Movable kidney and intermitting hydronephrosis : a thesis for the degree of M.D. Aberdeen / by G.D. Knight.

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PREFACE.

THE case of Intermitting Hydronephrosis on which this thesis is based was under my constant supervision for over six years. I have thus had ample time at my disposal for a complete study of the course of the disease. This was the chief consideration in the choice of this subject. In addition, however, it may be noted that the disease is of such rarity as to receive little, if any, notice in the general text-books of the day. And, finally, the practice of surgery within recent years has made such strides in the cure and amelioration of many hitherto intractable diseases of the kidneys, as to make a study of the course and symptoms of the rarer forms of these diseases, a matter of no little practical importance.

I have to thank Mr. HENRY MORRIS, not only for first directing my attention to this particular disease of the kidney, but also for bringing to my notice several cases

which are shown in the tables at the end of the thesis. For a similar favour my thanks are due to Dr. J. S. BRISTOWE and the late Dr. JAMES ANDERSON. To prevent frequent repetition, I may mention here my great indebtedness to the special works of LANDAU, MORRIS, NEWMAN, and FERRIER & BAUDOUIN.

G. DAVID KNIGHT.

LONDON: *May* 1893.

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ERRATA.

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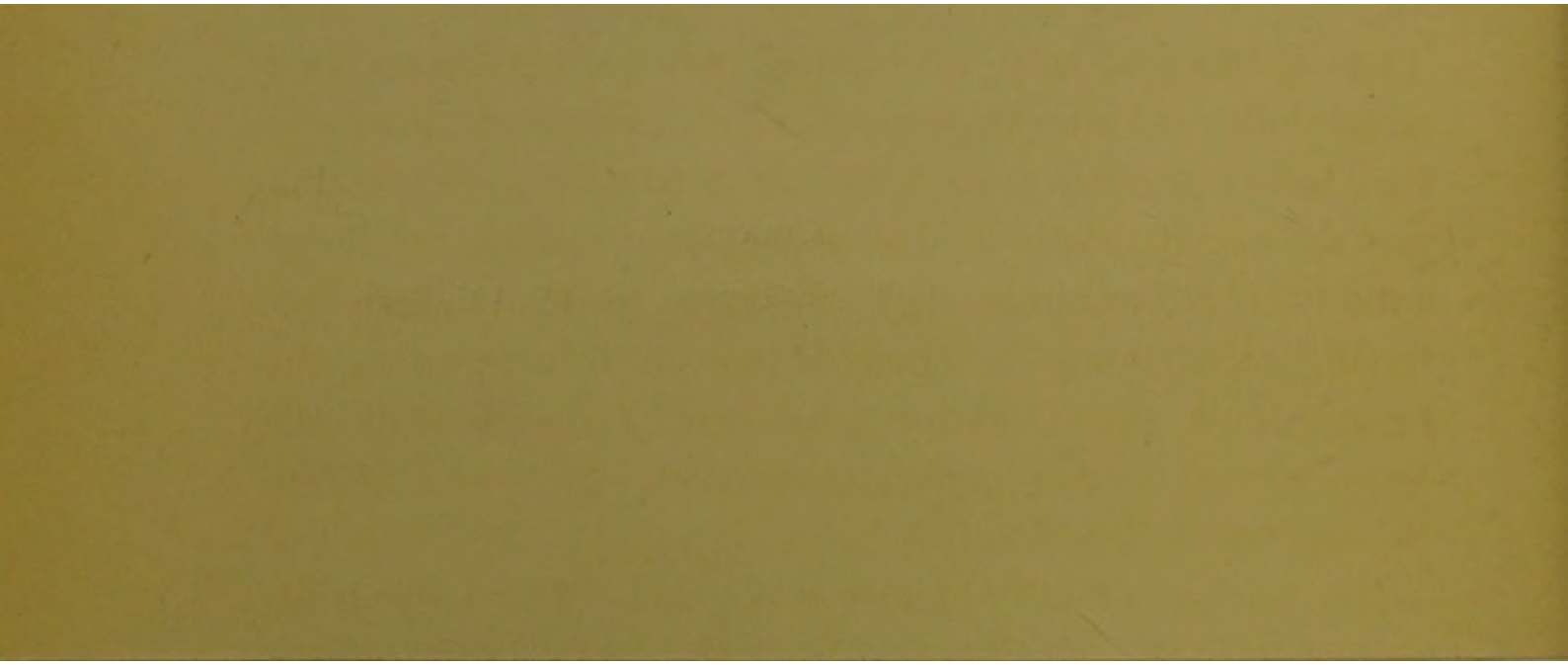

MOVABLE KIDNEY

AND

INTERMITTING HYDRONEPHROSIS.

THE patient, a lady, unmarried, aged thirty-seven, first came under my care in August, 1887. For some time she had been suffering from losses of blood from the bowel, and an exceptionally severe attack had led to my being called in consultation, her ordinary medical attendant having recently died. There being no recurrence of the hæmorrhage, my attention was simply directed to the improvement of her general condition, which had of late become much deteriorated.

The patient's family history was good. The only death among her near relatives had been accidental in its nature. There was also an indefinite history of some kidney disease in an uncle who had died some years previously. The details of her present illness were only elicited by degrees, and, from the patient's disposition, with considerable difficulty. When about fifteen years of age, she was laid up for about a week with pain and swelling in the left side, which the doctor in attendance attributed to some delay in the appearance of menstruation. Beyond that she enjoyed absolutely good health, save for a mild attack of scarlatina and a slight attack of rheumatic fever, until 1885. During the autumn of that year she had occasion to nurse a relative, and while lifting him one day she suddenly felt a severe sickening pain in the lower part of the abdomen.

She was menstruating at the time. The pain was so severe as to incapacitate her from work for two or three days. Before this her periods had been painless in character ; but from that date they were always accompanied by pain and sickness.

She also commenced to suffer from losses of blood from the bowel, at first moderate in quantity and at irregular intervals, but ultimately becoming so frequent as to occur once or twice a week, and even on several successive days. They generally, but not always, accompanied an action of the bowels. Immediately after each action she suffered from a dull aching pain, referred to the rectum, varying in severity and persisting for one or more hours. This pain frequently set up a condition of tenesmus, with moderate diarrhœa, which continued through the greater part of the day. She permitted this state of affairs to continue for many months before seeking advice ; and when she did apply to her medical adviser, little if any amelioration of the ailment was secured. Any slight exertion set up the pain and irritation in the bowel, prostrated her for hours, rendered her life inactive and miserable, and thus placed her, at a comparatively early age, in the condition of a chronic invalid.

During the fortnight following the attack mentioned above, the patient, being kept absolutely at rest, slowly and steadily improved. She began, however, to complain of pain in the epigastric region, with frequently recurring sensations of nausea and faintness. Vomiting, at first occasional and only with the ingestion of food, followed ; soon, however, becoming so persistent and continuous that only the most minute quantities of nourishment could be given with any certainty of its retention. This extreme irritability of the stomach continued for nearly three weeks. A gradual abatement of all these symptoms then occurred.

The sickness and faintness passed away, and the pain, which was never of a severe character, could only be elicited by firm pressure. By the beginning of October she had sufficiently recovered to get about the house.

This improvement was, however, only temporary. Hæmorrhage from the rectum recurred, though to a less extent than before. Severe abdominal pain was complained of, chiefly in the left side and groin, shooting downwards to the sacrum. It was paroxysmal in character, lasting several hours, and agonising in its severity. The temperature and, except during the paroxysms, the pulse were unaffected, and continued so throughout the entire illness. Every organ of the body seemed to be healthy, and repeated negative examinations of the abdomen had been made.

Towards the end of October, however, a small tumour was detected to the left of and above the umbilicus. But the general tenderness over the abdomen was so great as to prevent its being handled at all freely, and a week later, when the pain and tenderness had subsided, the tumour had also disappeared.

The patient soon became able to leave her bed, a proceeding which was followed by a reappearance of the hæmorrhages. A careful examination of the rectum was then made, but the only abnormality which could be detected was a small swelling to the left of the cervix, and adherent to it. There was very great tenderness, not only of this swelling, but of the uterus and rectum generally. Vaginal examination threw no fresh light on the matter. Some days later she was seen in consultation by a specialist in diseases of the rectum. He considered the hæmorrhage to be due, without any other visible cause, to a velvety condition of the rectal mucous membrane. The swelling to the left of the cervix, which had decreased in

size, was thought to be most probably a prolapsed adherent ovary. Later in the history of this case it was considered with more probability to be the remains of a small hæmatocele, and accounted for by the strain of which previous mention has been made. The injection of a strong solution of perchloride of iron was tried, followed by injections of weak solutions of sulphate of zinc and hammamelis, and this treatment had the effect of checking the bleeding for many months. There was no improvement, however, of the pain following the action of the bowels. Small quantities of mucus were passed with the motions, and occasionally actual shreds of mucous membrane were to be seen.

On November 21st there was a repetition of the symptoms of the previous month. Severe pain in the left side and groin, nausea, vomiting, and faintness returned, exactly as before. The paroxysms of pain lasted for several hours, and then died away, leaving only a general tenderness over the abdomen. In a few days the tumour was again to be felt in the left hypochondriac and lumbar regions. It quickly reached the size of a fœtal head, and then, slowly subsiding, was lost to touch within three or four days.

A similar cycle of events occured on the 20th of December and on the 21st of January, 1888. But after this attack the tumour did not subside so speedily, and at the end of a week was still of considerable size. It presented a smooth rounded swelling in the left hypochondriac region, extending from the ribs to below the level of the umbilicus in one direction, and from the left lumbar region to within two inches of the umbilicus in the other. Save at one spot, to the left of and above the umbilicus, it was covered by bowel giving a resonant note on light percussion. The swelling was fairly movable in all directions, and when the

patient stood up, could be seen and felt to descend some distance.

At this time the patient was seen in consultation with Dr. J. S. Bristowe, and a very careful examination made. The various possibilities were hydronephrosis, encysted abscess, and hæmorrhagic cyst opening into the bowel, but no definite conclusion was reached. The history of the rectal symptoms was so bound up with the tumour, that the probability seemed to be in favour of the last-mentioned disease. Per rectum there was much less tenderness, and the swelling at the cervix had become reduced to the size of a filbert. During this attack the pain had radiated over a wider field and extended down into the left thigh, and even to the foot. There was also a difficulty in micturition, with very frequent desire to pass water. The urine was perfectly healthy, and remained so throughout the entire course of the case. The average amount passed in twenty-four hours was 32 ounces.

The tumour subsided slowly, with occasional attacks of pain, during the month of February. One specially severe attack occurred about the 22nd, but was unaccompanied by any marked increase in the size of the swelling. This attack for the first time drew my attention to the fact that each reappearance or increase in the size of the tumour was coincident with the return of the menstrual periods. The pains generally appeared a day or two before the date of the period, the tumour followed, and either disappeared or became quiescent until the next period.

Towards the end of March there was a great increase in the size of the tumour, and a definite diagnosis of hydronephrosis of the left kidney was arrived at. There was now a line of unbroken dulness on percussion from the umbilicus to the spine behind, save where it was crossed by a tympanitic band produced by the colon. The swelling

could be handled freely, and could be pushed upwards beneath the ribs for a little distance, or slightly downwards and to the right. No thrill could be elicited. Firm pressure was painful and sickening. Pressure over the left iliac region below the tumour always caused pain.

The facts having been placed before the patient, an expectant line of treatment was adopted. Large doses of opium were required to relieve the agony of the more severe paroxysms, and the greater part of her time was passed in bed.

The tumour considerably decreased during the month of April, and became of insignificant size ; but coincidently with the period about the end of that month there was the usual increase of pain and sickness, and in a day or two the tumour was as large as before. There was a slow subsidence, and by the 7th of May no tumour could be felt, and pain could be elicited only by deep pressure.

Counter irritation in various forms was tried and certainly seemed to have the effect of considerably alleviating the pain. For, though the swelling reappeared at the end of May, there was no sickness, and the pain was comparatively slight. The tumour did not attain a great size, and, slowly subsiding to the size of a clenched fist, remained in that state without any variation for nearly five months. It cannot be reasonably suggested that the blisters or other forms of counter irritation which were used had any effect in altering what must have been practically a mechanical obstruction. It is, however, probable that the counter irritation had some influence in reducing the reflex susceptibility of the nervous system. At any rate the patient improved very much, and though the pain connected with the bowel persisted and required large doses of opium, yet she lost the severe pains in the left side, groin, and thigh, and recovered sufficient strength to permit her being

removed for some weeks to the seaside. During these months the patient, though far from well, was able to attend to domestic duties in a manner she had not done for over a year, and there seemed reasonable hope of perfect recovery. The anticipation proved to be fallacious. About the end of October the pain in the left side recommenced and the paroxysms steadily became more severe. Hæmorrhage from the bowel, which had long been absent, returned in moderate amount. It may be as well to state here, that the blood was generally of a bright red colour, showing its origin to be from or just above the rectum. The menstrual flow was delayed some days and was very scanty, and immediately after its appearance the tumour began to increase in size. By the 14th of November it reached its greatest bulk, and pain being now almost continuous, aspiration was determined upon. The needle of the aspirator was introduced posteriorly about the angle of the quadratus lumborum and the last rib, avoiding in this situation both the peritoneum and the coils of intestine which sometimes moved freely over the front of the tumour. The needle was felt to pass through a very resisting investment to the tumour. About twenty ounces of a clear odourless non-albuminous fluid was withdrawn ; specific gravity 1008 ; reaction neutral. There was only a doubtful trace of urea, but when allowed to stand for two or three days the fluid exhaled a distinctly urinous odour. Under the microscope a few white corpuscles were seen and nothing else.

Complete and immediate relief to all her symptoms followed the evacuation of the fluid. This, was, however, of short duration. The obstruction to the outflow of urine had evidently become complete, for the sac rapidly refilled, with the usual train of symptoms. At intervals of about a week the aspiration was repeated, until it was evident, after

the fourth or fifth time, that some more radical measure was required. Mr. Henry Morris was called in consultation for this purpose, and agreeing in the diagnosis, he suggested either incision into the sac or its total removal. The patient decided in favour of the latter, as she expressed an intense objection to the possibility of a fistula in the loin.

The operation of nephrectomy was performed by Mr. Morris on January 4th, 1889. The tumour on examination was found to be a dilated kidney and pelvis, sacculated where the remains of the dilated calyces still existed. The kidney tissue had all been destroyed save a thin layer of cortex which was spread out on the inner surface of the dilated capsule. What did remain looked quite healthy. The ureter where it was cut across was not dilated. No evident cause for the production of the hydronephrosis could be made out. It was thought, however, that the small swelling near the cervix might have produced some obstruction of the ureter. The further history of the case showed that this idea was erroneous; for a similar affection appeared at a later date in the right kidney, and no obstruction existed at the end of the corresponding ureter. In addition, there was the fact that about the age of puberty a swelling appeared in the left loin and slowly subsided some days afterwards. This occurred long prior to the history of the strain. It had been forgotten by the patient until she was reminded of it by a relative who was resident with her family at the time of the illness. The swelling was accompanied by considerable pain of a paroxysmal nature.

It may be mentioned here that during the subsidence of the tumour there was never any sudden increase in the amount of urine. During the rise of the tumour there was frequent desire to micturate with a very scanty flow of urine. During the fall of the swelling the urine flowed

freely and was very clear. As the subsidence lasted, however, for some days, the alternation was not of a striking character.

The patient made a good recovery. The temperature rose on the second day to 100·4°, but then sank to normal. There was severe sickness for two days, but no other complication worth recording. The urine, which had been generally under 30 ounces daily before the operation, fell to 25 ounces, and remained at that amount on an average for the ten days following the operation. Within a fortnight she was able to sit up, and slowly but steadily regained her strength. The period came on about the end of January, and, for the first time since 1885, was free from pain. But she still suffered from pain of a neuralgic character in the left side, and had occasional slight hæmorrhages from the bowel. These symptoms were, however, so much less severe that they were considered by the patient to be scarcely worth notice.

Within a few months she experienced a considerable recurrence of the pain during the periods, and they became irregular as to time and quantity. Still, her general health was good, and she was able to enter with comfort into social life. The pain on the action of the bowels unfortunately necessitated the continued use of opium. With its aid, however, she was quite free from pain within a couple of hours after rising in the morning.

This state of affairs continued for over a year, when a sudden and severe attack of pain in the right loin occurred in the latter part of 1890. It quickly passed away, but only to recur at lessening intervals of time. Careful examinations of the affected side, often repeated, gave no marked indication of the cause of this pain. But it is necessary to say that, when an attack was present it was impossible, on account of the general tenderness, to examine

the loin by palpation. Such examination as could be carried out presented the following conditions :—There was some amount of fulness in the right loin anteriorly and a sense of resistance on pressure, without any definite tumour. The pressure always caused sensations of nausea or faintness. Rest always relieved, while movement aggravated, the pain. Later, after several attacks, there could be distinctly felt a movable swelling in the position of the kidney, which could be pushed forward so as to touch the anterior abdominal wall, and then backwards into its natural position. The patient was well clothed with fat, which prevented the exact shape and consistence of the tumour being accurately defined.

With these attacks there reappeared the nausea, vomiting, and faintness, the difficulty in micturition, occasional diarrhœa, and general prostration, of which we had but a too vivid recollection in connection with the distension of the left kidney. The urine continued perfectly healthy. During the attacks it was scanty, with frequent attempts at micturition. After an attack it flowed much more freely, and became lighter in colour. The paroxysms lasted from two to five or six hours, but the tenderness over the right side persisted for a day or two after each attack. Examitions per rectum and per vaginam showed everything to be exactly as described in the earlier part of the case. No remedies were of any avail save the use of sedatives to deaden pain.

By September, 1892, the distension of the kidney in the right loin had reached the size of a cocoa-nut. This was nearly two years after the first paroxysm of pain was felt in that kidney. During all that time the patient was a chronic invalid. She still remained stout—in fact, if anything, she increased in weight. But her colour changed by slow degrees to a dull lemon-yellow, in appearance like

that of jaundice save that the sclerotics remained clear. Her appetite was poor and capricious. During the whole of 1892 nausea and vomiting were rarely absent. If occurring after food had been taken, that was vomited; but at other times a clear watery frothy fluid was vomited—sometimes in considerable quantity. If the sickness abated, diarrhœa generally followed, an alternation probably explained as being an attempt of the system to supplement the defective action of the kidney in eliminating effete material from the blood. A daily record of the amount of urine passed was kept for a month, and compared with the attacks of pain in the right side. It was found that the average quantity was 28 ounces, with a specific gravity generally under 1010. The urea never exceeded 1·7 per cent., the average amount being 1·2 per cent. It was found also that, though the tumour, when once it became clearly defined, never absolutely disappeared, yet it exhibited great variations in size. After a paroxysm of pain it was large and tense, and then became softer and smaller. Coincidently with its decrease, there was a rise in the amount of urine passed and corresponding relief to the pain. The greatest amount passed in twenty-four hours was 42 ounces; the least, 17 ounces. Throughout the entire month there was a repetition of the cycle every four or five days.

But there was a steady tendency to enlargement in the size of the tumour; and, with the certain knowledge that the kidney tissue was slowly being destroyed, it was evident that unless drainage through the loin was established, a fatal termination to the illness was only a question of time. With this intention, then, Mr. Morris operated on the 11th of February, 1893, four years after the removal of the left kidney.

The tumour, which was fairly movable, and situated in the right hypochondriac and lumbar regions, was about the

size of a child's head. Its dulness on percussion was continuous with that of the liver, the colon being pushed to the mesial line. It extended to the umbilicus in the middle line, and its lower border was about two inches below that level.

The usual incision in the lumbar region, half an inch below and parallel to the last rib, was made, and the distended kidney easily reached. An incision was made through the kidney substance, and a quantity of blood-stained fluid escaped. The pyramidal portion of the kidney was found to be destroyed, but the cortical part seemed to be hypertrophied and deeply congested. The finger did not penetrate into the body of the tumour, but into a dilated calyx, which evidently communicated with the enlarged pelvis of the kidney. The kidney was stitched firmly to the cut layers of tissue between it and the skin, and a large drainage tube inserted.

There was considerable sickness for the first three days. The patient had acquired a habit of taking a considerable amount of alcohol daily to deaden pain, and as this was not known, its sudden withdrawal caused considerable systemic disturbance. This was, however, remedied, and she progressed favourably. The only drawback was the onset, about the fifth day, of flatulent distension of the bowel, with a slight rise of temperature. The latter subsided in forty-eight hours, but the distension proved most troublesome.

Urine flowed freely from the incision, and was also passed per urethram. The amount from the wound could not be exactly estimated, but from the bladder 15 ounces was withdrawn in the first twenty-four hours. This gradually increased in amount, and by the third week the patient was passing per urethram 35 ounces on an average daily, and about 10 to 15 through the drainage tube.

Three months after the operation the patient's appearance had immensely improved. The yellow colour had disappeared. Her appetite had greatly increased, in fact she ate better than she had done for years. Vomiting rarely occurred. There was, however, considerable trouble with the bowels. From her symptoms it was clear that there had been adhesions between the colon and the dilated kidney, and that the action of the former had been interfered with. But there was every prospect of the restoration of its natural condition. Very little urine escaped from the fistula—three to four ounces daily on an average, but on some days none at all. On the other hand, the flow per urethram had increased to a daily average of nearly three pints of healthy urine, an amount which had never been reached during the six years she been under my care. Coincidently with this the patient became much thinner, and it was evident that the tissues, the face especially, had been puffed and œdematous before the operation. It was plain that the operation had just been performed in time, and that the relief by the fistula and the fixation of the kidney (which could now be felt deep in the loin about the size of a clenched fist) had not only saved her life, but had given her a possibility of comfort in her existence which she had not known for years.

The striking symptoms and slow development in both kidneys of this undoubtedly rare disease led me to collect from medical literature as many similar cases as possible. These are presented in the tables at the end of this thesis. To secure a thorough understanding of the symptoms and evolution of this type of hydronephrosis, a short description (chiefly from Quain's 'Anatomy') of the position of the kidneys is given. This is followed by an account of the misplacements of the kidney and a consideration of movable kidney. Lastly, the symptoms and

development of hydronephrosis are considered with special reference to mobility of the kidney, and to the occasional termination of that affection in hydronephrosis.

The hydronephrosis arising in this manner is alluded to in the thesis for the sake of convenience as the "special" form of hydronephrosis. As will be shown, the most common condition producing hydronephrosis in movable kidney is the bending, kinking, or torsion of the ureter which must necessarily follow any alteration in the position of the kidney. This condition, I consider, after careful consideration and the exclusion of all other possibilities, to be the cause of the double hydronephrosis which occurred in my patient.

ANATOMY OF THE KIDNEYS AND URETERS.

THE kidneys are deeply placed in the loins on each side of the vertebral column behind the peritoneum. They are on a level with the last dorsal (or lower border of eleventh dorsal) and two or three upper lumbar vertebræ. The right kidney is generally held to be a little lower in position than the left, but the difference is inconsiderable and need not be regarded as of importance. The more convex anterior surfaces look somewhat outwards and are partially covered by peritoneum. The duodenum and commencement of the transverse colon are in contact with the anterior surface of the right kidney without any intervening peritoneum. The anterior surface of the left kidney is in contact below with the pancreas. The posterior surfaces, imbedded in areolar tissue, rest on the lower part of the arch of the diaphragm in front of and below the twelfth rib, then on the anterior layer of fascia covering the quadratus lumborum, and finally on the psoas muscle. The external border is directed slightly backwards. The left kidney has the spleen in contact with its external border for its upper two-thirds. The concave internal border is directed downwards and forwards. At the hilus in the middle of this border, the vein, artery and ureter (dilating into the pelvis) find entrance to the kidney, the vein being placed in front, the ureter behind, and the artery in the middle. The upper ends of the two kidneys are

nearer to each other than the lower, which makes the long axes of the kidneys somewhat divergent. The lower ends of the kidneys reach nearly to the level of the iliac cresst.

The front of the right kidney touches at its upper end the under surface of the liver, and the front of the left kidney at its upper end touches the fundus of the stomach, and, near its lower end, the commencement of the descending colon.

The kidneys are covered with a firm fibrous envelope containing elastic fibres, which allows a considerable degree of expansion. This capsule, following the hilus, passes into the sinus of the kidney and becomes continuous round the bases of the papillæ of the pyramids with the fibro elastic tissue of the calyces and pelvis of the ureter.

The ureters measure 14 to 16 inches in length, and are about as wide as a goose quill. The narrowest part, save the orifices, lies in the walls of the bladder. Opposite the lower end of the kidney they expand into the funnel-shaped dilatation called the pelvis. The pelvis on entering the hilus divides into two or three primary branches, which end in several short truncated pouches called the calyces or infundibula, into which the papillæ open. A single calyx may surround two or three papillæ, and they are accordingly fewer in number than the pyramids of the kidney.

The ureters pass obliquely downwards and forwards to the true pelvis, and then curve forwards and inwards to the bladder. They lie behind the peritoneum in loose areolar tissue which binds them lightly to the structures on which they rest. Above they rest on the psoas muscle and are crossed in front by the spermatic vessels. The right ureter is close to the inferior vena cava. Lower down, the ureter passes over either the common or external iliac vessels, behind the termination of the ileum on the right side and the sigmoid flexure on the left side. In the

pelvis it enters the peritoneal fold, forming the corresponding false ligament of the bladder, and, reaching the side of the bladder near its base, runs downwards and forwards below the obliterated hypogastric artery until it enters the bladder by an oblique passage through the coats three-quarters of an inch in length. The vas deferens crosses the ureter on its inner side in the male. In the female the ureters run along the sides of the cervix uteri (separated from it by an interval of connective tissue about $\frac{3}{4}$ of an inch in thickness) and the upper part of the vagina, to reach the bladder. The ureters have the usual external fibrous coat, containing elastic fibres, a middle coat of muscular tissue, and a mucous lining. The latter is thin and smooth, and in the adult shows only a few longitudinal folds when laid open. On cross section, the lumen of the ureter shows the stellate appearance common to all elastic tubes. The epithelial lining is similar to that of the bladder.

The ureter and pelvis contain a few mucous glands and in the pelvis lymphoid follicles have been found occasionally.

Lloyd,* in some remarks on the ureter and pelvis of the kidney, points out that as the ureter approaches the kidney it enlarges from the size of a No. 10 English catheter till it reaches a diameter of $\frac{1}{3}$ to $\frac{1}{2}$ an inch. Immediately on entering the hilus it breaks up into two or three primary tubular branches, varying in size from a No. 10 to No. 20 English catheter, and measuring $\frac{1}{2}$ to $1\frac{1}{2}$ in. in length. These give off secondary tubes smaller in size, some only a line in diameter, which end in the cup-shaped calyces into which the pyramids open. There may be a few tertiary subdivisions. On account of this arrangement he shows that it is very difficult, if not impossible, to thoroughly explore the pelvis with the finger through an incision in the kidney, unless the latter together with the pelvis should

* 'Practitioner,' vol. ii., 1887.

be in a dilated condition. If it is not dilated the finger is caught in some of the divisions of the pelvis, and unless the septum is divided or torn the rest of the pelvis must remain unexplored.

The kidneys are enveloped in areolar tissue containing an abundance of fat in its meshes, called the tunica adiposa (Haller). This is thicker and more abundant posteriorly than in front, but everywhere surrounds the kidney. After inflammatory changes it may become strongly adherent to the tunica propria of the kidney. This packing is one of the chief agents concerned in the fixation of the kidney. In young subjects the capsule contains no fat, for this is not laid down in the areolar meshes until the eighth or tenth year. The areolar capsule originates from the splitting of the fascia transversalis into two parts, which enclose the kidney and reunite around the vessels as they leave the hilus. Above it separates the kidney from the supra renal body, and below it gradually thins away towards the brim of the pelvis. According to Englisch, this is really a ligamentum suspensorium renis. In front it is connected with the peritoneum, and behind with the areolar tissue over the psoas muscle. (Lloyd, *loc. cit.*, Landau.*) The blood-vessels, the ureter, and the reflection of the peritoneum all tend to keep the kidney in position. Indirectly the meso-colon helps to maintain the stability of the kidneys, and their position alongside of those vertebræ which are the least movable in the spinal column also secures for them the greatest freedom from disturbance. Landau says that in life the kidneys are almost immovably fixed. Even deep inspiration does not depress them, but produces only an axial rotation. Lloyd, however, disputes this, and states that the kidneys move freely during respiration, a state-ment with which the majority of writers are in agreement.

* 'Wanderniere der Frauen,' 1881.

MOVABLE KIDNEY.

SYNONYMS :—Renes mobiles. Wandering or floating kidney. Dislocation or luxation of the kidney. Ectopia renis. Descent or prolapse of the kidney.

Mobility of the kidneys had long been known to occur in certain subjects, but it was not until Rayer * published his work on diseases of the kidneys that it attracted particular attention.

Before entering into the symptoms and pathology of this disorder, however, it is advisable to devote a little space to the consideration of *misplacements of the kidney.* In its causation, misplacement of the kidney may be congenital or acquired. When the kidney is congenitally misplaced, the *left* is the organ which is usually affected. The degree of misplacement may be slight and of little importance. On the other hand, it may be found lying on the iliac vessels, in the true pelvis, and in other widely abnormal positions. The kidney may be distorted into a variety of shapes, the most common being that known as the "horse-shoe" kidney. In such cases the blood-vessels are altered, not only in direction, but very frequently in their origin.

Under *acquired* causes are included intrinsic tumours of the kidney, which by their weight tend to drag it from its moorings. Also all tumours of adjoining organs which by their increase in size produce a dislocation of the kidney. Prolapse of the pelvic organs, by the continued drag on

* 'Traité des maladies des reins,' 1841.

the ureters, may pull the kidney from its bed. The downward pressure of the liver in some cases of tight lacing will undoubtedly alter the position of the right kidney. Apart from this particular cause, it is the right kidney which is generally displaced by an acquired cause, while (as mentioned above) the left is usually affected congenitally.

The kidney in many cases of acquired misplacement is also movable, and then presents symptoms similar to those observed in idiopathic movable kidney.

Movable kidney is the term commonly applied to that condition in which the kidney, instead of being practically a fixed organ, can to a greater or less degree change its relative position in the abdominal cavity. This affection has been divided into two classes :—(1) *Floating kidney*, where there is a distinct mesonephron, the organ being more or less completely enveloped in a peritoneal covering. This variety is always congenital, and the degree of movement is usually very considerable. (2) *Movable kidney*, where the organ lies loosely in its adipose capsule, or can slip in several directions to a varying extent beneath its ordinary peritoneal covering. This variety is non-congenital in origin. A very considerable number of such cases have been recorded, both from clinical and anatomical observations.

The publication of these isolated cases, and especially a paper by Durham,* led to the appointment of a committee by the Pathological Society of London to investigate the whole subject. The committee† came to the following conclusions :—That there was a fair amount of movement to be detected in many kidneys on post-mortem examination. If such mobility existed, it was usually to the extent of about an inch upwards or downwards. That in some

* 'Guy's Hospital Reports,' 1860.

† Trans. Path. Soc., vol. xxv., 1876.

cases the degree of movement considerably exceeded that amount. In one case (Bindley's) the kidney moved over an area 8 or 9 inches in diameter. Frequently the displacement was accompanied by a rotation of the kidney on one or other of its axes. A case is recorded by Goodhart where the organ was turned completely round, the posterior surface becoming the anterior, over which the ureter coursed. In some recorded cases the extent of motion was so great that the kidney could pass beneath the peritoneum to the opposite side of the spinal column, gravitate below the brim of the pelvis, or slip forwards beneath the abdominal parietas. Finally, that, though the published cases of floating kidney (with a mesonephron) probably exhibited a greater degree of mobility (Henderson, Keetley, Stevens, &c.) than those cases where the kidney moved beneath the peritoneum, yet clinically it was found impossible to separate the two varieties. Morris points out, however, that surgically the diagnosis is a matter of considerable importance, as the danger of such an operation as nephrorrophy will be much increased by the presence of a mesonephron.

The first to investigate the frequency of this affection was Rollet.* He examined 5500 patients in Oppolzer's Clinic, and found 22 examples, giving a ratio of 1 in 250. Skorszewsky detected 32 cases in 1030 females and 3 cases in 392 males. This gives a percentage of 3·2 in females as against less than 1 per cent. in males. Rollet's patients were selected indifferently. Oser, of Vienna, considers that 10 per cent. of the women of the lower classes in Austria who have borne children would exhibit, if examined, some degree of mobility of the kidneys. Dickinson,† however, from his experience, considers it to be equally frequent in the upper and lower classes.

* 'Pathologie und Therapie der beweiglichen Niere,' 1866.

† 'Renal and Urinary Diseases.'

Of 290 cases of movable kidney collected by Newman,* 252 were in females and 38 in males, and 80 per cent. occurred between the ages of twenty and fifty. Landau, in 314 cases, found 273 in females and 41 in males. His percentage as to age incidence is nearly similar to Newman's. In 173 cases, 152 had mobility of the right kidney, 12 of the left, and 9 were double. This shows how much greater is the liability of the right kidney to suffer from this affection—a fact with which all writers agree. Dr. Roberts,† of Manchester, in 70 cases found 61 were females and 9 males. In 42 of the cases the right kidney was affected, in 9 the left, and in 14 both kidneys were movable. These cases give about 8 females to every male affected, and show that it is ten times more frequent on the right side than the left, and that the cases presenting double movable kidney are about equal in number to those where the left kidney alone is affected. This affection is not unknown in children. Steiner‡ mentions three cases in children under ten years of age, two girls and a boy. The kidney in these cases required one-and-a-half to two years to travel into the lower abdominal region.

As to the etiology of movable kidney, many explanations have been given.

The greater frequency in women, and especially in those who have borne many children, points to the general relaxation occurring after pregnancy as being a most active cause. In many of the cases pendulous belly and prolapse of the pelvic organs have been marked. The absorption of the fat in the adipose capsule surrounding the kidney, after wasting diseases or other causes, undoubtedly renders the kidney more mobile, and gives it greater op-

* 'Surgical Diseases of the Kidney,' 1888.

† 'Renal and Urinary Diseases,' 1885.

‡ Ziemssen's 'Encyclopædia,' "Diseases of the Kidney."

portunity for motion and rotation. The fact that there is no fat in the very young (in whom mobility is said to be less common) does not invalidate this theory. For, on the absorption of the fatty tissue, unless the peritoneum contracts firmly on the kidney, as it is in the young subject, then the kidney remains in a looser capsule than before, and the possibility of motion is greater. Acute wasting diseases are more likely to bring about this condition than chronic ones; for in the latter all the tissues waste simultaneously and, the relative positions being maintained, there is less chance of relaxation. Senator,* however, in an analysis of 32 cases of movable or floating kidney, which he found in the ratio of 1 in every 139 women examined, observes that the absence of fat is not so much a cause of mobility of the kidney as that it very much facilitates the diagnosis of the affection. Menstruation has been described by Becquet,† Lancereaux, and others, as being a predisposing cause of movable kidney. The congestion and distension of the kidney which occurs at every period is considered to aid in producing relaxation of the tissues which support the kidney.

Landau dismisses this with the statement that on this ground every woman ought to have movable kidneys. There is, however, more consideration required for this theory than he gives in the above opinion. Virchow long ago showed that the renal and uterine vessels have a close relationship, probably through the ovarian and renal nerve plexuses. That the kidneys swell up and become painful in many women during menstruation is a phenomenon that has been frequently noted. Roberts, of Manchester, describes a case in his work on the diseases of the urinary organs, and he quotes one reported by Dr. Ritchie, where during two periods any alteration in the size of the kidney

* 'Charité Annalen,' 1883. † 'Archiv. Général,' 1865.

was easily noticed. The organ during the periods was found to increase in size by one-half, and it became much more sensitive to touch. Wiltshire * describes the altered state of the urine during menstruation—thicker and less in quantity—as being due to this condition of congestion. In this way he shows that menstruation may in some cases prove a test of renal inadequacy, and quotes a case from Roberts where paroxysms of uræmic convulsions appeared only with the periods. Cases recorded by Dickinson,† Péan, Peter, Newman, and many of the cases given at the end of this paper, corroborate these facts. A considerable number of the cases among women which I have collected first date their illness from the age of puberty, a point which I shall enter into more fully in another section. It is true that this factor probably accounts for a few cases only ; but that it does so there can be little doubt. In those predisposed to that state where the kidneys are likely to become movable on slight provocation, the onset of menstruation may be sufficient to determine that condition. Similarily, we meet with distinct turgescence of the mammæ during menstruation in a comparatively small number of women ; but that does not alter the fact that in some cases (of which I have seen two) the congestion of the breasts may be so great as to require treatment for its relief.

Traumatic dislocations of the kidneys occur not infrequently. Cases have been recorded by Newman and many others as arising from falls, blows, and other injuries. Many of those diseases of the pelvic organs in females which produce hydronephrotic conditions of the kidneys are said to lead to a secondary condition of mobility of the kidneys. In considering the causes of movable kidney,

* Brit. Med. Journ., vol. i. 1884.

† 'Renal and Urinary Diseases,' 1885.

Dr. R. T. Morris * suggests the possibility of the child in utero kicking its mother's kidneys loose. He does not, however, advance any reasons in support of this statement.

Tight lacing is held by many to be an active cause in the production of movable kidney, more especially of the right kidney. Cruveilhier was the first to advance this theory, and it has since then led to the expression of very varied opinions.

Landau does not think it a likely cause to account even for the great frequency of the affection on the right side. He points out that the liver, if pressed down, would pass in front of the kidney, and that the liver tissue is so soft during life as to mould itself round a firmer and more solid organ, such as the kidney. Against this, however, is the case of movable kidney recorded by Dr. Tuckwell,† in which the thinned-out lobe of the liver passed down to the iliac crest and completely shut out the kidney from its normal position. The liver in this case was deeply marked by the ribs.

Among the anatomical conditions which might lead to the frequency of the affection on the right side, the greater weight and size of the right kidney as compared with the left has been advanced. Also that the uterus has a greater tendency to rise to the right side during pregnancy, and is more likely to disturb the connections of the right kidney. Lancereaux believes there is a special relation between the right kidney and the right ovary, through a more intimate nerve connection, and that this leads to greater distension of the right kidney during menstruation. Landau lays it down to other and more strictly anatomical reasons. He points out that the upper end of the descending colon lies

* 'New York Medical Journal,' 1891.

† 'Pathol. Society's Report on Floating Kidney,' 1876.

higher and is attached to the ribs further to the left and lower down than the ascending colon which lies over the middle of the right kidney, while the left kidney has the descending colon against its outer border. Thus the left kidney, though practically on the same level as the right, is fastened higher up and more firmly to the posterior abdominal wall than the right kidney.

Secondly, the hepatic flexure is looser than the splenic.

Thirdly, the ascending colon forms an obtuse angle, while the splenic flexure is a right angle. All these conditions point to the right kidney being held less firmly by the reflection of the peritoneum from the meso colon.

Fourthly, the left renal artery is shorter than the right, and is supported by the horizontal part of the duodenum. It is also closely connected with the head and neck of the pancreas, and is thus, as compared with the right artery, much less liable to displacement. Hence, he says, a movable kidney can only move downwards, forwards, and inwards, owing to its vascular connections, and as the kidney moves it undergoes rotation on one or other of its axes. The outer border generally rotates forwards, and the upper end becomes directed more forward than the lower.

Newman, to a certain extent, agrees with Landau, but, along with many others, considers the chief reason for the more frequent disturbance of the right kidney to be dependent on the circumstance that a large solid organ like the liver lies above that kidney. When therefore during delivery or in lifting heavy weights or straining in any way, both the anterior and posterior abdominal muscles are brought into action, the liver is pressed backwards, and at the same time the kidney is pushed forwards and downwards by the action of the crura of the diaphragm. Several cases of movable kidney have been described where the

sufferers were able to voluntarily eject it from its normal position by muscular action; but this has been recorded only in cases where the prolapse had existed for some time.

Symptoms.—The symptoms which have been observed in cases of movable kidney are many, and vary much in degree; they may be slight or altogether absent, and the patient's attention is only accidentally drawn to the misplaced organ. Dragging and drawing feelings in the side are complained of by some, often with the sensation of something slipping or moving in the side. Lancereaux points out that many cases are accompanied by hysteria in women, and that menstruation nearly invariably increases the pain and discomfort. Gastric disturbances are often observed, such as epigastric pain and nausea, especially when the kidney is displaced. Pressure on the displaced kidney will produce or intensify these sensations.

Dull aching pain, weight, and uneasiness in the loin are common symptoms. In many cases, however, the symptoms of displacement are very severe. There may be during an attack great faintness, and sinking sensations, vomiting, diarrhœa, shiverings, excessive tenderness over the loin, cold perspirations, and acute pains resembling nephritic colic. Gastro-intestinal catarrh may be set up, and even jaundice, as in cases cited by Litten and Newman. The former accounts for its appearance by the pressure of the misplaced kidney on the gall duct; the latter, by the catarrhal condition set up in the stomach and small intestine passing up into the bile ducts. Slight pyrexia may occur in some cases.

These violently acute attacks have been described under the name of renal incarceration or strangulation, from the analogy of a strangulated hernia. There has been considerable diversity of opinion as to the exact condition of

the kidney during such a paroxysm. Dietl first described these attacks, and he accounted for the pain by the irritation produced from the congestion and inflammation of the cellular tissue round the displaced kidney, with perhaps some amount of localised peritonitis.

Obstruction to the vascular supply of the kidney from torsion of its blood-vessels is undoubtedly one of the chief factors in the production of these acute attacks. Marked pulsation of the renal artery has been observed in more then one case of mobile kidney, during the attack.

A consideration of some of the numerous experiments on the circulation of the blood in the kidney will help us to understand more clearly the effects of torsion of the renal vessels. When the renal artery is ligatured, within two hours the epithelium of the uriniferous tubules undergoes necrosis, as has been shown by Litten,* and if the ligature is retained for some time the whole renal tissue dies. Torsion of the artery, however, from mobility of the kidney could not be expected, from the thickness of its coats, to lead to anything but a moderate diminution of the supply of blood to the kidney. It is otherwise with the thin-walled vein. Cohnheim has shown that if the renal vein is ligatured, the function of the kidney, as in the case of ligature of the artery, falls at once into abeyance. The kidney becomes extremely congested and may swell to double its size in a comparatively short time. If the obstruction is not retained too long the secretion of urine is re-established. The urine which first passes is of a highly concentrated nature from the great increase of blood pressure in the cortical part of the kidney. It generally contains blood and albumen.

It is not necessary to suppose that the renal vein

* Landois and Stirling's 'Physiology,' p. 572.

is completely obstructed, even for a short time, by torsion, for, as many experiments have proved, a very slight obstruction to the return of blood in the vein will cause marked congestion of the kidney and diminution in the flow of urine. Torsion of the vein, then, explains in some cases the sudden swelling of an escaped kidney. Frequently repeated it may lead to wasting, and even to complete atrophy of the organ in some extreme cases. It clearly explains the occasional appearance of blood and albumen in the urine after a paroxysm. But it is not so evident why slight symptoms of uræmia should in some cases so quickly appear. It is well known that if the other kidney is sound, it is capable of taking up the whole work immediately. This has been frequently observed in cases of blocking of the ureter by a calculus and after the ligature of one ureter. The explanation of this modified uræmia is not very obvious.

In addition, Landau believes that in some cases thrombosis of the smaller veins, or even the renal vein itself, may occur ; and if there should be at the same time any infective catarrh of the pelvis of the kidney, then suppuration, with the formation of abscesses in the kidney, is a not unlikely sequence.

These are, however, only extreme conditions, and usually the kidney, on the patient lying down for some time, slips into its natural position and the tension is more or less speedily relieved. The pain complained of during these attacks is, as has been said, of a dull and sickening character, and may radiate far from the affected side. The acute distension of the kidney probably accounts for the greater part of it, though the effect of twisting and congestion of the nerves running along the renal vessels must not be lost sight of in considering its exact origin.

But there is another explanation of the suffering which is so notable in some cases of mobile kidney. The torsion or flexion of the ureter in some cases leads to what is at first a transitory hydronephrosis, more often perhaps than has been supposed. As this, however, is the point with which this thesis is chiefly concerned, it will be considered more fully under the subject of hydronephrosis.

ETIOLOGY OF HYDRONEPHROSIS.

OBSTRUCTION to the flow of urine may occur in any part of its course from the Malpighian tufts to the external orifice of the urethra. Should the obstruction be near the Malpighian corpuscles, or in connection with the uriniferous tubules, cystic dilatations in the substance of the kidney are produced. If the obstruction is external to the kidney, in the pelvic or upper part of the ureter, then dilatation of the pelvis and kidney results. Should the obstruction be at the lower end of the ureter, its upper part also suffers and becomes tortuous and dilated. If the obstructing agent is situated in the bladder, prostate, or urethra, the former is first affected, and the ureters and kidneys later.

When the obstruction is high up in the urinary system, the diseased condition which is produced generally runs a course of an aseptic character; but when low down, as in the bladder or in front of that organ, the disease which follows very commonly becomes septic, as indicated by the appearance of a purulent catarrh in some part of the affected urinary tract.

The second of these conditions, where the pelvis and kidney are distended with fluid of a serous or urinous nature, was first called hydronephrosis by Rayer ('Traité des maladies des reins,' 1841). It has also been described under the names of hydrops renis, hydrops renalis, cystic tumour of the kidney, and hydro renal distension.

The name hydronephrosis has now become classical,

though it is certainly wanting in scientific accuracy. For that period of the course of the acquired disease when the kidney has become a fixed tumour containing serous fluid, it is very applicable; but for the earlier stages of the disease, and for those later conditions in which, as occurs in some instances, the fluid becomes purulent, or in which the tumour may even contain pultaceous material (Case 50), the name is not appropriate. The name represents only one phase in the whole course of the pathological changes which are produced by obstruction to the flow of urine along the ureter.

The causes of hydronephrosis have been divided into—

(1) CONGENITAL.
(2) ACQUIRED.

Hydronephrosis itself may be congenital, and children have been born with this condition, usually double, and survived some days or months, or even longer. But except in so far as they may help to elucidate any doubtful points, I shall not dwell on these cases. The various pathological conditions which have been found in such cases as have been carefully examined are fully described in those works where the diseases of intra uterine life are described.*

Under congenital causes we find the following conditions most frequently :—

(1) Various malformations, such as imperforate ureters, supernumerary renal arteries, and distortions of the kidney. Among the latter the horse-shoe variety is the most common.

(2) Folds of the mucous membrane so arranged as to act as valves. These are most frequently seen in the ureters, but also occur in the urethra. Congenital thickening of the

* See also for cases, Billard's 'Traité des maladies des enfants.'

walls of the bladder, leading to double hydronephrosis, may also be mentioned.

Under acquired causes there have been described :—

(1) Tumours of all kinds which may obstruct in various ways the urethra, bladder or ureters. Cancer is by far the most common form of tumour, especially cancer affecting the uterus. Malignant tumours, however, of the bowel, bladder, ureters, prostate, rectum, ovaries, pelvic glands, &c., have all furnished examples of secondary hydronephrosis. Other new growths, such as ovarian cysts, hydatids, enlargement of the pelvic glands, uterine fibroids, villous tumour of the bladder, &c., have led to the production of hydronephrosis from obstruction.

(2) Ulceration of the coats of the urethra, bladder and ureters from tuberculosis, syphilis, or gonorrhœal infection, leading to the formation of strictures and obstruction to the passage of urine. Inflammatory thickening of the walls of the bladder may be included in this group.

(3) Tumours, abscess, or hypertrophy of the prostate.

(4) Frequency of micturition, causing muscular hypertrophy of the bladder from such conditions as phimosis.

(5) The presence of calculi, blood clots, parasites, collections of thickened fibrinous pus or calculous material in the urinary passages. Of these, obstruction by a calculus is by far the most frequent.

(6) Collections of blood or pus in the true pelvis, and fibrous bands from old inflammatory mischief pressing on the ureters.

(7) Displacement of the female pelvic organs, such as prolapse of the uterus, cystocele, &c.

(8) Traumatic hydronephroses. These may arise from various injuries, and the ureter is the part most frequently affected.

(9) Flexion, kinking, or torsion of the ureter, generally

near its pelvic insertion. Many writers also include angular insertion of the ureter into the pelvis of the kidney.

(10) Hydronephroses, where no obvious cause can be found.

These are the principal causes which account for the vast majority of acquired hydronephroses. For the purposes of this thesis, however, the two classes which are placed at the end are those with which we are chiefly concerned. The occurrence of hydronephrosis in the other groups is so evidently due to a distinct obstruction that we need not consider them more fully.

Morris has shown in his work on the surgical diseases of the kidney that of 142 cases occurring in 2610 post mortem examinations, 130 were due to the pressure of tumours, chiefly cancerous. About 100 of these were double. Newman,* in 655 cases, found that 448 were double, and that the great majority were produced by tumours, calculi, stricture of the urethra, &c. The course and terminations of these cases of hydronephroses are intimately connected with the diseases of which they are only the secondary results. Most of them are not discovered until a post mortem examination is made. In the acute cases, however, such as are produced by injury to the ureter or blocking of the ureter by a calculus, our attention is directed more emphatically to the kidney and to the train of symptoms produced by the sudden obstruction. This will be considered later in connection with the special hydronephroses under the two last groups.

Until a considerable number of cases of hydronephrosis had been brought together it was generally considered that the single variety was more common than the double form. But this is far from being the case, for unilateral hydronephrosis occurs but once to every two or three cases of

* 'Surgical Diseases of the Kidneys,' 1888.

double hydronephrosis. Obstruction of the urinary passages by a calculus most commonly produces the single variety. In Newman's collection it was responsible for 57 single and 17 double hydronephroses, and is placed third in the list of the most frequent causes of this disease.

But it is the fourth class of the congenital causes, and the ninth and tenth classes of the acquired causes of hydronephrosis with which this thesis is chiefly concerned. Into one or other of these groups the case which I have described must fall. And as the hydronephroses produced by these causes differ to some extent in their course and characters from those belonging to the other groups, they will be discussed at greater amplitude.

In the 665 cases collected by Newman, 28 are given as arising from displacement of the kidneys, and entrance of the ureter into the pelvis at an acute angle. This is slightly less than 5 per cent. of the whole number. But the vast majority of these 665 cases presented no palpable tumour during life, being chiefly post mortem demonstrations, while on the other hand most of the 28 cases mentioned above did produce such a tumour, and much more frequently were essentially active factors in the termination of life. It will be found, on examining the above statistics, as well as those given by Morris, that if we exclude malignant tumours and diseases which tend to a fatal end without the assistance of such a secondary result as a hydronephrosis, that the hydronephroses belonging to these special groups occupy, with the exception of those produced by calculi and displacement of the pelvic organs, the first position as to number.

Not only do they occupy this position numerically, but they are of the first importance surgically. For, as was pointed out before, they most frequently form a distinct and evident tumour during life. Their course and termina-

tions are entirely inherent in their own pathological condition. Finally, it is not only probable but almost certain that they have been greatly underestimated as to frequency. Such a collection of cases as is given in this thesis, would strongly indicate this, or point to the fact that their diagnosis is becoming more certain and more accurate than it has been in the past.

Some writers have tried to separate the hydronephroses which present a definite tumour to the touch from those which have undergone comparatively slight dilatation, and are detected only after death. The latter class they would describe under the name of dilatations of the pelvis or kidney. The only distinction, however, lies in the difference in size, a distinction hardly sufficient to secure their division into two groups.

If then we meet with a tumour which is decided to be a hydronephrosis, and if on thorough examination we are able to eliminate all the causes which have been already mentioned as leading to hydronephrosis as a distinctly secondary affection, to what condition is it most probably due? By this elimination we mean that the causes under headings 1 to 8 inclusive have, on examination, proved to be non-existent. As all have their special signs and symptoms in addition to the hydronephrotic tumour which has been produced by them, this can be done with a considerable degree of certainty.

No doubt some cases present considerable difficulty. The formation of fibrous bands could only be known from a consideration of the past history of the patient, as in the case recorded by Simpson in the 'Glasgow Medical Journal.' The obstruction of the ureter by a gumma in a case reported by Dr. Hadden could hardly be detected during life unless it reached a tangible size.

As a rule, however, gonorrhœal, syphilitic, and tuber-

cular conditions are indicated by other and more obvious symptoms. Several cases of hypertrophy of the walls of the bladder occurring in newly-born children, and producing hydronephrosis by obstruction to the ureters at their point of entrance in the bladder have been described. No cause has been suggested for this peculiar condition. The ureters are usually dilated and tortuous, and the kidneys in an equally advanced state of hydronephrosis. Examples of this condition are recorded by Newman, *loc. cit.*, Gervis,* and Hicks,† but as they are always congenital, they hardly come under the scope of our inquiry.

Various displacements of the female pelvic organs, such as prolapse of the uterus, retroversion of both the unimpregnated and gravid uterus, cystocele, &c., are now well known to cause a considerable number of cases of hydronephrosis. Among the uncommon causes of hydronephrosis may be mentioned here a curious case recorded by Zuengel,‡ where one-half of a bifid uterus had become distended with menstrual fluid and pressed upon the ureter. Virchow was the first to point out the connection between pelvic displacements and hydronephrosis. He considered it to be due to the ureters being compressed against the arch of the pubes by the prolapsed organ. An additional cause of obstruction has been pointed out in the compression and stretching of the ureters in such cases over the brim of the true pelvis. It has also been shown that uterine prolapse frequently leads from the continued strain to displacement of the kidneys. Should the kidneys thus become freely movable, the likelihood of the development of secondary hydronephrosis is considerably enhanced.

I have included two or three such cases (57 and 67) in the tables, but only because they chanced to be included

* Trans. Obstet. Soc. Lond., vol. v. † Ibid., vol. vi.

‡ Ziemssen's 'Encyclopædia.'

in a number of cases reported by one author (Newman, Landau, &c.). Such cases, if taken in time, can be relieved by the application of proper means of support to the uterus. The etiology of these cases excludes them from our special hydronephroses. But it may be pointed out here that, if these cases should run on to the formation of large hydronephroses, surgically considered they are exactly analogous to the hydronephroses of Classes 9 and 10. There is a similar agreement in their course and treatment, and operative measures lead to equally good results.*

The detection of the cause of the hydronephrosis in such cases is not difficult. There is more trouble with the hydronephroses produced by calculous obstruction. Here, however, we have generally some previous history of the passage of sand, gravel, or calculi. In our special hydronephroses a single kidney is usually affected. This is usually the case with calculous obstruction. In the calculous form also, hæmaturia, albuminuria, and pyuria, may all at varying times be present. But the history of an obstructive calculus differs in that it is usually sudden and absolute in its action, or continuous though not complete, while there is, as a rule, an absence of variation in the size of the tumour. If, however, the calculus should remain in the pelvis of the kidney, and act as a ball valve, as in several recorded cases (Morris), the difficulty of diagnosing the cause of the hydronephrosis becomes very great.

It may be pointed out, however, that the cases of intermitting hydronephrosis which I have collected were chiefly in females (80 cases out of 109). On the other hand, in a collection of cases of calculus given by Ziemssen,† 5497 occurred in males and only 309 in females, a ratio of one

* For examples of this class see cases by Savage, 'Lancet,' vol. i. 1880; Whitehead, Brit. Med. Journ., vol. i. 1883; Walter, Brit. Med. Journ., vol. ii. 1883; &c.

† Ziemssen's 'Encyclopædia,' vol. xv. 1877.

of the latter to eighteen of the former. The incidence of these diseases on the sexes, therefore, shows considerable diversity. Complete obstruction of the ureter by a calculus seldom leads to a large hydronephrosis. Examples of this form of obstruction are mentioned by Roberts (*op. cit.*), of which one reported by Paget lived for twenty-one days with only one small emission of urine during that time. After death no particular distension of the kidney was found. A similar case is quoted by Bennett May,* with a like result on post mortem examination.

The hydronephroses which spring from congenital defects are of considerable interest, as well as importance. Most of those born with such a defect as an imperforate ureter on both sides, or with ureters whose calibre has been reduced to a size which renders them almost functionally useless, survive for only a short period of time. Such cases are recorded by Billard,† Newton Pitt,‡ Thurmen,§ and do not call for special remark.

But in some cases life has been prolonged for a term of years, more especially when the defect is unilateral. Such cases become of considerable importance from a diagnostic point of view. They may present most or all of the symptoms which accompany our special hydronephroses, and unless the history throws some light on the disease, it is impossible to distinguish between them.

Cooper Rose has reported the case of a young female who for fifteen years had a tumour in the flank. After death it was found to be due to a hydronephosis arising from an impervious ureter. Only a thin shell of kidney tissue was left. Thornton operated on a similar case in a child of seven. Braun‖ operated on a case of hydro-

* Brit. Med. Journ., 1883.
† 'Traité des maladies des nouveau-nés.'
‡ 'Lancet,' vol. i. 1891.
§ London Med. Gazette, 1837.
‖ Arch. f. Klin. Chir., 1890.

nephrosis where a double ureter existed, one of which was impervious.

In the case recorded by Sainsbury (50), the ureter was at one part impervious. But he concluded that it had become so from inflammatory mischief of a secondary character. This is a point which must be considered in all such cases. For it is not at all unlikely that a ureter with a congenitally narrowed bore may, later in life, become occluded. The inflammatory changes set up by its inability to permit of the proper escape of urine and the formation of a hydronephrosis are sufficient to account for this.

Malformations of the kidney, especially the horse-shoe variety, may not infrequently lead to hydronephrosis of a part of the kidney. An example of this condition is given in Morris's work, and Socin * performed a nephrotomy in a similar case, in which the malformation was only discovered during the operation. An example of narrowing of the ureter is seen in the case reported by Hillier.† In it the affection showed symptoms soon after birth. It is not uncommon to find in cases presenting congenital defects of the kidneys, other signs of defective development. The most frequent are hare lip, cleft palate, and defects in the development of the extremities.

Another congenital malformation which undoubtedly produces cases of hydronephrosis is variation in the number and direction of the renal arteries. It should be borne in mind, however, that irregularity of the renal arteries is extremely common (Quain). It may be expected, either with reference to the number, origin, or points of entrance into the kidney, in three out of every seven bodies, to a greater or less degree. Numerous cases have been reported where a branch of the artery has

* Beitr. z. Klin. Chir., 1888.

† Med. Chir. Soc. Trans., 1865, and tables.

entangled the ureter, or has pressed upon it in such a manner as to cause obstruction to the flow of urine. Case 23 (Coats) is a good example of this. So also is Boogard's case (No. 6), though in it the ureter was also adherent to the pelvic cyst. In addition, there was probably some mobility of the kidney to add to the effect produced by the deviating vessel.

ETIOLOGY OF THE SPECIAL HYDRONEPHROSES.

IN the previous chapter I glanced over the most common causes of hydronephrosis. Little attention was necessarily given to the great class of secondary hydronephroses. They are entirely outside the scope of this work. Fuller consideration was given to the hydronephroses from calculi, malformations, and displacement of the female pelvic organs. This was done on account of the similarity between such tumours and our special hydronephroses, and because the difficulty of distinguishing between them etiologically is very great. Cases of urinary obstruction from thickening of the coats of the bladder were also noticed.

There remain for consideration cases of hydronephrosis arising from congenital valvular obstructions in the ureters or urethra; hydronephroses produced by flexion or torsion of the ureters, or by their angular insertion into the pelvis of the kidney; and, lastly, hydronephroses which present no obvious cause for their production.

The occurrence of hydronephrosis consequent to an obstructive valvular fold or folds in the urethra has been reported more than once.* The same result may follow an imperforate urethra.† But their consideration need not detain us. With relation to valvular folds causing obstruction in the ureters, the case is different. A fair number of

* Lamotte, 'Traité des accouchements.'

† Howship, 'Treatise on Diseases of the Urinary Organs.'

cases of hydronephrosis were reported from the middle of the century to a comparatively recent date, which were considered to have their origin in this defect. These valvular folds of mucous membrane were universally considered to be congenital. They were usually near the pelvic end of the ureter, running transversely across it, and seldom complete. An example of this condition is seen in Case 10, reported by Dr. Broadbent,* and there can be little doubt that in this case it was congenital. No doubt there are others in which a similar congenital condition has existed.

But a suspicion arose that these valvular folds were not the cause, but only a sequence of the hydronephrosis. Cohnheim and Simon, and before them, Virchow, were the first to observe and consider this point in detail. In Cases 25 and 50, valvular folds existed close to the renal origin of the ureters. In the consideration of their development it may be of interest to refer to the appearance of the ureters in intra uterine life, and the changes which they afterwards undergo.

Wölfler,† to solve this question, specially examined the ureters of a hundred children who were either still-born or lived only a short time after birth. He found that, taking the whole length of the ureters, folds in the mucous membrane of some shape or form existed in twenty of them. These folds were usually diagonal or transverse, and in ten cases were of sufficient size to act as valves. On the other hand, on examining the ureters of fifty adult bodies, not a single case presented valvular folds. Longitudinal folds of course occur naturally in the ureters, but never act as an obstruction. From this he concluded that the folds

* Trans. Path. Soc., vol. xvi.

† Langenb. Archiv. f. Klin. Chir., Bd. 21, Heft 4. Wölfler also figures some good cases of congenital stricture of the upper end of the ureter with commencing hydronephrosis.

occurring in intra uterine life disappear altogether during extra uterine existence. That for a similar reason it was most probable that the folds found in cases of hydronephrosis in adults were secondary in origin.

Simon came to the conclusion that the hydronephrosis was the primary disease, and that these folds were formed by the pressure on the mucous membrane of the ureters, while the latter were lying in an angular position in relation to the escape of urine from the distended pelvis. He considered that the angular insertion of the ureter was the original pathological error. This opinion has been strongly controverted by some writers, and, I think, with success.

If we examine the whole group of causes now under consideration by the light of the cases in the tables, we find a certain definite relation between them. Such causes were kinking, twisting, torsion or flexion of the ureter, valvular folds in the ureter, valving of the ureter (all occurring near the renal end), and angular insertion of the ureter into the pelvis. By valving of the ureter is meant the entrance of the ureter into the pelvis in such a manner that when the latter is distended the ureter is compressed and rendered temporarily impervious by the internal pressure.

If an obstruction to the flow of urine is produced by torsion or bending of the upper end of the ureter (generally close to the pelvis), a dilatation of the pelvis follows. Should this process be frequently repeated, the coats of the pelvis, as shown by Cohnheim, gradually lose their elasticity. They become unable to contract the cavity of the pelvis to its normal size on the relief of the pressure. The kidney, as we shall show, is in these cases generally mobile. When the hydronephrosis reaches a moderate size, the kidney is tilted to one side, and loses its anatomical position. The natural result is that the relation of the axes of the ureter

and pelvis is permanently altered. Or, what is practically equivalent, the pelvis, as it distends in the direction of least resistance (which is downwards and forwards and inwards), also tends to alter the relation of the exit of the ureter.

The ureter in this manner may come to enter the pelvis above its apparent lowest point. It may seem to spring from the middle of the dilated cyst (Case 74), or even from its upper part. Or, after considerable dilatation has occurred, the kidney dropping downwards, permits the ureter to become S shaped, or double itself up in various peculiar twists. (Cases 12, 52, 106.)

As a result of the attacks of inflammation which occur during the formation of these hydronephrotic cysts, not only in the connective tissue round the kidney but even in the peritoneum, adhesion of the redundant ureter to the cyst wall frequently follows. (Cases 27, 31, 52, &c.)

In the same way the rotation of the tumour leads not only to angular insertion, but to the ureter becoming valved, exactly as occurs in its entrance to the bladder.

The ureter in such cases may from distortion run up for some distance between the coats of the dilated pelvis, or more usually beneath its peritoneal covering. The latter has become incorporated with the cyst through inflammatory exudation. The varying degrees of this condition are shown in Cases 1, 22, 24, 43, 74, &c., where the ureter is involved in the walls of the tumour for a distance which varies from half-an-inch up to twelve inches or more.

In several of the cases given in the tables, flexed or twisted ureters had become so firmly adherent to the dilated pelvis as to prevent the escape of urine during life while the tumour was distended. But a light dissection after death easily separated the ureter and allowed the urine to gush freely out. (Cases 12, 52, &c.) Landau quotes

a case where the kidney had become prolapsed and rotated on its axis in such a manner as to bend the pelvis and ureter round the renal vessels. Should hydronephrosis occur in such a case, it is easy to understand how great would be the deviation from its normal position which the ureter might ultimately assume. (See also Case 6.)

Several cases of marked narrowing of the ureter in its exit from the pelvis are recorded (Case 20), and there is little doubt that, as with impermeable ureter, this condition is often congenital. In some cases we find considerable thickening round the orifice of the ureter, with some amount of constriction, or even impermeability of the upper part of the ureter along with a hydronephrotic cyst. It is not to be immediately concluded, however, that this condition is congenital. On the contrary, there is considerable proof that the inflammatory conditions which accompany the formation of the cyst, when it arises from torsion of the ureter, are sufficient to explain not only the thickening and narrowing, but even the obliteration of the ureter.* It is well to bear in mind in relation to this point that the ureter has no real orifice into the pelvis, but gradually dilates to form that cavity.

* Sainsbury, Trans. Path. Soc., 1886.

INTERMITTING HYDRONEPHROSIS.

ONE of the most essential characteristics of these special hydronephroses is the variation in the size of the tumour, with a corresponding increase or decrease in the amount of urine passed. Dr. Cole, of Bath, was the first to give a distinct title to this variety, which he described under the name of *intermitting* hydronephrosis.* (Case 21.) A little later, Morris,† in recording a case of intermitting hydronephrosis drew prominent attention to this symptom, and gave a collection of nine cases in which it had been noted (his case, No. 29, is included in the list given at the end, though it does not belong to the group of hydronephroses with which we are concerned). This paper paved the way to a more careful consideration of the signs of hydronephrosis, and, as it appeared in the early years of the surgery of the kidney, which he has done so much to advance, was of great and permanent value.

Such cases have been, however, described without appreciation by older writers. Rayer quotes a case from Tulpius of a man who regularly at full moon had suppression of urine lasting several days. The urine recommenced to flow with the waning of the moon. Venesection was generally performed at the same time, as he considered that it aided the re-establishment of the flow of urine. After death there was found a great dilatation of the left

* Brit. Med. Journ., vol. ii. 1874.

† Med. Chir. Soc. Reports, vol. lix. p. 227.

kidney. Tulpius believed that the venesections were effective from the relief they afforded in diminishing the pressure in the great veins of the kidney.

These variations in the size of the tumour may be acute and sudden, or slow and progressive. With the passage of a large quantity of urine, healthy or otherwise, the whole swelling may suddenly collapse. Clement Lucas,* happily suggests that such intermissions may account for a few of the rapidly vanishing class of phantom tumours of the abdomen.

Or, for days, or even weeks, the tumour may slowly increase in size, and then as slowly subside. The tumour may entirely disappear, as has been said, or it may only partially subside, and if so, it grows larger and larger with each attack. Ultimately the hydronephrosis becomes permanently fixed, or the only variation afterwards shown is a steady increase in size.

The average time required for one of the periodic elevations and diminutions of the tumour is two or three days. The great majority of the attacks are comprised within a space of time of twenty-four hours to four or five days. It is certain that in all hydronephroses where the obstruction is intermitting, this variation in the size of the tumour must necessarily occur.

But, as has already been pointed out, very few of the hydronephroses from obstructive tumours, &c., become palpable tumours, or are recognised during life, and therefore these objective signs are equally undetermined. It is especially in the hydronephroses arising from congenital defects and in the special classes we have mentioned, that a tumour is detected and that variation in size is observed. Landau considers that Eger † was the first to point out its

* Brit. Med. Journ., vol. ii., 1891.

† Berlin, Klin. Wochen., No. 23, 1876.

appearance in the hydronephrosis following movable kidney. He himself specially observed it in one case on which he operated, and in his work on movable kidney dwells on this point at considerable length.

Other names applied to this condition are—*temporary*, *transitory*, *transient*, or *relapsing* hydronephrosis. A distinction is sometimes drawn between these cases and those in which the hydronephrosis is *constant*, *fixed*, *closed*, or *permanent* in its nature. But, as it has been shown that the latter conditions are simply later phases in the course of the disease, it is needless to complicate the subject by the introduction of such descriptive titles.

The name *remittent hydronephrosis*, proposed to be applied to that state of the tumour in which it never really disappears, and in which its decrease in bulk becomes less and less after each attack, should be considered in a similar light. It is simply that stage of the hydronephrosis which immediately precedes the complete closure of the cyst.

Among the cases which I have collected, though they do not specially bear on this point, at least eighty presented this sign.* This is after excluding two cases of dilated ureters. If one had included the numerous cases published of hydronephrosis resulting from uterine displacements, the number might have been very much increased. This fact however remains, that it is in the special class of hydronephroses described in this thesis that variation in the size of the tumour from time to time is most frequently observed.

The sign for most practical purposes may be considered pathognomonic. The only condition that could in any way

* Roberts, in his work on 'Renal Diseases,' p. 551, considers this form of hydronephrosis to be very rare. The cases collected here hardly bear out this statement.

lead to a mistaken diagnosis is the rupture of a cyst, most commonly ovarian or hydatid, into some part of the urinary tract. If this occurred there would be a sudden subsidence of the tumour and the passage per urethram of a large quantity of fluid, which would be considered to be urinous by the patient.

The passage of a large volume of urine on the sudden subsidence of a hydronephrosis, though typical, is not very common. More frequently the urine is simply lessened in quantity during the attack, and increased during the fall of the swelling. Still, if looked for, the alternation is sufficiently striking, even in cases where the duration of the attack extends over several days. Should the dilatation of the kidney be pyonephrotic, then on the decrease of the swelling, the amount of pus in the urine will be largely increased. During an attack, however, pus may, if the opposite kidney is healthy, altogether disappear from the urine. Such a sign affords a peculiarly marked indication of the condition of each kidney.

Similarly with hæmaturia, if it should be present in a patient with hydronephrosis. During the elevation of the swelling the urine may become almost or quite free from blood, while on its decrease the amount of blood in the urine is usually much augmented.

CONNECTION BETWEEN MOVABLE KIDNEY AND HYDRONEPHROSIS.

HAVING discussed the appearances presented by the ureter in this class of hydronephroses as seen by the light thrown upon them by the cases I have collected, it is necessary to consider somewhat more closely the theories as to the origin of such appearances. It may be stated here that, for reasons I shall give in another part, the group of hydronephroses, without any obvious cause, is included in the same category as those hydronephroses which spring from obstruction of the ureter by torsion or flexion.

That hydronephrosis might occur as a direct sequence of mobile kidney was first shown by Eger (*loc. cit.*) according to Landau, though Terrier disputes this statement Landau followed with one or two examples in his own practice, which are given in his work on wandering kidney. Since then a considerable number of examples has been recorded, most of which are given in the tables at the end of this thesis. It may then be taken as an accepted fact that such a sequence of events not infrequently occurs, and that it has probably been much underestimated.

In dealing with mobility of the kidney, it was pointed out that the centre of the part of the circle through which the kidney could move was the origin of the renal vessels, and that the usual direction of movement was downwards and forwards. It was shown also that any such motion was, as a rule, accompanied by a rotation of the kidney on

one or other of its axes. Landau has given a full description, with plates, of such cases, and shows very clearly in a diagrammatic form the appearance of these displacements and rotations of the kidneys.

From this mobility, flexion of the ureter is temporarily produced, along with a certain amount of torsion. Ferrier (*loc. cit.*) considers that the torsion of the ureter is invariable, and that it is the most important element in producing obstruction. (Case 98.) At the same time, some amount of twisting of the renal vessels may be produced, especially of the renal vein. The artery, from its large size and the thickness of its coats, is less likely to suffer.

In the account of movable kidney, torsion of the vessels was fully considered, and its effects upon the kidney. It was shown that increase of pressure, caused by obstruction to the flow of blood in the renal vein, if carried to a marked extent, led to decrease or suppression in the flow of urine. Also that urine secreted under increased blood pressure was more concentrated than usual, and often contained some amount of albumen, and, in severe cases, even blood. In addition, the torsions and flexions of the ureter were mentioned. That such conditions do occur has been clearly shown by post mortem demonstration, and, during operations, in the living subject. (Case 98 is an example.) The symptoms noted in the clinical study of cases of movable kidney are in agreement with such a belief, and experimental evidence can also be produced in its favour.

The question then is, can simple flexion or torsion of the ureter set up a condition of hydronephrosis? Landau has shown, by the simple means of an indiarubber ball with an afferent and efferent tube, through which water is propelled, how speedily a bending of the tube reduces or stops the flow of water. It is also seen that this obstruction to

the flow of water through the tube continues until the ball alters its position from distension, thereby altering its axis, or until the pressure is sufficiently great to force the water through the bend and straighten the tube.

In a similar manner it is believed that, the ureter having become twisted or flexed near the pelvis, the latter becomes distended with urine. This distension increases in amount until either of the following conditions occur:—(1) The pressure may become so great as to overcome the obstruction in the ureter. The dilatation of the ureter immediately above the angle no doubt aids in the production of this result. (2) The kidney and pelvis as they enlarge may produce some more favourable position of the organ in relation to the axis of the ureter; or, the kidney may slip into its natural position, or slightly untwist itself, and in this way permit the contained fluid to escape.

It does so, rapidly or slowly, according to the manner in which the obstruction is removed. External manipulation by the sufferer, or the adoption of the horizontal position, in most cases assists the efforts of nature.

Gilewski * was the first to point out the connection between the acute paroxysms which are seen in some cases of migratory kidney and the earlier stages of a hydronephrosis. His case, however, occurred in an individual the subject of curvature of the spine, and he considered it probable that the kidney was caught between the last rib and the spine in such a way as to compress the ureter. However, he grasped the idea that there were conditions occasionally present in movable kidney which might lead to hydronephrosis.

The pressure required to stop the flow of urine in the human ureter is practically very small. Newman † and

* Wien. Med. Wochenbl., xxi. 18, 1865.
† Journ. Anat. and Physiol., 1878.

James * both present us with facts from which we may deduce the probable pressure required. In his interesting paper on some cases of hydronephrosis produced by frequency of micturition in young boys suffering from phimosis, James gives us valuable information. He shows that the constant contraction of the bladder in these cases was sufficient to check the flow of urine from the ureters into the bladder, and to set up double hydronephrosis with dilatation of the ureters. He quotes authorities to show that a pressure of only 10 mm. of Hg in the ureter is sufficient to seriously check the flow of urine. He found by his own experiments that the expulsive force of the bladder, plus the abdominal muscles, was equal to about 4 inches of Hg. Also that the distended bladder showed an internal pressure of 20 to 30 mm. of Hg. From these facts he concluded that the contractions of the muscular coats of the bladder were sufficient, if kept up in a fairly continuous manner, to check the secretion of the kidneys. His cases also exhibited the effects of this pressure on the quality of the urine. During the continuance of the spasms the urine was scanty and of high specific gravity. But with the relief of the symptoms there followed a flow of urine of low specific gravity.

The pressure in the renal artery varies between 120 and 150 mm. of Hg, and a fall of the blood pressure to 40 mm. of Hg entirely checks the secretion of urine. In another part it was shown that obstruction to the flow of blood in the renal vein was immediately followed by distension of the kidney, and cessation of the secretion of urine.

Numerous experiments have also been made as to the results produced by tying the ureter. (Cohnheim, Litten, &c.) After such an operation, urine almost immediately ceases to be secreted by the kidney. A short primary

* Edin. Med. Journ., 1877.

distension of the organ generally occurs. Newman, in the paper cited above, shows very clearly that with a pressure of 10 mm. of Hg in the ureter the circulation through the vein is diminished by one-half. If the pressure is raised to 40 mm., the circulation is almost entirely checked. Bennett May * states that on injecting fluid into the ureter there is some resistance until about half an ounce has been injected. Then the resistance lessens, and ceases, and the fluid which is passed into the ureter flows freely out by the renal vein.

Taking all these points into consideration, it is plain that a pressure of fluid in the pelvis of the kidney, almost insignificant in itself, can dilate the uriniferous tubules, together with the glomeruli, and check with greater or less completeness the circulation in the capillary tufts. And, as a direct result, there is a temporary diminution, or, if the pressure is great, a complete cessation of the secretion of urine.

A further observation in the same direction is given by Stadfeldt,† in a paper describing the condition of the ureters in women dying in childbed. In sixteen examinations, he found the ureters more or less dilated in nine cases, the right ureter generally being most involved. I have seen two cases where the right ureter, after death in childbed, was found moderately dilated throughout its whole length, but more especially near the kidney. The pressure which is sufficient to produce this state of the ureters cannot have been very great, or some signs of it would have been noted in adjoining organs.

In connection with the secretion of urine under pressure, Newman has pointed out that in the case of fluids containing colloidal substances passing through animal membranes, the greater the pressure to which the fluid is submitted,

* Brit. Med Journ., 1883. † Monats. f. Geburtsk., 1862, p. 71.

the nearer in composition to it is the filtrate. In a case of movable kidney recorded by him, he concluded that the renal vein was obstructed during a painful attack, because the urine passed by the patient during the attack was very concentrated. This indicated a high pressure in the capillaries from obstruction to the flow of blood in the renal vein.

In the same way the low specific gravity of the urine passed after an attack is due to the cessation of the pressure in the kidney, caused by the retained urine. The low specific gravity of the fluid found in a distended hydronephrotic cyst may be explained by the fact that the urine is secreted against a pressure which approaches that of the blood itself, and, according to the experiments mentioned, must necessarily contain a less quantity of solids. Cohnheim also points out that on relief from obstruction and the escape of the pent-up fluid, there is a rapid secretion of fluid of a low specific gravity, owing to the release of the capillaries from pressure.

Some differences in the appearance of the urine may depend on the exact nature of the obstruction. If that is only partial, and permits the continuous escape of a moderate but insufficient quantity of urine, the effect on the circulation through the kidney must differ in nature from that which is caused by an obstruction which, for a time at least, is absolute and complete.

A noticeable point in looking over the collected cases is the frequency of the appearance of blood, albumen, or in more advanced cases pus, in the urine after an attack. Some of the conditions just mentioned may account for this in many instances. But in some cases, undoubtedly, the sudden reduction in volume of the congested pelvis and kidney affords a better explanation. Laceration of the capillaries, which have been weakened by the excessive

pressure of the retained urine, must often occur. Such a result would account more satisfactorily for the amount of the succeeding hæmaturia.

A consideration of all the facts just given justifies the conclusion that mobility of the kidney, even of a slight degree, is sufficient in some cases to produce a hydronephrosis. It has been shown how slight is the barrier in the shape of flexion of ureter which is required to obstruct the flow of urine, and how minute is the extra vascular pressure which is required to check the secretion of urine. Such being the case, many hydronephroses, whose cause is undetected on post mortem examination, may fairly be said to have their origin in such a condition of the kidney. Much more certainly does it hold good when there is found, in addition, post mortem torsion or distortion of the ureter.

Further evidence is, however, supplied on an examination of some points having special relation to the ureters. The ureter is freely supplied with nerves, both medullated (few) and non-medullated. The latter have numerous ganglia. During an attack of intermitting hydronephrosis from kinking, the pain is extremely acute and colicky in its character. It is similar to that felt during the passage of a calculus. If the torsion of the ureter is a little below the level of the kidney, the muscular coats of the ureter above that point, as well as those of the pelvis, must be brought into action in resisting the pressure placed upon them.

If a little urine escapes, and is immediately replaced, these contractions must be necessarily repeated again and again. Ultimately the pressure becomes so great as for a time to paralyse the nerve supply. (In discussing the symptoms of this form of hydronephrosis, this will be again referred to.) Intense congestion of the kidney is

also produced, and its capsule is slowly expanded by the pressure of its contents. Excessive local pain and tenderness must be caused by the interference with the nerve supply during this process.

It was shown that on ligature of a ureter in animals, not only as a rule was there no great distension of the kidney, but the pain produced seemed to be comparatively slight. Again, the flow of urine from the opposite kidney was found sufficient to carry away all the effete products usually excreted in the urine.

In human beings, on the other hand, though only one kidney is involved, slight uræmic symptoms quickly show themselves. Headache, nausea, and vomiting are marked symptoms, without, it is true, becoming very serious until the later stages of the disease, or the appearance of a similar condition in the opposite kidney.

It seems probable that the complete ligation of the ureter in the experiments mentioned must immediately cut off all power of nerve conduction. This may account for the absence of pain in animals. The obstruction, also, which is produced by ligation is instantaneously complete, and it is known that the secretion of urine is not carried on to any extent under such conditions. (Albarran,* Strauss, and Germont (*loc. cit.*) and others.)

But in the human subject the obstruction is slower in its formation, and allows the ureter and pelvis to become greatly congested. This undoubtedly causes intense irritation of the nerve plexuses. Landau states that in two of his cases of mobile kidney, if pressure was made on the affected kidney, pain was complained of in the region of the opposite kidney. Such transference to corresponding organs is not uncommon. It is possible that in the paroxysms of pain from which the subjects of hydronephrosis suffer, some

* Paper by Guyon in Annales des Malad. des Organ. Génit. Urin. 1891.

such reflection is produced on the opposite kidney of sufficient strength to hinder or inhibit its secretion of urine.

This would explain the appearance of uræmic symptoms during an attack. Many of the cases which I have collected point to such an occurrence. For, even though one of the kidneys was healthy, or presumably so, yet during an acute attack the total amount of urine was very much diminished. This diminution often persisted for a period of one or two days, and in some cases there was complete anuria for a considerable number of hours. There is one drawback to this explanation. Several cases have been reported of sudden block of the ureter by a calculus, and in which the opposite kidney was absent or ineffective. Symptoms of uræmia of an urgent nature were delayed for several days or weeks, a fact which it is difficult to explain. These cases, are, however, exceptions to the general rule of the prompt appearance of uræmia under such conditions.

Some further light is thrown on the question of hydronephrosis by cases of extroversion of the bladder. Champneys,* in a paper on this malformation, shows that several cases of extroversion have, after death, presented double hydronephrosis and tortuous dilated ureters. Guided by the paper by Dr. James, he considers this condition to be due to the frequent contraction of the muscular fibres of the bladder upon the ureters as they traverse its wall. This frequency of contraction is set up by the irritable condition from exposure of the inner surface of the bladder. A similar result is thus brought about to that which is found in the irritability of the bladder from phimosis.

He quotes Wundt (Lehrb. der Physiol.) as to the pressure of Hg required to check the flow of urine in the ureter, being only 7 to 10 mm. But he adds that Herman has shown that if the manometer is retained for two hours or

* St. Barthol. Hosp. Reports, 1880.

longer in the ureter, the pressure may rise to 40, or even 60 mm. of Hg. Against such a pressure, any urine which is secreted is of a very watery description, and deficient in salts.

Sinitzine,* of Moscow, in a case of extroversion of the bladder introduced a sound into the orifice of the ureter and so obstructed the flow of urine. The patient in a short time exhibited all the symptoms of a typical attack of acute hydronephrosis. Discomfort, pain, headache, nausea, acute pain, and vomiting successively followed, with complete relief on withdrawing the sound and permitting the escape of the retained urine. The injection of medicated solutions under pressure into the ureter produced a similar train of symptoms. But in addition there developed a febrile attack which probably arose from septic infection of the pelvis of the kidney. This showed clearly, though unfortunately, one way in which a hydronephrosis may pass into a pyonephrosis.

Finally, in connection with the torsion of the ureter, it may be pointed out that Ferrier (*loc. cit.*) lays great stress on the venous supply to the pelvis of the kidney and the upper part of the ureter. He quotes from a paper by MM. Legars and Tuffier,† in which they describe a plexus of veins in the pelvic walls. This plexus forms a sort of collar through which the ureter passes in its exit from the pelvis. During the flexion and torsion of the ureter in movable kidney these veins become choked and distended, and form a prominent factor in making the obstruction more complete and less easily reduced.

* Russian Medical Congress, Moscow, 1891, quoted by Ferrier.

† Arch. de Physiol. Norm. et Pathol., 1891.

PATHOLOGY OF HYDRONEPHROSIS.

THE following outlines of the pathology of a case of hydronephrosis arising from one or other of the causes mentioned in the special groups is taken from a consideration of the collected cases given at the end. Any hydronephrotic dilatation of the kidney and pelvis must arise from some obstruction to the passage of the urine lower down. That obstruction may be complete and absolute, occasional and intermitting, or constant but not complete. The effects produced on the kidney by these conditions differ very materially, and it is the second variety which principally concerns us.

If the ureter is suddenly and completely blocked, as by a calculus, atrophy of the kidney is the usual result. A case is recorded where a man with one active kidney had the ureter suddenly blocked by a calculus and died fourteen days later. On post mortem examination it was found that no great distension of the kidney had been caused by this sudden obstruction.

Strauss and Germont,* in numerous experiments on guineapigs, where complete and partial ligations of the ureter were performed, showed that on complete ligature of the ureter comparatively slight hydronephrosis appeared by the 15th to the 20th day. Commencing obliteration of the papillæ was noted at the same time. When the animals were killed four to six months after ligature of the ureter,

* Arch. de Phys. Norm. et Pathol., 1882.

there was moderate hydronephrosis, and the renal substance was found reduced to the thickness of an egg-shell. Later still the kidney was found to be entirely shrivelled.

It has been shown * that soon after complete ligation, the tubuli uriniferi become distended and the pelvis of the kidney also stretches from the increased pressure. Simultaneously there is considerable congestion of the kidney. Soon, however, the pressure of the urine on the capillaries of the glomeruli becomes so great as to choke the circulation, and the secretion of urine practically ceases. Starved of its blood supply, the kidney slowly wastes, and within a definite time completely atrophies.

Newman, in a communication to the Edinburgh Royal Society in 1878, gives an account of some experiments made by him bearing on this point. Salt solution was passed into the renal artery of a fresh kidney of a horse under a pressure of 50 mm. of mercury. The ureter was simultaneously filled with salt solution, which was subjected to various pressures. When no pressure was applied to the ureter, 23 cc. of salt solution passed out by the renal vein per minute. But when the pressure in the ureter equalled 45 mm. of mercury, only 1·5 cc. of the solution escaped from the vein in the same time. With varying degrees of pressure between these two points—highest and lowest—the quantity of solution passing through the vein was relatively greater or less in amount. It will be seen from this how easily insufficient blood supply or stasis of the circulation is produced by the pressure of the dammed up fluid in the pelvis and kidney.

In the second form of obstruction, the course of events is altogether different, though the result in some cases is practically the same. Let us suppose the obstruction to be in the ureter near its pelvic end, and to be occasional in its

* Senator, on 'Albuminuria in Health and Disease,' Berlin, 1881.

application. We find that the pelvis becomes distended more and more with each attack. The elastic nature of its walls easily permits such a distension. The calyces are dilated and the apices of the pyramids become flattened; the tubuli uriniferi undergo distension; the glomeruli are diminished in size.

Griffiths * has examined a number of hydronephrotic kidneys at various stages in the course of the disease. He shows that the signs of pressure are visible only on the layer of tissue immediately beneath the compressing fluid.

In the substance of the kidney, the method of destruction is that of an interstitial nephritis, which exhibits itself in areas of increased connective tissue with intervening sections of healthy tissue. The tubuli uriniferi are first distended and filled with granular débris and then undergo atrophy. The convoluted tubules show numerous microscopic cysts and the Malpighian bodies degenerate into fibrous tufts.

The arteries become thickened and contracted, and the circulation in this way is seriously checked. In this manner, internal pressure and interstitial mischief going hand in hand, the kidney is utimately reduced to a fibrous framework. He points out also that the large vessels running to the hilus are stretched and compressed over the distended pelvis, while their various coats are very much thickened. This presents an additional obstruction to the freedom of the circulation in the kidney, and aids in its starvation.

This pathological description is not quite in consonance with Newman's theory. He considers that the pressure of the urine in the Malpighian bodies obstructs the capillaries springing from the afferent vessel to supply the cortex. As a result of this the cortical part of the kidney must

* Trans. Pathol. Soc., 1889.

rapidly waste. It is not, perhaps, of great importance, but it may be noted in favour of Mr. Griffiths that in all cases the cortical part of the kidney is the last to disappear.

As the disease proceeds the pyramidal bodies gradually disappear and the capsule of the kidney and pelvis become more and more widely distended. The cortical tissue which is left is found spread out as a thin layer on the inner surface of the cyst.

Ultimately, if the obstruction continues, all secreting tissue disappears, and the dilated capsule may then slowly shrivel up and leave only a small kernel to represent what had formerly been the kidney.

In other cases, after the hydronephrosis has attained a certain size, the obstruction often becomes complete in a manner which will be considered later. A slow but progressive dilatation then goes on, until at last a mere framework of fibrous tissue distended with fluid remains, with its glistening surface destitute of a single particle of kidney substance. (Cases 4, 5, 14, 24, etc.)

In less extreme cases a fibrous skeleton of the kidney (containing fluid) is left, divided into numerous compartments representing the distended calyces prolonged in the direction and supported by the remains of Bertini's columns. These divisions usually communicate with one another and with the pelvis, but occasionally they have been found to form closed cavities.

In one case the sac was full of a colloid material (Case 24) similar to that which has been described as occasionally occurring in true cystic tumours of the kidney. In another peculiar case (No. 50), the sac was full of a creamy white pultaceous material, probably a degenerated secretion of some lymphoid follicles in the pelvis of the kidney.

In a considerable number of cases, however, the hydronephrosis passes into a pyonephrosis. (Cases 74, 87, 88,

98, &c.) No distinction ought therefore to be made between a hydronephrosis from such obstructive causes as are referred to here and a pyonephrosis from similar causes. The latter is simply a sequence of the former.

During the repeated attacks of obstruction intense congestion of the pelvis and kidney is temporarily set up. These congestions, and even inflammations of the pelvis, place the parts affected in a condition which must make them readily susceptible to septic influences. As we shall see in considering the symptoms, hæmorrhage from the kidney and albuminuria are frequent concomitants of an obstructive attack. These signs indicate the gravity of the disturbance which is set up. It only requires, in addition, some wasting or severe illness, some constitutional weakness or other adverse agency, to be thrown into the balance to produce a purulent catarrh of the pelvis.

Ferrier * is very emphatic on this point, and there can be little doubt of the justice of his conclusions. In one direction there is the passage of septic organisms along the urinary tract, which is certainly more apt to occur when the ureter is in a muco-catarrhal state, and the bladder in a condition of extreme irritation from frequent attempts at micturition. In addition there is always the possibility of auto-infection. By this is simply meant that a constant repetition of inflammatory processes in any organ weakens the tissues and alters their power of resistance. Under such conditions organisms already present in the system can exhibit a morbific influence which they are unable to exercise in the presence of healthy tissues. Terrier dwells at considerable length on the fact that pyonephrosis in this class of cases is simply a hydronephrosis which has become septic, and that this termination (Cases 87 and 88) not infrequently occurs.

* 'L'Hydronéphrose Intermittente,' Ferrier et Baudouin, 1891.

If a case passes into a pyonephrosis, the patient's health becomes more directly and seriously affected, and a fatal result sometimes ensues from the augmented drain which the system has to bear. In some cases of pyonephrosis of this character, however, nature is able to hold out until the kidney is completely destroyed. With the termination of its activity, the disease ceases, and the cyst shrivels up.

If the pyonephrosis has become fixed, it may remain, distended with purulent fluid, in a quiescent state, or become diminished in size to a greater or less extent by re-absorption of its fluid contents.

A few exceptional cases of spontaneous cure of hydronephrosis during the course of the disease have been recorded. This result is possible when, by some fortunate chance, the cause of the obstruction ceases to act. Pregnancy has been the cause of this happy result in several cases. The kidney most likely becomes fixed in a position in which it can overcome any obstruction already existing, or, having lost its mobility, the ureter remains patent, and the intermittent obstruction previously existing disappears. (Cases 14 and 59.)

Too often, however, pregnancy has a contrary effect, and hastens the progress of the disease. It must not be forgotten, in describing a case as cured, that there are numerous records of recurrence after the lapse of years (Cases 11 and 61), when a permanent cure was thought to have been secured.

From the foregoing statements, then, it is seen that hydronephrosis, from an obstruction of the nature mentioned, pursues a definite course with certain definite terminations. With a few exceptions, these ultimately lead to complete destruction of the kidney, and the practical cure of the complaint.

How long a time elapses before this much-desired result

occurs? A case is recorded by Rayer of a workman who sustained an injury to the kidney from a crush. Hæmaturia immediately followed, and later a remittent tumour was detected in the flank. He died less than two months after the accident. On post-mortem examination, the tumour, which was formed of the dilated kidney and pelvis and pelvic part of the ureter, was found to be full of a mass of black coagulated clot, commencing to decompose. There was no trace of kidney substance to be seen. It had been totally destroyed in the short space of six or seven weeks. But in this case the pressure of blood from ruptured vessels had doubtless hastened the rapidity of the destruction. In addition there was also a fairly complete obstruction to the flow of urine.

In other more typical cases, three to seven years is the shortest time in which intermitting obstruction has led to a complete, or almost complete, destruction of the secreting tissue. (Cases 37, 51, 56, 89.) But many cases present a history far more prolonged. Case 13 was still labouring under the complaint twenty-five years after the first appearance of a tumour.

In my own case, twenty years elapsed between the first symptoms and the performance of nephrectomy. When that operation was performed, there remained only a shell of cortical tissue. Here, however, the more acute symptoms had only been in existence, without intermission, for about four years. From an examination of all the collected cases, I have formed the conclusion that if the obstruction, though intermitting, never ceases—and by this is meant that if the swelling on subsiding recurs without any prolonged interval between the attacks—three to five years is sufficient to produce complete destruction of the kidney.

Many cases, however, have periods of intermission lasting months, or even years (Cases 11, 13, 17, 32, 35, 61,

and 80). Under such circumstances the disease, if not interfered with, may drag on its existence throughout the patient's lifetime. If, however, the disease should prove to be double, or occur in an individual possessed of but a single kidney, or having the opposite kidney affected with another disease, then the march of events is very much hastened. In such cases symptoms of uræmia occur within a short time, and a fatal termination inevitably follows. (Cases 12, 31, 50, 62, and 74.)

In addition to the liability to uræmia and its consequences, rupture of the distended organ has been several times recorded. Its contents may escape into the peritoneal cavity (Cases 11 and 38), or into the bowel (18, 28). The latter accident is not necessarily fatal.

The attacks of peritonitis of a local nature, which are an almost constant complication of the disease, rarely, if ever, lead to a fatal termination. But they invariably set up adhesions between the distended kidney and adjoining organs. The colon is naturally, from its position, very liable to become adherent (Cases 88, 44, and 35), but in some cases, where the tumour has reached a considerable size, the small intestine may be found firmly attached or tightly stretched over it (Case 74). Obstinate constipation, approaching to obstruction, as in Roberts' case, may in this manner be produced. This condition may alternate with atta ks of diarrhœa.

Gastric hæmorrhage (Case 74) from pressure has been noted, and hæmorrhage from the bowel is more frequent still. It was a marked and most misleading symptom in my own case, and is mentioned in several of the cases recorded in the tables at the end. Though pressure on the bowel is the most likely cause of the hæmorrhage, this may not be the only explanation. In several cases of nephritic colic from the passage of a calculus, Dr. Mitchell

Bruce * has observed hæmorrhage from the bowel. The two diseases to some extent correspond, but the hæmorrhage in the latter case would require a very different explanation to account for it.

During the course of a hydronephrosis, the opposite kidney, as a rule, enlarges, and may be considerably increased in size. Such enlargement, as has been shown by Prof. Golgi, is chiefly owing to the increased blood supply required by the greater activity of the kidney. Along with this there is, however, an increase in the connective tissue of the kidney, and perhaps an increase in the epithelial elements of the secreting tubes. There can, of course, be no actual increase in the number of the Malpighian corpuscles and uriniferous tubules, but they probably become hypertrophied.† In the affected kidney itself, if the obstruction is not too frequently repeated, there may, *pari passu* with the destruction by pressure of the superficial or pelvic portion, be some increase in size of the remaining part, from combined congestion and increased connective tissue formation. This may savour of a paradox, but several recorded cases have exhibited this condition. It occurs only during the earlier stages of the destruction of the kidney, and when there is a considerable interval of time between each attack. During the second operation on my case this hypertrophy was noticed, though in this case the kidney had probably undergone some enlargement before the obstruction commenced to act.

Double hydronephrosis was observed in twelve of the cases which I have collected. In hydronephrosis arising from other causes, the double variety is much more common than the single, the contrary being the case in our

* Quoted by Godlee in 'Practitioner,' vol. ii. 1887.

† Fagge (vol. ii. p. 527) favours the view of a hyperplasia rather than a hypertrophy. He bases this opinion, however, on the result of the examination of cases where one kidney was congenitally absent.

special group. In the latter also the hydronephrosis never appeared in both kidneys simultaneously. The disease generally showed itself in one kidney long before it presented any symptoms in the other.

In double hydronephrosis arising from obstructive disease in other organs, or from bi-lateral congenital defects, the appearance of the tumours (if detected during life) corresponds more closely as to time. Those cases of hydronephrosis where a tumour has caused obstruction, first in one and then in the other ureter, are, of course, excluded from this consideration.

The character of the fluid contained in a hydronephrotic kidney has been several times referred to. It varies widely in its nature. In slight cases it is simply dilute urine, often containing a little albumen, and sometimes blood or pus. In other cases it may be altogether purulent, or contain a large quantity of blood. Cases have already been mentioned where the contents were colloidal or pultaceous.

In the fixed very large hydronephrotic tumours, the fluid is usually pale and watery. A little urea and uric acid along with some of the salts of the urine may still be present. But in some cases, especially long standing ones, the fluid is free from urea and uric acid, and contains only a trace of saline matter and a few white blood corpuscles.

In hydronephrosis after ligature of the ureter, C. Ludwig* has shown that the sodic chloride and then the sulphuric and phosphoric salts are the first to diminish by their passage back into the blood. The uric acid and urea then follow, but kreatinin may still remain.

Though the chemical analysis may show an absence of all urinary constituents, yet, if the fluid is allowed to stand for a few days exposed to the air, a urinous odour can usually be detected.

* Landois and Stirling's 'Physiology.'

SYMPTOMS AND DIAGNOSIS.

It does not fall within the scope of this thesis to enter fully into the symptoms and diagnosis of hydronephrosis. They are described in all the text-books. But there are a few special points which it is advisable to consider, because they have a particular relation with the form of hydronephrosis under examination.

Many of the symptoms of the first stages of intermitting hydronephrosis are similar to those seen when an escaped kidney suddenly becomes "strangulated." In my own patient, after the removal of the left kidney I was able to watch from day to day for two years the symptoms accompanying the gradual evolution of a marked hydronephrosis.

Indefinite achings in the loins first appeared. These gradually became concentrated into attacks of pain lasting an hour or two. Nausea and faintness, followed by vomiting of a frothy fluid along with the contents of the stomach were next observed. Frequent desire to micturate (only a few drops being passed) was a marked symptom during an attack.

The pain could be divided into various types. An aching dull pain which radiated to some distance, extending after some time over the whole abdomen, and being specially marked towards the bladder. Thence it passed down the leg corresponding to the affected kidney as far as the calf, and occasionally in severe attacks both legs were afflicted

with shooting or aching pains. There was, in addition, considerable local tenderness over the kidney, sufficient to prevent its being touched without great discomfort to the patient.

Finally there was the true colicky pain produced by the retention of the urine, and which was described by the patient as being similar to prolonged retention of urine in the bladder. During the persistence of this pain the patient was unable to lie down, but would sit on a chair rocking herself to and fro. This variety of pain, I think, would probably help one to distinguish between torsion of the vessels producing intense congestion of the kidney, and kinking of the ureter. In the former the pain is a dull continuous aching which, if sufficiently severe, produces nausea and vomiting. In the latter it is colicky and intermittent at first, gradually becoming more continuous as the pelvis is distended. Nausea and vomiting then appear as in the first condition.

Pyrexia is nearly always absent. In the later stages it is sometimes seen, especially as inflammatory attacks, both peritoneal and pyelitic, are then more liable to occur.

In my patient, long before a definite tumour could be felt, the former symptoms were all observed. But with the progression of the hydronephrosis, the swelling up of the pelvis became palpable, and during an attack could be felt to gradually tighten and harden. A little later it could be felt to slowly relax and die away with the cessation of the pain.

The intermitting nature of the tumour, with its accompanying phenomena of diminution in the quantity of urine or absolute anuria, followed by a considerable rush of urine, or more often a gradually increasing flow, is peculiar to this disease, and, with a few exceptions, to this particular type of hydronephrosis. The exceptions are hydrone-

phrosis following movable kidney, produced by dragging of the prolapsed pelvic organs. As already stated this form of hydronephrosis is, except as to its causation, alike in every particular to that produced by torsion of the ureter.

Again, the repeated passage of calculi produces a similar intermitting condition. This would be easily diagnosed by the discovery of the calculi in the bladder, or on their expulsion in the urine.

In every case which I have collected, where reliable histories were secured, pain, more or less severe, marked the course of the special type of hydronephrosis. This is not the case with all hydronephroses. Those arising from the numerous causes which we have given are as a rule painless and develop unnoticed. The two groups mentioned above again form the chief exception, though I am far from suggesting that pain is altogether absent in every other variety.

With the development of the tumour pressure symptoms of various kinds are complained of, such as one would expect from any tumour of similar size situated in the same region. Constipated and catarrhal conditions of the intestinal canal are often seen, and these may alternate. The intestinal catarrh, like the excessive vomiting, is often, however, an evident attempt to throw out of the system effete material which should have escaped by the kidneys. After a severe attack of vomiting or diarrhœa the patient often feels materially better for some hours or days, until there is a fresh re-accumulation in the blood.

If both kidneys are affected, or the opposite one is disabled by another disease, uræmic symptoms become very marked and slowly lead to a fatal termination.

In another part reference has been made to the occasional appearance of hæmorrhages from the stomach and bowel.

These symptoms may tend strongly to confuse the diagnosis, and should be carefully borne in mind.

It may again be insisted upon, that immediately after or during an acute attack, the urine, which at first is usually concentrated, often contains albumen, and even blood. It quickly, however, in the earlier stages, becomes clear, abundant, and of a low specific gravity. If the hydronephrosis should become septic, pus in greater or less abundance appears in the urine. Along with this complication there may be pyrexia, and in most cases considerable emaciation, and the downward progress of the case is very much hastened.

The skin in the later stages of the disease becomes very dry. It also presents a curious sallow lemon hue, simulating jaundice in its appearance. The sclerotics, however, remain clear. It is most likely uræmic in its origin. Apart from operation, or the intervention of any other disease, uræmia is the most common cause of death in these cases. In a few pyelitic cases the septic mischief may be sufficiently great to set up thrombosis in the large veins of the kidney, and lead to a general infection.

Death from peritonitis, save in cases of rupture, or after operation, is very rare. Characteristic symptoms accompany these different terminations of the disease, which need not be discussed at greater length.

The diagnosis of the earlier stages of this disease, especially in subjects with much fat in the abdominal walls, is full of difficulty. In the very latest stages the difficulty is equally great, especially if the history is indefinite. When the hydronephrosis forms a large closed sac it may simulate an ovarian cyst, and when very flaccid it may resemble a case of ascites. In the middle stages, when the diagnosis lies between such diseases as cancer or other malignant tumour of the kidney, cystic kidney, hydatids, perinephric

abscess or extravasations, distended gall bladder, serous cysts of the liver, kidney, or spleen, tumours of or accumulations in the colon, &c., the difficulty, though often great, is not so likely to lead to a mistaken result.

The detection of intermittency of the tumour and the corresponding variations in the quantity of urine are peculiar to this disease, and make the diagnosis in such cases absolutely certain. The urine, if normal, as it generally is, would exclude malignant tumours of the kidney in which hæmorrhage is usually prominent. Cystic kidney is invariably bi-lateral.

The colon usually lies in front or to the inner side of the hydronephrotic tumour, and when the latter is still of no great size, the small intestine also may lie between it and the abdominal wall. The tumour of hydronephrosis is fairly movable backwards and forwards, and upwards and downwards.

The sex and age of the patient are important points in determining the nature of these tumours. So also is the history. If that can be clearly made out, and the position and symptoms of the tumour in its early stages distinctly stated by the patient, the diagnosis of the tumour is very much facilitated.

Mention may be made of a method of diagnosis adopted by Hillier (Case 20) which might sometimes prove useful. This is the injection into the tumour of various innocuous substances, which can be detected by their colour or by chemical analysis in the urine which is afterwards passed. The use of the aspirating needle in the diagnosis of doubtful tumours would, however, in most cases render this plan unnecessary.

PROGNOSIS AND TREATMENT.

THE prognosis of movable kidney is considered to be good. Not that a cure of the disorder is easily secured, but that it is a condition which may persist for years or for life without causing any serious trouble. This is the opinion given by Ziemssen, and this belief is shared by Reynolds and Aitken, and many others.

Keppler, however, considers it a most serious disorder, leading to many disturbances of nutrition, with consequent emaciation and sometimes death. He, therefore, strongly recommends nephrectomy in almost every case. Four such operations have been performed by Martin, of Berlin, with two deaths. This line of treatment is, however, utterly unjustifiable, at any rate as a routine procedure.

Between these two extremes the truth lies. It is evident that complications follow mobility of the kidney more often than was suspected by the earlier observers. And of such complications hydronephrosis is by far the most serious and most important. That this complication does occur fairly often the cases collected here plainly show. And when it does occur, the prognosis becomes much more serious in its outlook. Hydronephrosis is not necessarily a fatal disorder unless it is double, and even then life may be prolonged for many years.

The curious case recorded by Dr. Strange, of a labourer who had suffered all his life from diabetes insipidus is an example of this. Uræmic symptoms appeared shortly before

death, which occurred in his eighteenth year. On post-mortem examination there was found absolutely no kidney substance of any kind. Two large sacs distended with fluid occupied the place of the kidneys, and life must have been eked out by the vicarious action of the skin and bowels.

But such cases are exceptional, and the gravity of even single hydronephrosis should not be underestimated. Rupture of the sac is reported in three of the cases in the tables, one of which was fatal. But apart from such a serious accident, the pain and discomfort of this disease demand some kind of remedial measure. In most cases where the tumour has been in existence for some time, the patients are reduced to the condition of chronic invalids. If they attempt exercise of the gentlest nature a fresh accession of pain is the usual result, and any measure which offers the least prospect of relief is eagerly entertained. It is only within a very recent period that such a prospect could be held out to the patient with any certainty of its fulfilment. And even now the measures adopted fall very far below what may be expected in the future.

The treatment of this disease varies according to the stage of its development. In the early stage of mobility of the kidney, in which it is easily replaced, many varieties of trusses and methods of bandaging to secure fixation have been tried. As a rule, however, the tenderness is so considerable that most mechanical devices are irksome and painful. A firm abdominal bandage, with the addition of a properly shaped pad placed over the corresponding hypogastric region, seems to have given, on the whole, the best results.

When hydronephrosis has become declared, and this occurs most often in kidneys whose mobility has not been previously diagnosed, the treatment is to a great extent that of hydronephrosis arising from any other obstructive

lesion. The only difference lies in the possibility in some cases of removing or relieving the active cause and thus curing the hydronephrosis.

While it is still in the intermitting stage every effort should be made to keep the kidney in position by bandaging, aided by firm support from pads. This plan is, however, very often a failure. Continued rest in bed for weeks or even months should be given a fair trial. This treatment is nearly always followed by considerable improvement, which may continue for months after the patient has resumed the ordinary duties of life. Generally, however, the resumption of the upright position is soon followed by a reappearance of the trouble.

If, then, bandaging is a failure, and rest in the recumbent position has been given a prolonged trial without benefit, there remains one other method of treatment. This treatment, which is the only one likely to prove of any value in this intermitting stage, in which complete subsidence of the tumour still occurs, is the operation of nephrorraphy. It is not my purpose to discuss the methods and statistics of operations, but nephrorraphy has now been so often practised as to leave no reasonable doubt of its success in a considerable number of cases. Within the last few years by using silk ligatures in preference to gut ; by stripping off part of the capsule of the kidney ; by including some depth of the cortex in the ligatures, which are also carried through all the layers between the kidney and the skin, results have been achieved which far excel the early attempts at nephrorraphy. The prevention of immediate union by the introduction of a good sized drainage tube is also a point of some importance. The operation is not, judging by the numerous recorded cases, a dangerous one, and should, therefore, be tried in every case in the stage mentioned.

If the sufferer is first seen with the kidney in that stage when the tumour, though varying from time to time, never wholly subsides, the earlier treatment would differ from the above. In such cases bandaging, rest, and rubbing, with manipulation, having received a fair trial, aspiration should be tried. If the needle is introduced horizontally half way between the last rib and the crest of the ilium, and from two inches to two inches and a half behind the anterior superior iliac spine, and is carried forwards and inwards (Morris), the peritoneum is untouched, and no organ can be interfered with save the dilated kidney. Several cases are recorded, some where the tumour was very large, where a single aspiration (Cases 11, 17, and 102), or repeated aspirations, has materially relieved and even cured the complaint. If it is done with ordinary precautions as to the admission of septic material, the operation is perfectly safe. Aspiration, however, seems, from cases reported by Goodhart, Croft, and others, to be more effective in traumatic hydronephrosis than any other variety.

Variation of position has been tried successfully in one case (Hunter, No. 72). Here the recumbent position along with elevation of the pelvis seemed suddenly to permit of a rush of urine and collapse of the tumour. It is conceivable that elevation of the legs and pelvis high above the rest of the body might in some cases lead to the relief of the distension. Such a position would tend to cause the kidney to slip towards the liver, and by its own weight straighten the ureter and allow of the escape of the retained urine into the bladder. But the relief could only be temporary.

If aspiration fails, combined nephrorraphy and nephrotomy seems to be the measure which is most likely to be successful. By the nephrotomy, the cyst is emptied and a fistula left, but if the nephrorraphy has been successful, the escape of urine by the fistula afterwards will be unim-

portant, and may ultimately entirely cease. This is well seen in my own case, where it became reduced after some months to two or three ounces daily, and on some days none at all. Case 92 is an example of a similar operation by Clement Lucas, which seems to have been equally successful.

When the hydronephrosis has reached a still greater size, and when we are driven to the conclusion that a considerable wasting of the secreting tissue must have been produced by long continued pressure, the chances of the less severe operations being successful are very doubtful. Aspiration should certainly be tried once or twice. The old operation of tapping should practically never be used. Among the cases I have collected it led to the largest number of deaths, owing to the peritonitis which often followed. It is true many of the patients were in a dangerous state, and could not have lived long. None the less, it is not more useful, and is certainly more dangerous than aspiration. Together with the old practice of simple incision it was undoubtedly the immediate cause of death in no less than ten of the cases in the tables. The previous use of potassa fusa to secure adhesions between the skin and tumour is also obsolete. The injection into the tumour of solutions of iodine, perchloride of iron, and other astringents is, from the pathology of the disease, not only useless, but certain to do harm.

Careful manipulation of the tumour sometimes has been successful in causing a more or less complete dispersion of the tumour. Examples of this result are seen in the cases recorded by Broadbent (No. 10), Roberts, and others. But it is questionable if the relief would be anything but a temporary one in the great majority of cases. Here and there exceptions may occur which only tantalize us by their rarity. In a similar manner pregnancy, which too

often initiates and hastens the progress of the disease, sometimes, by setting up adhesions while the kidney is forced into a more natural position, produces a permanent cure.

In this stage of the disease, however, all these methods are of little use, and the only operations of value are nephrotomy and nephrectomy. Both operations have now been frequently performed, either by incision through the anterior abdominal wall, or by reaching the kidney from behind without opening the peritoneal cavity.* The great majority of surgeons favour the latter method of operating, and statistics undoubtedly demonstrate its superiority over the anterior incision, when the question of mortality is considered.

If the distended kidney is a *fixed* hydronephrosis, or should it be in a condition of pyonephrosis, there can be no question that with the surgical resources of the present day, nephrectomy is the best operation. Some surgeons in these cases, however, advocate a preliminary nephrotomy as being safer, and allowing of the easier performance of a nephrectomy at a later date if necessary. Again, if an incision into the distended kidney shows that the parenchyma is reduced to a mere coating, applied to the inner surface of the sac, total extirpation is the only reasonable course.

But when an amount of kidney tissue is found equal to one-fourth or more of the whole organ, the decision between nephrotomy and nephrectomy becomes much more difficult. If the urine is healthy, save during the attacks of severe pain, nephrotomy should be adopted, in my opinion, in every case. The operation is very much safer than nephrectomy. The dilated kidney can be fixed to the tissues beneath the line of incision. The escape of urine

* First performed by Dr. Weir, of New York, in 1878.

from the resulting fistula can be placed under control, and is not such a source of personal discomfort as is often imagined. And, finally, if the other kidney should be affected in a similar manner (which it is, judging from my collection, in every eighth case), it gives the patient a better chance of the prolongation, not only of life, but of a healthy condition of the opposite kidney. For when the whole stress of the urinary excretion falls on the remaining kidney, the evolution of its hydronephrotic state is markedly hastened.

An interesting case is recorded by Godlee * of a woman aged forty-eight with a right-sided pyonephrosis of six months' history. The swelling was observed after an attack of typhoid fever. Nephrotomy was performed. Fourteen ounces of pus flowed from the distended kidney and the calyces and ureter were also distended. A probe passed down the latter came upon no obstruction. Vaginal and vesical examination gave no evidence of any obstructive cause. After the operation, the pus in the urine lessened in amount. Three years later the fistula had completely closed, and the patient was in good health. This case, as showing the passage of a hydro- into a pyo-nephrosis during a serious illness is interesting. But the result of the operation is still more so, and shows that even in pyonephrosis, nephrotomy as a preliminary operation is not to be passed over as useless.

On the other hand, a septic condition of the fistula after a nephrotomy may be set up, and the kidney tissue previously healthy may become involved in purulent inflammation.

The occurrence of such an accident (Case 99) would considerably increase the risk to the life of the patient, and would necessitate the performance of a secondary nephrectomy. Again, some cases, after operation, have shown a

* 'Practitioner,' 1887.

great tendency to rapid closure of the fistulous opening.* This, however, is hardly an argument against the operation. It should be borne in mind that this special class of hydronephrotic swellings is the one in which aspiration or nephrotomy is most likely to aid in bringing about a cure, if the pathological conditions are in the least degree favourable to such a termination.

Nephrectomy for advanced cases of hydronephrosis has been practised during the last twenty years as a recognised operation. Previous to that date it had been performed in several cases where a mistaken diagnosis of ovarian cyst had led to operative interference. The operation is fully described in the surgical handbooks of Treves, Greig Smith, &c., and full statistics of the operation have been collected by Czerny, Newman, and Gross.

As an operation, with the exception of nephrectomy for movable kidney, it is most successful in the type of hydronephrosis which we have so fully considered. It is very much more favourable in its results than nephrectomy for malignant, cystic, or degenerative diseases of the kidney. The general mortality of nephrectomy is given by Treves in his work on operative surgery as 40 per cent. In the twenty-three cases in which nephrectomy was performed, which appear in the tables given at the end of this thesis, there were six deaths. This gives a mortality of about 26 per cent. In one case (106) in which death occurred the disease was double, and in another case (77) it was complicated by its association with locomotor ataxia. This reduces the direct mortality of the operation in these cases to 17·4 per cent., a result not very unfavourable when the gravity of the disease and the operation is considered.

Nephrectomy for this disease of the kidney is usually

* T. H. Smith, Brit. Med. Journ., 1878.

performed by the lumbar incision. When the contents of the sac are evacuated, the tumour is little if at all beyond the size of a normal kidney, and can be easily withdrawn through the limited incision required by the lumbar method. In comparison with the abdominal method, statistics show that lumbar nephrectomy gives far the most successful results. Newman places the mortality of abdominal nephrectomy at 47·1 per cent. as compared with 30·5 per cent. from the lumbar method. But as Grieg Smith * points out, all forms of disease of the kidney are grouped together in the analysis, and it is obvious that the worst cases, such as large solid tumours or enlargements of the kidney, can be dealt with by abdominal nephrectomy only. And, further, that if the class of cases usually treated by lumbar nephrectomy were operated upon by the abdominal method the results might be equally favourable.

Apart from the question of statistics as to results, however, the lumbar operation in this type of hydronephrosis is the one usually performed at the present time for the following reasons :—

The operation is entirely extra peritoneal. The resulting wound permits of very complete drainage after the operation, and when healed can be most easily supported against a possible hernial protrusion. Should it be impossible to complete the nephrectomy, as has occurred in several cases, the kidney can be easily and securely fixed as in an ordinary nephrotomy, and the resulting fistula is in the best position not only for the escape of urine, but for the comfort of the patient.

Several surgeons, however, headed by Thornton, prefer the abdominal incision. In its favour it is pointed out that if adhesions are very extensive, they can be broken down

* 'Abdominal Surgery' (Section on Operations on the Kidneys).

more easily and with less risk by this method of operating. That the ligation of the renal vessels is more easily carried out, and there is less risk of hæmorrhage. And, finally, that the condition of the opposite kidney can be ascertained.

The latter point is undoubtedly of some importance. In this type of hydronephrosis the urine is often normal, and commencing hydronephrosis of the opposite kidney cannot be detected by any method of catheterisation of the ureter. My own case is an example of this. An abdominal incision in such a case would most likely restrain one from performing a nephrectomy in preference to a nephrotomy. As the disease is double in every eighth case, it is undoubtedly a point deserving of consideration. For, unless the kidney tissue has undergone almost complete destruction, nephrotomy is preferable to nephrectomy in every case where the opposite kidney is affected.

The adhesions which are formed between the tumour and the surrounding organs are the cause of many disagreeable and even serious symptoms during the course of the disease. Examples of this complication have been given in another part of the thesis. In a still greater degree do adhesions complicate the operation of nephrectomy. A case of lumbar nephrectomy is recorded by Lucas where the colon was torn in removing the kidney, with a fatal result. Thornton records a case of abdominal nephrectomy where a V-shaped piece of the vena cava was excised in cutting through the pedicle. Accidents such as these are to some extent unavoidable when the adhesions are both firm and extensive, as is not infrequently the case. Even when the operation has been successfully performed, convalescence may be much retarded and disturbed by the effects of these adhesions. There may be considerable twisting, knuckling, or contraction of the colon or small

intestine, which tends to produce extreme constipation or a semi-paralysis with distension of the bowel.

Occasionally hæmorrhage from the bowel is observed after nephrectomy.

The most common cause of death after nephrectomy, however, is shock, and this is generally accompanied by suppression of urine. Uræmia is not infrequent, most likely from some degeneration of the remaining kidney, or because that organ is affected with a similar disease, and is unable to bear the strain thrown upon it by the operation. Peritonitis, hæmorrhage, and pyæmia, have all been placed on record as causes of a fatal termination to the operation, and as long as hydronephroses are permitted to reach great dimensions, or have passed into pyonephroses of an infected type, these results may be expected in a considerable number of cases.

ANALYSIS OF CASES TABULATED.

On reviewing the whole subject, I think it may be taken as proved that the torsion or kinking of the ureter, rendered possible by excessive mobility of the kidney, is the primary cause of a number of cases of hydronephrosis. That it is a factor in the production of hydronephrosis very much more common than is generally believed, is proved, in my opinion, by the collection of cases which is presented in this thesis.

This much is certain, that an examination of the pathological appearances of the cases in which nephrectomy or post-mortem section has made this possible, clearly shows the gradual and progressive distortion of the ureter.

The condition of simple torsion which first occurs, may pass into the most extreme condition of spiral twisting or lengthening of the ureter, with adhesions; or, it may end in the production of a markedly angular insertion of the ureter. This angularity may cause "valving" of the part of the ureter enclosed in the cyst wall, or lead to the formation of valvular flaps in the mucous membrane of the ureter, from the distortion produced by the altered pressure.

During this evolution the kidney is undergoing corresponding pathological changes. At the commencement there is the simple hydronephrosis, usually intermitting in character. This is soon followed by a difficulty in keeping up what may be called the balance of compensation. As

a result of this the kidney either withers into an atrophied organ, or, becoming more and more distended, gradually loses the power of discharging its surplus urine. Finally, the orifice of the ureter becomes impermeable, and a distended sac, a sort of extinct volcano, is left to represent a once actively secreting organ.

With reference to atrophy of the kidney, Fagge * states that he found 20 cases of unilateral atrophy of this organ recorded in Guy's Hospital Reports alone, and that other examples had occurred since his investigation. This shows that the condition is not very rare. In five of these cases, calculi were found in the ureters or renal pelves. In two others, a history of lithotomy was recorded. In the rest, no obstructive agent was detected, although in no less than seven the pelves and calyces were dilated, showing that such a force had been at work.

Fagge suggests that in these cases a stone may have escaped at some previous time from the kidney, and left it in a condition from which it was unable to recover. But he gives this explanation with some reserve. Some of these cases might be explained with as much, if not greater, probability, as being due to such an obstruction of the ureter as is described above. In several of the cases of double hydronephrosis in the tables (12, 74, &c.), one of the kidneys, which had undergone dilatation, was found in this atrophic state. There could be no doubt in these cases as to the causation of the disease.

A considerable number of post mortem cases are on record in which the affected kidney was found in an earlier stage of the disease. Such cases generally presented no history of the disorder during life, or they were admitted to hospital previous to their death from another affection. Examples of this are seen in Cases 4, 5, 22, 23, and 52.

* 'Practice of Medicine,' vol. ii. p. 527.

The production of hydronephrosis from some deviation in number or course of the renal arteries has already been described. Cases 23 and 44 are typical examples. Unless it could be deduced from the presence elsewhere of abnormal blood-vessels, there is no possibility of arriving at a correct diagnosis of this cause.

But even in these cases there is an element of doubt as to the primary cause of the disease. It is equally probable that the kidney, by its mobility, led to the entanglement of the ureter in these cases. This would occur all the more easily owing to the abnormal course of the vessels. (Case 6.) There is no example in other parts of the body of deviating arteries, otherwise healthy, producing such marked pathological changes. Hydronephrosis from this cause is, however, very rare, and can hardly be placed in comparison with hydronephrosis resulting from simple torsion or flexion of the ureter.

In those cases where extreme distension of the pelvis and kidney with closure of the ureter has been found, what other explanation can be given of their pathological conditions? It is fairly safe to assume that there can be no other.

Among the writers who have reported such cases as post mortem curiosities (Cases 1, 3, 4, 24, &c.), or who have removed these tumours by operation (Cases 34, 39, 51, 73, &c.), few enter into any consideration as to the cause of such a tumour. This is the case even when the ureter remains patent in its entirety, or from immediately below its exit from the cyst. It is to be noticed that in recent years cases of enormous tumours are becoming rarer.

But though the writers do not enter into explanations, it is only fair to assume that in every case (reported as most of the cases are by most trustworthy observers), a thorough investigation was made as to the probable causation of the

disease. But, as a result, nothing of an obvious nature was discovered.

In the cases where nephrectomy was performed, the only part of the urinary tract which could fail to be thoroughly explored would be the lower section of the ureter and its point of entrance to the bladder. In some cases a sound was passed down the ureter during the operation, and no cause of obstruction found, and these might fairly be considered equivalent to cases in which an actual post mortem demonstration was obtained. Finally, there is a large class of cases which, when reported, had undergone no operation, but were either improving, remaining in *statu quo*, or steadily becoming worse. No positive statements as to causation can be made in such cases.

All these varieties combined account for about 100 of the cases that I have collected, and in which there can be little reasonable doubt that hydronephrosis developed as a sequence to torsion or flexion of the ureter from undue mobility of the kidney.

There are, it will be noticed, 111 cases altogether in the tables. Several, however, are examples of dilatation of the ureters, or impermeable ureters, obviously congenital in origin, or cases of hydronephrosis from prolapsed pelvic organs. These have been introduced chiefly to indicate points of difference between them and the special hydronephroses.

Of these cases, as has already been mentioned, 80 gave a history of that condition of the hydronephrosis in which intermission in the tumour was observed; 59 of these cases were in females, and 21 in males.

In 61 cases, four of which were double, some amount of mobility of the kidney was noted. One must point out, as to this mobility, that many of the cases came under observation with a well-marked tumour in the position of the

kidney. Mobility in these cases might be laid down to the increase in weight of the distended kidney favouring its displacement, especially in a downward direction. This is not altogether borne out by the behaviour of malignant and other tumours of the kidney, and I think it may be taken for granted that such mobility is not a *propter hoc* condition.

In the later stages of "fixed" hydronephroses, the tumour, by its size or by the adhesions which it has formed, cannot be expected to exhibit much if any mobility. In 40 cases no notice is taken of this condition by the writer. In most of them, however, the kidney was either extremely enlarged, or else in an atrophic state, and in either condition a record as to mobility could hardly be expected. A similar statement may be made with reference to the cases which are presented simply as post mortem demonstrations.

In 91 cases where the affected kidney was mentioned, the respective numbers were as follows :—

	Female.	Male.	Total.
Right Kidney	39	7	46
Left Kidney	19	14	33
Double	6	6	12

By including the double cases, this may be put in another way, viz. the right kidney was affected in 58 cases, and the left in 45.

It will be noticed that the relative proportion between right and left kidneys is very much lower than that which is usually found in cases of movable kidney. If we combine the tables given in Landau's work on movable kidney, and add the cases of double movable kidney to the right

and left kidney respectively, we find 294 right to 64 left, or about 4 to 1.

The incidence in men and women was shown to be about one of the former to six of the latter. In the above table, which is comparatively small, the proportion of males is considerably greater (1 to 2·5), and as the left kidney is more commonly affected in males, this tends to reduce the ratio between the right and left kidneys very materially. It will also be noticed that while the right kidney in females is twice as often affected as the left, exactly the reverse holds good in the males. If this should prove to be a general rule, the numerous theories accounting for its greater prevalence on the right side in females, with the single exception of tight lacing, would require considerable modification.

An interesting fact bearing on this question is that in a number of cases the first symptoms of kidney trouble, particularly with relation to "pains," appeared about the age of puberty. In the tables at the end, 16 females date the onset of the disease from the tenth to the fifteenth year. Five more (13, 78, 86, 90, and 104) may be added to this number, as, though no exact date is given, the disease must have commenced about the age of puberty. This group forms more than one-fourth of the whole number of female cases.

On the other hand, 17 female cases are described as occurring during or immediately after a pregnancy, or having a direct relation to the child-bearing period of life. Of the remaining cases no definite history is given. The latter comprise, in about equal numbers, single and married women. In this consideration, however, cases arising from prolapsed pelvic organs, and cases in which pregnancy occurring at a date subsequent to the first appearance of the symptoms, are excluded.

It can be seen from this that in about 40 female cases in which a definite history is given, over one-half date the development of the disease from the age of puberty. This entirely disagrees with the general belief that the onset of the disease is most common between twenty and forty—during the child-bearing age.

Now it is plain that in a considerable number of these cases the theory of tight-lacing is hardly applicable. This is stated under the presumption that previous to the fifteenth year tight lacing is not likely to be of common occurrence. It is very difficult to advance a plausible explanation of this frequent appearance of the affection in the right kidney. But it must be remembered that we are at as great a loss to account for lobar pneumonia appearing five times in the right lung for every three appearances on the left, and also for left gonorrhœal epididymitis being twice as frequent as right.

A consideration, then, of the whole of the female cases shows very clearly that there are two periods in life during which the disease is peculiarly liable to develop. These are at or near the age of puberty and during the child-bearing age.

To my mind the number of cases occurring at the earlier age is of considerable interest. It bears out to some extent the contention of Becquet, previously mentioned, that the onset of menstruation is an undoubted factor in the origin of this form of hydronephrosis. Mobility of the kidney sufficiently marked as to be detected by the physician, is not unknown at the same age. In 100 cases collected by Landau, six were in children under ten years of age. Many cases must pass unnoticed and uncomplained of. In some, however, the appearance of menstruation is sufficient, by the repeated congestions of the urinary tract which it produces, to

determine the production of a hydronephrosis. A case recorded by Dr. Capon* is another example of the effects of menstruation on the kidney. A lady, aged 26, died under his care from calculous disease of the kidneys. One kidney was found to be a distended sac without secreting tissue and with a stone plugging the ureter. The other kidney was also distended and inflamed, and rupture of the sac had occurred. In this case it was observed that the tendency to the obstruction to the flow of urine by the calculi was always most marked at the time of the periods. Their cessation was always followed by a greatly increased flow of urine, and diminution in the size of the tumours. A reflex congestion of the kidney and urinary passages is the only possible explanation of this phenomenon.

In the majority of the cases commencing at this early age the progress of the disease is usually very slow. Ten to fifteen years is the average duration. Exceptions may be seen in cases 36, 38, and 89. In those cases, however, which are reported as having developed during or after pregnancy, the course of the disease is much more rapid. A period of two or three years may suffice for the total destruction of the kidney.

I believe, however, that in several of these cases, the history, if carefully sifted, would have shown indications of the presence of the disease previous to the pregnancy supposed to have produced it. A careful analysis of the cases given in the tables strongly bears out this contention, and shows in addition that the patient's history of an injury being the active cause is not always to be trusted. (See cases 54, 62, and 70.)

There can be no doubt, however, of the undoubted influence of pregnancy on this disorder. As a rule it renders the progress of the disease much more rapid, and

* 'Lancet,' vol. ii., 1888.

aggravates all the symptoms. But, on the other hand, cases are given in the tables where it seems to have been the active agent in checking the onward progress of the disease for some time, and even in some cases bringing about a complete cure.

The actual detection of these hydronephrotic tumours by the patient or the physician occurs most frequently between the ages of twenty and fifty. Fully 90 per cent. of the reported cases lies within these limits.

In 12 out of 91 cases of the special type in the tables a condition of double hydronephrosis was found. This is equal to about 13 per cent. As has been already mentioned, this is a fact of some importance with reference to operative proceedings. It must determine in many cases the choice between actual removal of the kidney and other less serious measures.

It is well to point out also that there are cases in the tables the causation of which was laid down to some other factor or factors than that which I have given. The majority were, however, without any obvious cause, and the opinions of the reporters were given admittedly with reservation. For example, Guyon, in describing the cases given under his name, considers that a condition of lithiasis favoured the development of the hydronephrosis. In recording the present and previous history of these patients, he does not, however, mention any of the special symptoms of this disorder, which, therefore, must be simply inferential.

Lancereaux also suggests calculous disease in his cases. But he admits that no signs of a certain character, such as the passage of calculi or the appearance of gravel, had at any time been observed. In his paper two additional cases, a male and female, are mentioned without any history being given, which might have been included in the tables. Both had typical intermitting hydronephrosis.

Thompson (Case 11) and one or two others, also suggest calculus, on the principle that no other cause was visible, and that the stone must have escaped. It is possible that in some cases lithiasis and mobility of the kidney co-existed. Every case, however, in which a calculus had at any time been passed, or which presented the least doubt in this respect, has been excluded from the tables.

In the cases given in the tables, the treatment adopted in each instance is briefly described. It will be noticed that in the earlier cases little is said on this subject beyond puncture and incision. In the later cases the operations of nephrotomy and nephrectomy are frequently mentioned as having been performed when necessary. Nephrorraphy (92, 94, 99, and 103) is also introduced in the later cases with a considerable amount of success. The full measure of its value yet remains to be determined. But at present it holds the field as the only operation apart from nephrectomy which presents a possible and successful means of checking the progress of the disease. The necessity of a simultaneous nephrotomy in the more advanced cases is included in this statement as to its value.

In concluding this examination of the cases in the tables, a brief repetition of the principal facts which they display may not be out of place.

These, briefly, are, that intermitting hydronephrosis is far from being so rare an affection as was formerly supposed.

That numerous examples of hydronephrosis have been placed on record for which a most careful examination showed no obvious cause.

That mobility of the kidney causing torsion or flexion of the ureter affords the most reasonable as well as the most likely explanation of this condition. The direct sequence of mobility and hydronephrosis has now been

often observed. The mobility of the kidney is most frequently idiopathic, but is occasionally traumatic.

That the anatomical pathology of these affections supports this view, and physiological experiments show the easy possibility of the production of hydronephrosis in this manner.

That it is most frequently seen in females, and is especially liable to develop in the second decade of life. In addition, these diseases have a very distinct relation, as regards origin and progress, with menstruation and pregnancy.

And that, if rest and mechanical measures prove ineffective in treatment, nephrorraphy, alone or combined with nephrotomy, affords the best means of relief, and gives the greatest probability of a cure.

TABLE OF CASES.

	Sex.	Age.	Kidney.	History and Symptoms.
1	F.	23	Right	Born with enlarged abdomen, which gradually increased in size as she grew older. Only symptom was pain in passing urine. At death she measured 6 ft. 1 in. in circumference, and 4 ft. 0½ in. from the xiphoid cartilage to the pubic bone.
2	M.	?	Left	Suffered from a tumour in the left side, which fluctuated on palpation. The tumour had been tapped two years before, and he continued well for a year and a half. Reappearance of tumour, which was again punctured.
3	F.	..	..	Presented a tumour rather below the level of the umbilicus. Had suffered from dropsy.
4	M.	..	Left.	The man died in Vienna Hospital.
5	M.	..	Left.	A man who died of fracture of the skull.
6	M.	20	Right.	Suffered much from attacks of vomiting. A doubtfully fluctuating swelling found in left flank. Died five days after coming under observation.
7	M.	2	..	Had an attack of retention of urine, followed by a large fluctuating tumour in lumbar and iliac regions, which disappeared with a copious flow of urine. Occasional recurrence.
8	F.	40	Right.	In the eighth month of her second pregnancy a tumour was found in the right loin. It persisted and increased in size until some days after delivery, when it almost disappeared and much milky coloured urine was passed. She died fifteen days later. Symptoms had existed for about two years.
9	F.	24		Enlargement of abdomen had been noticed some years before. Last two years had slowly increased. Retention of urine followed. Amount passed declined from two quarts to a few ounces for some weeks. It then flowed so freely that seventeen gallons passed in three weeks. Some months later tumour burst into the bowel, and when it refilled escaped alternately by the bladder and the bowel. Though the tumour varied in size there was never complete subsidence. End unknown.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
..	Death.	A distended right kidney found, containing 30 gallons of light brown limpid fluid. The ureter passed obliquely into the sac, and running up to the right for 12 inches, was then deflected downwards to its aperture of exit from the pelvis.	Mr. S. Glass, Philosoph. Trans., 1747.
Puncture.	Death from peritonitis.	Hydronephrotic cyst large enough to hold 8 pints of fluid. No cause of obstruction found.	Mr. P. Martineau, Norwich, Medic. Commentaries, vol. ix. 1785.
..	Death.	Kidney dilated into a large sac, white in colour, and filled with water. No kidney tissue left. Opposite kidney healthy. No cause given.	Haller quoted by Rayer, Traité des Malad. des Reins, vol. iii. p. 486.
..	..	No trace of the kidney found. Only a distended capsule, containing about 60 lbs. of aqueous fluid.	Frank, quoted by Rayer, *loc. cit.*
..	..	Left kidney greatly distended and containing a large quantity of aqueous fluid. Opening of ureter contracted to a pin point.	Raynaud, quoted by Rayer, *loc. cit.*
..	Death.	Right renal artery divided into two branches, the lower of which compressed the ureter. The ureter had also become adherent near its upper end to the cyst of the pelvis.	Boogard, Arch. f. d. Holland. Beit. z. Natur. und Heilk., bd. i. p. 96.
..	Death.	Ureters found enlarged to twice the size of large intestine and distended with urine. No cause of obstruction given.	Dr. Roberts, New York, Americ. Journ. of Med. Sciences, 1841.
..	Death.	Large hydronephrotic cyst found with adhesions to intestines and liver. It contained three pints of fluid. Ureter dilated. No cause for condition found.	Mr. Johnson, Med. Chir. Jour. and Review, vol. ii. 1816.
..	..	.. ..	Howship, Diseases of Urin. Organs, 1823.

	Sex.	Age.	Kidney.	History and Symptoms.
10	F.	3½ mths.	Double.	Abdomen large from birth, and steadily increased in size. Urine passed naturally. Under friction the tumour completely disappeared. Child died a little later.
11	M.	..	Left.	First seen in 1851 for tumour of left side. Great pain, which subsided with the passage of much portwine-coloured urine and disappearance of the tumour. Frequent recurrence. No history of calculi passing. Was ultimately tapped, and eight pints of dark-coloured fluid withdrawn. This had to be repeated in a year, and again eight years later.
12	F.	38	Double.	This is a classical case. Began to suffer pain when twelve years old in left loin, and this continued for years. At twenty-eight pain appeared in the right side, and she was seldom free after that. When pain severe a tumour was noticed on the right side, which disappeared with cessation of pain. Frequent recurrence of this phenomenon. Before death a tumour appeared in left side, which also rose and fell. Attacks of pain lasted about twenty-four hours, and there was a greatly increased flow of urine after each attack. Urine at first healthy, later contained blood.
13	F.	..	..	Married. Several children. Had been under Dr. Hare's observation for twenty-five years. Suffered from attacks of pain, followed by a tumour which subsided with increased flow of urine. Repeated attacks. Still alive.
14	F.	..	..	Another patient with similar history to last—an intermitting tumour in the flank, swelling and subsiding. After one attack, he applied firm pressure with a spring compressor, and a year later there was no recurrence.
15 16 17	FFF.	..	..	Mr. Smith mentioned that he had seen three cases of intermitting hydronephrosis in women. In two cases incision and drainage was adopted. Both died within a short time. In a third case he tapped and closed the wound. The patient had no relapse, and since then had become a mother.
18	F.	48	Left.	Symptoms commenced about two years before death. Acute pains in left flank. Vomiting. Alternate diarrhœa and constipation. Appearance of tumour. Disappearance of tumour after passage of abundant liquid stools. Urine healthy.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
..	Death.	Both kidneys hydronephrotic. Ureters distended and sacculated. Right kidney twice the size of the left. Kidney tissue altered and condensed. A circular fold of mucous membrane in ureter close to the kidney formed a perfect valve. There were several other imperfect folds in both ureters.	Dr. Broadbent, Path. Soc. Trans., London, vol. xvi.
..	Death from rupture of sac and peritonitis a year after last tapping.	Large hydronephrotic cyst found. Ureter entered at lower and anterior part, and ran obliquely through the parietes for some distance. A cretaceous nodule found in the cyst, which had no evident connection with the disease.	Thompson, Path. Soc. Trans., London, vol. xiii. 1862.
..	Death from Uræmia.	Double hydronephrotic cyst. Right kidney distended, left collapsed. Colon, small intestine, and liver adherent to right tumour, which was also movable. Both ureters were twisted like the curl of a cork-screw at their junction with the cysts, to which they were also adherent. No urine escaped from the right ureter until it was dissected off, when urine gushed out freely. Tissue of left kidney completely atrophied. Right kidney dilated but enlarged, weighing 11 oz. without the cyst wall.	Dr. Hare, Med. Times and Gazette, 1857. Case I.
..	..	Intermitting hydronephrosis.	Case II. Discussion Path. Soc. Reports, 1876.
Mechanical pressure.	Recovery.	Intermitting hydronephrosis.	Case III. Discussion Path. Soc. Trans., 1876.
..	..	Three cases of intermitting hydronephrosis.	Mr. Thom. Smith, Discussion Path. Soc., London, 1876.
..	Death.	Hydronephrotic cyst. Secreting structure of kidney almost destroyed. Ureter healthy. No cause given.	Dr. Gintrac, Sydenham Soc. Retros., 1867–68.

	Sex.	Age.	Kidney.	History and Symptoms.
19	F.	47	Right.	Had suffered from pains in right side for three or four years, at irregular intervals. When pain most severe a swelling, oval in shape, was noticed, which subsided with increased flow of turbid urine. Great tenderness over swelling. Obscure fluctuation in tumour. Urine slightly albuminous. Frequent repetition of all these phenomena. Suppression of urine during one attack.
20	M.	3½	Double.	Abdomen large since birth. Tumour, large and fluctuating, discovered in right flank. Tapping was proposed, but often postponed, owing to the frequent variations in size of the swelling. Urine healthy at first. A swelling of the left kidney was noticed later, but this subsided soon after. Urine became purulent after the operations.
21	M.	23	Left.	Good health until twenty years old. Then suffered from pains in the left lumbar region lasting some hours each time. Sickness, vomiting, and expectoration of much frothy mucus—as much as one and a half pints during a paroxysm. Repeated at shorter and shorter intervals. Urine healthy ; some oxalates. Tumour discovered in left flank, which subsided in a few hours, with increased flow of urine. Urine slightly albuminous after an attack. Frequent repetition of these events.
22	..	..	..	Post-mortem demonstration.
23	..	..	..	The patient died of pneumonia, and the condition of the kidney was not recognised during life.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
..	..	Intermitting hydronephrosis. Tumour movable.	Dr. Hillier, Med. Chir. Soc. Trans., vol. xlviii. 1865. Case I.
Tapped on anterior surface and 102 oz. of fluid removed. Frequently repeated. Fistula established, which ultimately healed.	Death three years later.	Considered to be congenital malformation of ureter. After death, right ureter found to be narrowed, and left to contain calculous material.	Case II.
Sedatives.	..	Intermitting hydronephrosis. Calculus suggested, but no definite signs or symptoms of that condition existed.	Dr. Cole, Bath, Brit. Med. J., 1874, vol. ii.
..	..	A hydronephrotic kidney. Pelvis dilated into a large cyst and calyces into smaller ones. Ureter patent, but valved, owing to the way in which it ran up the side of the wall of the cyst.	Dr. Joseph Coats, Glas. Path. Soc. Trans., 1882. Case I.
..	..	A hydronephrotic kidney, supplied by two principal arteries, the larger of which had four branches. Three passed into the kidney along anterior border of pelvis. The fourth, passing downwards and backwards, crossed the ureter close to its exit from the cyst. The pressure of the artery had thinned all the coats of the ureter, and destroyed the muscular coat.	Glas. Path. Soc. Trans., 1891. Case II.

	Sex.	Age.	Kidney.	History and Symptoms.
24	F.	13	Right.	Had abnormal swelling in flank for three years previous to death. Frequent tappings performed, but cyst alway re-filled.
25	F.	..	..	Case was operated on for supposed ovarian cyst, for which also she had been previously tapped.
26	M.	6½	Double.	Had been treated when two years old for ascites. Was born with large abdomen, which slowly increased in size.
27	F.	..	Right.	A woman advanced in pregnancy. Tumour found in right flank. Was described by patient as feeling like "a river in her side." Urine healthy. Death after delivery.
28	F.	47	Left.	In her twentieth year had a swelling in abdomen, which subsided on passing coffee-coloured urine. Married later, and had two children. Tumour reappeared and increased in size, and patient became very ill. Three months later tumour burst into the bowel, and much blood and pus passed. Recurred later; was aspirated, and again re-filled. It was then laid open.
29	F.	56	Double.	For six years suffered from bladder pains. Blood in urine, &c. Small tumour found in urethra, and tumour of bladder suspected. Later, complained of pain in right side, and a tumour found there, which subsided. Again re-appeared, with constant sickness and great pain. Was fairly movable, and varied in size several times before death, which occurred three weeks later.
30	F.	19	Left.	History of a fall when two years old, with occasional pains in the loin since then. Menstruated at sixteen, and pains in loin became more acute at the periods. For some months had amenorrhœa. Dysmenorrhœa due to retroflexed uterus. Urine normal. The attacks of pain appeared monthly with the periods and radiated over abdomen. Severe nausea and vomiting. Appearance of a movable tumour in left iliac region during attacks, subsiding on cessation of the pain, after four or five days' duration. Polyuria was noticed sometimes on disappearance of the tumour; pain became more or less continuous.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
Tapping. Injections. (Various.)	Death.	Left kidney hypertrophied. Right kidney formed a hydronephrotic cyst divided into compartments, and these again into loculi. Obstruction thought to be due to obliquity of ureter and to be congenital. Full of colloid material.	Dumreicher, Wiener. Med. Halle, 1864.
..	Death.	Very large hydronephrotic cyst. Kidney tissue entirely atrophied. Obstruction was due to a valvular flap of mucous membrane at renal orifice of ureter.	Krause, Langenbeck's Arch. f. Klin. Chir., 1865.
Paracentesis. Several times. Fistula established.	Death.	Right kidney formed a large cyst. Left kidney also had dilated pelvis, and was sacculated. No cause of obstruction given.	Dr. W. G. Little, Path. Soc. Trans., London, vol. xiii. p. 151.
..	Death.	Left kidney found to be pale, flabby, and hypertrophied. The right was distended into an enormous tumour. Colon adherent. Ureter adherent to cyst and bent upon it at an angle. When this was dissected off 98 oz. of urine flowed freely away.	Dr. Bryce, Dalkeith, Edin. Med. Jour., 1867.
Aspiration. Incision.	Death from Peritonitis.	No examination post-mortem. Intermitting hydronephrosis.	Mr. Bryant, London, quoted by H. Morris, 1876.
..	Death from Uræmia.	Left kidney small and wasted. Pelvis and ureter dilated. Right kidney dilated into a cyst with adherent small intestine. Tumour (villous) of posterior wall of bladder involving first the left then the right ureter. Acted on the left like a ball valve.	Mr. Henry Morris, Med. Chir. Soc. Reports, vol. lix. 1876.
..	..	Cause unknown, probably movable kidney. Intermitting hydronephrosis.	Desnos et Barié, Ann. de Gyn., 1876.

	Sex.	Age.	Kidney.	History and Symptoms.
31	F.	39	Left.	Pain in the loin commenced at age of fifteen. Married. Eleven children. Pains got worse after third pregnancy, and albumen appeared in the urine. Later a tumour, freely movable, appeared in left flank during the attacks of pain, with nausea and vomiting. Subsided slowly. No increase in flow of urine noticed. Attacks lasted two or three days.
32	F.	29	Left.	Chlorotic at puberty. Pains appeared in left loin during second pregnancy, and became much more acute after delivery. The attacks occurred about every three weeks, and were accompanied by shivering and vomiting and sensation of retention of urine. A tumour appeared later during each attack, subsiding with a largely increased flow of urine (suddenly). Duration about twenty-four hours. Urine normal. Tumour smooth, round, and not movable as a rule. No temperature. During third pregnancy attacks ceased at fourth month, and in the fourth pregnancy, nephritis occurred with premature labour.
33	F.	37	Left.	Had five children. Two years ago, just previous to last confinement, felt pains in left side. Not continuous. Six weeks before admission tumour detected, movable, not tense or tender. Urine sometimes dark, usually clear, normal. On tapping a clear fluid was withdrawn. No urea, uric acid, &c. Sp. gr. 1004.
34	F.	46	Right.	Married. Eight children, six dying in infancy. When 41 began to suffer from severe recurring pains in right side. A swelling the size of a fist appeared, which soon subsided. In her last pregnancy had excessive sickness and pain ; and tumour was again perceived and persisted after delivery. It slowly increased in size. Urine normal and passed without trouble. Menses became irregular. Tumour showed a constriction dividing it into unequal parts. Considered to be ovarian cyst.
35	F.	40	Right.	When first seen in 1876 was extremely anæmic and yellow in complexion. Eleven years before had noticed a fist sized, very moveable swelling in abdomen (right side). Three years later it caused discomfort, with attacks of crampy pains lasting about two hours. After six months pains ceased and for five years she remained well, though tumour increased until after a fall it suddenly dispersed. Slowly reappeared, and pains returned, but attacks ceased in about six months on passing some thick sandy urine. Menses healthy. Urine albuminous.
36	F.	Young		Illness began a year before with pains in right loin. Urine contained when seen one-third its volume of pus. A tumour was detected in the loin so freely movable that it could be tilted from hand to hand.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
..	Death. Uræmia and premature labour.	Hydronephrotic cyst of left kidney with flexion of renal end of ureter and a valvular fold acting as obstruction.	Wilse, Norsk. Mag. f. Læg. 1873.
..	..	Intermitting Hydronephrosis. Movable kidney.	Eger, Berlin. Berl. Klin. Woch., 1876.
Tapping.	Recovery. A hard body felt in position of kidney afterwards.	Hydronephrotic movable kidney	Fagge, London. Morris, H. 1876. *Op. cit.*
Puncture. Operation for ovarian cyst by Billroth.	Death two days later.	Left kidney healthy. Right kidney distended into a very large cyst and its tissue entirely atrophied. Ureter patent and no cause of obstruction found.	An. Wölfler, Langenbeck's Arch. f. Klin. Chir., Bd. 21, Heft. 4, 1887. Case I.
Incision and fixation of sac. Escape of six litres of coffee-like fluid.	Death twelve days later from Uræmia.	Movable kidney leading to hydronephrotic cyst with complete destruction of kidney tissue. Ureter patent, passing into pelvis through a deep furrow in the sac. Colon adherent. Left kidney of normal size. Nephritic.	Case II.
Nephrectomy.	Recovery.	Kidney disorganised and dilated. The ureter was tied along with an artery below the hilus. No cause found.	Cooper, Brit. Med. Jour., 1880.

	Sex.	Age.	Kidney.	History and Symptoms.
37	M.	16	Left.	Had suffered from occasional sharp pains in his left side since his 12th year. Attacks occurred weekly, and have continued since then. Persist for about eight to sixteen hours. Later a tumour appeared during attacks, disappearing with cessation of pain. Urine normal between attacks, scanty or suppressed during attack and purulent after it.
38	F.	15	Left.	When first seen had a hydronephrosis of the left kidney, which ruptured a few days later. Laparotomy and stitching of cyst to anterior abdominal wall was performed. At irregular intervals a little blood and pus had been seen in the urine before operation. Afterwards, none, and both kidneys seemed healthy, judging by their secretions.
39	F.	35		Unmarried. Tumour observed for three years. Slowly increasing. Was freely movable. Urine albuminous. Difficulty in micturition.
40	M.	26	Left.	Gave a history of attacks of pain on the left side for ten years, gradually becoming more severe. When seen had acute pains in left side, vomiting and faintness for some hours, with general collapse. Then tumour detected, very tender to touch. Urine scanty and high-coloured. Tumour diminished during next fourteen days, and blood and pus appeared in urine. Reappearance of all the symptoms, and increase of tumour.
41	F.	..	..	No details.
42	F.	..	..	No details.
43	F.	..	Right.	Had been twice tapped for supposed ovarian dropsy. No other history.
44	M.	20	Double.	For very many years subject to attacks of intestinal obstruction, lasting four or five days and recurring every few weeks. Lately abdomen had become swollen, with acute pains, vomiting, and scanty flow of urine with a little blood in it. Double kidney tumour detected. Suddenly passed enormous quantity of urine, and swellings subsided.
45	F.	27	Right.	Had six children. Suffered from sudden attacks of acute nephralgia (right), with nausea and vomiting, lasting about forty-eight hours. Frequent repetition. Later enlarged and tender movable kidney detected (like a cucumber), which lessened in size and slipped into natural position after an attack. Very marked at menstrual periods.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
Nephrectomy.	Recovery.	Intermitting hydronephrosis. No cause discovered.	Morrant Baker, Trans. Internat. Congress, London, 1881.
..	Rupture. Fixation of sac, and recovery with a fistula.	Probably flexion of ureter? No stone discovered, or any history of one.	Taylor, Lancet, 1884, vol. ii.
Nephrectomy.	Recovery.	Kidney contained over eight pints of urine. Ureter patent, and no cause for obstruction found.	Thornton, Path. Soc. Trans., London, 1885.
Nephrotomy.	Recovery with a fistula.	..	Morris, Henry, London. Diseases of Kidneys, 1885. Case I.
..	..	Case of intermitting hydronephrosis.	Case II.
..	..	Case of intermitting hydronephrosis.	Case III.
..	Death from peritonitis.	Right kidney greatly distended, and consisting only of sac and calyces. Ureter opened into it, in a manner similar to its entrance into the bladder, and thus prevented escape of urine. Movable kidney?	Roberts, Manchester. Urinary and Renal Diseases, 1885. Case I.
..	Death from Uræmia.	Left kidney distended. Ureter narrowed with oblique entrance into pelvis. On firm pressure only could urine be expressed. Tissue atrophied. Colon adherent. Right kidney also distended. Ureter normal, but crossed and compressed by a branch of a second renal artery.	Case II.
Bandaging.	Improvement, save for tenderness at periods.	Movable kidney, with commencing hydronephrosis, intermitting.	Case III.

	Sex.	Age.	Kidney.	History and Symptoms.
46	M.	27	Right.	For nineteen years had paroxysmal lumbar pains. Later a tumour noticed which "comes and goes" with the attacks of pain. Slight occasional hæmaturia and pyuria.
47	M.	5	Left.	Had suffered for four and a half years from paroxysmal attacks of pain. Urine healthy. Tumour (intermitting) detected.
48	M.	23	Right.	Healthy, save for attacks of nephralgia, with hæmaturia appearing at eighteenth year. Second attack eighteen months later. Since then very frequent. Attacks of dull renal pain, becoming acute in a few hours, with scanty urine and hæmaturia and enlargement and tenderness of right kidney, lasting one to three days and disappearing with diuresis. In the intervals, health good and urine normal.
49	M.	10 Mths.	Left.	A tumour which appeared and disappeared several times in left loin.
50	F.	34	Left.	Had epileptiform attacks since childhood. About a year ago commenced to vomit frequently. Blood occasionally passed in motions. Frequent micturition. Urine slightly albuminous. For last few months lay in a state of mental stupor, and ultimately died of uræmia.
51	F.	23	Right.	Gave a history of aching on right side for seven years, with one free interval of over three years. A tumour appeared in right flank, remained for three months, and then disappeared. She suffered from dragging, sickening sensations and much pain. Urine normal. Swelling reappeared and became of a distinctly intermitting type.
52	M.	59	Double.	Died of apoplexy.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
Nephrectomy.	Recovery.	Hydronephrotic cyst. Probably from bending of ureter. Intermitting.	Jordan Lloyd, Birm. Med. Rev. 1886. Case I.
Nephrectomy.	Recovery.	Hydronephrotic kidney. Probably from kinking. Intermitting.	Case II.
Bandaging.	Improvement.	Hydronephrosis of movable kidney—first stage.	Case III.
Nephrectomy.	Death four days later.	Hydronephrotic kidney. Probably congenital. No cause given save kinking of ureter. Intermitting.	Case IV.
..	Death from Uræmia.	R. kidney granular and contracted. L. kidney enlarged into a fibrous sac with compartments full of a soft white creamy substance. Ureter impervious in lower third, patent but narrowed in upper two-thirds. At the pelvic entrance, two valve-like flaps of mucous membrane had completely checked flow of urine. These were considered to be obstructive agents, the ureter contracting secondarily.	Sainsbury, Path. Soc. Trans. 1886.
Aspiration. Nephrectomy.	Recovery.	Right hydromephrotic cyst. Kidney tissue almost entirely atrophied. Supposed to be due to kinking of ureter from a movable kidney. Intermitting.	Elder, Nottingham, Lancet, 1887, vol. ii.
..	..	Hydronephrotic cyst of left kidney. Kinking of the ureter. No urine could be squeezed out of cyst through the ureter, but water could be injected into it. Right kidney totally atrophied and ureter occluded probably long previous to death.	Hansemann, Arch. f. Path. Anat. und Phys., Bd. 112, 1888.

	Sex.	Age.	Kidney.	History and Symptoms.
53	M.	28	Left.	Commenced to suffer two years before with severe attacks of "gastric crises." Crampy pains, sickness, and vomiting, lasting several hours or days. Urine normal. No temperature. Great agony during attack. Eyesight had failed for some months. Attacks considered to be due to Locomotor Ataxia. Later, a tumour very movable, fluctuating and painful, appeared with each attack in the left flank, and passed away with the cessation of pain. Frequent recurrence of swelling. Urine once contained blood. Clear fluid aspirated from tumour.
54	F.	50	Left.	History of a fall down stairs five years previously, followed by abortion. Later, attacks of pain in the left side occurring at intervals. Appearance of a tumour. Pain first appeared in the back ten years before, and when it was severe urine was scanty.
55	F.	31	Right.	Married woman. Suffered from periodic attacks of severe pain in right loin and in front. Appearance of a tumour in right flank which subsided with the cessation of the pain. Tumour freely movable. Urine normal.
56	M.	24	Left.	When running one day was seized with pain in left loin. Repeated attacks. Tumour discovered a year later, which disappeared in four days. Returned in a few months and again vanished. Pain ultimately became persistent, and tumour reappeared and remained. Urine normal.
57	F.	60	Right.	Had prolapse of uterus and anterior vaginal wall. Had suffered for ten years from lumbar pains, sickness, &c., and had noticed a tumour in right side for eight years. It was tender, elastic, and movable. The tumour had typical increases in size, and then diminution with increased flow of urine. It was movable. Urine normal.
58	F.	31	Right.	Married. One pregnancy. Had suffered since the age of sixteen from pains in the side, becoming gradually more severe. Sickness, vomiting, cramps. Appearance of tumour, which decreased in size with increased flow of urine, and then disappeared. No fever. Urine normal.
59	F.	35	Right.	Suffered from right lumbar pains. Attacks of cardialgia. Appearance of a tumour from time to time, disappearing altogether in the intervals. Ultimately complete disappearance.
60	F.	42	Left.	A simple observation and no history given.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
..	..	Considered to be a case of incipient tabes, with intermitting tumour of kidney. Case unfinished.	Renvers, Berl. Klin. Woch., 1888.
Nephrectomy.	Recovery.	Cause unknown. No direct connection with the fall evident, as side was not injured. Tumour was markedly movable in a backwards and forwards direction.	Stanmore Bishop, London. Lancet, vol. i. 1888.
Nephrectomy.	Recovery.	A hydronephrotic cyst. Kidney disorganised. Ureter inflamed at point of junction with pelvis. Kinking of ureter given as cause of the hydronephrosis (intermitting).	Walter Fell, New Zealand. Brit. Med. Jour., vol. i. 1888.
Nephrectomy. Recovery with a sinus. An attempt to cure the sinus some months later led to peritonitis and death.	Death.	No cause given. Intermitting hydronephrosis.	Hunter, Mr., Battersea. Brit. Med. Jour., vol. i. 1888.
Aspiration. Nephrotomy.	Recovery, with a sinus. Was well at the end of ten years.	Probably owing to movable kidney. The fistula led to the cyst becoming pyonephritic.	Leopold Landau, Berlin. Berlin Kl. Wochen, 1888. Case I.
..	..	Kidneys were both movable. The left kidney was considerably prolapsed. Intermitting hydronephrosis.	Case II.
..	..	Movable kidney. Intermitting hydronephrosis.	Case III.
..	..	Intermitting hydronephrosis.	Case IV.

	Sex.	Age.	Kidney.	History and Symptoms.
61	F.	22	Right.	Had suffered from her eleventh year with pains in the side. Except that, had good health. Attacks commenced with abdominal discomfort, pains, vomiting, &c. Tumour in right side freely movable; floating; varying in size. Rapid disappearance of tumour, with desire to micturate, and increased flow of urine. Attacks occurred every fourth week. Pregnancy intervened, and after that there was cessation for some years. Again tumour reappeared and became in the end fixed.
62	M.	33	Double.	Had a history of a fall from a tramcar three years before with suppression of urine for two days, hæmaturia, &c. General good health after, save for repeated painful attacks in right side. Tumour found; fluctuating; moving with the liver. Urine normal. Cessation of flow with appearance of tumour, and as it subsided there was emission of sanguineous urine. Repeated rise and fall. Ultimately uræmia, coma, and death.
63	F.	30	Right.	Attacks of pain in that side. Had gravel in the urine. A tumour noticed for six weeks, which disappeared with abundant flow of clear urine. Had pain for several days before the relief.
64	F.	25	Right.	No particular early illnesses. Three confinements; suffered at the periods. Acute pains developed in the right side in paroxysmal attacks, and radiating in various directions; vomiting. Tumour observed, which passed away with cessation of pain, and with increased flow of urine. Repeated attacks.
65	F.	26	Left.	Acute pains in loin, followed by tumour in the left flank. This disappeared with abundant discharge of urine. Attack lasted forty-eight hours.
66	F.	43	Right.	Had good health until birth of last (ninth) child. Then feelings of abdominal discomfort, irregular menstruation, pains in the right side, &c., gradually becoming worse. More severe after exercise and at the menstrual periods. Then pain; nausea and vomiting became severe, and were followed by a tumour in the flank, scanty flow of urine, and uræmic symptoms lasting some hours. Sudden flow of concentrated urine on recovery from attack. Urine at first healthy, later albuminous. After many attacks kidney showed tendency to become smaller.
67	F.	32	Double.	Had seven children. Prolapse of uterus and bladder with pendulous abdomen. She suffered from pains, nausea, and vomiting, especially when uterus was prolapsed. These were followed by increase in size of kidney, which subsided with increased flow of urine.
68	F.	25	Right.	Severe gastric symptoms. Intermitting hydronephrosis, with suppression of urine. Emaciation. Menstruation irregular. Pains more marked in right lumbar region during periods.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
..	..	Intermitting hydronephrosis. Movable kidney.	Israel, Berlin, Kl. Woch., 1888.
..	Death. Uræmia.	Right kidney was enlarged to the size of a cocoa-nut from a dilated pelvis. Ureter dilated but no obstruction. Slight hydronephrosis of left kidney. Nephritis of both kidneys. The fall would be unlikely to produce this effect on both sides.	Furbringer, Berlin. Berlin Kl. Woch., 1888.
..	..	Diagnosed to be intermitting hydronephrosis. Possibly a calculus.	Thiriar, Revue de Chir., 1888.
..	..	Diagnosed to be produced by obstruction of calculus, but no reason given for this. Intermitting hydronephrosis.	Lancereaux, L'Union Médic., 1888, p. 849. Case I.
..	..	Intermitting hydronephrosis.	Case II.
..	..	Probably movable kidney. Intermitting hydronephrosis.	Newman, D., Glasgow. Diseases of the Kidneys, 1888. Case I.
..	..	Both kidneys movable.	Case II.
..	..	Movable kidney (?) and intermitting hydronephrosis.	Case III.

	Sex.	Age.	Kidney.	History and Symptoms.
69	M.	..	Left.	Repeated attacks of renal (left) colic. Not very severe. Increase in size of left kidney. Attacks lasted forty-eight to fifty-six hours, and recurred every four to seven weeks. On cessation of pain swelling diminished, and a flow of concentrated urine followed. Urine normal.
70	M.	49	Right.	History of injury to *left* side, followed by pain in *right* side under liver and discovery of a tumour there. It was freely movable. Attacks lasted five to six hours. Sometimes vomiting and diarrhœa. Attacks were worse after exercise and improved with rest. Occasional sudden suppression of urine. Urine was quite healthy when it could be examined.
71	F.	..	Left.	Had movable kidney (left), followed by development of a tumour with acute pain in left loin. Increase in size of tumour and diminution of urine. Subsidence in twenty-four hours with increased urinary flow. Whole attack lasted six to eight days.
72	F.	30	Right.	Suffered from a tumour in right loin, which with rest in bed and elevation of the pelvis on pillows suddenly disappeared, with increased flow of urine.
73	F.	14	Left.	A Hindoo girl. Had never menstruated. A large tumour in the left side.
74	M.	31	Double.	Symptoms commenced at the age of twenty-eight with acute pains in right side after running. Gradually got worse and more paroxysmal. Vomiting frequent and at all times. Hæmorrhage from the stomach. Urine often scanty, albuminous, and occasionally sanguineous.
75	F.	30	Right.	Two years previously had hæmaturia after lifting a weight. A tumour followed in the right loin. Slightly fluctuating. Acute pains in the right side, followed in a short time by abundant flow of urine and disappearance of tumour. Frequently repeated.
76	F.	38	Right.	Family tuberculous. Mother died of cancer. For two years had suffered from pains in right flank, followed by a tumour, which at times increased with most acute pain, to the size of two fists. Very tender. Urine normal. Spontaneous disappearance on rubbing of the tumour, leaving sensation of an empty sac.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
..	..	Angular insertion of ureter. (?) Probably movable kidney with intermitting hydronephrosis.	Case IV.
..	..	Considered to be due to torsion and obstruction of renal vessels from movable kidney.	Case V.
..	..	Movable kidney and intermitting hydronephrosis.	Lindner, Ueberdie Wanderniere der Frauen, Berlin, 1888.
..	..	Intermitting hydronephrosis.	Hunter, Mr., Battersea, Brit. Med. Jour., 1889.
Nephrectomy.	Death.	Great enlargement of pelvis of kidney with atrophy of kidney tissue. Ureter impermeable and like a cord at upper part. Probably congenital.	Surgeon-Major Brandford, Brit. Med. Jour., vol. i. 1889.
Tapping of right kidney.	Death some days later with uræmic symptoms.	Both kidneys, but especially the right, had largely dilated pelves. The ureters, narrowed but patent, joined the cysts about their middle part. The duodenum was tightly stretched over the right cyst. Left kidney had its substance most extensively atrophied. This tumour was not noticed during life. Renal arteries were irregular in number, but were not considered to have caused the obstruction.	Dr. Barrs, Leeds, Lancet, vol. i. 1889.
Incision into cyst and drainage.	Recovery.	Intermitting hydronephrosis.	Hahn, Berl. Kl. Woch., 1889.
..	Recovery.	Intermitting hydronephosis.	Kappe, Berl. Kl. Woch., 1889.

	Sex.	Age.	Kidney.	History and Symptoms.
77	M.	30	Left.	For three years had suffered from pains and discomfort in the loin; later on a movable tumour in the flank appeared during the attacks of pain, along with vomiting and painful micturition. Subsidence of tumour. Very frequent recurrence of these phenomena. Each attack persisted twenty-four hours. Symptoms of tabes developed.
78	F.	20	Right.	History of appearance of a tumour in the right flank, accompanied by pain. Very movable. Recurred every four to six weeks. No distinct relation to menstrual functions. During an attack, nausea and vomiting were prominent, along with scantiness of urine. Rapid subsidence of tumour, with increased flow of urine. This could be aided by manipulation of the tumour.
79	M.	..	..	Morphia taker. No fever. Normal urine. Intermitting hydronephrosis.
80	F.	35	Left.	Four children. Pains in left flank appeared after last pregnancy, and recurrred every two or four months. In 1883 a tumour detected in the left flank. From 1885 to 1889 she was free from all attacks, and no tumour was seen. Then reappearance. Attacks accompanied by pallor, severe pains, vomiting, &c. Tumour tender, and not very movable. Persisted four to ten hours. Urine normal. No fever.
81 82 83	F(3)	..	..	All with intermitting tumours, normal urine, and free from fever.
84	M.	41	Right.	Since his sixteenth year had attacks of right lumbar pain. More recently a tumour observed. Good health generally. No fever. Attacks commenced with acute radiating pains, vomiting, &c., and appearance of a tumour. Gradual cessation of symptoms, with greatly increased flow of urine. For last three years hæmaturia was noticed during each attack. Attacks lasted several hours.
85	F.	24	Right.	Anæmic. Pains in right hypochondriac and epigastric regions since puberty. Kidney movable. During attack, acute pains, nausea, and vomiting, with appearance of tumour in the flank. Lasted about twelve hours, then disappeared. Attacks variable in number, and good health in intervals.
86	F.	30	Right.	Suffered long from pains in right side, with intervals of freedom. The pains were violent and acute, and simultaneously a tumour developed, smooth and firm. Persisted about a day, then subsided.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
Aspiration. Fistula established four months later. Nephrectomy.	Death.	Hydronephrosis of left kidney. Movable kidney. Right kidney freely movable. Ureter normal.	Kœhler, Charité Annalen, 1889–90.
Nephrorraphy.	Recovery. Ultimate complete freedom from attacks.	Movable kidney, with hydronephrosis (intermitting).	Guyon, Académie de Médecine, 1889. Case I.
Nephrorraphy.	Recovery.	Movable kidney, with intermitting hydronephrosis.	Case II. Ann. des mal. d. Org. Gén. Urin., 1891, pp. 605 and 653.
Fixation. Instrumental.	Recovery. Normal confinement later.	Movable kidney: intermitting hydronephrosis.	Case III. Loc. cit.
..	..	In all cases movable kidneys and intermitting hydronophrosis.	Cases IV., V., VI.
..	..	Movable kidney. First idea of stone being discarded. Intermitting hydronephrosis.	Zawisza, Warsaw, Medycyna, 1890-91. Case I.
..	..	Movable kidney and hydronephrosis (intermitting).	Case II.
..	..	Movable kidney and hydronephrosis (intermitting).	Case III.

	Sex.	Age.	Kidney.	History and Symptoms.
87	F.	24	Left.	Married. Suffered since early childhood from dull pain in left lumbar region, with tendency to paroxysmal attacks. Tumour discovered. During last five years much worse, and attacks distinctly intermitted with scanty urine first, and then increased flow, when tumour lessened in size. Urine albuminous—some pus in it. Became a chronic invalid from severity of pain.
88	F.	24	Right.	Married. Had noticed an enlargement in the right side since her fourteenth year. This varied in size considerably from time to time, and when increasing was accompanied by paroxysms of pain. At height of attack (present time) there occurred a free discharge of milky-coloured urine, and pain would cease for two or three weeks or longer. The last attacks had been ushered in with rigors and pyrexia.
89	F.	17	Right.	Tumour in the right loin. No history of variation in size. Aspirated four times, and after the last aspiration tumour did not increase in size for nearly three years. Then nephrectomy was done.
90	F.	..	..	No history given. A housemaid who had a recurring renal tumour, filling and emptying of its own accord.
91	F.	40?	Right.	Attacks of pain, specially marked at menstrual periods, in the right side. Kidney tumour very movable, falling forwards on movement and being easily pushed beneath the ribs. Urine healthy. Kidney slowly passed into the condition of a hydronephrotic cyst, which fills and empties itself. No operation.
92	M.	22	Right.	A young athlete. Paroxysmal attacks of pain in right side, and appearance and disappearance of a tumour, occurring once a week, and lasting several hours. Tumour observed a year after pain appeared. Could be easily moved back beneath ribs. Urine normal. Nephrorraphy. Taken at first for case of gall stones and distended gall bladder.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
Nephrectomy.	Recovery.	Intermitting hydronephrosis and pyonephrosis in movable kidney. Kidney had become a large sac, with little tissue left. Contained a urinous milky fluid, and showed septal divisions. No cause given.	Fowler, Brooklyn, New York Med. Jour., 1891. Case I.
Nephrectomy.	Recovery.	Intermitting hydro- and pyonephrosis in a movable kidney. Great dilation of pelvis and calyces. Little secreting tissue left. Firm attachments to non-peritoneal surface of colon. No remarks as to ureter.	Case II.
Aspiration. Nephrectomy	Recovery.	Dilated pelvis of kidney. Ureter dilated. No cause discovered.	Symonds, C. J., Brit. Med. Jour., vol. i. 1891. Case I.
Incision and drainage for 3 months. Fistula then allowed to heal. Recurrence 7 months later. Nephrectomy.	Recovery.	Cause unknown. Pelvis dilated. Orifice of ureter thought to be contracted. Intermitting hydronephrosis.	Case II.
..	..	Movable kidney, and intermitting hydronephrosis.	Clement Lucas, Brit. Med. Jour., vol. ii. 1891. Case I.
Nephrorraphy. Quite well up to ten months after operation.	Recovery.	Movable kidney. Pelvis found on operation to be dilated as well as calyces. Ureter normal. Intermitting hydronephrosis.	Case II.

	Sex.	Age.	Kidney.	History and Symptoms.
93	F.	30	Left.	Swelling in left loin observed February 1890. Caused little pain, grew slowly, was freely movable, and had no history of variation in size. Urine healthy. Tumour dull on percussion, save just below the ribs.
94	F.	29	Left.	Married. Three children. Since last confinement, sixteen months before, had suffered from pains in left loin at frequent intervals. A swelling observed there during attacks ; subsiding with the cessation of the pain, with increased flow of urine. Seldom a fortnight free from pain. Tumour, when large, showed fluctuation, and was freely movable.
95	F.	..	Left.	Died of acute rheumatism in the hospital.
96	F.	40	Right.	Suffered from violent pains in right side, followed by appearance of a large tumour in the flank. Then a copious flow of urine, with disappearance of the swelling and cessation (though not always simultaneously) of the pains.
97	M.	22	Left.	Had suffered from left renal pains for seven years. Tumour been noticed for four years. Attacks occurred every two or three months. Acute pains, frequent micturition, vomiting, and swelling in the side. Slow subsidence. Urine healthy in intervals, but hæmaturia after attack. Improved when under his care.
98	F.	30	Right.	Intermitting pains in right lumbar region for about fourteen years. Tumour observed in same region four years ago. Urine normal. Attacks came on once or twice a month, with acute pains, pallor, anxiety, nausea, and scanty urine. Tender movable swelling in the loin, size of child's head. Some fever. Disappearance of pains and swelling with increased flow of urine, thick and purulent.
99	F.	23	Right.	Mother tubercular. One confinement, after which the attacks of right-sided pain appeared. Right kidney movable. Attacks occur every month (sometimes one follows another directly), with acute pains, nausea, vomiting, slight fever, and scanty flow of urine, and appearance of large tumour in the loin. Attacks last twenty-four to forty-eight hours.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
Aspiration. Clear, urinous fluid removed, sp. gr. 1012. Urea 1·5 p.c. Nephrectomy.	Recovery.	Dilatation of pelvis and calyces of kidney. Secreting structure wasted. Ureter normal.	Case III.
Nephrorraphy.	Recovery. Since operation no evidence of accumulation, and no pain.	On operation, pelvis found distended, and a considerable amount of kidney tissue felt to be still remaining. Ureter became normal in calibre opposite lower end of kidney. No obstruction found.	Case IV.
..	..	Left hydronephrosis. Urine could be squeezed only in drops from the cyst through the ureter, which was quite patent, but inserted at an angle forming a form of valve. Kidney freely movable.	De Rechter, La Presse Médic. Belge, 1891, April.
..	..	Movable kidney, with intermitting hydronephrosis.	Lindner, Munch. Med. Woch, 1890.
..	..	Movable kidney most probable. Intermitting hydronephrosis.	Ferrier, De l'Hydronephrose Intermittente, 1891. Ferrier et Baudouin. Case I.
Nephrectomy.	Recovery.	Hydronephrotic cyst from twisting of ureter of movable kidney. Intermitting.	Case II.
Nephrorraphy. Amelioration of attacks. Slight pyelitis. Nephrectomy.	Recovery.	Hydronephrotic kidney, due to kinking of ureter of movable kidney. Intermitting.	Quénu, Ferrier et Baudouin, *op. cit.*, 1891.

	Sex.	Age.	Kidney.	History and Symptoms.
100	F.	42	Right.	Had suffered from parametritis. Also movable right kidney for ten years. Renal pains for six years. During an attack a tumour appeared in position of kidney, hard and not movable, which disappeared with increased flow of urine after attack. On puncture a clear yellowish fluid obtained.
101	F.	28	Right.	Three pregnancies. After an injury had pains in the renal region, followed later by a tumour. Some anæmia and wasting. Attacks occurred every seven to twenty-one days with headache, acute pains, and appearance of a hard, tender tumour, desire to micturate, &c. Disappearance of tumour with abundant flow of urine.
102	F.	40	Right.	One child. For eight years had periodical painful attacks in right side. Movable kidney. Attacks appeared every four weeks, often at the periods, with acute pain, nausea and vomiting, and a tender tumour, size of a child's head, in the loin. Scanty urine, thick and dark. On cessation of pain a free emission of urine, subsidence of tumour. Attack lasted a day or two.
103	F.	..	..	Went through operation of nephrorraphy in 1889 with recovery from symptoms for many months. Escape of the kidney and reappearance of attacks every two months. Acute pains in lumbar and iliac regions, with appearance of large tumour in position of kidney and suppression of urine. Attack persists about twenty-four hours. On lying down for some time a free emission of urine occurs with subsidence of tumour.
104	F.	23	Left.	A tubercular subject. Had been insane. Suffered from pains in the left side, followed by a swelling in the flank, which subsided. Urine healthy. Tumour reappeared in a few weeks and again melted away. She remained free for a year, when it returned again. Once only was an increased flow of urine noticed, with subsidence of swelling. Massage seemed to aid the reduction of the swelling.
105	M.	45	Left.	Complained of pains in the left loin, which ceased on taking a complete rest. On resuming work they returned, and a tumour was found in the left flank. This disappeared evidently as a result of the manipulation during examination. The same sequence of events occurred a second time. Urine healthy. Unfinished.
106	F.	..	Double.	Married. Suffered for sixteen years from left-sided pain, and ultimately became unable to do anything. Tumour detected first in 1892, was noticeable for three days. Tumour movable.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
..	..	Intermitting hydronephrosis of movable kidney.	Landau, Ferrier et Baudouin, 1891, *op. cit.* Case I.
..	..	Intermitting hydronephrosis of movable kidney.	Case II.
..	..	Intermitting hydronephrosis. Movable kidney.	Oppenheimer, Arch. Gén. de Méd., 1891.
Nephrorraphy.	Unsuccessful.	Intermitting hydronephrosis. Movable kidney.	Arnould, Thèse, 1891. Ferrier et Baudouin, *op. cit.* and Ann. d. Mal. d. Org. Gen. Urin., 1891.
..	..	Intermitting hydronephrosis.	Bristowe, Dr. J. S., International Clinics, January, 1892. Case I.
..	..	Intermitting hydronephrosis.	Case II.
Nephrectomy.	Died a month later.	Dilatation of left kidney with atrophy of substance. Right kidney in a similar but less marked condition. Supposed to be due to kinking of ureters. Intermitting hydronephrosis. Double.	Morris, Henry, Brit. Med. Jour., vol. i., 1893.

	Sex.	Age.	Kidney.	History and Symptoms.
107	F.	30	Right.	Single. Had complained of painful micturition for many years. During the last four years the pains had become more paroxysmal in nature and the attacks more protracted. Generally an attack at each period. While straining the tumour became dislocated downwards and forwards to a marked extent. Hæmaturia on one occasion.
108	F.	27	Right.	Had complained several years. Tumour observed low down on right side towards pelvis. Considered to be an ovarian cyst. Showed fluctuation.
109	F.	37	Right.	Married. Three pregnancies. Shortly after last confinement found a round, smooth swelling in right flank. On examination, showed fluctuation. No other history given.
110	F.	47	Right.	Married. Four pregnancies, last occasion twins. For two years periods had been irregular, then ceased. Following a strain, she felt as if something had given way in her right side. Had never been well since. Movable fluctuating tumour detected in right flank, size of man's head. Urine albuminous. On puncturing it a reddish fluid containing some blood obtained.
111	F.	37	Double. Left first.	First symptoms at fifteen. Quiescence for twenty years, reappearance after a strain. Intermitting tumour. Hæmorrhages from bowel. Nephrectomy. Appearance on right side. Tumour freely movable when small. Attempts at fixation by pads ineffectual. Tumour intermitting. Perfect health, save for this trouble. Urine normal. See case.

Treatment.	Termination.	Pathological State, &c.	Authority and Reference.
Tapping; 4½ pints of straw-coloured fluid removed.	Complete recovery; eight years later was in good health.	Hydronephrosis most probably from movable kidney. Fluid removed contained crystals of cholesterine, was urinous, and had a sp. gr. of 1004.	Coghill, Edin. Med. Jour., 1874–5, p. 747.
Nephrotomy-	Recovery with fistula.	Hydronephrosis of wandering kidney.	Ahlfeld, Arch. für Gynœk, xv. 1880.
Nephrectomy.	Recovery.	Hydronephrosis. Ureter inserted at an acute angle, and having an S-shaped twist near its pelvis end. Contents of cyst showed 7 per cent. of urea. Kidney wasted. Probably movable kidney.	Czerny, Langenb. Arch. f. Klin. Chir., Bd. 25, 1880.
Nephrotomy.	Recovery with fistula.	Hydronephrosis in movable kidney.	Schramm, Berl. Klin. Woch., 1883, p. 561.
Nephrectomy of left kidney. Nephrotomy of right kidney.	Recovery with fistula.	Intermitting hydronephrosis of movable kidney. Double.	Case recorded in this thesis.

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