

CHAPTER XXVI

SIMPLE AND TUBERCULOUS ULCERATION OF THE
BLADDER

TUBERCULOSIS OF THE BLADDER

ETIOLOGY

TUBERCULOSIS of the bladder is almost always secondary to a tubercular lesion elsewhere in the genital or the urinary organs. Like these lesions it is commonest in the young adult, though it has been observed in the infant and the aged. It may be primary. Fenwick¹ recognises a distinct type of multiple tubercles in the bladder which he thinks characteristic of a primary invasion. But this condition is certainly very rare and the clinician is justified in seeking the cause of vesical tuberculosis elsewhere in the genito-urinary tract. Infection usually comes from the prostate or the kidney—I leave out of account instrumental infection, in which I put small faith, as well as those rare cases in which the bladder may be infected from the peritoneum (Bryson²) or from some other neighbouring organ—and is probably usually carried by the lymphatics. Some writers believe that when there is a tubercular focus in the kidney and the urine is laden with tubercle bacilli, an infection of the bladder often occurs from these bacilli in the urine. Allowing a stone in the bladder or some inflammation or injury of that organ as a predisposing cause, the assumption may be granted; but in those cases which this theory is called upon to explain—viz., the common descending ulceration about the mouth of one ureter—it does not seem entirely adequate. Moullin³ has elaborated a theory fully in accord with our knowledge of the general tendencies of tubercular disease and more in accord with the clinical facts. According to this author, the trigone and base of the bladder contain a submucous network of lymphatics which are intimately related to other lymphatics similarly

¹ Ulceration of the Bladder, London, 1900.

² Morrow's System of Genito-urinary Diseases, etc., 1893, i, 846.

³ Inflammation of the Bladder and Urinary Fever, 1898.

situated in the ureter, kidney, and prostate. Thus a tubercular inflammation of the kidney may extend along the ureter until it reaches the bladder, or it may leap from the kidney to the bladder, breaking out in few intervening spots or in none. Similarly it may extend from the prostate or from one part of the bladder to another; but whether these extensions of the disease leave large intervening areas of healthy mucous membrane or not, the bacteria travel from the old focus to the new one chiefly, if not wholly, through the lymphatics. The influence of an antecedent inflammation in preparing the soil for the tubercular bacillus is very striking in those cases which begin as acute gonorrhoea, drag on as chronic gleet, and terminate in frank tuberculosis of the prostate or the trigone.

Most recent writers upon this subject incline to the belief that the bladder is more frequently involved by a descending process from the kidney than by an ascending one from the prostate; but, however this may be, there are two forms of vesical tuberculosis, each one showing distinct evidence of the origin of the disease. The one, ulceration at or about the neck of the bladder, points to a primary focus in the prostate; the other, an ulcer surrounding one ureteral orifice, points to a tuberculosis of the corresponding kidney. Mixed and irregular forms, of which there are not many, may arise from either source.

MORBID ANATOMY

The bladder, like every other organ, may be involved in a general miliary tuberculosis. Apart from this phenomenon of purely pathological interest, the bladder infected by tuberculosis may present two clinical aspects. There may be simply a number of discrete tubercles developed immediately beneath the epithelium, or, as the result of the breaking down of one or more of these tubercles, tuberculous ulcers may appear. The tubercles evince an acute condition, the ulcers, a long-standing malady. The two often coexist.

The tubercles appear as minute whitish areas, the size of a pin-head, surrounded by an area of congestion (Plate IV, Fig. 1). They are usually grouped together over irregular areas of the bladder wall, while between them the mucous membrane is red, swollen, and velvety. Thus a diffuse vesical tuberculosis gives the whole mucous membrane this congested, velvety appearance. Although the tubercles may be seen, and sometimes even felt, through the unbroken epithelium, the initial deposit occurs, as Coplin¹ has justly remarked, not in the epithelium, but in the subepithelial connective tissue.

The tubercular ulcer "is singularly round and discoid. . . ."

¹ J. of Cut. and Gen.-Urin. Dis., 1898, xvi, 557.

Even the confluent ulcers rapidly lose the isthmus which at one time partly separated them and quickly assume a roundish outline. The floor of the ulcer is shaggy, of a dirty yellowish colour. It is uneven in contour. . . . Commonly the ulcer does not become larger than 1 or 2 cm., or about the size of a 5-cent piece. The floor of the ulcer is the submucosa containing considerable embryonic tissue. In some instances and at a few points in any ulcer the muscular wall may be exposed. . . . I think extension into the muscular wall must be rather infrequent. . . . The edges are elevated and slightly undermined . . . hard to the touch . . . extremely muscular" (Coplin).

The above description, written from the point of view of the pathologist, is entirely in accord with the clinical findings. I have never known perforation of the bladder to occur, though I have followed many cases for years. Senn,¹ however, makes a point of the danger of perforation. Coplin suggests that perforation, which he believes very exceptional, may be due to a mixed infection. The great irritability of the bladder—its characteristic inability to retain more than a few ounces—is due at first to the great sensitiveness of the tubercular lesions, later to an actual infiltration and contracture of the muscular walls—a sort of concentric hypertrophy.

The distribution of the lesions may be irregular, but the centre of trouble is always in the trigone or about the mouths of the ureters. Thence the tubercles, ulcers, and congestion spread slowly to all parts of the organ by lymphatic extension, by direct growth and coalition of the ulcerated tubercles, and perhaps by contact, an ulcer of one surface giving rise to a secondary ulcer on the opposite surface by actual contact with the mucous membrane.

In the more acute forms of the disease the tubercles, the ulcers, and the lesions of simple cystitis are variously combined. But in the commoner chronic cases the disease assumes one of two forms. If the infection comes from one kidney the bladder lesions are entirely confined to the neighbourhood of the corresponding ureteral orifice. Ulcerations and tubercles are closely grouped around this point as a centre. If, on the other hand, the disease begins in the prostate, the neck of the bladder bears the brunt of the inflammation. The mucous membrane here becomes congested, thickened, and ulcerated until the condition is almost an exact counterpart of a simple contracture of the neck of the bladder. In perineal section, with cutting down of the contracted orifice, I have sometimes been unable to detect by eye or finger any difference between the simple and the tubercular inflammation (p. 317).

¹ Tuberculosis of the Genito-Urinary Organs, 1898, p. 188.

Direct extension of the inflammation from or to the lower part of the ureter and the posterior urethra is common. Extension to the anterior urethra is rare.

SYMPTOMS

Vesical tuberculosis is simply a specialized inflammation of the bladder with characteristics so little distinct that many of the most pathognomonic among them have been determined only within the last twenty years. The course of the disease is varied and often obscure. Sometimes the symptoms are quite characteristic, but the final diagnostic test rests always with the discovery of the tubercle bacillus in the urine.

Onset.—The disease, beginning usually during the course of a renal or prostatic tuberculosis or of a chronic gleet, declares itself first by one of two symptoms, hematuria or irritability of the bladder. This onset may be spontaneous or provoked by the use of instruments in the urethra. Whether bleeding or irritability comes first the other soon follows.

Hematuria.—The hematuria of tuberculosis is usually quite characteristic. It is a prominent symptom of the disease first and last. It differs from the hematuria of stone in being influenced little, if at all, by jolting or exercise, and it is only in exceptional cases a free hemorrhage, such as is common with neoplasms. The first bleeding noticed by the patient is often the exudation of a few drops of pure blood at the end of the urinary act. The blood is squeezed, as it were, from the base and neck of the bladder by its own contraction. This *terminal hematuria* is usually accompanied by some terminal pain and spasm and is strongly suggestive of tuberculosis, though it may occur with any severe congestion about the neck of the bladder. The next urine passed is usually red with blood, and so the bleeding continues for a few hours or days, and then apparently stops, to recur after an interval of days or weeks. In the meanwhile, however, the urine is not entirely clear of blood. Though not a bright red, it may still be smoky, and even when clean and sparkling the microscope will almost invariably detect a few red blood-cells in a centrifuged specimen, and a trace of albumin will also be found. So these bleedings recur, never profuse enough to fill the bladder with clots, growing perhaps more, perhaps less frequent, but never stopping entirely. They occur by night as well as by day; they are uninfluenced by exercise or by rest. As the disease progresses and its lesions spread the hemorrhages become, if anything, less profuse and more continuous. The urine gets to be hazy all the time, and contains a few small bright-red clots. The last few drops

passed may be pure blood, but beyond this there is not likely to be any severe bleeding unless it is stirred up by the introduction of instruments into the bladder.

Irritability of the Bladder.—The characteristic irritability of the bladder—the frequency of urination and the pain accompanying the act—is often the earliest and always the most distressing symptom of tuberculosis. At first, the frequency of urination is not great, although there may be undue discomfort as soon as a few ounces of urine have collected in the bladder, and the pain is chiefly confined to the end of urination. As the bladder contracts down on the last drops of urine, as the terminal hematuria appears (if there is terminal hematuria), a sharp pain is felt in the perineum and often on the under surface of the penis at the peno-scrotal angle. Pain may also be felt in the glans penis and may radiate in various directions. The effect of this pain is to excite a tighter spasm of the bladder, and the result of this spasm is an increase in the pain, so that a good deal of pain and spasm persists after the last drop of urine has been expelled, leaving a soreness which may not pass off before another urinary act renews the wretched cycle. At first this terminal pain is only fairly constant, but later it accompanies every act of urination and grows more severe as the disease progresses.

After a short time, when ulcers have formed, or a mixed infection has occurred, another pain is felt, a pain before urinating, often an imperious and irresistible spasm which, if not immediately acceded to, will squirt a few drops of urine down the sufferer's thigh in spite of all his efforts to prevent it. The increased sensibility to pressure brings on some such spasm, more or less severe, as soon as a few ounces have entered the bladder; and what with this spasm before urinating and the more intense spasm afterward, what with the constantly decreasing capacity of the bladder and the increasing frequency of urination, the patient knows no peace day or night. The irritability of the bladder is even more strongly marked when instrumentation is attempted. Such are the bleeding and spasm aroused by almost any instrument or wash that the patient soon learns to dread the catheter and the searcher with all his soul. A special antipathy of the tubercular bladder to nitrate of silver is often a means of distinguishing tuberculosis from simple cystitis.

The Urine.—The urine of tubercular cystitis is acid. At first it may be clear or bloody. Later it is bloody, and often foul with the products of a suppurative cystitis ingrafted on the tubercular process either spontaneously or as the result of catheterization. But, however foul and ammoniacal, however full of shreds of bloody mucus and stringy clots the urine may be, its one striking characteristic is

its continued acidity. It is by no means impossible for the urine of a mixed infection to be alkaline when passed as a result of the predominance of pyogenic cocci; but, clinically, alkaline urine is most exceptional in tuberculosis, however violent the mixed infection. The urine may be only slightly acid, though it is usually strongly so, but acid it is; and this persistent acidity, in face of the ammoniacal odour and the foul muco-pus so characteristic of alkaline cystitis, is often one of the most suggestive features of the disease.

Chemical analysis of the urine usually reveals albumin in considerable quantity derived from the red blood-cells, or perhaps in part from the kidney.

The microscope shows red blood-cells and bladder epithelium. A diligent search for casts must be made, for, if found, they suggest the existence of a renal lesion, presumably tubercular.

The Tubercle Bacillus.—The most important part of the urinary examination is the search for the tubercle bacillus. The final diagnosis often depends upon the discovery of this bacterium, and the present knowledge of our more expert urinalists is, happily, such as to afford an almost perfect analysis of its presence or absence. Unfortunately, however, the practitioner who has not a skilled bacteriologist at his call, or whose patient cannot afford the expense entailed, must make his diagnosis either from the clinical aspects of the case alone (see below) or from such an examination as can be conducted without any great technical skill and without any laboratory. To such I can only urge the necessity of depending upon the clinical aspects of the case, the presence or absence of a tubercular tendency, of other tubercular lesions, or of a characteristic symptom-complex, rather than upon the unfamiliar use of delicate scientific manipulations. Every man to his own calling. The trained clinician is quite as likely to diagnose a vesical tuberculosis correctly by clinical methods as the scientist is by scientific methods. As Thomas A. Edison, the greatest living clinician in another science, has said, "I could guess closer than those men could calculate."

But for those who have laboratory facilities and a sufficient scientific training there are adequate methods. The special difficulties to be overcome in searching for tubercle bacilli in the urine are: (a) The small number of bacilli present in the urine, (b) the danger of mistaking the smegma bacillus for the tubercular bacillus.

In order to make a thorough examination of the urine for tubercular bacilli the specimens employed should be passed into a sterilized vessel and submitted to the centrifuge. Thus external contagion is prevented and the bacteria are concentrated. When the urine is quite clear sedimentation of the bacilli is favoured by the addition

of a small quantity of clear egg albumin which entraps them and carries them to the bottom of the centrifuge tube. The sediment is then examined by means of fixing and staining and cultivation, or by injection into guinea-pigs. Of the three methods the first two—viz., staining and cultivation—are rapid and accurate if properly performed by an expert. But they present many difficulties and liabilities to error, and cannot be carried through satisfactorily, except by a bacteriologist especially trained in the methods of distinguishing between the tubercle and the smegma bacillus. Koenig, Bunge, and many others have been led astray by the alleged discovery of the tubercle bacillus in urine. Hence, the guinea-pig test, though slow, is the appropriate one for all but the most skilled. The injection of sedimented urine and the post-mortem examination of the animal several weeks later require no special description here.

The ordinary staining methods by which the tubercle bacillus is readily distinguished in sputum do not avail to distinguish it from the smegma bacillus in the urine. A full exposition of the difficulties surrounding this work with an explanation of the means devised to overcome these difficulties is detailed by Sondern.¹ I have not attempted to employ these special methods myself, but I can vouch for the accurate results obtained by Dr. Sondern.

Other Symptoms.—Among the other symptoms due to tubercular cystitis a partial incontinence of urine from spasm or from ulceration of the neck of the bladder is notable. Mixed infection adds pyuria to the hematuria, and phosphatic stone may be formed and multiply the patient's agonies. The symptoms of involvement of the other genito-urinary organs are, sooner or later, important, and the rapid pulse, hectic fever, and general deterioration characteristic of this disease may be distinguished in advanced cases.

DIAGNOSIS

Familiarity with the symptom-complex just laid down, together with the discovery of tubercular lesions elsewhere in the body, may be depended upon to establish the diagnosis in many cases. A family history of tuberculosis may also be elicited.

Differential Diagnosis.—The evident features about the disease, early or late, are bleeding and irritability. It may be confused with simple cystitis, stone, tumour, contracture of the neck of the bladder, and renal tuberculosis. From *simple cystitis* it is distinguished by the preponderance of hemorrhage and irritability, by the special antipathy of the tubercular bladder to nitrate of silver, by

¹ Jacobi Festschrift, 1900, p. 484.

the evidence of tuberculosis elsewhere in the body, and by the discovery of the tubercle bacillus in the urine. *Stone in the bladder* often gives rise to symptoms closely resembling tuberculosis; the searcher establishes the diagnosis. *Tumour* is not often confused with tuberculosis, but excessive irritability from the former, or excessive hemorrhage from the latter may make them seem very much akin. *Contracture of the neck of the bladder* may (pp. 317, 400), as we have seen, be either simple or tubercular. The symptoms of the two resemble each other so closely that one of our best-known genito-urinary surgeons habitually confounds them. Evidence of tuberculosis elsewhere in the body, or the discovery of the tubercle bacillus in the urine is absolutely essential to convict any one with a contracted vesical neck of being tubercular. *Renal tuberculosis* often gives symptoms purely referable to the bladder (p. 602). The cystoscope may be required for a diagnosis.

Method of Examination.—In the examination of a patient with tubercular cystitis the nature of the disease may be first suspected from the symptoms, the history, or the evidence of tuberculosis in the testicles, prostate, or lungs, or from the general tubercular aspect of the patient. If this is the case every effort should be made to establish the diagnosis without introducing any instrument into the bladder. This can often be done, and the patient's gratitude well earned. But if the surgeon inclines to operative treatment (which I do not), if there is question of stone or of renal lesion, or if the idea of tuberculosis does not cross the surgeon's mind, instruments may be employed. The use of any instrument in the tubercular bladder is likely to be followed by considerable prolonged spasm, which can be minimized only by gentleness. The searcher must be used (p. 436) if stone is suspected. The cystoscope I have employed but rarely. General anesthesia is usually required to overcome the vesical spasm and bleeding, and the diagnosis of renal tuberculosis can usually be made without cystoscopy. In only one condition is the cystoscope absolutely essential—viz., when removal of a tubercular kidney is contemplated. Cystoscopy is then essential to determine the condition of the bladder and permit catheterization of the opposite ureter (p. 472). It is notable that if the bladder lesion is confined to the neighbourhood of the ureteral mouth it will usually heal after nephrectomy, and is no contra-indication to the operation.

Urinary examination and detection of the tubercle bacillus are always part of the routine examination. I have employed the tuberculin test, but I consider the febrile reaction which it causes an unwarranted strain upon the system.