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Genital Tuberculosis

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Genital tuberculosis is never a primary infection, but is always secondary to a distal focus. The tubercle bacillus usually gains entry to the body either by the respiratory or alimentary system, and rarely through a cutaneous lesion. Pulmonary tuberculosis, active or latent, is generally present, because genital tuberculosis is always an infection by the human type of tubercle bacillus. A distinction should be made between the terms genital, genito-urinary, and uro-genital. In the literature these are often used indiscriminately or as though they were synonymous. Genito-urinary signifies that the urinary infection is secondary to the genital, and uro-genital that the urine is first infective. Genital tuberculosis can only be so described when no demonstrable tuberculous lesion can be found in the bladder and kidneys. The presence of tubercle bacilli in the urine does not necessarily mean an infection of the renal tract, unless the urine has been collected through a catheter. Even then, tubercle bacilli in the urine may be due to a prostatic tuberculosis, and this being so the findings of a catheter specimen may be equivocal, for the bacilli may be carried by the catheter from the infective prostatic urethra into a non-infective bladder. Prostatic tuberculosis, however, except as a secondary condition, is so rare that for practical purposes if tubercle bacilli are found in the urine then a renal lesion may generally be inferred.

Statistics

Genito-urinary tuberculosis is not a common disease. In the annual report of the London County Council for 1937, the total number of patients admitted to their 30 general hospitals was 202,485, of which 8,500, or 4·2%, were genito-urinary cases. These, however, included both male and female, and medical as well as surgical. Out of a total of 5,624 cases of tuberculosis genito-urinary cases numbered 97, i.e. ·05% of the total general admissions, and 1·7% of the total admissions for tuberculosis. These figures are also inclusive of male and female, and medical as well as surgical.

These figures differ widely from American and continental records, where, apart from the greater population, there seems to be an increased incidence of tuberculosis. An average from several writers gives about 2% genito-urinary tuberculosis in all autopsies, and 12% in autopsies on tuberculous patients. These findings are terminal, however, and relate to the dead. I have been unable to find comparable figures in the living, such as those given in the London County Council report.

It is still disputed whether tuberculosis can be primary in the genital tract, or is always secondary to a renal infection. Wells maintains that a tuberculous epididymitis is a certain sign of renal tuberculosis. He bases his argument on an analysis of 55 cases of epididymitis, 30 of which ultimately developed frank renal disease, and 6 remained purely genital. In only 14 cases, however, were tubercle bacilli found in the urine at the time epididymitis was first diagnosed, while in 4 other cases tubercle bacilli were found only after a lapse of two years. In 5 cases renal tuberculosis was diagnosed

before epididymitis, in 13 cases a considerable time after, and in 13 cases both were diagnosed together. It is incorrect, therefore, from these figures, to infer that tuberculous epididymitis is always of renal origin. Established tuberculosis in either the renal or genital tract is apt to spread rapidly, and from one tract to the other, and that both will be involved at some time during the course of the disease is not surprising. In a series of 222 cases Young found the seminal vesicle involved alone in 47, the epididymis alone in 37, both together in 100, and an associated kidney lesion in 122. In another series of 336 genito-urinary cases Young found 108 were genital with no kidney involvement, and 71 were renal with no genital involvement. Kretschmer, in 94 cases of tuberculous epididymitis, found tubercle bacilli in the urine in 13, and a renal lesion in 10. It is evident, therefore, that an antecedent renal lesion is not always present. Statistics are interesting, but not conclusive, and they can be made to support almost any theory. In practice, however, one's own statistics are the most influential, however small these may be.

From a study of a large number of contradictory figures I am confirmed in my belief that it is impossible to be didactic and state categorically that genital tuberculosis is always secondary to kidney disease. It may be in many cases, but it cannot be proven in all, and there is no evidence that it should be accepted as the routine route of infection. Genital and renal tuberculosis may be discovered at the same time, and there is nothing to indicate which is primary and which secondary. The extent of a lesion is not necessarily an indication of its duration or priority, as is well known in cases of carcinoma, e.g. a small growth in the gall bladder may have extensive secondaries and be easily missed. Also, as renal and genital tuberculosis are metastatic and secondary to infection in the lung, they might both have become infected at the same time. Multiple bone lesions are not unknown. Hammond, quoting J. Hutchinson who states that in lupus vulgaris multiple lesions arise at first, most of which clear up, leaving only one or two chronic and recurrent, suggests that in genito-urinary tuberculosis multiple lesions may also occur at the beginning, with later only one or two isolated sites of infection persisting. Band and others have shown that tuberculous bacilluria generally indicates a renal infection, and that many healed renal foci can be demonstrated microscopically, that probably both kidneys are infected at the beginning, that one overcomes the infection and remains healthy, although the other succumbs and must be removed. The possibility and probablity of multiple infection must therefore be accepted.

Incidence

Primary tuberculosis of the prostate is very rare. Keyes found in 1,215 autopsies 343 cases of pulmonary tuberculosis, and in only one of these was the prostate alone involved. Barney could find in the literature only 5 authenticated cases of primary prostatic tuberculosis, and Young, in his extensive experience, had only one personal case. Hammond reported one case of primary infection, and in French literature I have come across 4 cases. K. Walker in 1911 reported 3 cases, and Saxforth in 1910 found 9 cases in 10,016 autopsies. It is not mentioned, however, whether other tuberculous lesions were present, and if they were, how a diagnosis of primary tuberculosis was arrived at.

Secondary infection, on the other hand, is very common, an average of many statistics being from 60 to 70% of cases of tuberculosis of the prostate. Personally I have only encountered 4 cases of prostatic involvement in a series of 13. Primary tuberculosis of the seminal vesicle also appears to be rare, though Young believes otherwise, but his reasoning is not convincing. There are no autopsy figures showing tuberculosis of the seminal vesicles alone, and there are no early symptoms to indicate a diagnosis. The facts that the globus minor of the epididymis is most commonly infected, and sometimes only a small nodule of tuberculosis may exist there while the vesicle is markedly involved, are the chief arguments in favour of primary vesiculitis. In the 55 cases of tuberculous epididymitis analysed by Wells, the vesicles were affected in 11 cases, not involved in 16, and in 28 there was no record. It has already been mentioned that the severity of a lesion is no indication of priority or time of infection. That a primary vesiculitis can occur none can deny, but that it has actually occurred has never been proved.

Secondary vesiculitis is more common than secondary prostatitis, and is reported in 80% of cases. If the primary kidney or epididymis, however, were earlier diagnosed and removed, these secondaries in the prostate and vesicles might be of rare occurrence.

The epididymis is the principal site of primary genital tuberculosis. According to Hammond, 30% of the patients when first seen have unilateral epididymitis, with no lesion in the prostate or vesicle, but if they are present then 25% are bilateral. Young's figures suggest that the vesicles are more commonly affected, being 47 out of 222 cases of genital tuberculosis, whereas the epididymis was alone infected in 37. It is difficult

to believe, however, that a clinical diagnosis of isolated vesiculitis can accurately be made, while it is common knowledge that isolated epididymitis is often found, and that a diagnosis of tuberculous vesiculitis or prostatitis is seldom made in the absence of epididymal or urinary infection. In 4,250 autopsies at the Boston City Hospital, there were 35 cases of tuberculous epididymitis. In 25 of these the vesicles and/or prostate were affected, but in 10 the epididymis alone. Of 80 cases in St. Thomas's Hospital reported by Lee, 40% were unilateral epididymitis alone, and 50% unilateral epididymitis with involvement of the prostate and vesicle.

Epididymitis secondary to a urinary infection is common. Of 342 cases of uro-genital tuberculosis Young found only 71 renal with no genital involvement.

Primary tuberculosis of the testis is unknown. It is always secondary to an epididymitis, and occurs, according to Barney, in 83% of cases within a year.

Tuberculosis of the urethra is rare, which is surprising seeing that for years tuberculous urine may be flowing along it. Trauma from rough instrumentation may incite an attack of urethritis.

Tuberculosis of the glans is also rare. There are only 25 cases in the literature, and 22 of these followed ritual circumcision in Jewish children. Though seldom due to coitus, Lazarus and Rosenthal reported one undoubted case, which was so persistent and widespread that eventually the penis had to be amputated. In French literature I have found one other case.

Route of Infection

The tubercle bacillus can reach the epididymis by the blood-stream, by lymphatic extension, or by the lumen of the vas.

In favour of hæmatogenous infection are the facts that in most cases when first seen the epididymis alone is infected, and that in many cases the urine is free from tubercle bacilli, and pyelography reveals no abnormality of the kidney. Wells thinks a blood-borne infection unlikely, because frequently both epididymides are involved consecutively, and he considers that both should be attacked via the blood-stream to be too striking a coincidence. He does not hesitate to assert, however, that renal tuberculosis is blood-borne and generally bilateral. Both Carver and Hammond believe in hæmatogenous infection. Young, however, says that the seminal vesicle is always involved first, and points out that the globus minor is generally attacked before the globus major. Primary infection of the globus major, however, is not infrequent, and in many cases when first seen it is impossible to say where the disease started. It is well known also that ligature of the vas prior to a prostatectomy does not always prevent epididymitis. In favour of ascending infection along the perivasal lymphatics are the presence of tuberculous nodules in the vas, the facts that both ends of the vas are extensively diseased and that infection of the seminal vesicles nearly always precedes bilateral epididymitis. Lymphatic extension of tuberculosis is a common occurrence in other parts of the body and there is no evidence to suggest that it does not happen in genital tuberculosis.

That infection should reach the epididymis through the lumen of the vas is not impossible, but highly improbable. How a non-motile bacillus can ascend against the stream in a very narrow channel, against peristalsis and against ciliated epithelium, is difficult to explain. The orifice of the ejaculatory duct is very minute, and a reflux from the prostatic urethra could only occur if the duct were diseased and gaping or the fluid in the prostatic urethra under great pressure. In the absence of vesiculitis urethroscopy never shows diseased duct orifices. An ascending infection up the lumen of the ureter has been shown experimentally not to occur, and reverse peristalsis can only happen if the lower ureter is obstructed. There is no reason to believe that the vas behaves differently. Also, after epididymectomy or division of the vas a urinary fistula is rare. It is quite true that very occasionally a drop of urine has been seen to emerge from the cut vas, and the theory that non-specific epididymitis is due to irritation caused by a little urine being forced up the vas into the epididymis is attractive and generally accepted. Non-specific epididymitis, however, is most prevalent amongst soldiers in training, and it is understandable that the combination of a full bladder and strenuous exercise might produce a reflux from the prostatic urethra. Moreover, in only 30% of patients, when first seen for epididymitis, are tubercle bacilli found in the urine.

Symptoms

Acute tuberculous epididymitis occurs in about 5% of cases, and cannot at first be distinguished from *Bacillus coli* or gonococcal infection. The preceding history, however, will be helpful. The disease usually becomes chronic is a tuberculous infection, occasionally

so with *Bacillus coli* and frequently in the case of the gonococcus. When this does happen the specific characteristics become more pronounced. In tuberculosis the initial hydrocele disappears and the cavity of the tunica vaginalis becomes obliterated with adhesions. The rugosity of the skin of the scrotum becomes increased because of œdema and adhesion to the testis and epididymis. An abscess or discharging sinus is often present. The cord is thickened, also the vas, which may be nodular. On rectal examination one or both vesicles may be thickened and palpable, less often the prostate. A very early diagnosis is fraught with danger. McGavin, from St. Bart's Hospital figures, found that 30% of epididymides removed for tuberculosis were non-tubercular on microscopic examination. Yet if an early diagnosis is not made epididymectomy is a doubtful procedure, for extension to the testis and vesicles rapidly occurs. Barney reports 3 cases of doubtful tuberculous epididymitis where operation was delayed, and which later at operation were found to be sarcoma. He rightly says: "If in doubt operate", for it is better to remove a doubtful tuberculous epididymis or testis than to leave a sarcoma to mature.

Insidious onset and chronicity with progression are the chief characteristics of tuberculous epididymitis. The testis only becomes involved after the globus major, and usually at operation the condition is one of epididymo-orchitis, for an exploratory incision into the testis often reveals infection. In 83% of cases the testicle is said to become infected within a year.

Pain, tenderness, and fever are slight and insignificant.

There are no special symptoms of vesiculitis. The patient generally complains of an enlarged epididymis, and the diseased vesicle is only discovered on routine rectal examination.

In the beginning a tuberculous prostatitis is silent and devoid of symptoms, and is only discoverable on rectal examination. The disease is progressive, culminating in caseous degeneration, abscess and sinus formation. Calcification and fibrosis are uncommon. Symptoms of urethritis may develop, and tubercle bacilli will be found in the discharge. Sometimes the disease is only accidentally discovered after microscopy of an adenoma removed suprapubically. If there is frequency of micturition and tubercle bacilli are found in the urine, and there is no evidence of renal or other genital tuberculosis, then a primary tuberculous prostatitis may be inferred. Blanc, of Bordeaux, suggests the following technique to clinch the diagnosis: Irrigate the bladder with oxycyanide of mercury; then fill the bladder with sterile water; empty the bladder naturally and examine for tubercle bacilli. If none are found pass the remainder after prostatic massage, and if tubercle bacilli are now present the case is one of primary prostatic tuberculosis.

Differential Diagnosis

Acute primary epididymitis cannot be distinguished from that due to other organisms, and it has been known to occur during an attack of gonorrhœa. One must wait for the chronic phase before making a definite diagnosis, when gonorrhœa, syphilis, non-specific disease and tumours have to be excluded. Associated disease of the seminal vesicle is the surest indication that the epididymitis is tuberculous, but if diagnosis is to be withheld until this occurs, it might be advisable to do an Aschheim-Zondek test in order to exclude tumour.

Treatment

It must be stressed that the genital condition is merely one aspect of the disease, which is tuberculosis, and unless adequate treatment is given for this then surgical intervention will avail little.

Sanatorium régime, with rest, diet, and heliotherapy, is most important both before and after operation. Unfortunately, despite the national tuberculosis service which has been operative in this country since 1912, these facilities are not easily available. Before operation there is too much delay in getting a patient admitted into a sanatorium, and after operation, if a wound requires dressing or a sinus is present, there are very few places to which a patient can be sent. In this country surgical tuberculosis centres should be on the East Coast, and I only know of two places which attempt to treat surgical tuberculosis adequately, and these are at Margate and Felixstowe. At Margate the Royal Sea Bathing Hospital was a pioneer, and at both places now the London County Council have adequate establishments. For the country as a whole, however, the accommodation is hopelessly insufficient.

Tuberculin therapy has still a few advocates, but has been given up by the majority of physicians and surgeons. I have never seen any success which could directly be

attributed to tuberculin, and from my experience at the Royal Sea Bathing Hospital, where it was used in all cases by one surgeon, and never by another, I have long since ceased to regard tuberculin as of any therapeutic value.

Freshman, however, from his statistics at the London Hospital, thinks tuberculin combined with sanatorium treatment better than surgery. Hammond also advises expectant treatment, i.e. prolonged stay in a sanatorium combined with tuberculin injections, and suggests that operation should consist chiefly in ligature of the vasa to prevent extension, and that only occasionally is epididymectomy or orchidectomy called for. He has also shown that if orchidectomy is performed after puberty there is but little deterioration in general health.

Few surgeons, however, agree as to the efficacy of expectant treatment and most surgical disputes concern the merits of a conservative as opposed to a radical operation. By a conservative operation is meant epididymectomy with the removal of a portion of the vas, and sometimes ligature of the opposite vas, leaving the diseased testis, seminal vesicle and prostate alone, hoping Nature will step in and effect a cure.

Whichever type of operation is undertaken, however, the nature of the anæsthetic is most important. Pulmonary tuberculosis, latent or active, being always present, it is better to avoid inhalation anæsthesia. Local infiltration of novocain will suffice for epididymectomy, but a spinal anæsthetic should be given if a radical operation is to be performed.

Epididymectomy was first performed by French surgeons, some sixty years ago, and has remained a popular operation in France, while in Germany orchidectomy was preferred. I fail to see any great value in epididymectomy, for the testicle is diseased in the majority of cases. The advice to curette away the diseased parts, in the hope of conserving some testicular tissue because of its internal secretion, is no longer necessary, owing to the success of subcutaneous implantation of testosterone propionate, and the failure of the curette to eradicate disease is too often disappointing. An average from American statistics is 30% recurrence in the epididymis after epididymectomy or orchidectomy and in this country the average is about 40%.

Young strongly advocates a radical operation, even in advanced cases of genito-urinary tuberculosis with active phthisis. He quotes Kocher, who taught that the more diseased tissue was removed the better the body could then cope with the remainder. Sutcliffe, of Margate, certainly got better results in cervical adenitis by his operation of complete excision than others obtained by partial adenectomy and curetting. Young's operation consists in a perineal removal of the prostate and vesicles, and an inguinal removal of the epididymis and vas. He was opposed to orchidectomy, for the testis is never primarily infected, and he taught that an extension to the testis could be dealt with by the curette. He bases his operation on the assumption that infection was always primarily vesicular. In a series of 24 radical operations, he states there was genital recurrence in 3 cases, once in the kidney, whereas in 98 conservative operations (i.e. epididymectomy) there was genital recurrence in 26 cases and renal in 17. Few of his colleagues, however, obtained such good results, and the operation has never become popular.

Most surgeons agree that operation for tuberculosis of the prostate is seldom called for, unless retention is present, in which case a suprapubic cystostomy alone is advised.

The operation I favour is one I planned and carried out in 1914, and described before this Section in 1924 (*Proc. R. Soc. Med.*, **17**, Sect. Urol., 60), and in the *Urologic and Cutaneous Review* in 1929. The operation is as follows: With the patient in the Trendelenburg position the bladder is emptied through a rubber catheter, which is left *in situ*, in order to keep the bladder empty. An inguinal incision is then made above and parallel to Poupart's ligament, and the oblique and transversalis muscles divided. The testis is next manipulated out of the scrotum and the vessels separated from the vas and divided. By blunt dissection the vas is traced down to the seminal vesicle, and a line of cleavage is sought for between the bladder and vesicle, which is gently separated and then avulsed from the urethra.

The chief difficulties met with are: (1) A deep and narrow pelvis. (2) Obesity. (3) Abscesses in the vas and vesicle which entail very gentle handling if rupture and spread of infection are to be avoided. (4) Involvement of the base of the bladder and ureter and dense adhesions. Hæmorrhage is seldom of serious moment. If the testicle is adherent to the scrotum and if a sinus is present, then the inguinal incision is prolonged to encircle the affected skin. The testicle with adherent skin is wrapped in gauze, and

thus contact infection prevented while the operation is proceeding. Both vesicles can be removed through the one incision.

There is often a urinous discharge for two or three days, and in two of my cases a tuberculous sinus occurred, which took some weeks to heal. Nitch is the only surgeon I know who has carried out this operation since I described it, and he finds the results disappointing, being only 6% better than epididymectomy, but the remote mortality is decreased. He found 52% apparently cured by orchido-vaso-vesiculectomy, as against 46% by the conservative operation.

Of the 13 cases I reported in the *Urologic and Cutaneous Review*, 1 died from tubercular bronchopneumonia six weeks later. There were free from symptoms or bacilli in the urine: 1 four years later, 3 two years later, 2 one year later, 5 three months later. Kidneys healthy, but cystitis with tubercle bacilli in the urine, 1 four months later. The disease was unilateral in the testicle in 7 cases, and in the seminal vesicle in 7. The disease was bilateral in 6 cases, and in 5 of these simple orchidectomy had been performed two to five years previously, so that when I operated two vesicles were removed with one testicle five times, both testes and vesicles once. On several occasions it was noticed that the ureters near the bladder were diseased.

Of a later series of 21, including these, 2 died from tubercular bronchopneumonia, an operative mortality of 9·5%. Two others died, one at eight months and one four years later. Of these 21, 17 were alive and well from one to ten years later. Nine of these had a unilateral orchido-vaso-vesiculectomy and have had no recurrence or extension (five to ten years report). In 7 cases of unilateral orchido-vaso-vesiculectomy in 1 case the other testicle had been removed six years previously, in 6, two years previously, i.e. genital recurrence or extension where simple orchidectomy had been performed occurred in 6 cases in two years, whereas in 9 cases of orchido-vaso-vesiculectomy there was no recurrence in five to ten years. In 4 cases one testicle and two vesicles were removed. I consider an orchido-vaso-vesiculectomy the most desirable operation. An epididymectomy is only justifiable if the vesicles and vas are not involved, and McGavin's findings must be remembered, that 30% of epididymes removed for suspected tuberculosis were shown on microscopy not to be tubercular. Personally I seldom diagnose a tuberculous epididymitis unless the vesicle is involved, and as I consider this to be generally secondary to the epididymitis I do not consider the delay deleterious.

In conclusion, I think that genital tuberculosis may be either blood-borne or secondary to a urinary infection; and that if secondary to a urinary infection then the vesicles are involved first. I do not consider that infection can be carried up the lumen of the vas, lymphatic extension being the usual mode of transmission. In regard to operation, if the vesicles and vas are not involved, I advise orchidectomy, but if they are, an orchido-vaso-vesiculectomy is the better procedure.