CHRONIC NON-TUBERCULOUS INFLAMMATORY DISEASE OF THE FALLOPIAN TUBES:

SURGICAL & NON-SURGICAL MANAGEMENT.

A CLINICAL STUDY.

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I N D E X

INTRODUCTION.

Non-Tuberculous Chronic inflammatory disease of the pelvis, in which the Fallopian Tubes are always involved, is the commonest etiological factor in Cape Town of the infertility of women who belong to the lower socio-economic groups.

These people belong to the Non-White race in whom it is well known that mal- and under-nutrition is rife (Lanskowsky,1960) the resistance to infection low; in whom the course of many disease entities, classically Tuberculosis, can be more virulent or subtle; in whom the standards of education, personal hygiene and living conditions are poor.

All these factors must play a part in a disease process which lends itself to preventitive measures, easy early diagnosis and adequate treatment; but also to reinfection. If it is neglected initially, or inadequately treated, or exposed to reinvasion, the course it takes can be prolonged and crippling, punctuated by exacerbations, ultimately leading to great misery and invalidism. The end result is a "pelvic cripple" suffering from constant nagging pain, aptly described as "pelvic toothache", often aggravated by menstruation; who is troubled by a foul vaginal discharge in

many cases; who experiences great domestic unhappiness both from inability to conceive and dyspareunia. These patients go from Doctor-to-Doctor and from hospital-to-hospital (and I dare say from Quack-to-Quack) seeking relief from pain and sterility.

Historical Pathology Note :

The magnitude and complexity of this problem had earnestly engaged the attention of gynaecologists since the turn of the century. But the affliction had been described in the earliest medical writings.

Thus, Hippocrates (460 - 377 B.C.) described cases which resemble pelvic infection, although this precise morbid-anatomical knowledge was then unknown (Ricci 1950). Pelvic abscess or tubo-ovarian abscess was the first entity pertaining to the inflamed pelvis to be described with a remarkable degree of accuracy by the ancients. The earliest descriptions appear in the texts of Aetius of Amida (502 - 575 B.C.) and Paul of Aegina (625 - 690 B.C.) (Ricci 1945).

The celebrated John Hunter referred to it under the name of iliac abscess. In 1775 he made reference to it and added most significantly that if the abscesses did not come to suppuration they gradually disappeared; and sometimes the disease "gave a degree of tenderness for years" (Ricci 1935).

In 1872 Emil Oscar Jacob Bruno Noeggerath pointed out the association of latent gonorrhoea and sterility in both males and females. He was the first to understand gonorrhoea and its complications clinically. However, direct proof was lacking; but this was supplied by Neisser in 1879 with the discovery of the Gonococcus (Thomas 1935).

Our modern concept and differentiation of the various types of pelvic infections is due primarily to T.Gaillard Thomas (1831-1903) but adequate cognisance must be taken of the momentous and revolutionary work on "Cellular Pathology" published in 1858 by Rudolf Virchow, "The Father of Modern Pathology" (Cianfrani 1960).

Historical Anatomy Note :

The uterine tubes had been described by earlier observers (Galen, Soranus, Rufus et al) but the classical description by the Italian Anatomist, Gabriele Fallopio (1523 - 1563) resulted in his name being associated with the uterine tubes and they are still so-named. (H.A.Skinner 1961).

Many people have written about various aspects of management, some hopeful, others with a tone of gloom, disappointment and frustration. The results have also varied from good, indifferent to poor. Methods have varied from purely surgical to the use of Corticosteroids only or a combination of them.

With this perspective of the subject in mind, the present study was undertaken to evaluate critically various methods of treatment, surgical and non-surgical.

Pathology of Non - Tuberculous Chronic Inflammatory Disease of The Fallopian Tubes

Classically non-Tuberculous pelvic infection is described in relation to Gonococcal & Pyogenic infection. The former spreads along the mucosal surfaces and in the Fallopian tube produces primarily an endosalpingitis. The latter reaches the Fallopian tubes chiefly by lymphatic spread through the parametrial tissues and produces thus an interstitial salpingitis and a perisalpingitis.

However, after repeated attacks of gonorrhoea there are essentially the same pelvic changes as there are with a pyogenic infection or with non-specific infections; moreover mixed infections become more common after the initial specific infection. Thus in the end result of chronic pelvic disease, it is practically impossible to determine which organism was responsible for the primary infection. Moreover, the distinction at that stage becomes academic, as the symptoms, physical findings and, more important, the treatment, are essentially similar.

Route of Infection:

In many instances salpingitis can be related to infection elsewhere in the genital tract. It may follow abortion or childbirth, or the initial infection may be cervicitis. In certain instances procedures such as dilatation of the cervix, curettage, insufflation or salpingography are followed by salpingitis. The methods of spread are considered to be (1) an ascending infection from these varied sources to the tube and frequently both tubes are affected. (2) lymphatic spread through the parametrium producing usually a greater or less degree of cellulitis.

The chronic form of salpingitis may manifest itself in the following forms:

(1) Hydrosalpinx

(2) Pyosalpinx

(3) Interstitial Salpingitis

(4) Chronic Salpingo-oöphoritis and Tubo-Ovarian Inflammatory mass.

Hydrosalpinx:

This represents a truly "burnt-out" salpingitis.

The usual mode of closure of the abdominal ostium is that the fimbriae are drawn into the lumen of the tube, and their surfaces then fuse together. Actual sealing is effected by means of a plug, consisting of the swollen fused fimbriae, which are compressed by the unyielding peritoneal investment of the tube.

Closure of the uterine end of the tube is caused by Catarrhal swelling of the mucous membrane. When it is remembered that the lumen of the interstitial part of the tube is only 0.5 to 1 mm. in diameter, it will be understood that slight turgescence is sufficient to effect its occlusion. There is now no escape for the secretion of the tubal mucous membrane, and a collection of fluid in the lumen results. By intratubal fluid-pressure the tube is both elongated and expanded. When the indrawn plicae are completely fused, closure of the tube becomes permanent. It is obvious that in this mode of closure the fimbriae will have disappeared externally, and nothing remains to mark the site of the ostium but a small cicatrix.

Another mode of closure is that which arises from peritonitis and which results in adhesion of the open ostium to adjacent surfaces. However, in the absence of Catarrh the uterine end of the tube may remain open, in which case no hydrosalpinx will result.

Macroscopic Appearance of Hydrosalpinx:

Distension of the tube begins, and is always most marked, at the ampulla, from where it diminishes gradually towards the uterine end.

The early distal enlargement is explained by the fact that the muscle is thinner at the ampullary end of the tube, and the secreting epithelial surface much more extensive. Thus a hydrosalpinx of typical shape possesses a pedicle, consisting of the relatively small but little altered uterine end of the tube, which connects the distended ampulla to the cornu. The entire tube now assumes a shape commonly likened to that of a chemical retort.

Kinking of a hydrosalpinx is likely to occur because the inelastic peritoneal coat cannot share in elongation of the muscle; coiling of the tube then takes place, especially if the peritoneum is adherent.

Whatever may be the shape of a hydrosalpinx its walls are always thin and often semi-transparent; when opened the mucosa may be found to be as smooth as a serous membrane, with here and there a slight fold or projection, representing the remains of the original plicae.

The contents of a hydrosalpinx generally consist of a clear or slightly turbid, thin, serous fluid.

On cutting across the tube, one of two pictures will be encountered, leading to a subdivision into two varieties of hydrosalpinx.

Hydrosalpinx Simplex:

In this variety the distended tube forms a single lumen, the tubal rugae being flattened out against the wall. Often they are so atrophied that only here and there a small fold projects above the otherwise smooth surface, lined only by a flattened epithelium.

Hydrosalpinx Follicularis:

Here the distended lumen is divided into many compartments by trabeculae which often present a complicated pattern when seen on cross-section. This type is explained by the fact that adjoining rugae have adhered and merged one with another, forming gutter-like compartments between them.

Microscopically, in early cases of hydrosalpinx evidences of inflammation can be traced in the mucosa, e.g. round-celled infiltration in the folds, fusion of the tips, and resulting Pseudo-follicles at the bases of the plicae. Even in otherwise unaltered muscle there may be tracts of round-celled infiltration. In the walls of the longer sacs all traces of inflammation are commonly lost. In the sac itself the flattened epithelium lies immediately upon a fibrous wall, from which the muscle-bundles have often completely disappeared.

Hydrosalpinx is always the result of tubal inflammation. Haines and Taylor (1962) are doubtful whether it can follow a pyosalpinx, but Novak (1958), and Parsons and Sommers (1962) believe that a hydrosalpinx is practically always an end result of pyosalpinx. When the latter has been present for a long time without exacerbations, there is a tendency for resorption of the purulent exudate, so that ultimately only a clear watery fluid is left, just as may occur with a haematoma. Hydrosalpinx is therefor, especially apt to be encountered where there is a history of longstanding infection, with no exacerbations for many years.

Pyosalpinx:

The mechanism by which retention of pus produces a pyosalpinx is in many respects similar to that involved in the development of a hydrosalpinx. The fimbriae are indrawn to a certain extent, but closure is aided by more rapid fusion of the fimbriae owing to destruction of the surface epithelium. Occlusion is often effected through fusion of the abdominal ostium to neighbouring organs; also retention of pus may occur through swelling of the mucosa alone.

A pyosalpinx of long standing may consist of a thick wall, composed almost entirely of connective tissue without a trace of muscle. Such tubes are always adherent to adjacent structures due to the associated perisalpingitis. On section, the mucous membrane of a pyosalpinx may be bright red, yellow or grey in colour.

Microscopically, there is seen to be much desquamation of the surface epithelium, which may be shed entirely; where the epithelium persists, it becomes many-layered, and thickened. The individual cells, instead of being cubical, are round or irregular.

During acute suppuration the epithelium first disappears at the summits of the main plicae and their branches. The extremities then adhere and organic union occurs producing pseudofollicles, which may persist and be found in the thicker parts of the wall of the pyosalpinx. In large pus-sacs the entire mucous membrane may almost disappear, leaving nothing but a lining of granulations. Even here traces of the mucosa, in the form of displaced follicles, may be found in the fibrous tissue composing the sac-wall (salpingitis follicularis).

Usually the contents of a chronic pyosalpinx are sterile.

Chronic Interstitial Salpingitis:

The tube is enlarged, sometimes enormously, sometimes only slightly. The enlargement is not necessarily due to distension of the tube with exudate, but often is due to the great thickness of the wall itself. The fimbriated extremity is completely or at times only partially closed, usually with inversion of the fimbriae, though some of the latter may still be visible externally. Very frequently the end of the tube, when completely sealed, is rounded and bulbous, and practically always the tube is adherent to surrounding structures from perisalpingitis.

As a result of the infection and repair within the tubal musculature, the wall becomes thickened (from fibrous tissue), tortuous and rigid.

Microscopically one finds extensive infiltration of all the tubal layers, but especially the mucosa, with round cells and usually a considerable number of plasma cells; the muscle layers become replaced largely by fibrous tissue.

Chronic Salpingo - Oophoritis:

Many cases of chronic salpingitis are non-suppurative and not accompanied by dilatation of the tube. Marked perisalpingitis is present together with a moderate degree of thickening of all layers of the tubal wall. Without exception the ovary shares in the inflammatory process and hence chronic salpingo-oöphoritis is the term correctly applied to this condition.

Very often the tube and ovary become glued together in an indistinguishable mass; this is best called a tubo-ovarian inflammatory mass.

It is not uncommon to find inflammatory cysts filled with clear serous fluid. The cysts represent encapsulation of the original serous exudate. The inflammatory cyst may completely envelope the tube and ovary and extend down into the cul-de-sac.

In chronic pelvic infection, most of the pelvic organs become involved. As already mentioned, peri - oophoritis is common; this results in multiple retention cysts, situated usually under the thickened capsule.

Typically the uterus is retroverted and fixed by adhesions. Firm, fibrous adhesions weld the tubes and ovaries to the back of the uterus and to the lateral pelvic walls. Loops of large and small bowel are tethered to the uterus and adnexa and adhesions attach the bladder to the uterine fundus.

MATERIALS

&

METHODS

The patients in this study were all investigated by myself at the New Somerset Hospital, Cape Town, which caters only for Non-White patients. The free patients attending here are of the poorest sections of the community.

The series covers a three-year period from 1960 to 1962. During this time there were 2,420 admissions to a twelve-bedded Gynaecology Ward. Of this 411 were suffering from chronic inflammatory disease of the pelvis and its complications. This gives an incidence of 16.9 %. It must however, be borne in mind that only those patients requiring surgery or who are very ill with high temperatures and signs of peritonitis are admitted. Consequently it is generally conceded that the incidence is much higher and it forms a problem of considerable magnitude.

The high incidence of the pelvic infection in the Non-white group in Cape Town has been emphasised by Louw (1953), Claassens (1958), and Rosnick (1962). Stallworthy (1958) and Charlewood (1956) mention the high incidence in Non-whites in South Africa as a whole.

Walker and Baker (1961) quote an incidence of 1.9 % over three years for acute pelvic infection and mentions that "refractory" cases are significantly lower than reported by others.

Ringrose (1960) states that acute salpingitis represents 24 % of all gynaecological admissions to the Receiving Hospital, Detroit.

Most authors agree that there is a higher incidence in Non-whites, mainly for socio-economic reasons (Mohler 1949, Huffmann 1962 etc).

In the diagnosis of chronic pelvic inflammatory disease, particular care was taken to exclude cervical erosions. As emphasized by Louw (1953) as the "Cervical Syndrome" can mimick chronic pelvic infection closely.

However, the diagnosis was obvious in most of the cases and was made on the history, abdominal and vaginal examination, salpingography in some cases, laparotomy in most cases and often confirmed by histological examination.

Despite improved prophylaxis and therapy, patients suffering from inflammatory conditions of the Fallopian tubes with the associated prolonged course, deficient healing and resulting infertility, constitute an important medical and social problem.

The data on these patients can be divided into two parts.

Part I :

Treatment by surgical means.

Part II :

Treatment by medical means.

PART I

TREATMENT BY

SURGICAL

OR

MECHANICAL

METHODS

"The introduction of antibiotics and chemotherapeutic drugs more than twenty years ago, did not completely solve the problem of treating bacterial genital infections. On the contrary, on some occasions it has become even more complex".

Birnbaum (1959).

There were seventy-seven patients in this section. They can be subdivided on a surgical basis into -

Group I :

Those where conservative , extirpative surgery was carried out.

Group II :

Those where conservative, reconstructive procedures were effected.

Group III :

Those where radical surgery was performed.

GROUP I

CONSERVATIVE, EXTIRPATIVE

SURGERY

"Gynaecology comes near to religion. The female organs of reproduction and their accessories are sacred, as future generations are bound up in them. The main object of this speciality is the conservation of these organs - no matter how radical the attempt".

J.T.LOUW (1953).

In this group there were fourteen patients.

Age :

The majority of patients (eight) were under thirty years of age.

The age distribution is shown in the accompanying graph. (Fig 1.)

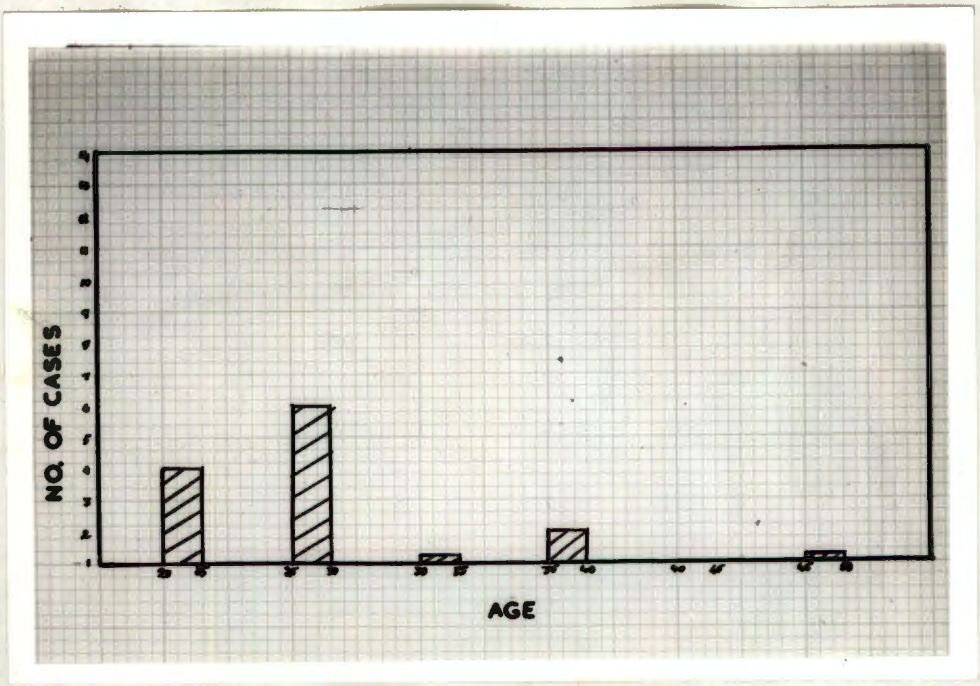

Fig 1

Abortion: Three cases had one or more abortions.

Parity :

Three had never been pregnant. There were four with only one child; one with two children and two patients had three children. But all of these women had had their last child three or more years ago and wanted more. One patient was aged thirty-seven years with four children, had remarried and desired offspring from her second husband.

Previous History of Pelvic Infection :

Although only five patients gave a history of previous pelvic inflammatory disease, on examination and at laparotomy, it was obvious that all must have had previous pelvic infection.

Pain :

All had had pain in the lower abdomen for varying periods of time; nagging, constant but quite severe in many.

Menses :

The majority (eight cases) had menstrual irregularities varying from amenorrhoea to menorrhagia, but mostly the latter.

Pelvic Examination :

All had tubo-ovarian masses on vaginal examination with varying degrees of tenderness.

Indications for laparotomy :

In three an ectopic pregnancy could not be excluded by the usual means.

Two were operated upon for pelvic masses felt abdominally.

In two patients perforation of a tubo-ovarian abscess was suspected.

Seven cases had had several attacks of acute recrudescences of chronic pelvic inflammatory disease necessitating attendance at hospital and often admission; they required expensive antibiotic therapy and were incapacitated and off work for long periods of time.

Findings at Laparotomy :

The usual picture is as follows -

Distortion of pelvic organs by adhesions of recent and longer duration, tethering one or both tubes and ovaries to the postero-lateral pelvic wall; attaching large bowel to the tubo-ovarian masses. The tubes are distorted by old inflammation, often distended by sterile pus; usually the tube is attached to the ovary forming a tubo-ovarian inflammatory mass. One side is more markedly affected than the other but in all cases there was involvement of both sides. (FIGS. 2 & 3)

The affected ovaries show a thickened tunica albuginea with numerous sub-capsular simple cysts varying in size; occasionally the ovary contains a single large cyst which might be of corpus luteum origin, often with old haemorrhage in it. The uterus is displaced by adhesions, but of normal size. Some free serous peritoneal fluid is often found. The whole picture is one of acute exacerbation of a chronic infection. This was confirmed in most cases by histological examination.

FIG 2

FIG 3

Management :

General Supportive Measures :

These include bedrest usually in a semi-Fowler's position; adequate fluid intake; high calorie diet; full vitamin supplement; judicious use of analgesics; attention to regular bowel actions.

Antibiotics :

The use of these follows the accepted general principles. Cervical swabs revealed no growth in ten cases; coliforms in three cases and enterococci in one case. Likewise the culture of pus where present in the Fallopian tubes was sterile in most cases.

The antibiotic sensitivity involved Chloromycetin, Kanamycin and Neomycin where organisms were isolated. This is in keeping with the studies of Stevenson et al (1951), de Alvarez and Figge (1955), Ringrose (1960), Holtzhausen (1961) etc.

Accordingly, where a temperature of 100 degrees Fahrenheit or more was present before operation, a broad spectrum antibiotic was administered in the usual dosage. Operation was undertaken after forty-eight hours of being apyrexial and under heavy antibiotic cover.

Post-operatively antibiotic cover is continued or begun if not being used already; very often the antibiotic is given intravenously in the first twenty-four hours as a 5 % Dextrose-in-water infusion is usually proceeding.

Where antibiotic sensitivity is obtained, the correct antibiotic is used. Post-operative antibiotic administration is continued until the temperature has been normal for at least three days.

Antibiotics are given to cover the first three menstrual periods after operation; however, this was seldom carried out for lack of co-operation on the part of the patients.

It is now suggested that one either suppresses menstruation for three months with one of the new progestational agents; or that antibiotics are continued for at least six weeks to ensure adequate treatment as has been followed with pyelonephritis (Anderson and Petersdorf 1962; Grieble and Jackson 1958; Rhoads et al 1952).

Surgical Procedure :

Many of these cases were operated upon not in the actual acute phase, but in the early subacute phase.

The abdomen was always opened through a lower longitudinal incision to allow adequate access to the pelvic organs.

The tube and ovary which were more affected were carefully mobilised by blunt and sharp dissection and excised. This occurred in eleven cases; the two cases of ruptured tubo-ovarian abscess were drained per abdomen as the only procedure; in one case both adnexa were spared and only inflammatory cysts were removed.

Where necessary the uterus was hoisted forwards by plication of the Round ligaments. Raw areas were reperitonised with the help of bits of Omentum where necessary.

Except for the two cases mentioned above, drainage of the abdomen was not part of the routine procedure.

Course and Complications :

The temperature in all cases settled after an average of five to six days. All were discharged within twelve days except for three; the two who had peritonitis took seventeen & twenty-three days respectively to settle and the third developed a persistent sinus of the abdominal wound which closed on conservative therapy after thirty-three days.

Follow-up extended over half to two-and-a-half years.

ILLUSTRATIVE CASES

CASE I. : F.S. (No. 2693/62). Aged twenty-nine years.

Had no children; was suffering from pelvic pain for three months; also had dysmenorrhoea but menses were regular. She had had several attacks of pelvic inflammation necessitating prolonged treatment and invalidism.

On examination she was apyrexial; a tender mass was palpable in the hypogastric region.

Pelvic examination revealed irregular masses on either side of the uterus pushing it upwards.

At laparotomy a large tubo-ovarian inflammatory mass was found on the right, with a smaller one on the left. The right mass was excised. (FIG.4)

Histology:

The presence of active on chronic inflammatory changes involving both ovary and tube was noted. (FIG.5)

FIG4

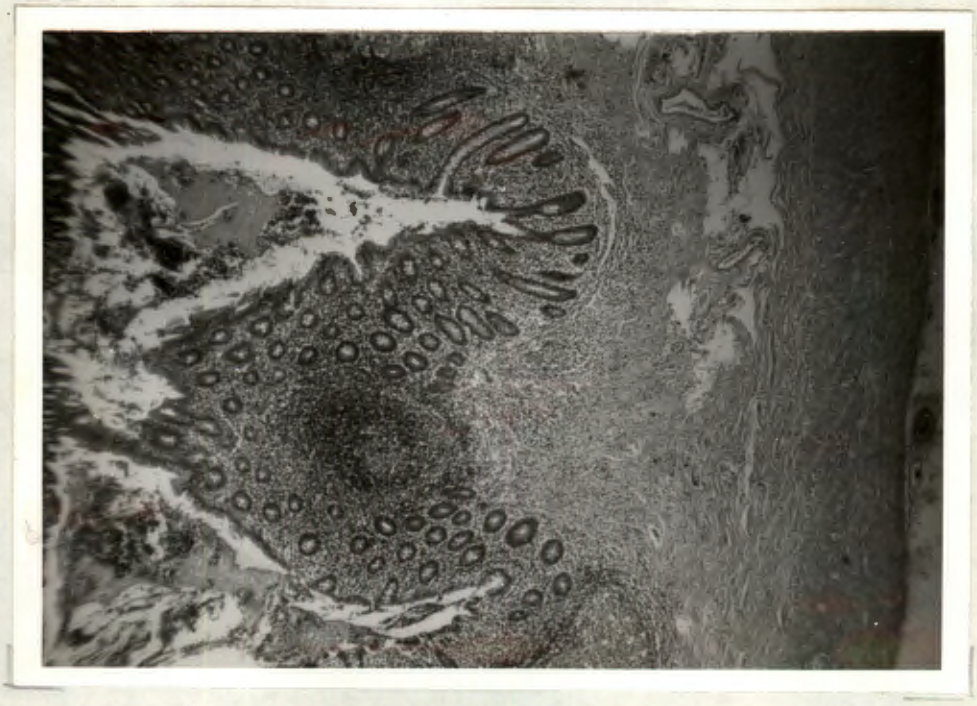

FIG5

CASE 2 : S.A. (No. 2313/62). Aged twenty-eight years.

Had one child two years old. Had lower abdominal pain for five days. The menses were regular. There was a long past history of pelvic trouble.

Examination revealed tenderness of the lower abdomen and a right tubo-ovarian mass was palpated on vaginal examination spreading to the Pouch - of-Douglas.

At laparotomy bilateral tubo-ovarian masses were found with the bigger one on the right; this one was excised leaving the left side intact. (FIG.6)

FIG 6.

RESULTS AND DISCUSSION :

Not a single case has so far required attention for a flare-up of pelvic infection.

Pelvic examination in all revealed the aftermath of chronic pelvic infection. No one has as yet conceived.

It must be stated here that it is not our policy to subject women who have a recrudescence of pelvic inflammatory disease to operation. However, if these women have had several attacks which lay them low for prolonged periods of time; which require their attendance at or even admission to hospital; whose personal habits and general low health render them more liable to exacerbation; who virtually beg one to operate and yet in the same breath implore a chance for further procreation; who in short "earn a laparotomy", then an operation is indicated. This should be in the nature of a radical procedure as so vehemently emphasized by Huffmann (1962) in Cape Town, however, that these same women would never consider a hysterectomy for curious social reasons and also because of their profound desire to be able to become pregnant. Our results as far as general health of the patients is concerned are satisfactory. However, the ultimate prognosis in regard to conception must be poor in these cases.

Conservation of the Fallopian tubes was advocated by H.Martin (1885 & 1895), Gouilloud, Seitz, Strassmann, Jallee, Douay, A.Mayer, Toppuse, Reiprick, Twoody, Bonnet and others.

Before the antibiotic era it was generally accepted that operation should be deferred until the disease had become #quiescent because of the associated high mortality when operating in the acute stage.

However, Bourne (1923) was desperately keen to avoid the crippling sequelae of acute salpingitis and proposed operating in the acute phase. He was unconvinced of the alleged increased mortality and he was supported in this contention by Bonney. The operation should be in the form of a slit salpingostomy to allow drainage of the tubes; however, where the tubal mucosa was destroyed a salpingectomy should be done. Bourne did not receive unanimous approval.

For acute primary salpingitis, elective operation has virtually disappeared. An exception is Van Wiedenbach who recommends early operation with aspiration of pus, washing with chemotherapeutic agents and liberation of adhesions. To most gynaecologists these recommendations are dubious.

It is stated that surgery for recurrent salpingitis is becoming infrequent; this is not our experience in Cape Town.

Parsons and Sommers (1962) recommend operation if :

(1) the attacks recur too frequently.

(2) the pain is persistent and incapacitating.

(3) the recurring episodes are accompanied by signs of peritonitis.

(4) signs of intestinal obstruction appear.

We agree with Falk (1947), Hodberg and Spotz (1958) that when a tubo-ovarian mass forms, chemotherapeutic agents are unlikely to penetrate it in high enough concentration to effect resolution. This was the pathology in most of our cases (thirteen out of fourteen).

All agree that operation should be performed in the quiescent stage, preferably under heavy antibiotic coverage; this precaution should also be adopted when operating inadvertently in the acute phase. Most authors postpone operation until the temperature has remained normal for at least two weeks, the leucocyte count and sedimentation rate are normal. We have tended to operate sooner under cover of the correct antibiotic in maximum dosage and the results have been favourable. This was also the experience of Stevenson et al (1951) who used chloramphenicol. Likewise this was recommended in cases of ruptured tubo-ovarian ~~disease~~ abscesses by Collins and Jansen (1959), de Alvares and Figge (1955), Te Linde (1953) and by Walker and Baker (1961) in refractory cases of acute pelvic infection.

The removal of one tube at operation when both are invariably affected, must expose the patient to the potential risk of further trouble. This must be fully explained to her as well as the fact that the remaining tube will in all probability require further treatment, surgical or otherwise, to achieve pregnancy.

It is obvious that surgical treatment is far from ideal in the management of these difficult cases. But conservative measures, with antibiotics at the spearhead, have been equally disappointing. Stevenson et al (1951), de Alvares and Figge (1955) and Hedberg and Spets (1958) were impressed with the use of antibiotics in primary, acute salpingitis (which we all accept) but in exacerbations this treatment was only symptomatic and palliative.

The use of corticosteroids in cases of chronic pelvic inflammatory disease refractory to conservative measures was enthusiastically reported on by Collins, Davidson and Mathews (1952), Hurtig (1955 & 1957), Wills et al (1956 & 1958), Poorman and Mc Ganity (1957), Collins and Jansen (1959).

A broad spectrum antibiotic was used in conjunction with the steroids. The regimen was aimed at infections where the acute stage had passed, but in which the lesions had degenerated into a smouldering granulomatous mass which sequestrated the organisms from the bloodstream, thus preventing the complete extermination of the infection by the patients defense mechanisms aided by antibiotics.

This subacute phase then of itself had become a disease, which would gradually resolve over a long period of illness, leaving behind it destructive scar tissue and destroyed organs. The intention was to use the corticosteroids to disperse with the body's defence against the infection by suppressing the inflammatory response and relying on the proven specific antibiotic to destroy the pathogenic organisms as they were released.

The results were most gratifying and astounding. All remark that the dramatic softening and disappearance of pelvic masses and / or induration must be observed to be believed. The striking improvement was also noticed at laparotomy in some cases in that adhesions were few and the procedure technically much easier. Also, some pregnancies have followed this regimen. It is concluded that from the immediate results obtained, this type of therapy is of advantage in the treatment of chronic, recurrent pelvic inflammatory disease.

However, Collins and Janson (1959) record some cases who, inspite of this regimen, failed to respond and developed tubo-ovarian abscesses, necessitating surgery. Also, it is mentioned by Wills (1956) and generally agreed that corticosteroids could mask a ruptured tubo-ovarian abscess apart from other general complications which will be mentioned in Part II.

We feel, however, that in our cases this regimen should be evaluated and a trial will soon be undertaken.

G R O U P II

CONSERVATIVE RECONSTRUCTIVE SURGERY IN CASES OF CHRONIC INFLAMMATORY DISEASE OF THE FALLOPIAN TUBES

"Being entrusted with the female reproductive organs, it is the doctor's bounden duty, not only to conserve them, but also to keep and leave the passages patent".

J.T. Louw (1953).

There were fifty-three cases in this group.

AGE : The age distribution is shown in Fig. 7.

The ages varied between twenty to forty years. The vast majority were in the period of active reproductive life.

Thus forty-nine patients were under thirty-five years old.

ABORTION:

Ten cases had a previous abortion.

One case had a Right Salpingectomy for an ectopic.

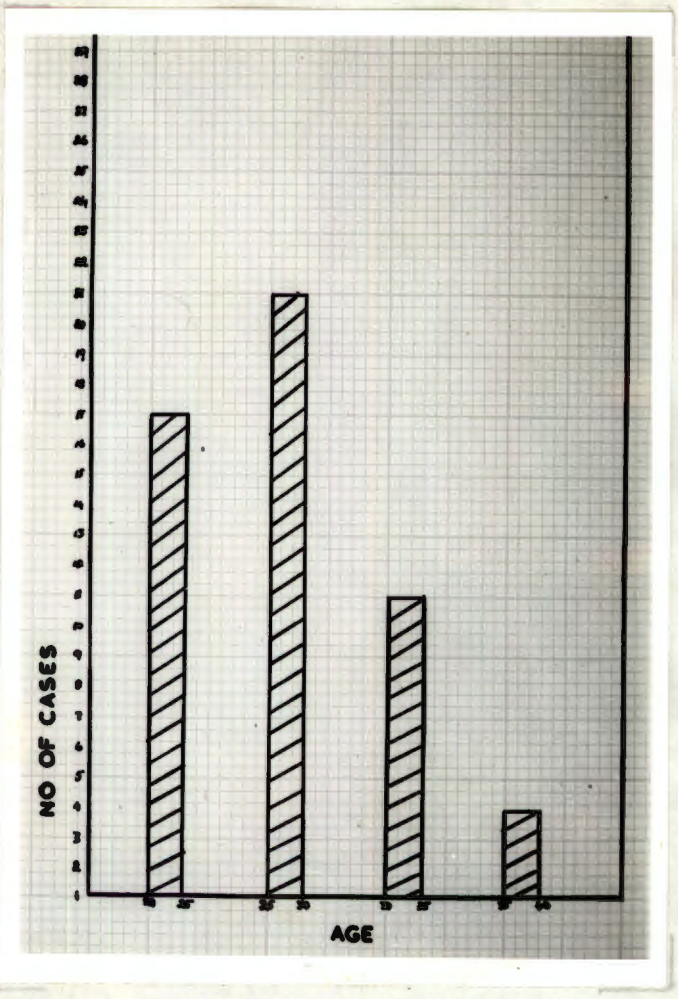

FIG 7

PREGNANCIES : There were thirty-five patients who had at least one child; four had two children and one had five children.

Of those who could recall their last pregnancy, this had occurred between three to seventeen years ago. The woman with the five children had the last one six years ago and was eager to have more. Eight patients had never been pregnant.

PAIN: This was a prominent feature in this group. The pain was of a constant, chronic nature, confined to lower abdomen; often aggravated by menstruation; the pain was also experienced on having sexual intercourse making marital life for these patients very wretched.

MENSTRUAL IRREGULARITIES:

These were present in ten cases, mainly in the form of menorrhagia.

INDICATIONS FOR LAPAROTOMY :

In all of these cases there was a long drawn-out history of pelvic infection. In twenty-five cases the initial episode of infection was related to child-birth either full-time or abortion and one patient did not conceive again following a right salpingectomy for an ectopic pregnancy.

Although infertility was a major consideration in all of these cases, it was felt that preliminary infertility investigations would cause a recrudescence of the tubal pathology present in forty cases and that a laparotomy would best serve the interests of the patients.

In addition Linton Smith (SMITH) advises that no case of infertility can be regarded as completely treated until laparotomy had been performed. In two cases the presence of fibroids the size of eighteen-to-twenty weeks gestation indicated laparotomy though we agree that full fertility investigation should be performed in cases of smaller fibroids.

In eleven cases preliminary infertility investigations were performed in that a diagnostic curettage and hystero-salpingograms were carried out. Only one hystero-salpingogram sufficed in view of the past history of chronic pelvic inflammatory disease; however, more than one were done when cornual block occurred.

These procedures will be described in detail in Part II.

It must be emphasized that the male patient in these cases had either "sired" offspring or had satisfactory semen on investigation.

PATHOLOGY AT LAPAROTOMY :

In all cases there were numerous old adhesions in the pelvis, sometimes fixing the Omentum and large bowel to the adnexa and back of the uterus.

The tubes and ovaries were bound together forming tubo-ovarian inflammatory masses, often fixed to the back of the uterus and Pouch-of-Douglas.

Pus was never found and the tubes were distorted and thickened. The ovarian capsule was thickened with numerous cysts underneath it. These were usually simple follicular cysts but occasionally persistent corpus luteum cysts were found, sometimes with haemorrhage in them.

The appendix was never at fault and the pelvic colon unaffected in these cases.

PROCEDURE :

A subumbilical longitudinal incision was always employed to give adequate access to the pelvic structures.

Adhesions were gently freed by blunt finger or swab-dissection assisted with a pair of scissors. The tubes and ovaries were mobilised as best possible. Salpingolysis was invariably necessary. Before doing definitive tubal surgery, the tubes are insufflated "from above" with saline or air.

Three types of salpirgostomy procedures were carried out in these cases depending on the findings - cuff, fishmouth or "window", as illustrated in Figs. 8, 9+10.

Particular attention is paid to haemostasis around the new openings. Fine plain catgut used to be used but we are now employing electric cautery point for these bleeding parts as suggested by Stallworthy, Green - Armytage et al. Polyethylene hoods were not employed as devised by Rock, Wainer et al.

After completing the salpingostomy, the tubes are insufflated retrogradely again to demonstrate satisfactory patency. The ovary was approximated to the new opening where this was deemed necessary.

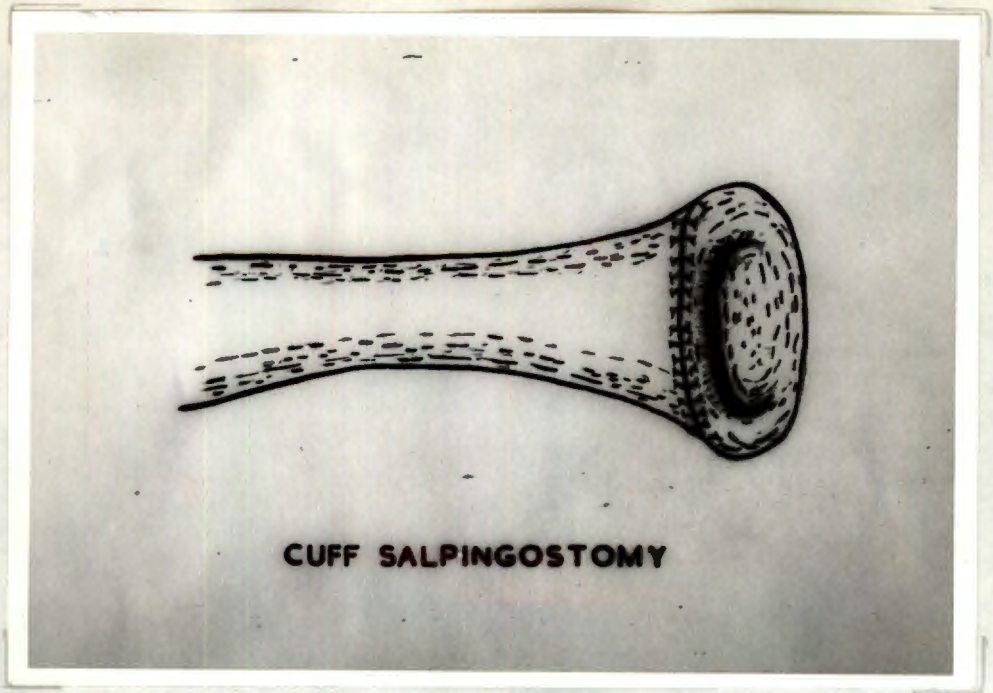

FIG 8

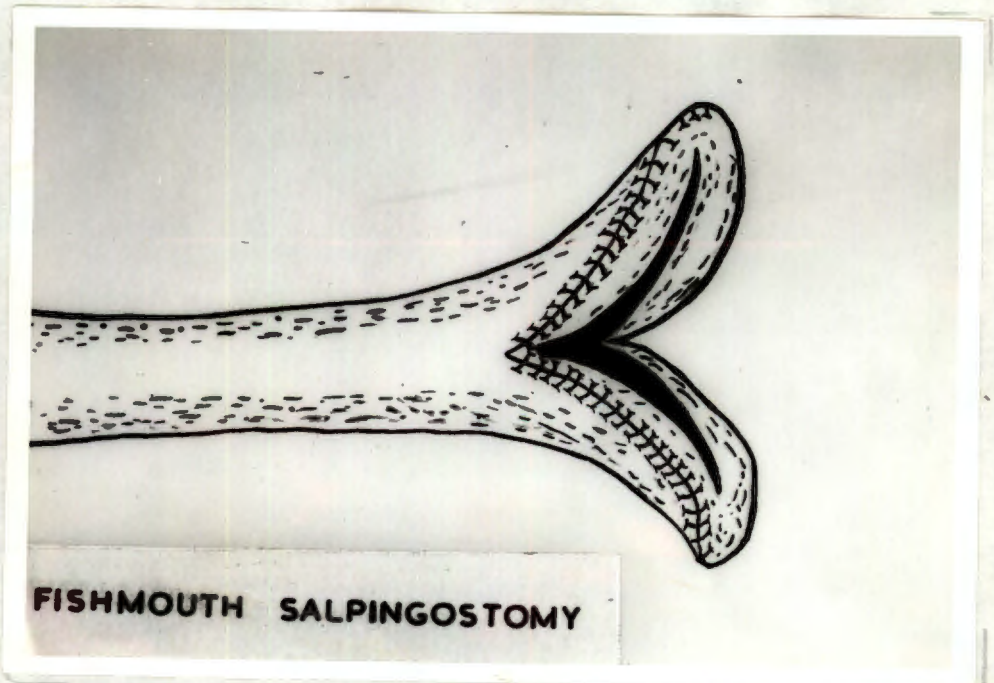

FIG 9

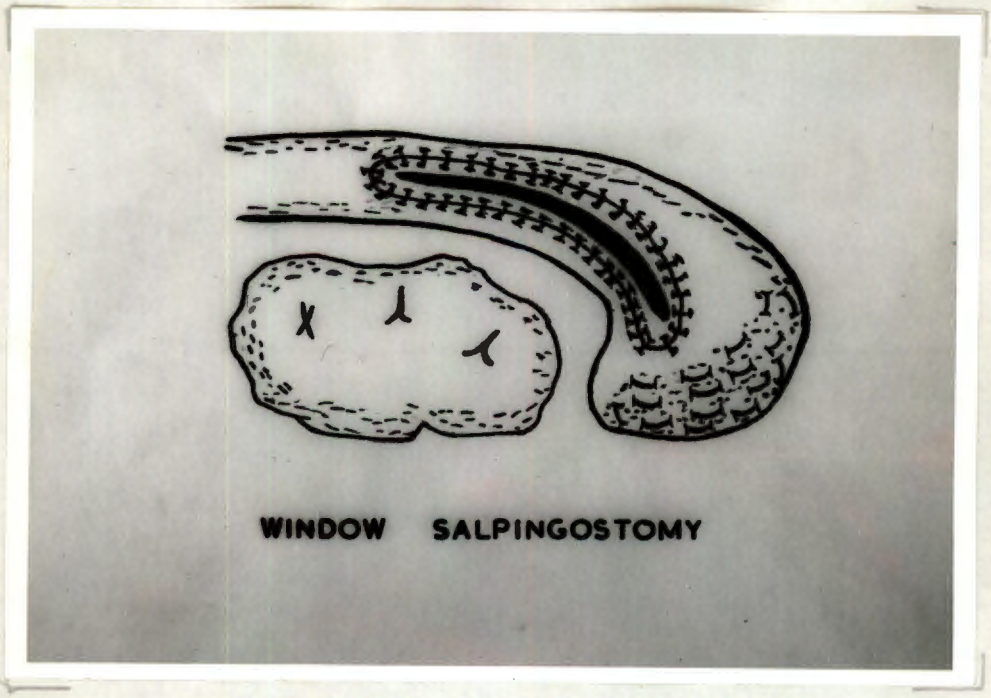

FIG 10

A biopsy of the tube was taken in most cases for histology.

In seven cases one tube had to be excised because at the time it appeared hopelessly diseased and irreparable.

In five cases tubal implantation with terminal salpingostomy was performed without using polyethylene splints.

We did not do any resection-anastomosis.

In forty-seven cases the ovaries were multicystic and wedge resections were performed.

Where necessary the uterus is suspended forwards by plicating the Round ligaments.

Raw areas are reperitonised where possible, sometimes using a piece of omentum.

COURSE AND COMPLICATIONS :

These patients had no special post-operative management. Routine antibiotics were given orally in order to diminish the chance of a recrudescence and this did not occur in any of the patients. We did not employ corticosteroids post-operatively.

A follow-up hystero-salpingogram at three months was recommended but few patients co-operated. However, over a period of two and a half years we have been able to obtain a hystero-salpingogram in all of these patients.

HISTOLOGY :

This demonstrated Chronic Salpingitis. (Fig. 11)

No evidence of Tuberculosis was found in any of these patients.

Fig. 11

CASE 3. : V.H. (No. 791/62). Aged thirty-two years.

Had one child twelve years ago and a miscarriage ten years ago; never conceived subsequently.

Menstrual history normal, apart from some dysmenorrhoea.

Examination revealed a left-sided tubo-ovarian mass extending into the Pouch-of-Douglas.

Laparotomy revealed pelvic adhesions; a left ovarian cyst and bilateral fimbrial-end occlusion of the tubes.

The adhesions were freed; the ovarian cyst resected and bilateral salpingostomy performed.

Both Round ligaments were plicated.

Histology: (Fig.12)
(i) Haemorrhagic corpus luteum cyst.
(ii) Chronic salpingitis.
No evidence of tuberculosis.

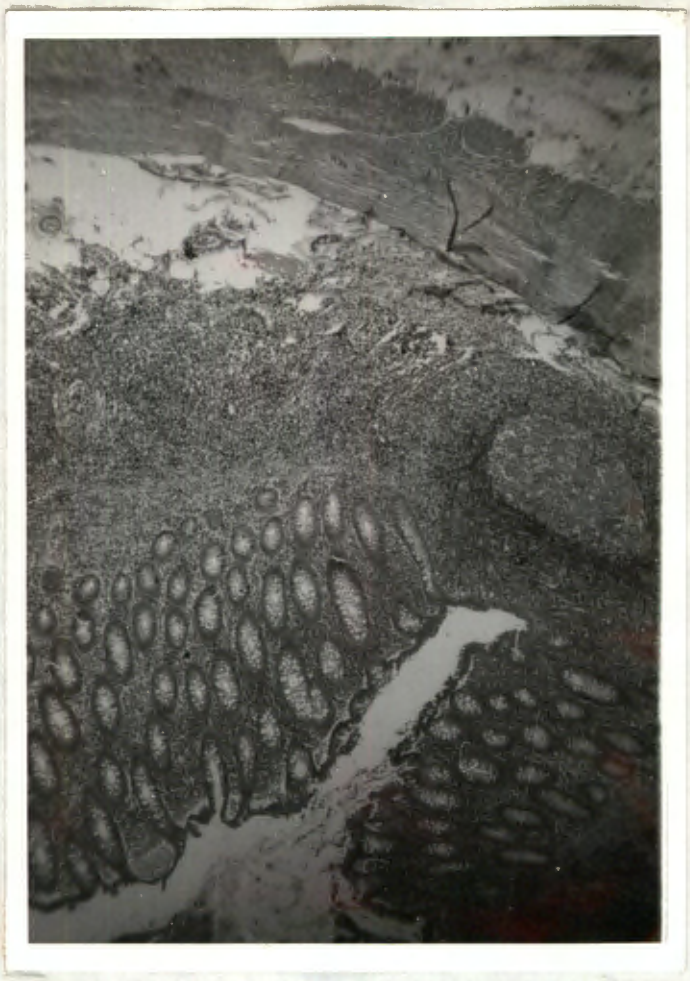

FIG. 12

CASE 4 : M.L. (No. 27/62). Aged twenty-six years.

Had one child seven years ago and a miscarriage six years ago.

Presented with chronic lower abdominal pain for about four years. No menstrual irregularities apart from dysmenorrhoea.

Examination revealed a left-sided tubo-ovarian mass with induration of the right adnexum.

At laparotomy a left tubo-ovarian abscess was found which was excised. Adhesions were freed and the right tube required freeing from adhesions and a terminal salpingectomy. The right ovary was cystic and was resected. Both Round ligaments were plicated.

Histology: (Fig. 13) The Fallopian tube showed a marked chronic non-specific inflammatory process.

No evidence of tubercle formation.

FIG. 13

CASE 5 : A.B. (No. 2239/62). Aged twenty-seven years. Had two children of whom the youngest was eleven years old. Remarried but had not become pregnant from her second husband who had children elsewhere. A diagnostic dilatation and curettage revealed a secretory endometrium and no evidence of tuberculosis. A hystero-salpingogram revealed bilateral hydro-salpinges. (FIG. 14)

At operation adhesions were freed; both ovaries required wedge resection.

Bilateral salpingolysis and salpingostomy were performed.

FIG 14

CASE 6 : D.N. (No. 867/62). Aged thirty-eight years.
Had one child years ago and wanted more.
Menstruations were regular.
Bilateral cystic ovaries and tubal thickening palpated on vaginal examination.
Laparotomy revealed pelvic adhesions with a fibrotic right tube and a distorted distally occluded left tube. Both ovaries were cystic and a wedge-resection of each carried out.
The right tube was sacrificed and the left required salpingolysis and salpingostomy.

Histology: (FIG.15) A low grade chronic salpingitis noted.
No evidence of tuberculosis.

FIG 15

RESULTS AND DISCUSSION :

Symptomatically all were much improved; there was less pain with menstruation and on intercourse.

Vaginal examination revealed residual adnexal thickening in all cases with palpable ovarian cysts in fifteen cases.

TUBAL IMPLANTS WITH SALPINGOSTOMY	SALPINGOSTOMY ALONE
5	48

TOTAL : 53

HYSTERO - SALPINGOGRAMS :

Follow-up hystero-salpingography revealed Bilateral patency in two cases and Unilateral patency in two cases. There were no tubal patencies in the tubal-implantation group. Thus out of fifty-three patients only four successful results were obtained in regard to resultant patencies, an incidence of 7.5 %.

The patients with the resultant patencies will be described in detail.

Four successes.

CASE 7 : G.G. (No. 9284/61). Aged twenty-eight years.
Had one miscarriage years ago.
Chronic pelvic pain since time of miscarriage.
No menstrual disturbance but severe dysmenorrhoea.
A large right-sided tender tubo-ovarian mass palpated per vaginam.
Laparotomy showed pelvic adhesions; the right tube and ovary bound together; the left tube occluded distally.
The adhesions were gently freed; the tubes and ovaries mobilised and separated; both ovaries were partially resected; bilateral distal salpingostomy performed.

A follow-up hystero-salpingogram revealed bilateral tubal spill.

CASE 8: E.R. (No . 2619/62). Aged thirty-four years.
She had one child of thirteen years.
Menses regular. Some abdominal pain for years.
A secretory endometrium was obtained on curettage and no evidence of tuberculous endometritis detected.
A hystero-salpingogram revealed distal occlusion. (Fig.16)
At laparotomy pelvic adhesions were freed and both tubes required terminal salpingectomy.
A follow-up hystero-salpingogram revealed patency of the left tube only. (Fig.17)

FIG. 16

FIG 17

CASE 9 : F.B. (No. 2853/62). Aged twenty-nine years.

Had a miscarriage when she was seventeen years old.

Now married five years and failed to conceive.

Her husband had children elsewhere.

A preliminary curettage revealed a secretory endometrium and no tuberculosis.

On hystero-salpingogram bilateral fimbrial occlusion was seen. (FIG. 18)

At operation pelvic adhesions were found. The tube and ovary on each side were matted together and adherent to the posterior aspect of the uterus.

Both tubes and ovaries gently freed; bilateral salpingostomy performed as well as bilateral ovarian wedge resection.

A follow-up salpingogram revealed patency on both sides. (FIG. 19)

FIG. 18.

FIG. 19.

CASE 10 : J.S. (No. 4025/62). Aged twenty-two years.
Had one child four years ago and a miscarriage two years ago.
Complained of chronic lower abdominal pain.
Menses were regular.
A left-sided tubo-ovarian mass was palpated vaginally.
There were adhesions at operation; the tube and ovary were bound together. The right tube and ovary were freed and a salpingostomy and partail ovarian resection were performed. The left tube and ovary were inseparably matted together and were removed.

Histology: Chronic tubal inflammation; no evidence of tuberculosis. A follow-up hystero-salpingogram revealed patency of the remaining tube.

PREGNANCY

As yet there has not been a single pregnancy in this group. However, Sir John Peel suggested that the time interval between operation and success may be very long; - in one of his cases seven years had elapsed before the successful pregnancy occurred. Palmer advises not to abandon hope for at least four years after the operation.

We are hoping that similar good fortune befalls our patients for it is the successful performance of reconstructive operations, especially in the face of dense inflammatory adhesions, that elevates gynaecology to the realm of a fine surgical art.

Our results must be viewed against the background of the gross, destructive and neglected pathology encountered. It is doubtful if other authors have dealt with similar cases. In their book of impaired fertility, Green - Armytage and Moore - White (1962) lay down very strict, precise and well-defined criteria for operation, which will disqualify all our patients.

This is borne out by their stated experience with patients from West Africa and the West Indies who had previous history of pelvic infection and in ~~which~~ whom the adhesions were so dense and the pelvic organs so fixed that they could not carry out any reconstructive surgery.

Likewise the results of Shirodkar (1962) are poor when inflammatory changes are gross.

Yet these three authors have the best published results in the world!

J.P.Greenhill (1956) pointed out that the tubal factor continues extremely important in infertility and is the greatest single cause of infertility in the female.

It has been established ~~that~~ by both clinical and laboratory studies that the tube is a functional structure, not a conduit. It plays an important role in receiving the ovum and spermatozoa and in facilitating fertilisation and migration of the embryo into the uterus.

Tubal patency is now recognised as incomplete evidence of a normal tubal factor.

DISCUSSION

As the vast majority of patients in this group were improved symptomatically, the results are satisfactory. But from the point of view of restoration of tubal function, the results are poor. (Resnick 1962).

Thus a patency rate of 7.5 % (four cases) in fifty-three patients with no pregnancies is a poor result when compared to some other series. However, results have varied considerably in published reports.

It has become accepted that the tubal factor is the commonest cause of sterility. Grant (1958) found that the tubal factor was present in 30 % of infertile couples. Also in six hundred-and-ninety-seven patients partial or complete occlusion of the Fallopian tubes was one of the major etiologic factors in two hundred-and-ten (30 %) (Mazer and Israel 1951).

They consider it the most formidable factor in the management of sterility. Moore - White gives a figure of 20 - 30 % of cases of subfertility.

Greenhill (1956) believes it to be the greatest single cause of infertility in females; Davis and King (1956) agree with this and estimate it to be the responsible factor in about half of five hundred cases.

Westman (1950) examined one thousand, four hundred-and-two cases of female sterility without signs of endocrine disease and found that in five hundred-and-twenty-nine (37.7%) it was a sequela of salpingitis.

Schultze (1941) claimed that 43% of all sterile women have bilateral tubal occlusion, usually due to salpingitis.

Grünberger (1953) contended that tubal occlusion due to inflammatory disease of the adnexa was responsible for 45 - 50% of all cases of female sterility.

As a result of our lack of pregnancies and low incidence of patency following tubal operation, we must define the situation absolutely clearly to the patient and her husband, noting that general health would be improved (Resnick).

In 1936 Bethel Solomons wrote despairingly of the poor success rate in the conservative treatment of tubal infection. He agreed that as a result the situation must be clearly defined for the patient and her husband.

Maser and Israel wrote despondently about the unsatisfactory outcome of tuboplastic operations. Consequently, they do not feel satisfied in doing tuboplastic operations unless there is a more specific indication for laparotomy, such as an ovarian cyst or chronic appendicitis. If surgical treatment of occluded fallopian tubes is undertaken specifically for the relief of sterility, then the following exacting prerequisites should be met : -

(1) Absence of all other etiologic factors in the sterile union, irrespective of their apparent unimportance.

(2) Failure to open the Fallopian tubes by at least ten insufflations at a pressure of 200 millimeters of mercury. This would be dangerous in the type of patient that we treat.

(3) Demonstration by Hystero-Salpingogram that the occlusion is bilateral, that it is total and that it is located at the fimbrial end in at least one tube.

(4) Acceptance by the Barren couple of a 5 % chance of pregnancy as a result of the operation.

Greenhill (1955) believed tubal surgery to give very poor results in the best hands after analysing Sieglor and Hellman's "world" series.

He concluded that over twenty years there had not been much improvement.

Lee Burton and Anne Southam (1955) after analysing one thousand, two hundred-and-thirteen cases, point out that occluded tubes were rarely amenable to treatment. But Sharman (1956) reporting on two thousand-and-eighty-nine cases state that there still is a definite place for surgery in tubal occlusion.

Andrews and Andrews (1955) commenting on reconstructive tubal surgery, conclude that although results have improved, they are still disappointing.

Sir John Peel (1956) points out that it is more important to know when to operate than the surgical technique used; that these unfortunate women are very gullible, anxious and persuasive; that because of the multitude of operations devised careful consideration should be given to the merits or otherwise of surgical interventions; that there is just as much scope for overenthusiasm, distorted judgement and even quackery as in endocrine or medical therapy; in the final analysis all these factors must be considered in order to ensure a satisfactory result in these few whose only hope of a successful pregnancy depends upon a triumph of surgical skill and above all judgement. He agrees that if one adnexum is more affected than the other, it often pays to remove in toto that tube and ovary. (See Procedure, Page 49).

Greenhill (1956) summarising the present status of tubal plastic operations, collected data on two thousand, one hundred-and-thirteen tubal operations.

The pregnancy rate was 19.1 % or one pregnancy after every five operations and one living child after every six-and-a-half operations.

The ectopic rate was 15.7% or one ectopic pregnancy after every six operations.

He concluded that though results are far better than twenty years ago, they are still far short of what they should be to justify indiscriminate plastic tubal operations.

Consequently in 1957 he insisted that the following conditions be present before undertaking tubal reconstructive surgery : -

(1) The patient must be in the childbearing period, preferably under thirty-five years and be a good surgical risk.

(2) She must have at least one functioning ovary.

(3) Both tubes or the remaining tube must be proved to be closed.

(4) There must be no other cause for the sterility but the tubal closure.

(5) There must be no tuberculous infection of the genital tract.

(6) The husband must be fertile and healthy.

We agree with these but in our cases there was obvious adnexal pathology; age is not a barrier in our opinion for even if the desired pregnancy did not result, the patient could not later regret any omission, which is very important for her peace of mind and domestic bliss in the years that follow.

Stallworthy (1958) has also been unimpressed with the results of tubal surgery.

Weiner and Castallo (1959) reviewing the whole subject are optimistic about the better results achieved with the newer surgical techniques using polyethylene splints and hoods. They stress the importance of careful selection of patients and correct delicate surgical technique.

However, they emphasise the point that when tubal damage is extensive from inflammatory changes as in most of our cases, it is doubtful whether these tubes can ever function normally again even should patency be attained.

They mention that all aspects be discussed with both partners but feel assured that many a couple would point out that a 20% chance of pregnancy is worth the risk of the operation for without it they won't have any chance at all.

Palmer (1960) showed improved results from 11.6% to 25.9% intra uterine pregnancies. He ascribes this to the use of prednisone post-operatively, although we find this difficult to comprehend as he does not seem to consider improved selection of cases, better technique, earlier operation etc.

Green - Armytage (1960) describes the new Hammersmith treatment making linear tubal incisions and injecting Hydrocortisone into the tubes. Gestation resulted in 46 % with 2 % Ectopic pregnancies. These outstanding results are confirmed in the textbook written by him and Moore - White (1962).

Kimball (1960) reports poor results - two babies from fifty-one patients. We agree entirely with him when he states that the more damaged and distorted the tubes are at operation, the poorer is the outlook.

Siegler (1960) presenting a historical survey of the status of tubal reconstructive surgery, concludes that the number of live births following surgery has been unimpressive.

In 1961 he and Hellman remain sceptical about the results.

Pulgnaia (1960) collected data on three thousand-and-eighteen operations performed by sixty-six surgeons via a questionnaire. Patency occurred in 53.9 % and pregnancy in 22.3 %.

Shirodkar (1960 and 1961) claims a 40 % pregnancy rate in cases of cornual block and ascribes the poor results of surgery to -

(1) inexperience

(2) improper selection of cases

(3) faulty technique.

Huffmann (1962) states that the disappointing results which follow tubal plastic operations create grave doubts as to whether the gynaecologist is ever justified in urging the sterile patient to undergo such a procedure. Plastic operations on the tubes are rarely successful when the pelvic viscera are meshed in a mass of post-inflammatory adhesions.

Parsons and Somers (1962) seem impressed with the results of the newer technique employing polyethylene splints and hoods.

Resnick (1962) confirms the poor results in Non-whites in Cape Town and states that tubular inflammatory destruction is the chief reason for this unsatisfactory state of affairs.

AUTHOR	TOTAL NUMBER of TUBAL OPERATIONS	TOTAL NUMBER of PREGNANCIES	LIVE BIRTHS	ABORTIONS	ECTOPICS	PATENCY
GREENHILL (1937)	818	54 (6.6%)	36	–	–	–
DOUAY & PALMER (1947)	121	14 (11%)	14 (11%)	–	–	–
COMINOS (1954)	37	16%	–	–	–	37.5%
BUXTON & SOUTHAM (1955)	35	2 (5.6%)	–	–	–	–
LANGLEY (1955)	32	22%	–	–	–	–
GRANT & MACKAY (1955)	122	30 (25%)	–	–	2	–
JOHNSTONE (1955)	27	8 (29.6%)	7	–	1	–
FERREIRA (1955)	23	3 (13.1%)	–	–	–	–
MULLIGAN & ROCK (1955)	163	–	–	–	–	70 (42.9%)
SIEGLER & HELLMAN (1956)	1354	–	12.4%	–	9.1%	–
HELLMAN (1956)	36	11.1%	–	–	–	54.8%
GREENHILL (1956)	2113	–	19.1%	–	15.7%	–
HARTL & LANGER (1956)	399	46.4%	–	–	–	–
CHALIER (1956)	71	11 (15.6%)	–	–	–	–
PEEL (1956)	48	8	–	–	–	–
OSTRY (1957)	9	–	–	–	–	1
CAUVET (1958)	69	18 (26%)	13	3	2	–
GREENHILL (1958)	964	8.5%	–	–	–	–
GREEN-ARMYTAGE (1959)	50	40%	–	–	–	–
MUTCH (1959)	42	20%	–	–	–	–
MOORE-WHITE (1960)	16	56%	–	–	–	–
PUIGMACIA (1960)	3018	672 (22.3%)	591 (19.5%)	–	81 (2.7%)	53.9%
PALMER (1960)	396	75 (18.9%)	52 (13%)	15.2% of 60 cases	23	–
GRANT & MACKAY (1960)	165	37 (22.5%)	–	–	8 (21.6%)	–
SIEGLER & HELLMAN (1961)	38	3 (7.9%)	–	–	–	–
CENTARO (1961)	15	2 (13.3%)	–	–	–	–
PASQUINNUCCI (1961)	62	2 (5.2%)	–	–	–	–
DE GROOT (1963)	29	1 (3.8%)	1 (3.8%)	–	–	4 (16.6%)

De Groot (1963) reporting from the Groote Schuur Hospital, Cape Town, which caters for all races, found one pregnancy from twenty-nine cases.

The following table reflects the success rates in tubal surgery in published works.

Types of Tubal Surgery:

The results must obviously vary with the type of operation performed and for obvious reasons the highest succes rate will occur in patients in whom the tube is least damaged by the effects of old inflammation.

Salpingolysis:

Uniformly good results can be expected when peritubal and perifimbrial adhesions are the only pathology encountered. (White, Stallworthy, Palmer, Pool et al). Some authors have used polyethylene hoods but it is doubtful if these have any advantages (Rock and Mulligan).

It is essential to secure haemostasis adequately; using the cautery point is better than the finest catgut.

Salpingostomy:

This procedure is used when the fimbriae have been damaged as in a hydrosalpinx formation.

Results have generally been poor though Rock and Mulligan have claimed better results with the use of Polyethylene hoods.

Green - Armytage (1960) using his new technique with Hydrocortisone has improved his results from less than 20% to 46%.

Siegler and Hellman (1961) reflect the general opinion when they call for a total reappraisal of the value of this operation when the cause of the occlusion is chronic salpingitis.
However, Parsons and Somers are impressed with the polyethylene "hood" method and feel optimistic about the results.

In these cases it is not indeed surprising that results are poor for the tubal muscle and epithelim may be destroyed to such an extent as to render it functionally useless, even though patency might be maintained. (Peel, Moore - White, Stallworthy et al).

Tubal Implantation :

Some of the most brilliant results in tubal surgery have been recorded with this procedure (Green - Armytage, Moore - White, Palmer, Shirodkar et al); but it is only fair to point out that dismal failures have occurred in other experienced hands. (Mulligan and Rock, Grant and Mc Kay, Hellman and Siegler).

Apparently the use of Polyethylene splints (solid or tubing) have not influenced the results in the respective groups one way or the other.

AUTHOR	SALPINGO-LYSIS.	PREGNAN-CIES.	SALPINGOS TOMY.	PREGNAN-CIES.	TUBAL IMPLANTATION	PREGNAN-CIES.	TUBAL SURGERY	PREGNAN-CIES.
BEECHAM AND SIGMANN (1962)			8	2				
GRANT AND MAC KAY (1955)	61	37%	38	10%	9	11%	14	100%
JOHNSTONE (1955)					23	8(29.6%)		
CHALIER (1956)			71	11(15.6%)				
OSTRY (1957)					9	0		
FUENSALIDA ET AL (1958)	23	5(21.7%)	40	2(5%)	13	3(23%)		
TOPKINS (1958)	24	0						
GREENHILL (1958)			964	8.5%				
CAUWET (1958)	35	14	14	0	16	1	4	3
GREEN-ARMYTAGE (1959 & 1960)			?	20%	50	40%		
MARTIUS (1959)	138	49.3%	58	10.3%	14	0	25	0
MOORE-WHITE (1960)					16	56%		
PUIGMACIA (1960)	264	35.1%	1936	14.7%	203	27.9%		
PALMER (1960)	?	46%	?	15%	?	36%		
GRANT AND MACKAY (1960)	?	29.2%	?	15%			?	16.7%
PARSONS AND SOMMERS ('62)			?	1/3				
STALLWORTHY (1962)	?	40%						
DE GROOT (1963)							29	1

Resection - Anastomosis:

This procedure has not been used as frequently as the above. Published series are few and results poor (Puigmacia 1960).

The following table illustrates variations in results of different authors for the different procedures.

Complications of Tubal Plastic Surgery :

Ectopic Pregnancy:

This is a very real danger after tuboplastic operations and a grave drawback. Although it represents a partial success, to the patient it is an absolute disaster and every effort must be made to avoid its occurrence.

Before undertaking the operation, the patient must be made fully aware of this complication.

Peel (1956) gives the likely explanation in that presumably poor peristalsis and deficient ciliary action delay the passage of the ovum after fertilisation, as well as possible residual areas of relative stenosis.

The table on page 73 indicates the incidence of ectopic pregnancy in some published results.

II. Abortions:

This represents a very near success for all parties concerned. It is difficult to assess from the literature if the abortion rate is increased. (Peel 1956).

III. Recurrence of Adhesions:

This is one of the biggest difficulties in tubal surgery and must account for many failures. It affects all types of tuboplasties and is responsible for the use of Polyethylene splints and Cortisone before, at and after operation.

Bonte and Palmer (1961) using celioscopy, found recurrence of adhesions in thirty-one of fifty-five patients; they conclude that cortisone post-operatively has definitely improved their results.

IV. A long term possible complication is that a caesarean section is recommended by some (Browne 1960) where pregnancy occurs in cases of tubal implantation.

I am sure however, that these patients would be only too willing to accept this added operation.

GROUP III

RADICAL SURGERY

In this group there were ten cases.

Age group: Except for (case 9), all these patients were over thirty years of age with five over forty years, two between thirty-five and forty years and two aged thirty-one.

Parity: All had children except for two, both of whom had become chronic pelvic invalids.

All had long histories of chronic pelvic infection with numerous flare-ups and were begging for relief.

Vaginal examination revealed distorted pelvic structures with tubo-ovarian masses; in four cases fibroids were also palpated.

Laparotomy confirmed these findings.

Procedure:

In eight cases a total hysterectomy with bilateral Salpingectomy was done conserving as much Ovarian tissue as possible.

In two cases bilateral Salpingectomy only was performed because of unwillingness on the part of one patient "to lose her womb"; the other case warrants a detailed description.

Case 11 : R.K. (No. 619/62). Aged twenty-five years.

Had never been pregnant.

Complained of lower abdominal pain for months, unrelieved by antibiotics.

On examination she was tender especially in the left iliac fossa; pelvic examination revealed a right tubo-ovarian mass and left adnexal induration.

At laparotomy both tubes were found to be chronic pyosalpinges with marked distortion and complete destruction of the tubes. A bilateral salpingectomy was reluctantly performed with the hope of doing an ovarian implantation at a later date.

This case illustrates the fact that before laparotomy is undertaken in these patients, the uncertain nature of the operation must be explained to them in relation to removal of organs which might sterilise them and to obtain consent for these procedures.

Course and Complications :

No special treatment was given to these patients. Post-operation Antibiotics were not routinely used. No special complications occurred.

Over a follow-up period of two and a half years, they have all been in much better health and very grateful patients.

Histology: All revealed Chronic Salpingitis. No evidence of Tuberculosis was found in any of these patients. (FIG 20a)

FIG 20a

Typical Illustrative Cases :

Case XII R.V. (No. 140/62). Aged thirty-one years.

Had four children and two miscarriages. Had been suffering from chronic lower abdominal pain for years; had had numerous attacks of acute exacerbations, the last one four weeks before this operation.

Examination revealed the presence of tender adnexal masses.

At operation both tubes and ovaries were bound together on each side.

Both tubes were removed; an incidental appendicectomy and and bilateral Wedge resection of the Ovaries.

She had refused consent for a hysterectomy.

Histology : (FIG. 20)

The Fallopian tubes show features of chronic salpingitis.

FIG. 20

Case XIV E.C. (No. 2245/62). Aged forty-six.

Had three children and was complaining of menorrhagia and chronic lower abdominal pain.

Examination revealed a fibroid uterus and a tender Tubo-Ovarian mass on the left.

At laparotomy there were many adhesions in the pelvis; the uterus contained numerous small fibroids; both tubes and ovaries were distorted and adherent posteriorly.

A total hysterectomy with bilateral salpingectomy and bilateral Partial Ovarian resection were performed. (FIG. 21)

Histology: The fibromyomata were uncomplicated. A hydrosalpinx and tubo-ovarian inflammatory mass were found.

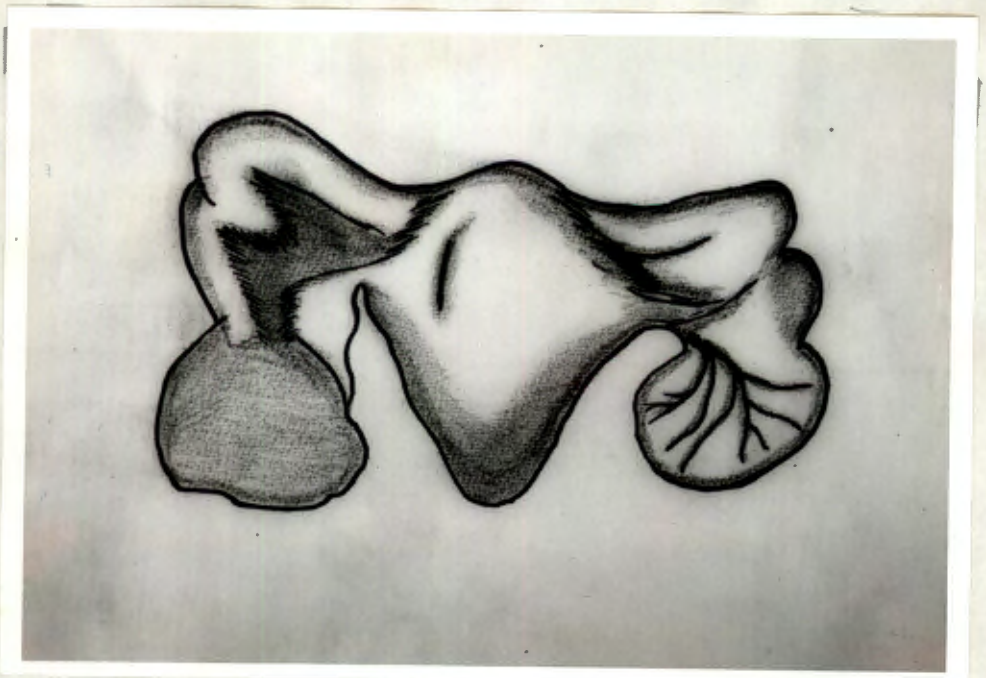

FIG. 21

DISCUSSION.

When pelvic infection has recurred often and has left a "pelvic cripple" in its wake; when the patient has children and is nearing forty years; when a patient pleads for relief from pelvic pain, dysmenorrhoea, dyspareunia and general invalidism; when a patient suffers from pelvic inflammatory disease and infertility despite previous reconstructive pelvic surgery, then radical surgery should be undertaken. However, as in Case/IX, it might become necessary to perform a radical procedure even in a young patient, when gross tubal destruction is present and when the intention was to do a conservative operation. In Cape Town the socio-economic aspect must be seriously considered, for our patients belong to the poorer classes and prolonged absence from work is an added burden; thus under these circumstances radical surgery might be necessary as it is the only permanent method of cure. This indication is comparable to the use of surgery in duodenal ulcer cases.

These indications are generally agreed upon by most authors- Alvarez and Figge (1955); Falk (1947); Curtis (1939); Stevenson et al (1951); Hodberg and Spotz (1958); Hurtig (1955); Stern (1958); Blinick (1959); Charlewood (1956); Huffmann (1962); and Parsons and Sommers (1962).

Walker and Baker (1961) describe cases of pelvic infection resistant to conservative measures in whom radical surgery is advised.

Collins and Jansen (1959) likewise point out that in cases of Tubo-Ovarian abscesses resistant to conservative measures or where these have ruptured, the mortality rate can be reduced to 10 - 15 % by doing radical surgery as opposed to a recovery rate of 10 - 15 % with conservative measures.

There are three types of radical procedures which can be performed.

(1) Bilateral Salpingectomy.

Most authors agree that this should not be the radical procedure of choice.

Falk (1947) mentions the occurrence of post-operative ovarian dysfunction with cyst formation associated with pain and troublesome menstrual irregularities; this is probably due to an interference with the blood supply of the ovary when doing a salpingectomy.

Blinick (1959), Huffmann (1962) and Parsons and Sommers (1962) concur on this complication.

Thus far we have not had any of these complications.

(2) **The Falk Operation :**

Many patients, especially in the younger age group, are against a hysterectomy and would prefer to put up with menstrual disturbances if reinfection of the tubes can be avoided.

This can be achieved by the "Falk Procedure" in which bilateral cornual resection is carried out. This interrupts the pathway of infection through the uterus to the tubes, but the bloodsupply to the ovary is not disturbed. In the absence of recurring episodes of infection the tube will eventually sterilise itself. Falk (1947) had performed over a thousand of these procedures with no reinfection of the tubes.

Falk (1947) reserves this procedure only for those patients who will not heed advice and are repeatedly admitted with pain and fever of recurrent salpingitis. It does not replace chemotherapy but is employed as a last resort to cure patients who will not stay cured on medical therapy.

Klinick (1959) has used this procedure for many years. He thinks it is definitely contraindicated by evidence of ovarian abscess, pronounced cystic disease of the ovary or severe ovarian dysfunction manifested by abnormal uterine bleeding; it is also not advised to deal with a primary attack of salpingitis.

(3) Total Hysterectomy with Bilateral Salpingectomy.

All are agreed that this is the procedure of choice which will ensure as permanent a cure as possible.

Unless great technical difficulty is experienced, the hysterectomy should include the cervix, which might otherwise become reinfected.

As much as possible of the ovarian tissue should be preserved; this often requires partial resection of the ovaries if the ovary of one side cannot be spared completely.

Blinick (1959) mentions the removal of the uterus only when severe tubal disease is complicated by benign uterine disease, such as fibroids or adenomyosis. This would have the same effect as the "Falk Procedure" by interrupting epithelial continuity from the cervix to the tubes and will also not jeopardise the bloodsupply of the ovaries. However, there must be very few circumstances under which one will not remove the tubes as well.

PART II

MEDICAL TREATMENT OF OCCLUDED FALLOPIAN TUBES

INTRODUCTION

The therapeutic management of inflammatory tubal occlusion has traditionally been approached from the mechanical or surgical viewpoint.

As reviewed in Part I of this Thesis, the results following this approach have varied considerably from being poor to highly encouraging. Our results, however, have been frankly depressing.

During the last decade, the use of corticosteroids in pelvic inflammation has received much publication. In Part I some of this work, as related to acute pelvic inflammatory disease, has been discussed. But the results achieved by the use of these drugs in chronic inflammatory tubal occlusion have caused tremendous enthusiasm. To date the published results have been uniformly excellent. Moreover, there have apparently been fewer ectopic pregnancies indicating, I think, that the corticosteroids restore both the anatomical and functional integrity of the tubes.

Thus far corticosteroids have been used in three ways in chronic tubal inflammation:

(1) In conjunction with Surgery.

(2) In hydrotubation, when several other agents are usually used in a mixture; this has so far been the commonest method with which corticosteroids have been used; the most remarkable results have followed this method.

(3) On its own; given orally and parenterally.

We have been very favourably impressed with the excellent results achieved by other workers; with our own surgical attempts producing disappointing results, we were naturally keen to elucidate the value of these drugs in our type of patient.

The Rationale for their Usage as an Investigative and Possible Therapeutic Procedure

The rationale for investigating the effect of corticosteroids in chronic tubal inflammation and occlusion is their well-known "anti-inflammatory" action.

It was in 1949 that Hench, Kendall et al of the Mayo Clinic (Annals Rheumatic Diseases, 1949. 8:97) first reported the remarkable "anti-inflammatory" effect of cortisone in chronic rheumatoid arthritis. Since then numerous attempts have been made to utilise this remarkable non-specific "anti-inflammatory" effect of cortisone, and other corticosteroids, in the management of many acute and chronic inflammatory diseases, of known and of unknown etiology, affecting various organs of the body.

As the years passed, it has become possible to differentiate between the effect of corticosteroids in -

(A) Acute, self-limiting inflammatory disorders,

and

(B) Chronic inflammatory disorders.

(A) Corticosteroids in Acute, self-limiting inflammatory disorders:

Acute inflammation is characterised by oedema due to exudation of plasma, increased vascularity, and accumulation of acute inflammatory cells. When corticosteroids are administered to patients suffering from a wide variety of acute inflammatory conditions, there is usually a prompt subsidence or a marked decrease in the inflammatory features - e.g. in the arthritis of acute rheumatic fever (Brandon p.377 etc); in acute gouty arthritis (Brandon p. 497 etc); in acute iritis; in acute types of dermatitis (Brandon p.54-55 etc); and in the acute myositis of trichinosis (Brandon p.438 etc).

If the corticosteroid therapy is discontinued prematurely, then there may be a relapse of acute inflammatory features, which subside on the re-introduction of the corticosteroid. If the disorder was self-limited, then eventually, after weeks of therapy, the drug can be discontinued without a relapse occurring.

These drugs have thus been of inestimable value in innumerable serious acute inflammatory disorders, and in the case of former serious ocular diseases such as acute iritis or acute choroiditis, blindness has been often averted.

(B) Corticosteroids in Chronic Inflammatory Disorders:

Cortisone (and allied corticosteroids) have been, and still are, widely used in the management of a wide variety of chronic inflammatory disorders affecting various organs. The relevant doctors and specialists, if asked the rationale, are likely to answer that "the agents are being used on account of their well-known anti-inflammatory effects". Bunim(in Hollander p.357) e.g. states that " granulation tissue proliferation is suppressed". Prominent experts in therapeutics, e.g. Beckman (1961, p.604) associate themselves with this concept by stating that "the inhibitory effect exhibited by the cortisones in fibrotic states" is based on their anti-inflammatory actions.

However, on deeper perusal of some of the reports, and on careful appraisal of the effect, and of the role, of corticosteroids in chronic inflammatory disorders, it appears that the results are not as striking, nor as constant, nor as uniform, as the effects are in acute inflammatory disorders.

Three major examples will be considered in greater detail, viz:

1. Chronic pulmonary fibrosis
2. Tuberculous meningitis with spinal blocks
3. Rheumatoid Arthritis

1. <u>Chronic Pulmonary Fibrosis with Alveolar - Capillary Block:</u>

Brandon (1962) summarizes the results as follows: "The response is not predictable, especially if the adrenocorticosteroids are used in relatively small dosage. Improvement is usually subjective and symptomatic". He quotes reports in which objective improvement occurred, as judged by radiological changes and by improved arterial oxygenation, but they are apparently not common. Brandon considers that the adrenocorticoids may be helpful by reducing inflammatory reaction and fibroblastic proliferation.

2. Tuberculous Meningitis:

Steroids have been administered to try and reduce the degree of inflammation and exudation and thereby help relieve the mechanical obstruction of the cerebrospinal fluid (see Brandon pages 429-430-431). The subject is of special interest to Capetonians as C.Barnard (1953) was amongst the first group of workers to employ steroids in this disease in an attempt to prevent, or minimise, or reduce, the chronic inflammatory and fibrotic changes which were producing the serious undesirable spinal blocks in this disease. The results are equivocal.

3. Chronic Rheumatoid Arthritis:

Clinically, it is well known that the degree of swelling of the inflamed joints tends to decrease on instituting corticosteroid therapy. Hench (1949), in his original paper, had noted that "the articular swellings generally diminished, sometimes fairly rapidly and completely, occasionally tardily and incompletely". Mild flexion deformities of knees and elbows disappeared in some cases.

Histologically, there is evidence of a decrease in the inflammatory changes in the synovial membrane after the commencement of corticosteroid therapy. This information has been obtained by comparing synovial biopsies before and during therapy. (Hench, 1949, page 102; Bunim in Hollander, 1960 - Pages 357 & 359, Figs. 92 & 93). Granulation tissue proliferation was suppressed.

"There is no consistent or striking effect of steroid therapy on the subcutaneous nodules of rheumatoid arthritis. Some nodules may become smaller or softer, the lymphocytic infiltration in them may diminish, and some may disappear. In most cases, however, the older and larger nodules remain unchanged".

(Extracted from Bunim's chapter in Hollander "Arthritis, Page 365, based on reference 10, viz - Bunim,J.J., Ziff,M., and Mc Ewen,C: Am.J.Med.,18:27 1955).

The effect of corticosteroids on the joints of a patient who has had rheumatoid arthritis for, say three years, naturally tends to be more marked than the effect on the joints of a patient who has had the disease for, say twenty years, with severe contractures and deformities of the joints. (Bunim,J.J., Ziff,M., and Mc Ewen,C: Am.J.Med.,18:27, 1955, in Brandon page 502.) It seems reasonable to suspect that certain chronic inflammatory changes in the joints of rheumatoid arthritis, e.g. oedema, cellular proliferation and infiltration, vascularity, could conceivably decrease on corticosteroid therapy, whereas inert avascular acellular long-standing fibrous tissue presumably cannot be modified by therapy. The clinician, looking at the deformed knees of a patient with rheumatoid arthritis, may hazard a guess as to the relative extent of these two pathological processes: the more soft tissue swelling there is, accompanied by warmth, the better the prospect for improvement on corticosteroid therapy; whereas the longer the duration of the contracture, and the less the signs of active inflammation, the less improvement is there likely to be.

Bunim (in Hollander page 362) ably summarises the roles of corticosteroid therapy in rheumatoid arthritis as follows:

"In estimating expected results, it should be recognised that only the active inflammatory changes in the joints and other organs can be reversed. Fibrotic and destructive changes in joint structures cannot be repaired or halted by steroid administration".

The analogy between rheumatoid arthritis and chronic tubal inflammation:

The role of corticosteroids in rheumatoid arthritis has been reviewed at some length. The pathology of chronic tubal inflammation is not perfectly comparable: The etiology of chronic tubal inflammation is previous acute pyogenic tubal infection; the etiology of the chronic inflammatory changes in rheumatoid arthritis is unknown. However, in the pathology of chronic tubal occlusion(~~was~~ reviewed earlier in this Thesis) (see Pages 5-4), it is noted that a variety of inflammatory changes could be encountered in different cases, viz:

oedema

increased vascularity

chronic round cell, and other cell, infiltration

increase in fibroblasts

granulation tissue

avascular relatively a-cellular fibrous tissue

It is thus conceivable that chronic inflammatory changes due to oedema, increased vascularity, increased cell infiltration and granulation tissue might be reduced on corticosteroid therapy, whereas no change could be anticipated in the avascular a-cellular fibrous tissue.

This view was also expressed by Collins et al; Hurtig; Speerman etc. who used Corticosteroids mainly in Acute and smouldering cases of Pelvic inflammation.

However, soon after the introduction of cortisone it was realised that tuberculosis could become manifest during the therapy, and this has become recognised as one of the hazards of long-term corticosteroid therapy. The assumption has been widely made that tubercle bacilli which had been surrounded by fibrous tissue become invasive once the fibrous tissue was subjected to the "anti-inflammatory" and "fibrolytic" effect of cortisone. This concept is, actually, difficult to either prove or to disprove. It appears plausible, and certainly it has become widely accepted that tuberculosis may become manifest or may spread during cortisone therapy. Interestingly enough, however, cortisone is not contra-indicated in the presence of active tuberculosis provided anti-tuberculous therapy is given simultaneously. This has been the basis of the use of Corticosteroids in smouldering chronic pelvic infection by Hurtig; Wills et al; Collins & Jansen; Collins et al; Peerman etc.

Likewise, Prednisone has been used in an interesting manner in chronic pyelonephritis. In this disease the diagnosis may be, at times, difficult to establish as pyuria and organisms are not constantly present in the urine. In such cases Prednisone can be given "provocatively" - and organisms may appear in the urine. It is plausibly suggested that the prednisone had inhibited or reduced the chronic inflammatory changes in the kidneys, which had been surrounding the organisms, thus liberating the organisms into the tubules and into the urine where they could be detected. (Katz & Moore 1960, Katz et al 1962, Little & de Wardere 1962, and Leatler 1963.

Consequently a therapeutic trial was undertaken.

In the first instance it was decided not to select or to include cases with resolving acute pelvic infection and salpingitis, nor cases under treatment for tubo-ovarian abscess etc. If, inadvertently, an organism was present which was insensitive to the antibiotic being administered, then the addition of the corticosteroid could do harm by favouring local and systemic spread of the infection. This point was especially emphasised by Hurtig (1955 & 1957) and also by Wills et al (1956); Peerman et al (1957); Hollander (1960, Page 372).

In this trial it was decided not to combine corticosteroid therapy with plastic tubal operations. This combination has been employed by Palmer (1960); Green - Armytage (1960 & 1962); Sales (1958) and others. However, the purpose of this whole investigation at the New Somerset Hospital was largely an attempt to assess the efficacy and limitations of -

(A) Plastic Tubal Surgery

(B) Corticosteroid Therapy

in the management of chronic inflammatory tubal occlusion.

Consequently it was thought best to employ a corticosteroid drug alone so that its use could be critically assessed.

The choice of a Corticosteroid:

After being in use for a little over a decade the indications for the use of the corticosteroids are becoming clearer, though as time goes by the dangers of the treatment are also more apparent.

The term "Corticosteroids" is used to refer to cortisone and its derivatives and to distinguish them from numerous other steroids.

The naturally produced hormone is hydrocortisone, though cortisone itself was the first substance to be isolated. It was introduced into clinical therapeutics in 1949 following its momentous first trial in a case of Rheumatoid Arthritis by the Mayo group on September 21, 1948.

Since then, derivatives of both of these compounds have been produced, mainly in the last two to five years. These are more potent than the parent substances and consequently have to be given in smaller dosage.

The six corticosteroids commonly used in the management of various internal inflammatory disorders are:

(1) Cortisone Acetate - 17-hydroxy-11-dehydrocorticosterone-21-acetate.

(2) Hydro cortisone - 17-hydroxy corticosterone.

(3) Prednisone - a dehydrogenated analogue of cortisone.

(4) Prednisolone - a dehydrogenated analogue of hydro cortisone.

(5) Methyl - Prednisolone - 6α methylprednisolone, a slight chemical variant of prednisolone.

(6) Dexamethasone - 9α fluoro-16α-methylprednisolone; basically resembles prednisolone.

It was decided to select one of the latter four preparations as they all produce less sodium retention than does cortisone or hydrocortisone. (Beckman 1961; Hollander 1960).

Amongst the four latter preparations, there is none which is unquestionably superior or freer of undesirable side-effects, as compared to the others.(Beckman 1961).

The therapeutically effective dosage of dexamethasone is less than that of prednisone and methyl-prednisolone, but this is neither an advantage nor a disadvantage as the same undesirable side-effects can occur.

Accordingly any of the last four preparations could have been selected. Dexamethasone was chosen as it happened to be more freely and readily available. Large quantities of the 16 β-methyl isomer of dexamethasone, Betamethasone , were placed at my disposal as "Celestone".

Dosage of Corticosteroids.

There were two possibilities to consider: -

(A) Relatively high dosage - this was utilised by Hurtig (1955 & 1957), Wills et al (1956), Peerman et al (1957), Collins et al (1952) in their regimens for "acute" pelvic inflammatory disease. However, the duration of treatment in their series was short.

(B) Moderate or low dosage - as employed by Kurzrok and Streim (1959) and Kurland and Loughran (1961).

It is known that the incidence and severity of serious complications are related to the dosage and duration of the hormone therapy (Brandon, 1962 - page 487).

Accordingly it was decided to adopt procedure ~~with~~ B above and to ascertain the possible effects on tubal inflammatory occlusion of a moderate or relatively low dosage; in this way the possibility of undesirable and serious side-effects could be reduced during the investigation.

Kurland and Loughran (1961) considered an initial three-month period of treatment to suffice in most of their patients. Three-months was thus also selected as the duration of therapy in the present investigation.

As there are no absolute indications or criteria to guide one in such an investigation, it was decided to adopt a somewhat similar regime to that used in another chronic inflammatory disease, viz - Rheumatoid Arthritis, by an experienced rheumatologist. (Dumin in Hollander).

The dosage of dexamethasone which he considers "effective and prudent for cases of moderate severity" is in the range of 1 - 4 mgm. per day. Similarly, an experienced pharmacologist, Beckman (1961), recommends "1.5 to 3.0 mgm. daily initially, then decreasing to determine the maintenance dose".

An important principal in corticosteroid therapy which must be stressed, is that dosages should be diminished gradually; abrupt cessation can result in severe withdrawal disturbances and catastrophic collapse; also it has happened that the illness for which the corticosteroid was given, could be precipitated in a more severe form.

Accordingly, the following dosage was selected:

0.5 mgm. t.i.d. for the first month, i.e. 1.5mgm./day; then,0.5mgm. b.i.d. for the next two months, i.e. 1mgm./day.

This regime compares favourably with that adopted by Kurland and Loughran (1961).

The aim of the project was investigative, in the first instance, to try and determine whether or not corticosteroids have a role in the management of chronic inflammatory tubal occlusion.

One naturally wanted to reduce the possibility of untoward effects to a minimum when employing an investigative procedure of as yet unproved value. Thus a conservative dosage schedule was adopted; also, only one course of treatment was t thought sufficient at this stage.

Kurland and Loughran (1961) repeated the treatment after a month's interval in five of their patients.

The trial was conducted by me personally on an outpatient basis. Patients in this investigation all complained of infertility primarily. A past history of prolonged pelvic illness was not as prominent as in cases of Part I of this Thesis. This was confirmed to some extent on Pelvic examination in that adnexal pathology was at the most palpable as tubal induration and thickening.

However, from past surgical experience we know that these patients had probably the same type of pathology as those in Part I; in addition hystero-salpingography demonstrated tubal obstruction on more than one occasion in all of these patients.

The following pre-therapy investigations were performed on all the patients:

(1) Hystero-Salpingography

(2) Tubal Insufflation (Rubin's test)

(3) Diagnostic Curettage

(4) Semen Analysis.

SALPINGOGRAPHY.

The uterine cavity was visualised roentgenographically in 1910 by Rindfleisch using bismuth paste as a contrast medium. Cary and Rubin independently in 1914 described the use of Collargol as a contrast medium to visualise the uterus by X-Ray.

Premedication: The procedure was carried out on an outpatient basis. Three-quarters to one hour before the procedure, the patient was given two tablets of Buscopan (0.020) and one tablet of Sparine (25mg). This combination is antispasmodic and tranquillising sedative. This has proved an effective combination for preventing spasm and never had ampoules of Amyl or Octyl Nitrite to be broken and inhaled by the patient. It is our policy to do the procedure in the Radiology Department and General Anaesthesia is never used.

After the procedure, which on an average lasts an hour, the patient could go home alone by walking or public transport.

Contra - Indications: The following were recognised as conditions obviating the performance of the test.

(1) Normal Intra - Uterine Pregnancy.
(2) Acute or Subacute infection in any of the pelvic organs.
(3) Normal or Abnormal uterine bleeding.
(4) Recent Curettage, because injection of radiopaque media in the presence of open sinuses may lead to embolism.
(5) Purulent discharge from Cervix or Vagina.
(6) Heart trouble or serious Systemic Disease.
(7) Fever from any cause.

Both the Fractional Method, as described by Hyams in 1935, and the method using fluoroscopic control have been used. It was found that where uterine morphology and pathology were under study as well as tubal function, fluoroscopic screening was more efficacious. But where tubal function only was under scrutiny, the uterus having been explored before under General Anaesthesia during the performance of a Dilatation and Curettage, it was found that 5 - 8ccm. of dye were necessary to fill the tubes; with experience in this method only two antero-posterior films are necessary, including the twenty minute follow-up film. This is an important consideration in relation to gonadal irradiation as these patients require the procedure to be performed on two separate occasions.

Should resistance be encountered early on in the injection of the medium, constant, steady pressure must be maintained to overcome the obstruction for intravascular embolization with water-soluble dyes is not associated with any untoward effects.

After the prone films have been taken, the patient walks about and has another follow-up film taken twenty minutes later. This is equivalent to the twenty-four-hour film when using Lipiodol and gives similar information.

Technique:

It is generally recognised that the optimum time for the procedure is one week after the cessation of the menstrual flow.

The procedure is explained to the patient before commencing to alleviate apprehension on her part. The bladder is emptied before the procedure. The patient is placed on a radiographic table equipped with Bucky diaphragms with her knees and hips flexed. Aseptic precautions are observed in that the operation scrubs up after donning a lead-protective apron, wears a mask and gloves, his hands being covered by a lead protector only just before the films are taken; the perineum is cleansed with Dettol or Hibitane solution and draped with a fenestrated towel.

A bimanual examination is performed to determine the position, size and mobility of the uterus and to note the presence of adnexal pathology. A bivalve speculum is inserted into the vagina, the cervix is exposed and painted with Dettol or Hibitane solution. The anterior lip of the cervix is grasped with a volsellum and a uterine sound introduced to determine the depth and direction of the uterus. The cannula is now introduced having filled it with radiopaque dye to dispel the air from it and the injection of the iodised material commenced. Uterine efflux of the dye is prevented by maintaining a liquid-tight connection at the cervix. The injection is carried out slowly.

The Media :

Lipiodol has been associated with Utero-Salpingography for many years, but undesirable side-effects such as intravascular embolism and foreign-body granulomatous formation in tubes obstructing them further, have resulted in the search for other media. With few exceptions, lipiodol is no longer used and these days there are many water-soluble dyes on the market.

It is agreed that these water-soluble dyes are safe and I have used :-

Endografin : Brand of Methylglucaminate Acetrizoate.

Hypaque 50% : Brand of Diatrizoate Sodium.

Diaginol : Brand of Sodium Acetrizoate.

Uriodone 50% : Brand of Diodone.

The medium is warmed to body temperature before use.

Instruments: Sterile tray containing -
(Fig. 22)

(1) Swabs and Fenestrated Towel.
(2) Antiseptic Solution and cream.
Dettol or Hibitane used.
(3) Sterile gloves.
(4) Volsellum.
(5) Bivalve Speculum.
(6) Cannulae - Screw-top and Nozzle and Olive types.
(7) 20 cc. Syringe.

Fig. 22.

Complications :

These can be divided into those due to the procedure and those due to the medium used.

Those due to Contrast Medium :

Pain:

Some form of discomfort is experienced by the majority of the patients when the uterus is filled but this is no more than a bearable discomfort. With distension of a hydrosalpinx pain is felt near the associated iliac fossa; pain is most severe when free peritoneal spill occurs using a water-soluble dye. However, adequate explanation and firm reassurance go a long way to lessen the pain, which is transient as the dye is rapidly absorbed. No patient needed analgesics or admission for pain.

Other complications such as a marked chemical peritonitis, allergic phenomena and emboli did not occur.

Complications due to the Procedure:

Haemorrhage:

Some staining following the procedure was common, but considerable bleeding was never encountered.

Acute Exacerbation of Chronic Pelvic Infection was not precipitated in any case of this series.

INTERPRETATION OF RESULTS :

This follows conventional methods.

Free Peritoneal Spill indicates tubal patency and is often best seen on the "20-Minute" film. (Fig. 23) Care must be exercised here for apparent "spill" may be seen on follow-up films to have collected in adhesive pockets. These cases have patent fimbrial ends but adhesions around the tubal openings, preventing the expelled ovum from reaching the tube with consequent infertility.

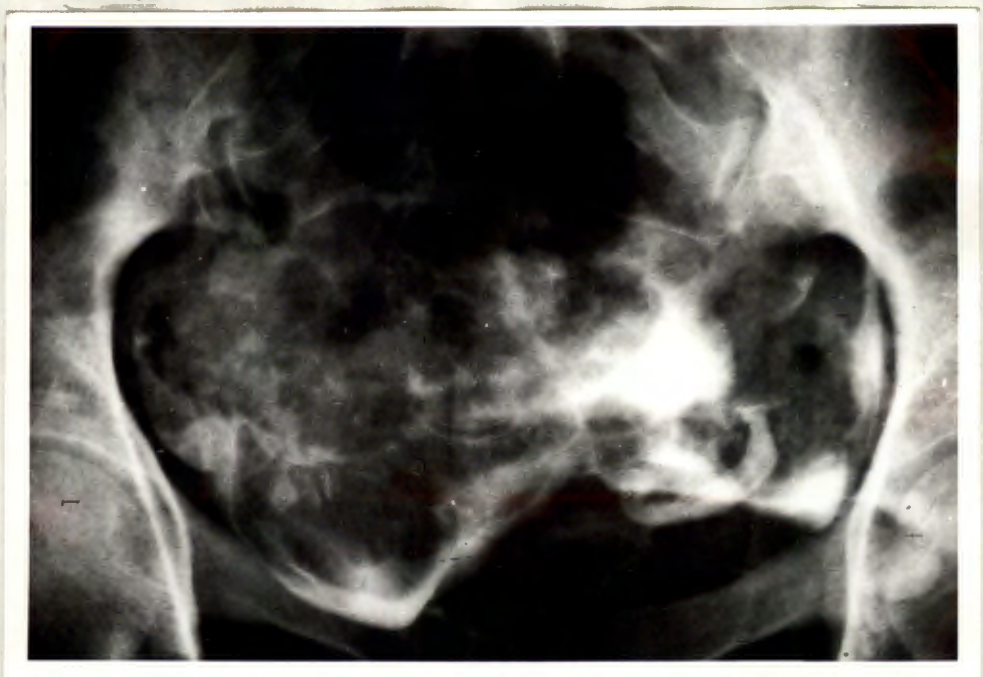

FIG. 23

An occluded, dilated and distorted tubal fimbrial end indicates a hydrosalpinx. (Fig 24).

Fig 24

Filling of the Uterus with no filling of the tubes indicates Cornual Obstruction. (Fig. 25) The commonest cause of this is uterine spasm. This was very strongly emphasized by Stallworthy, Greenhill et al in mistakes made in labelling these as organically obstructed tubes. Consequently they are of the opinion that a similar result must be seen on several utero-salpingograms (3 - 6), where all measures to combat or obviate Uterine Spasm are employed. Incomplete, intermediary filling of the tubes indicates obstruction at that site.

All hystero-salpingograms in this work were carried out by me personally.

FIG 25.

Hystero-Salpingography was performed on at least two occasions before therapy was commenced. The two occasions were separated by at least three cycles so that any tubal pathology could be confirmed and also to allow any inadvertent beneficial effects of the radiopaque medium to become overt.

We deemed two hystero-salpingograms sufficient to confirm tubal occlusion because of the high incidence of chronic pelvic infection in our patients. Many authorities (Peel, Greenhill,etc.) consider that tubal occlusion should be confirmed by three to six patency tests before commencing.

Tubal Insufflation:

This was performed in the standard way. However, we do not possess the apparatus for kymographic tracings which Grant (1959) and others consider an essential feature of tubal insufflation.

The pressure was noted on a manometer; the passage of gas through the tubes was determined by abdominal auscultation as this procedure was usually combined with diagnostic curettage under general anaesthesia. We are mindful of the inherent difficulties in interpreting the results under these circumstances as emphasised by Stallworthy (1958) and Grant (1959). However, economic considerations forced us to accept this position.

The lack of escape of gas under a pressure of 160 - 180 mm. Hg. was interpreted as a negative result. This occurred in all our patients.

We are fortunate in that no complications occurred with the insufflation.

Although much has been written about the technique and interpretation of tubal patency tests, there are still numerous pitfalls in both which must be recognized. These were strikingly emphasized by Sweeney (1962), Grant (1959), Stallworthy (1958) and Ostry (1957). There are two important considerations in this connection.

(a) Functional tubal occlusion is common; if sufficient tubal patency tests are not considered in the diagnosis of corneal obstruction, then the surgical treatment by tubal implantation are likely to be highly successful.

(b) There are many tubal functions which cannot be adequately assessed by the above tests; ciliary activity, tubal mobility in relation to ovulation and the constitution of luminal secretions cannot be explored.

Diagnostic Curettage:

This was always carried out under general anaesthesia to allow adequate exploration of the uterine cavity and to obtain curettings representative of the whole endometrial lining.

The object was to determine whether ovulation had occurred and also to exclude tuberculosis. The latter involved both histological and bacteriological examinations.

Semen Analysis:

This was requested in those patients who had never conceived and whose husbands had no children from other women.

Semen analysis coupled with other data relative to marital habits affords a means of general evaluation of the chances of conception. The appraisal cannot be absolute in the sense that a distinct boundary line between fertility and infertility can be drawn. An absolute decision is warranted only when the semen is devoid of spermatozoa.

A count as low as twenty million spermatozoa per cubic centimeter is permissable before concluding that the specimen is subnormal. The percentage motility appears to have an influence on the probability of conception. A good grade of activity, above 40% at least of the cells, increases the likelihood of conception. A percentage of over 60 percent of normal cells appears to be of importance.

A satisfactory semen analysis was required before the female partner was investigated.

Initially there were forty-one patients who started with treatment, but eight were excluded as they failed to attend soon after therapy was commenced.

Thus thirty-three patients completed the course.

Age: This varied between twenty-two and thirty-eight years; fifteen patients were between thirty and forty years. The age distribution is shown in Fig. 26.

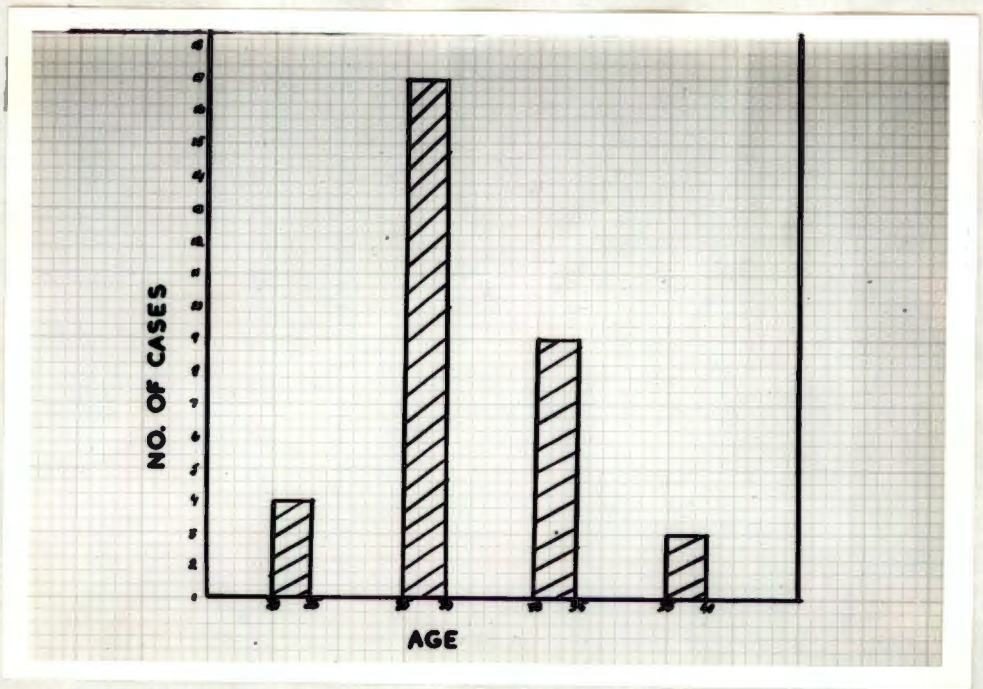

FIG 26

Parity:

Twelve patients had never conceived before; seven had one child and the rest two children; none had more than this number.

Six had had an abortion in the past after which they had never become pregnant again.

One patient had an ectopic pregnancy thirteen years ago and never conceived afterwards.

Time of Last Pregnancy:

In those who had conceived in the past, the last pregnancy had occurred between two to thirteen years ago. This was also found to be the period of involuntary sterility in the series.

Past Tubal Surgery:

This had been performed on four of the patients. One had the operation in 1961 at another hospital, one in 1959 and two in 1958, all at the New Somerset Hospital.

Procedure Adopted for the use of Corticosteroids in this Investigation:

Before commencing the administration of a corticosteroid, the following information was obtained.

(1) X-Ray chest - to exclude pulmonary tuberculosis which could flare-up under this type of therapy. Although this precaution is well-known, omission can have tragic consequences as so forcibly shown by Ansell (1963).

(2) A history of dyspepsia was especially enquired after as it is well-known that "silent" perforation of a peptic ulcer can occur when a patient is receiving corticosteroids.

Actual Management of the Trial:

(a) The patients were seen at fortnightly intervals.

(b) Each was told to keep to a low salt diet but this was not stressed and I am sure not really followed.

(c) At each visit inquiry was made as to the development of dyspeptic symptoms and swelling of the feet.

(d) The following were ascertained at each visit : -

(i) Temperature: This, we felt, would be a sensitive enough indicator of imminent recrudescence of pelvic inflammation in these patients; moreover it is of course an exceedingly easy undertaking for both patient and examiner - more so than a sedimentation rate.

(ii) The Weight was checked as a rise in weight would indicate the presence of oedema long before it became manifest.

(iii) The lower extremities were examined for evidence of oedema.

(iv) The Blood-Pressure was recorded.

These last three measures would reflect retention of sodium which is one of the common complications of corticosteroid therapy.

(v) The urine was tested for glucose.

Corticosteroids are well known diabetogenic agents.

(e) There have been quite a number of unexplained deaths in people subjected to stress, usually in the form of a general anaesthetic, who had been or still were on corticosteroid therapy whenprecautionary measures were not adopted (Hollander page 367, Winstone & Brooke 1961, Horwits 1963, etc).

These deaths were ascribed to adrenal insufficiency but this was not a constant finding in all these patients; moreover adrenal function tests had shown in some patients a normal response.

In order to obviate this happening to our patients, each was issued with a bracelet on which the following information was inscribed: (FIGS. 27+28.)

On one side: Name of patient.

On the Other side: Steroid therapy plus Hospital Number plus Name of hospital.

FIG 27

FIG 28

This token had to be constantly worn; it had to be retained for two years after completion of treatment, which is the period generally recommended by authorities (British Medical Journal 1960; Horwitz etc.) for full recovery of adrenal function to occur; they were informed of the potential risk and were instructed to produce it when ill or undergoing a general anaesthetic for treatment. However, it must be emphasized that there is still considerable controversy about this potential risk and not every authority accepts this as a necessary complication of corticosteroid treatment (Winstone & Brook 1961, etc.).

Objective Assessment of Results:

(1) At the end of the course of treatment, each patient was examined generally as well as locally.

(2) A hystero-salpingogram was repeated one to three months after completion of therapy.

The follow-up period extended from six months to one-and-a-half years.

TYPICAL ILLUSTRATIVE CASES

CASE 14 : A.E. (No. 7319/62). Aged twenty-seven years. She had never been pregnant though married nine years. The infertility was involuntary and made her miserable. Her menses were regular and there was nothing else of note in her history. Examination revealed moderate tubal thickening. Her husband's semen analysis proved to be satisfactory.

Her X-Ray Chest revealed clear lung fields.

On Two salpingograms in different cycles bilateral hydrosalpinges were seen.

The endometrium was secretory with no evidence of tuberculosis.

During the course of treatment she gained seven pounds in weight and became less miserable; the hirsutism, which was familial, became somewhat more pronounced.

There were no menstrual disturbances.

A follow-up salpingogram failed to disclose any sign of tubal patency. (FIG 29)

FIG 29

CASE 15 : E.F. (No. 13580/62). Aged twenty-six years.

This patient had never conceived.

Her husband's semen analysis was satisfactory.

The involuntary sterility had lasted four years.

She had had a pelvic abscess drained per vaginam at another hospital three months before therapy was begun.

There was bilateral fimbrial closure on two salpingograms; Ovulatory cycles were demonstrated by curettage; there was no tuberculosis in the endometrium or on chest X-Ray.

She gained two pounds in weight during the course of treatment. There were no other complications of the treatment. However, on a follow-up salpingogram there was still bilateral distal occlusion. (FIG 30)

FIG 30

CASE 16 : G.R. (No.4254/60). Aged thirty-eight years.

She had one child thirteen years old; a few years before that pregnancy she had had an abortion which was followed by an ectopic pregnancy.

She presented with secondary infertility having been married now for five years. Her husband's semen analysis was satisfactory. She had had a full infertility investigation and four years ago had had a left polyethylene tubal implantation.

However, we found cornual obstruction again on two salpingograms, confined also by tubal insufflation.

She gained seven pounds in weight and developed a more cheerful outlook but a follow-up salpingogram still revealed cornual obstruction. (Fig 31)

FIG 31

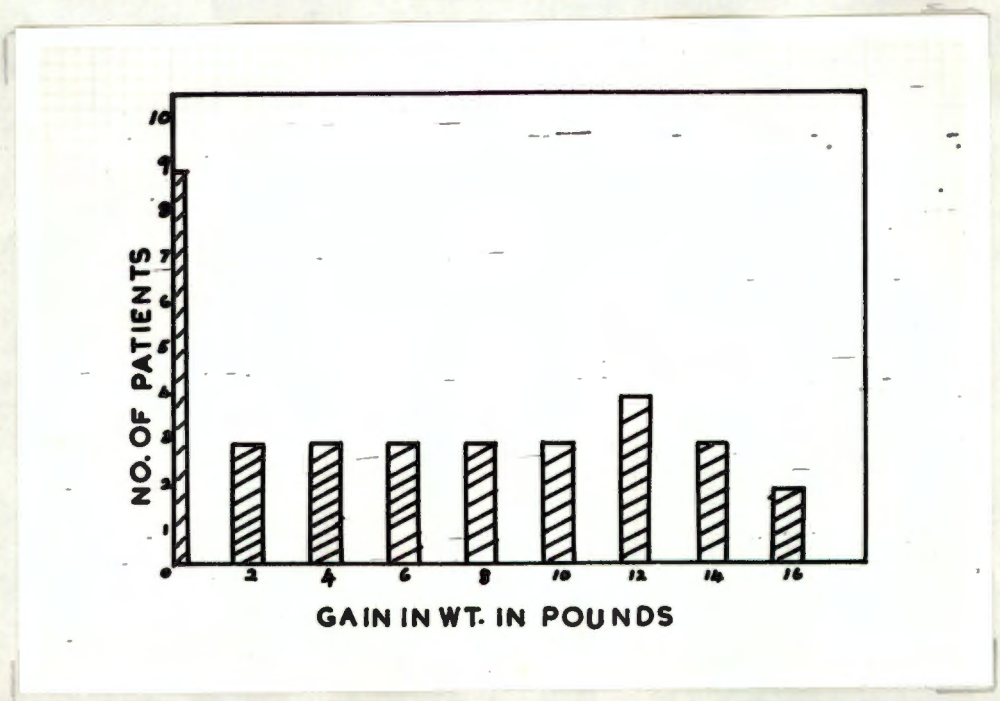

FIG 32.

Results and Discussion:

The most striking results following the use of Corticosteroids in these cases, were concerned with the general well-being of the patients. There was a striking change from miserable, anxious women to bright, blossoming females. They felt something positive was being done for them; in may cases they could see the difference - increase in weight; filling out of face.

This euphoria, so well-known with corticosteroids, was evident in all our cases.

Psychosis: All the patients were of stable personality; in none was a psychotic state precipitated.

Blood - Pressure:

Four patients developed a mild rise in Blood-Pressure - up to 150/90; fortunately this required sedation and diuretics only; these patients were able to finish the course of treatment.

Weight:

Twenty-four revealed a gain in weight varying from two pounds to sixteen pounds. It is doubtful whether this gain in weight can be ascribed solely to retention of fluid for only two patients developed clinical oedema and &ight acquired a "Moon - facies"; yet all developed a marked improvement in appetite and many noticed that their clothing was becoming somewhat tight. It follows therefor that some of this increase in weight must have been due to an actual increase in tissue deposition. (See graph) Fig 32.

Oedema: In two patients dependent oedema was quite marked. This responded to oral diuretics ("Navidrex K") and both patients completed the course of treatment.

Menstrual Irregularities:

Menstrual irregularities were observed by three patients but these were transient. Temporary amenorrhoea can occur but was not found in this series (Naberro 1962).

Hirsutism: (Figs 33 & 34)

In two patients a fine hairy growth developed ab initio on the upper lip during the course of treatment. Mild hirsutism was present before commencing treatment in six patients; in two this remained unchanged, but in four this became appreciably more marked and this was noticed by the patients themselves. This is one of the paradoxical effects of corticosteroids for these drugs have actually been used in the treatment of some forms of hirsutism! (Mattingly, Mills and Prunty 1960).

FIG 33

FIG 34

Dyspepsia:

Five patients complained of dyspepsia. This responded readily to antacids. These patients also completed the course.

Glycosuria:

This was not observed in any of the patients.

These Complications following corticosteroid therapy become reversible on discontinuing the drug.

Recrudescence:

This was not observed in any of our patients. Moore-White (1963) found this in two of her patients.

There were no marked changes in the pelvic organs at the end of the course as elicited by pelvic examination.

RESULTS OF HYSTERO - SALPINGOGRAPHY

Bilateral Fimbrial Closure	29
Bilateral Cornual Occlusion	4
Total -	33

After conclusion of treatment, Hystero-Salpingography revealed: -

Left-sided spill in one case;

Bilateral spill in three cases.

Therefor Overall Patency occurred in four patients (12.2%). All these occurred in patients with fimbrial end occlusion; there were no patencies in those cases with cornual occlusion.

These four cases will now be detailed:

CASE 17 : P.R. (No. 2927/62). Aged twenty-two years.

Involuntary infertility extended over more than two years with a husband whose semen analysis was found to be satisfactory; there were no pregnancies.

All the requirements were present for corticosteroid treatment. She gained no weight on treatment; there was a transistory bout of menorrhagia; the hirsutism became worse.

Before treatment two salpingograms revealed bilateral distal block. A follow-up salpingogram showed bilateral tubal spill. (FIG 35)

FIG 35

CASE 18 : A.I.(No. 324/63). Aged thirty-three years.

Presented with secondary infertility having had a miscarriage seven years ago; pregnancy was from the present husband. She had had tubal surgery at another hospital three years ago.

The menstrual history was normal; all the other investigations were satisfactory.

She gained six pounds in weight but exhibited no other complications of corticosteroid therapy. Before treatment Hystero-salpingogram revealed a left-sided hydrosalpinx and a right cornual obstruction.

Following therapy , left tubal patency was observed but the right side remained occluded. FIG 36.

FIG 36

CASE 19 : F.M. (No. 6841/62). Aged twenty-nine years. She had two children, the younger one was seven years old. There was a past history of pelvic inflammation and thickened tubes were palpated per vaginam. Salpingography revealed bilateral hydrosalpinx on two occasions. (Fig 37) All the other investigations were normal.

Weight gained on therapy was three pounds, but otherwise the treatment was concluded uneventfully. Bilateral tubal patency was found on the third salpingogram. Fig 38

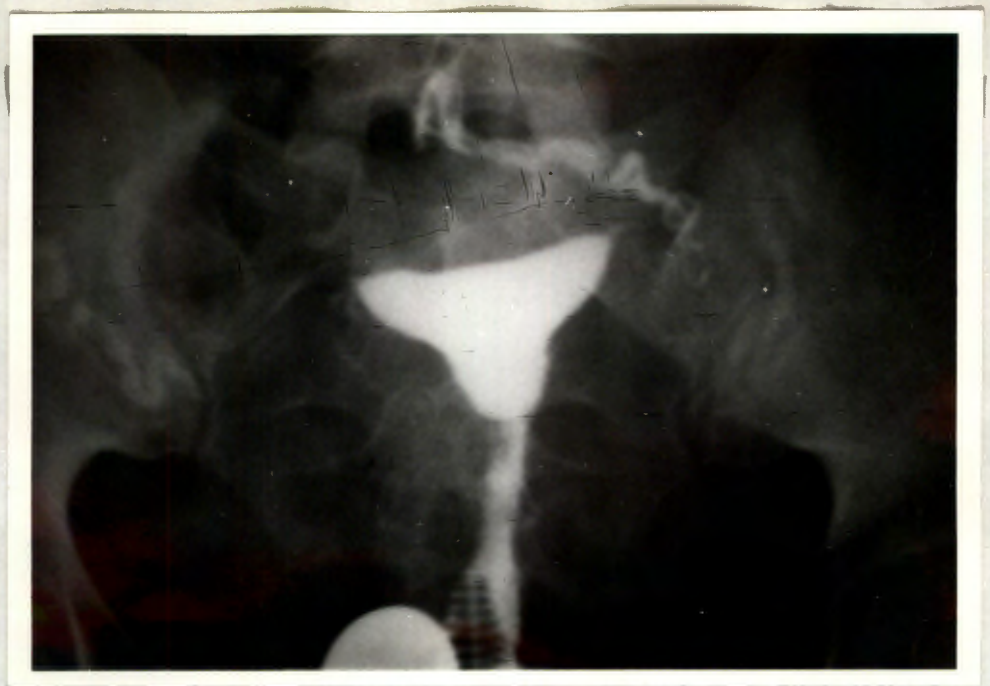

FIG 37

FIG 38

CASE 20: R.T. (No. 4707/62). Aged thirty-six years.

Married eight years. Had an abortion three years ago.

Menses regular. There was some adnexal thickening on both sides.

The rest of the investigations were satisfactory.

Salpingogram demonstrated occlusion of the fimbrial end on each side with stenosis on the right.

She gained twelve pounds in weight and developed a fullness of the face on treatment; the fine hirsutism remained the same.

A peritoneal spill was demonstrated on follow-up salpingography.

There were no pregnancies in any of these patients.

These results are as disappointing as those following surgical treatment. In two series comparable to ours the results were astonishingly good.

Thus Kurzrok and Streim (1954) reported on eight patients who had received oral and parenteral "Cortogen"; five pregnancies ensued; three patients revealed tubal patency although in only one was this maintained.

Likewise, Kurland and Loudhran (1961) obtained patency in eleven patients and pregnancy in six patients. Of the seven failures in this series two had resection anastomosis performed eighteen months before corticosteroid therapy was instituted.

Although their dosages schedule was about comparable to ours, they repeated the three-month course in five patients after an interval of a month. Moreover, I feel their series was not very strictly controlled in that too few tubal patency tests per patient were used as the basis for the diagnosis of tubal occlusion in some patients, viz cases - 1, 2, 3, 4, 5, 7, 10 & 11.

Also, their diagnosis is open to some doubt in a few of the published hystero-salpingograms , vis Figs. 1,4 & 7.

However, the basic reason for our poor results as compared to those just mentioned must, I feel, be ascribed to a difference in Pathology. In most of our patients the disease had probably reached a truely "burnt-out" phase with the deposition of much acellular, avascular fibrous tissue. This is due to neglect on the part of the patients seeking medical assistance.

Doubt was expressed whether corticosteroids could dissolve fibrous tissue which had already been formed (see section on Rationale of Corticosteroid therapy); Hurtig, Wills and others expressed similar thoughts.

Also, as remarked in Part I, our follow-up period has been rather short.

Some of the most spectacular results with corticosteroids have been with hydrotubation. Today this term indicates the instillation of drugs into the uterine cavity and tubal lumina as a therapeutic procedure, though originally it was used as a diagnostic investigation by Yagi (1929).

The mixture of drugs used in hydrotubation usually contains a corticosteroid, but need not (vide infra), a single or a mixture of antibiotics, a local anaesthetic agent and sometimes a "spreading agent", hyaluronidase; all are usually mixed in saline. Some authors have supplemented the instillations with oral corticosteroids. The procedure is carried out in a similar way to hystero - salpingography. The work of de Moraes and Peano merits special consideration. The treatment routine was adapted for each patient according to chronicity of inflamation, localisation and type of tubal obstruction, pathological origin of the lesion and individual response to the drugs.

Hydrocortisone (25mg.) is combined with an antibiotic (1 Gm. streptomycin) and 1% procaine. Instillation is carried out for varying periods slowly and under controlled pressure to avoid painful distention. Five applications constitute a series; three series were administered in some instances.

When the obstruction is situated in the uterine horns, 20mg. prednisolone/day is given for five days orally, 15mg. for five days and 10mg. for ten days during two consecutive menstrual cycles. During the next menstrual cycle, three injections of hyaluronidase (150 units), with antibiotics and seven utero-tubal injections of hydrocortisone-streptomycin, are given between the 9th and 25th days of the cycle. These solutions are maintained in loco with pressure always under 100mm. Hg for 20-40 minutes. This method is designed to increase the effectiveness of the instillations through facilitating penetration by previous treatment with prednisolone and hyaluronidase and by duration of the instillation. During the 6th menstrual cycle, after a month's rest, five instillations of hydrocortisone-streptomycin are repeated.

For occlusion in the tubes without hydrosalpinx or cystic salpingitis, 5 uterotubal instillations of hydrocortisone-dihydrostreptomycin are used during the first month. After a second month of rest and when bilateral tubal obstruction persists, another series of uterotubal instillations is given.

These applications are for 4-6 minutes, with pressure under 100 mm. Hg.

In hydrosalpinx, the fluid is removed by administration of 17-hydroxicorticosterone or prednisolone, by mouth for three months. During the second month, uterotubal instillations of dihydrostreptomycin are given during the first phase of the menstrual cycle. During the third month, uterotubal instillations of combined hydrocortisone-hydrostreptomycin complete the treatment. When tubal obstruction is relieved, administration of 6 mg. prednisolone/day, orally, between the tenth and twentieth days of the menstrual cycle, is continued for three months or until pregnancy supervenes.

In general other authors have adopted a similar regime with slight modifications. Moore - White (1962) dispensed with the use of a corticosteroid in the first treatment as some patients have experienced exacerbations. Also Moore-White (1963) and Cabello (1961) confined the intermittent instillations to the first half of the menstrual cycle. The latter used the corticosteroid orally.

The results reported by de Moraes and Peano are remarkable for any form of treatment of tubal obstruction; they obtained an 88.6% patency rate and 71.4% pregnancy rate! However, no other workers have been able to reproduce these excellent results.

Cabello(1961) obtained a 16% pregnancy rate and a 38% patency rate.

Moore-White (1963) reported a conception rate of 29.4%.

Bennoun (1955) had only one pregnancy out of twenty-nine patients; his tubal patency rate was 58%.

Maeda and Shindo (1962) using hydrotubation with a corticosteroid alone obtained a pregnancy rate of 10.5% and a tubal patency rate of 7.7%.

Moudry and Najmr (1958) used a mixture of penicillin, streptomycin, hyaluronidase and oestrogen without a corticosteroid; 14.5% of their patients conceived.

Cross (reported by Greenhill 1962-1963 year-book series.) considers that this form of treatment is one of the great advances in infertility since Rubin's test was universally adopted.

However, it is difficult to assess the value of corticosteroids from the published reports as the corticosteroid was usually administered together with other medicaments. In the one series where corticosteroid alone was used in hydrotubation, that of Maeda and Shindo, the results were poor. Also, one cannot absolutely rule out the benefit which might accrue consequent upon the procedure, for it is well known that pregnancy has followed tubal patency investigation. Further, some authors have produced similar results with hydrotubation without using a corticosteroid (Moudry and Najmr 1958). Moreover, according to Green-Armytage and Moore-White (1962) this form of therapy is unlikely to restore tubal function where gross tubal changes are present.

In conclusion we reluctantly tend to agree with Linton Snaith (1959) who is unconvinced that any form of medical treatment is of use in established pelvic inflammatory disease.

The following table summarises the results of the various authors:

SUMMARY OF PUBLISHED RESULTS

WHERE CORTICOSTEROID WAS USED WITHOUT SURGERY.

AUTHOR	NUMBER of PATIENTS	METHOD	PREGNANCIES	PATENCIES	IMPROVEMENT ON KYMOGRAPHIC STUDIES	ECTOPIC	ABORTION
KURZROK + STREIM (1954)	8	ORAL & I.M.	5	3	–	–	–
BENNOUN (1955)	29	HYDROTUBATION	1	58 %	–	–	–
RAMOS and PEANO (1956)	18	HYDROTUBATION & ORAL	HIGH	HIGH	–	–	–
de MOREAS and PEANO (1958)	35	HYDROTUBATION & ORAL	25 (71.42%)	31 (88.6%)	–	–	–
CABELLO (1961)	146	HYDROTUBATION & ORAL	16 %	38 %	–	–	–
KURLAND and LOUGHRAN (1961)	20	IM & ORAL	6	11	–	–	–
MAEDA and SHINDO (1962)	18	HYDROTUBATION	4	3	5	–	–
GREEN-ARMYTAGE & MOORE-WHITE (1962)	–	HYDROTUBATION	14–16 %	25 %	–	–	–
MOORE-WHITE (1963)	34	HYDROTUBATION	10 (29.4%)	9	4	2	2

(2) For a week before and a week after operation 15mg. prednisolone is given daily; for the second and third post - operative weeks the dose is reduced to 10mg and 5mg a day respectively. If preferred 50 mg. Cortisone acetate can be given intramuscularly twice a week as well.

(3) Intramuscular Penicillin and Streptomycin should be given routinely for three days before and after operation. In addition, he gives 5000 I.U. of Chymar intramuscularly the day before, of and after operation.

The above routine is employed with any form of tuboplastic operation.

(4) At operation the tubal lumina are bathed with a Streptomycin-cortisone solution.

This is introduced either via a fundal injection, the uterine cavity having been occluded by means of a myomectomy clamp; or injected along a fine polyethylene tube which is gently inserted from the fimbrial end of the tube.

He obtained a pregnancy in 46% of cases.

Though the methods of both Palmer and Green - Armytage were not strictly controlled, their results are impressive, especially those of the latter authority.

Consequently it seems logical that we should combine our methods i.e. tubal reconstructive surgery with corticosteroid therapy in order to attempt to improve our results, even though the pathology in our patients is probably more severe. In fact, measures along these lines have been undertaken and a trial is in progress.

CONCLUSION

It is one of the paradoxes of life that while "population explosions" are occurring all over the world, threatening to outstrip food supplies and drain natural resources, there are still innumerable couples who are unable to fulfil their procreative desires.

(1) Often the cause of this involuntary sterility is to be found in the Fallopian tubes. There is a high incidence of chronic pelvic inflammatory disease with its associated tubal occlusion in Cape Town. It is a public health problem being confined chiefly to the Non-White people.

Poor socio-economic circumstances, with its implied poor nutrition and thus lowered resistance to infection; ignorance in personal health matters; lack of morals and promiscuity; all of these combined form the ideal soil for a disease like pelvic infection to become firmly implanted and run its well-known course of chronicity, punctuated by exacerbation, and culminating in invalidism, sterility and unhappiness.

Thus these people eschew medical attention for leucorrhoea when a gonococul infection at an early stage could so easily be completely cleared up; also they are liable to repeated reinfections with similar lack of medical care.

Similarly unwanted pregnancies, often acquired when they are in their teens and unmarried, are usually terminated under far-from-sterile surroundings. The subsequent infection which follows again might receive medical attention at a late neglected stage or not at all.

(2) It therefor follows that these people often present at a late,neglected stage when they have either become "pelvic cripples" or sterile. Accordingly the pathology we find consists of gross distortion and destruction of the Fallopian tubes. These structures may be distended by sterile pus; have thickened, fibrosed walls, in which there is destruction of the delicate cilia and epitholial cells of the lining (chronic endosalpingitis); destruction of the muscle layers (chronic interstitial salpingitis); destruction of the serosal layer with formation of peritubal adhesions (chronic perisalpingitis) all of which can be replaced by variable amounts of fibrous tissue.

The fimbriae become destroyed by chronic infection and the fimbrial end of the tubes occluded with the formation of a pyosalpinx and later a hydrosalpinx. The normal alignment of the tubes becomes distorted by adhesions; often the tube and ovary have been converted by fibrous tissue into a single tubo-ovarian inflammatory mass.

(3) It is thus obvious that the normal physiological functions of the Fallopian tubes are greatly encumbered if not totally destroyed and the normal process of fertilization is therefor unable to take place.

Unfortunately the two common tests of tubal patency vis Hystero - Salpingography and Tubal Insufflation, do not convey any information about the more subtle tubal functions such as ciliary activity, luminal secretions, tubal activity in relation to ovulation and tubal motility, though the last can, to some extent, be assessed on kymographic studies. In addition these procedures have inherent defects in the absolute diagnosis of tubal obstruction especially cornual obstruction.

Basically the approach to the problem of chronic inflammatory tubal occlusion is : (a) surgical or mechanical and (b) non-surgical or medical.

The patients in this Thesis all attended the New Somerset Hospital which caters only for Non-White people.

(4) a. Surgical: This has been the traditional method of treatment. In a personal series collected over a three-year period, there were seventy-seven patients. These patients can be divided into three groups.

In Group I, Conservative extirpative surgery was practised.

In Group II, Conservative reconstructive surgery was employed.

In Group III, Radical extirpative surgery was undertaken.

GROUP I.

There were fourteen patients in this group. They all presented with chronic pelvic pain and exacerbations; in addition they were keen on having children; also, most were in an age group of active reproductive life.

The pathology at laparotomy was gross, with features of a recrudescee of infection; extirpative procedures were conservative; this usually involved the removal of the tube and ovary which were more affected than the other side; in two cases a ruptured tubo-ovarian abscess was only drained per abdomen. Heavy antibiotic coverage was employed.

Though post-operative recovery was complete and follow-up examination satisfactory, the ultimate prognosis must be poor especially in relation to pregnancy which, so far, has not occurred in any of these patients.

With similar cases, some authors (Hurtig, Wills, Collins, etc.) have reported excellent results with the use of Corticosteroids combined with antibiotics not only to the extent of resolution of pelvic masses and the shortening of the course of the illness, but also to the occurrence of pregnancies.

GROUP II.

There were fifty-three patients in this group.

Their chief complaint was of involuntary sterility with husbands who either have a satisfactory semen analysis or had children elsewhere. Chronic pain and the presence of pelvic masses warranted operative treatment in most cases.

Again pelvic pathology was gross, but reconstructive procedures were performed. Various types of salpingostomy were employed; in five cases tubal implantation in addition to salpingostomy was necessary; salpingolysis was also performed in all cases. In seven cases one tube was so badly destroyed that it was removed in the hope of improving the overall chances of the remaining tube. Incidental Partial Ovarian resection was often necessary.

Polyethylene splints or "hoods" were not employed nor were corticosteroids.

No pregnancies resulted; Patency was restored in four patients.

Reviewing the world literature on tubal reconstructive surgery, one finds widely varying results; some authorities are optimistic about the results, others are more cautionary and still others are openly despondent.

There is also some indication that the pathology encountered by other surgeons is not as gross and neglected as in our cases. It is thought that this fact is probably the basis of our poor results. In this connection it must be stressed that tubal patency is only a partial success for the restoration of complete tubal function in relation to fertilisation and transport of the zygote involves more than just the restitution of tubal patency.

GROUP III.

In this group there were ten patients.

By-and-large the patients in this group had a long history of pelvic troubles, had sufficient children and/or were in an older age group than those in Groups I and II.

Under these circumstances radical surgery involving Total Hysterectomy with Bilateral Salpingectomy and conservation of ovarian tissue, is strongly recommended as the procedure most likely to result in permanent cure.

Two other lesser radical procedures, for those patients who are reluctant to lose their function of menstruation, are bilateral Salpingectomy and bilateral Cornual Resection ("Falk Procedure"); both of these procedures expose the patient to potential further pelvic disturbances.

It must be pointed out that the surgical treatment in general was of beneficial effect to the patients in that there was relief of pelvic pain to some degree, and most important, their morale was restored.

(4) b. Medical Treatment:

The use of Corticosteroids in pelvic inflammatory disease came into being only in the last decade. The utilisation of the anti-inflammatory properties of these potent hormones were mainly envisaged. From a consideration of some general medical disorders this use seemed justified. A trial was undertaken personally in which the efficacy and limitations of a corticosteroid drug in chronic tubal occlusion was determined. A conservative dosage schedule over a three months period was deemed reasonable. One of the more recent corticosteroid preparations was used via Betamethasone ("Celestone"); these preparations have fewer side-effects and certainly cause less salt retention than the original Cortisone or parent substance, hydrocortisone.

Full cognizance was taken of the potential dangers of Corticosteroid therapy as well as of the known common side-effects in the design of the trial.

Tubal occlusion was proved on two hystero-salpingograms at an interval of three months, as well as on tubal insufflation, although with the latter procedure our results could only be crudely assessed. In addition, evidence of ovulation was sought by means of a curettage when tuberculosis was excluded at the same time. Likewise the male factor had to be satisfactory.

Thirty-three patients qualified for the trial and finished the course. Evidence of some side-effects of the drug was noted in the weight-gain of patients; Hirsutism; dependent oedema, mild increase in Blood-pressure and euphoria. This last entity was tremendously beneficial to these miserable, unhappy, sterile women.

No recrudescences occurred and tubal patency was re-established in four patients (Patency rate 12.2%). Once again there were no pregnancies.

From 1951 - 1956 there were two hundred-and-six operations with twenty-four intrauterine pregnancies (11.6%-). From 1956 - 1959 he had performed a hundred opeartions; there were twenty-one intrauterine pregnancies (25.9%) and forty with normal patency (49%).

He prescribed 30mg. Prodnisolone per day for six weeks post-operatively.

Green - Armytage (1960 & 1962) employed corticosteroids in an interesting and novel way.

(1) Where operation is decided upon, in some cases where tubal pathology is not too gross this would occur after four or more hydrotubation treatments have failed, he recommends hydrotubation once a week for three to six weeks before and after the surgical procedure.

The mixture (P.S.C.) used in hydrotubation consists of:

Procaine Hydrochloride	100mg.
Streptomycin Sulphate	1g.
Hydrocortisone	25mg.
Sterile normal saline to	10cc.

This mixture must be freshly prepared and used within twenty-four hours.

The third method in which corticosteroids have been used in the treatment of chronic inflammatory tubal disease is in conjunction with tuboplastic operations.

Post-operative adhesions and fibrosis are conceivably reduced; Brandon(1962) reports a similar concept in the prevention of radiation pulmonary fibrosis.

Palmer (1960) is convinced that as a result of using Prednisolone post-operatively after every operation on the tubes, the results of his last 100 operations have been better than without the use of the corticosteroid.

Thus from 1942 to 1951 he had performed 90 operations resulting in fifteen intrauterine pregnancies (16.6%).

Kurzrok and Strein (1954) and Kurland and Loughran (1961) produced far better results with a similar programme of corticosteroid therapy, though it is felt that there is some doubt about the diagnosis of tubal occlusion in some cases of the latter authors.

The literature concerning hydrotubation is reviewed; some of the most spectacular results of corticosteroids have been recorded with this method of treatment. However, it is thought that this method of treatment will not be of much value in cases with gross pelvic pathology.

It can be concluded that corticosteroids do have a place in the management of chronic tubal occlusion, and have been effective in a significant, if small, number of cases; though this has only been in the form of restoration of tubal patency, there is at least hope now for subsequent pregnancies in these patients.

It seems logical that we should combine Corticosteroid therapy with tubal surgery in order to improve our results. Indeed, some authors have reported very favourably on this combination, notably Palmer (1960) and Green-Armytage (1960).

Such a trial is at present underway.

Summarising, it must be reiterated that the poor results obtained, by both surgical and non-surgical means, in the management of chronic inflammatory disease of the Fallopian tubes in the non-White people of Cape Town, can be ascribed solely to the neglected gross pathology encountered; this in turn is intimately bound up with the poor socio-economic position of these people and all its associated complications.

What does the future offer for further research in the management of chronic pelvic infection in Cape Town? At the moment the outlook for these people is decidedly bleak. However, the following suggestions are made for future investigations in the management of chronic inflammatory tubal occlusion.

(1) The reduction in the incidence of septic abortion.

(i) Consideration of birth-control and family planning measures for married and particularly for unmarried women.

(ii) Consideration of the pros and cons of society adopting a different attitude to the problem of unwed women, and a consideration of widening the indications for inducing abortions under hospital conditions, on medical, psychological and socio-economic grounds.

(iii) Socio-economic uplift of the masses of the populace; wider education; making them more conscious of personal health problems. This will ensure earlier medical attention for pelvic infection either following an abortion or of venereal origin. Consequently such a patient, receiving prompt, definitive antibiotic treatment, is more likely to remain fertile.

(2) Prompt referral and admission, of incomplete abortions for adequate, definitive antibiotic therapy. This would entail the bacteriological examination of cervical and other smears to isolate the organisms and to obtain the correct antibiotic sensitivity. The same obtains for patients presenting with pelvic infection from other sources.

The duration of antibiotic therapy must be adequate to prevent relapses and consequently a prolonged smouldering course. In this connection serious consideration should be devoted to the possible value of long-term antibiotic therapy, say for six weeks, comparable to the procedure advocated in the management of acute pyelonephritis (Stansfeld and Webb; Turck et al; Crieble and Jackson, Rhoads et al).

(3) a. Consideration of undertaking a planned, controlled trial od the addition of corticosteroid therapy to the antibiotics in acute or chronic pelvic infection, in an attempt to reduce the incidence and extent, of residual chronic inflammation and fibrosis. The series of Hurtig, Wills etc. resulted in a favourable outcome.

It has been stated that antibiotic therapy of acute salpingitis has resulted in an increased incidence of ectopic pregnancies (J.T.Louw, 1953; Green-Armytage, 1960).

This indicates that although the infection may be eradicated, the body's reparative processes result in an functionally damaged tube. It is therefor conceivable that corticosteroids combined with antibiotics in the primary attack may lead to a better functional result.

b. A Changed surgical approach to the problem of Acute-on-chronic pelvic infection in that reconstructive tubal surgery be performed at the same time as conservative extirpative surgery.

Also, the place for a reconstructive surgical attack on the Fallopian tubes in the initial acute stage should be carefully re-assessed; this was advocated in 1923 by A.Bourne when the modern potent drugs were still far off from being discovered. Thus pre and post - operatively antibiotics with corticosteroids should be used in an attempt to minimise oedema and adhesions.

An approach along similar lines was advocated by Von Wiedenbach; most overseas gynaecologists disapproved of his views, but we should re-assess his approach under our circumstances.

(4) a. In the treatment of chronic tubal obstruction,(a) surgery should be combined with corticosteroid therapy. This should be a carefully controlled series in order to be of any definite value.

(b) Consideration of higher dosage schedules of corticosteroids e.g. 2mg dexamethasone daily for three months, to try and procure a greater number of successes i.e. an attempt to evaluate and assess the efficacy of higher dosages of corticosteroids than used in this pilot study. The social unhappiness and even misery, of chronic tubal occlusion with its associated invalidism and sterility, are grounds for investigating the effect of higher dosages of corticosteroids, providing the risk of undesirable side-effects is appreciated by both patient and doctor.

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Medical Superintendent of the New Somerset Hospital until his retirement in August, 1963; he died in September, 1963. Dr. Joubert very kindly gave me free access to the patients and their charts.

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