eyes, there are present the characteristic hurry of circulation, cardiac murmurs, etc., and in other cases again these circulatory phenomena precede the thyroid enlargement.

For the present the exact meaning of tachycardia must remain unsolved, and we may associate it with some other clinical facts, such as persistent elevation of temperature and unexplained continued elevation of arterial tension, the morbid physiology of which is not yet apparent.

The theory of exophthalmic goitre maintained by Moebius, Johnston, Greenfield, Murray, and others, that it is due to an excessive formation and absorption of thyroid secretion and its action on the nerve centres in the medulla, is useful if only as a working hypothesis. This hypothesis has been suggestive of certain measures of treatment that have been devised for exophthalmic goitre, and more successfully for its opposite myxedema. It would appear to be at least approximately true, although probably some central medullary change precedes the thyroid phenomena, and is responsible for them. Some regard the thyroid secretion as modified and having toxic effects. It is based upon certain very definite observations, namely:

1. That no definite lesion of nerve centres has been found.
2. That the thyroid is the organ more obviously affected than any other.
3. That its structure is altered in the direction of hypertrophy and over-activity of function, and possibly there may be some alteration in the quality of the secretion (Moebius, Murray, Jeffrey).
4. The symptoms tachycardia, nervous irritability, insomnia, and vibratile contraction of voluntary muscles, are the reverse of the bradycardia, torpidity and impaired reflexes characteristic of myxedema, consequent upon atrophy or excision of the thyroid.
5. Whilst moderate doses of thyroid extract will cure or keep in abeyance the phenomena of myxedema, an overdose of the extract will produce symptoms resembling those of exophthalmic goitre.

There has as yet been found no direct means of treating simple tachycardia successfully. The digitalis class of drugs are useless in this, as in almost all cardiac neuroses, except, and the exception is important, in the treatment of the heart fatigue which sooner or later ensues as a consequence of the functional strain upon the organ. Tachycardia in its various grades is, however, often but a symptom, a prominent expression, of a neuropathic state which requires to be approached for treatment from many sides.

In exophthalmic goitre again, having made the diagnosis, the physician has to deliver himself of the somewhat magisterial sentence "imprisonment for six months and under surveillance for from two to five years." The rest for the first six months should be absolute on bed sofa, or on a couch in the open air, with the utmost avoidance of all excitement and mental fatigue. The patient can then be promoted to bath chair exercise, quiet walking and driving, or more scientifically graduated exercises, and in the course of time recovers. The general well-being of the patient can be maintained, and the more distressing local and general symptoms relieved or removed by cold applications to the throat, sedatives of the bromide and valerian order, arsenical and sometimes iron tonics; digitalis and the like drugs may be given on the appearance of heart fatigue, indicated by the signs of dilatation and a pulse irregular in time and force. In the treatment of the tachycardia, apart from heart strain, digitalis is of little value. The use of thymus extract is, in my experience, of some value in diminishing the rapidity of the pulse; the galvanic current has been found useful in some cases. Theoretically, the Nauheim brine baths should be useful, but practically I have seen no good from them, at least in the more acute stages. The treatment of constipation and proper dietetic support are all matters of great importance under the enforced quietude of the patient.

Operative treatment, by partial extirpation of the thyroid gland has been rather extensively tried, as has also section or partial resection of the sympathetic nerve in the neck. Mr. Treves has recently given some instructive illustrations of the fact that any surgical operation will in a certain proportion of instances, in some manner unknown, modify, perhaps even cure, a pure neurosis. The partial removal of the thyroid gland in the acute stage of the disease is attended with very considerable danger and only very inadequate success.

The best cases were those of Paul of Liverpool, but of his six cases recorded in the BRITISH MEDICAL JOURNAL for 1897, all except one were of more than two years' standing. Abadie and Faure (*Prog. Medical*, 1897) have had successes from section or ablation of the cervical sympathetic, but, of Faure's three cases, one was of twelve years' standing,

and in the others the duration is not stated. Doubtless the section of the sympathetic will slow the heart, but it has not yet been satisfactorily shown to influence the disease, and one would regard with some misgivings the future of a heart deprived of due sympathetic innervation, whilst it is clinically remarkable how well the heart comes out of the long struggle, but little damaged when the patient has been carefully steered through by judicious handling. It sometimes happens that a disfiguring enlargement or a more serious distortion of the thyroid remains after the tachycardial symptoms have subsided, and in one instance I have seen this condition dealt with very successfully by removal.

BRADYCARDIA.

One form of bradycardia is that which sometimes follows upon the rapid heart of exophthalmic goitre. It is very commonly associated with well-marked myxedema, and may continue notwithstanding that the disease has been cured or held in check by thyroid treatment. I have seen it in epileptics, in which case the rhythm is not only slow, but generally irregular. As a temporary condition bradycardia is not infrequently met with as a sequel to influenza, and also in association with the stage of depressed temperature that frequently follows upon other fevers. In the influenzal cases that I have seen it has been associated with a very high density of urine with great surcharge of urea, as though there had been some previous accumulation, the urine becoming solid with crystals on the addition of cold nitric acid. Spurious anginal seizures are sometimes observed under these circumstances, but I have never known them to prove fatal, although of course in the presence of any previous heart disease they might readily prove so.

Chronic high arterial tension is generally associated with a slow, sometimes a very slow, pulse, whereas in acutely raised tension the heart's action is, as I have pointed out, generally quickened.

In chronic bradycardia, a condition that tends to remain permanent, and does not necessarily shorten life, an occasional twenty-four hours' rest in bed should be enjoined, and for mental work the recumbent posture should be preferred. In cases of a more temporary kind the combination of strychnine with an alkali or iodide of potassium (the two drugs being kept in separate bottles, and only mixed at the time of taking) is a very useful one. Caffeine is also very useful, especially where the urine is scanty. A five minutes' whiff of oxygen three or four times in the twenty-four hours is a valuable cardiac stimulant. In cases of myxedema thyroid extract will be given, but it is not wise to push it to the production of any excitement of circulation.

THE HUNTERIAN LECTURES

ON THE

SURGERY OF THE KIDNEY.

Delivered at the Royal College of Surgeons of England,

By HENRY MORRIS, F.R.C.S.,

Surgeon to the Middlesex Hospital.

LECTURE I.

ON THE ORIGIN AND PROGRESS OF RENAL SURGERY AND THE CONSERVATIVE TENDENCY OF ITS RECENT DEVELOPMENT.

MR. PRESIDENT AND GENTLEMEN,—In selecting the subject for the lectures, which by the grace of the Council I am about to deliver, I was influenced by the fact that "renal surgery," though it has attracted a good deal of attention amongst surgeons during the last twenty years, has not yet received the general recognition by the profession at large to which it is entitled, nor has it hitherto been the theme of any Hunterian professor.

I propose in this lecture to describe briefly the origin, and then to trace the progress, of this quite modern branch of surgery.

HISTORY.

In the sixteenth, seventeenth, and eighteenth centuries the practicability of nephrotomy was repeatedly discussed by Camerarius and François Rousset in 1581; by Shenck in 1584; by Jean Duclédat and Cousinot in 1622; by Riolan also in the early part of the seventeenth century; by Von Hilden in 1646; then a century later by de Lafitte in 1753, Borden in

1754, MM. Hévin and Ledran in 1757; and later still, namely, in 1829, it found a very ardent supporter in P. N. Gerdy,¹ the professor of anatomy and surgery in Paris, who, in a footnote to his lectures on anatomy to artists, refers at considerable length to the subject in all its aspects.

Various physiological experiments upon animals to show that life could be well maintained after removing one of the kidneys were undertaken by Zambecarius² about the year 1670, and Roonhuyzen³ in 1672.

Blancard⁴ in 1690 expressed the opinion that extirpation of the kidney would give a fair prospect of success in patients suffering from renal calculi, and who could not obtain relief from any other treatment.

In the first years of the nineteenth century (1803) Comhaire⁵ was repeating the experiments of Zambecarius with the object of proving that nephrectomy was possible.

Renal incisions are said to have been practised by Cossé,⁶ by Jean Beverovicus and others, upon kidneys greatly distended with pus. The cases of the archer of Meudon, of the British consul at Venice, and others, which had found their way into surgical literature, may be dismissed in the words of M. Hévin,⁷ who wrote in the year 1757, "it is very doubtful, if not absolutely improbable, that cutting into the kidney had ever been practised without the operation having been determined by an abscess swelling; or by a fistula due to renal abscess which had broken and discharged in the lumbar region."

None of these cases had any influence in encouraging surgeons to operate upon the kidney, and no surgical treatment for any kind of renal disease was systematically employed until the second half of the present century had well advanced. As M. Le Dentu has said, it needed more than a century to overcome the interdiction of Hévin against incising the sound kidney, an interdiction which seemed to carry with it the force of the law.

Nor can we regard the cases of unintentional excision of the kidney (that is, diseased kidneys removed on a wrong diagnosis and in ignorance of the nature of the tumour operated upon) as assisting in establishing nephrectomy as a recognised surgical procedure.

At least four of such mistaken operations had been performed before Simon's first nephrectomy; these were by Wolcott in 1861, Spiegelberg in 1867, Schnettelig,⁸ and Peaslee in 1868.

All were followed by fatal results, and for this reason would not have been encouraging to Simon, even if he had known of them, which intrinsically it is not probable he did.

NEPHRECTOMY.

The dawn of renal surgery admittedly dates from August 2nd, 1869, when Gustav Simon, of Heidelberg, removed by the lumbar method the kidney of a woman who had a ureteral fistula opening upon the abdominal wall above the pubes, and following on ovariectomy done one year and a-half before. Simon performed his operation in face of the pronouncement long before made by Rayer that it was "madness to dream of extirpating a kidney in the human subject." He no doubt was aware of the experimental results of Prévost and Dumas (1823), of Claude Bernard, Rayer, Meissner, and Shephard, all of whom established the fact that animals could live with only one kidney. For himself, he compared the result of fifteen hysterectomies with fifteen nephrectomies, practised on animals, and was satisfied that there was no more danger from a surgical point of view in the one operation than in the other; and at the same time he convinced himself that the physiological changes effected by the kidneys could be amply performed by one after the ablation of the other organ. The cynic might remark that the same fact had been demonstrated over and over again in the *post mortem* room in the bodies of persons who had lived with one kidney, the other having been absent or long ago atrophied; but that is not the same fact. What was wanted was the assurance that one kidney could do the work of both, after the shock of so severe an operation as nephrectomy.

These experiments on animals led Simon to resort to nephrectomy in the human subject, and the result of his first operation upon women justified his deductions drawn from experiments on animals.

✓ Rather more than a year after Simon's case, Gilmore, in

America, followed (December, 1870) with a very successful nephrectomy for a painful, shrunken, fibrous kidney in a woman five months pregnant, and who recovered without a miscarriage. After this came Simon's second operation, performed in August, 1871, for calculous pyelitis, but the patient died of pyæmia on the twenty-first day.

Then came two fatal operations, one for painful kidney by Durham, and the other for calculous pyelitis by Peters, of New York, both in 1872. Next, two successful ones for injuries by Brandt in 1873, and Marvaud in 1875. Next, four operations for malignant disease, two successful, namely, one by Langenbuch in 1875, and one by Jessop of Leeds, in 1877; and two fatal, both by Kocher, in 1876 and 1877. In 1878 Martin followed with four successful nephrectomies for painful floating kidneys, and thus confirmed Simon's first experience and Brandt's result, namely, that a quite healthy kidney might safely be removed.

In England the first nephrectomy was performed by Arthur E. Durham on May 14th, 1872. The next, that just referred to, by Jessop, and the third by Barker.

Barker, who had made himself thoroughly familiar with Simon's work, read two important papers before the Royal Medical and Chirurgical Society; one in March, 1880, the other in April, 1881. He therein tabulated all the nephrectomies done up to those dates, and thus brought the whole subject of extirpation of the kidney before the notice of British surgeons, who till then, for the most part, were quite unfamiliar with it.

In France, where the earliest and most ardent advocates of nephrotomy had lived, nephrectomy was for several years either neglected or opposed. It was not until May 20th, 1880, nearly eleven years after Simon's successful initiative, that M. Léon Le Fort practised the first nephrectomy done in France. This was performed on account of a very rare form of injury—namely, a penetrating wound by a knife, which completely divided the ureter.

NEPHROTOMY.

Nephrotomy is the operation which had received most consideration in past times, especially in its bearing on the treatment of renal calculus disorders; but it was not, in all probability, ever systematically put into practice until 1870. Previous to 1870 fluid swellings, believed to be of the kidney, had been punctured, and opened by the thermo-cautery; and perinephric abscesses had been incised through the loin.

On April 27th, 1869, three months before Gustav Simon's first nephrectomy, a paper was read by Mr. (now Sir) Thomas Smith, describing a method for exposing the kidney through the loin. This he recommended for diagnostic purposes, and for the extraction of a calculus, if of suitable size and shape, and capable of removal through the renal pelvis; but not if fixed in the substance of the kidney, or if its removal entailed cutting into the normal secreting structure. Though the author had no actual case of his own to record, and advocated nothing more than had been recommended on several occasions during the two preceding centuries, there can, I think, be little doubt that his paper, coming when it did, influenced the minds of surgeons to a degree which previous similar suggestions had failed to do. In July of the same year (1869) Annandale, and in January, 1870, Spencer Wells,⁹ also wrote advocating nephrotomy in some cases of renal calculus. These articles, together with Simon's success, were all factors leading up to the application of nephrotomy to a class of case for which no one had as yet, so far as our absolute knowledge goes, suggested it—namely, for cases of renal calculus in a kidney otherwise normal.

In 1870 Bryant performed nephrotomy for tuberculous pyonephrosis, but at too late a stage to save his patient, and in the same year Gunn and Durham each cut down upon the kidney; and Lente and Barbour each cut into the kidney with the object of removing calculi, but none were found. All four patients recovered.

During the next ten years, 1870-80, nephrotomy was done in some half-dozen cases—according to Dickinson's tables—in each of which there was a large pyonephrosis, more or less pointing at the loin, and in four of these calculi were extracted.

NEPHROLITHOTOMY.

No further advance, however, was made in the operative

treatment of renal disorders till February 11th, 1880, when I successfully removed a mulberry calculus weighing 31 gr. from the undistended, and to the naked eye quite normal, kidney of a young woman. The kidney was exposed through an oblique lumbar incision, and the stone reached and removed through the renal parenchyma.

At that time I was unfamiliar with the attempts of other surgeons except Durham, whose exploration of the kidney, however, was not a nephrotomy at all. Nor did I then know that the name "nephrolithotomy" which I suggested for the operation I had performed had been used by Hévin more than a hundred and twenty years previously. I was led to undertake the operation in this particular case by the extreme severity and persistency of the symptoms, and by the little fear I felt about hæmorrhage from the cut renal parenchyma, on account of my previous experience of the trivial and easily-controlled bleeding from the cut surface of the liver in operating for hydatid tumours.

This case demonstrated for the first time that a stone could be removed safely by cutting freely upon it through a thick layer of renal tissue. It thus became the starting point of both the development and the conservatism of renal surgery, which I am persuaded will become more and more conservative in the future.

The second nephrolithotomy was performed in August, 1881, by the late Mr. Marcus Beck, who removed a calculus composed of uric acid and phosphates weighing 26 gr. through an incision in the renal substance. Then followed cases by Mr. Butlin, who extracted an oxalate of lime calculus weighing 60 gr. by scratching through the renal pelvis; by Mr. Bennett May; by myself and other surgeons; and in the list of my operations for removal of renal calculus by nephrolithotomy I am able to show 34 operations, with recovery in 33 and death in 1 of the cases. These results disprove the supposed dangers of nephrolithotomy, and show the invalidity of the objections which in all previous times had been urged against the proposal to operate upon a kidney not already converted into a mere abscess sac.

NEPHROPEXY.

Fourteen months after the first nephrolithotomy Hahn of Berlin introduced an operation at first called "nephrorrhaphy" and afterwards by the French writers "nephropexy," for fixing movable kidneys. This consisted in an incision alongside the sacro-lumbalis muscle (such as the old writers advised for nephrotomy and Simon had employed for nephrectomy) from the twelfth rib to the crest of the ilium; the quadratus lumborum was cut, and the fibro-fatty capsule of the kidney opened along the outer border of the kidney; the fibro-fatty capsule was separated to some extent from the kidney and dragged forcibly backwards into the wound along with it. By means of six or eight catgut sutures this capsule was stitched into the wound and the wound itself plugged with carbolic gauze.

In his account, published in July, 1881, Hahn describes two cases thus operated upon by himself in April of that year. The patients were both women, and recovered in four weeks with the kidneys as securely fixed in their attached position as immediately after the operation.

This was an important advance, because it at once had the effect of putting a stop to nephrectomy for movable kidney which had been recommended and practised by Martin of Berlin in 1878. The importance of this step was indeed great, for it not only brought about the substitution of a safe operation for one which, at that time especially, was attended with a very high mortality, but it also saved healthy organs from being needlessly excised, and was applicable to kidneys of the same person when both were movable and required fixing.

But Hahn's method had this drawback, that it was not always or permanently efficacious; whereas, of course, nephrectomy, though only capable of being employed for one kidney, could not be followed by a return of symptoms.

The principle of Hahn's operation was perfect; what was wanted was the improvement of the technique. In my own practice I followed Hahn's method in two or three instances, except that my lumbar incision was an oblique instead of a vertical one, and that I shortened the fibro-fatty capsule by trimming off more or less of it before inserting the sutures.

But I never felt confidence in this mode of fixation, and preferred to attach the kidney itself to the cut edges of the transversalis fascia and the aponeurosis of the transversalis muscle by means of three sutures dipped deeply into the posterior surface of the organ and running for from three-quarters of an inch to an inch in its substance. I have used various materials for sutures—stout catgut, kangaroo tendon, and silk, but now always employ silk. The accompanying figure (Fig. 1) will explain my method of inserting the sutures.

Fig. 1.—Mr. Morris's method of fixing the kidney.

The results obtained have in most of the cases been perfectly satisfactory, and I see from time to time patients upon whom I operated nine or ten years ago with their kidneys as firmly fixed as can be desired, and who have been quite free from their former symptoms ever since the operation. Moreover, I have had the opportunity of witnessing in the living bodies of some three or four of my patients the sound and complete holdfast which this method affords. It has a few times happened to me from six to twelve months or longer after fixing a hydronephrotic as well as after fixing the healthy kidney, to have to do a second operation for quite different reasons upon the same organ; and I have then seen my sutures imbedded in a mass of tough fibrous tissue, and have had to pull or cut them out from the renal parenchyma before I could detach the kidney. Here they had for months harmlessly remained without showing the least tendency to become the nuclei of calculi, as some surgeons anticipated would be the case.

M. Tuffier, of Paris, whose admirable experimental work, published in 1889, on this and other branches of renal and urethral surgery is well known, is of opinion that the parenchyma, where the sutures constrict it, becomes sclerosed and atrophied. This condition did not appear to have been caused in the kidneys of the cases just referred to; but even if it had been, the amount of the kidney tissue so affected would be small, and could easily be spared without danger to the individual. Moreover, it would be less extensive than the superficial sclerosis which follows the plan M. Tuffier himself advocates.

Tuffier, believing that the proper capsule of the kidney—smooth, thin, little resisting, avascular, and fibrous as it is—prevents the kidney from forming firm adhesions with the tissues and organs around it, recommends its partial decortication, and the suturing of the tunica propria to the edges of the parietal wound. This done, he thinks the parenchyma does not fail to attach itself firmly to the neighbouring tissue by the whole of the exposed area. Tuffier's illustrations [diagrams were shown] show two different ways by which this can be accomplished. Various modifications of Tuffier's method have been practised by different surgeons, but the principle of them all is to obtain direct adhesion between the bared parenchyma and the deep tissues of the abdominal

wall; whether the capsule is detached in small squares, or in one large piece, or in many triangular slips or is merely scarified.

A fourth method has more recently been suggested by M. Vulliet, of Geneva, and was first tried by his friend Pouillet, of Lyons. It consists in making use of a long slender slip of the tendon of the erector spinæ of the patient as the means of fixation of the kidney. After exposing and freeing the kidney in the usual manner, a separate short vertical incision, parallel with the spinous process of the first lumbar vertebra, is made through skin and fascia, and a tape-like slip of the tendon, about ten inches long and a quarter of an inch wide, is detached and pulled out through this little wound, but still left attached by its lower end to the muscle. This tendinous slip is to be the suture and is passed through the muscular tissue, and having been made to under-run the capsule of the kidney, is then passed back again and fixed to the erector spinæ muscle. This is shown in the accompanying figure (Fig. 2).

Fig. 2.—Vulliet's method of fixing kidney.

I have in some cases practised Tuffier's and, in others Vulliet's method, but have found it requisite to modify the latter, because in many cases too short a length of the tendon is torn out. I will not stop to describe the modification I have adopted, and will merely say that I prefer Vulliet's method to Tuffier's, but that neither is so simple, or so rapidly done, or more efficacious than my own.

PARTIAL EXCISIONS.

Another most important advance in the conservatism of the surgery of the kidney is the excision of diseased portions of the organ in place of nephrectomy. This step was a natural result of the establishment of nephrolithotomy as a sound surgical procedure. The fear of uncontrollable bleeding during the operation, and the doubts as to the healing power of a kidney when cut into or otherwise wounded being once removed, the attempt to save the greater part of the organ, when only a small portion was diseased or injured, was bound to be made.

Tuffier's experiments on animals in 1888, and Barth's histological researches, supply ample proofs of the healing power of the kidney, and of the process by which healing is accomplished, even after extirpation of considerable portions.¹⁰ Paoli of Perugia performed extraperitoneal operations for resection of the kidney upon twenty-five dogs, cats, and rabbits, with perfect recovery, and published his results in 1890.

But such experiments were not required to convince us that wounds of the human kidney readily heal. In 1883 and 1884 I collected for my work on diseases of the kidney a number of cases proving the cicatrising capacity of the human kidney after incised, punctured, lacerated, and also gunshot wounds. Such cases, known long before the days of

renal operations, might have given surgeons faith in the reparative power of renal wounds of their own making, but it has been only by slow degrees, and quite recently, that they have become convinced that a free incision or a partial excision may be made without fear of dangerous bleeding on the one hand, and of a urinary fistula following the operation on the other hand.

In 1890 I had the opportunity of examining a kidney which I had freely incised for exploratory purposes a month before, and which was removed from the body of a patient who died from hæmorrhage from a gastric ulcer. A linear scar extending through the cortex to the renal pelvis was the only evidence in the organ that an operation had been performed upon it. The kidney otherwise had the appearance of being perfectly healthy.

Up to the present time partial excision or resection has been very rarely performed; and surgeons, whether aware of the results of such experiments as Tuffier's and others or not, seem to hesitate to apply the method to man.

An excellent epitome of the work hitherto done in this direction is contained in a paper read before the British Medical Association at Carlisle in 1896 by Oscar Bloch, of Copenhagen. He therein reports a case in which he removed in September, 1895, half the kidney affected by a new growth, and gives abstracts of 10 cases which he collected from German and French sources. The first partial excision was by Czerny in November, 1887, for an angio-sarcoma following injury. Tuffier has operated in 3 cases; in his first case, which was done in 1889, he cut out a fistulous canal and sutured the cut surfaces of the kidney together; the wound healed by first intention. Kümmell has operated also in 3 cases, Bardenheuer in 2, and Waitz in 1.

Three out of the 11 operations were for cysts, of which 1 was hydatid, 3 were for calculous pyonephritis, 2 were for new growths, and 1 each for puerperal pyonephritis, renal fistula, and a patch of interstitial nephritis mistaken for malignant growth. Not one of these 11 patients died from the operation; 9 of them made good recoveries therefrom, 1 subsequently required nephrectomy, and in 1 a fistula resulted.

Bloch makes no mention of any English or American cases. My own personal experience of resection commenced in November, 1890, when, in drawing out a kidney of a young man, aged 24, which I was exploring for calculus, several abscesses were seen in the cortex, which I opened, and evacuated, and scraped. The kidney was replaced and the loin wound closed, but a week later I had to remove the whole kidney on account of acute general pyonephritis. The man quite recovered after a long convalescence, and is well and leading an active life to-day.

In April, 1892,¹¹ I scraped out six tuberculous, breaking-down caseous masses in the kidney of a man aged 28, which I was exploring for calculus. The raw surfaces of the kidney from which these deposits were removed were treated freely with iodoform emulsion; the kidney was then put back into position, and the lumbar wound closed. An excellent recovery followed, but some two years afterwards he returned with tuberculous disease of one of the testes, but no further trouble in the kidney; the testicle also was treated by incision and erosion, and he again recovered.

In a third case, that of a female aged 28, whose left kidney I was exploring for stone, on January 2nd, 1895, I found three areas of grouped miliary tubercles at different points of the kidney. I removed them by excising three wedges of the renal parenchyma, and in so doing opened up the calyces. At one of these wounds I shaved off layer after layer till I reached healthy tissue. The cut surfaces were sutured with catgut, three sutures in each wound. The kidney was then replaced, and the parietal wound closed. After the operation blood was passed with the urine for three days. The patient made a rapid recovery, and left the home without a sinus on January 16th, 1895. In March, 1897, two years and two months afterwards, her husband wrote stating that she had steadily improved in health since the operation, and was then well.

In three other cases I have done similar operations on women. In one of them quite a third of the kidney was removed for tuberculous disease. All recovered from the operations. One is believed to be alive and well now. One from whose right kidney I excised a cyst and a tuberculous

abscess, lived three years afterwards without a fistula or any return of trouble in the kidney (see Table VII, No. 14), and died of an acute attack of broncho-pneumonia in 1897. The third, from whose left kidney I removed quite a considerable portion for tuberculous disease, recovered without a fistula, but seven months afterwards an abscess formed in the iliac fossa of the same side, and opened at the scar. The kidney and a great part of the ureter were subsequently removed, as it was thought they were the cause of the abscess, but it was not so, although the kidney was considerably diseased (see Table VII, Nos. 22 and 28). She subsequently had severe hæmoptysis, and died of tuberculous disease of the lung and peritoneum, and a tuberculous ulcer in the bladder.

[The tables referred to were distributed among the audience. They include 267 cases, arranged according to their nature, operated on by Mr. Morris.]

Partial resections are capable of a wider application than has yet been given to the operation, especially in the case of tumours taking origin from the renal capsule, and those which, though originating in the perinephric tissue, grow into, and partially destroy the kidney itself.

In an operation upon an elderly woman in 1896 I endeavoured to save the kidney when removing a large perinephric fibrolipoma, but in the course of the operation I found it impossible to do so. If in future such tumours are operated upon before they attain so large a size as practically to destroy or surround the kidney, there is no reason why they should not be removed without interfering with the kidney, or at any rate without excising more than a small portion of it.

Besides the cysts which project from the parenchyma and the morbid conditions of the cortex which have been referred to, it is reasonable to anticipate that innocent tumours, such as villous papilloma, will be successfully removed from the renal pelvis without sacrificing the whole organ by nephrectomy. Bardenheuer and, in this country, E. Owen and Keetley, acting on the same conservative principle, have treated cases of accidental injuries of the kidneys by taking away a portion and leaving the bulk of the organ.

OPERATIONS ON THE URETER.

Operations upon the ureter are an advance of the last few years, but not many have been recorded up to the present time. They are of very considerable importance because of the influence they are having, and are destined to have, upon renal surgery generally.

Ureterotomy has been employed in the treatment of hydronephrosis, calculus, and calculous anuria. Ureterectomy will improve the results of operations for advanced tuberculous disease descending from the kidney, and also of those performed for calculous pyonephrosis complicated with suppurative ureteritis. Ureteral anastomosis and other plastic operations on the ureter will save many kidneys which would formerly have been nephrectomised on account of hydronephrosis, fistulæ, and surgical injuries of the ureter.

It is of interest to note that ureterotomy, like nephrotomy and nephrolithotomy, was suggested many years before it was put into practice. The first allusion to it which I have met with is in Velpeau's *Surgery* (edition 1851, p. 1021). Velpeau mentions it in connection with an account of a case under his own care, in which a calculus the size of a nut and having a pin in its centre, was impacted in the right ureter three inches below the kidney. The posterior wall of the ureter was perforated at the level of the calculus, and there was (periureteral) suppuration in the retroperitoneal tissue, extending from the kidney to the floor of the pelvis. Velpeau satisfied himself upon the dead body that this stone might have been readily extracted by the flank on the same side.

In 1856 a remarkable series of articles was published by Dr. C. Gigon of Angoulême,¹² in which he suggested opening the ureter with the object of establishing an artificial passage for the escape of the obstructed urine in a case of calculous anuria. He called the operation he proposed ureterotomy, investigated the anatomical causes which determine the impaction of calculus in the ureter, gave an excellent description of the normal anatomy, and figured the natural dilata-tions and contractions in the lumen of the ureter. He pointed out the intimate relation of the ureter with the peritoneum, and that it is the peritoneum which maintains the ureter in

contact with the psoas magnus. This led him to explain the rationale of enforced walking exercise upon a calculus impacted in the ureter; the contraction of the fibres of the psoas, he thought, communicated to the ureter a sort of peristaltic action which made the stone descend towards the bladder.

He gave an explanation based on his anatomical knowledge, and upon a *post mortem* examination of a case in which he found a movable right kidney opposite the third and fourth lumbar vertebræ, of the occurrence of hydronephrosis in association with movable kidney. This, be it observed, was forty-two years before the same explanation was credited to Landau, Terrier, and Baudoin respectively. He attributed it to kinking of the ureter, which, fixed by the peritoneum, cannot follow the kidney in its displacements, and thus causes it to form a curve with the convexity upwards, all the more pronounced as the kidney gets lower and lower. The result of this curvature, he thought, was to obstruct the urine, or even to render its flow impossible. Finally, he described the operations of ureterotomy and lumbar ureterostomy precisely as they are now performed. Gigon thought that the obstruction to the free flow of urine due to the kinking of the ureter was a predisposing cause of stone in movable kidneys. In support of this view, I may say that I have seen several instances of very movable kidneys which contained calculi, as well as cases in which the kidneys have been greatly disorganised from stone, and the ureters stric-tured or of very small size, and thus giving rise to more or less obstruction. Fig. 3 is an illustration of a small ureter and a stone impacted immediately above it.

Fig. 3.—Small ureter, with slight contractions of its lumen. A stone plugs the infundibulum, and the kidney is completely disorganised. (Author's case.)

Ureterotomy for Calculus.—In 1879, Thomas Addis Emmet, of New York¹³ stated that in three cases he had met with stones obstructing the vesical end of the ureters. In one he removed the stone through the bladder by means of curette forceps after opening the bladder. In the second case he removed a stone weighing 93 gr. by cutting upon it through the vaginal wall without having opened either the

bladder or the peritoneum, and he closed the opening with interrupted sutures. His third case does not seem to have been operated upon.

It was not until the year after Hahn's first nephrorrhaphy that ureteral surgery fairly commenced. In 1882 Bardenheuer performed ureterotomy for calculous anuria, removed four stones, one of which was impacted in the upper end of the ureter, and closed the ureteral incision by sutures. In Bardenheuer's case the urine did not find its way subsequently into the bladder, so he divided the ureter and established a lumbar ureterostomy.

In 1884 I published a paper advocating the extraction of calculi impacted in the intravesical portion of the ureter through the bladder by opening the bladder through the perineum of the male, and by dilating the urethra of the female; and I suggested that this might be found useful in cases of calculous anuria, and might obviate the performance of nephrectomy in certain cases of calculous hydronephrosis. I therein related a case of calculous anuria, in which, by scratching through the margin of the vesical orifice of the ureter with my fingernail, I tried to get a calculus into the bladder and thence remove it through the urethra.

In 1885 Cullingworth removed a calculus from the lower end of the ureter of a woman by abdominal section. In this case stones could be felt *per vaginam* in both ureters. The operation was designed and undertaken for abdominal nephrectomy. The right kidney formed a large tumour, but a stone being found in the right ureter this was removed instead. Death followed from uræmia.

In 1887 Ceci¹⁴ removed seven calculi from the lower end of the ureter by an incision through the rectum. The patient, however, died.

In and since 1887 ureterotomy was performed for the extraction of calculi impacted in different parts of the ureter by means of a retroperitoneal operation in the lumbar or inguolumbar region, by Godlee in 1887, by Kirkham and Torrey in 1889, by Twynam in 1890, and by several other surgeons since.

Ureterotomy for Stricture and Valvular Obstruction.—Another application of ureterotomy is in cases of ureteral stenoses. Simon in 1876 was the first to give theoretical directions for this operation. I do not know that he ever performed it. Trendelenburg in 1890 was, I believe, the first to make the attempt.

In 1892 Fenger, of Chicago, performed the first successful ureterotomy for a valvular obstruction of the ureter. The patient was a woman aged 28, with intermittent hydronephrosis in a floating kidney. He explored the dilated renal calyces for stone through an incision in the convex border of the kidney. No stone was present. As he could not catheterise the ureter through this incision, he made a small opening in the posterior wall of the infundibulum, and found a valvular obstruction at the top of the ureter where it joined the renal pelvis. The valve was divided, and the ends of the incision were united by a suture. A bougie, now passed through the wound in the parenchyma, was retained in the ureter for two days. The wound in the renal pelvis was closed by sutures. The floating kidney was fixed. The patient recovered without fistula, and subsequently had no return of hydronephrosis.

On November 26th of the same year (1892) Fenger operated upon a man aged 47 for intermittent hydronephrosis of twenty years' duration, due to a stricture of the ureter close to its junction with the infundibulum.

The stricture was produced by an injury when the patient was 13 years old by his jumping from the back of a horse.

The kidney and upper end of the ureter were exposed through the lumbar incision. The upper end of the ureter for half an inch was found imbedded in cicatricial tissue; below this the ureter was normal. A longitudinal incision, a centimetre long, was made into the ureter just below the cicatrix, and the strictured part of the tube was divided from below upwards to the renal pelvis. The ends of the incision in the ureter were stitched together by the Heineke-Mikulicz manner for closing the pylorus after division for stenosis.

The next successful operation of this sort was performed by Herman Mynter of Buffalo, on August 14th, 1893. The patient was a man, aged 25, who for twelve years had suffered

from painful intermittent hydronephrosis, due to a valvular obstruction at the upper extremity of the ureter. Calculus was diagnosed as the cause of the obstruction, but no stone was found. On exposing the kidney and upper part of the ureter through the "usual oblique incision" in the loin, a valve formation at the junction of the ureter and renal pelvis, and a hydronephrotic distension of the infundibulum of the size of an orange, were discovered. An incision an inch long was made into the lower part of this swelling, and about half a pint of pale limpid urine evacuated. Through this opening in the infundibulum the kidney and ureter were explored. The incision was then prolonged downwards through the valvular stricture, the lateral margins of the wound were pulled apart, and the ends united by numerous fine silk sutures, avoiding the mucous membrane. After the wound was sutured, the opening into the urethra from the renal pelvis was somewhat funnel shaped. The patient recovered without a fistula, and remained well subsequently.

I have recently done a similar operation on a female patient, aged 29, who for four or five months has had intermittent periods of aching or discomfort in the right kidney, which was very movable, associated with very frequent micturition, sometimes almost amounting to incontinence. At these times the urine became very thick and offensive; and at other times there was pus in small, but distinct, quantity in the urine. There was marked tenderness on bimanual examination, so that renal calculus was suspected.

Fig. 4.—Pelvis of the kidney and upper end of ureter, showing the stricture at their junction. A probe has been passed along the ureter through an opening in the infundibulum (Author's case). (Diagrammatic).

Twelve months before her symptoms began she was thrown from a horse on to a heap of stones and a good deal shaken. Possibly this had some influence in causing the condition found at the operation. After consulting with Sir William Roberts and Dr. Cullingworth it was decided that the kidney should be explored and fixed; and Dr. Cullingworth and Mr. Burghard were present at the operation. Through a lumbar incision the upper end of the kidney was seen to be firmly bound down by tough fibrous adhesions, almost as hard as cartilage. In the contraction of these adhesions the kidney had become slewed round, so that its upper end had been drawn lower than the lower pole of the organ, and the front surface came to look backwards. At least this was the explanation of the abnormal position which suggested itself during the operation. The pelvis of the kidney was distended to the size of a tennis ball, and the ureter, which joined the infundibulum at its lower point as normally, was so constricted as barely to admit the smallest

urethral catheter. The kidney was incised along the convex border and thoroughly explored for stone. None was present, but the calyces were found slightly sacculated. The constricted orifice of the ureter was longitudinally divided upon the catheter, which was passed from a small opening in the infundibulum through the stricture to the bladder, and the ends of the incision were drawn together, by the Heineke-Mikulicz method, by means of two fine silk sutures, passed after the manner of Lembert (see Figs. 4 and 5). The wound

Fig. 5.—Manner of suturing after division of the stricture. The side view shows a great exaggeration of the pucker produced by tightening the sutures. (Diagrammatic).

of the renal parenchyma was sutured with silk. Nephropexy was then performed by Vuillet's plan. The wound healed entirely by first intention, and there has been no return since of the symptoms which led to the operation.

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(To be continued.)

NOTES OF A CASE OF PERFORATING GASTRIC ULCER: OPERATION AND RECOVERY.

By RAYMOND SHAW, M.S., M.B.(DUNELM),
Great Yarmouth.

Miss H., aged 20, an assistant in a shop, had been suffering from gastric ulcer since September, 1896, and had at intervals been under medical treatment. On June 24th, 1897, she was in the shop as usual, but was in great pain all day. Nevertheless her food on that day included rhubarb, strawberries, tomatoes, bread and butter, with tea. About 9 P.M., some four hours after tea, she suddenly felt acute pain in the stomach, rapidly spreading over the whole abdomen, but managed to walk home, a distance of two or three hundred yards, preferring that method to the jolting of a cab.

I saw her at 11 P.M., when it was evident that perforation had occurred. The pulse was 120, temperature 100°, liver dulness was still present, and there was no distension. The belly was too tender to elicit the presence of fluid. Consent

was only obtained for operation in the morning, so she was put under morphine, and dry heat applied. Next day her condition was much more grave, but at 9 A.M., with the help of Dr. Ryley and Mr. Blake, I operated.

An incision, above the umbilicus, in the middle line was made, 4 inches in extent, and immediately the peritoneum was opened, signs of the lesion were evident. Gas and fluid escaped, and large flakes of lymph were found, especially between the stomach and liver. The stomach was somewhat contracted, but not empty, and when drawn into the wound the ulcer was easily detected on the anterior wall, near the pyloric end. The edges were thin, ragged, and undermined, without evident induration; there was no large aperture, and evidently some slight attempt at repair had taken place, although the gentlest handling caused more of the contents of the stomach to escape. The ulcer was closed by a double row of Lembert's sutures, and, to afford further security, a portion of omentum was also fixed over the weak spot. The lymph was removed by careful sponging, an incision made below the umbilicus, and the abdomen washed out with hot boiled water. It was necessary to repeat the flushing several times, as on passing a glass drainage tube into Douglas's pouch, vent was afforded to nearly a pint of purulent fluid. The abdomen was then closed, several gauze strips being left in the upper wound, taking care that one passed up under the liver, and others proceeding directly to the line of sutures. Just as the dressing was completed, vomiting occurred, so the stomach was immediately thoroughly washed out. The operation lasted an hour and a-half, and was well borne, her condition being rather better than at the beginning.

The after-progress was uneventful. For two days she was very ill, but then commenced to improve. After the first day sips of hot water were given, and at the end of forty-eight hours, small quantities of champagne and milk alternately were administered. Vomiting occurred once on the third day. During this time drainage, especially from the tube in Douglas's pouch, was very free. The gauze strips were removed on the third day, but the lower wound was drained for a week. At the end of a fortnight both wounds were soundly healed. The temperature at no time rose above 102° F., and was normal in ten days. Menstruation, which for some months had been in abeyance, occurred on the third day after operation, and has since been regular. The patient was allowed up in the third week, and solid food gradually given. She has now, February 24th, been at work for some months, and, excepting when indiscreet in diet, there is practically no pain.

The points of interest in this case seem to me to be:

1. The ragged, undermined character of the ulcer, without induration or any large perforation.
2. The time after perforation (twelve hours) that the operation was successfully undertaken.
3. The necessity for thorough flushing and drainage, especially through Douglas's pouch.
4. The fact that such a severe operation could be satisfactorily and successfully performed in a small room of an ordinary lodging house, at very short notice, and without skilled nursing being obtained either at the time of, or subsequent to, the operation.

THE VISION OF RAILWAY OFFICIALS.

By S. JOHNSON TAYLOR, M.B., M.R.C.S.,
Honorary Ophthalmic Surgeon to the Eastern Counties Asylum.

A BRIEF account of the following case will show how unsatisfactory in some instances is the visual test for railway servants, in spite of the exertions of Mr. Bickerton and others.

J. L., aged 25, engine driver, consulted me on December 3rd, 1897, complaining of defective eyesight. Since leaving school he has, with the exception of a period of six months, been in the railway service. Beginning as "cleaner" in the engineering sheds, he was gradually promoted and passed as fireman (stoker) in 1890, whilst in July, 1895, he became an occasional driver, and a regular one some twelve months back, driving a passenger train this last summer, and a goods train since.

His vision for the post of driver was not tested until February, 1896, when it was tried by a chief clerk, who, he