

# SOME STUDIES ON UROCYTOGRAM IN NORMAL MENSTRUAL CYCLE, NORMAL PREGNANCY AND THREATENED AND COMPLETE ABORTION CASES

by

SARLA BENAWRI\*, M.S.

and

PUSHPA KAWATHEKAR\*\*, M.B.B.S.

Squamous epithelium of the vagina and the cervix was found, in rodents, to undergo cyclic changes under the influences controlling the menstrual cycle and pregnancy. Moran (1889), Retterer (1892), Lataste (1892) and Stockard and Papanicolaou (1917) deserve special mention in this context. Dierks (1927) reported somewhat similar observations on the human vaginal epithelium. Papanicolaou (1933) described cyclic changes in the cells found in vaginal fluid.

Numerous studies on vaginal smear cytology have been carried out all the world over and its significance and utility have been established. The changes in vaginal cytology in menstrual cycle, in oestrogen therapy and in menopause are firmly established.

Solomon et al (1958) reported that cells from urinary sediment show changes similar to vaginal epithelial cells under hormonal influences, because the epithelium of the vagina, urethra and the trigone of urinary bladder are all derived from the urogenital sinus. He argued that further studies on cytology of urinary

sediment may be useful since they can be carried out with greater ease and repeated any number of times in pregnant women and even in young unmarried girls. It is also better than vaginal smear study where blood sometimes obscures the picture. They concluded that pregnant women having more of eosinophilic cells (more mature or abnormal cells) in their urinary sediment smear are more likely to abort. Pierce and Cope (1954) and Pierce (1957) had noted similar changes in vaginal cytology of women going in for abortion.

Di Paola and Usubiaga (1958) used the study of smears from urinary sediment (Urocytogram) for control of threatened abortion. They reported that in normal pregnancy urocytogram is predominantly of basophils and the acidophils are only about 5 per cent during the first two months and still less (0.6 per cent) by the end of gestation. They concluded that an increase in the acidophil percentage indicates hormonal (progesterone) deficiency, and a large rise, especially if stilboestrol has been given to the patient, is diagnostic of ovular death. These authors collected the voided urine of the subjects, centrifuged it and made smears of the deposit on glass slides. The smears were then dried and stained.

\* Reader in Obstetrics & Gynaecology.

\*\* Demonstrator, Department of Obstetrics & Gynaecology, G. R. Medical College, Gwalior.

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### Material and Methods

In view of these findings authors undertook study of urocytogram of—

- (1) 11 young women in different phases of menstrual cycle,
- (2) 40 cases of normal pregnancy (8th to 36th weeks),
- (3) 20 cases of threatened abortion who recovered under progesterone therapy, and
- (4) 4 cases of threatened abortion who, in spite of progesterone therapy, ended in complete abortion.

In all these subjects voided urine was collected for study.

In 5 subjects with normal pregnancy (in addition to the 40 cases mentioned above) catheter specimen of urine was used for the study. In these cases the cellular content of the deposit was very meagre and in the smears a total of only 17 to 26 cells were encountered. In voided urine smears, 100 cells were counted in each smear. The percentage of basophilic and eosinophilic cells was recorded in each case. The smears were stained with Leishman's stain.

### Observations

**Group 1.** In the first group there were 11 young women varying in age from 15 to 35 years. None of them was pregnant. In each case voided urine was collected in three different phases in a menstrual cycle and the smears of sediments stained and examined for differential cell count.

Table 1 gives particulars of the 11 subjects in whom urocytogram studies were carried out in normal menstrual cycle.

TABLE 1

Subject No.	Age in years	Age at menarche	Menstrual history
1	20	14	3-4 days
2	19	13	30 3-4 days
3	22	14	28 3-4 days
4	24	12	25-26 6-7 days
5	19	13	30 5-6 days
6	17	13	30 5 days
7	35 (5th para)	12	26-28 5 days
8	28	13	30 2-3 days
9	15	13	20-25 4-5 days
10	25	12	30 3-4 days
11	23	13	30 5 days
			28 days

Only one of these subjects had borne children, all the others were nulliparous, either single or recently married.

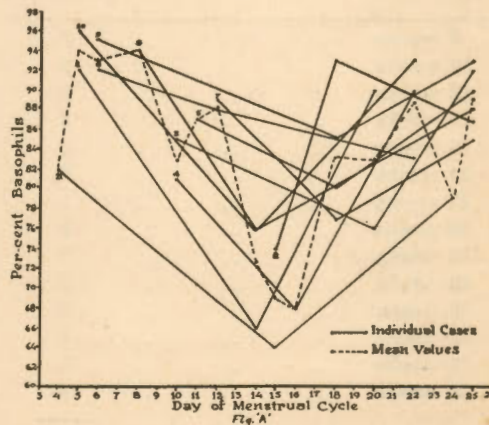


Figure A represents the results of

urocytogram studies of these 11 subjects graphically. Continuous lines represent the findings in the individual subjects. Broken line represents the average values.

In all subjects, except the second, we find that the basophil count is high at the beginning and towards the end of the menstrual cycle and shows a fall towards the middle of the cycle (12th to 20th day). In case No. 2, the first urocytogram was on 15th day of the cycle when the basophil percent was lowest. It rose on 18th and 25th days.

In the broken curve representing average figures we find that lowest basophil counts are encountered on 15th and 16th days of the cycle.

*Group 2.* In this case urocytogram studies were carried out on 40 women with normal pregnancies who attended the ante-natal clinic of the hospital.

Table 2 shows the distribution of these subjects according to the period of gestation at the time of study.

TABLE 2

Period of gestation	Number of subjects
8 weeks .. .. .	1
10 weeks .. .. .	3
12 weeks .. .. .	6
16 weeks .. .. .	2
18 weeks .. .. .	2
20 weeks .. .. .	3
22 weeks .. .. .	1
24 weeks .. .. .	5
26 weeks .. .. .	1
28 weeks .. .. .	3
30 weeks .. .. .	3
32 weeks .. .. .	4
34 weeks .. .. .	2
36 weeks .. .. .	4
Total .. .. .	40

Table 3 gives the age distribution of these 40 subjects and Table 4 gives their distribution according to parity.

TABLE 3

Age group	Number of subjects
15-19 years .. .. .	10
20-24 years .. .. .	14
25-29 years .. .. .	9
30-34 years .. .. .	4
35-39 years .. .. .	2
40 years and over .. .. .	1 (40 years)
Total .. .. .	40

TABLE 4

Parity	Number of subjects
Zero para .. .. .	5
One para .. .. .	4
Two para .. .. .	5
Three para .. .. .	5
Four para .. .. .	8
Five para .. .. .	5
Six para .. .. .	3
Seven para .. .. .	1
Eight para .. .. .	2
Nine para .. .. .	2
Ten or more para .. .. .	0
Total .. .. .	40

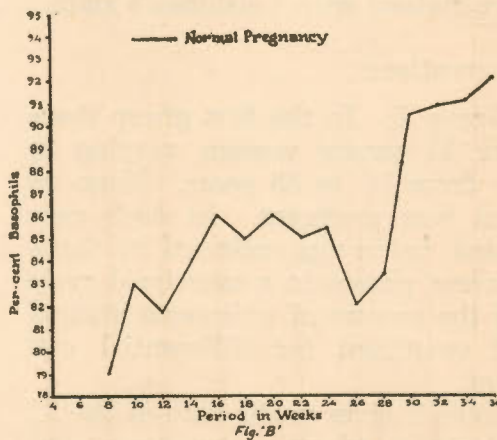


Figure B gives the average results of urocytogram studies (per cent of

basophil cells) at different periods of gestation.

*Groups 3 and 4.* Group 3 contained 20 cases of threatened abortion who improved under treatment (rest, progesterone therapy, etc.) and were discharged relieved. Group 4 contained 4 cases who came with threatened abortion but in spite of all treatment (including progesterone therapy) aborted completely. In one case dilatation and curettage had to be done as the bleeding continued in spite of all treatment. Cases in group 3 were 6 weeks to 18 weeks pregnant. Of the cases in group 4 one was

percentage of basophils in the urocytogram in cases of groups 3 and 4 at different periods of gestation. The figures in group 3 are on admission and on discharge after successful treatment whereas in group 4 these are before abortion (on admission) and after completion of abortion (or dilatation and curettage in one case).

In the group of 5 subjects of normal pregnancy in whom catheter specimen of urine (instead of voided urine) was collected, the smears of sediments were very poor in cellular content. Their findings are given in Table 5.

TABLE 5

Subject No.	Period of gestation	Total number of cells found in urinary sediment smear	% of basophils in urocytogram
1	34 weeks	25	92.0%
2	32 weeks	20	95.0%
3	36 weeks	18	94.4%
4	32 weeks	17	76.5%
5	36 weeks	26	88.5%

8 weeks pregnant and the other 3 were 10 weeks pregnant.

*Discussion and Conclusions*

Studies on urocytogram in normal menstrual cycle in 11 subjects (Group 1) as represented graphically in figure A are indeed very interesting.

In 10 out of 11 subjects the initial basophil count fell appreciably in the mid-cycle (12th to 20th day) to rise again in the latter part of the cycle. In one case in which the first study was done on 15th day of the cycle, this count (basophil %) was lowest. It rose on 18th day and fell again on 25th day. Unfortunately in this particular case the patient came rather late for the first collection of urine (15th day), hence nothing can be said about the urocytogram picture in the

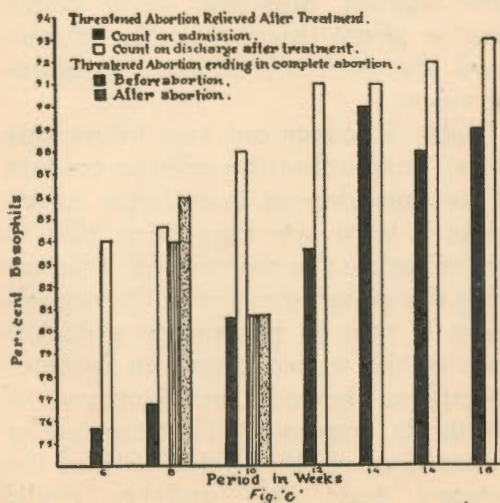


Figure C represents the average

first half of the cycle. The broken curve of average figures, apart from slight undulations shows the lowest value for basophil count on 15-16th days. These findings are very significant as they show that the basophil count in the urocytogram shows a distinct fall in the mid-cycle. It may possibly be related to ovulation in which case it can prove a very easy method for determination of the ovulation time.

Figure B, which shows the average basophil count in urocytogram at different periods of gestation in normal pregnancy shows a marked fall at the 26th week. This may, however, be not of much significance since there was only one subject of 26 weeks' gestation. It, therefore, appears that a normal hormonal balance between oestrogens and progesterone at different periods of gestation is such that it favours a rise in basophil count in urocytogram with advancing pregnancy. This may prove useful as a check up for normal progress of pregnancy.

A perusal of figure C shows that in cases of threatened abortion the basophil counts on admission were not much different than the average counts at similar periods of gestation (as per figure B). There is, however, a marked increase in the basophil count after treatment in cases which were relieved and discharged cured. In cases that aborted there was either no rise in basophil count on progesterone therapy (10 week gestation cases) or only a slight rise (8 week gestation case). This appears rather significant. Urocytogram studies in

cases of threatened abortion can therefore be of prognostic value.

Di Paola and Usubiaga (1958) also reported high percentage of basophils (95 to 99.4 per cent) in normal pregnancy. Present authors are in general agreement with this finding though their figures are lower than those of Di Paola and Usubiaga (1958). These workers had reported increased eosinophil counts (or decreased basophil counts) in cases of threatened abortion. Similar observations are also reported by Solomon et al (1958). In the present series there is not much significant difference between the basophil counts on admission of cases of threatened abortion and the subjects of normal pregnancy of identical gestation period. In the present series, however, there is significant increase in basophil count under progesterone therapy in cases of threatened abortion treated successfully whereas those that led to completion of abortion did not show such rise. It is, therefore, concluded that whereas urocytogram may not be of much help in predicting impending threatened abortion, it is of great prognostic value.

Table 5 brings out two interesting facts. One is that the cellular content of urinary deposit in catheter specimens is very low suggesting that in voided urine the majority of cells are from the generative tract. The second point is that in pregnancy even the cells of the urinary tract in catheter specimens showed a predominance of basophils, suggesting (as reported by Solomon et al, 1958) that cells of the urinary tract also undergo cyclic changes under the influence of sex

hormones. However, since ordinary voided urine serves the same purpose, it is unnecessary to catheterise the subjects.

### Summary

1. Smears made from urinary sediment were stained with Leishman's stain and differential count of basophilic and eosinophilic cells carried out.

2. Cells of catheter specimen of urine, though much less in number, show the same type of staining characteristics as from voided urine.

3. Urocytogram studies were carried out on 11 subjects in normal menstrual cycle. The percentage of basophils showed a fall in the mid-cycle period suggesting a possible utility of such studies for ovulation time determinations.

4. Urocytogram studies in 40 subjects with normal pregnancy revealed a general rise in basophil count with advancing pregnancy.

5. Urocytogram studies in 20 cases of threatened abortion treated successfully with rest and progesterone therapy and in 4 cases of threatened abortion which led to complete abortion in spite of hormone therapy revealed that successful treatment is accompanied by a marked rise in basophil count. In cases which abort-

ed there was either no rise or very slight rise in basophil count on progesterone therapy. This shows that urocytogram studies may have prognostic value in cases of threatened abortion.

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