

ARBORIZATION TEST IN THE DIAGNOSIS OF RUPTURED MEMBRANES

by

URMILA GUPTA*, M.S. and UMA SACHAN,** M.S.

Diagnosis of ruptured membranes has got an important bearing in obstetrics as cases may come in various stages of pregnancy and labour with a history of watery discharge per vaginam. In most of the cases the diagnosis of leaking membranes is obvious, either by history or by examination; however, in some cases the findings are inconclusive. The decision regarding hospitalisation, antibiotics and various operative procedures depends upon the condition of the membranes. It also affects maternal and foetal morbidity and mortality.

The above facts clearly indicate the need for a reliable and simple test for the diagnosis of ruptured membranes. Various authors have put forward different methods. Gold (1927) suggested the use of litmus paper. Temesvary (1933) advocated the use of filter paper sticks soaked in 0.2 per cent of alcohol-bromothymol blue solution, which changes green in the presence of amniotic fluid. The use of nitrazine paper was introduced by Baptisti (1938).

Cyodiagnosis of ruptured membranes has been suggested by Philipp

(1929) which is based on the recognition of lanugo hair, while Langreder (1952) suggested staining the suspected discharge with methylene blue for the recognition of foetal epithelial cells in the amniotic fluid.

Papanicolaou (1946) described the fern phenomenon or arborization test in dried cervical mucus. Subsequently, this phenomenon was reproduced in almost all body fluids. Kardos and Tamasi (1955) first observed the fern phenomenon in amniotic fluid and described its utility in the diagnosis of ruptured membranes. In the present study the same arborization test has been re-evaluated.

Material and Methods

The cases for the present study were taken from the outpatient department and indoor admissions of U.I.S.E. Maternity Hospital, Kanpur, from 1.3.68 to 31.8.68. In all, 200 cases were studied.

A drop of fluid was taken from the vagina, avoiding contact with the cervix to prevent false positive results. It was placed on a glass slide and was allowed to dry. Then it was examined under low power with maximal lowering of the condenser diaphragm.

The patients were divided into the following groups:

*Reader in Obst. & Gynec.

**Lecturer in Obst. & Gynec.

G. S. V. M. Medical College, Kanpur.

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childhood results from environmental factors after birth, common both to the mother and the baby, and not the maternal anaemia in the antenatal period. There is only one criticism of the observation that the recovery of iron stores in anaemic patients following oral iron is not as satisfactory as following total dose infusion. Therefore, in a community like Jamaica where the diet is poor in iron content, improving the maternal iron status in the antenatal period may protect the foetus from developing the anaemia of the late infancy and childhood. Only a long term follow-up of these babies will provide a definite answer.

Summary

Cord blood samples were collected soon after delivery of normal non-anaemic mothers and those who developed anaemia in the antenatal period but were successfully treated with Iron-Dextran Complex given as total dose infusion.

The two groups comprised of 25 patients each, matched for age and parity. Various haematological determinations made failed to reveal any significant difference in the two groups. A suggestion is made that in spite of this, the babies of treated mothers may have better iron stores and thus be less prone to developing anaemia of late infancy.

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Group 'A' (as control):

Fifty cases—where it was definite that the membranes had ruptured either spontaneously or artificially.

Group 'B' (as control):

Twenty-five cases at different stages of gestation with intact membranes. Out of these, twenty-one cases were in the first stage of labour and the remaining four were in the later weeks of gestation.

Group 'C' (as control)

Cervical smear was studied in twenty-five cases in the third trimester of pregnancy, provided they were not in labour.

Group 'D' (experimental group)

Hundred cases were taken in this group, who complained of leaking of fluid per vaginam.

Observations

Specimens were obtained from two hundred pregnant women at various period of gestation. Out of these, hundred cases were taken as control, subdivided into three groups A, B and C. The remaining hundred cases were the actual study group labelled as group 'D'.

*Control Groups**Group 'A'*

In this group all the fifty cases were known to have ruptured the membranes either spontaneously or artificially. (Table I).

Forty-nine (98%) out of these fifty cases showed positive ferning, whereas in one (2%) case the test was negative. In this particular case the smear was heavily meconium stained.

TABLE I
Arborization after artificial or spontaneous rupture of membranes

Time elapsed between rupture of membrane and taking of specimen	Length of gestation in weeks			
	Positive		Negative	
Time in hours	28-32	33-36	37-40	33-36 weeks
$\frac{1}{2}$	-	-	10	-
$\frac{1}{2}$ -1	-	1	6	-
1-2	1	2	3	-
2-3	-	-	8	-
3-4	-	1	2	-
4-8	-	-	7	-
8-12	-	-	3	-
12-24	-	-	4	-
24-28	-	-	1	1
	1	4	44	1

Group 'B'

Twenty-five cases were studied at different stages of gestation with intact membranes. Out of these, twenty-one cases were in the first stage of labour and the remaining four were in last trimester of pregnancy.

Twenty-three (92%) cases had a negative smear and the other two (8%) showed fern phenomenon.

Group 'C'

This included twenty-five cases. All of them were in the last trimester of pregnancy but not in labour. In these cases cervical smears did not show any ferning.

Group 'D' (study group)

Specimens were obtained from hundred cases who complained of leaking of fluid per vaginam. In seventy-eight cases there was ferning (fig. 1), whereas in twenty-two cases there was no ferning. Later on

it was confirmed that all these seventy-eight cases had leaking due to ruptured membranes. Out of twenty-two negative smears, sixteen cases had intact membranes while six cases had ruptured membranes. Out of these six, four cases had excessive show. In the remaining two cases the smear was apparently normal.

Discussion

The crystallization phenomenon, as described by Zondek (1954), depends primarily on the relative concentration of electrolytes, proteins and hydrocarbons, the most essential component being sodium chloride. Crystallization of amniotic fluid was shown by Volet (1959) as early as in the ninth week of gestation.

The findings of positive ferning in 98 per cent of cases known to have ruptured membranes (group A) in the present study confirms the observations of other authors (Kardos and Tamasi, 1955; Kovacs, 1962; Anjaneyulu and Likhite, 1967).

In the present study, a false positive result was obtained in two cases (8 per cent of group B). The factors giving false positive and false negative results are cervical mucus, blood and presence of meconium.

Temesvary (1933), Pierce (1955) and Zondek *et al* (1955) showed that cervical mucus does not usually show crystallisation during pregnancy. Roland (1958) used this fact as an aid in the diagnosis of pregnancy. However, all these authors have shown a small percentage of cases with slight crystallization of cervical mucus during pregnancy, mainly in the first trimester of pregnancy with a high incidence of abor-

tions. Zondek *et al* (1955) showed 11.5% with slight crystallization in the first trimester and 2.5% with slight crystallization in the second and the third trimesters. A positive cervical smear could be due to the admixture of amniotic fluid with cervical mucus or cervical mucus itself may be responsible for a false positive result in cases of progesterone deficiency. But in our study none of the cases showed positive cervical smears (group C) for ferning. This is perhaps due to the fact that all the cases were in the third trimester of pregnancy and it is in this trimester that we are concerned much about the diagnosis of ruptured membranes. Further, cervical mucus forms a heavy dark and wide arborization pattern in contrast to the thin delicate and discrete pattern of amniotic fluid ferning. This may be of help in differentiating the positive smear due to leaking membranes and the presence of cervical mucus.

Presence of blood in the vagina may obscure the presence of crystallization phenomenon and give rise to a false negative result. However, it is not associated with all the cases and a repeated smear study can overcome this difficulty.

The difficulty of false negative smear due to presence of meconium is overcome by the fact that its presence itself confirms the diagnosis of ruptured membranes.

However, in the group of cases with leaking membranes, the results are variable. Sixteen cases with intact membranes were all negative for arborization test (100 per cent). In eighty-four cases with ruptured membranes the test was positive in

all (92.86%) except in six (7.14%) cases. A comparative analysis with other authors has been done in Table II.

TABLE II
Showing the comparative data given by various authors

Name of authors	No. of cases	Positive test (per cent)	Negative test (per cent)
Smith and Callagan (1962)	509	98	2
Kovacs (1962)	224	96.3	3.7
Tricomi et al (1966)	233	95.2	4.8
Anjaneyulu et al (1967)	66	86.6	13.4
Present series	84	92.86	7.14

As shown in Table II it is evident that the figures of the present study are a little lower than those of Smith and Callagan (1962), Kovacs (1962) and Tricomi *et al* (1966), but are higher than those of Anjaneyulu *et al* (1967).

Summary & Conclusions

1. Vaginal fluid from 100 cases was studied for the fern phenomenon of amniotic fluid with a control series of 100 cases.

2. The test was positive in 92.86% of cases with ruptured membranes and negative in 100% of cases with intact membranes.

3. The complicating factors like cervical mucus, blood and meconium are discussed.

4. It is concluded that the vaginal smear arborization test is simple, highly accurate, useful and economic in the diagnosis of ruptured membranes.

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See Fig. on Art Paper III