# VAGINAL CYTOLOGY FOR PREDICTION OF LABOUR

## (A Preliminary Study)

by

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One of the difficulties encountered by obstetricians is to determine the optimum time for induction of labour in cases of placental insufficiency as, pre-eclampsia, post-maturity, diabetes and previous still-births. What brings on labour is as yet not well established, yet there is evidence to suggest that hormonal factor is important for continuation of pregnancy and for the onset of labour. In cases where placental insufficiency is expected one is often in a dilemma. If labour is induced too early the induction may fail. If delayed too long there is risk of intra-uterine death. The hormone estimations in blood and urine are elaborate time-consuming procedures and not available everywhere. Vaginal endocrine cytology, on the other hand, can be within everyone's reach.

The earliest description of the changes which take place in vaginal epithelium during pregnancy was made in 1913 by Favarger. In 1925, Papanicoloau described the characteristic navicular cells of pregnancy. Pundel, in 1959, made a more elaborate study on term smears and was able "to determine, with an accuracy obtained by no other technique whether or not pregnancy is at its biological term and also how long it can continue without risk to baby". Although other workers, like Hindman and Abrams, were not able to collaborate Pundel's findings a renewed interest in the subject is shown by Osmond-Clarke *et al* in the use of vaginal cytology as an index to placental efficiency. We have, therefore, undertaken a preliminary study of vaginal cytology to determine if there is a pattern of smear which would suggest onset of labour within 7-14 days.

*Material and Method*

We studied 70 cases of normal pregnancy out of which 30 cases were followed up to labour. Vaginal smears were taken in the second trimester, beginning of third trimester and every week for 3 weeks prior to due date. Few smears were studied from patients in labour, but these were found to be unsatisfactory because of excessive mucus secretion

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and hence this study was given up. Smears were taken by sterilized cotton swab from lateral wall of mid-vagina by gently rolling the swab on the vagina under speculum vision. An immediate smear was made and fixed before drying in equal parts of ether and 95% ethyl alcohol. The smears were stained with haematoxylin-Shorr's stain.

The following points were noted while reading the slides.

A. *The Types of cells:*

(i) *The cornified cells from superfical zone* are polyhedral, with clear or granular cytoplasm, which stain pink; nucleus is pyknotic, small darkly staining and is peripherally placed.

(ii) *The precornified and navicular cells from intermediate zone.* These cells are large, flat and polygonal with smooth edge and homogenous, transparent clear blue or violet cytoplasm; nucleus is centrally placed, large and round with well-marked chromatin nucleolus.

(iii) *The parabasal cells from the deep zone.* They are round cells with large nuclei, scanty cytoplasm, light blue nuclear chromatin and well- differentiated and deep basophilic cytoplasm.

Hundred cells were counted from four fields and cornification index marked according to cornified or superficial cells/pre-cornified or intermediate cells. The basal and parabasal cells were not counted as they were not encountered in any significant number in pregnancy.

B. The clumping of cells was noted. The clumps were classified as large with closely packed cells, small with loosely packed cells, or discrete cells not in clumps.

C. The edges of the cells showing folding or curling observed and marked as +++, ++, or +.

D. Colour of the cells, eosinophilic or basophilic.

E. Miscellaneous — leukocytes, mucus or Doderleins bacilli noted, if present.

*Discussion*

We found, therefore, that in the second trimester and early third trimester there was a definite type of vaginal smear which was characterized by excessive exfoliation of cells. These cells were grouped in large clumps of overlapping cells. The cells were mainly basophilic with an aver-

TABLE 1

*Shows a comparative result*

| | 2nd Trimester | 3rd Trimester | 21-14 days before labour | 14-7 days before labour | 7-1 days before labour |
|---|---|---|---|---|---|
| C. I. | 20/80 | 20/80 | 23/77 | 24/76 | 24/76 |
| Clumping | +++ | +++ | ++ | + | + |
| Curling | ++ | ++ | ++ | + | + |
| Reaction | B 90% | 90% | 69% | 61% | 64% |
| | E 10% | 10% | 31% | 39% | 36% |

B—basophelic, E—eosinophilic, C.I.—Cornification Index.

age cornification index of 20. The oyster cells of Papanicoloau appear at this stage.

The smear changed its characteristics to 'term smear' gradually in the last two weeks when the cells became discrete and curling was much less. There was no appreciable change in cornification index, which remained more or less constant from 20 to 24. We did not find much change in the reaction of cells. These changes were not abrupt but came on gradually in the last three weeks. However, they were more marked within a week of delivery.

Osmond-Clarke lays great emphasis on the absence of clumping as an index to the onset of spontaneous labour. She classified smears as discrete, partly discrete and clumped. In her series, 58% showed discrete changes, 34% partly discrete smears and 11% clumping. When discrete smear occurred late in pregnancy, labour usually followed within seven days while the partly discrete usually persisted for 4 to 5 weeks. This indicates to the obstetrician the possibility of premature labour before 36 weeks with the persistence of a discrete smear. Our findings are in agreement.

What produces clumping in pregnancy is not definite. In menstrual cycle progesterone produces clumping and lowering of cornification index, but these effects are not produced in amenorrhoeic women by large doses of progesterone. Although plasma progesterone rises from 5 mg% to 80 mg% at term and there is steep increase after the 28th week and urinary progesterone rises from 10-14 mg at 12 weeks to 40-70 mg. at 32 weeks there is no decrease in progesterone during the latter part of pregnancy. But there is change in the metabolism of progesterone as shown by the blood progesterone/pregnanediol ratio (Deshpande). Lack of progesterone effect may be due to change in metabolism.

According to Lichtfus and Pundel cell clusters disappear in number and individual clusters become smaller in the last two weeks of pregnancy. Our findings are in agreement.

With the disappearance of clumping the cells become more flat and the curling of edges is not marked. This again shows lack of progesterone effect.

The cornification index in our series did not show very marked change. According to Hindman, cornification index is the best guide. Out of his 31 cases there was increase in 8 cases and decrease in 21 cases and no change in two cases. He found decrease in cell clustering in 16 cases and no change in 13 cases. Pundel found cornification index over 15 or 20 in term smear.

We did not find significant change in the reaction of cells. We agree with other workers that colour may vary due to technical defects. If the smear dries before it is dropped into the fixative the colour of the cells is towards eosinophilia. The stain used is also important as Shorr's haematoxylin stain tends to produce more eosinophilia than basophilia, as compared to Papanicoloau stain.

We feel from the above findings that vaginal endocrine cytology may prove to be a useful guide in predicting the onset of labour.

*Summary*

(1) An attempt is made to determine the time of onset of labour by endocrine vaginal cytology.

(2) The pregnancy smear shows large number of exfoliatied cells grouped in large clumps showing marked curling.

(3) As term approaches the cells tend to be discrete and curling disappears.

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*Figs. on Art Paper I*