

A few suggestions may facilitate work along this line. Readings should always be made under constant lighting conditions. Bacterial count may be substituted for standardization by opacity. One-tenth per cent. formaldehyd solution kills bacteria, but not fungi. If work is to be done intermittently, it is best to bottle the culture in small bottles, for preservation, since contamination by fungi is common. For routine work, large bottles, from which the daily amount is removed under aseptic conditions, yield best results. Under proper storage conditions (a dark ice chest), the factor of agglutinability does not change in six months, and probably continues the same for a much longer period of time.

THE URINARY TRACT IN PULMONARY TUBERCULOSIS

A REPORT OF THE STUDY OF SIX HUNDRED CASES

S. WILLIAM SCHAPIRA, M.D.

Professor of Clinical Surgery and Director of Genito-Urinary Division,
Fordham University School of Medicine; Visiting Genito-Urinary Surgeon, Sea View and Sydenham Hospitals

JOSEPH WITTENBERG, M.D.

AND

SIDNEY L. SPIEGELBERG, M.D.

Instructors of Genito-Urinary Surgery, Fordham University School of
Medicine; Assistant Visiting Genito-Urinary Surgeons,
Sea View Hospital

NEW YORK

For years we have had forced on our attention, at frequent intervals, the question of the relative value of surgical and medical treatment of tuberculosis of the kidney, and of the true significance of the various symptoms and signs on the presence or absence of which the diagnosis of this condition is made. We frequently see patients who apply for relief of advanced tuberculosis of the second kidney, very shortly after the first kidney had been removed for tuberculous involvement. In the Sea View Hospital alone, since 1913, we have seen at least twenty-five such patients who were admitted within eight to twelve weeks after the nephrectomy.

This problem cannot be dismissed with the statement that "a kidney which is practically destroyed and which acts as a focus for dissemination of the disease, and the toxins generated in which irritate the second kidney during their elimination, should be removed—the second kidney being in good condition," nor that "a kidney which contains the sole active focus of tuberculosis in the body should be removed to prevent dissemination of the disease." The fact remains that in the cases of renal tuberculosis in which nephrectomy is done, the large majority of primary deaths are due to inability of the remaining kidney, and the secondary death rate is high.

It seems to us that the most important points to settle in considering the relative values of the surgical and the medical treatment of this condition are, "Do we judge correctly the significance of the symptoms and signs we attribute to it?" and "Do we read aright the results we obtain with the precise methods of examination of the urinary organs which are now at our command?" In other words, do we operate in some cases which had best be let alone, because of misconception of the significance of these symptoms and signs?

To get more light on this perplexing subject, we have carefully observed at the Sea View Hospital a series of 600 cases of tuberculosis, and have studied the relation of the urinary organs to tuberculosis of the body in general, the presence and absence of symptoms referred to the genito-urinary organs and their significance, and the presence and absence of signs referred to these organs and their significance.

The series under consideration differs from some of the groups of cases previously observed and reported by others, in that this series consists entirely of cases not unlike those which the physician and surgeon meet in everyday practice, rather than of necropsy findings in those who have succumbed to the tuberculosis, and in whom, naturally, the disease had made more extensive ravages. This will explain the more favorable findings—the considerably smaller percentage of complications in the genito-urinary organs found in this series than in those of other observers. The patients under observation were 386 men and 214 women—all adults.

Because of:

1. The difficulty in demonstrating the tubercle bacilli in the urine; and
2. When the bacilli are found, the difficulty of diagnosing the seat of the focus in the urinary tract, whether it is:
 - (A) in one kidney or the other, in the ureter, bladder, or in the prostatic urethra;
 - (B) if foci were present in several of these organs, or
 - (C) whether no tuberculous lesions were present or demonstrable in any of the urinary organs in spite of
 - (a) the urine containing tubercle bacilli, or
 - (b) of the presence of subjective symptoms referred to the genito-urinary tract or of both,

the following careful routine was observed, and the following results noted:

1. A note was made of all patients who gave a history of subjective symptoms referable to the genito-urinary tract, such as nocturnal and diurnal frequency of urination, tenesmus, etc. These numbered sixty-three (10.5 per cent. of the total).

2. A twenty-four hour specimen of urine of each of the 600 patients under observation was examined by the usual routine method, and a separate search was made for acid-fast bacilli.

3. In all patients whose urine showed acid-fast bacilli, the bladder urine was drawn by catheter under rigid aseptic precautions, to guard against contamination of the urine by smegma bacilli, which are also acid fast and otherwise resemble, morphologically, the tubercle bacillus, and which are often found in the anterior urethra in the male and are very commonly present on the external genitals of the female.

The following reports of observations as to the frequency with which the smegma bacilli are met about the urogenital organs are cited to show the necessity of such precautions: Young and Churchman¹ took smears from the fossa navicularis in twenty-four patients, and found the smegma bacilli in eleven (46 per cent.). Brereton and Smith² examined two series of cases with the following results: In 126 insane patients, red-stained bacilli were found in eighty-five (67.5 per cent.) after the smears were decolorized with 25 per cent. sulphuric acid. After being counterstained with methylene blue, which stains smegma bacilli but not the tubercle bacilli, only nineteen of these smears (22 per cent.) were found to

1. Young and Churchman: *Am. Jour. Med. Sc.*, 1905, **130**, 52.
2. Brereton and Smith: *Am. Jour. Med. Sc.*, 1914, **148**, 267.

contain red-stained bacilli. The second series consisted of twenty patients. In these, red-stained bacilli were found in thirteen (65 per cent.) after decolorization of the smears with 25 per cent. sulphuric acid, and in only two (10 per cent.) after the smears had been counterstained with methylene blue. Brereton and Smith question whether true smegma bacilli have ever been cultivated, and until a satisfactory method has been discovered for cultivation of the true smegma bacilli, we believe it is useless to base any diagnostic value on a procedure that depends on their growth.

4. Samples of ninety-one urines that showed the presence of acid-fast bacilli were sedimented and injected into guinea-pigs. A positive result was obtained in only twenty-three cases (25 per cent.). This is a much smaller percentage for the total number of cases studied than was found by other observers, being only one in twenty-seven cases as compared to one in eleven found by Cunningham and one in ten found by Bernstein.

5. A searching cystoscopic examination of the bladder, the trigon and the ureteral orifices was made in the sixty-three patients who presented subjective symptoms referable to the genito-urinary tract, as well as in such other patients as would consent to it. In those patients whose catheterized bladder urine showed acid-fast bacilli, the ureters were catheterized (when that was possible) for further examination of the urine from the individual kidneys. In view of the interesting results obtained, it is unfortunate that many of those who had no subjective symptoms referable to the urinary tract refused cystoscopic examination and ureteral catheterization.

6. The genital organs of the 386 men patients showed the following associated tuberculous lesions: twenty-three tuberculous prostates, eleven tuberculous seminal vesicles, and sixteen tuberculous epididymides.

7. In a number of cases, tests of the kidney function were made, to note the effect of tuberculosis of the kidney on its function. In this series, the phlorizin glycosuria test (which we find to be as reliable as any, in all except diabetic patients) was made.

RESULTS OBTAINED

Routine examination of the urine was made of 449 patients whose urinary organs were negative to any form of perceptible tuberculous involvement or to subjective symptoms. In 220 the urine was normal, and in 229 the urine showed some albumin, casts, etc.

The presence of tubercle bacilli was by no means limited to such urines as showed apparently damaged organs. Of fifty cases in which the presence of the bacilli was the only indication of tuberculosis in the urinary tract, in twenty-six the urine was otherwise negative, and in twenty-four it showed albumin, casts, etc.

The 151 cases which showed some other abnormality than simple chronic nephritis, were divided into two main groups: Group A, consisting of ninety-one patients, showing the presence, microscopically, of tubercle bacilli in the urine, and Group B, sixty cases in whose urine repeated microscopic examination failed to show the presence of the tubercle bacillus.

Animal inoculation with sedimented urine from the ninety-one patients of Group A proved positive in only twenty-three. Among the sixty patients of Group B were found two whose urines proved positive on animal inoculation.

The number that gave subjective symptoms referable to the urinary tract was sixty-three. A careful cystoscopic examination of these sixty-three cases showed rather surprising results: Twenty-three showed bladder lesions; forty showed no bladder lesions on the most careful scrutiny. Of the forty, twenty-three presented tuberculous lesions in the genital organs, and seventeen showed no tuberculous lesions discernible anywhere in the genito-urinary tract.

We thus see that much the larger number (64 per cent.) of these patients did not have discoverable lesions in the bladder which would explain the symptoms. In these cases the symptoms can be accounted for only as being reflex, being due to irritation of the urine as it passes through the bladder, or being due to both. We must mention here, as tending to acquit the urine of such irritating action, that some of these cases of subjective symptoms without bladder lesions showed no tubercle bacilli in the urine by microscope or by animal inoculation; one had urine that was normal in every way—that did not show a trace of albumin or a cast, and five had tubercle bacilli in the urine without albumin, etc.; and that of twenty-three cases of subjective symptoms which had no

FINDINGS IN THE TWO GROUPS

Group A, 91 Cases	Group B, 60 Cases
50 were negative to animal inoculation, and otherwise showed no symptoms or signs of tuberculous involvement	2 cases proved positive by animal inoculation, and otherwise showed no symptoms or signs of tuberculous involvement
15 gave positive results in animal inoculation, and otherwise showed no symptoms or signs of tuberculous involvement	6 cases showed lesions of the bladder, but did not have subjective symptoms
6 showed lesions of the bladder, but did not have subjective symptoms	8 had lesions of the bladder and subjective symptoms
15 had lesions of the bladder and subjective symptoms	12 had no bladder lesions who did have subjective symptoms referred to the bladder
5 had no bladder lesions, but did have subjective symptoms referred to the bladder	

We thus find that the foregoing 28 cases, in which we would expect to find tubercle bacilli, were in Group B, i. e., they failed to show the presence of the bacilli on microscopic examination.

lesions in the bladder but did show tuberculous foci in the genital organs, several had normal urine, eighteen showed no tubercle bacilli, and only five showed tubercle bacilli microscopically or by microscopic examination and animal inoculation. On the other hand, tuberculous lesions were found in the bladder in seventeen patients who had no subjective symptoms.

Because many of the patients who presented tuberculous lesions in the genito-urinary organs outside the bladder (that viscus appearing normal) complained of painful urination, we will mention here that four men with such lesions and with apparently normal bladders presented no subjective bladder symptoms.

A number of patients were examined by the phlorizin glycosuria test for functional activity of the kidney. The normal kidney will excrete sugar in from eighteen to twenty-one minutes after the hypodermic injection of 1 c.c. of a 1:200 solution of phlorizin. The length of time before the sugar appears is increased when the kidney substance is damaged. In our cases the results were negative. Kidneys which excreted tubercle bacilli, the urine, however, being otherwise normal, responded in the normal time; kidneys which were the seat of chronic inflammation as shown by the excretion of albumin and of other abnormal constituents showed a delayed excretion of sugar.

CONCLUSIONS

1. As to the relation of subjective symptoms to lesions of the urinary tract: We find that frequency, painful urination, tenesmus, etc., do not prove the presence of discoverable lesions in the urinary tract. In fact, in but little over one third of such cases did we find lesions which appeared in themselves as sufficient cause for these symptoms.

2. As to the relation of symptoms to the presence of tubercle bacilli in the urine: Neither can we say that these symptoms, as a rule, are the results of the passing of irritating urine, since in many of these cases the urine is entirely negative or is not sufficiently affected to give reasonable grounds for assuming that it irritates the bladder mouth and urethra sufficiently to cause the subjective disturbances found.

3. As to the presence of tubercle bacilli in the urine in tuberculosis of the genito-urinary organs:

(a) Many urines which show the presence of acid-fast bacilli by microscope prove negative in animal inoculation tests. (The converse is infrequent.)

(b) Tubercle bacilli are often found in the urine without subjective symptoms or apparent lesions in the urinary organs.

(c) Tuberculous lesions in the bladder are often found when the urine shows no tubercle bacilli.

The explanation of the presence of tubercle bacilli in the urine in some cases of genito-urinary tuberculosis and of its absence in others is that the tubercle bacilli are eliminated in "showers," so that it is quite possible to get specimens between the "showers" that are free from tubercle bacilli.

4. Great care is essential in diagnosis of tuberculosis of the kidney, in view of the fact that tubercle bacilli are found in the urine in patients who have neither demonstrable tuberculous lesions of the genito-urinary tract nor symptoms referable to the urinary organs.

"When is a kidney tuberculous?" In the light of these researches and of the reports of other observers (Rist and Kindberg), we can no longer say that the presence of a few tubercle bacilli in the urine shows tuberculosis of the kidney. In former times, before the refinements of diagnosis now available were at our disposal, the argument that a tuberculous kidney must be removed had some basis of good reason, because a diagnosis of tuberculosis of a certain kidney was not made, as a rule, till the kidney was badly injured. Now, the finding of a few tubercle bacilli in the urine from a certain kidney is not sufficient to condemn that organ on the one hand, and on the other hand, the second kidney may show tubercle bacilli in its urine, at the next examination.

1847 Madison Avenue.

Whale Fat.—In Denmark whale fat has been used for margarin since 1914, and Norway is now making experiments with hardened whale fat on account of the shortage of other materials for the margarin industry, according to *Commerce Reports*, February 2. Whaling off the coast of Norway is to begin for government account with the idea of supplementing the fat supply from this source. In 1914 Denmark used 20,000 barrels of hardened whale fat for making margarin, and the product made from it is said to keep well and taste well and to be even better in the form of lard. Different percentages of vegetable oil, such as cottonseed and soya bean, are used to make the lard of the proper consistency. In Denmark, where these products have been used three years, no results deleterious to the human organism have been observed.

A METHOD OF DRAINING THE BODIES OF THE VERTEBRAE

PRELIMINARY REPORT

LEO MAYER, A.M., M.D.

NEW YORK

Symptoms suggestive of osteomyelitis of the spine in a case of sepsis due to infection by the *Streptococcus viridans* brought vividly to my mind the necessity of

working out some technic by means of which, in suitable cases, the bodies of the vertebrae may be rendered accessible to surgical intervention. A brief review of the literature, as well as a personal conference with Dr. Bradford of Boston, convinced me that, as yet, no satisfactory method had been devised. Although in the instance of the patient in question the local symptoms of osteomyelitis subsided, it seems to me of value to report a method which, on the cadaver, gives an excellent operative exposure.

The method previously used consists of a resection of the transverse process through a midline incision similar to that used in the typical laminectomy (Menard). It is readily seen by reference to Figure 2 that this method does not expose the body of the vertebra, because the lamina and pedicle are in the way. To approach the

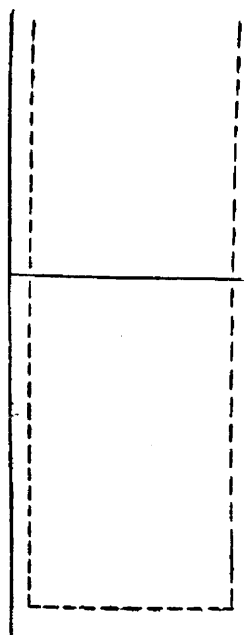


Fig. 1.—The H shaped skin incisions and the line of the hemostatic suture enclosing the muscle flap (dotted line).

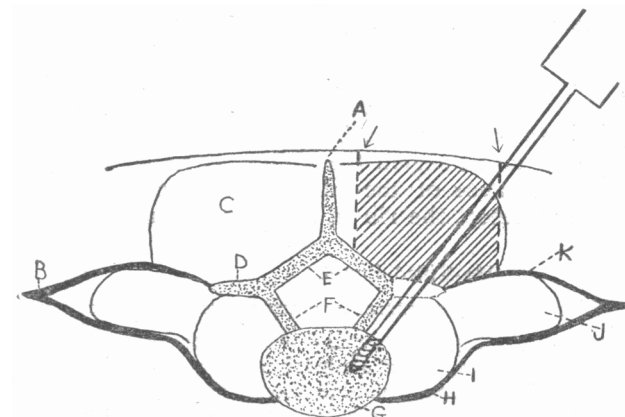


Fig. 2.—Diagrammatic cross section at the level of the first lumbar vertebra, illustrating the principle of approaching the vertebra by the oblique route. The arrows indicate the two longitudinal skin incisions. The shaded area illustrates the muscles which are deflected upward. The resected transverse process is indicated by a dotted line. A, spinous process; B, lumbar fascia; C, spinal muscles; D, transverse process; E, laminae; F, pedicles; G, body of vertebra; H, anterior layer of lumbar fascia; I, psoas; J, quadratus lumborum; K, middle layer of lumbar fascia.

body, an oblique route will have to be followed which will enable the operator not merely to bring his instrument to bear on the body of the vertebra, but also to see it accurately. This can be accomplished by the following technic, the essential part of which consists in the upward retraction of a wide muscular flap,