

A STUDY OF CERVICAL MUCUS AND POSTCOITAL TEST IN INFERTILITY CASES

by

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Physicians are often faced with a paradox, during study of infertility cases, that there are a number of couples where both partners meet all the accepted standards of fertility and still conception does not occur. In these cases it has been observed that there may be certain cervical factors due to which even normal looking cervix may be hostile to spermatozoa.

Ovulation and time of ovulation are very important in management of sterility. Cervical mucus study is one of the methods which can be used to diagnose ovulation and ovulation time conveniently in routine out-door practice. Sims (1959) Hunner (1929) post-coital test is a useful method to find out viability of spermatozoa in cervical mucus.

Material and Method

The present study is based on ninety-seven cases of both primary and secondary sterility in patients attending the out-patient department of the State Znanana Hospital, Jaipur. The criteria for selecting cases were:

- (i) No conception for two or more years without contraception.
- (ii) Couples were in "Fertile Phase".
- (iii) No cause for the sterility either in the form of general ill-health or local pelvic diseases.
- (iv) Regular menstrual cycles of 25 to 40 days.
- (v) Husbands' semen counts were within normal limits.

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Cervical mucus study was started from 7th or 8th day of menstrual cycle and then every alternate day till the time of ovulation; at that time post-coital test was performed and then repeated on 21st or 22nd day. If the investigations were unsatisfactory, same tests were repeated in next menstrual cycle.

For collection of cervical mucus a glass cannula with tapering end attached to 10 C.C. record syringe by means of rubber tubing was used. Mucus was aspirated from endocervix and blown over a dry glass slide. Following points were noted:

- (i) Quantity: Scanty, fair or copious.
- (ii) Viscosity: Thick, thin or moderate.
- (iii) Transparency: Opaque or transparent.
- (iv) Reaction: Alkaline or acidic.
- (v) Spinnbarkeit: It was measured in centimeters.

Microscopic Examination

The mucus was thickly spread over a glass slide and examined under H.P. of microscope for pus cells, epithelial cells and R.B.C.

Arborizations

It was graded as follows:

- Negative: No P.L. reaction.
Atypical: P.L. reaction in atypical pattern.
+ P.L.: Sparse P.L. reaction.
++ P.L.: P.L. reaction spread over most of slide.
+++ P.L.: Dense P.L. reaction spread all over slide.

Sims-Huhner Post-Coital test (P.C.T.)

The test was performed at mid cycle, i.e. on 11th or 12th day. If the first test was negative it was repeated on 13th or 15th day of the same cycle; on repetition if still negative it was performed on 12th, 14th and 16th day of next menstrual cycle.

Test was done 6 to 12 hours after coitus after abstinence for five days. Samples were taken from three place:

- (i) Posterior fornix of vagina.
- (ii) External os (lower cervical plug).
- (iii) Internal os (upper cervical plug).

Samples were examined under H.P. of microscope—Results were interpreted as follows:

Negative—No spermatozoa.

Poor—Presence of non-motile spermatozoa only.

Fair—1 to 5 spermatozoa/H.P.F. with satisfactory forward motion.

Good—6 to 20 spermatozoa/H.P.F. with satisfactory forward motion.

Excellent—More than 20 spermatozoa/H.P.F. with satisfactory forward motion.

Endometrial Biopsy

Taken in same cycle to compare the result with that of arborization test.

Observations

Ninety-seven cases of both primary and secondary sterility were studied. Age group was 18 to 35 years. 39.1% were married before they reached the age of 15 years and the rest between 16 to 25 years. Age of menarche varied between 11 to 17 years. In 28.5% cases it was 14 years.

Duration of sterility ranged between 2-19 years but in maximum number of cases (30.9%) duration was of 7-10 years.

Cervical Mucus Study

(a) Quantity:—Quantity gradually increased to its maximum from immediate postmenstrual to midmenstrual period and then again diminished in premenstrual phase. Refer Table 1.

Viscosity

In maximum number of cases, viscosity was found to be thick in postmenstrual and premenstrual phases and thin in midmenstrual phase. In 19.6% cases it remained thin in premenstrual phase. The cycles in these cases were anovulatory (Table II).

TABLE I
Quantity of Cervical Mucus

Menstrual Phase			Scanty%	Fair%	Copious%
Postmenstrual	..	..	50.5	38	11.4
Midmenstrual	..	..	10.3	43.3	46.4
Premenstrual	..	..	73.2	22.7	4.1

TABLE II
Viscosity of Cervical Mucus

Menstrual Phase	Cervical Mucus		
	Thin%	Thick%	Moderate%
Postmenstrual	25	62.9	11.3
Midmenstrual	67	18.6	14.4
Premenstrual	19.6	70.1	10.3

Spinnbarkeit

It gradually increased in length from postmenstrual phase to maximum of 6-20 cms. in midmenstrual phase and then gradually diminished in premenstrual phase (Table III).

Spinnbarkeit was maximum when mucus was clear, thin and copious with + P.L. reaction and relative acellularity. pH:—In all cases was alkaline.

Arborization

P.L. reaction was found to appear between 7th to 10th days of menstrual cycle and it gradually increased in intensity till time of ovulation and on 21st or 22nd day it disappeared (Table IV).

In 36 cases + P.L. reaction persisted in premenstrual phase while in 4 cases it remained cellular throughout the cycle. In 2 cases, in one due to blood in cervical mucus and in the other due to early menstruation, samples could not be obtained.

Cells

Cells were minimum in copious watery

mucus and in these cases results of P.C.T. were better.

Sims-Huhner Post-Coital Test

It was noted that results of post coital test were good or excellent when endocervical mucus was copious, thin, with maximum spinnbarkeit, +++ P.L. reaction and relative acellularity (Table V).

In 62 cases test was positive at the first examination. In 20 cases P.C.T. was positive after repeated examination, showing the need for performing the test repeatedly at least in two subsequent cycles.

Posterior Vaginal Pool

In 31 cases of + post coital test no spermatozoa were found in posterior fornix.

Endometrial Biopsy

The biopsy could be taken only in 94 cases as two cases had early menstruation and in one case there was cervical stenosis. The correlation of the endometrial biopsy report with fern test is shown in (Table VI).

TABLE III
Spinnbarkeit

Length in Cms			Postmenstrual%	Midmenstrual%	Premenstrual%
0 — 5	Cms.	.. ..	78.4	23.7	83.4
6 — 10	Cms.	.. ..	13.4	35.0	10.3
11 — 15	Cms.	.. ..	4.1	24.7	4.1
16 — 20	Cms.	.. ..	4.1	16.7	2.1

TABLE IV
P. L. Test

Arborization	Postmenstrual	Midmenstrual	Premenstrual
+P. L.	20	12	59
+P. L.	18	Nil	
++P. L.	16	3	36
+++P. L.	41	82	
Sample not obtained	2	Nil	

TABLE V
Post Coital Test in Correlation with properties of Cervical Mucus

P.C.T.	Quantity.		Viscosity.		Spinbarkeit in Cms.					Arborization.					Cells.						
	No. of cases.	Fair. Copious.	Thick.	Thin. atc	0-5	6-10	11-15	16-20	—	+	++	+++	-	+		++	+++	++++			
Negative.	10	4	5	1	8	2	Nil	7	3	Nil	Nil	5	1	2	2	Nil	5	3	Nil	2	
Poor.	5	2	2	1	3	2	Nil	4	1	Nil	Nil	2	Nil	Nil	3	Nil	2	3	Nil	Nil	Nil
Fair.	25	2	15	8	3	17	15	7	8	6	4	4	Nil	5	16	1	5	14	4	1	1
Good.	32	1	12	19	3	27	2	6	10	10	6	3	Nil	1	28	4	13	14	1	Nil	Nil
Excellent.	25	Nil	13	12	Nil	21	4	3	11	7	4	3	Nil	1	21	3	13	7	1	1	1

TABLE VI
Correlation of Endometrial Biopsy and Fern Test

Type of cycle shown by endometrial biopsy	No. of cases	Type of cycle shown by cervical smear	Suggestive %	Not suggestive %
Anovulatory	73.1	26.9
Ovulatory {	..	Mixed reaction	69.1	30.9
		Secretory reaction	100	....
Total	..	93	78.5	21.5

Note.—One case of tubercular endometritis excluded from the table.

Discussion

In the present study it was found that cervical mucus undergoes cyclic changes in its quantity, viscosity, spinnbarkeit, cellular content, and arborization pattern which can indicate ovulation, ovulation time and physiological function of the cervix regarding fertility.

Pommerenke and Viergiver (1946), Marcus and Marcus (1963) found a great difference in quantity of cervical mucus during various phases of menstrual cycle. Irving (1939) found outpouring of cervical mucus during ovulation time. In this study in the postmenstrual and premenstrual phases it was scanty in 50.5% and 73.2% cases respectively while it was copious in midmenstrual phase in 89.7% cases. In 26 cases it was fair to copious in premenstrual phase, out of these 19 were anovulatory cycles.

Cervical mucus was thick in postmenstrual and premenstrual phases in 62.9% and 70.1% cases respectively while during midmenstrual phase it was thin in 81.4% Bergman (1953) also described midmenstrual phase as "Water Phase". Nineteen cases had thin mucus in premenstrual phase and in these cases cycles were anovulatory.

According to Clift there was definite relationship between quantity, viscosity and spinnbarkeit of cervical mucus and longevity of spermatozoa; our studies corroborate his findings. In their series Irving and Bernhard (1958) found that spinnbarkeit varied from 0 to 1 cms. in postmenstrual and premenstrual phases to 10 to 20 cms. in midmenstrual phase.

pH was alkaline in all the cases. Mazer and Israel (1951) also failed to find acidic pH of cervical mucus as a cause of sterility. Barton and Weisner (1944) also did not find acidic reaction to usual indicators.

Numerous writers like Pappanicolaou (1952), Rydberg (1952), Forman (1957), Chinoy and Jungalwala (1963) suggested that fern pattern of cervical mucus appears on 7th or 8th day, becomes maximum between 12th to 14th day and disappears on 21st or 22nd day of menstrual cycle. In the present series of cases it was maximum in intensity at the time of ovulation and disappeared in premenstrual phase while it persisted in cases where the cycles were anovulatory, as later confirmed by endometrial biopsy.

Cervical mucus showed more intense P.L. reaction in the samples taken a day or two earlier than at the time of post-coital test. This confirms the findings of Ullery (1959) that serum semen and blood inhibit arborization. As stated by Ullery and Shabanah (1959), in present series also the presence of cervicitis did not affect the dependability of cervical smear.

Number of cells diminished at the time of ovulation. According to Marcus and Marcus (1963) ovulatory mucus should be free of leucocytes. In Grants (1958) study, cases having negative P.C.T., 70% cases had leucocytes, and only in 30% mucus was clear. In presence of +++ P.L. reaction, results of P.C.T. were good or excellent in 70% cases; while in presence of cellular reaction it was positive in only 35.2% cases. Campos da Paz (1951) also found that + P.L. reaction favoured spermatozoa penetration while cellular element and absence of fern are unfavourable.

Sims-Huhner's test was performed 6-12 hours after coitus as it allowed optimum time for survival of spermatozoa. In 62 cases first test showed positive results but in 20 cases repeated tests were required to obtain positive results. Barton and Wiesner (1946) also found that cervix is temporarily barred to spermatozoa

because of absence of suitable mucus which may correct itself in subsequent cycles.

It was found that results of P.C.T. were better when mucus was thin and copious. According to Clift (1951) and Irving (1939) there is definite relationship between viscosity of cervical mucus and spermatozoal penetrability. In presence of thin mucus, 65 cases had positive post-coital test, while in thick mucus only 17 cases had positive test, but in 6 cases in presence of thick mucus P.C.T. was positive. Barton and Wiesner (1946) also found that invasion by spermatozoa in some cases may occur even in imperfect mucus.

Results of endometrial biopsy correlated with the results of arborization test in 80.5% cases of ovulatory cycles and 73% of anovulatory cycles. Roland (1952) Chinoy and Jungalwala (1963) found accuracy of this test in 81% cases while in the present study it was 78.5%

Incidence of cervical factor was found to be 15.5% and of cervical hostility 7.2%. Incidence of cervical factors recorded by Broca (1956) and Palmer (1956), Mazer and Israel (1951) and Warner and Steinberg (1956) was 33%, 22%, 26% and 46% respectively. Incidence of cervical hostility varied from 2.5% of Mazers and Israel to 24% of Warner Steinberg. The lower incidence of cervical factors in this series as compared to other workers is due to difference of criteria for considering positive P.C.T.

Summary and Conclusions

Ninety-seven cases of primary and secondary sterility were studied. Cervical mucus study throughout menstrual cycle is a good guide to diagnose type of cycle and ovulation time.

Arborization test can be used for diagnosis of faulty cervical mucus in infertili-

ty cases. The results of fern test, post coital test and semen analysis can be a guide to the cause of infertility.

Cervical factor was found in 15.5 per cent cases and cervical hostility in 7.1 per cent cases, showing that healthy cervix and normal mucus may not be performing its physiological function properly.

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