

SOME ASPECTS OF AMENORRHOEA

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Introduction

Disorders of menstrual flow and rhythm are common problems in clinical gynaecology and, of these, the disorders of rhythm are probably the more frequent. Under the disorders of rhythm are included amenorrhoea, oligomenorrhoea and polymenorrhoea. This paper records observations in cases of amenorrhoea and oligomenorrhoea. For clarity of presentation it is essential to define what is meant here by amenorrhoea. Vague or very little information is available on the data regarding the age of menarche in tropical countries. Although none of the figures quoted for Indian women are based on large series of cases the average age of menarche as observed by Curjel from Calcutta (13.63 yrs.), Purandare from Bombay (13.6 yrs.) and Parvatidevi from Madras (13.79 yrs.) is similar. In absence of the data available on larger series, the age of 14 years is taken as an average age of menarche for Indian women. Cyclical bleeding occurring thereafter at intervals of 24-39 days is physiological. When bleeding fails to occur by the 17th year of life the condition is defined as primary amenorrhoea. Secondary amenorrhoea is defined

as one when regular menstruation is followed by cessation for a period of 3 months or more. Oligomenorrhoea is a term used for designating long interval type of menstrual cycle ranging from 40 days to 6 months or even a year. Occurrence of regular cyclical bleeding between the ages of 14-40 years usually implies a proper functioning of a system constituted of the hypothalamus-pituitary-ovary-uterus. Any deviation from this suggests, but does not necessarily imply, some defect in this axis.

The causes of amenorrhoea are varied. Thus amenorrhoea which is a symptom and not a disease demands every effort to discover its cause before any treatment is given. In many cases the exact mechanism, however, is not clear but the focal point of disturbance almost always lies on the ovarian-endometrial axis. Failure of the ovary to undergo a normal cycle may be due to some influence exerted on the gonads directly or by interference with the gonadotrophic function of the anterior hypophysis. The ovary may be involved by inflammatory disease. It is only rarely that ovarian activity is completely suppressed; in the majority of cases, there is only a partial suppression, sufficient to diminish uterine stimulation by oestrogen. Tuberculosis of the endometrium is an important cause of these

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disorders. This may require careful study for diagnosis. Disorders of menstruation in tuberculous endometritis are supposed to be due to general debility (Brown, Gilbert et al). This study will attempt to demonstrate that in a majority of such cases amenorrhoea is the result of changes in the endometrium rather than of functional deficiency of the ovary. Further the importance of a simple technique like examination of the vaginal smear in obtaining relatively definite information about the functional capacity of the ovary is emphasized.

Material and Methods

Fifty-seven patients are included in this study. They ranged in age from 16-36 years. Of these 57, there were 33 cases of secondary amenorrhoea and 24 of oligomenorrhoea. Amenorrhoea due to pregnancy and lactation has been excluded from consideration. These patients could be grouped into two categories.

- I. Those consisting of known clinical syndromes. There were two patients in the series.
- II. The majority of patients, viz. 55, presented themselves as functional menstrual disorders. Further investigation revealed obvious disease in a proportion of these.

The 55 patients were classified into 3 groups on the basis of habitus i.e. adult body form and build. Based on the criteria laid down by Ucko these patients were grouped as follows:

- (A) Feminine Habitus
- (B) Infantile Habitus
- (C) Bisexual (Heterosexual) Habitus

A detailed history was obtained and thorough physical examination performed on all the cases studied. Repeated vaginal smears were examined for about a month in each case and sometimes throughout one complete cycle ranging from 3-5 months. Papanicolaou's technique (1943) was followed for the preparation and staining of smears. Endometrial biopsies obtained by Novak's suction curette were, in addition, examined in almost all cases. The biopsy was taken when convenient in the group of cases having secondary amenorrhoea, while in the patients with oligomenorrhoea, this was taken in most of the cases on the first day of the menstrual period. Repeated endometrial biopsies were studied in some cases. A total of 986 smears and 106 endometrial biopsies were examined.

Cytological and biochemical examination of the blood, determination of the Basal Metabolic Rate, radiographic study of skull and excretory urogram were done in a few cases. Estimation of FSH (Klinefelter et al), neutral 17-ketosteroids (Landau), oestrogens (Engle, Stevenson et al) and pregnanediol (De Waterville et al), whenever indicated, were done in samples of urine collected over 24 hours. Basal temperature was recorded in a few cases.

Observations

I. Two patients belonged to this group, one of Cushing's Syndrome and the other of Sheehan's disease. These two cases will be reported in detail in a subsequent publication.

II. The observations in this group were directed towards elucidating

changes in (i) ovary, (ii) hormonal status of blood and (iii) endometrium. As, in the absence of palpable enlargement of the ovary, laparotomy is rarely performed on women with functional amenorrhoea, the available information regarding the state of the ovary in this condition is comparatively meagre. Laparotomy was performed on two of the cases in this group. In one, the right ovary was enlarged to about 4 inches diameter. The histological findings revealed a fibroma (Figs. 1, 2). In the other, both the ovaries were enlarged to about thrice the normal size and contained small cysts. The main histological features were the presence of follicular cysts and hyperplasia of theca-interna cells which were not infrequently luteinised. Marked fibrosis was another finding (Figs. 3, 4). Similar features were recorded by Geist et al and Fraenkel.

Before presenting the details of observations relating to the hormonal content of blood and endometrium, the pertinent data obtained by history taking and clinical examination are briefly stated. Although findings in patients with oligomenorrhoea or secondary amenorrhoea are tabulated separately for convenience, they will be discussed together as we think that these are essentially similar symptoms with identical causes—the difference being one of degree only.

(A) Patients with Feminine Habitus

There were 16 patients with oligomenorrhoea and 25 with secondary amenorrhoea in this group. They ranged in age from 16-36 years. The menstrual irregularity in 12 of the

41 patients appeared to be related to the following events. The irregularity followed an attack of typhoid fever in five patients; tuberculosis of the pleura, peritoneum and lymph nodes respectively in three, abortions in two (one spontaneous and the other induced) and normal delivery and removal of bilateral ovarian dermoids in one each. Ten of the 16 patients with oligomenorrhoea had had bleeding at normal intervals for a period ranging from 1-17 years.

In the group of women with secondary amenorrhoea there were only 3 who had normal flow at normal intervals prior to amenorrhoea. The menstrual pattern was interesting in this group. There was a preceding oligomenorrhoea in 9, bleeding once only in 2, disturbance of flow in 10 while amenorrhoea of 3½ years' duration followed normal delivery in one.

Thirty-five of forty-one patients were married; only 8 bore children, the number ranging from 1-3. One patient had no viable child but had had six abortions. The remaining 26 patients (74%) had primary sterility.

Thirty seven of the 41 cases did not reveal anything remarkable on pelvic examination. In the remaining 4 cases, there was enlargement of the adnexa on the right side. In two of these, the enlargement was subsequently shown to be due to tuberculous salpingo-oophoritis; one had a cystic ovary and the remaining one had a fibroma of the ovary.

Vaginal Smear: Table I summarises the findings in vaginal smear of the 41 cases.

TABLE I

| Smear type | Oligomenorrhoea | Amenorrhoea | Total |
|---------------------------------------|---------------------------|-------------|-------|
| Atrophic | — | 2 | 2 |
| Hypotrophic | 3 | 8 | 11 |
| Hypotrophic with marked cytolysis | 6 | 7 | 13 |
| Eutrophic with progestational changes | 4 | 5 | 9 |
| Persistent cornification | 3 | 3 | 6 |
| | (1 Trichomonal infection) | | |
| | 16 | 25 | 41 |

Comments

The changes in vaginal cytology occurring in women having cycles of 24-39 days duration and of ovulatory nature can be described as "Eutrophic with progestational changes". These changes can be correlated with the circulating hormones. In the order of decreasing insufficiency in circulating oestrogen, the abnormal smears (Shah) are described as follows:

- Atrophic
- Hypotrophic
- Hypotrophic with marked cytolysis

One more type of abnormal smear "Persistent cornification" is suggestive of persistently high circulating oestrogen.

In the present series there were 9 patients in whom the changes in vaginal cytology were indistinguishable from those seen in the normal cyclic women. Of the remaining 32 patients, 26 had smears revealing different degrees of hypoestrinism while 6 showed hyperoestrinism.

Endometrium: Histological examination of the endometrium in 36 of the 41 patients is summarised in Table II.

TABLE II

| | Oligomenorrhoea | Amenorrhoea |
|----------------------------------|-----------------|-------------|
| Atrophic endometrium | — | 3 |
| Normal endometrium | 9 | 10 |
| Endometrial hyperplasia | 1 | 2 |
| Chronic endometritis | | |
| (a) complete destruction | — | 5(4) |
| (b) proliferative phase | 1(1) | 3(3) |
| (c) secretory phase | 2(1) | — |
| | 13 | 23 |
| Not studied: | 3 | 2 |
| | 16 | 25 |

Figure in brackets indicates the cases with Tuberculous Endometritis.

Comments

It is interesting to note that of 36 cases in whom the endometrium could be studied tuberculous lesions were discovered at the first biopsy in 9 cases (25%). In three additional cases though the past history was very suggestive, the diagnosis could not be confirmed because adequate endometrial tissue could not be obtained. In 5 of 9 cases having tuberculous endometritis, the changes in vaginal cytology resembled the one that occurs in a normal cyclic woman, i.e. eutrophic with progestational changes. In the remaining 4, 2 had the hypotrophic with marked cytolytic changes and in the other two, atrophic changes in the vaginal smear. Of the 3 probable cases, 2 revealed the smear type eutrophic with progestational changes and the other atrophic.

(B) Patients with Infantile Habitus

Seven patients ranging from 19-26 years constitute this group. There were no specific events in the past history of the patients to which the onset of the disorder can be related. Four of the 7 patients had oligomenorrhoea right from menarche while in the remaining 3 patients 2 had only a single episode of scanty bleeding prior to coming under observation. The remaining one patient had had normal flow at normal intervals preceding amenorrhoea. Six of the total 7 patients had primary sterility while the remaining one was unmarried.

The changes in vaginal cytology in these cases, revealed hypoestrinism of various grades; 3 showed atrophic smears, 3 hypotrophic smears and 1 revealed the type described as hypo-

trophic with marked cytolysis. The endometrial histology in all these cases revealed a proliferative phase.

(C) Patients with Bisexual (Heterosexual) Habitus

There were 7 patients ranging in age from 17-26 years. Four of them had oligomenorrhoea and 3 had amenorrhoea. In the latter, 2 had oligomenorrhoea preceding amenorrhoea, while in the remaining 1, scantier and scantier periods were recorded prior to amenorrhoeic phase. Two of the 4 married women had primary sterility. Though now mother of 2 children, 1 of the 2 remaining patients had long period of sterility before she conceived while the other is only recently married. Of the 7 cases, 4 had a family history of hirsutism; 2 belonged to the Parsi community and the remaining 2 were Sindhis. All the 7 patients had measurable quantity of hair in more than two unusual regions (Shah-unpublished data). Four of the 7 cases also showed some features of defeminization and masculinization. Pelvic examination of these 7 cases revealed enlargement of the right ovary in 1.

Vaginal Smear: The pattern of the vaginal smear in the patients with heterosexual habitus, though not consistent, is interesting. It appears that the cells of the superficial layer of vaginal mucosa are replaced by cells of the deeper layers. The gamut of intermediate stages of regressive character seen in the cytology of vagina does not permit to assess circulating oestrogen as reliable as could be done in the foregoing clinical groups. However, the changes in

vaginal cytology of the series can best be described in the usual way of classification, depending upon the pronounced characteristic features of the types described.

| Smear Type | No. of patients |
|-----------------------------------|-----------------|
| Atrophic | 2 |
| Hypotrophic | 1 |
| Hypotrophic with marked cytolysis | 4 |

Of the two cases having an atrophic type of smear, endometrial biopsy was possible in one and the changes were consistent with those of an atrophic endometrium. Estimation of FSH, carried out on a 24-hour sample of urine by Klinefelter's method in this case, revealed 22.5 m. u.u./24 hours (normal 6-50 m. u.u./24 hours). The endometrium in the remaining 5 patients revealed a proliferative phase. Of the 3 cases in whom radiographic study of the skull was done, 2 revealed hyperostosis frontalis interna. Excretory urogram done in all the 7 cases, to rule out any sizable adrenal tumour, did not show anything abnormal.

The results of the hormone estimations along with the findings of the

vaginal smear and endometrial biopsy are summarised in the Table III.

In the group of oligomenorrhoea neutral 17-ketosteroids were estimated on the 13th day and pregnanediol on the 21st or 22nd day of the menstrual cycle while in patients with amenorrhoea such estimations were done at random. The normal range of neutral 17-ketosteroids in Indian women is 1.7-17.4 mg/24 hours (Tampan & Ramaswamy). In absence of findings for the excretion of pregnanediol in Indian women 1-5 mg/24 hours is taken as the normal range (De Waterville et al).

Discussion

Although opinions are divided regarding the role of a bleeding factor (Smith) in menstruation the contention that normal cyclic bleeding occurs because of sudden withdrawal of a hormone or hormones is tenable. There is ample evidence to indicate that the bleeding response of the uterus to oestrogen follows a definite pattern. This pattern may be explained on the theory of oestrogen levels (Bishop 1951).

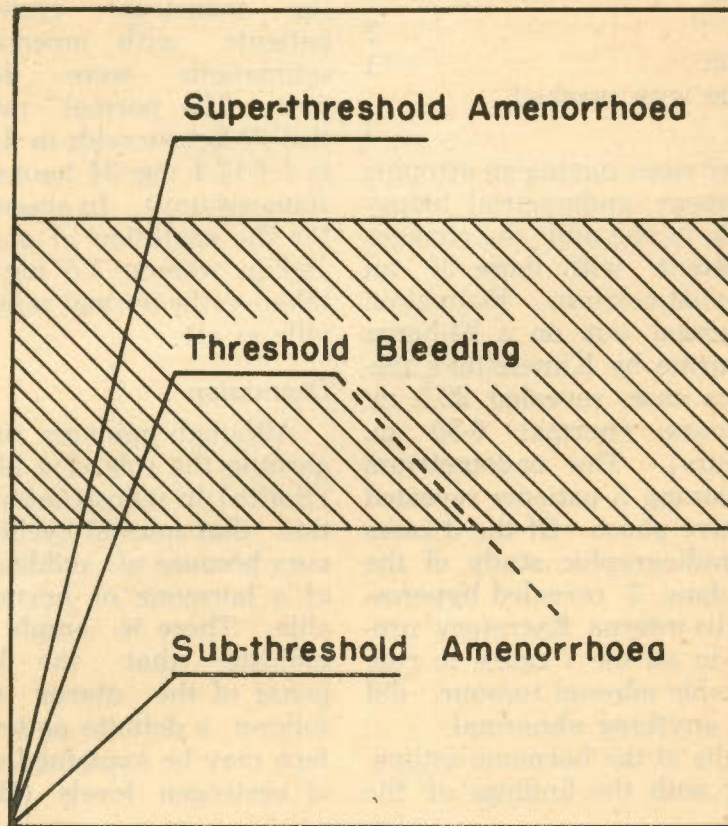
TABLE III

| | Oligomenorrhoea | | | | Amenorrhoea | | |
|--------------------------|------------------|------------------|-----------|---------------|------------------|------------------|----------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17-ketosteroids in mgms. | 8.1 | 11.9 | 9.4 | 9.7 | 21.7 | 10.2 | 8.4 |
| Pregnanediol in mgms. | 1.6 | 2.9 | 0.7 | nil | nil | 23.2 | 0.5 |
| Vaginal smear | Hypo. c m. cyto. | Hypo. c m. cyto. | Atrophic | Hypotrophic | Hypo. c m. cyto. | Hypo. c m. cyto. | Atrophic |
| Endometrial biopsy | Proliferative | Proliferative | Not taken | Proliferative | Proliferative | Proliferative | Atrophic |

It is assumed that there is a threshold level at which normal bleeding occurs (Fig. 5). If the oestrogen level is

serve the approximate ovarian function. Most of the workers, (Brown et al, Neustaedter et al, Papanicolaou

Threshold Level of Oestrogen Bleeding



sub-threshold, amenorrhoea results, nor will bleeding occur if oestrogen is maintained at super-threshold levels. In some cases, however, amenorrhoea is due to disease of the endometrium. It is possible that occasionally both these factors may be involved and in such a situation it is rather difficult to evaluate their relative importance.

The examination of vaginal smears is an accepted method today to ob-

et al, Rubenstein et al) using this technique agree that a fairly accurate assessment of circulating oestrogen can be made from the changes in the cellular content of vaginal secretion. Examination of the vaginal smear is more dependable than oestrogen assay which is a complicated procedure and not available to every practising gynaecologist. However, the application of this technique has

not found unanimous acceptance in the determination of progesterone or androgen activity. Definite evidence of the occurrence of ovulation and progesterone activity was obtained in a previous study by correlating vaginal cytology and the histology of endometrium. To appreciate the general trend of oestrogen fluctuation as well as progesterone effect it is necessary to examine serial vaginal smears (Shah).

The changes in the vaginal smears in the present series appear to reflect every grade of ovarian activity, from total insufficiency to abnormally high, as well as cyclic activity. A fairly accurate assessment of circulating oestrogen is mirrored in the changes of the cellular content of the vaginal secretion. The oestrogen levels for bleeding in the clinical groups studied are summarised below.

Oestrogen Levels in the Clinical Groups

| | Feminine Habitus (41) | Infantile Habitus (7) | Hetero- sexual Habitus (7) |
|-----------------|-----------------------------|-----------------------------|-------------------------------------|
| Sub-threshold | 26 | 7 | 7 |
| Super-threshold | 6 | — | — |
| Threshold | 9 | — | — |

Sub-threshold Amenorrhoea

It is clear from the table that sub-threshold level of oestrogen in different degrees was the most important finding in 33 of the total 48 patients with feminine and infantile habitus. Thirty-two of 41 married women of these groups had associated sterility because of absence of ovulation.

As stated previously hypoestrinism as seen in the vaginal smear of the 7 patients with heterosexual charac-

ters is not comparable to that met with in the foregoing clinical groups. It is conceivable that the changes seen in the vaginal smears of these patients are but the various end effects of the fluctuating levels of endogenous oestrogen and androgen. This is well depicted in the smears as one finds cells from the deeper layer side by side with cornified cells (Figures 6 & 7). These paradoxical features are similar to the findings in the smears of patients with dysfunctional uterine bleeding under treatment with male sex hormone (Fig. 8). Observations on the vaginal cytology of cyclic women to whom androgen was administered are as yet too meagre to permit any conclusions as to the exact sequence of events by which these effects are brought about. It is not definitely known whether the male hormone acts directly on the ovary or otherwise. Zuckerman showed that gonadotrophic principles are capable of inducing ovarian activity despite the concomitant injection of amounts of testosterone propionate which ordinarily suffices to inhibit the cycle. It is interesting to note here that normal amounts of FSH were found in one of our hirsute patients whose vaginal smears and endometrium were atrophic. It is reasonable to think that the atrophic vaginal smear of this patient was due to peripheral neutralisation of oestrogen by androgen. This mode of action has been demonstrated in women by Shorr et al. It appears then that oligomenorrhoea or amenorrhoea in the clinical group of heterosexual habitus results from an androgenic negation of the normal oestrogenic function. The findings stated in Table

III demand further discussion regarding the source of androgen in this group of cases.

The rate of excretion of neutral 17-ketosteroids in urine is accepted as reliably indicative of the level of circulating androgens. A high rate of their excretion in women always indicates hyperplasia or functioning tumour of the adrenal cortex. In the absence of corpus luteal activity (as inferred from examination of the endometrium and vaginal smear) the excretion of pregnanediol in sufficient amounts concomitantly with normal excretion of neutral 17-ketosteroids points to a mild degree of adrenal cortical hyperplasia (Butler & Marrian). As will be seen from Table III, 2 (cases No. 1 & 2) of the 7 cases may fall in the latter category. A closely related compound, 17-hydroxy-progesterone, isolated from the cortex of the adrenal gland has been shown to behave biologically as androsterone (Piffner & North). A reduction compound of 17-hydroxy-progesterone pregnane 3-17,20-triol has been demonstrated by Butler and Marrian in the urine of a woman exhibiting the adrenogenital syndrome with masculinisation. This compound was contaminated with quantities of pregnane 3, 20 diol. Recently Fischer and Riley demonstrated persistently high pregnanediol in a typical case of Stein Leventhal syndrome. According to the authors, the source of progesterone was the luteinised theca interna cells of the follicular cysts and the continued secretion of large quantities of progesterone was thought to be related to the causation of this syndrome. In all probability, case No. 6 in table III

belonged to this category. But this is not the whole story as of the remaining 4 cases (Nos. 3, 4, 5, 7), 3 had normal excretory levels of neutral 17-ketosteroids and all the 4 had either total absence or insignificant amounts of pregnanediol. One of the reasons for this may be that androgens possibly produced by the ovary in these cases are, like similar hormones from masculinizing ovarian tumours, not excreted in the form of neutral 17-ketosteroids (Bishop 1954). Recently on exploring the abdomen of 3 hirsute women, the ovaries were sclerotic and had small multiple cysts. These women had normal corpus luteal activity and normal excretion of neutral 17-ketosteroids. Chemical analysis of the fluid from the cysts revealed proportions of neutral 17-ketosteroids that were considerably more than that obtained in similar fluids obtained from non-hirsute women (Mahajan & Shah). The association of this finding with hyperplasia and luteinisation of theca interna cells in these 3 cases is interesting in view of the speculative hypothesis regarding the production of androgenic substances by these cells in the ovary (Culliner & Shippel Huis in't Veld et al, Shippel).

Super-threshold Amenorrhoea

The changes in vaginal cytology of this group of women are best described as "Persistent Cornification". Similar cytological changes caused by trichomonal infection may lead to erroneous assessment if this probability is not excluded by careful study (Bechtold et al). There was one case of tricho-

monal infection of the vagina in our series. Of the remaining 5 cases in two, the endometrium revealed changes suggestive of hyperplasia cystica glandulosa. The other 3 cases however deserve special mention.

The first was a woman in excellent health with postlactational amenorrhoea of 3½ years' duration. The endometrial changes were those seen at the height of oestrogen level prior to ovulation. The B.M.R. was — 11% (Indian standard) and blood cholesterol was 293.6 mg%. Administration of l-thyroxine tablets in increasing doses from 0.1 mg. to 0.3 mg. daily for three weeks followed by progesterone (parenterally) 10 mgs. daily for 5 days regularised the cycle probably by bringing down the high level of oestrogen in two ways—better utilization and effective neutralisation.

The second case was a woman aged 21 years who complained of amenorrhoea of 2 years' duration. Pelvic examination revealed a hard, round mass of about 4 inches diameter in the right adnexa. Histological examination of the ovarian tumour revealed a fibroma (Figs. 1 & 2). The possibility of the tumour being a thecoma was carefully excluded (Herbut). It is difficult to understand why hyperoestrinism was associated with a fibroma which is not a functioning tumour. Again it is surprising to note that removal of the tumour not only regularised the cycle immediately but also facilitated her to conceive in four months following the operation.

The changes seen in the genital tract of the third case were also interesting. She had been curetted

six times in a period of 12 years when she used to have irregular profuse bleeding for months together. Following the last curettage two years ago, she got very scanty periods for about 6-12 hours at intervals of 3-4 months. Sufficient endometrial tissue on curettage was not obtained to permit study. This condition most probably was caused by too vigorous previous curettage. It is easy to realise that if only vaginal smears had been studied in this case, one would have thought hyperoestrinism as the probable cause of amenorrhoea. As mentioned before, it is rather difficult to evaluate the relative importance of both these factors which exist together causing amenorrhoea.

Threshold Amenorrhoea

There were 9 cases who revealed eutrophic with progestational changes in the vaginal smears, i.e. amenorrhoea occurring in spite of oestrogen reaching threshold level for bleeding. The endometrial findings in these cases are briefly stated as under.

Endometrium in 9 Cases With Threshold Level for Bleeding.

| | No. of patients |
|--------------------------|-----------------|
| Tuberculous endometritis | 5 |
| Chronic endometritis .. | 2 |
| Complete destruction .. | 1 |
| Not studied | 1 |

Five of the 9 cases of tuberculous endometritis revealed eutrophic with progestational changes in vaginal smears. This is interesting because it is believed that menstrual irregularities in this condition are due to general debility (Brown, Gilbert et al) or to the ovarian insuffi-

ency (Norris) caused by the inflammatory process. The patients with tuberculous endometritis in our series appeared as healthy as other women who had regular cyclic bleeding. The majority had normal ovarian function and it is probable that the loss of an active endometrium may have led to amenorrhoea. The exciting factor for the dismantling of the endometrium and bleeding, though definitely not known, is believed to come from the endometrium itself (Smith). Further work alone will show how far various menstrual irregularities associated with endometrial infection are due to the qualitative and/or quantitative differences in the production of the so called bleeding factor.

Our knowledge regarding the detrimental effect of other infectious diseases on the ovarian-endometrial axis is meagre. In this series five patients are included in whom the menstrual irregularity followed an attack of typhoid fever. In one patient with severe tonsillitis, the menstrual cycles returned to normal soon after tonsillectomy. The menstrual irregularity in two other patients followed either a spontaneous or induced abortion while another patient had amenorrhoea for a period of $3\frac{1}{2}$ years after normal delivery. The pathogenesis of amenorrhoea following abortion or normal delivery is not always clear.

The common practice of inducing withdrawal bleeding with the "shot" therapy (Zondek) may be an easy way of getting out of the difficulty or may even in some cases restore the menstrual cycle yet, its use, generally speaking, should be highly deprecated.

Of the 49 cases in whom endometrium was examined, tuberculous endometritis was discovered at the first biopsy in 9. A few more cases most probably would have come to light with repeated biopsies. When the clinical history was carefully reviewed in our patients with tuberculous endometritis it was realised that inadequate investigation only facilitated further delay in specific treatment of an already diseased endometrium, till finally an irreversible process terminated into amenorrhoea. It may well be repeated that unless we study the endometrium in all cases with menstrual irregularities, we are bound to miss diseases like tuberculosis in its incipient stage. This is tragic, for the application of specific treatment at this stage will make all the difference to many young women.

Summary

1. A study pertaining to pathological physiology of oligomenorrhoea and secondary amenorrhoea has been completed on 55 women.

2. A relatively high percentage (86%) of the patients had ovulatory failure. Examination of the vaginal smear was found useful in the classification of amenorrhoea relating to the grade of ovarian activity. Such a classification was found useful in determining the prognosis and deciding the line of treatment.

3. Examination of the vaginal smears, however, did not help in excluding any organic lesions of endometrium. Endometrial study revealed tuberculous endometritis in 18% of the cases. These cases were not diagnosed by others and were

mostly treated by them to produce withdrawal bleeding. Endometrial study therefore is a "must" before any hormonal therapy is instituted.

4. General debility probably did not play an important role in the mechanism of menstrual irregularities occurring in tuberculous endometritis. The majority of patients with tuberculous endometritis had normal ovarian function.

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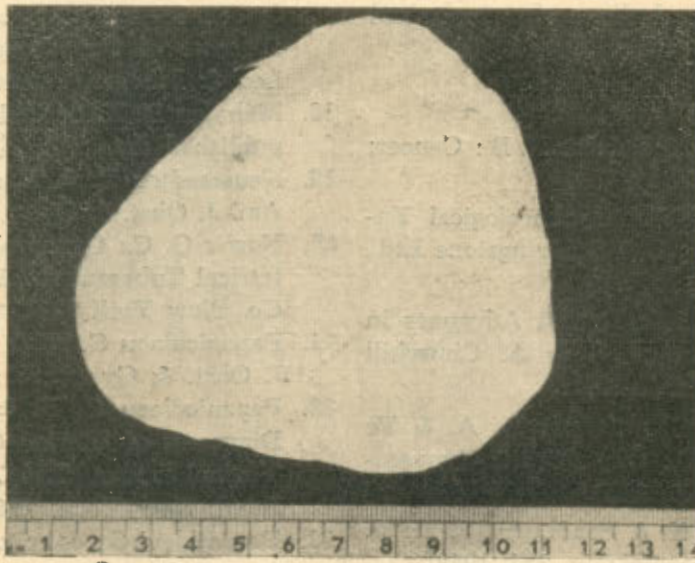


Fig. 1

Gross appearance of the Fibroma of the Ovary.

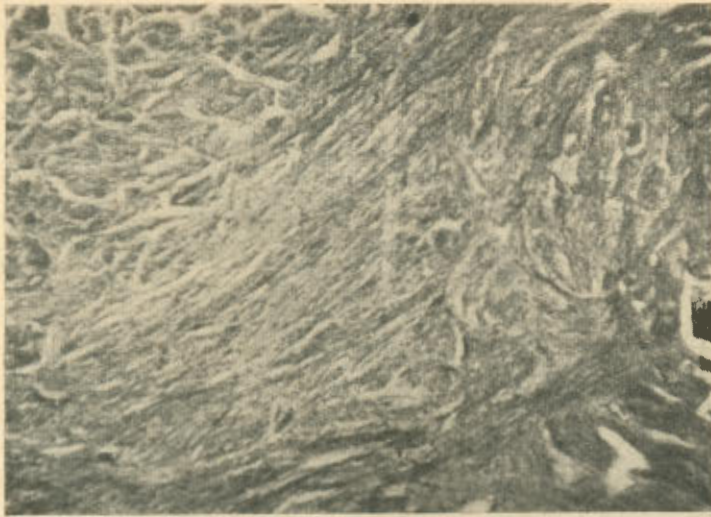


Fig. 2

Microscopical appearance of the specimen in Fig. 1 x 40.



Fig. 3

A portion of the Polycystic Ovary x 5.

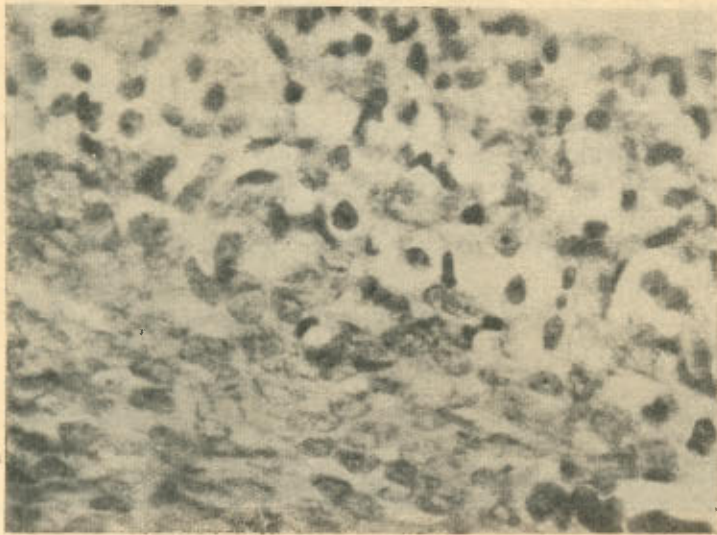


Fig. 4

The wall of one of the atretic follicles of the polycystic ovary showing conspicuous stimulation of theca-interna cells. Note luteinization of these cells x 400.

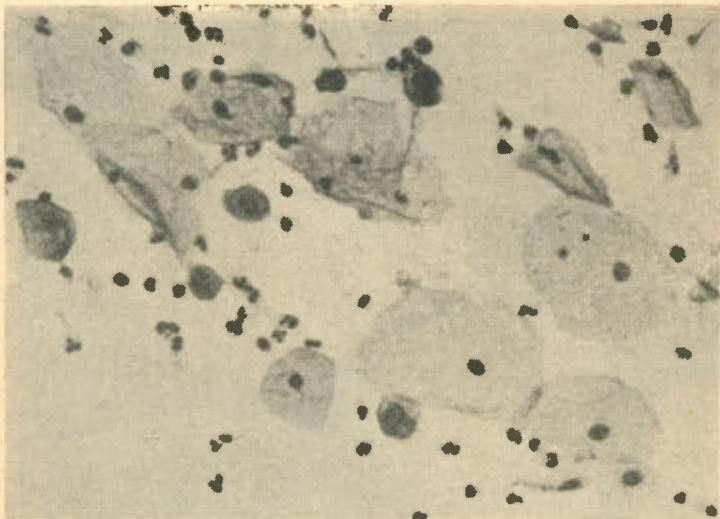


Fig. 6

Small round cells from deeper layer are seen lying side by side with cornified cells from the superficial layer of vaginal mucosa. (From a patient having heterosexual habitus) x 330.

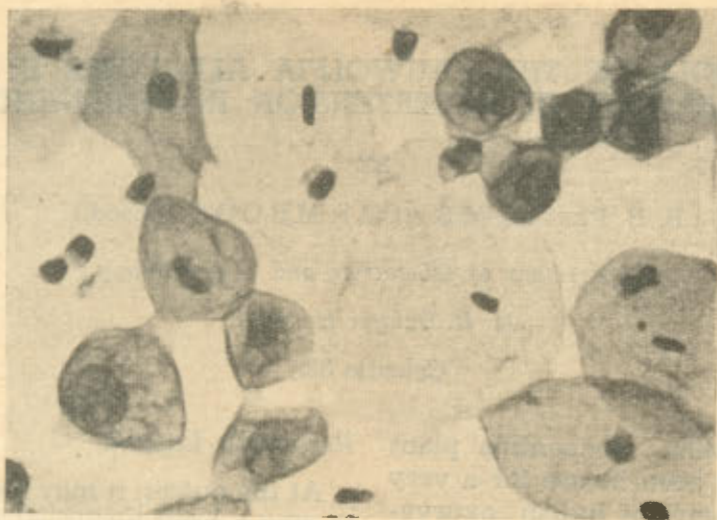


Fig. 7

Similar findings as in Fig. 6 from another patient having hetero-sexual habitus x 600.

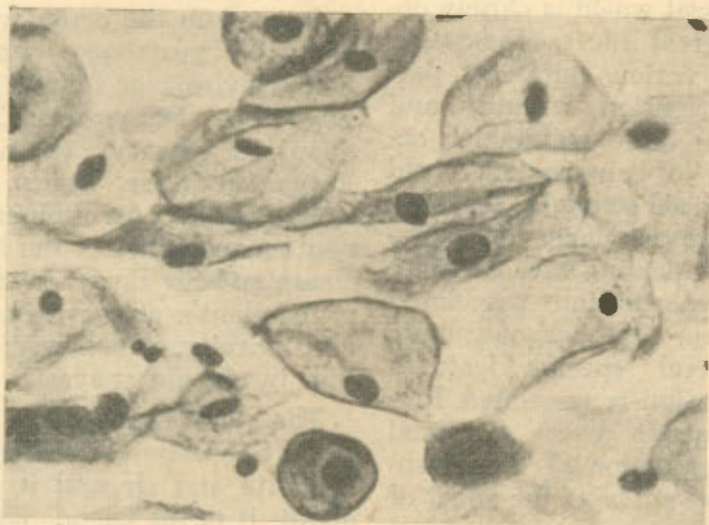


Fig. 8

The changes in the cytology of the vagina after administration of 200 mg. of male sex hormone. (From a patient having dysfunctional uterine bleeding) x 660.