

## PREDICTION OF RESPIRATORY DISTRESS SYNDROME BY SHAKE TEST ON NEWBORN GASTRIC ASPIRATION

by

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Tremendous progress with regard to the knowledge of etiology, early prediction and management of respiratory distress syndrome (RDS) has been achieved in recent years. It is now possible to predict with relative certainty even before birth, those infants who are likely to develop RDS after birth. Most investigators now believe that the deficiency of surfactant in the premature lung is the primary etiological defect in the development of RDS. The surface active lecithin in the pulmonary secretion contributes to the amniotic fluid and so analysis of amniotic fluid surface-active lecithin content accurately reflects the degree of lung maturity. Several methods of amniotic fluid analysis have been proposed and found beneficial in predicting RDS in the newborn. Measuring actual lecithin content of amniotic fluid described by Bhagwanani *et al* (1972) and lecithin-sphingomyelin ratio of amniotic fluid described by Gluck *et al* (1971) is quite predictive, and no infant with a ratio above 2 will develop RDS. Sefton *et al* (1972) predicted RDS by determining lecithin-sphingomyelin ratios on gastric aspirates. In

General, the tests performed on gastric aspirate were in agreement with those previously performed on amniotic fluid. However, for the lecithin-sphingomyelin ratio skilled laboratory facilities are necessary, and in smaller hospitals these facilities may not be available. The ethanol shake test developed by Clement *et al* (1972) for use on amniotic fluid is also sufficiently reliable for prediction of RDS. Evans (1975) performed ethanol shake test on gastric aspiration of premature newborn infants as they swallow amniotic fluid in utero.

This paper deals with preliminary report of 'Ethanol Shake Test' done in 180 newborn infants.

### *Material and Method*

The 180 consecutive babies included in the study with birth weight from 1100 gm to 3400 gm were delivered in J.J. Hospital, Bombay in the months of August to November 1975. Gestational age varied from 30 weeks to 40 weeks. Out of 180 babies 9 were delivered by lower segment caesarean section (LSCS); 6 by low forceps application and 1 by vacuum extraction. One hundred and sixty-two babies delivered vaginally by vertex and 2 delivered by breech. Ethanol shake test for prediction of RDS was performed on gastric aspiration of all infants within 1 hour after birth. In 9 babies delivered by

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Caeserean section this test was also performed on amniotic fluid collected at the time of operation.

Gastric aspirates for the test were obtained by mucous catheter or rubber catheter connected to the syringe before one hour of age. A specimen less than 1 ml was considered inadequate. The specimen containing blood or meconium were discarded and hence were not included in this series, as it may give false positive results. Absolute alcohol 0.5 ml was added to 0.5 ml of gastric aspirate in a 4 ml glass test tube (88 mm by 12 mm). The test tube capped by the thumb was vigorously shaken for 15 seconds and allowed to stand for 15 minutes. The test was read as follows:

Negative — No bubbles.

- 1 + — Very small bubbles in one third or less of the meniscus.
- 2 + — Single rim of bubbles extending one third to all round the test tube.
- 3 + — Rim of bubbles all round the test tube with the double row in a small area.
- 4 + — Double row or more of bubbles all around the test tube.

#### Results and Discussion

The results of ethanol shake test in relation to respiratory distress syndrome are analysed according to the birth weight of the infants. (Table I). On the basis of the test the infants are divided into three groups, those with adequate surfactant showing 2 + or higher, borderline surfactant showing 1 + and inadequate surfactant showing a negative test. Table I shows that out of 180 infants, the test was negative in

TABLE I  
Results of Shake Test to Respiratory Distress Syndrome and Birth Weight of Infants

Birth weight in gms.	No. of infants	Test strongly positive			Test 1 +			Test Negative		
		No. of infants	No. with RDS	No. of Deaths	No. of infants	No. with RDS	No. of Deaths	No. of infants	No. with RDS	No. of Deaths
1	2	3	4	5	6	7	8	9	10	11
< 1500	3	2	Nil	Nil	1	Nil	Nil	Nil	Nil	Nil
1500 to 2000 gms.	11	7	Nil	1	2	Nil	Nil	2	2	2
2000 to 2500 gms.	61	48	Nil	Nil	12	Nil	1	1	Nil	Nil
> 2500 gm.	105	98	Nil	Nil	6	Nil	Nil	1	Nil	Nil
Total	180	155	Nil	1	21	Nil	1	4	2	2

4 infants and out of these 4 infants, 2 developed respiratory distress syndrome and died. Postmortem examination confirmed the diagnosis of RDS. One of the infants weighing 1.8 kg. was delivered by lower segment caesarian section at 34 weeks of gestation for previous caesarean section and suspected disruption of scar. Apgar score after birth was 5. The shake test was negative for gastric aspirate but positive in undiluted amniotic fluid and negative in dilution. Postmortem examination showed non-expansion of the lungs. Second infant weighing 1.5 kg was delivered by breech as a second twin with 5 apgar score after birth and shake test was negative. The baby died of RDS 4 hours after birth. Postmortem showed atelectasis of the lungs. While first of the twins who survived (weighing 2.1 kg) had 1 + positive test and had no signs of RDS.

Twenty-one infants of all weights showed 1 + test; there was no incidence of RDS but 1 baby died of sclerema on 10th day. Baby weight was 2.3 kg. and apgar score was 10 at birth. Infants with adequate surfactant showed by strongly positive tests were 155 in this series. There was no incidence of RDS in this group, but one infant weighing 1.6 kg. delivered by breech died of sclerema on 10th day. In Evan's series of 160 premature infants, the incidence and of RDS with 1 + and negative test was 61 per cent as compared to 4.8 per cent in the positive group. In this series incidence of RDS in premature infants with 1 + and negative test is 11.1 per cent as compared to zero per cent in strongly positive group. However, the series presented is small and no statistically significant conclusion can be drawn at present. In this study results of the shake test were not used for the pro-

phylactic management of RDS. The present preliminary study was undertaken to show that prediction of RDS by shake test on newborn gastric aspirate is sufficiently reliable. Although the errors in prediction of the RDS are much more frequent, errors were in the direction of safety for the infants as compared to the predictive errors for the lecithin-sphingomyelin ratio. These have been in the opposite direction as shown by Lemon *et al* (1973).

#### *Summary and Conclusion*

(1) The shake test was performed on 180 newborn gastric aspirates. Out of 4 infants showing negative test, 2 developed RDS. There was no incidence of RDS, when the test was positive.

(2) This is rapid method of predicting RDS and simple enough to be performed in small hospitals where specialized laboratory facilities are not available. This will help in transferring the infants having deficient surfactant to intensive care unit for appropriate treatment, thus reducing neonatal mortality.

(3) On the basis of our limited experience we conclude that this test is sufficiently reliable and informative to merit extensive clinical trial.

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