

# THE ROLE OF TUBERCULOSIS IN THE PATHOGENESIS OF SUBACUTE AND CHRONIC ADNEXITIS

by

PARVATI K. MALKANI, M.B., B.S., F.R.C.O.G.,

and

AROTI BANERJEE, M.B., B.S., D.G.O.,

*Professor of Obstetrics and Gynaecology*

*Lady Hardinge Medical College & Hospital, New Delhi.*

## *Introduction*

One of the major problems confronting the gynaecologist is the treatment of chronic pelvic inflammatory disease. Although chemotherapeutic agents, antibiotics, non-specific protein therapy and short-wave pelvic diathermy have been used as therapeutic agents with fair degree of success in a majority of cases, there is always a certain proportion of cases who fail to respond to any treatment. Experience has shown that the sulphonamides and antibiotics become less effective as the disease advances because the organisms become anatomically less accessible.

Recently *Cortisone* combined with antibiotics has been given trial in the chronic adnexal inflammatory lesions and the results have been encouraging. It is presumed that the recurrent pelvic inflammatory disease is associated with multiple localised abscesses with thick fibrous walls which prevent the anti-biotics from reaching the infecting organisms.

Paper read at the 10th All-India Obstetric and Gynaecological Congress at Hyderabad, in January 1959.

Cortisone possibly breaks down the barrier of fibrous tissue and allows the antibiotics to have the desired effect. Such a therapy is, however, not without danger as the invasiveness of a wide variety of organisms may be enhanced and therefore cortisone must be used with a specific antibiotic. However, to determine the causative organism when the disease is chronic and the seat of infection is in the upper genital tract is not always possible.

It is said that the chronic inflammatory disease of the adnexa is usually preceded by an episode of acute illness. This is, of course, not true of a chronic tuberculous lesion in the pelvis where the disease may be silent and symptomless. Rubin has said, "although advances in our knowledge of the true nature of inflammatory lesions of the body of the uterus have shown them to be much less common than was hitherto believed, we have become cognizant of the high incidence and importance of inflammatory lesions of the fallopian tubes and ovaries." The lesions of the tubes and ovaries usually occur in combination, hence it is appro-

priate to use the term "adnexitis" for inflammatory lesions of the tube and the ovary.

In general, it is supposed that the frequency of inflammatory lesions of the tubes and the ovaries closely follows the incidence of gonococcal and puerperal infections and in this country the treatment by dais has an important role to play. During the recent years, tuberculosis of the adnexa has been recognised more frequently than before, specially due to advances made in the investigations of a sterile woman. The incidence of genital tuberculosis in different countries shows wide variations and this seems to be in accordance with the hygienic conditions and social strata of the population and is also dependent on the public health administration of a country in combating tuberculosis in general.

Although gonococci and pyogenic organisms are the usual organisms invading the adnexa, the possibility of the mycobacterium tuberculosis being the offending organism should always be kept in mind. Only few sufferers of subacute and chronic adnexitis undergo surgical treatment, hence the true histology of the surgically removed adnexa is available in but a few cases. The incidence of pulmonary, abdominal and bone tuberculosis is higher in this country than in many other parts of the world and as such it could be expected that the incidence of genital tuberculosis would be correspondingly higher than found in the reports from other countries.

Of the various organs of the pelvis attacked by mycobacterium tuberculosis, the fallopian tubes are supposed

to be the most common site, being affected by the disease in more than 90% of such cases. Next in frequency is the tuberculosis of the endometrium, the disease having involved this mucous membrane in 50-70% of cases of genital tuberculosis. It is obvious that if the endometrium is found to be the seat of tuberculosis, fallopian tubes are almost sure to be involved in the disease process. Tuberculosis of the cervix is comparatively rare; 12.4% of the patients of endometrial tuberculosis studied by the authors showed involvement of the cervix.

The diagnosis of chronic pelvic adnexitis is based on the history of having had gonorrhoea, self-induced abortions, puerperal sepsis and local treatment by dais.

An acute episode of illness followed by recurrent attacks of abdominal pain, rigor and fever are suggestive of chronic adnexitis. The common symptoms are:

- (1) Lower abdominal pain.
- (2) Backache.
- (3) Leucorrhoea.
- (4) Menorrhagia.
- (5) Metrorrhagia.
- (6) Dysmenorrhoea.
- (7) Sterility.

*Method of Study:* A planned study was done on 518 patients with chronic adnexal inflammation and parametritis in the Gynaecological Department of the Lady Hardinge Medical College Hospital, New Delhi. The object of the study was to find out how often adnexal inflammations are of tuberculous origin. Every patient was subjected to a routine endometrial biopsy. On the basis of the histopathological examination of the endometrium in those showing evidence of endometrial tuberculosis it was presumed that the inflammatory

lesion in the fallopian tubes was of tuberculous origin. It is logical to conclude that many more than those diagnosed by endometrial histology were suffering from tubal tuberculosis, but the diagnosis could not be established as the disease had not spread to the endometrium at the time of study. Dilatation and curettage was not done on any of these cases and it is certain that in some the diagnosis of tuberculosis was missed because with the use of an endometrial biopsy curette, much less tissue was available for study.

The cases were grouped according to the clinical findings in the pelvis with reference to abnormal feel of the vaginal fornices.

Group I: *Unilateral Thickening*: On one side the fallopian tube was felt to be thickened and cord like.

Group II: *Bilateral Thickening*: Both the fallopian tubes were thickened.

Group III: *Unilateral Tubo-ovarian Mass*: A tubo-ovarian mass was felt on one side.

Group IV: *Bilateral Tubo-ovarian Masses*: Tubo-ovarian masses felt on both sides.

Group V: *Unilateral Scarring*: Scarring in the vagina in one fornix suggestive of chronic parametritis on one side.

Group VI: *Bilateral Scarring*: Scarring in the vagina in both the lateral fornices suggestive of chronic parametritis on both sides.

Group VII: *Unilateral Thickening and Unilateral Tubo-ovarian Mass*: A tubo-ovarian mass was felt on one side and thickening of the fallopian tube on the other side.

It is possible that in cases of scarring on one or both sides, the underlying inflamed tube was not palpable although in those cases of parametritis in whom the endometrium showed tuberculous granulomas, it is presumed that similar pathology was present in the fallopian tubes also.

For convenience of tabulations, those showing evidence of endometrial tuberculosis were labelled as "T. B. Group" and the rest as "Non-T. B. Group".

#### *Results of Study*

The following abbreviations have been used in the Tables I to XII:

1. Unil. Th. = Unilateral thickening.
2. Bilat. Th. = Bilateral thickenings.
3. Unil. T. O. = Unilateral tubo-ovarian mass.
4. Bilat. T. O. = Bilateral tubo-ovarian masses.
5. Unil. Sc. = Unilateral scarring.
6. Bilat. Sc. = Bilateral scarring.
7. Unil. T. O. & Unil. Th. = Unilateral tubo-ovarian mass and unilateral thickening.

*Age Distribution*: This is shown in Table I.

There were only 2 cases in age group 41-45 years and one in the age group 46-50 years. Excluding these last 2 groups, it appears that the younger the age when adnexitis is first diagnosed, the greater is the possibility of the lesion being of tuberculous origin.

#### *Incidence of Tuberculous Adnexitis*

Out of a total of 518 cases studied, evidence of tuberculosis was found in 136 cases, an incidence of 26.2%. Table II shows the number of cases studied in each clinical group.

TABLE I  
*Age Distribution*

Age	Non T.B. group	T.B. group	Total	Percentage T.B. in each age group
Under 20 years .. .. .	50	27	77	35
21-25 years .. .. .	128	59	187	31.5
26-30 " .. .. .	109	29	138	21
31-35 " .. .. .	62	14	76	18.4
36-40 " .. .. .	31	6	37	16.2
41-45 " .. .. .	1	1	2	50
46-50 " .. .. .	1	0	1	nil
Total .. .. .	382	136	518	

TABLE II  
*Incidence of Tuberculous Adnexitis*

Clinical group	Non T.B. group	T.B. group	Total	Percentage T. B. adnexitis
1. Unil. T. O. .. .. .	112	46	158	
2. Bilat. T. O. .. .. .	25	25	50	
3. Unil. Th. .. .. .	189	31	220	
4. Bilat. Th. .. .. .	29	20	49	
5. Unil. Sc. .. .. .	17	7	24	
6. Bilat. Sc. .. .. .	1	1	2	
7. Unil. T. O. & Unil. Th. .. .. .	9	6	15	
Total .. .. .	382	136	518	26.2

There were 402 cases of unilateral adnexitis of whom 84 were diagnosed as tuberculous, an incidence of 20.9%. Out of 116 cases of bilateral adnexitis 52 were diagnosed as tuberculous, an incidence of 44.8%. Incidence of tuberculosis in bilateral lesions is more than double the incidence in unilateral lesions. Even though the adnexal lesions following an ascending infection with gonococci and pyogenic organisms are supposed to be more often bilateral than the tuberculous lesions it appears that in the chronic stage the chances of finding the lesions to be of tuberculous origin are

greater in bilateral lesions than in unilateral lesions.

An attempt has been made to find the incidence of tuberculous adnexitis in various groups. Those who had scarring are presumed to have unilateral or bilateral thickened tubes.

*Tubo-Ovarian Masses*

	No. of cases	No. T.B.	Incidence T.B.
Unil.	158	46	
Bilat.	50	25	
Unil. T. O.	15	6	
with Unil. Th.			
Total	223	77	34.5%

*Tubal Thickenings*

	No. of cases	No. T.B.	Incidence T.B.
Unil.	244	38	
Bilat.	51	21	
Total	295	59	20%

The incidence of tuberculosis in association with tubo-ovarian masses (34.5%) is higher than the incidence in cases with thickened fallopian tubes (20%).

Several workers have reported the incidence of tuberculous adnexitis, most of them have diagnosed the condition by the histological examination of the surgically removed specimens of the tubes and the ovaries. In some European countries, specially the Scandinavian countries, many women in whom tuberculous adnexitis was suspected by clinical examination have been subjected to laparotomies. The diagnosis was based on the direct examination of the diseased tubes and the ovaries; whereas in the present series, only indirect evidence is available by presuming that adnexa are the seat of tuberculosis if the endometrium shows histological appearance of tuberculous granulomas. Table III shows the incidence of adnexal tuberculosis as reported by various workers.

*Number of Pregnancies*

Genital tuberculosis is reported to be commoner in primary sterility than in association with secondary sterility. In the series of chronic adnexitis studied with the aid of the endometrial biopsy curette, 204 patients complained of primary sterility and tuberculosis of the endomet-

TABLE III  
*Incidence of Adnexal Tuberculosis as Reported by Different Workers*

Author	Percentage T.B. adnexitis
Olow (1912)	20.9
Greenberg (1921)	6.76
Wetterdal (1924)	14.5
Holst (1931)	9.1
Montobbio (1946)	20
Greenhill (1946)	5
Lecours (1948)	3.3
Porten and Houlen (1948)	10
Present series	26.2

rium was detected in 62 cases (30.4%). There were 220 cases who sought advice for secondary sterility and 64 (29.1%) among them had endometrial tuberculosis. The incidence of tuberculous adnexitis is almost equal in both the sterile groups.

45.1% of the tuberculous group had primary sterility as compared to the 37.1% of the non-tuberculous group.

*Post-abortal and Puerperal Sepsis*

Out of 382 cases of the non-tuberculous group, 50 (13.1%) gave history of post-abortal or puerperal sepsis, whereas only 6 (4.4%) of 136 cases of tuberculous group gave such history. Whether adnexitis followed a delivery or an abortion is shown in Table V. In this table is also shown the group that had never been pregnant.

98 patients had tubo-ovarian masses following delivery; of these 31 (31.6%) were of the tuberculous group; three (9.4%) of 32 cases of post-abortal masses were tuberculous, whereas out of 93 cases of tubo-ovarian masses in patients who had

not had any conception, 42 (45.1%) were diagnosed as tuberculous adnexitis. The percentage of tuberculous adnexitis in each of the above mentioned groups ranged between 16% and 20.5%. The possibility of detecting tuberculous adnexitis in a case of primary sterility with tubo-ovarian masses is much greater than in a patient with thickened fallopian tubes only.

Tuberculous adnexitis in post-delivery group was 25.2%, in post-abortum group it was 14%, in no pregnancy group it was 30.7%, and in all the groups combined it was 26.2%.

*Symptoms*

The common symptoms of adnexal inflammation are pain in the lower abdomen, backache, leucorrhoea, dysmenorrhoea and menstrual disturbances. Jeffcoate has said that amenorrhoea never occurs even when there are bilateral ovarian abscesses. Sterility is complained of by the majority of the patients. The following were the symptoms of 518 patients in order of frequency.

	No. of patients	Percentage
Secondary sterility ..	220	42.4
Primary sterility ..	204	39.5
Leucorrhoea ..	318	61.4
Dysmenorrhoea ..	256	49.4
Menstrual abnormalities	253	48.8
Abdominal pain ..	57	11
Backache ..	13	2.5

It was observed that backache and lower abdominal pain were complained of by 2.5% and 11% of the cases respectively. This is contrary to the common belief that these two symptoms are among the commonest of

gynaecological symptoms of pelvic inflammation.

TABLE IV  
*Symptoms of the Tuberculous and Non Tuberculous Group. Symptomatology*

Symptom	No. of cases			Percentage	
	Non-T.B.	T.B.	Total	Non-T.B.	T.B.
Secondary sterility	156	64	220	40.8%	47.1%
Primary sterility	142	62	204	37.2%	45.6%
Sterility	298	126	424	78%	92.6%
Leucorrhoea	242	76	318	63.4%	56 %
Dysmenorrhoea	226	30	256	59.1%	22.1%
Menstrual abnormalities	153	100	253	40.1%	70.4%
Abdominal pain	39	18	57	10.2%	13.2%
Backache	6	7	13	1.6%	5.1%

Comparing the symptoms in both the groups, it is not possible to make a presumptive diagnosis of tuberculous adnexitis. Menstrual abnormalities are commoner (70.4%) in the tuberculous group than in the non-tuberculous group (40.1%). This can be accounted for by a larger number of cases in the tuberculous group suffering from amenorrhoea. Dysmenorrhoea in the tuberculous group was reported by 22.1%, whereas of the non-tuberculous group 59.1% had this complaint. This can be explained by the fact that 50% of the patients in the tuberculous group had amenorrhoea and therefore dysmenorrhoea could not be a symptom of such cases.

Other symptoms were complained of by 5 patients. In the non-tuber-

culous group, one complained of dyspareunia, one complained of dysuria and one had hirsutes. Of the tuberculous group, one had dysuria and one had painful defaecation.

### Menstrual Pattern

Menstruation was normal in 51.2% of cases. Menorrhagia was complained of by 6.8% and metrorrhagia by 4.2%. Oligomenorrhoea was the complaint of 20.1% and amenorrhoea of 17.7%. Excessive blood loss was found in 11% as compared to scanty blood loss and cessation of menstruation in 37.8%. This is contrary to the common belief that menorrhagia and metrorrhagia are often found associated with chronic adnexitis. Even those who had tubo-ovarian masses, excessive flow was reported in 9% of the patients. Oligomenorrhoea and amenorrhoea was a more frequent complaint of the patients with tubo-ovarian masses (48.8% of cases) than of those with tubal thickenings (25.9%). It appears that the involvement of the ovaries in the inflammation results in scanty flow and in a number of cases absolute cessation of menstruation.

In Tables V and VI the menstrual pattern of the two groups is shown.

TABLE V  
Menstrual Pattern in Cases of  
Chronic Adnexitis

Menstrual pattern	No. of cases	Percentage
Normal	265	51.2%
Oligomenorrhoea	104	20.1%
Amenorrhoea	92	17.7%
Menorrhagia	35	6.8%
Metrorrhagia	22	4.2%
Total	518	100.00%

Excessive blood loss occurred with practically the same frequency in both the groups; in 10.4% of the non-tuberculous group and 12.5% of the tuberculous group.

Oligomenorrhoea and amenorrhoea was the menstrual pattern of 29.6% of the non-tuberculous group and 61% of the tuberculous group. In the non-tuberculous group, oligomenorrhoea alone was twice as frequent in the tuberculous group as in the non-tuberculous group. On the other hand, amenorrhoea was the commonest menstrual abnormality in the tuberculous group being found

TABLE VI  
Comparison of Menstrual Pattern in T.B.  
and Non-T.B. Groups.

Menstrual pattern	Non-T.B. group			T. B. group		
	No. of cases	Percentage		No. of cases	Percentage	
Normal	229	60%		36	26.5%	
Oligomenorrhoea	89	23.3%	} 29.6%	15	11%	} 61%
Amenorrhoea	24	6.3%		68	50%	
Menorrhagia	23	6.3%	} 10.7%	12	8.8%	} 12.5%
Metrorrhagia	17	4.4%		5	3.7%	
Total	382	100.0		136	100.0	

8 times as often as in the non-tuberculous group.

*Family History of Tuberculosis*

The family history of tuberculosis in patients with tuberculous adnexitis was obtained from 13 patients (9.5%) of the tuberculous group. Of the non-tuberculous group only 12 (3.1%) gave a history of contact with tuberculous patients in the family.

There were in all 25 patients with family history of tuberculosis and 13 (52%) had tuberculous adnexitis.

*Extragenital Tuberculosis*

A past history suggestive of extragenital tuberculous lesions was given by 76 patients out of 518 of chronic adnexitis. In Table VII, the incidence

TABLE VII  
*Extragenital Lesions of Tuberculosis*

Lesion	Non-T.B. group of 382		T.B. group of 136	
	No.	Percentage	No.	Percentage
Pulmonary	16	4.2%	19	14%
Pleurisy	3	0.8%	6	4.4%
Abdominal	2	0.5%	10	7.3%
Skeletal	1	0.3%	2	1.5%
Adenitis	2	0.5%	2	1.5%
Meningitis	1	0.3%	0	0
Pyrexia only	2	0.5%	10	7.3%
Total	27	7%	49	36.0%

of the extragenital lesions of tuberculosis is shown.

A careful history, in search for the past extragenital tuberculous lesions, revealed that 7% of the non-tuberculous group had suffered from extragenital tuberculosis, whereas 36% of the tuberculous group gave such a history. The incidence of extragenital tuberculosis in the tuberculous group was five times the incidence in the non-tuberculous group.

*Endometrial Histology*

The diagnosis of tuberculous adnexitis was based on finding of tuberculous granulomas in the endometrium. In some cases the diagnosis was confirmed by bacteriological studies. Endometrial histology has been the clue to the diagnosis and assuming that the endometrium is involved in the tuberculous process in about 50% of the cases of tuberculous salpingitis, it is certain that in many cases of chronic adnexitis the diagnosis of tuberculosis has been missed.

The histology of the endometrium in the two groups is shown in Table VIII.

Presumptive evidence of ovulation as determined by the finding of the secretory phase of the endometrium

TABLE VIII  
*Histology of Endometrium*

Histology	Non-T.B. group		T.B. group		Total	
	No.	%	No.	%	No.	%
Proliferative phase ..	121	31.7%	52	38.2%	173	33.4%
Secretory phase ..	255	66.7%	9	6.6%	264	51%
Endometrial structure lost ..	6	1.6%	75	55.2%	81	15.6%
	382		136		518	



was 66.7% in the non-tuberculous group and 6.6% in the tuberculous group.

The details of endometrial histology in the various clinical groups are shown in Tables IX and X.

pears that the presence of a tubo-ovarian mass does not disturb ovulation to a large extent. Similar conclusion can be drawn from the figures of the tuberculous group. In this latter group, secretory phase of the endo-

TABLE IX  
*Endometrial Histology of Non-tuberculous Group*

Clinical group	Proliferative phase	Secretory phase	Structure lost	Total
1. Unil. T.O.	43	67	2	112
2. Bilat. T.O.	11	14	0	25
3. Unil. Th.	46	139	4	189
4. Bilat. Th.	11	18	0	29
5. Unil. Sc.	6	11	0	17
6. Bilat. Sc.	1	0	0	1
7. Unil. T.O.	3	6	0	9
Unil. Th.				
Total	121	255	6	382

TABLE X

Clinical group	Proliferative phase	Secretory phase	Structure lost	Total
1. Unil. T.O.	21	2	23	46
2. Bilat. T.O.	8	1	16	25
3. Unil. Th.	13	2	16	31
4. Bilat. Th.	7	1	12	20
5. Unil. Sc.	1	2	4	7
6. Bilat. Sc.	0	0	1	1
7. Unil. T. O.	2	1	3	6
Unil Th.				
Total	52	9	75	136

*Endometrial histology of Tuberculous Group*

An attempt was made to ascertain whether ovulation is affected in the presence of tubo-ovarian masses. In the non-tuberculous group, 60% of the patients with unilateral or bilateral tubo-ovarian masses showed evidence of secretory phase, whereas 71.1% of those having tubal thickenings showed evidence of ovulation. Since 66.7% of all the non-tuberculous patients were ovulating, it ap-

pears that the presence of a tubo-ovarian mass does not disturb ovulation to a large extent. Similar conclusion can be drawn from the figures of the tuberculous group. In this latter group, secretory phase of the endometrium was found in 5.2% of the patients with tubo-ovarian masses and in 8.5% of the patients with tubal thickenings. From this it may be concluded that absence of secretory phase of the endometrium is not due to the involvement of the ovaries in the inflammatory process, but possibly due to the destruction of the endometrium by the tuberculous granulomas. Even though the ovarian

function may not have been disturbed, the endometrium fails to respond to the ovarian hormones because there is no responsive endometrium.

### *Summary and Conclusions*

Five hundred and eighteen cases of chronic adnexitis were studied with the object of finding the clinical picture in the tuberculous and the non-tuberculous groups.

- (1) The age distribution of the two groups was studied. It appears that the younger the age when adnexitis is first diagnosed, the greater is the possibility of the lesion being of tuberculous origin. In the age group under 20 years, 35% of the patients had endometrial tuberculosis, whereas in age group of 36-40 years, the incidence of tuberculous lesions was 16.2%.
- (2) Out of 518 patients of chronic adnexitis that were studied, 136 showed evidence of tuberculosis, an incidence of 26.2%. Of those having bilateral adnexitis, 44.8% had tuberculosis, whereas of the unilateral adnexitis only 20.9% were of tuberculous origin. The incidence of tuberculosis in association with bilateral lesions is more than double the incidence in patients with unilateral lesions.
- (3) The incidence of tuberculosis is higher (34.5%) in cases with tubo-ovarian masses than in those who had tubal thickenings (20%).
- (4) Sterility was a symptom of 92.6% of the tuberculous group and 78% of the non-tuberculous group. The possibility of detecting tuberculous adnexitis in a case of primary sterility with tubo-ovarian masses is much greater than in patients with thickened fallopian tubes.
- (5) Only 2.5% of the patients with chronic adnexitis complained of lower abdominal pain. Backache was the symptom of the 11% of cases. Comparing the symptoms of the tuberculous and the non-tuberculous groups, it is not possible to make a presumptive diagnosis of tuberculous adnexitis.
- (6) The present study has proved that excessive blood loss in the form of menorrhagia and metrorrhagia was not a common finding. It occurred in 10.4% of the non-tuberculous group and 12.5% of the tuberculous group, the frequency being practically the same in the two groups.
- (7) Oligomenorrhoea and amenorrhoea was the menstrual pattern of 29.6% of the patients of the non-tuberculous group and 61% of the tuberculous group. Oligomenorrhoea alone was twice as frequent in the non-tuberculous group as compared to the tuberculous group. But amenorrhoea was found in 50% of the cases of the tuberculous group and 6.3% of the non-tuberculous group. Amenorrhoea being about 8 times more frequent in the tuberculous group, it is logical to conclude that a combination of chronic adnexitis and amenorrhoea should arouse a strong suspi-

cion of the lesion in the adnexa being of tuberculous origin.

- (8) There were 25 patients who gave a history of contact with patients with tuberculosis in their families. Thirteen (52%) of these 25 patients had tuberculous adnexitis.
- (9) Extragenital tuberculous lesion were reported by 7% of the non-tuberculous group and 36% of the tuberculous group. It is important to make a careful search for foci for extragenital tuberculosis as this is a valuable aid in the diagnosis of the pelvic lesion.
- (10) Endometrial histology showed evidence of ovulation in 6.6% of the tuberculous group and 66.7% of the non-tuberculous group. The presence of tubo-ovarian masses with the possibility of involvement of the ovaries in the inflammatory process does not seem to disturb the ovulation to a large extent. In the tuberculous group, with tubo-ovarian masses evidence of ovulation was found in 5.2% of the cases, whereas in the non-tuberculous group, 60% of the patients with tubo-ovarian masses showed secretory phase of the endometrium. The absence of evidence of ovu-

lation is probably due to the destruction of the endometrium by tuberculous granulomas. Even though the ovarian function may not have been disturbed by the inflammatory process in the ovaries, the endometrium fails to respond to the ovarian hormones because there is no responsive healthy endometrium.

#### References

1. Bohlig H.: Zbl. Gynak.; 73, 1676, 1951.
2. Hurtig A.: Am. J. Obst. & Gyn., 73, 1183, 1957.
3. Jeffcoate T. N. A.: Principles of Gynaecology, 1957, Butterworth & Co. Ltd., London.
4. Penman L. R., Heller E. M., Kleppinger R. K. and Gaby W. L.: Am. J. Obst. & Gyn.; 65, 175, 1953.
5. Reich W. J. and Nechtow M. J.: Practical Gynaecology. 2nd Ed., 1917. J. B. Lipincott Co., Montreal.
6. Ribin I. C. and Novak J.: Integrated Gynaecology, 1956, Blakiston Division, Mc. Graw-Hill Book Co. Inc., New York.
7. Sutherland A.: Glasgow Med. J.; 31,2 79, 1950.
8. Willis S. H., Jacobs W. H., and Landers A. E.: Obst. & Gyn.; 7, 689, 1956.