

## ARBORIZATION TEST OF AMNIOTIC FLUID

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It is not uncommon to encounter pregnant women presenting with the history of leaking membrane while physical findings do not verify the same. The correct diagnosis of these ruptured membranes is important for the outcome of labour. It not only affects the hospitalization and treatment but also the maternal and foetal morbidity and mortality. It is, therefore, essential to have some reliable test for the diagnosis of ruptured membrane.

Different methods have been described by various authors. Gold (1927) suggested the use of litmus paper sticks soaked in 0.2% alcohol bromthymos blue solution, which changes to green in the presence of amniotic fluid. Baptisti (1938), introduced the use of Nitrazine paper. Phillip and William (1929), first described the presence of lanugo hairs in the vaginal secretion as an evidence of ruptured membranes. Papanicolaou (1946), was the first person to describe the fern phenomenon or arborization test in dried cervical mucus. Subsequently, this phenomenon was described in all the body fluids. Kardos and Tamasi (1955), first observed this phenomenon and described its utility in the diagnosis of ruptured membrane. Kittrich (1963) in-

troduced use of Nile Blue test for the diagnosis of ruptured membrane. At present arborization test is considered to be the most reliable test as compared to others.

### *Material and Method*

The following study has been undertaken from the indoor patients of the J.L.N. Medical College and Hospital, Ajmer. In all 200 cases have been examined. A drop of fluid was taken from the vagina, avoiding contact with the cervix to prevent false positive results. It was allowed to dry on a glass slide. These Slides were examined for the identification of fern pattern under the microscope.

The patients have been divided in the following groups:

*Group A:* Fifty cases of known ruptured membranes were examined. Artificial rupture of membranes was done for some indication in few of these cases.

*Group B:* Fifty cases of gestational age of 36 to 40 weeks with intact membranes were taken as control. A few of them were in first stage of labour.

*Group C:* Hundred cases with the history of leaking of fluid per vaginum were taken as study group.

### *Observations*

*Group A:* All the fifty cases of known ruptured membrane exhibited fern pat-

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tern in the smears. The amniotic fluid showed any one or all the three stages of ferning.

**Group B:** None of the fifty cases showed the fern phenomenon. The smears in these cases showed vaginal epithelial cells and debris.

**Group C:** Out of 100 cases admitted with history of leaking membranes, 80 were subsequently found to have ruptured membranes and 20 with intact membranes. Fern pattern was observed in 74 cases (92.5%) with ruptured membranes and 12 (60%) with intact membranes. Six (7.5%) patients with ruptured membranes did not show the fern pattern.

TABLE I  
Results in 100 Cases of Leaking Membranes

	No. of Cases	Membrane Absent	Membrane Present
Fern Test (+)	86	74	12
Fern Test (—)	14	6	8

TABLE II  
Comparative Evaluation of the Results of Arborization Test

Name of Author	No. of Cases	Fern positive Ruptured Membranes	Intact Membranes
Smith & Callagan	509	98%	2%
Kovacs	224	96.3%	3.2%
Tricomi	233	95.2%	4.4%
Anjaneyulu & Likhite	100	86.6%	87.5%
Present Series	100	92.5%	60%

#### Discussion

The Crystallization phenomenon depends primarily on the relative concentration of electrolytes protein and hydrocarbon, the most essential component being sodium chloride.

The finding of ferning in all the fifty (100%) cases of known ruptured membrane (Group A) confirm the observation

of other authors Kardos and Tamasi, 1955, Kovacs, 1962, Anjaneyulu and Likhite, 1967.

A vaginal smear either during pregnancy or labour in patients with intact membranes rarely gives a positive fern pattern. Occasionally it is possible that contamination with cervical mucus could be responsible for a false positive crystallization test during pregnancy. This can be identified by the type of fern pattern. Cervical mucus forms a heavy dark and wide arborization pattern whereas with amniotic fluid the pattern is thin, delicate and discrete. Zondek *et al* (1955) showed 11.5% of his cases with slight crystallization of cervical mucus in the first trimester and 35% in second and third trimester. In our control group of 50 cases with intact membranes the vaginal smear did not show any fern pattern. This is perhaps due to the fact that all the cases were in third trimester of pregnancy and it is in this trimester that we are concerned much about the diagnosis of ruptured membrane.

However, in our group of cases with leaking membranes, the results are variable. Out of 80 cases with ruptured membrane the test was positive in 74 (92.5%) whereas it was positive in 98% in Smith and Callagan, 96.3% in Kovacs and 95.2% in Tricomi *et al* Series. In 20 cases with intact membranes, the arborization phenomenon was observed in 12

(60%); whereas a positive test was found in only 2% of cases of Smith and Callagan, 3.12% in Kovacs and 4.4% in Tricomi *et al* Series. The positive test is not due to contamination with cervical mucus as due care was taken to obtain the smears from vagina at or around introitus. It is however, as Kovacs pointed out for all practical purposes crystallization in the vaginal smear during II and III trimesters of pregnancy is diagnostic evidence of ruptured membrane.

Presence of blood and meconium in the vagina may obscure the presence of crystallization and result in a false negative test. This occurred in 6 of our cases of ruptured membranes group. Smith and Callagan (1962) have shown a loss of arborization where proportion of amniotic fluid to venous blood, serum or oxalated blood was less than 10:1. However, this error is not of much clinical significance as the presence of meconium itself is diagnostic of membrane rupture.

As compared with the test described earlier to detect ruptured membranes, the crystallization test is more accurate. In Tricomi *et al* (1966) series the arborization test gave false negative result in only 4.8% of cases whereas the PH test using nitrazine paper gave 12.7% false negative. Apart from being more accurate this test is also simple and cheap to perform. Other tests require costly laboratory equipment and are more time consuming.

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

#### Summary

1. Vaginal fluid from 100 cases of leaking membranes was studied for fern test of amniotic fluid with a control series of 100 cases.

2. All the 50 cases of known ruptured membranes exhibited fern phenomenon.

3. All the 50 cases in the gestational age of 36 weeks to 40 weeks with intact membranes did not show this phenomenon.

4. In 100 cases with history of leaking membranes the test was positive in 86 cases showing ruptured membranes in 80 while the membrane was intact in 6 cases. Six cases of ruptured membranes gave a false negative test while 6 cases of intact membranes gave a false positive test.

5. As the test is reliable, economic and easy to perform, it is recommended in the diagnosis of ruptured membranes.

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