ON SOME
SURGICAL ASPECTS OF RENAL TUBERCULOSIS.

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TUBERCULAR disease of the urinary organs has recently received considerable attention, and the literature of the subject has been importantly added to by the French school of pathologists. In reviewing urinary tuberculosis it is impossible entirely to dissociate any one part of the system as belonging to the physician, it being now well recognised that certain morbid conditions feign well-marked surgical complaints, and give rise to consequences which are only amenable to surgical interference. The observations I am about to make have been led up to by cases presenting symptom indicating the necessity to explore for calculi or to practise cystotomy for their relief.

Tubercle of the kidney in its earliest form I have frequently found to be a cause of incontinence and urinary irritability in children; many children, especially males, who were suspected of stone, proved to have tubercular kidneys. It is not easy always to determine cases of this kind. In one instance recently under observation, where in addition to medical treatment, circumcision of an elongated prepuce had been performed, extensive renal tuberculosis with almost entire atrophy of one kidney was shown after death to have taken place. In assisting to make a diagnosis between what we may call medical and surgical incontinence, I have found the use of the thermometer extremely valuable in doubtful cases. If there are tubercles in the kidney, the temperature will generally show them, provided the observations are continued for some time, in addition to other indications which it is not my province to enter upon.

Of the various operations employed for the relief of urinary affections it would be difficult to mention one that had given better results generally than cystotomy; the least favourable cases, in my experience, have been those where this operation was undertaken for symptoms traceable to tuberculosis. Of these I might instance several. The following example was a particularly interesting and an instructive one of its kind.

Some years ago a small boy four years of age came under my care at the Royal Infirmary, at the request of Dr. Little, on the suspicion that he had a stone concealed somewhere in his urinary organs. He had many of the symptoms of this complaint, but though he had been sounded several times no calculus could be felt. He was the child of distinctly strumous parents, and was singularly bright and intelligent for his age. Twelve months previously he commenced to wet his bed at night and to suffer from urinary irritability in the daytime. Occasionally very small quantities of blood had been detected with the microscope in the urine, which was invariably acid and opaque. Within two months prior to his admission the urine had been charged with mucus and granular matter containing a few pus cells of a tenacious character, efforts to expel which from his bladder produced much spasm and suffering. To aid micturition, and at the same time with the view of mitigating his spasm, he acquired the habit, which at last became constant, of pulling at his penis. He seemed, as it were, to milk-away the urine and what it contained from his bladder. It was under these circumstances he came into the infirmary, when it was found necessary to give him sedatives freely. The urine, always granular-looking and opaque, now and then contained something which seemed more like the white of an egg half boiled than anything else. He was sounded, under ether, but nothing abnormal could be detected by any form of physical examination that was employed. Towards evening he was generally noted to have a rise in temperature, and there was a distinct tendency towards hectic. To alleviate the constant pain and spasm of micturition a median cystotomy was performed, but with little benefit. The spasm and vesical tenesmus still continued almost unabated. In the course of a month the child died with renal symptoms and a gradual suppression of urine. Post-mortem examination showed nothing wrong with the bladder or the urethra. The ureters were dilated and the kidneys cystic and tubercular. Some of the cysts thus

formed, communicating with the pelvis of the kidney, contained thick gummy-looking mucus similar to that which was observed in a more diluted form in the urine; the cyst walls seemed to be engaged in secreting this viscid matter, which obviously with some difficulty had found its way along with the urine down the ureters. This was the explanation of the dilated ureters, the bladder spasms, and the irritability which led to cystotomy being practised. Without such an explanation it was difficult to understand how the ureters could be dilated, and yet no stricture exist in the urethra.

This case has since served to illustrate, in connexion with others of the kind not very dissimilar in history, progress, and results, at least three points: (1) That urinary incontinence or irritability in young children may proceed from renal tuberculosis; (2) that though cystotomy gives relief by allowing escape of the viscid mucoid material the tubercular cysts in the kidneys furnish when it has reached the bladder by slowly trickling, or insinuating itself down the ureters, there might in other cases of this kind be more cogent reasons for opening and directly draining the cystic kidneys, with the view of preserving what remains sound in structure as well as of preventing the constant spasm or colic which is aroused by the products of the disorganised kidney forcing a way along the ureters; (3) that such a case serves to illustrate those extremely rare cases (of which but few specimens are known to exist) where stones in the bladder have been found, wrapped up as it were in fibrous or gelatinous envelopes.

It was only comparatively recently, until I had by the kindness of Mr. Bickersteth an opportunity of carefully preserving and examining a well-marked specimen of what these tubercular cysts in the kidneys are capable of pouring along the ureters into the bladder, that I felt it possible to explain the formation of semi-fibrous stones. The best specimen I know of is in the Liverpool Infirmary Museum, and has been there referred to by me on a previous occasion.¹ "In 1873 a boy was admitted into the Liverpool Royal Infirmary, under the late Mr. Long, suffering from symptoms of stone. The child was sounded carefully, but without any evidence of stone being afforded. Death occurred in the course of a few days. On making a post-mortem examination the kidneys were found in an advanced stage of tubercular disorganisation and cystic. The bladder was small, and in it lay a calculus made up of a urate of ammonia nucleus, the size of a damson-stone, surrounded by a thick layer of soft material, consisting of mucus, fibrin, and a little gritty matter, probably phosphatic. The outer covering could be cut or torn easily, and after it had been in spirit it presented on section a laminated appearance, like the fibrinous layers found in an aneurysm. On striking the mass with a metal instrument no ring was produced; hence the impossibility of determining its existence with the sound during life." Mr. Bickersteth records a similar example.²

The possibility that in a strumous subject a small stone in the bladder may, as it were, be wrapped up in a fibrous sort of coat furnished by a tubercular kidney must not be lost sight of in the investigation of obscure cases of vesical stone, whether or not the explanation I have offered as to their formation be a satisfactory one.

In the diagnosis of urinary tuberculosis in the adult male, in whom this disease is frequently found between the ages of twenty and forty, the careful examination of the testes and prostate with the finger often furnishes valuable evidence as to the probability of tubercle existing in some other portion of the genito-urinary apparatus which is beyond reach. When such evidence coexists with positive signs of functional urinary irritation in some form or other, further evidence as to the cause of the symptoms is hardly requisite. In all cases where there are grounds for suspicion the testes and prostate should be carefully examined. So far as the testes are concerned, there is nothing to be said in reference to their mode of examination. With the prostate it may be observed that our generally recognised method of examining this gland with the patient on his back or side is a very imperfect one, for whatever purpose, diagnostic or otherwise, it is required. To examine the prostate thoroughly and with the least amount of discomfort both to the patient and the surgeon, the former should be placed with his abdomen

¹ The Surgical Disorders of the Urinary Organs, second edition, p. 281 (with plate of stone).

² Observations on Lithotomy, Liverpool Medical and Surgical Reports, vol. i., 1867.

over the end of a sofa or on a pillow over the side of a bed, with the legs slightly apart, so that the surgeon may introduce the finger into the rectum with its palmar surface downwards, the patient's abdomen being at the same time pressed backwards and towards the pelvic outlet by the weight of the body on the bed. In this way the most accurate information can be obtained by the finger respecting the size, consistence, and relations of the gland. In urinary tuberculosis in the adult male small rounded bodies like shots, sometimes softened in their centres, can be felt either singly or scattered throughout the gland. This I have often demonstrated in the wards of the Royal Infirmary in connexion with the diagnosis of urinary tuberculosis. In young male children, or in adults where the prostate is immature, and it is difficult to make out accurately with the finger, even under an anæsthetic, the consistence and boundaries of the glands, I generally examine with a slightly flattened smooth staff in the bladder; this furnishes a central point of resistance which renders it easy to detect any structural change by the finger, such as a tubercular deposit. I attach much importance to the examination of the prostate in all cases of suspected tubercular disease of the urinary organs.

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A CONTRIBUTION TO THE CLINICAL STUDY OF THE LIVER VIEWED THROUGH THE URINE.¹

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NO. I.—TEN TESTS FOR THE BILE SALTS, WITH DEMONSTRATION.

THE study of the urinary aspect of diseases of the liver is so large, and withal so full of clinical interest, that he who has mastered it merely in outline, cannot well do it justice without devoting a series of papers to the elucidation of it. I, therefore, cannot hope to do more on this occasion and at our next meeting than to provide a sketch of one department—namely, the clinical significance of the colourless central components of the bile in the urine. In this communication I will confine myself to a consideration of the tests which enable us to detect the presence of the biliary salts in the urine, leaving over for the next meeting an outline of the physiological and clinical aspects of the subject.

The urinary derivatives of the biliary salts.—The salts of the bile acids, as they exist in the bile, are taurocholate and glycocholate of sodium, the former greatly predominating. These biliary constituents are not altogether eliminated by the kidneys in the chemical forms in which they are secreted by the liver. When they reach the intestines, they are split up into taurin and glycin on the one hand, and cholate of sodium on the other. The cholate is mainly re-absorbed by the bowels, a small portion only being excreted in the fæces; while the rest is returned to the liver by the portal blood, and is, at least, in part, eventually discharged in the urine. The bile salts, as they appear in the urine, therefore, in all probability, consist of the liver-secreted salts—taurocholate and glycocholate, and of the derived salt—cholate.

The clinical tests hitherto employed for detecting bile salts in the urine are unsatisfactory.—All the works on physiology and on urine refer to Pettenkofer's test—sulphuric acid and cane sugar—or some modification of it, as the only clinical means by which bile acids are to be detected in the urine. However satisfactory this test may have proved itself in the hands of chemists, who have applied it to solutions of the bile acids extracted from the urine, it cannot, I am fully persuaded, claim an analogous position as a mode of direct testing, such as the practitioner requires, for my experience of it as a clinical test has been most disappointing. In delicacy it falls very far short of the clinical needs of the practitioner, and in reacting with other substances besides the bile derivatives—e.g., albumen² and

other organic bodies—it is apt to mislead the observer. I can, therefore, endorse Dr. Tyson's remarks on this point: "From a perusal of almost all the text-books on Physiology, and even of numerous manuals on the examination of the urine, the student is led to suppose that the detection of bile acids, if present in the urine, by means of what is called Pettenkofer's test, is one of the easiest possible. On the other hand, nothing is farther from the truth, and the fact is that *such detection by the direct application of the elements of Pettenkofer's test to urine, or any other animal fluid, is practically impossible, even if the bile acids are present in considerable amount.*" Nor have any of the modifications of Pettenkofer's test, recently announced as clinically available, proved such in my hands, even where the elements of bile have been added to the urine, except where inspissated ox-bile has been used." The italics are Dr. Tyson's.³ I am disposed to conclude from my observations that Pettenkofer's test does not react directly with the liver-secreted salts, taurocholate and glycocholate, but only so with the derived salt, cholate. Hence, it does not indicate the presence of the biliary salts in fresh ox-bile until it has had time to decompose them, and thus to liberate cholic acid; but it reacts at once, and very decisively, after the bile has been boiled for several hours with caustic potash, a procedure that breaks up the liver-secreted salts, and furnishes the derivate, cholate. This is doubtless the reason why Pettenkofer's test reacts with inspissated, though it fails to do so with fresh bile, for the taurocholate is readily decomposed by boiling only, and the extract is an evaporation product; and, furthermore, why it rarely affords at once a distinctive reaction in jaundiced urines, which are highly charged with liver-secreted salts.⁴ The test for peptones, recently introduced by Dr. Randolph, of Philadelphia,⁵ may likewise be employed for the direct testing of bile salts, and for this purpose it is delicate; but is unfortunately open to the objection that it reacts equally well with the merest trace of peptone—a constituent often present in small quantity in the urine of hepatic cases, and, moreover, generally in such traces as to be detected with difficulty, and, therefore, cannot always be definitely excluded.

The proposed test is founded on a physiological reaction.—The test I employ for the direct detection of the bile salts in the urine is a purely physiological one, for it is based on a reaction which belongs to the bile itself as it flows into the intestines. When the products of gastric digestion—peptone and parapeptone—which leave the stomach in a state of acid solution, meet with the bile, they are precipitated, as a tenacious layer, all over the villi of the lining membrane of the duodenum.

A solution of the bile salts precipitates acidulated albuminous urine or urine charged with peptone.—The same physiological fact is illustrated outside the body, by acidulating—by means of citric or acetic acid—albuminous urine,⁶ or urine charged with peptone, and treating it with a solution of the bile salts, or by ox-bile freed from pigment, mucin, and fat, when the proteid is precipitated. I take a sample of albuminous urine, acidulate it with a citric test paper, and add a few drops of a solution of the biliary salts, and a voluminous white precipitate is observed, just as if I had thrown down the albumen by ferrocyanide of potassium, or by potassio-mercuric iodide. But though like other precipitates of albumen in failing to dissolve when heated, when the bile salts have not been added in excess, it differs from them in this—in vanishing on the addition of acetic acid. This precipitation of albuminous matter from an acid solution is induced not only by the bile salts, taurocholate, and glycocholate, but also by their derivative, cholate of sodium.⁷

³ Practical Examination of Urine, p. 91.

⁴ Just lately I met with an instructive instance of this fact in a specimen of colourless bile extracted by aspiration from the gall-bladder of a jaundiced patient. I first of all determined the presence of a fairly large quantity of bile salts. Pettenkofer's test, however, afforded no reaction within several hours; but, after boiling a portion of the colourless fluid with liquor potassæ, the test afforded the characteristic colour change in a few minutes.

⁵ THE LANCET, June 28th, 1884.

⁶ Physiological writers assert that the bile only precipitates the proteid from the acid solution that enters the duodenum when in the form of peptone and parapeptone, and not when in that of albumen—as when albumen is dissolved by an acid. If this be so in the duodenum, it certainly is not so in the urine. When a solution of bile salts is added to an acidified albuminous urine, the proteid is precipitated, just as in the case of acidulated normal urine artificially charged with peptone.

⁷ Observation shows there are three conditions that prevent the reaction between the bile salts and an acidified solution of albumen

¹ Read before the Leeds and West Riding Medico-Chirurgical Society, April 10th, 1885.

² I have sometimes been led to believe that the presence of albumen retards or prevents the reaction with bile acids.