

VAGINAL CYTOLOGY IN NEWBORN INFANT

by

E. PETERS,* F.R.C.O.G. (London) PUSHPALATA GUPTA,** M.S.

The place of exfoliative vaginal cytology as a method of detection of hormonal status is well established in recent years. The exfoliative cytology of the menstrual cycle and of pregnancy has been well documented (Osmond-Clarke & Murray 1961) to indicate the hormonal balance.

The much discussed genital crisis of the newborn resulting in varying degree of breast activity and the presence of increased vaginal secretion or even uterine bleeding, is said to be influenced by the hormones circulating in the newborn child. Fraenkel & Papanicolaou (1938), investigated the state of the genital organs during the period of secretion of the mammary glands in new born infants. They described a marked uniformity in the appearance of the vaginal smears, which apart from the absence of cornification resembled those found in the adult in the preovulatory phase. In premature and underdeveloped children there was less marked breast activity than in full term infants. Bonine (1950) stated that in the first few days of life, the vaginal epithelium, which had undergone proliferative changes under the influences of the maternal hormones, rapidly becomes much thinner as a result of desquamation first of the superficial and then of the deeper cells.

* Professor and Head, Dept. of Obst. and Gynec. S. M. S. Medical College and Superintendent.

** Clinical Tutor, Obst. and Gynec. S. M. S. Medical College, Jaipur.

Received for publication on 21-5-1970.

Montalvo and Slocker (1951) in the study of genital crisis in 80 new born females, stated that genital crisis after birth is brought about by sudden deprivation of oestrogen. A uniform fall in cornification index during first 7 days of life in neonates was detected by Da Bro-mida (1958), Boemi (1959), Wied & Davis (1959), Wavchtel & Plester (1954), in their study of vaginal smears of 10 female new born and buccal smear of 4 male infants found essentially the same type of curve of cornification index and thereby postulated that the changes in the mucosa were as a result of maternal oestrogen circulating in the blood of newborn.

Carreras & Marzano (1957), detected breast enlargement and vulval hypertrophy in 10 infants and genital crisis in 3, in their study of 20 infants and desquamation of superficial cells persisted for longer period in those infants. Perego (1958), found that the vaginal cytology of the infant at birth resembled the maternal smear of latter part of pregnancy while Hoffman (1959), found its resemblance with that of post menarcheal adolescents.

Dokumou (1961), noted swelling and secretory activity of breasts in 4 cases out of the 40 neonates. Elstein (1963), noted genital crisis in 2 infants in his study of 50 new borns and did not find any difference in cytology of term and premature babies. Parker & Johnson (1963), found marked oestrogenic effect in the first 24 hours after birth, declining

to minimal level on 3rd day and disappearing completely after 10 days.

Material and Method

The present investigation was made on 50 infants born in the Zenana Hospital, Jaipur, whose maturity varied from 34th weeks to 40 weeks of gestation. Usually 3 smears were taken in each case i.e. on first day, on 3rd to 4th day and 20th day after birth. The vaginal smears were stained by shorr's stain using shorr's technique. At the time of obtaining the specimen the breasts were examined and any enlargement of activity of the breasts was noted. The appearance of vulva, its roundness and vascularity and the character of the vaginal mucosa, in addition to the macroscopic appearance of the vaginal secretion was observed. Obstetric abnormalities of the mother and the method of feeding of the child were noted.

Observations:

Certain interesting observations were made in a correlative study of vaginal cytology, breast changes and vulval changes in the newborn females as shown in table No. 1.

In the 50 female neonates the gestation age was 34 weeks in 2, 36 weeks in 7, 38 weeks in 5 and 40 weeks in the remaining 36 cases. The cornification indices were nearly the same i.e. 17.7, 17 & 18, in gestational age of 40, 38 & 36 weeks respectively, but in gestational age of 34 weeks low C.I., 11.9 was noted. The C.I. on the 3rd day after birth also showed the lowest figure in babies with a gestational age of 34 weeks; however on the 20th day no cornified cells were seen in all cases. The average cornification indices in 50 cases were 15.4 on 1st day, 8.7 on 3rd day and zero on the 20th day.

On the first day of life slight hyper-

trophy of the breasts was noticeable in all the cases. By the 3rd or 4th day regression in the breast size was noticed in all except three who showed an increase in the size over that observed on the first day. By 20th day complete regression of the breast size was observed in all the 50 cases. The cornification indices in these three cases on the first day was 14, 35 & 32 with an average of 27; on the 3rd day it was 30, 29 & 30 respectively with an average of 29.6; thus the average C.I. on the first and third day in these three cases was considerably higher than the respective average in total cases, but it was zero in these cases on 20th day as seen in other cases who did not show breast activity. Two of these 3 cases also showed vulval hypertrophy.

Vaginal bleeding in the new born commonly referred to as the genital crisis was observed in 4 (8 per cent). It was noticed in 2 on the 3rd day and in another 2 on the 4th day after birth. The red blood cells were detected in the smear in these cases. It is significant to note that 3 of these 4 cases, had breast hypertrophy and 2 had vulval hypertrophy.

Discussion

The origin of the circulating sex hormones in the new born is not certain. Probably maternal hormones are responsible for changes in the vaginal epithelium, breasts and vulva. If the cornification index is taken to indicate the amount of oestrogen available to the foetus at the time of birth, it can be inferred that a significant rise in oestrogen level is achieved in the tissues of the foetus after 34 weeks of gestation and the level is maintained thereafter upto 40 weeks. Whether this rise of oestrogen is due to rise in the maternal hormone level or

TABLE I: Showing the relation between gestational age, cornification index, breast changes, vulval changes and vaginal bleeding

| S. No. | Gestational age in weeks | C.I. | | | | Breast changes | | | | Vulval changes | | | | Vaginal bleeding | | | |
|--------|--------------------------|-------|---------|-------|---------|----------------|---------|---------|---------|----------------|---------|---------|---------|------------------|---------|---------|---------|
| | | I day | III day | I day | III day | I day | III day | I day | III day | I day | III day | I day | III day | I day | III day | I day | III day |
| 1 | 40 weeks | 33 | 17 | + | + | Swollen | Swollen | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 2 | 40 " | 21 | 11 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 3 | 40 " | 11 | 6 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 4 | 40 " | 11 | 8 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 5 | 36 " | 15 | 12 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 6 | 40 " | 17 | 6 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 7 | 40 " | 14 | 11 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 8 | 40 " | 17 | 10 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 9 | 34 " | 13 | 1 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 10 | 40 " | 13 | 9 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 11 | 40 " | 8 | 3 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 12 | 38 " | 11 | 11 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 13 | 36 " | 8 | 8 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 14 | 40 " | 13 | 7 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 15 | 36 " | 25 | 28 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 16 | 38 " | 28 | 8 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 17 | 34 " | 10 | 6 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 18 | 40 weeks | 14 | 30 | + | + | Swollen | Swollen | Nil | Nil | Swollen | Swollen | Nil | Nil | Swollen | Swollen | Nil | Nil |
| 19 | 40 " | 17 | 14 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 20 | 38 " | 35 | 29 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 21 | 40 " | 8 | 5 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 22 | 40 " | 18 | 3 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 23 | 40 " | 40 | 6 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 24 | 36 " | 32 | 30 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 25 | 38 " | 7 | 2 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 26 | 40 " | 18 | 9 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 27 | 40 " | 22 | 12 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 28 | 40 " | 30 | 14 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 29 | 40 " | 18 | 8 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 30 | 40 " | 9 | 7 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 31 | 40 " | 7 | 6 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 32 | 40 " | 31 | 9 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 33 | 40 " | 7 | 5 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 34 | 40 " | 11 | 5 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 35 | 40 " | 10 | 4 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 36 | 40 " | 4 | 2 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 37 | 36 weeks | 8 | 5 | + | + | Swollen | Swollen | Swollen | Swollen | Swollen | Swollen | Swollen | Swollen | Swollen | Swollen | Swollen | Swollen |
| 38 | 40 " | 30 | 3 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 39 | 40 " | 20 | 4 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 40 | 40 " | 16 | 3 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 41 | 36 " | 18 | 8 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 42 | 40 " | 17 | 5 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 43 | 38 " | 6 | 2 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 44 | 40 " | 13 | 2 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 45 | 40 " | 5 | 2 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 46 | 40 " | 3 | 2 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 47 | 40 " | 6 | 2 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 48 | 40 " | 14 | 3 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 49 | 40 " | 22 | 8 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |
| 50 | 36 " | 20 | 14 | + | + | " | " | " | " | " | " | " | " | " | " | " | " |

C.I. :- Slight hypertrophy. + + + :- Moderate hypertrophy.

due to production of hormones by the foetal ovaries (de Blicck 1959), is not yet certain. At the same time relative immaturity of the vaginal mucosa to oestrogenic influence at the 34 weeks of gestation can also account for a low C.I. at this stage as is seen in our cases. Parker & Johnson (1963), noted a uniform fall in C.I. during the first week of life and according to them it is due to production and subsequent withdrawal of oestrogen of placental origin, Wiold & Davis (1959). Diczfalsy (1962), found a low C.I. despite the presence of high oestrogen metabolism in the period which may be due to simultaneous effect of anti-oestrogens such as progesterone and androgens or due to variation in the tissue response to these hormones in individual foetus. High cornification index may result from non-metabolization of the hormone during this period either due to inefficient liver function or immaturity of liver cells. Sudden withdrawal of oestrogen resulting in vaginal bleeding in some cases may be due to cessation of hormone synthesis by the neonatal ovaries in the absence of any more stimulation by chorionic gonadotrophins or F. S. H. (Pinkerton 1959), along with the rapid metabolisation of hormones by the liver.

Summary and Conclusions

1. Vaginal cytology was studied in 50 newborn females delivered in Zenana Hospital Jaipur.

2. Out of 50 newborns, 36 (72 per cent) were delivered full term while 14 (28 per cent) were premature; the gestational age in them being 34, 36 and 38 weeks.

3. The cornification indices, on the first as well as on third day of life, were significantly low in neonates born at 34 weeks of gestation than in those deli-

vered later.

4. Breast enlargement was noticed in three case while two of them also showed vulval hypertrophy on third day of life.

5. Vaginal bleeding was observed in 4 neonates.

References

1. Boemi, P. (1959): Clin. Obstet. e. Ginecol. Univ. di Catania, 90-101 (Quoted from Ext. Med. Obst. & Gynec., 1827 (1960), 13, 472).
2. Bonine, R. G.: Am. J. Obst. & Gynec. 60: 1307, 1950.
3. Carreras, L. and Marzano, C. M.: Quad. Clin. Obstet. 12: 462, 1957.
4. Da Bromida, G. (1958), as quoted by Perego, A., Riv. Ostet. Ginec. Prat. Lio., 1133.
5. De Blicck (1959): Acta. Obstet. & Gynec. Scand., 41, Suppl. 1: 61, 72.
6. Diczfalsy, E. (1962): Acta. Obstet. & Gynec. Scand., 41, Suppl. 1: 61, 68.
7. Diczfalsy, E. (1962): J. Obstet. & Gynec. Brit. Comm. 70: 1950, 1963.
8. Dokumou, S. I. (1961), Akush, I. Ginek, 1, (31-39) (Quoted from Ext. Med. Obstet. & Gynec. 415: (1962), 15, 103).
9. Fraenkel, L. and Papani Colaou, G. N.: Am. J. Anat. 62: 427, 1938.
10. Hoffman, J. W. C.: Ann. N. Y. Acad. Sci. 83: 228, 1959.
11. Montalvo, L. and Slocker, C. (1951): Acta. Ginec. 2, 183. (Quoted from Ext. Med. Obst. & Gynec. 743: (1952), 5, 199.
12. Osmond-Clarke, F. and Murray, M.: J. Obst. & Gynec. Brit. Comm. 68: 778, 1961.
13. Parker, C. E. and Johnson, F. C. (1963). D. C. Clin. Pediatr. 2, 374. (Quoted from Ext. Med. Pediatr. 1682 (1964), 18, 342).
14. Perego, A.: Riv. Ostet. Ginec. Prat. 40: 1133, 1958.
15. Pinkerton, J. H. M.: J. Obst. & Gynec. Brit. Emp. 66: 820, 1959.
16. Wachtel, E. and Plester, J. A.: J. Obst. & Gynec. Brit. Emp. 61: 155, 1954.
17. Wied, G. L. and Davis, M. E.: Ann. N.Y. Acad. Sci. 83: 215, 1959.