group. Apathy syndrome was the most frequent type of abnormality, which is in keeping with reports in the literature.<sup>4</sup> The only infant with a hemisindrome was abnormal at 1 year, and all others who were abnormal at 1 year had been initially diagnosed as apathy syndrome. Only 1 infant of less than 1 500-g birth mass was abnormal at 1 year. This is in contrast with Niswander's<sup>5</sup> suggestion that low birth mass is the prime factor in subsequent neurological deficit. Three of the 7 infants who convulsed and were studied at 1 year were abnormal. This agrees with the findings of Brown *et al.*<sup>6</sup> that convulsions within the first 3 days of life carry a poor prognosis. Of the 7 infants who were grossly abnormal at 1 year, 4 had been breech deliveries.

Six of the 10 infants considered abnormal at 1 week were normal at 12 months, whereas 3 considered abnormal at 1 year were normal at 1 year. Similar findings have been reported in the literature,<sup>7,8</sup> giving rise to pessimism regarding the prognostic value of neurological assessment during the neonatal period. Two factors have been put forward to explain the favourable outcome after early abnormality. Acute perinatal stress may cause brain trauma without permanent damage. Secondly, it may be possible for the uninjured portions of the brain to

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TABLE I. NEUROLOGICAL ABNORMALITY AT 1 WEEK

Birth mass (g)	Delivery	Intra-uterine asphyxia	Apgar score		Neonatal complications	Syndrome
			1 min	5 min		
3 150	Caesarean section	Yes	1	2	Convulsions	Apathy
3 850	Caesarean section	No	2	4	Convulsions	Apathy
3 175*	Breech	Yes	1	2	Meconium aspiration, convulsions	Apathy
3 600*	Forceps	Yes	1	3	Convulsions	Hemi
3 850	Caesarean section	Yes	2	2	Meconium aspiration	Mixed
2 350	Caesarean section	Yes	1	6	Convulsions	Mixed
1 450	Breech	No	1	1	Hyaline membrane disease	Apathy
2 960	Vertex	Yes	1	1	Meconium aspiration	Hyper-excitability
2 450*	Breech	No	2	2	Convulsions	Apathy
2 180*	Vertex	Yes	1	8	Meconium aspiration	Apathy

\* Abnormal at 1 year — see Table III.

TABLE II. FOLLOW-UP OVER 1 YEAR

Total number of cases	126
Normal at 1 year	104
Abnormal at 1 year	7
Infant deaths	3
Lost to follow-up	12

present series were all appropriate for gestational age. The prevalence of breech deliveries must be stressed.

CONCLUSION

In the present series, approximately 6% of infants who suffered from asphyxia neonatorum were grossly neuro-

TABLE III. NEUROLOGICAL ABNORMALITY AT 1 YEAR

Birth mass (g)	Delivery	Intra-uterine asphyxia	Apgar score		Neonatal complication	Examination at 1 week
			1 min	5 min		
2 450	Breech	No	2	2	Convulsions	Abnormal
3 175	Breech	Yes	1	2	Convulsions, meconium aspiration	Abnormal
2 180	Vertex	Yes	1	8	Meconium aspiration	Abnormal
3 600	Forceps	Yes	1	3	Convulsions	Abnormal
2 100	Caesarean section	No	3	5	Nil	Normal
2 450	Twin breech	No	2	7	Nil	Normal
1 360	Breech	Yes	2	8	Nil	Normal

TABLE IV. HIGH-RISK FOLLOW-UP

Abnormal at 1 week	No.	10
Normal at 1 year		6
Abnormal at 1 year		4
Neonatal convulsions		9
Normal at 1 year		4
Abnormal at 1 year		3
Lost to follow-up		2
Less than 1 500 g birth mass		8
Infant death		1
Normal at 1 year		6
Abnormal at 1 year		1

reprogramme function, and to take over from damaged areas. An explanation of the later onset of abnormality is that chronic prenatal factors may cause permanent damage to the brain which may not be apparent in the early stages. However, the 3 infants in this group in the

logically abnormal at 1 year. Abnormality at 1 week does not necessarily imply an unfavourable outcome, neither does normality at this stage assure normal development. Convulsions in the first week of life are strongly associated with both early and late abnormality. There is a disproportionately high incidence of neurological sequelae in breech deliveries.

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