Tuberculosis of the female genitalia

Roy D. Sinclair
University of Nebraska Medical Center
Tuberculosis of the Female Genitalia

Roy D. Sinclair

Tuberculosis is an extremely ancient disease. Hippocrates according to Norris, (460-376 B.C.) wrote of it as "the greatest and most dangerous disease and one that proved fatal to the greatest number." Osler states that the title of one of the lost books of Democritus, "On Those Who are Attacked with a Cough after Illness," probably indicates that pre-Hippocratic writers were acquainted with certain features of tuberculosis.

All writers on the subject of genital tuberculosis, who give an historical introduction, date the beginning of the history of tuberculosis of the female genitalia back to 1744, when Morgagni, making a necropsy on a young woman who had died from tuberculosis, found the uterus and both fallopian tubes filled with caseous material. The tubes and ovaries were firmly adherent, so that it was impossible to separate them, and Morgagni considered the lesions as being the primary focus of the disease.

It was not until 1886, according to Norris, Greenberg, Murphy and others, when Hegar's monograph appeared that tuberculosis of the female regenerative organs had always been considered a rare condition. Since that time, however, an enormous literature has accumulated, and more and more anatomical (gross and histologic) bacteriologic and clinical studies have brought forth to show that the affection is not uncommon and that it is of great clinical significance. Nevertheless, those who have
studied the subject agree that the actual incidence of the disease is still under rated. Greenberg asserts that when we stop to reflect that the diagnosis in the majority of cases is made only after careful microscopical examination there is little wonder that many cases are overlooked and that the true condition is seldom recognized before operation, partly because there are no pathognomonic signs and partly because it is still considered rare and hence not always remembered. Modern text books seem to be especially negligent in their space allotment to the consideration of genital tuberculosis.

Incidence:

In Johns Hopkins Hospital during the years 1890 to 1919 inclusive there were two hundred cases reported in which diagnosis was made microscopically. This figure was estimated to be 0.32 per cent of all cases on the gynecology service during that time. This of course does not give the actual incidence of the disease as it occurred for many patients having tuberculous peritonitis had no tissue removed for examination, even though a large percentage of them were known to have tubal tuberculosis. (Greenberg)

According to Osler, tuberculosis of the tubes is found in thirty to forty percent of tuberculous peritonitis in women.

Greenberg's report, based on these two hundred cases suffering
with genital tuberculosis, estimates that nearly one percent of all surgical gynecology shows tuberculosis of some part of the genital tract and that from five to ten percent of all fallopian tubes removed because of inflammatory conditions, appear microscopically to be tuberculous.

As long ago as 1894, Williams, in his monograph on tuberculosis of the female genital organs, stated that one operation in twelve for inflammatory disease of the pelvic organs had been found upon microscopic study to be tuberculous although in seventy-five percent of the patients the tuberculosis was not suspected until laboratory examination had been made.

From the experience of Martin, Kroenig, Schoorl, Pankow, and others (cited by Baker) show about two percent of all pathology of the female genital organs has tuberculosis as its base.

Estimating the incidence of genital tuberculosis from another point of view, Murphy states that fifty-three cases of genital tuberculosis were found in a series of cases of 4470 routine autopsies performed by Schramm, Von Winckel and Donhoff which gives an incidence of one case of genital tuberculosis in eighty-four autopsies while 270 autopsies on tuberculosis in women twenty-four cases of tuberculosis of the genital organs were found, or an incidence of one case of genital tuberculosis in eleven cases with generalized tuberculosis.
Salmond states that 10 per cent. of all cases of salpingitis are tuberculous.

When we consider the incidence of genital tuberculosis in tuberculous women we find that it occurs in from one to thirty per cent. of all necropsies. According to Greenberg, the most recent reports are showing an incidence which more nearly approach the later figure because of the more exact methods now in use.

Nearly all writers on the subject (Murphy, Baker, Cullen, Simmonds, Williams and others) are agreed that tuberculosis of the pelvic organs may occur at any age but is most common during the child-bearing period. Berkely says that 93.2 per cent. of his cases occurred in the child-bearing period. Other reports range from 70 to 100 per cent. in this period.

That tuberculosis of the genital organs in children is rare is shown by the fact that Kelly in 1901 was able to collect from the literature only 21 cases in children under 15 years of age. The youngest child in his series was 10 months old.

Routes of Infection:

Whether all genital tuberculosis is secondary or whether there are cases in which the lesion may be primary in the genital tract is still a question. Murphy argues that genital tuberculosis may be either primary or secondary. By the former we understand that the focus in the genital apparatus is the
only one in the body. In favor of primary genital tuberculosis he gives the following facts:

(a) Otherwise strong, healthy people have manifestations of the disease in the genitalia.

(b) After the removal of local genital focus, patients remain well for years.

(c) Children otherwise apparently healthy, have primary tuberculous manifestations only in the external genitalia.

Morris, although he admits the possibility of primary infection states that it is a very rare condition and backs his argument by citing numerous experiments in which a primary infection has been attempted by purposful or accidental deposition of the tubercle organisms in the genital tract by different methods and under different conditions. These experiments were failures as far as active infection is concerned in the vast majority of cases.

An argument in favor of primary infection is the number of cases reported of genital tuberculosis in apparently otherwise healthy women whose husbands were carrying the organism in the semen. Murphy cites several cases in which pelvic tuberculosis was definitely found without evidence of tuberculosis in any other part of the body.

Veit and Martin point out that the infection is most commonly descending but that it occasionally ascends the vulva.
Amann holds that primary genital tuberculosis by direct infection from without, is in the highest degree questionable, and he points out that the examples of primary genital tuberculosis found in literature are not absolutely without question holding that evidence gained from operation is not sufficient proof of a primary infection and that only a thorough examination of all organs at autopsy, where all unsuspected sources of infection could be excluded can be accepted. He also holds that marriage with a tuberculous man offers more chance of infection through the respiratory tract than through the genital tract. Amann quotes Bollinger, Von Beckeinghausen, Hibbert, Albrecht, Schmaus, Schmorl and Ashoff as having seen no absolutely certain case of primary genital tuberculosis in an adult.

Pozzi states that the auto-infection, endogenous or primary-secondary infection, as it is termed, is more theoretical than practical for it is impossible to positively exclude the hematogenic or lymphogenic route under such circumstances, unless an autopsy is performed. Even then it is often difficult.

Cornet suggests and Greenberg later reports a case in which tubercle bearing saliva may be used as a lubricant by a phthisical husband during coitus and thus result in infection.

Fuhrmann remarks that 90 per cent. of the tuberculous lesions of the female genitalia are secondary to lesions elsewhere in the body.
In general the consensus of opinion of most authorities seems to be with that of Williams in that blood born infections are more frequent than has been generally supposed. Norris gives four routes of possible infection to which the majority of authors hold. They are as follows:

(a) By direct infection from without—(ascending)

This is a rare form but has been quite definitely proven to be possible. The infectious organisms may come from the patient’s own mouth or other lesions by way of the hands etc. or may originate in another host and be conveyed to the genital tract by coitus or in the course of pelvic examination.

(b) Infection of the genital tract may be secondary—(descending) by way of the blood stream; the primary focus may be distant or near at hand, the lungs being the most frequent site for the primary infection. Secondary infection via the blood stream is a frequent form of genital infection.

(c) Infection may result from a direct extension from a near by focus, such as the peritoneum, intestines, bladder, etc. This is also a frequent method of infection.

(d) Infection may occur by way of the lymphatics, usually from a comparatively near by focus.
External Genitalia

Tuberculosis of the external genitalia, according to Murphy, Braviss, Curtis, Norris and others, is a rare form of infection. Only three proven cases were reported at the time when Williams wrote his monograph in 1894. These structures are affected less frequently than any other part of the genital tract. This may probably be accounted for by the fact that the external genitalia are covered by a stratified squamous epithelium. In tuberculous subjects the skin is necessarily frequently contaminated by the tubercle bacilli, and were it not for the protective properties of this type of covering, dermal lesions would be of frequent occurrence. In cases of tuberculous salpingitis or endometritis, the resultant leukorrhea frequently contains virulent tubercle bacilli. (Murphy, Greenberg, Norris) but despite this the lower genital tract rarely becomes invaded. According to Berkeley and Norris it is probable that in the majority of cases the route of infection to the external genitalia is by way of the blood stream and not by surface infection. They give pre-existing inflammation and trauma as the most important predisposing factors.

White states that 25 per cent. of tuberculosis of the vulva occurs in children and that when in the adult, the age incidence is between 30 and 40 years.
In general, as would be expected, vulvar lesions closely resemble tuberculosis of the skin in other parts of the body except that they are modified according to Norris, Funk and others as a result of local conditions, such as moisture, heat, friction and the presence of special glands and other anatomic conditions.

Most authors recognize two varieties of infection—the ulcerative and the hypertrophic. Of these the ulcerative seems to be by far the most frequent. Norris collected a series of 54 cases of tuberculosis of the external genitalia from the literature of which 44 were the ulcerative type. He states that he himself has never seen a case of the hypertrophic type although he does not doubt its existence.

Norris Murphy, Solomon and others describe the ulcerative lesions as being single or multiple, varying greatly in size from the microscopic to huge ulcers involving not only the genitalia but the surrounding skin as well. The ulcers may occur at any point on the external genitalia. The adjacent surface is generally the seat of more or less marked chronic inflammation with redness and swelling. Pigmentation is often present. The initial genital lesion, described by Bender, is usually a small swelling, papule-like in character, which enlarges, softens and breaks down leaving in its center an
Irregular necrotic ulcer. More or less edema is present in the neighborhood of the swelling. Histologically there is chronic inflammation with perivascular infiltration of small round cells. Epitheloid and giant cells are found on section. The specific bacilli are also found but are few in number, and in order lesions may be entirely wanting. In appearance, the ulcer often resembles cancer or epithelioma of the labium.

The hypertrophic variety usually results in moderate sized tumor-like masses, the labia being the most frequent area involved.

Norris in his earlier work described a third or miliary variety which is now not recognized as being typical.

Symptoms as described by Norris Murphy, Funk and others vary markedly with the variety and stage of the lesion and are often overshadowed by lesions in the upper genital tract or elsewhere in the body. A family history of tuberculosis is sometimes present and a past or present history suggestive of a primary lesion in the lungs, intestines or elsewhere in the body is frequently elicited. A history of previous trauma is sometimes obtainable. The onset is slow generally, and unless treated, the disease is progressive. Pain is a variable symptom but is generally present, especially in the ulcerative type and in the latter is augmented by coitus and the presence of urine.
Pruritis is a moderately constant symptom. In the hypertrophic type the symptoms are usually less pronounced, and discharge is thin and generally scant. With the ulcerative variety, discharge is more profuse, thick and sometimes blood-streaked. The ulcerative variety usually begins as a swelling on the dome of which an ulcer develops. In the hypertrophic variety there may be only a discomfort from enlargement of the parts.

The most frequently confused lesions in making a diagnosis of tuberculosis of the external genitalia are malignant neoplasms or manifestations of syphilis and diagnosis can not be made with certainty without laboratory aid. A Wasserman test and biopsy should be performed in all cases.

As in most cases of tuberculosis of the genital tract, the prognosis depends largely upon the condition of the primary lesion according to Fuhrmann, Berkeley, Bulkey Norris and others. They emphasize the fact that the majority of cases being secondary, this fact should be born in mind in considering the prognosis and also the treatment. The genital lesions tend to run a chronic course and to be resistant to local treatment. White states that in children the development is sometimes more rapid than in the adult. Death rarely results from the local lesion alone. Even after wide excisions, recurrences have been noted especially by Bulkey, who in an excellent review of this subject
warns that when dealing with these lesions the term "healed" when applied to the lesion, should not be interpreted as an end result.

All writers on the subject agree that each case is a matter of individual management and no one specific treatment will suffice for all cases. Bulkely stresses the need for general management of the patient as in general tuberculosis, such as suitable changes in diet, environment, mode of life etc. He also advocates the use of tuberculin. Local treatment may be palliative or radical depending upon the nature of the local lesion. Small lesions can often be treated satisfactorily by curittage and cauterization. (Morris) Bulkely claims good results with the local application of certain antiseptic solutions such as iodoform. Larger lesions are generally best treated by wide excision which theoretically according to Bulkely should give the best results, but since the depth of the lesion is sometimes considerable and the anatomical arrangement of the parts makes a wide incision often impossible without serious mutilation to the surrounding structures, and since all of the invaded tissue can not be excised the manipulation and trauma to the parts during the operation often tends to spread the infection rather than to check or heal it. Bulkely gives excision with the cautery knife as the method of his choice.
Vagina

It is quite a universally agreed fact that tuberculosis of the vagina is almost as rare as that of the external genitalia. According to Murphy, cases in which the vagina alone is involved are much less frequent. He found record of only one case (reported by Bierfreund) in which the tubercular ulcer of the vagina was the sole focus in the entire body. According to Arman the vagina may be infected in the following ways:

(a) Infection comes directly from the uterus, vulva, rectum, bladder or by recto- or vesico-vaginal fistulae or through Douglas' pouch from the peritoneum.

(b) From contact of urine and tubal discharge containing tubercle bacilli or from infection by feces and urine, after fistula formation.

(c) Directly through the blood stream.

(d) By direct infection from without.

Norris believes that in spite of the proximity of the vagina to the other pelvic organs the secondary type of infection is by far the most frequent. He believes that trauma is a very important predisposing factor in either mode.

Pathologically, three types are described. (a) ulcerative, (b) hypertrophic, and (c) miliary. The two former lesions present the same pathologic characteristics as a tuberculous lesion of the external genitalia except that they may be modified as a result of heat, moisture, pressure and local conditions. In the miliary form the vaginal lining is thickened and reddened, and contains numerous tubercles in various stages.
of development. It is not infrequently associated with general miliary tuberculosis. (Norris)

Murphy states that there is nothing pathognomonic in the symptoms presented and Norris upholds him in stating that positive diagnosis can only be made on a histologic or bacteriologic basis. According to Berkely and Norris, discharge is the most important and only constant symptom. The discharge varies from a thin, sometimes blood streaked variety of the ulcerative type to a more profuse, purulent discharge of the miliary infection. Pain is rarely a marked feature. Dyspareunia is usually present and dysuria is quite frequent. Fever and other systemic disturbances are rarely produced by vaginal lesions alone but are often present as a result of tuberculosis in other parts of the body.

In general, treatment is similar to that for the treatment suggested for vulvar lesions. Murphy, Norris and Barnes advocate practically the same treatment for the local condition which may be summarized as follows:

In mild cases curettage, followed by the application of tincture of iodine or other chemical agents, or by actual cauterization may suffice to produce at least temporary relief, but excision offers better hopes for permanent cure in the ulcerative or hypertrophic varieties. Unfortunately the majority of these cases are secondary, and treatment directed toward the
vaginal condition is at best but palliative.

As has been previously stated, many cases of vaginal tuberculosis are associated with vulvar lesions and cervical lesions. Therefore, to obtain a full list of all vaginal lesions the reader is referred to reports of tuberculosis in both these other areas.

**Cervix**

It is generally admitted that tuberculosis limited to the cervix is a rare pathologic condition.

Greenberg, in his study of 200 cases of tuberculosis of the fallopian tubes found only 7 cases of cervical involvement or an incidence of 3.5 per cent. and states that Labhardt in a study of 73 cases of genital tuberculosis did not find the cervix involved in any. Eden and Lockyear, in their Textbook on Gynecology, state that 8 per cent of genital tuberculosis involves the cervix. Norris found in 66 tuberculous specimens of the female genitalia only one case of tuberculosis of the cervix. Spalding states that he found only 135 cases of tuberculosis limited to the cervix which were reported in the literature in 1922 of this number many reports would have to be eliminated because no laboratory examination had been made of the pelvic organs except the cervix, and many diagnoses have
been based upon clinical findings. He reports that in the Woman's Clinic of Stanford University School of Medicine since 1912 that 6005 specimens from gynecological operation have been examined of this number the cervix has been examined 704 times and only once has the diagnosis of tuberculosis of the cervix been made, altho there are in the laboratory quite a number of specimens showing tuberculosis of the uterus above the internal ass. Norris reports that among 118 specimens of tuberculosis of the genitalia in the Gynecological and Obstetrical laboratory of the University of Pennsylvania only 2 cases of cervical involvement have been observed. Both were secondary and both were associated with tuberculous salpingitis and endometritis. In an analysis of 29 cases he showed that 5 occurred in virgins, 17 in nulliparae and 7 in multiparae. He is after this analysis undecided as to predisposing causes but believes that pre-existing infection and laceration probably play a slight part. Among 116 of his cases 75.6 per cent. were between the ages of 20 and 30 years. Two patients were under 11 years of age and two were over 77 years. Hartzlof states that 75 per cent. of cases occur in child bearing ages and gives child bearing as an important predisposing factor.

As in tuberculosis of other parts of the genital tract, considerable discussion has taken place regarding the method of infection of the cervix. Some doubt exists as to the possibility of infecting the healthy cervix with fingers, instruments or by other direct means. Norris and Murphy both give the direct
rout as a possibility but it is agreed by all authors that this is very rare and that the secondary or metastatic rout, through the blood and lymph channels is by far the most frequent mode of infection. Martzloff is inclined to consider all cases of tuberculosis of the cervix as being secondary, especially to tuberculous salpingitis and metritis.

Norris and Martzloff describe four main types of tuberculosis of the cervix, all of which frequently overlap and all of which tend to become ulcerative in the later stages. In order of frequency they are: (a) ulcerative, (b) papillary, (c) miliary and (d) interstitial. As described by Norris, Murphy, Martzloff and others, the ulcerative variety often resembles carcinoma. This form is usually met with as large or small ulcers occurring over the vaginal portion of the cervical canal. In some cases the entire portio vaginalis is eroded and excavated. The ulcerative process appears to commence near the external os and spread over the vaginal portion, up the canal. When the ulcers are large, they are scooped out but with abrupt edges. In the papillary form there is great hyperplasia. This type usually originates in the portio and develops into a calliflower like outgrowth, often macroscopically indistinguishable from a carcinoma. The outgrowths may be single or multiple. The cervix itself is usually hypertrophied and reddened. In the miliary form, tubercles may be found scattered over the
portio vaginalis, cervical mucosa and in the stroma of the cervix. This type is often associated with general miliary tuberculosis. The interstitial or intramural variety is the least frequent type. It begins in the substance of the cervix, probably first as a nodule which finally breaks through the mucosa leaving a necrotic cavity. Murphy and Beyea describe a fourth or bacillary type which is limited to the surface epithelium and the glands of the cervix which may be filled with a caseous material containing numerous bacilli. Histologically there is according to Brody, the ordinary picture of tubercle with giant cells surrounded by epitheloid cells and lymphocytes.

It is generally conceded that the symptoms of tuberculosis of the cervix per se are not characteristic or in any way pathognomonic. Murphy gives the most important symptom as being leukorrhea, which discharge is purulent, quite often blood tinged and having an offensive odor. Menstrual disturbances such as dysmenorrhea, scanty menstruation and amenorrhea are common. Martzloff states that a muco-purulent vaginal discharge is a common evidence and that bleeding is very apt to occur in the ulcerative and papillary varieties. The discharge may however vary greatly in character and at times it may be so definitely malodorous that it is suggestive of malignancy.
Norr is lays stress on the elicitation of a history suggestive of a primary lesion or demonstration of that primary focus. Constitutional symptoms if present are due to the other concomitant tuberculous processes.

According to Kartzloff a tuberculous process of the cervix uteri may always be suspected when one of the pathological lesions described above is observed in a patient who has a tuberculous lesion elsewhere, particularly if that process be a tuberculous peritonitis or salpingitis occurring in a virgin. In view of the fact that tuberculosis of the cervix may simulate almost any other cervical lesion such as carcinoma which Norris estimates is 400 to 600 times more frequent and for which tuberculosis is most often mistaken, eversion, Hypertrophy, gonococcal infection, the lesions of syphilis, simple polypi, myoma and sarcoma no clinical differentiation is of definite practical value. As stated previously, the examination of microsections from suspected material is the only certain way of establishing a diagnosis.

In general, in every case of tuberculous cervicitis, a focus elsewhere should be suspected even though it may not be clinically demonstrable and a hygienic regime employed for patients with pulmonary tuberculosis should be adopted in these cases. (Berkeley)
Murphy, Norris Funk and Baker advocate practically the same local treatment for the local condition which is summarized by Martzloff as follows:

1. Cauterization:

   A. Where it is desirable merely to give relief from the irritation of the local discharge in cases where other well developed tuberculous foci render strict conservatism desirable, electro-cauterization of the cervical lesion may produce marked local improvement.

   B. Cauterization of the cervical lesion prior to an abdominal panhysterectomy is also a valuable procedure in sterilizing a cervix which has to be removed through the peritoneal cavity.

2. Trachelectomy—Total or subtotal removal of the cervix uteri has been performed in cases diagnosed as primary cervical tuberculosis. This operation is at best a questionable procedure in view of the frequent association with concomitant tuberculosis elsewhere in the generative tract. Patients have however, been cured by it.

3. Panhysterectomy—In operable cases, panhysterectomy either by the abdominal or vaginal route is generally the procedure of choice, especially since
the uterus and adnexa are so frequently invaded in conjunction with the cervix.

Uterus

Norris, Murphy and Solomon state definitely that tuberculosis of the body of the uterus is second only in frequency to the tubal infection. Berkeley cites a series of 172 cases of genital tuberculosis in which 75 had the uterine body affected. On the other hand Osler's Principles and Practice of Medicine contains the following statement: "Tuberculosis of the uterus is very rare. Only three cases have come under my observation, all in connection with pulmonary phthisis." Carstens said that he only saw one case of uterine tuberculosis in his life. Cullen, however, collected 40 cases of tuberculous endometritis in a period of six years. Kelly and Noble state that most cases of tuberculous salpingitis are accompanied by tuberculosis of the endometrium. From the reports of most authors I find that among the cases of genital tuberculosis the uterus ranks next to the fallopian tubes in frequency.

Mayo states that tuberculous endometritis is rarely
found in a menstruating uterus. In Greenberg's 200 cases, only three were not in the menstruating age. Norris states that tuberculous endometritis is most common during active sexual life.

Most writers agree that endometritis, myometritis and perimetritis is generally secondary to tuberculosis of the ednexa or peritoneum. Some authors, however, have reported cases of endometritis in which they believe the uterine infection to be primary. (Murphy and Beyea) Norris cites one case in 4,620 autopsies in which there was apparently a primary endometritis. He believes that the majority of lesions are secondary to primary infection in the fallopian tubes and from them the infection spreads by direct extension to the endometrum, for tuberculous endometritis is often somewhat patchy in distribution, and these areas which are adjacent to the internal ostia of the tubes are most prone to be attacked. This is especially true in early cases.

Norris describes two types of endometritis, miliary and caseous, the former being 4 to 5 times the more frequent. Murphy describes three types, the third being a mixed infection and states that the miliary
form is less frequent than the other two. Berkeley states that the caseous form is the more frequent. Norris in his later work states that the caseous form probably occurs in all advanced cases. Histologically the miliary form presents the usual characteristics of chronic inflammation. In addition, characteristic tubercles and giant cells are present. In the caseous form, the inner surface of the uterus is covered with a caseous material, whilst its cavity is filled with the same substance. The underlying tissue is crowded with tubercles which may be breaking down to form ulcers liberating the caseous material. (Berkeley and Norris.)

Regarding myometritis and perimetritis, all writers agree that they are secondary to either endometritis or peritonitis and are considered as being an extension of one of the two infectious processes. Very little consideration is given to these two conditions except in conjunction with the latter two.

Leukorrhea seems to be the most important and most constant symptom. Since, however, tuberculosis of the uterus is so frequently associated with tuberculosis in other organs, especially the adnexa, it is only natural to conclude that any symptoms which are due to infection of the uterus itself, are masked by those produced by
the accompanying infection. Norris states this as a fact but says that much less frequently the converse is true. Next to leukorrhea, pain and tenderness in the lower abdomen is the most frequent symptom but pain is by no means a constant or reliable symptom although it is suggestive of the occurrence of an endometritis. (Norris) How much of the dysmenorrhea which these patients suffer is due to an actual endometritis and how much is due to an accompanying adnexal lesion is quite difficult to determine. Menstrual irregularities, both as to periodicity and amount of flow, are of frequent occurrence, but are probably more a result of the primary lesion or of the ovarian involvement than of the actual endometritis. (Norris, Murphy, Berkeley)

All authors so far quoted agree that diagnosis of uterine tuberculosis is practically impossible, unless tubercle bacilli can be demonstrated in the discharge or the tissue is examined histologically. The absence of other forms of infection, virginity or extreme youth and the evidence of tuberculosis elsewhere in the body are suggestive of this type of infection.

Most authorities agree that hysterectomy offers the best hope of curing the condition. Norris recommends
supravaginal hysterectomy with cautetization of the
cervical canal in average cases. If salpingitis is
present, the case should be treated as such with salping-
ectomy with conservation of one or both ovaries if
possible in young individuals. Murphy cites a few cases
in which it was not possible to remove the uterus that
were cured by merely curetting, but he agrees with the
majority that this treatment is merely palliative in
most cases. Some later writers recommend the use of
postoperative deep X-ray and heliotherapy. (Brody)

Adnexa

Because of the close anatomic relationship between
the tubes and ovaries, they will be considered together.

Of all the parts of the genital tract, the tubes
are the most frequently attacked by the tubercle bacilli.
According to Norris they are affected in about 90 per
cent. of all cases of genital tuberculosis. Williams
concluded that tuberculous salpingitis occurred in
7.7 per cent. of all inflammatory tubes. Hurdon found
an incidence of 10.9 per cent. in 1,001 cases of
salpingitis but she adds that as a rule, tuberculous
salpingitis occurs in from 5 to 10 per cent. of all
inflammatory tubes. There is a wide discrepancy in the percentage of tuberculous cases cited by different authors ranging from 2.7 to 11.5 per cent. The discrepancy in these figures from the literature may be due to lack of microscopical and bacteriological studies, to geographical differences and the prevalence in large cities of gonorrhea, which makes the incidence of tubal tuberculosis appear small in comparison with the total number of inflammatory tubes. Greenberg estimates that 7.5 per cent. of all pathological tubes are tuberculous. In cases of genital tuberculosis, the tubes are affected in from 83 to 95 per cent. of all cases, according to Greenberg's review of the literature, quoting various authors.

According to Williams, it was the belief of Klob and Virchow that tuberculosis of the ovary rarely if ever occurred. According to Coodal, the ovary is seldom invaded in genital tuberculosis. Other authors have found the ovaries quite frequently involved. Cummins found the ovaries involved in 34 out of 40 cases of tuberculosis of the pelvic organs, or a frequency of 85 per cent. W. Williams found the tubes involved in 44 per cent of tuberculous pelvic inflammatory disease, Kelly in 33.3 per cent. Berleley in 22.5 per cent. and Greenberg in 33.1 per cent. Both ovaries are usually involved in the process and there is nearly always coincident tubal and peritoneal tuberculosis. Norris states that salpin-
Poly-oophoritis is present in the majority of cases and that in no case are the tubes affected unless the ovaries sooner or later are subsequently involved.

The routes of infection are the same as those for genital tuberculosis in other parts of the tract. They are summarized by McGoogan as follows.

(a) By direct infection from without. This is rare.
(b) By blood stream, the primary focus near of distant, usually the lungs.
(c) By direct extension from a near by focus such as the peritoneum, intestines, bladder, etc.
(d) By lymphatics from a near by focus.

Predisposition toward tuberculosis of the fallopian tubes has been subject to considerable study. Greenberg's conclusions show that tuberculosis of the tubes is one and a half times as frequent among colored as among white women. Nearly all writers (Greenberg, Mc Googan, Berkeley, Norris, Murphy etc.) are agreed that tuberculosis of the pelvic organs may occur at any age but is most common during the child-bearing period and less frequent after the menopause. Berkeley says that 93.2 per cent. of his cases occurred in this period. Among Cummins' cases, 70 per cent. were between the ages of 20 and 40
years. In Norris's cases, 9 per cent. were under 20 years of age, 50 per cent. were between 20 and 30 years, 34 per cent between the ages of 30 and 40 years and 8 per cent. between 40 and 50 years. Norris and Findley believe that trauma, especially that of child bearing, and hypoplasia are important predisposing factors. Many investigators believe that a previous gonorrheal infection plays an important role and Norris reports that in 30 per cent. of his cases, preceding gonococcal infection was apparently present. All authors agree that the most important causative factor is tuberculosis in other organs even more is this factor important when there is an exacerbation of the primary lesion. (Norris)

Most authors agree that the symptoms produced by tuberculous adnexitis are by no means characteristic and differ in no marked degree from those produced by other organisms. McCoogan and Norris make exception to this in that there is so often a preceding history of family or personal tuberculosis. The bilateral character of the infection, the tendency to resist the ordinary palliative treatment for pelvic inflammatory disease and for the development of chronic general peritonitis are characteristic but by no means pathognomonic (Norris)
The symptoms in themselves vary considerably. Greenberg states that in some cases, the inflammation is found accidently, having produced no symptoms whatsoever. In others the manifestations may be almost sufficient to cause death. Then there are cases that stand midway. A tuberculous involvement of the tubes may persist for years with few symptoms and only after careful investigation, before or after operation, may one reconstruct from the anamnesis that certain symptoms were referable to the tuberculous tubes. Generally speaking, however, in the majority of cases the symptoms of tuberculous salpingitis are the same as non-tuberculous salpingitis. Among the symptoms, Greenberg, Norris, Murphy and others list pain, sterility, menstrual, urinary and gastrointestinal disturbances, leukorrhea, loss of weight and fever as being the most constant and therefore the most important. In all reports the most frequent symptom complained of by the patient was pain. In Greenberg's 200 cases three-fourths of the patients complained of abdominal pain as their chief complaint and while 101 of them were sterile, only two patients complained of sterility and only 28 complained of menstrual disturbances. He concluded, therefore, that the pain of which most of the patients complained was sufficiently disturbing to overshadow all other symptoms, regardless of their importance in the process of reproduction.
Among Cummins's patients the most frequent complaint was pain, the character of which was a persistent dull ache which became severe at menses. Only one third of McGoogan's 30 cases reported complaints of pain. Thirty-seven of Greenbergs cases complained of sharp pain, 52 of dull persistent ache, 34 had both dull, constant ache which was interrupted at intervals by acute exacerbations of sharp pain. The most frequent location of the pain was in the abdomen, either or both sides with almost the same frequency. Although back pain is next most frequent he does not believe that it is characteristic of tuberculous adnexitis, and due to the low frequency in which pain was present in the region of the liver and umbilicus, he does not consider them as being characteristic. In nearly all cases reported there is some menstrual disturbance. In Greenberg's cases, irregular menses was present in 62, amenorrhea in 13, dysmenorrhea in 124, menorrhagia in 83, oligomenorrhea in 48 and menopause in 2. In McGoogan's 30 cases there were menstrual disorders in 55.5 percent. Dysmenorrhea was complained of in 10 cases, liucorrhea by 10, irregular menses by 4, amenorrhea by 2, metrorrhia by 1 and menorrhagia by 1, one patient was past the menopause and in two the menarche had not begun. According to Osler and others,
Amenorrhea indicates advanced disease and is usually preceded by menorrhagia. Williams maintains that the amenorrhea is usually due to coincident phthisis. The work of more recent observers does not bear this out. Only 38.5 per cent. of Greenberg's patients with amenorrhea had pulmonary tuberculosis. Norris states that amenorrhea is usually due to coincident endometritis. Most authors agree that the menstrual disturbances are not caused by the salpingitis but by perioophoritis and endometritis which so frequently accompany the tubal infection. When the uterus is involved, leukorrhea discharge is the rule according to Williams and Murphy.

Most of Cummins's patients had leukorrhea. Of Greengerg's cases, 144 had leukorrhea, including all of those cases with tuberculosis of the cervix. Cummins states that burning and smarting on urination were common in his cases. Some complained of urgency, but had no evidence that the cause was in the bladder. Half of Greenberg's cases had dysuria and many had polyuria and nocturia. Most of the reported cases give histories of gastrointestinal disturbances of which constipation is the most frequent. Greenberg found constipation in 57.5 per cent. of his cases. McCooogan in 40 per cent. Anorexia, nausea and vomiting and pain on defication are the next most frequent symptoms in this order. Norris lays some stress on the presence of fever, particularly
the characteristic evening rise. Murphy, Norris and Berkeley agree that it is sometimes present but give it but little diagnostic value. For study, Norris divides his cases into two types, namely, acute and chronic.

There is no sharp line of demarkation between the two types, they merge into one another. The condition may be chronic from the onset. The acute stage is characterized by bilateral pain and tenderness, distension and tympanites usually, to a greater or lesser degree. There are usually menstural disturbances, dysmenorrhea, scanty or delayed menses or amenorrhea are most prevalent.

There is leukorrhea of there is endometritis. Constipation, nausea and vomiting, anemia and fever with its accompanying symptoms all may be present. With exacerbation of pulmonary lesions the cough increases the pelvic distress and evidence of intestinal obstruction may occur.

The acute stage usually subsides slowly, followed by intervals of subsequent attacks. In the chronic stage the symptoms are do to adhesions chiefly. Amenorrhea or scanty menstruation is the rule in more than half of the cases of this type, although there is an occasional increase in the flow which lasts for a short time.

Anemia, loss of weight and strength are very common in these cases.
There is nothing characteristic in general physical or pelvic examinations to differentiate tuberculous adnexitis from any other pelvic inflammatory disease. According to McGoogan, the uterus may be either normal in size or slightly enlarged and induration can be felt in both farnices. This induration may be of the "horse-shoe" type and may be accompanied by bilateral tubal or tubo-ovarian masses. If ascites is present in the cul-de-sac, fluctuation can frequently be demonstrated by the trimanual method of Clark.

Most authors agree that the diagnosis of tuberculous salpingitis before operation is seldom made. Greenberg states that this is partly due to the fact that the condition is still considered rare and that if the diagnosis is made it is usually one of suspicion rather than certainty. An absolute diagnosis, even after operation can be made only with the aid of the microscope and some cases may possibly be overlooked even then.

Graves states that tuberculosis of the fallopian tubes is always bilateral. The following figures are given by different authors: Kelly 95.2 per cent., Hindley, 20 per cent., Greenberg 98 per cent., Curtis describes the usual pathology as follows: The disease tends to localize first in the mucosa of the fallopian
tubes. The typical pathologic picture of genital tuberculosis resembles, grossly, a severe recurrent gonorrheal infection of the pelvic organs. Although similar to gonorrheal disease, there are, in addition, certain distinctive characteristics worthy of special emphasis. Pallor of the tissues is a notable feature, there is a tendency to marked induration of the fallopian tubes, tubal calcification is frequent, one or both fimbriated extremities are open in half of the cases and from these open ends caseous material may be expressed, the tubes are commonly held by dense adhesions, which are often firmly resistant, even on cutting. The opened tubes reveal thickening, chiefly due to hyperplasia of the mucosa. The lumen is often tortuous, partly obstructed or obliterated. Gross tubercles and ulcerations of the mucosa are usual. The ovary, when diseased, most frequently presents the picture of a tubo-ovarian abscess. Spontaneous healing of these abscessed tuberculous ovaries is rare.

The wide divergence of opinion as to the proper therapy in tubal tuberculosis is astounding. At one extreme we find those who believe in spontaneous recovery and who treat most of their cases expectantly with hygienic measures. (Findley, Lewis, Fuhrman) These men maintain
that operation is ordinarily useless because the condition is not primary but secondary. However, most authors favor operation, but as to the type of procedure there is again no unanimity. Some authors (Kelly, Curtis, Curwaine and others) advise radical operation. Others (Cullen, Simmons, Murphy, Mayo and others) remove the ovaries only when obviously diseased. However belittled the conservative treatment may be, it is often employed as a temporary measure by those who do a radical operation. Others employ this form of treatment in mild cases with advanced pulmonary tuberculosis or persistent high temperatures because the prognosis of the operation is bad. As a general rule, most authors agree that in the typical case of genital tuberculosis it is usually advisable to remove both tubes and the body of the uterus. The cervix is seldom involved and can be spared as routine. Curtis believes that ovaries which are spared are the chief source of subsequent trouble. Most authors avoid drainage after operating. Thus, Murphy, Mayo, Curtis, Norris and many others close without drainage. Drainage has almost been abandoned on account of the frequency with which mixed infection has followed, often with fistulae which become feculent. Norris believes that pre and post-
operative care is of utmost importance. He suggests complete rest in bed for a long period before the operation, regulation of the bowels, high caloric diet and heliotherapy as essentials. The later being contraindicated in cases with active pulmonary lesions. For post operative care he suggests local applications of heat, hot vaginalouches, Fowler's position, deep X-ray therapy in small doses below the sterilizing point. Rest, sunlight and feeding are essential. Post operative X-ray therapy is recommended by Cassidy who reports good results. Heliotherapy is recommended by Allison Gauvain, Brody and others. Wright recommends ultraviolet irradiation.

In considering the prognosis it must be remembered that in the great majority of the cases the genital infection is secondary. The primary lesion must, therefore, according to Norris and Fuhrmann, be as thoroughly studied as the pelvic and is usually of grave importance. The age of the patient, the duration, course and character, the extent, individual disposition of the lesions, the social and financial standing of the patient are all points which must be considered, both as regards to the future course of the primary as well as the
genital condition. Norris, Murphy, Berkeley, Greenberg and others are of the opinion that fever before operation is an extremely unfavorable sign. Norris states that fever, either the result of a primary or of the pelvic lesion is undoubtedly an unfavorable sign and is generally an indication for delay in operation.

Norris, Murphy, Berkeley and others state that the operative mortality is no greater with tuberculous salpingitis than for operations for other types of genital infections with similar involvement. Greenberg estimated the operative mortality at 7.6 per cent.

The question of fertility among women with tuberculosis of the fallopian tubes is of considerable interest. Most authors have shown that about half the patients with tuberculosis of the reproductive system are sterile. Cummins reports 46.7 per cent in his cases and according to Murphy, sterility seems to be the rule in tubal tuberculosis. Greenberg estimates that 60 per cent of his cases were sterile. Graves states that sterility is inevitable in these cases.
Bibliography.