

## THE TREATMENT OF PELVIC INFECTIONS

WITH AN ANALYSIS OF 1,105 CASES

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**D**URING the past 8 years 40 per cent of the patients admitted to the Gynecological Division of Harlem Hospital, New York City, have had some variety of adnexal infection. There were 1,105 cases of adnexal disease, and these form the basis for the clinical study herein submitted.

It is not the purpose of this paper to offer anything new in the way of conservative or surgical treatment, but solely to analyze and record the treatment and clinical end-results.

These cases can be divided into the gonorrhœal and non-gonorrhœal. In this series of cases of adnexal disease approximately 88 per cent are regarded as gonorrhœal in origin, 12 per cent non-gonorrhœal. In the latter group the condition was due to infections following birth trauma, secondary infections associated with other pelvic pathological changes, and in a small number, to tuberculosis.

Attempts to classify these groups more accurately by prevailing laboratory methods were unsuccessful. In the presence of urethral and cervical discharges, only 12 per cent of smears demonstrated the gonococcus. Cultural methods also proved disappointing. Complement fixation tests from the blood were not only valueless but in some instances were even misleading. Intradermal injections of specific bacterial proteins were tested and seemed devoid of diagnostic significance (3).

As the gonococcus has a predilection for mucous membrane, and the site of the primary infections is the urethra or cervix, one can classify adnexal disease as gonorrhœal: (1) when smears from the urethra or cervix show the presence of gram-negative intracellular diplococci; (2) when in spite of negative smears there is observed an endocervicitis with a urethritis, skenitis, or bartholinitis; and (3) when there is adnexal infection with infections of the above anatomical sites, the smears from which show a preponderance of pus cells.

While these clinical observations are not scientifically accurate criteria for the diagnosis of the etiological factors in genital tract infections, they may be relied upon until more improved biochemical methods have been devised.

Patients having adnexal disease sought admission to the hospital for relief of abdomino-pelvic pain. They were usually seen in the acute stage of pelvic inflammation, whether suffering from an initial attack or an exacerbation of a chronic condition. Examination of these patients disclosed the presence of a vaginal discharge, either from a concomitant urethritis or endocervical infection. The adnexa were tender and enlarged. The temperature varied from 100 to 104 degrees F.

During this period conservative measures only were applied. Sedatives were given to ameliorate pain; ice bags were applied to the abdomen, and hot vaginal douches prescribed, to aid nature in the control of the infection. Local treatments were given for the urethritis and endocervicitis. In the event of a sub-urethral or Bartholin abscess, the pus was evacuated by incision and drainage.

Certain groups of these patients were selected at different times to test various forms of the newer therapeutic measures, such as intramuscular injections of milk preparation, normal horse serum, and medical diathermy.

The principles upon which the theory of non-specific foreign protein therapy is based will not be discussed. A group of 25 patients having acute adnexal infections with readily demonstrable pelvic lesions were given a sterile lactalbumin preparation (aolan). This was administered by intramuscular injections in 10 cubic centimeter doses, as recommended by Heinemann (6). The subsequent temperature, leucocyte counts, and clinical symptoms were carefully observed. No general reaction followed in any instance. The leucocyte count showed an increase in 4 patients,

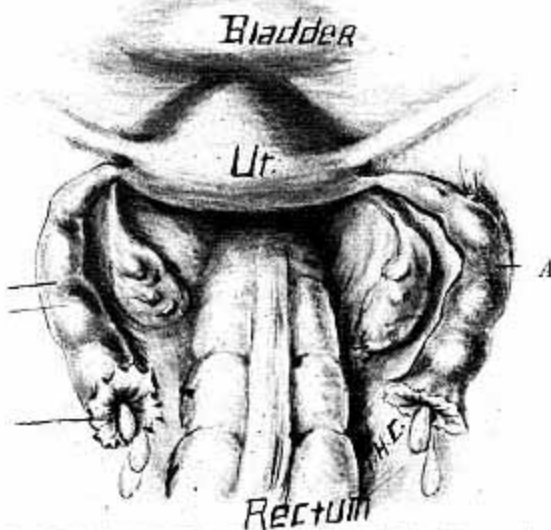


Fig. 1. Showing an initial gonorrhoeal salpingitis. A, Inflamed tubes; B, ovaries; C, fimbriated end from which purulent material is exuding.

the lowest 4,000 and the highest 7,000, 12 hours later. The other 21 patients showed either no increase or a slight reduction in the existing leucocytosis.

In no case treated with this preparation was there any relief of pain, reduction of the pelvic inflammation, or diminution of the vaginal discharge.

Foreign protein in the form of normal horse serum was administered to another group of 15 patients with similar pathology. This serum was injected subcutaneously in 40 cubic centimeter doses after a previous cutaneous test had been made to ascertain the susceptibility to anaphylaxis. A marked general reaction followed in 50 per cent of these patients, with rise of temperature and the typical skin eruption of "serum sickness." When the reaction subsided these patients showed a beginning resolution of the pelvic infection, reduction of pain and tenderness, a decrease, and in some cases, complete cessation of the vaginal discharge. Because of severe reactions in 2 cases, as manifested by extreme illness from the injections, and because of no improvement in the pelvic infection unless a reaction was obtained, the use of this therapy was discontinued.

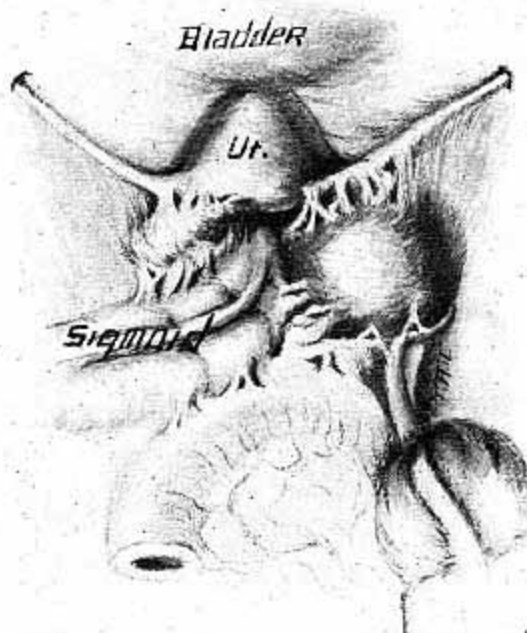


Fig. 2. Illustrating complicated lesions following recurrent attacks of pelvic inflammation.

continued. The risk involved and the lack of uniform results from its employment did not warrant its continued use.

Diathermy, as a therapeutic agent, has yielded definite results when applied to pelvic infections of gonorrhoeal origin. The penetration of the pelvic structures by an electrical high frequency current through properly placed electrodes generates heat in the tissues to varying degrees. The intensity of the heat can be controlled by the size of the electrodes and the amount of current utilized, measured in milliamperes. It is an established fact that the gonococcus is susceptible to comparatively low degrees of heat. An exposure to 42 degrees C. for 10 minutes will destroy it completely. By the use of diathermy, a temperature of 45 degrees C. can be generated in pelvic structures without discomfort to the patient or damage to the tissues; destruction of the gonococcus is thereby assured. By means of experimental work upon rats and dogs, I have demonstrated that skin, subcutaneous tissue, bone, and the internal pelvic



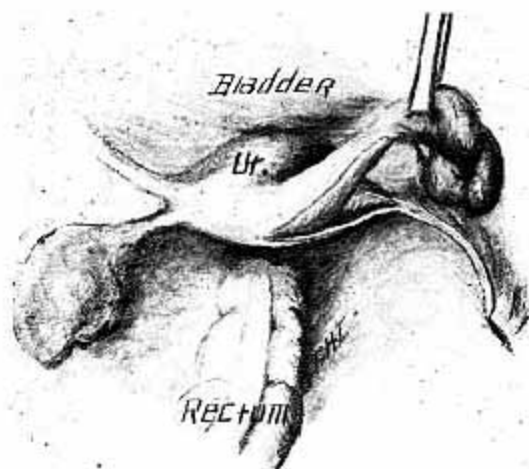


Fig. 3. First step in a fundal hysterectomy with removal of both adnexa.

organs will withstand a temperature of 50 degrees C. without morphological changes.

In a previous article (1) a report was made of 52 patients with adnexal disease to whom diathermy had been applied. The treatments were administered by means of vaginal or rectal electrodes, with an inactive electrode upon the abdomen or sacral region. In some instances a sacro-abdominal application was made. The number of milliampères used varied from 2,000 to 3,000, but in all cases sufficient current was utilized to raise the vaginal temperature to 43 or 45 degrees C. for 25 to 35 minutes.

Gratifying results followed, the immediate cessation of pain being particularly impressive. In 36 patients whose pelvic lesions consisted of tender and painful masses there was complete resolution of the masses in 12; and a marked reduction in size in another 12.

In 12 additional patients, however, the masses were apparently unaffected and not reduced in size, although there was a decrease in body temperature and relief of abdominal pain. It is interesting to note that when 8 of these patients were operated upon, large pus tubes or tubo-ovarian abscesses were removed more easily than usual; adhesions seemed softer, more hyperæmic, and were easily separated by blunt dissection; the masses themselves appeared softer, were cedematous, and readily delivered without rupture. The inflammatory

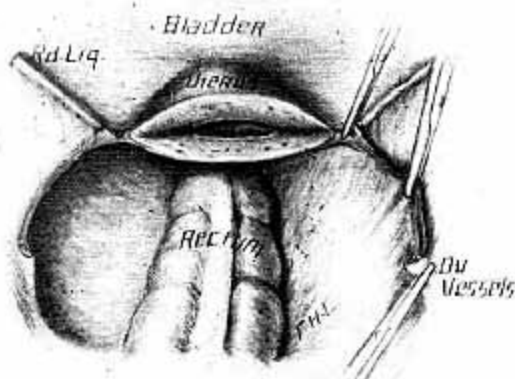


Fig. 4. Drawing showing pelvic structures and fundus of uterus removed.

products consisted of a thin, watery, straw-colored material, instead of the thick, creamy, purulent material usually encountered. All cultures from these masses were sterile. Convalescence in these cases was remarkably smooth, all wounds healing by primary union.

In postpartum and postabortion adnexal infections, the application of diathermy was not as successful as in those of gonorrhœal origin. The pain was only temporarily relieved and then recurred. In one case of a fresh post-abortion infection, a generalized peritonitis was aggravated and death followed. Another patient having a postpartum infection of the adnexa, to whom diathermy was given, showed a spreading pelvic peritonitis with abscess formation, necessitating evacuation and drainage.

The bacteria most active in postpartum infections are the streptococcus, staphylococcus, and colon bacillus. To destroy these micro-organisms 58 to 60 degrees C. of heat are essential, but since such temperature coagulates tissue, the use of diathermy is precluded in most cases of this type of pelvic infection.

Two hundred and eighteen patients having adnexal disease were treated conservatively and not operated upon. After the acute symptoms had subsided the endocervicitis was treated to prevent a re-infection of the adnexa. This consisted of cauterization of the canal in some cases, electro-coagulation in some, and the application of dyes in others. The urethra and Skene's ducts were treated by topical

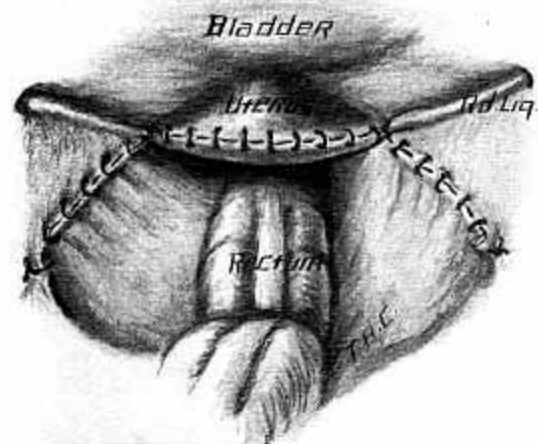


Fig. 5. Round ligaments have been implanted and broad ligaments and fundus uteri sutured.

applications as well as by the use of the Corbus thermophore in the urethra. Abdominal operations were performed upon 832 patients whose history or physical findings indicated recurrent adnexal inflammation. Fifty-four patients who had concomitant pelvic abscesses with tubal infection were drained through the vagina; 3 deaths occurred; a mortality of 5.5 per cent.

In the entire series of 887 operative cases there were 44 deaths; a mortality of 4.6 per cent.

When patients with an initial attack of acute salpingitis were admitted they were treated by the conservative measures already outlined. Resolution, as a rule, occurred, and in some instances the tubal lumen apparently became re-established. This was particularly true if it was possible to free the lower genital tract of infection. A few cases of this type were operated upon in the presence of pronounced right-sided pain; they were mistaken for cases of appendicitis. Under such circumstances the adnexa were not disturbed and the abdomen was closed.

During an exacerbation of a recurrent chronic infection surgical interference was performed only when there was evidence that the infection was spreading beyond the pelvis and producing a generalized peritonitis. Spontaneous rupture of a pyosalpinx or tubo-ovarian abscess occurs infrequently; but when



Fig. 6. Giant pyosalpinx of left side adherent to hilum of spleen. Tubo-ovarian abscess present in right side.

such an accident does occur generalized peritonitis develops and operative interference should not be delayed.

When a pelvic abscess forms, drainage by the vaginal route is established, and laparotomy is deferred until a later date.

The abdomen was opened in the presence of acute symptoms 81 times. When there was definite evidence that a chronic infection was present, the pathological masses were removed if feasible; otherwise proper drainage only was established.

The chronic cases of adnexal infection presented interesting variations in pathology. Some showed slightly thickened tubes, the fimbriated ends of which were or were not occluded; adhesions were few in some instances, in others dense. Some tubes were greatly thickened and fibrosed and densely adherent to surrounding pelvic structures; most contained a purulent exudate of varying consistency that, as a rule, proved sterile. The tubes were often much enlarged, containing thick, creamy pus; communications between the pyosalpinx and ovary, forming tubo-ovarian



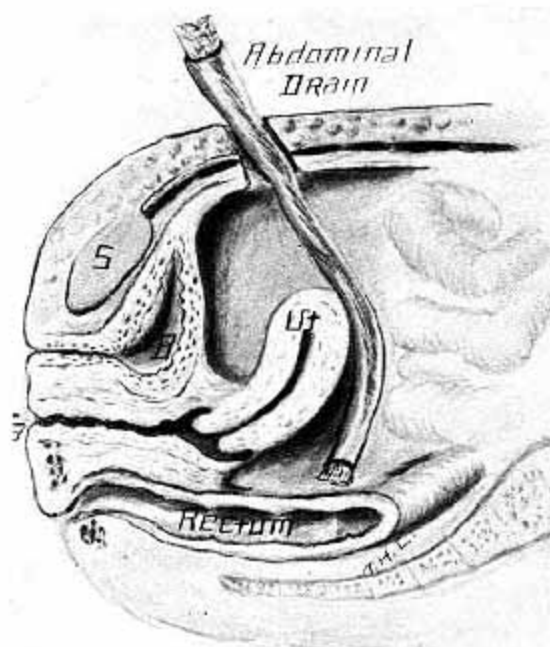


Fig. 7. Cigarette drain inserted through lower angle of abdominal wound down to cul-de-sac.

abscesses or cysts, were not uncommon. Infective processes may take place in the ovaries, presenting a simple ovaritis, retention cysts, or abscesses.

In this same group there were 806 patients operated upon, for tubo-ovarian abscess or cyst, 144 cases; pyosalpinx, 386; and thickened adnexa with peritubo-ovarian adhesions, 276. Incidental pathological changes noted were cystic ovary in 118; ovarian cyst in 61; tubal pregnancy in 8; hydrosalpinx in 16; intraligamentous cyst in 1; papillary cyst adenoma of the ovary in 1; ovarian cyst-adenocarcinoma in 1; fibromyoma in 85; appendicitis in 83; retrodisplacements of the uterus in 102.

These patients presented clinical evidence of a recurrence of pelvic infection, either acute or subacute. Abdomino-pelvic pain was a pronounced symptom; temperature ranged from 100 to 104 degrees F.; leucocyte counts varied from 8,000 to 30,000, depending upon the severity of the infection and the patient's resistance. Practically all had an endocervicitis with a mucopurulent vaginal discharge. Many had urethritis, skenitis and Bartholinitis.

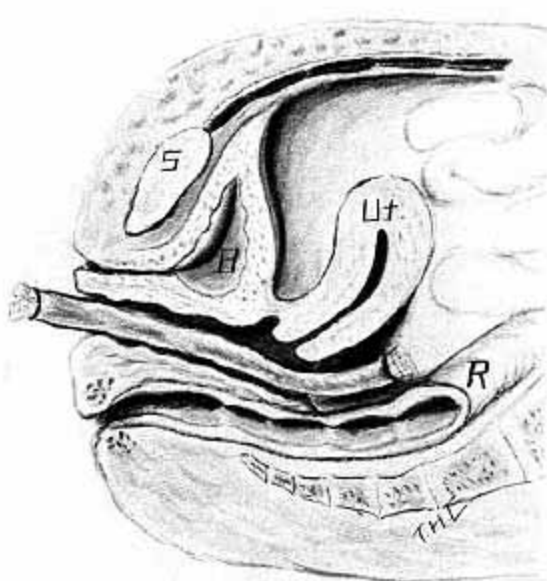


Fig. 8. Cigarette drain through vaginal vault into cul-de-sac.

During the acute stage conservative therapeutic measures were instituted until it subsided, as shown by normal temperature, pulse rate, lowering of leucocyte count, and amelioration of pain.

Early operation has been adopted as a wise policy by the personnel of the Gynecological Department of Harlem Hospital following subsidence of the acute exacerbation. It has been considered safe to operate when the patient's temperature has been normal from 3 to 10 days, and the leucocyte count is below 16,000.

In 508 patients operated upon whose recorded leucocytosis was below 16,000, there were 21 deaths, or 4.1 per cent mortality. Among 120 patients with a leucocytosis above 16,000 there were 20 deaths, or 16.6 per cent mortality. These observations demonstrated the value of the leucocyte count as an indicator of the reaction or acquired immunity of the patient to the pelvic infection.

European Clinics place great dependence upon the sedimentation time of the red blood cells as a more reliable indicator of the activity of infection.

Linzenmeier (8) believes that a sedimentation time of below 20 minutes indicates an

active infective process and that one of 60 minutes, or less, suggests a latent infection. Friedlander (5) prefers not to operate upon pelvic infections until the sedimentation time is well above 60 minutes. In a previous article (2) the writer presented a comparison of the relative value of the leucocyte count and sedimentation time of the erythrocytes in a group of 71 patients operated upon for adnexal disease. Twenty-nine patients of this group showed a sedimentation time of less than 30 minutes, but their average leucocyte count was 13,250. There was no mortality, and the morbidity averaged 18.2 days. Twenty-six patients showed a sedimentation time of between 30 and 60 minutes, with an average leucocyte count of 10,200. There were no deaths, and the morbidity averaged 16 days. The rest of the group, 16 patients, had a sedimentation time above 60 minutes, with an average leucocyte count of 10,200. One death occurred in this group from a general peritonitis with the sedimentation time of 68 minutes.

From these comparative results, as well as from other isolated instances, one cannot help but believe that in estimating the activity of an infective process greater reliance should be placed upon the white cell count than upon the sedimentation of the red cells.

At operation, I first dispose of the endocervicitis either by performing a tracheloplastic operation or by thoroughly cauterizing the endocervical mucosa. The abdomen is then opened and the tubo-ovarian masses removed. No attempt is made to salvage portions of damaged ovaries or tubes. In previous years such attempts at conservation were frequently made with disappointing results. In 10 such instances it was necessary to evacuate secondary abscess formations by colpotomy.

In patients with extensively involved adnexa, a fundal or supravaginal hysterectomy was done in order to extirpate all infective foci. This operative maneuver was performed 159 times. When ovaries appeared normal they were suspended to the fundus uteri by shortening the utero-ovarian ligament. The ovaries were conserved in 401 cases.

In many instances upon removal of both tubes with retention of one or both ovaries,

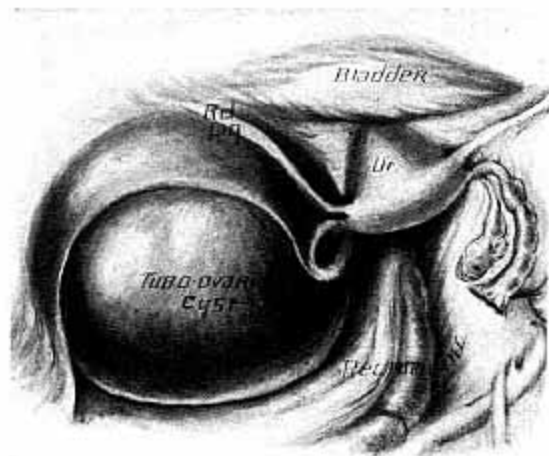


Fig. 9. Large tubo-ovarian cyst simulating intraligamentous mass.

the uterus was suspended either by a fixation suture or shortening of the round ligaments. This was done to prevent a postoperative retrodisplacement, which will otherwise occur in 70 per cent of cases.

In the separation of adhesions care was taken to prevent injury to the intestinal walls. The judicious use of sharp dissection, where blunt separation seemed harmful, prevented many such injuries. In some instances portions of the inflammatory masses were cut away and allowed to remain attached to the gut wall rather than risk perforation. In spite of this extreme care in technique, accidental intestinal opening occurred 12 times; 5 times in the sigmoid; and 7 times in the small intestines. Resection was necessary in 1 case; otherwise single suture sufficed. No deaths occurred from injury to the large gut, but 4 patients died from the injuries to the small gut, a mortality of  $33\frac{1}{3}$  per cent.

Among the 833 abdominal sections for adnexal disease, pus was encountered and the peritoneal cavity was soiled 324 times. When such an accident happens, the question of whether or not to institute drainage is naturally foremost in the mind of the surgeon. To determine which pus cases require drainage many things must be taken into consideration. Practically speaking, all these adnexal infections originated as gonorrheal inflammation. The chronicity and subsequent acute



exacerbations were due either to a fresh infection of another gonococcal strain or a recrudescence of the original one. Occasionally the acute exacerbations were due to the invasion of the field by other pyogenic bacteria, which also may persist as a low grade inflammatory process producing great damage to the pelvic organs; however, in the course of time the resistance of the tissues overcomes these invading germs and an immunity is established. The pus in most instances becomes free of bacteria. It is true that the tissues of the tubal wall may harbor these bacteria, as shown by Curtis (4) in tissue cultures, but an immunity to this has also been attained and they are usually quiescent and not virulent.

The introduction of a drain into the peritoneal cavity, either through the abdominal wound or vaginal vault, produces a peritoneal irritation that, according to Hertzler (7), surrounds it with adhesions sufficient to exclude it from the peritoneal cavity. At the end of 48 hours these adhesions are fairly firm and the drain has accomplished its purpose in establishing a communication for the escape of infective material; therefore, on the third post-operative day the drain should be gradually withdrawn and shortened and by the seventh day it should be entirely removed. Instances occur when the advisability of establishing drainage is questionable. The old slogan, "When in doubt, drain," might be paraphrased to read, "When in doubt, drain, but don't drain long." Under these conditions the drain should be removed by the fourth or fifth day. When infection has not taken place, the communicating sinus will close more quickly.

In my opinion it is not necessary to drain the pelvis in pus cases when a smear shows the absence of bacteria, when the temperature has remained normal for a period of from 3 to 10 days, and the leucocyte count is below 16,000.

A guide to the infectivity of pus in the 324 contaminated cases is well illustrated by the mortality of 4 per cent in those patients whose leucocyte count was under 16,000; while a mortality of 20 per cent occurred in those patients whose leucocyte count was above 16,000.

The most logical site for the establishment of drainage in pelvic surgery seems to be through the vaginal vault rather than through the abdominal wound. Occasions frequently arise, however, that necessitate, for the sake of speed, the latter course. Drains were also inserted for hæmostasis, when persistently oozing areas could not be controlled otherwise. Drainage was established 163 times; 126 times in the presence of pus contamination, and 37 times for bloody oozing.

It is interesting to note that in the contaminated series, when no drainage was used, the mortality rate was 3.8 per cent and primary union occurred in 79.6 per cent of the cases. When abdominal drainage was instituted the mortality was 14.3 per cent with primary union in 18.3 per cent of the cases. When vaginal drains were inserted the mortality was 10.2 per cent and primary union occurred in 63.2 per cent of cases.

In the entire series of 578 cases in which drainage was not employed, 18 patients died, a mortality of 3.1 per cent; of 125 patients with abdominal drainage, 19 died, a mortality of 15.2 per cent; of 38 patients with vaginal drainage, 4 died, a mortality of 10.1 per cent.

It would seem from these statistics that when pus is encountered in pelvic infections, no drainage yields the best results, and when the operator decides that drainage is necessary the vaginal route is better than the abdominal.

#### CONCLUSIONS

1. In 1,105 cases of pelvic infections in the Harlem Hospital, New York City, the gonococcus is the inciting agent in 88 per cent, and in 12 per cent the condition is due to other causes.

2. Exclusively conservative treatment of adnexal disease is, on the whole, unsatisfactory. The patient upon discharge from the hospital is inclined to ignore the advice given urging return visits, and re-infection of the adnexa often occurs.

3. Injections of foreign protein in the form of milk preparations (aolan) and horse serum have proved unsatisfactory.

4. The use of diathermy as a conservative measure in the treatment of adnexal disease of gonorrhœal origin was the most successful of

the palliative methods, as it caused a resolution of pelvic masses in 66.6 per cent of patients, besides relieving pain in practically 100 per cent. It also, by proper application of electrodes, controlled the infection of the lower genital tract.

5. Initial acute attacks of adnexal inflammation should not be treated surgically, as they spontaneously subside. Re-infection should not occur if the lower genital tract is properly treated.

6. Recurrent attacks of pelvic inflammation are excellent reasons for the surgical removal of the pelvic lesions. Such surgical procedures can be performed with a reasonable assurance of not more than a 3 per cent operative mortality, if the temperature has remained normal for 3 to 10 days and the leucocyte count is below 16,000.

7. When in the course of operative removal of infected adnexa, pus contaminates the peri-

toneal cavity, the best results as to mortality and wound union are obtained by closure of the abdomen without drainage. If drainage is necessary the vaginal route is better than the abdominal.

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