REFERENCES.

- ¹ Cholelithotomy in a Case of Chronic Jaundice and Cholangitis, *West London Med. Jour.*, Jan., 1903, p. 1. ² Large Bile Cyst of the Liver: Jaundice without Cholelithiasis, *Med. Chir. Trans.*, vol. lxxxvii, 1904, p. 1. ³ Langenbuch, *Chirurgie der Leber und Gallenblase*, 1897, p. 212. ⁴ Terrier, *Dilatation considérable de la vésicule biliaire*, *Bulletin de l'Acad. de Méd.*, vol. xxiv, 1890, p. 831. ⁵ Tait, Lawson, Note on a case of Cholecystotomy, *Lancet*, vol. 1, 1889, p. 1294. ⁶ Erdmann, Ein Fall von colossalem Hydrops vesicae felleae, *Virchow's Archiv*, vol. xliii, p. 89. ⁷ Kocher, Prof. T. Mannskopfgrosses Empyem der Gallenblase, *Korrespondenz-Blatt für schweizer Aerzte*, vol. viii, 1878, p. 577. ⁸ Tuffier, Lithiase de la vésicule biliaire et cholécystotomie, *Bull. et Mém. de la Soc. de Chir. de Paris*, 1896, p. 245. ⁹ Raymond, Compression du pédicule d'un rein mobile par une vésicule lithiasique et distendue, *Rev. de Chirurg.*, vol. xxi, 1900, p. 749. ¹⁰ Chance, A Case of Gall Stones with Symptoms suggesting Tubercular Pyonephrosis, *Med. Chronicle*, vol. xxxvii, 1901, p. 120, and private correspondence. ¹¹ Osler, *Principles and Practice of Medicine*, 1903, p. 565.

SOME SURGICAL NOTES ON TUBERCULOSIS OF THE KIDNEY.*

By HOWARD A. KELLY,

Professor of Gynaecological Surgery in the Johns Hopkins University at Baltimore.

As earnest thinking men you will all, I feel sure, at once agree with me that it is not so much the clever and the novel as the useful we should ever hold in highest esteem in our art. And especially in these days do I appeal to your judgement, at a period in which we find ourselves literally engulfed in a chaos of new surgical procedures, evoked by the great discovery of your fellow countryman, Lister, do we not need as never before to investigate, to deliberate, to reject and finally to accept the good?

The great keynote of this earliest decade of the twentieth century ought not to be something new but the establishment of that which is good and the unification of the surgery of the world. I would far rather make all men recognize and do the well-known right thing than effect some large discovery and attract wonder and applause.

It is because of this strong conviction that I have not aspired this evening to the novel so much as the useful. May I venture also to suggest that I have come thus far hoping too for a little of that collegial fellowship which was the notable mark of English and American intercourse throughout the latter half of the eighteenth and the first half of the nineteenth centuries—in the days of the two Hunters, of Smellie and the great Blundell, of Sir Astley Cooper and Sir Benjamin Brodie, and a galaxy of departed braves whose mighty names still shine in your British firmament with ever-increasing lustre?

HISTORICAL.

It was in 1871, as you will recall, that Simon extirpated the kidney and then published that considerable work of his; and now about thirty-four years later the surgery of the kidney, as I grasp the subject, has pretty nigh reached its acme under the existing conditions of surgical science.

It is a pleasure in looking down the intervening years to recall the inestimable pioneer services of your own late lamented Knowsley Thornton, and then of David Newman of Glasgow, and of Hurry Fenwick, all in this field, and I shall be happy indeed if my conclusions merit the approval of these veterans of the service. Although, as I have said, thirty-four years have elapsed since the field of aggressive renal surgery was opened up, in reality the operation for tuberculosis is still in its teens, for our surgeons were long held back from entering this fruitful field by a total misconception as to the pathology and clinical history of the disease.

Three serious errors blocked the path of progress: in the first place renal tuberculosis was seen by the pathologist only in cases of advanced or of general tuberculosis, so that the impression obtained that the disease was either a local expression of a general condition or was almost invariably bilateral. In the second place the convenient and well-sounding but unfortunate term, "urogenital tuberculosis," was long current, conveying the false impression that the disease of necessity involved more or less of the entire urogenital tract *ab initio*; and in the third place it was commonly assumed that the tuberculosis was of an ascending character, advancing from the bladder upwards, and therefore ineradicable. The true facts did not, as we shall see,

warrant the clinician in making a general application of a single one of these dicta.

Let me quote Rokitsansky¹: "Tuberculosis of the kidneys is but the partial expression of a primary tuberculosis of the urinary organs, and in the male commonly a part of a combined tuberculosis of the urogenital system." Guyon, writing in 1888, declares: "We do not know of a single case of renal tuberculosis, primitive and unilateral, without lesions of the same kind in the bladder, the seminal apparatus, or in other organs." I can but pause to note with Schede of Bonn, that Schmittlein, writing as early as 1863, was the first to distinguish clearly between a urogenital tuberculosis arising in the male genital organs, and secondarily involving the bladder, the ureter, and lastly the kidney, and a true primary renal tuberculosis which descends the ureter to invade the bladder from the opposite direction. Even as late as 1888 Steinthal² showed how hopelessly at variance were the current opinions touching this vital question.

As I con the evolution of the history of our subject the following dates are important:

1. The period of recognition of the disease up to 1860.
2. The collection and sifting of a number of cases with both pathological and clinical histories in view, 1863-1885.
3. The stimulus to surgical thought given by Simon's first renal extirpation in 1871.
4. The discovery of exact methods of diagnosis from 1876-1893.
5. A period in which the development of the surgical technique has been wrought out in the hands of a few specialists, 1890-1900.
6. The final period, the gradual transportation of the perfected operation into the hands of surgeons at large, may I say from this present date on, 1905?

ETIOLOGY AND PATHOLOGY.

The nexus between etiology, diagnosis, and treatment is so close woven that I must touch upon causation if but briefly, in order to give my little sketch—taken as it were from a surgeon's diary—its due perspective.

In the first place, how does the disease reach so recondite an organ? Manifestly there are but three avenues of access:

- By the blood;
- By ascending the ureter;
- By direct extension from some contiguous organ.

Baumgarten of Tübingen (1901), after some careful experimental inoculations of the urethra in rabbits in which he succeeded in causing a tuberculous ulceration of the bladder and the prostatic urethra, found himself utterly unable to provoke any like affection of the vasa or of the testicles on the one hand, or the upper urinary tracts on the other. He therefore insisted that the tubercle bacilli, being no *Secretionsparasiten*, never advance against the current of secretion, but always with it.

This dictum, generally speaking, is true, although there are good clinical reasons for believing that in man the disease frequently extends from the epididymis to the bladder where it may involve and cause a stricture of one or both ureteral orifices; this in turn causes a slight hydro-ureter, and then follows the invasion of the upper urinary tract. A case of Albarran's and one of my own, both with a double kidney, seem almost conclusive in this respect.

An ascending disease in women is most rare, except when the disease has first affected one side, and then when this is in an advanced state of tuberculosis, proceeds to invade the bladder and the opposite ureteral orifice in the manner depicted. I would call attention to the fact that I have never seen a primary ascending tuberculosis in upwards of fifty surgical cases, for the most part in women. I have seen several cases of vesical tuberculosis, primary or associated with a genital tuberculosis, but the kidneys were not involved.

I have also seen coincident renal and genital tuberculosis, but without other manifest liaison than the vascular system or some remote common dépôt of infection. I would therefore urge that what is commonly called urogenital tuberculosis does not exist in women.

Without any doubt the infection of the kidney is almost always hematogenous. It is important to note that the focus by which the blood becomes infected is often found in the thorax. Kelyneck (1897), in a series of autopsies studied with especial reference to tuberculosis of the kidney, found the lungs affected in 70 per cent. of the cases. The primary focus, as has been shown by autopsy, is sometimes a cheesy bronchial gland, apparently dormant but for this accident.

Let me urge with these facts before us that it is most important in every case to investigate most minutely the condition of the lungs. A study of this kind will sometimes serve to check a too sanguine prognosis.

* Read before the British Gynaecological Society on June 8th, 1905.

Let me urge, too, in searching for evidences of latent disease not to neglect overhauling such a fruitful field as the sub-maxillary, cervical, axillary, and inguinal regions for swellings or scars, as well as looking for old joint troubles.

The involvement by contiguity has been shown by Patois (1897), who had a case of a girl of 19 with vertebral caries whose kidneys became involved by the extension of the disease through a mass of sclero-tuberculous tissue.

If for any reason the kidney becomes a *locus minoris resistentiae* it may then become affected by a tuberculosis when it would otherwise have escaped. This is proved: (1) By cases of trauma (see especially Newman), followed by tuberculosis; (2) by the occurrence of tuberculosis with calculi, in a case of Henrotin of Chicago the tuberculous disease developed years after the abstraction of the stones; (3) by the occurrence of a tuberculosis grafted on to a hydro-nephrosis, in instances too numerous and too entirely in accord with experimental data, to be coincidental. Before passing from this phase of the subject I would ask for further observations touching the asserted relationship between gonorrhoea and tuberculosis of the kidney.

CLINICAL HISTORY.

A few words with reference to two vital points in the clinical history of this pseudo-malignant renal affection.

In the first place, tuberculosis once started finds in the kidney so favourable a nidus that the disease becomes, with perhaps the rarest exceptions, progressive. Time spent in trying to cure this disease by climatic or other methods is lost time, for the affection moves *pari passu* or *saltatim*, but in any case it advances. Delay in active treatment means courting the risk of involvement of other organs.

The second is that a spontaneous cure is so rare an occurrence that Albarran could successfully challenge the French Surgical Society to produce an indubitable instance. A seeming cure is sometimes obtained with the complete caseation, destruction, and sequestration of the kidney associated with the obliteration of the lumen of its ureter, but this natural cure (*sic*) is fraught with such risks of further dissemination and is so protracted in its course that few surgeons, I think, would hazard it.

Excluding cases of general and miliary tuberculosis, rarely seen by the surgeon, and excluding those forms of the disease in which it is but a late complication of an advanced and manifest tuberculosis elsewhere, usually pulmonary, we have to deal with a disease which is local and unilateral in its onset and which may remain local and unilateral for months and even for years.

Given an affection of this character incompatible with health and in the end destructive of life located in a paired organ, one of which can readily be spared by the economy, what more fruitful field, I demand, need the surgeon look for in which to exercise his precious skill?

DIAGNOSIS.

The real crux of the situation is the diagnosis, and upon this capital point I would like to dwell a little.

One is perhaps best able to realize the progress that has been made in the last decade and a half, in the diagnosis of tuberculosis of the kidney, upon reading such a communication as Madelung's,² in which he declares that the demonstration of a renal tuberculosis is a matter of extreme difficulty, while catheterization of the ureter after dilatation of the urethra is open to the serious objection that in some instances in women it has given rise to incontinence. Madelung mentions the method of making an exploratory laparotomy in order to palpate both kidneys transperitoneally (Thornton) as a procedure not likely to lead to a definite conclusion, while a bilateral lumbar exploratory incision might be of value. He further declares that the inoculation of rabbits as an adjuvant to diagnosis consumes too much time, and if negative the result would of course be valueless. In conclusion, the unsatisfactory nature of the diagnostic measures at hand (in 1890) forbid the surgeon to establish the rule of early operation in renal tuberculosis; on the contrary, only those cases should be selected "in which the disease has progressed so far that a spontaneous recovery is impossible, and in which, further, after a prolonged observation there is the utmost assurance that the disease is limited to one side." I have thus quoted so excellent an observer somewhat in detail in order, when contrasting our present status, to heighten the appreciation of the remarkable advances which we have made within such a short term of years.

We have just seen that the clinical history of this almost

malignant bacterial infection of so delicate an organ is characterized by the invariable tendency of the disease to proceed step by step until the kidney has been completely destroyed, and *pari passu* with its local progress is there a tendency to become disseminated or to invade other vital organs. The careful clinical studies of the disease have further demonstrated the fact that the disease when it starts in the urinary tract always attacks one kidney first and then the ureter, then the bladder, and that the involvement of the other kidney is fortunately almost always a late secondary affection. From these considerations it at once becomes evident that if the disease can be correctly diagnosed at an early stage, while it is as yet in the one kidney, a cure may be effected by a complete extirpation. It is because of this possibility that the diagnosis becomes a matter of such paramount importance.

It is evident, therefore, that the diagnosis keeps one eye squinting in the direction of an operation.

It becomes, then, the province of the diagnostician to take cognizance not only of the presence of the tuberculous affection, but of its extensions and its limitations as well, determining with especial care the great question whether it still remains localized in one half of the urinary tract. His task is not complete until he has further determined the condition of the opposite kidney, whether it too is tuberculous or otherwise infected, or whether it is attainted with a nephritis or an amyloid degeneration. He must determine in the course of his investigation the functional coefficient of both kidneys, that is to say the amount of solids excreted by each in twenty-four hours. A diagnosis, therefore, cannot be considered as made until it has included within its realm of investigation the entire urinary tracts of both sides as well as the condition of the bladder and the ureter. The diagnostician must also search for other perhaps latent foci of the disease in the male and female genital organs, in the lungs, the superficial glands, and in the joints.

The great question of importance in every urinary tuberculosis is as to the accuracy and the thoroughness of the diagnosis; it is here if anywhere that the skill of the medical man is apparent; the worst clinical cases are often suddenly illuminated by a bright ray of hope when a careful diagnosis is made. In comparison to the difficulties encountered in making such an exhaustive analysis as is often called for, the operation is easy. In brief the diagnostician has to consider:

1. Has the patient a tuberculosis of the urinary tract?
2. Is the disease still localized?
3. If the diseased kidney is removed, is the remaining kidney able to do the work?

A satisfactory diagnosis is made when tubercle bacilli are found in the urine at more than one examination, and preferably by more than one observer, and when these are traced upwards to one kidney and positively excluded from the other. In order to do this the urine as it is collected from the bladder must first be examined, then the separated urines (I use the plural discriminately) must be collected near their sources in the pelves of the kidneys. The diagnosis must include both the character or quality of the infection, as well as the abundance of the bacteria and the question of their constant or intermittent appearance in the urine.

In an advanced case with all the signs present the diagnosis is usually quite easy. The patient, often much emaciated and cachectic, has hectic fever, sweats, a rapid pulse, a furred tongue, and anorexia, with a more or less marked low haemoglobin. There is, as a rule, constant vesical tenesmus, with the passage of urine loaded with pus and sometimes bloody. Palpation in the loin at once reveals, if it is not already apparent to the eye, a more or less manifest tumour on one side. On inspecting the body scars may be found in the neck, in the axilla, or in the groin, or there may be a swollen joint, or distinct evidences of pulmonary disease. The family history in a large percentage of cases points strongly towards tuberculosis. On making a vaginal examination, an enlarged cord-like ureter, sometimes nodular and sometimes so infiltrated and rod-like that it feels as though it would break under firm pressure, is felt through the anterior vaginal wall sweeping round the front of the cervix. Pressure upon this often induces an intense desire to urinate. The opposite fornix is as a rule soft and yielding, and here the practised touch readily detects the little normal yielding ureter slipping like a soft wet string between the fingers as it is handled bimanually or is pressed against the pelvic wall. If in a case presenting such earmarks tubercle bacilli are found in a specimen of urine taken from the bladder by a catheter, the diagnosis is assured, and it only remains to determine further the condition of the bladder and of the

opposite kidney by a cystoscopic examination, upon which I shall dwell more fully a little later. While the diagnosis of tuberculosis, renal and ureteral, becomes more easy as the disease advances, with the increasing involvement of the bladder comes the difficulty of finding the opposite orifice and analysing the separated urines and so of differentiating the two sides, and when this is not done the diagnosis must be considered incomplete.

The cases most difficult of diagnosis are the early ones, in which the bacilli are often sparse or appear in the urine only at considerable intervals. We are obliged here to depend upon repeated examinations of large quantities of urine (twenty-four hours), allowed to stand decanted and then the sediment centrifugalized. Sometimes the examiner only finds the bacillus after many hours of search repeated day after day. In this way one who has had experience and whose suspicions have been aroused by an otherwise inexplicable slight pyuria, will sometimes succeed where others have failed.

In all obscure cases one of the first steps should be to collect the urinary sediment and inject it into two guinea-pigs, one into the peritoneal cavities and one under the skin of the groin or axilla. If there is tuberculosis, after three weeks the disease will have developed sufficiently to be recognized at autopsy.

The injection of tuberculin is valuable if in addition to the fever induced there is marked local reaction in the form of intense pain in the kidney.

A practised examiner will in these early cases often detect little thickening or hardening of a ureter on one side as compared with its fellow, which is significant and yet would ordinarily escape notice.

It is in these doubtful cases, too, that the inspection of the ureteral orifices plays such an important part; a tell-tale blush or puffiness or granular condition will often mark the diseased side. The ureteral catheter may then be introduced and the urine from the infected kidney collected without dilution with that of its fellow.

In case the diagnosis is not clear, the physician can well afford to demand the important added element of time and further observation, putting off any thought of operation while he keeps his eye on the patient from week to week or perhaps from month to month. Any persistent acid pyuria, as Caspar insists, even of a mild grade, which does not yield an efflorescence of organisms on the ordinary culture media, should at once be placed under the category of suspected tuberculosis, and the urine centrifugalized, and a test guinea-pig injected. The following plan is used, adopted from Belgard, cited by Caspar:—

The urinary sediment, which has been centrifugalized and washed with sterile water, is injected both intraperitoneally and subcutaneously. The guinea-pig should at first receive 0.5 of the old Koch's T.R. If they are tuberculous when this dose is given it is deadly. One then receives an injection into the peritoneal cavity of the washed urinary sediment mixed in about 0.2 sterile water. The other receives the same quantity subcutaneously. If the urine contains tubercle bacilli in from three to four weeks following the subcutaneous injection large palpable glands can be felt in the fore or hind feet according to the point inoculated. These glands have already begun to undergo cheesy degeneration and contain tubercle bacilli. The intraperitoneal injected guinea-pigs develop a general military tuberculosis with characteristic nodules on the peritoneum, omentum, spleen, and in the lungs and kidneys.

Any slight persistent cystitis rebellious to treatment should also always be suspected as a possible tuberculosis, and in such a case diagnosis must be looked upon as incomplete until the condition of the kidney has been investigated.

Cystoscopic Examination.

I prefer to all other methods in these cases the direct aëroscopic examination of the bladder. If that viscus is badly affected it is most difficult as well as oftentimes most painful to clear the bladder and distend it sufficiently to see all parts clearly, especially the ureteral orifices. It is also still more difficult, if there is a tight ureter, as well as hazardous to attempt to catheterize the kidney through a medium of contaminated fluid.

By my direct method I can see all parts, and I do not frequently mistake a painful bladder, which screams when the effort is made to distend it, for a contracted bladder which is a rare bugbear in woman. I can also cleanse the ureteral orifices before catheterization and use hard metal as well as flexible catheters of various sizes in dealing with a rigid ureter. The ulcerated, suppurating, bleeding bladder is a common picture.

An injected ureteral orifice, an ulcerated orifice on one

side, a pocketed retracted orifice, a deep hole looking like a diverticulum (Fenwick's golf-hole orifice) often tell the tale, and are finger-posts to the side diseased. If one orifice looks sound while the other is in the midst of a diseased area the case promises well.

In an advanced case when most of the work is being done by one side that orifice shows twice the normal activity, and it is easy to catch the urine as it spurts out in the lumen of the speculum and collect it below and subject it to a microscopic and bacteriologic examination. One may thus avoid catheterizing the sound side, although I have yet to see any serious harm result from so doing. The diseased side may resist the entrance of the catheter, and when it is once engaged it may bite it so tight that it feels as if held in a vice. If the urine does not flow after the catheter reaches the kidney it may be started by injecting a little bland fluid. There is no objection to leaving one or both catheters in the ureters for an hour or more. The urine collected in this way may be used for a bacteriologic as well as chemical and microscopic examination as it is uncontaminated.

Summary.

Let me here present in a categorical manner some of the alternatives to be borne in mind in making a diagnosis:

1. Is the organism found the smegma bacillus? How was the urine secured? Was it by voiding or by catheterization?
2. Given the tubercle bacillus in the mixed urines, from which side does it come? Determine by catheterization the appearance of the ureteral orifice and the thickened ureter.
3. Is the opposite side entirely free from disease? Bear in mind that a simple pyelitis is not infrequent in the opposite kidney.
4. Bear in mind that the opposite ureter may show marked thickening (periureteritis) and yet the kidney be free from tuberculosis.
5. Note carefully to what extent the bladder is affected, as having an important bearing upon the operation and the subsequent treatment.
6. Determine the urea coefficient of the opposite kidney. Is it able to support life?
7. Look carefully for disease elsewhere. Is there a tuberculosis of the genital organs? Is there any pulmonary or glandular tuberculosis?
8. In injecting guinea-pigs remember that tubercle bacilli may pass out of the bladder, if your patient has phthisis, without injury to the kidney.
9. Remember that the enlarged kidney found in the loin may be the one functionally enlarged and therefore the only sound organ. Twice has such a kidney doing all the work of the body been taken out. There is a great risk of making this mistake.

With the information afforded by such a complete analysis one is then ready to proceed to the operation with confidence, or at least with full knowledge of the risks incurred.

TREATMENT.

Radical treatment, the extirpation of the disease in every case which will permit it, is the rule. But before we bring the patient to this surgical crisis, again I insist such a thorough analysis of the separated urines must have been made beforehand that the surgeon shall be able to perform this capital operation (nephrectomy) without misgivings as to the capacity of the remaining kidney to sustain life.

The supreme aim of surgery is conservatism, but in spite of some notable exceptions, it has not done well here. The difficulty is that almost all tuberculous kidneys contain scattered foci of infection which cannot be seen before the complete removal of the organ from the body. The late and eminent surgeon, Christian Feniger, tried a conservative resection of the kidney in a short series of cases, and the disease recurred and they died.

I would only be content to excise the diseased area in rare cases in which the disease was evidently limited to one pole, as demonstrated by splitting the organ from end to end and down into the pelvis as it lay outside the body before ligation of the vessels and detachment.

Now, having spoken so strongly for radicalism, let me cite a few of the cases in which conservatism has proven brilliantly successful. Your own Morris had seven cases of partial nephrectomy, and in three of them a total nephrectomy had to follow; of the remaining four, three were living and well three and a quarter, four and a half, and two and a half years later. The fourth case was a remarkable one, which must

afford that eminent surgeon considerable satisfaction; a woman had previously had one kidney excised, when she acquired a tuberculosis of the remaining kidney and Morris excised one-third of its substance; she recovered and was living four years later in domestic service. In a case of Israel's reported as well, it was found after four years she had a tuberculous ureter as well as kidney, and the bladder was involved too. Dr. Williams, of Rochester, did a partial nephrectomy on a man with a well-marked phthisis some four years ago and he is well and working on a farm to-day.

There is one group of cases, of which several instances have been recorded, in which the tuberculosis affects one-half of a double kidney with pelvis and ureter separated from its fellow which remains sound. Albarran had such a case and I have one now under my care. I removed the double left kidney with its two pelves and two ureters, one of which was perfectly sound. The patient was so ill with the advanced disease that I do not believe I could have done a delicate resection in this broadly fused organ. She returned about a year later and I was then able to determine that the opposite right kidney had two orifices opening into the bladder, one of which was sound while the other was ulcerated, and I could feel two ureters per vaginam, one of which was greatly thickened; I could also feel the two ureters in the opposite side, the thickened one corresponding to the diseased half of the kidney removed. She would not submit to another operation without an amount of urging and an assumption of responsibility I did not feel warranted in taking.

In stating that the general experience at present shows that extirpation is the wiser rule, I am aware that I have to overcome in the minds of many of my hearers who may not have studied this question minutely, the depressing effects of the early statistics, compiled at a time when the technique was ill-defined, when the cases were always advanced and associated with pyogenic infections, and when transperitoneal operations were frequent. Thus S. Gross in 1885 collected twenty cases with an immediate mortality of 40 per cent., and of the eight recoveries only one was living after twenty months. Dr. Newman gives in a list of 125 collected cases an operative mortality of 20 per cent. within the first month. Morris only lost five out of twenty-eight cases. In a series of thirty-five cases of renal tuberculosis surgically treated by myself or my associates and carefully studied by Dr. Hunner, there were four nephrotomies, of which one died in eleven weeks; there were nine nephrectomies, of which one died with evident involvement of the opposite kidney, six weeks after operation; there were nine nephrectomies and partial ureterectomies, all living; there were thirteen cases of nephroureterectomy, all living; and three of nephroureterocystectomy, of which one died on the sixth and one on the fifteenth day. This, as you see, is no bad showing for so serious an affection treated so aggressively. Albarran's splendid statistics show but two deaths in fifty cases.

Nephrotomy.

Nephrotomy or a simple incision of the kidney for drainage has been thoroughly tried as an alternative to a nephrectomy. Pousson, for example, cites 63 nephrotomies with 39 deaths from the progress of the disease within one year; of the remaining 24 some lived as long as ten years. Out of 82 cases so treated by Tuffier, with a mortality of 47.8 per cent., only 2 were cured. I had one case myself of an old cheesy tuberculous kidney in which nephrotomy, followed with a thorough curettage, was followed by a complete recovery. This, however, is not the operation of election but of necessity.

In its proper sphere, as a preliminary to a radical operation, nephrotomy is a precious life-saving measure. I have had cases of patients carried in on a stretcher after years of illness, apparently in the last stages of emaciation and hectic, two of them condemned to death by eminent counsel; a nephrotomy readily done in from three to five minutes without shock under gas gave immediate relief to the distressing symptoms and enabled them to pick up and stand a radical operation at a later date.

It is important in a nephrotomy to open up all the abscesses in both poles of the kidney.

Nephrectomy.

The radical operations may be conveniently divided into five classes:

1. In the early stages of the disease.
2. In advanced renal disease.
3. With involvement of the ureter.
4. With involvement of both ureter and bladder.
5. A group of anomalous cases in which the tuberculosis complicates a hydronephrosis or a calculous kidney.

Not to enter into any unnecessary details before an audience of surgeons, let me state that I find the most satisfactory avenue for the exposure of the kidney in the absence of malignant disease, to be the superior lumbar triangle formed by the tendinous aponeuroses of the oblique muscles and lying just below the last rib. The boundaries of the triangle are the oblique muscles, the quadratus lumborum and the eleventh or twelfth ribs. Over the triangle lies the covering of the latissimus dorsi and ventrally lies the retroperitoneal fat. An oblique incision about three inches long extending from the little soft yielding spot in the angle between the quadratus and the rib exposes the latissimus, which can be lifted like a lid or separated in the direction of its fibres or simply divided transversely. The whitish area of the triangle, apex down, is then usually seen at once. A pair of closed forceps is pushed through the aponeurosis and withdrawn when the golden yellow fat pops out. The opening is then enlarged by blunt force, pulling the muscles away from the quadratus. In this way, as a rule, an opening can be made large enough to remove the kidney and give perfect command of the entire field without the ligation of a single vessel. An enlargement is easily effected by further separating the oblique muscle fibres or by dividing them in a direction downward and outward, making a sort of frying-pan incision.

Care must be taken throughout not to injure either the last dorsal nerve or the first lumbar lying under the shelter of the quadratus but varying a little in its position. It is pleasant here to acknowledge the debt we owe to Lennander for the emphasis he has placed upon the necessity of sparing the nerve trunks in the various lateral incisions in the abdominal parietes, so as to avoid such disagreeable sequelae as anaesthetic and paraesthetic areas and muscular atrophy.

In advanced disease, when the kidney is much enlarged, it is not worth while to waste time trying to remove it intact; it is best to empty it at once, reducing its size to a minimum and then after irrigating thoroughly to proceed to the extraction. The greatest difficulties are often encountered at the upper pole and on the right side in the intimate adhesion to the vena cava and the duodenum. Extreme care is necessary in effecting a detachment at these points, proceeding slowly and under direct inspection. A duodenal fistula is a serious and often fatal accident.

This brings me to a most important point connected with the extirpation of the kidney in old suppurative cases. I would here urge the more extensive use of the intracapsular enucleation.⁸ Sometimes an operation which has bid fair to be hazardous in the extreme is turned into the simplest possible procedure by thrusting the fingers through the dorsum of the kidney and then breaking through the kidney substance from within out as far as the tough capsule. By following this in every direction with one or two fingers, the kidney is soon separated on all sides down to the vessels at the hilum, which are then tied. This is practically the only possible method of enucleation in those instances of sclerosis of the surrounding adipose tissue.

Removal of the Ureter.

About a year ago Dr. Hunner, my associate, reported⁷ thirteen cases of nephroureterectomy, all of which recovered. In four of these the ureter was felt like a whip cord through the vagina, but on removal showed only a chronic ureteritis. I therefore recommend caution in adding the ureteral extirpation to that of the kidney. The cases best adapted to the more radical operation are those with a greatly enlarged, often strictured ureter. In my last case, a man operated upon just before leaving home, I left a large infiltrated ureter to be removed by a subsequent operation, as he could not stand more.

The first patient operated upon by me in 1893, the left kidney being removed and ureter as far as the pelvic floor, is living to-day without any return of the disease. Another operated on in 1895, by removing the left kidney and its ureter by one long incision from loin to pubis, was well eight years later and had borne two children.

I did my first operation, freeing the kidney and the upper part of the ureter by a lumbar incision, and then slipping the kidney under a wide intact bridge of abdominal muscles and extracting it with the rest of the ureter all in one piece through an opening low down on the abdominal wall, May 3rd, 1898. It is a greater pleasure, however, to accord the priority for this advance in our technique to Berlin's great renal surgeon, Israel.

A. Schwyzer⁹ has effected this removal by making a long

incision above to free the kidney and the upper ureter and a vaginal incision to free the lower end of the ureter. When the ureter is entirely free the fingers in the abdominal, and those in the vaginal wound meet and the organ is extracted above.

Nephroureterocystectomy.

One of the most serious local extensions of the disease has, from the first, been deemed an involvement of the vesical walls, and a number of surgeons have considered cases of this character as beyond the pale of radical relief. My own work in some desperate cases has taught me that with careful surgery almost no case is beyond radical relief so long as the disease remains confined to the urinary tract of one side and the bladder; and to this may be added a non-tuberculous pyelitis of the opposite side.

Two of my cases looked exceedingly hopeless and had been given up to die, both were emaciated by months of night vigils, and constant intense suffering with tenesmus, and one did little else than lie moaning like a distressed animal, screaming if she was touched on the vagina, and soaked in her offensive involuntary discharges. The bladder was contracted, ulcerated, bleeding, and uniformly of a deep angry red colour characteristic of an active universal cystitis.

The first step was to relieve the pain, and that was done by making a large vesico-vaginal fistula. Next the tuberculous kidney with its thickened ureter was taken out, then in one case a large part of the bladder was excised, and subsequently another piece was taken out, both times suprapubically, between one-third and a-half in all. The fistula was closed, the bladder was irrigated and distended, and in the latter case the remaining kidney was irrigated. Both recovered over a year ago and are now well women managing their respective households. I cannot insist too strongly on the value of the prolonged bath at an even temperature of 100° F. for hours or all day as devised by Dr. Hunner for these cases, especially if the vagina is patulous.

The steps in these bad cases are the following: (1) Drain a bladder thoroughly; (2) then remove kidney and ureter; (3) use the bath when possible; (4) close the fistula; (5) treat any remaining small patches of the disease with nitrate of silver applied through the open-air speculum; (6) use distension and irrigation treatments; (7) excise any rebellious areas of disease.

As a matter of fact the small patches of cystitis and the little areas of disease around the ureteral orifice are rarely tuberculous, and this is the reason they clear up so readily without further treatment after a nephrectomy.

REFERENCES.

- ¹ *Lehrb. d. path. Anat.*, Wien, 1861, Bd. 3, p. 342; ² *Virchow's Archiv*, Bd. 100; ³ *Centralbl. f. Chir.*, 1890, Bellag, p. 73; ⁴ *Amer. Jour. Urology*, 1904, 1, 50; ⁵ *Lancet*, 1900, 1, 526; ⁶ Ollier, 1883; ⁷ *American Medicine*, April 30th, 1904; ⁸ *St. Paul Med. Jour.*, Jan., 1905.

CONSTRICTION OF THE URETER.

By K. W. MONSARRAT, F.R.C.S.E.,

Surgeon, David Lewis Northern Hospital, Liverpool.

The causes of ureteral constriction may be divided into three classes: The first, congenital anatomical anomalies; the second, morbid affections of the ureteral channel itself; the third, morbid affections which involve the ureter from the outside. The anatomical peculiarities which have been described are: Kinking of the duct over an abnormally situated renal vessel and an oblique or unusually high insertion of the ureter into the renal pelvis, giving rise to physical difficulty in the emptying of the latter. True congenital stricture of the ureter has also been recorded in a few cases. The affections of the canal itself which may cause stricture are: Ureteritis, especially the tuberculous form, injury, and the lesions set up by calculi.

Of the acquired conditions other than those of the canal itself, which may lead to ureteral obstruction, the most common at the upper pole is renal mobility causing kinking of the duct at the lower pole, new growths, and inflammatory processes of the pelvic organs.

Sooner or later obstruction to the passage of urine down the ureter is followed by dilatation of the renal pelvis and of the ureter itself above the obstruction. The degree of this dilatation will depend on the degree of obstruction and the length of time it has been established. The ureter, like other muscular organs, will not undergo dilatation until the resistance to its contractions has passed a certain limit; it will

tolerate a certain degree of resistance for a certain period. That a resistance sufficient to lead to symptoms of ureteral colic may be present without any marked dilatation is shown by one of the cases which I shall relate. Under such circumstances diagnosis may be a matter of considerable difficulty, and the symptoms have been attributed to affections of the uterine appendages, of the intestinal tract, and of the appendix. The first of the three cases which I have to record is instructive chiefly from the point of view of the symptomatology and the diagnosis.

CASE I.

On August 15th, 1902, a young lady, aged 20, was sent to me with the statement that she had had several attacks of appendicitis, and with the request that I would remove her appendix during the period of quiescence which was said to be then present.

History.—In November, 1900, she had her first attack of so-called appendicitis; this came on with great suddenness, while she was in a railway station; she collapsed with very acute pain, referred to the right iliac region. She was taken home in the train and vomited several times on the journey. The same night the pain became more generalized over the abdomen, and during the next three days morphine was administered steadily. At the end of this period there was still some general abdominal pain, worst in the right iliac region; this gradually subsided, and she was soon pronounced convalescent. Since this time, that is to say for about twenty months, she had had a somewhat similar attack about every two months; these had always been attended by constipation and much nausea; the pain was of a sharp burning character. The last attack had occurred a month previous to the time of consultation; she was kept in bed for thirty-six hours, and since this she had never been free from a dull pain in the right iliac region, which was always more pronounced after exercise. The abdomen was normal to inspection and flaccid; palpation showed an area of marked tenderness over an oval area immediately inside the upper third of Poupart's ligament, but there was no increased resistance here. Except for this tenderness, abdominal examination showed nothing abnormal.

On August 21st the appendix was removed; it showed an area of eroded mucous membrane adjacent to the base, but no appearances such as were expected on reference to the history. She returned home at the end of September. During the winter she continued to have dull pains referred to the right iliac region, and either stayed in bed or lay on a couch. In March she had an acute attack; she had just got up out of bed about 5 p.m., when a sudden very acute pain came on below the operation scar and radiating to the front. For 24 hours she had retention of urine; she felt a desire to pass water, but could not. In July I saw her again, with Dr. Tellett of Ramsey. He told me that, although he considered her attack one of cystitis, he had not been able to discover any abnormality in the urine. At this time she was still suffering, and, except for an occasional walk into the garden, was unable to take any exercise. The pain remained localized as before, the only new point being that it occasionally radiated to the right loin. At this time I diagnosed either stone or stricture in the right ureter, and she came over to Liverpool for further treatment. The urine examination at this time showed: Reaction, neutral; specific gravity, 1030. Deposits: Oxalates in abundance, acid phosphate crystals, a few white corpuscles and epithelial cells of transitional type; no albumen, blood, or pus. For three days after her journey she was unable to empty her bladder voluntarily. The average amount of urine passed for ten days before operation on August 5th was 45 oz.

On August 5th I dilated the urethra and passed a ureteral catheter into the right ureter through a Kelly's speculum. I was unable to introduce this further than $\frac{3}{4}$ in. from the orifice, where it met with some resistance. I then opened the abdomen and exposed the right ureter transperitoneally, and making a small longitudinal incision passed a fine flexible bougie downwards. It was arrested about an inch from the bladder, and on exerting some pressure it was felt to be gripped in the channel, and I could pull on the ureter in the same way as one can pull on the urethra with an instrument tightly gripped by a urethral stricture. I was not able, however, to get any instrument available through the constriction. Feeling confident, however, that I could dilate the stricture from the bladder with a suitable instrument, I closed the ureteral incision, brought the peritoneum together across it, and sutured the incision in the abdominal wall in the usual manner.