University of Glasgow.

THESIS FOR THE DEGREE OF M.D.

MOVABLE KIDNEY:

ITS ÆTIOLOGY AND SYMPTOMS.

BY

ANDREW F. GALLOWAY, M.B., C.M.

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PREFACE.

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WHILE acting as house surgeon in the Glasgow Royal Infirmary I had several cases of movable kidney brought under my observation, and these have formed the basis for the brief account of this disease contained in the following pages.

Through the kindness of Dr. Newman I am permitted to refer not only to these cases, but to several others which he has had under his care, and with notes on which he has supplied me.

I have also to thank Dr. Dougall for permission to refer to Case VIII, which was admitted to his ward while I was acting as his house physician.

A. F. G.

MOVABLE KIDNEY.

A GOOD deal of attention has of late years been directed to the subject of mobility of the kidney, and in the following pages an endeavour has been made to regard this disease chiefly from a clinical standpoint, and to illustrate the chief points in its ætiology and symptomatology by reference to typical cases. Before proceeding to discuss the displacements of the kidney, however, it may be of advantage to refer very briefly to the

GENERAL ANATOMY

of these organs.

The kidneys are deeply situated in the lumbar region, lying one on each side of the vertebral column at the back of the abdominal cavity and behind the peritoneum. They are situated on a level with the last dorsal and two or three upper lumbar vertebræ; the right kidney lying about three quarters an inch lower down than the left.

The inferior extremity of the left kidney is about 2 inches from the iliac crest, while that of the right is about $1\frac{1}{4}$ inch. The hilus lies about 2 inches from the middle line.

The kidneys measure about 4 inches in length, $2\frac{1}{2}$ inches in breadth, and $1\frac{1}{4}$ inch or more in thickness. The left is

a little longer and thinner than the right. The coverings of the kidney are two in number—the outer capsule or tunica adiposa, and the inner or tunica fibrosa.

The tunica adiposa is composed of loose areolar tissue, which contains a variable quantity of fat. In obese persons the quantity is often very great, and may lead to some confusion in estimating the size of the kidney. It is thicker and more abundant posteriorly than in front, but it completely surrounds the fibrous capsule.

The tunica fibrosa forms a smooth, thin, but firm investment, which closely surrounds the kidney. It can normally be easily separated from the substance of the gland, to which it is united by minute processes of connective tissue and small blood-vessels. It follows the hilum of the kidney, passing inwards, and thus becoming continuous around the bases of the pyramids with the strong external fibrous and elastic tissue of the calyces and pelvis of the ureter.

The kidneys are highly vascular, and receive their blood-supply from the renal arteries, which are of very large size in proportion to the size of the organs.

Each renal artery divides into four or five branches, which, passing in at the hilum between the vein and the ureter, may be traced to the sinus of the kidney, where they lie amongst the infundibula.

The arterial twigs enter the kidney substance between the papillæ. Venous trunks coming from the sinus join together and pass out from the hilum, forming one large vein which lies in front of the artery.

The nerves forming the renal plexus are derived chiefly from the semilunar ganglion, but branches also come from the solar and aortic plexuses, and a few filaments from the smallest splanchnic nerve. The nerves pass along the renal artery, and in their course several ganglia are formed. They

divide with the vessel, and follow the renal arteries into the kidney.

The ureters, along with the vessels and nerves just described, form the pedicle of the kidney. The upper end of the ureter situated in the pelvis of the kidney is dilated and funnel-shaped. The ureters measure from 14 to 16 inches in length. Passing at first obliquely downwards and inwards, they enter the true pelvis, and then curve forwards and inwards to reach the side and base of the bladder, which they enter by two narrow and oblique slit-like openings.

We have now to consider the means by which the kidneys are retained in their position.

The *adipose capsule* has been mentioned above. This capsule is derived from the lamina fibrosa of the fascia propria peritonei, which on reaching the kidney divides into two layers. One of these, running with the peritoneum, passes transversely over the anterior surface of the kidney, while the other passes beneath the pelvis and vessels of the kidney on the posterior surface, and is joined again by the anterior layer. This posterior layer, lying behind the renal vessels, consists of closely compressed and compact connective tissue, and, according to Englische,[1] contributes largely to the fixation of the kidney. Bartholin has termed it the "ligamentum suspensorium renis."

The two layers described above join at the upper border of the kidney, and separate it from the suprarenal body, while from the lower border the united layers can be traced as far as the brim of the pelvis. The anterior layer is intimately connected with the peritoneum, while the posterior is loosely united to the posterior abdominal wall. Again, the kidneys are prevented from moving outwards by the renal vessels and ureters, while the meso-colon, which is short and tense, and attached to the posterior abdominal

wall, assists indirectly in preventing movement inwards and downwards. In addition, it must be remembered that the kidneys, lying as they do close to the part of the vertebral column which is least affected by movement, and enclosed for the most part within the bony cavity of the thorax, are protected from pressure to a great extent. Besides these anatomical factors, the intra-abdominal pressure enables the abdominal walls to retain the abdominal viscera in position.

By these means the kidneys remain almost immovably fixed during life.

Displacements of the Kidney.

The definition of the term movable kidney, and the distinction between it and floating kidney, are subjects on which there has been much controversy.

In order to simplify matters it will be advisable to consider first in a general way *displacements of the kidney*, and afterwards to consider more in detail the varieties.

Displacements of the kidney are not at all uncommon, but in many cases the degree of displacement is so slight that, unless very careful examination is made, it may be overlooked. They have been divided by most authors into three classes:—

1. Simple misplacement without mobility.
2. Floating kidney.
3. Movable kidney.

1. *Simple misplacements* are of comparatively frequent occurrence. The kidneys vary much in position with relation to other organs, in relative distance from spine, &c.

Dr. Newman, in his work on *Surgical Diseases of Kidney*, states that in 1,000 *post-mortem* examinations, the position

of one or both kidneys was abnormal in 24 cases, and in 9 of these there was also malposition of the suprarenal capsule. It would thus seem that misplacement of the kidney does not necessarily involve misplacement of the suprarenal capsule. Where the misplacement is slight it may give rise to no disturbance, but where, as sometimes happens, the kidney is fixed in the iliac fossa, between the rectum and the bladder, or at the side of the uterus, grave symptoms may supervene. In most of the cases described by Newman,[2] Aubé, Drouin, Bellini, and others, alteration in form of the kidney was found, depending on the situation occupied by it. As a rule, the displacement is associated with some deviation in the position of the large intestine and peritoneum, and very frequently there is also abnormality in respect to the renal vessels and ureter. Roberts[3] states that in 21 cases of congenital displacements of the kidney investigated by him the abnormality was confined in all cases to one kidney, and in 15 of these cases the one affected was the left.

One of the most remarkable varieties is what has been called the "*horse-shoe kidney.*" This has been described by Butler and others, and has been found in 9 out of 14,318 cases examined. In such cases the kidneys are united or fused into one, and in Butler's case it extended from the border of the fourth lumbar vertebra downwards over the promontory of the sacrum to the middle of that bone—in all, 5 inches. In breadth it measured $3\frac{3}{4}$ inches. The ureters sprang from a pelvis which occupied the centre of the anterior surface of the organs, and then passed off on each side, and discharged into the bladder at the usual sites.

The arteries supplying the organs were four in number—above, a single large trunk came from the aorta at its bifiurcation, and, passing downwards, broke up into five small branches before entering the substance of the kidney.

On the left side two arteries came from the left internal iliac, near its origin, while on the right side an artery passed into the organ from the right internal iliac.

Besides these cases where the displacement is *congenital*, there are other *acquired* cases caused by enlargement of liver, spleen, or other organs, or by pressure from tumours. These acquired cases are mostly on the right side, and tight lacing has been ascribed as a cause in some cases. When the right kidney is displaced by an enlarged liver it is usually rotated on its short axis, so that the hilus is turned upwards.

In one case of Hohl's, described by Rayer, the right kidney was displaced downwards by an enlarged suprarenal body, and caused obstruction to parturition by retarding the passage of the fœtal head.

In the majority of cases these simple misplacements are only discovered after death, and it is rare that any treatment is required.

We now come to consider the second class of displacements of kidney—viz.,

Floating Kidney.

Much confusion has been caused in the past by the failure of writers to clearly distinguish floating from movable kidney. In order to avoid this confusion it will be necessary to define clearly what is meant by the term floating kidney.

Briefly, a floating kidney is one which is provided with a mesonephron, and moves about within the cavity of the peritoneum.

Sir William Jenner,[4] in his *Clinical Lectures on the Diagnosis of Extra-pelvic Tumours of the Abdomen*, thus differentiates between the two classes:—

"A floating kidney is a kidney that has a mesentery—a

fold of peritoneum attaching it very loosely to the spine. A floating kidney, therefore, can be moved about to a considerable extent—to the extent of the length of the mesentery. A movable kidney can only be passed up and down a little; it slips a little under your fingers."

In this definition, however, Sir William Jenner, while clearly distinguishing the two conditions *anatomically*, falls into the error of attempting to distinguish them *clinically*, by comparing the amount of movement. To distinguish the two conditions clinically has been found practically impossible, as in many cases the amount of movement possible in a "movable kidney" is quite equal to that which is found in a "floating kidney." This will be seen when we come to consider the clinical histories of cases of movable kidney. A committee of the Pathological Society of London was appointed to inquire into the matter of displaced, movable, and floating kidneys, and in their report[5] the same error is found, as will be seen from the following passage:—

"Looking at the matter of kidneys unduly movable, we think it well to divide them into two varieties. The first form is that in which the organ may be moved to some extent beneath the peritoneum. A certain degree of this mobility is not very uncommon. It will be found to be present in a considerable number of subjects, if, as soon as the body is opened, the kidneys be handled without the removal of any of the organs. The amount of movement possible is not commonly greater than an inch or two upwards and downwards. Occasionally, however, a flaccidity of the peritoneum exists to a much greater extent, so as to allow the kidney to move under the peritoneum over a space described, in one of the reports sent to us, as a circle having a diameter of 8 or 9 inches. In the second

variety the peritoneum passes over the posterior surface of the kidney, forming a kind of mesonephron. From the evidence which has been laid before us, it appears that these so-called floating kidneys may depend upon either of the above states; that the peritoneum may be flaccid and loose to such an extent as to allow the kidney to move under it, so as to come in contact with the wall of the belly; or to leave its natural place and pass to, or below, the brim of the pelvis; or, indeed, in some cases, to encroach upon the opposite side of the belly. A like movableness or floating of the kidney may be due to the presence of a mesonephron, already spoken of. It will, therefore, be seen that the terms movable and floating kidney must not be used as strictly corresponding to two anatomical varieties, since a kidney without a mesonephron may give rise to all the clinical phenomena shown by one with a mesonephron. Both these anatomical varieties merge by insensible degrees into one another, and these two expressions, movable and floating, can only be used as implying different degrees of the diseased state, which, according to its extent, may give rise to a slightly mobile, or an extremely mobile kidney."

Cases of true floating kidney are very rare; indeed, their occurrence has been doubted by some writers

The condition is always congenital, thus differing from movable kidney, which is usually acquired.

Dr. William Henderson[6] reported a case in which "the right kidney was found to be perfectly movable, and was suspended, as it were, by a prolongation of the peritoneum enclosing the kidney, and forming a distinct mesentery, which allowed it to move in all directions."

Dr. Priestley[7] has recorded a case where, at the *post-mortem* examination, "the peritoneum was found reflected

over the posterior surface of the kidney, giving it thus a mesentery, and allowing it very considerable motion in the right side of the abdomen."

Coming to more recent times, Dr. J. Lindsay Steven [8] has described a case where "the lower end of the right kidney was found projecting forwards quite through the intestines, so as to be visible without disturbing them. Upon seizing it, it was discovered to be freely movable in a radiating manner, the centre of movement corresponding to the attachment of the renal vessels, and that part of its internal border extending from them to its upper extremity. On turning aside the parts the suprarenal capsule was seen in its normal situation, immediately beneath the posterior border of the liver, and, on letting the kidney fall back into its normal situation, it was found to lie quite an inch and a half below the level of that organ. In the movements of the kidney the suprarenal capsule was not at all affected, and that it was not at all dragged downwards was proved by the fact that, on removing it along with the kidney and abdominal vessels, a small portion of the liver remained adhering to it. In this case there was quite evidently a partially formed renal mesentery, its line of attachment corresponding to the upper half of the internal border and a small area of the upper portion of the posterior surface of the kidney—the movements of the lower portion of the organ being thus much more free than those of the upper. There was no peritoneal sac in which the organ was moving, as the peritoneum was very firmly adherent to the organ all round, except at the part where the mesentery passed off to attach the kidney to the posterior abdominal wall."

In a case described by Mr. Keetley [9] the right kidney was found *post-mortem* to be in its normal situation, but freely

movable in every direction. Two layers of peritoneum were found forming a mesonephron. These layers were quite separate and far apart, but they covered the kidney and moved with it. The subject in this case was a female of 68.

Floating kidney is very frequently found to be associated with other malpositions of the other abdominal viscera or of the peritoneum.

This is shown in a case reported by Mr. Durham,[10] where, "upon opening the abdomen of J. C., æt. 34, it was at once noticed that the left kidney was situated lower down and nearer the middle line than usual; the descending colon was also nearer the middle line, and formed no sigmoid flexure in the left iliac fossa, but passed across the last lumbar vertebra and entered the pelvis on the right side of the sacrum. Upon slightly pressing the kidney it slipped at once into its normal position, and upon further examination it was found to be movable to a most remarkable extent. By changing the position of the body, or by gentle manipulation, the kidney was caused to pass, according to circumstances, quite up under cover of the ribs, across to the front and slightly to the *right* side of the bodies of the vertebræ, or down into the iliac fossa. This mobility appeared to depend principally upon the unusual disposition of the peritoneum, which was associated with the misplacement of the colon. Instead of passing over the anterior surface of the kidney, and then forming the descending meso-colon, the peritoneum from the side of the spinal column only just touched the lower part of the inner border of the kidney, and then, having been reflected over the descending colon, touched the lower part of the outer border of the kidney as it passed on to line the side of the abdominal cavity; and again, the lesser sac of the peritoneum extended behind the spleen and as low down as the upper border of the kidney. Thus, the kidney, instead

of being fixed in its position by a single layer of peritoneum over its anterior surface, was placed, as it were, in the middle of three diverging layers, none of which could afford much support.

"Upon dissection, it was found that there was little or no fat in the lumbar region, and that the kidney was consequently only surrounded by very loose cellular tissue. To this circumstance, doubtless, must be attributed, in great part, the remarkably prominent appearance of the kidney when the abdomen was laid open. The renal artery was somewhat longer and thinner than usual. The kidney itself was rather small, but of perfectly healthy structure. No other anatomical peculiarities than those already described were met with. No history of the recognition of the mobility of the kidney during life could be obtained."

The above are the principal authentic cases of true floating kidney which have been recorded. Although, however, this condition is so excessively rare, the possibility of its presence should always be borne in mind. The symptoms would be identical with those got in a case of movable kidney.

We now come to consider the most important part of our subject, namely,

Movable Kidney.

This condition has been described by writers by many terms. By the older writers it was called "Descent," "Displacement," "Prolapse," "Ectopia" of the kidney. It has also been termed "Dislocation of the kidney," and two varieties of this were spoken of—"Spontaneous" and "Traumatic."

In later times it has been spoken of as "Wandering" or "Floating" kidney, the latter term corresponding to the

French phrase "Rein flottant." We have already discussed how the employment of the terms floating and movable kidney in an indefinite manner has given rise to great confusion, and, in the following remarks, we will strictly confine the term *movable kidney* to those cases where the kidney is capable of movement from its normal situation, but *behind* and not *within* the cavity of the peritoneum. This condition was first described by François Pedemontanus,[11] but no special importance was attached to it by him.

It was termed "Dislocation of the kidney" by Riolan,[12] who was the first to recognise its clinical importance.

It was considered by many of the older writers to be merely an anatomical curiosity. Baillie[13] mentions several cases in which a movable tumour was discovered in the region of the kidney of one or other side, and which had the general shape and size of a kidney. In these cases the patients were practically free from discomfort of any kind. According to this writer, the tumour was often mistaken for an enlarged ovary in women.

The condition is also mentioned by Otto,[14] Meckel,[15] and Portal.[16] Aberle,[17] however, was the first writer to furnish clinical descriptions of this condition associated with accurate *post-mortem* records. King[18] observed one such case, and even attempted to remove the movable mass. In this he was unsuccessful, but the woman experienced great relief from the operation. Rayer,[19] in his work on kidney diseases, described several cases. Dietl[20] followed with an account of the clinical symptoms and the frequency of this condition.

The author of the first monograph on the pathology and treatment of this condition was Rollet,[21] who discovered 22 cases in 5,500 patients of Oppolzer's clinique. In more recent times we find this condition described by Durham,[22] Trousseau,[23] Fourrier,[24] and Keppler,[25] while Newman has

collected and recorded a large number of cases within the last few years.

In text-books of medicine and surgery movable kidney is, as a rule, dismissed in a few sentences, and for this reason probably the condition is too often overlooked, and the symptoms arising from it attributed to other causes.

Pathological Anatomy.

By the older writers little attention was paid to the changes produced by movable kidney, and we look in vain for any accurate descriptions of *post-mortem* appearances in such cases.

This is shown by the fact that Durham found only 2 cases of displacement of kidney in the records of 1,600 autopsies at Guy's Hospital, while Schultze found only 5 recorded in 3,658 autopsies in the Charité Hospital, Berlin, between 1859 and 1866. Landau,[26] on inspecting the records of the same hospital from 1870 to 1879, found only 4 cases in 6,000 autopsies, and no special note had been made even of these 4. Landau[26] records 17 cases in his monograph on the subject published in 1881.

It must be remembered, however, that movable kidney is of itself not a fatal disease; and, besides, the liability of the organ to slip back into its normal position must be considered before much reliance can be placed on statistics based on *post-mortem* records. When, however, special search is made for this condition, the result is different. This is seen by the fact that Newman[2] gives, as the result of his observations, 1·8 as the percentage of cases in which the kidneys were movable through an area of more than 3 inches.

In the cases which have been examined *post-mortem* the conditions found have been variable.

In one of the cases recorded by Aberle the right kidney was found very movable in its normal position, from which it could be easily displaced in front of the bodies of the vertebræ beneath the duodenum downwards and forwards. Its vessels were comparatively long; the cellular capsule of this kidney was completely destitute of fat, the hepatic flexure of the colon was unusually distant from the liver, and depressed somewhat towards the middle of the abdominal cavity.

In 6 of the cases collected by Landau [26] it is recorded that the capsule of the kidney was destitute of fat; in 3 there was also displacement of the colon; in 4 the liver was enlarged, and was supposed to have caused the displacement of the kidney by downward pressure; in 1 there was hydronephrosis, attributed to pressure of an enlarged uterus and ovarian cyst on the ureter; in 1 there was caries of the thoracic vertebræ, and the kidney was found suspended by a prolongation of the peritoneum; in 1 there was caries of the lumbar vertebræ and the kidneys were dilated, and an opening was found between the renal tumour and the carious vertebræ, while the ureter was occluded by a piece of carious bone.

These last two cases are specially interesting, as, in one of the cases which has come under my observation, the patient suffered in earlier life from a large abscess connected with the thoracic vertebræ.

Out of these 17 cases of Landau, 3 were on the left side, 13 on the right, while 1 was double.

The degree of movement found varies greatly, and, as a rule, it has been observed that the kidney, besides being displaced, is rotated on one or two of its axes. In such cases the position and relation of the renal vessels and ureter is altered, and torsion of these structures is found.

In some of the cases the movable kidney has been found to be considerably atrophied, while in others there is a marked degree of hydronephrosis. The cause of this will be referred to when we come to consider the symptomatology of this disease.

One of the conditions most constantly observed is the absence of fat in the adipose capsule. Newman,[2] as the result of his observations, has described three conditions which may be found.

In the first of these the adipose capsule is atrophied, and the kidney is allowed to move freely within it, while the capsule itself retains its position. In the second variety the capsule, besides undergoing atrophy, becomes movable; while in the third the capsule and kidney are adherent, but the peritoneum and the attachments of the kidney to the posterior abdominal wall have become relaxed.

ÆTIOLOGY.

Before proceeding to discuss the ætiology of movable kidney, it may be of advantage to refer briefly to the statistics which have been published regarding the frequency of this disease and the class of patients affected. First, as regards the age of patients affected.

Landau[26] has recorded that in 100 cases 6 occurred between the ages of 1 and 10, 2 between 10 and 20, 15 between 20 and 30, 43 between 30 and 40, 21 between 40 and 50, 9 between 50 and 60, and 4 between 60 and 70. Thus, 79 per cent of the cases were in patients between the age of 20 and 50.

Newman,[2] again, found that out of 290 cases about 46 per cent were between the ages of 30 and 40, and 20 per cent between 40 and 50, while 81 per cent were between the ages of 20 and 50.

In the cases which I have personally investigated, and many of which I have had an opportunity of observing clinically, I find the following:—Out of 17 cases 14 were between the ages of 20 and 50, and 3 between the ages of 50 and 60. Of these latter cases, two out of the three dated the onset of their illness previous to their attaining the age of 50.

From these statistics it will be seen that an overwhelming majority of the cases of movable kidney occur in patients between the ages of 20 and 50.

Turning now to the question of sex, we find that by far the largest number occur in females.

In the 314 cases collected by Landau 273 were women and 41 men. Skorszewsky found 32 cases in 1,030 females, and only 3 cases in 392 males, or a percentage of 3·2 in females and 1 in males. Roberts,[3] in 70 cases, found 61 females and 9 males. Fritz,[27] in 35 cases, found 30 in females and 5 in males. Newman, in 290 cases, found 252 females and 38 males; while in the 17 cases which I have observed 13 were females and 4 males.

Again, most of the females affected have borne children, and in many cases the number of pregnancies has been large. Thus, in 42 cases observed by Landau only 2 had never borne children. In 21 cases observed by Newman 14 had borne children, and in 10 of these the pregnancies numbered over 4.

As regards the kidney affected, statistics show that the right is much more frequently affected than the left. Thus, in 178 cases collected by Landau 151 were on the right side, 13 on the left, while 14 were bilateral. In 65 cases collected by Roberts, 42 were on the right, while 9 were on the left, and 14 were double. Hare,[28] in 23 cases, found 18 on the right and 5 on the left. Lancereaux,[29] in 43 cases,

31 on the right, 5 on the left, and 7 bilateral. Ebstein, in 91 cases, 65 on the right, 14 on the left, and 12 bilateral. In the 17 cases collected by myself, 14 were on the right and 3 on the left. For the sake of clearness we may tabulate the above results:—

Author.	Number of Cases.	Age.		
		Under 20.	20 to 50.	Over 50.
Landau, ...	100	8	79	13
Newman, ...	290	...	about 81%	...
Galloway, ...	17	...	14	3

Author.	Number of Cases.	Sex.	
		Males.	Females.
Landau, ...	314	41	273
Skorszewsky, ...	35	3	32
Roberts, ...	70	9	61
Newman, ...	290	38	252
Fritz, ...	35	5	30
Galloway, ...	17	4	13
	761	100	661

Author.	Number of Cases.	Kidney Movable.		
		Right.	Left.	Both.
Landau, ...	178	151	13	14
Roberts, ...	65	42	9	14
Hare, ...	23	18	5	...
Lancereaux, ...	43	31	5	7
Ebstein, ...	91	65	14	12
Galloway, ...	17	14	3	...
	417	321	49	47

We will now consider in detail the causes of movable kidney, and endeavour to explain some of the facts brought out by the above statistics. The ætiology of this disease is a subject which has given rise to much discussion, and some confusion has arisen owing to writers mistaking cause for effect.

One of the commonest causes assigned is pregnancy, and that there are good grounds for this is borne out by the facts we have learned from statistics—viz., that the largest number of cases are found in females, and especially in females who have borne children.

In pregnancy we have, first of all, the undue distension of the abdomen and the pressure exercised by the expanding uterus; secondly, we have violent muscular contractions at parturition; and, thirdly, there is the lax condition of abdominal wall resulting from the sudden diminution in size of the abdominal contents.

These conditions would in themselves be sufficient, in some cases, to give rise to a movable condition of the kidney, but in the majority of instances pregnancy must be looked upon as a predisposing rather than an exciting cause.

When the pregnancy has been a normal one, and when, as is usually the case in the better classes, the mother retains the recumbent posture for a suitable length of time, and when, moreover, she is not exposed to the danger of hard or fatiguing work for some time at least after her confinement, the abdominal wall is allowed time to regain its firmness and elasticity. When, however, as is the case in the lower classes, the women are forced to resume their usual occupation in a comparatively short time after their confinement, and no proper precautions are taken to afford suitable support to the abdominal wall, a lax condition of the parietes frequently results.

Again, in many instances it has been found that the pregnancies have not only been numerous, but have followed each other in such rapid succession that the patient has never had time to regain her strength between her confinements. As a result she has become thin and emaciated, and separation of the recti muscles and pendulous belly have resulted.

But, it may be asked, why should pendulous belly give rise to movable kidney? The answer is that when the abdominal wall becomes lax and atonic, it can afford little, if any, support to the abdominal viscera. If, that being the case, pressure on these organs be increased as in labour, difficult defæcation, or in the lifting of heavy weights, stretching of the attachments of these organs is likely to result.

Again, in repeated pregnancies the peritoneum is dragged upon and stretched, and, as we have seen at the beginning of this paper, it plays an important part in fixing the kidney to the abdominal wall; hence anything which weakens this attachment will predispose to movement of the organ.

Moreover, the distended uterus exercises pressure on the kidneys as well as on the other abdominal viscera, and the sudden withdrawal of this pressure at delivery will result in the falling forward to some extent of the kidneys.

We have mentioned above that emaciation is a frequent result of rapidly succeeding pregnancies, and this also is a predisposing cause of movement of kidney.

When referring to the attachments of the kidney, we found that the tunica adiposa was an important factor in retaining the organ in position. Now, in general emaciation, such as we are likely to get after repeated pregnancies, the adipose tissue in this capsule will be absorbed. Supposing, now, that the amount of fat in the capsule has been large

and that it has been absorbed somewhat rapidly, it follows that the capsule will become lax and stretched, and be easily capable of being dragged upon. Besides this, the fat in the surrounding structures will also have been absorbed, and this indirect support of the kidney correspondingly weakened.

We must not suppose, however, that it is only repeated pregnancies which give rise to this degree of emaciation. Any acute or chronic disease which causes emaciation must be looked upon as a predisposing cause of movable kidney. Newman states that as a result of extensive *post-mortem* observations, considerable movement of the kidneys is permitted in those who have died of rapidly emaciating diseases. When emaciation has been very rapid, he has seen the kidneys so loose as to be easily drawn out in front of the spine without injury to their connections.

Menstruation has been advanced as an important factor in the production of movable kidney. Now, it must be admitted that in many cases an increase in the severity of the symptoms has been observed at the menstrual epoch, and Becquet,[30] Lancereaux,[29] and others have stated that congestion of the kidney and its capsule occurs at this period. They assert that the alternate distension and relaxation of the capsule which thus results leads to the kidney becoming movable within it. Landau, on the other hand, entirely rejects this theory. Too much stress, therefore, should not be placed on this theory, and it must still be regarded as under discussion.

Again, displacement of the generative organs has been ascribed as a cause of mobility of the kidney in women, and a good deal of evidence may be adduced in support of this theory. Retroversions and prolapses of the uterus are bound to exercise direct traction on the kidneys, and thus weaken the peritoneal attachments of these organs.

Besides this, they are apt to cause torsion of the lower end of the ureters, and in this way cause hydronephrosis. Now, hydronephrosis, both by stretching the capsule owing to the distension and by increasing the weight of the kidney, is very liable to give rise to mobility of that organ.

The same result may be caused by parametritis, which may cause obstruction of the ureter either by compression resulting from cicatricial formation, or by dragging the uterus and consequent dragging on the ureter of the opposite side.

Again, cases are recorded in which the mobility was due to weakening of the support of the kidney as a result of caries of the lower thoracic or upper lumbar vertebræ. When an abscess results from caries in this region, it is evident that there will be distension behind the peritoneum, and a consequent relaxation of the capsule and attachments of the kidney when the fluid is removed.

Mention has already been made of two such cases which have been recorded by Landau, and the following case, which came under my own observation, is a good illustration of this condition:—

CASE I.—*Right movable kidney—Spinal curvature—Transitory hydronephrosis—Suppression—Severe paroxysmal pain—distension of stomach.*

Mrs. K., æt. 56, married, was seen first by me in June, 1897. She was then recovering from a severe attack of pain in the region of the right kidney. Careful questioning elicited the following history:—About twenty-four years ago, while working at a farm, she attempted to raise a heavy cart. She felt at the time that she was overstraining herself, and shortly afterwards she was seized with severe pain in "the back." Some time after this a large abscess formed

in the back, and this was found to be connected with the spine. This was opened and drained, and the discharge lasted, she says, for over three months. It ultimately healed, but curvature of the thoracic vertebræ resulted.

About a year after this she first began to suffer from pain in the region of the right kidney. This was at first of a dragging nature, and was always worse after she had been doing a hard day's work.

The pain gradually became worse, and has been much more severe during the past fifteen years. She has had two children, and she noticed that the pain was always more severe when she was pregnant. It was also increased during menstruation.

For some years past she has had pretty constant pain radiating from the region of the right kidney across the abdomen, down the right thigh, and up towards the right scapula.

She has suffered for many years from nausea, sickness, and general gastric derangement. Bowels are very costive, and this also increases the pain. The pain is increased by stooping, and relieved by rest in the recumbent posture.

She is herself conscious of something moving about on her right side, and can grasp the mass in her hand. She says when she does this she has considerable pain. She has had several attacks of acute and agonising pain in her right side. This usually comes on when she has been working. It lasts sometimes for a day or two, and at these times she is forced to remain in bed and apply hot poultices to relieve the pain.

She says that when she has these attacks little or no urine is passed for a day or two. After a varying interval a large quantity is passed, and the symptoms are alleviated. During these attacks, she says "the right side of the belly is swollen."

This swelling disappears after there has been a copious flow of urine.

On examination I found the patient considerably emaciated. The abdominal wall was flaccid and atonic. There was marked separation of recti muscles. The stomach was considerably distended, and succussion was easily elicited. No swelling was visible in right lumbar region, but on palpation there was greatly increased resistance and some degree of tenderness in this region. An oval swelling was appreciable in the region of the right kidney. No hilus could be detected, but the swelling was uniform and smooth. Pressure on this caused considerable pain and a sickening sensation. The mass could be moved as far as the middle line, and also upwards and downwards. Percussion yielded negative results.

Patient has not had another acute attack up till the time of writing (July, 1897), and I am thus unable to report on the character of the urine during an attack.

There are several points to be noted as regards the ætiology of the above case. While, undoubtedly, the symptoms of movable kidney followed on caries of the thoracic vertebræ and spinal abscess, it must be remembered that emaciation was an almost certain result of such long continued suppuration, and this might quite possibly have something to do with the causation of the mobility. Besides this, we have a history of injury, and this leads us to consider the bearing of injury on the production of movable kidney.

Injury has long been recognised as a possible cause of mobility of the kidney.

Landau [26] states that physicial influences are competent, by themselves and without any previous anatomical changes of importance, to produce movable kidney. Cases produced by

acute injuries, such as a fall or a blow on the side, are quoted by Rayer, Henoch,[31] Ferber, and Le Ray, and this has been termed by Landau "Luxatio Traumatica Renis."

In the cases which I have collected it will be seen, when we come to consider the clinical histories, that in several the symptoms dated from an acute injury.

An example of this is seen in the following case, for the notes of which I am indebted to Dr. Newman. I had an opportunity of frequently observing this patient both before and after operation.

CASE II.—*Movable kidney caused by fall—Symptoms: severe paroxysmal renal pain, sickness and vomiting—No history of hæmaturia; urine normal between attacks of colic—Operation; kidney enlarged and engorged with blood —Cure.*

A. B., æt. 53, sea captain, came under observation in June, 1896. He enjoyed good health until five years ago. At that time, when on board ship, he was called suddenly one night, and while running on deck tripped over a hawser and fell heavily on his right side. He was conscious then of having "twisted himself." Severe pain in the right lumbar region followed the accident; but, after lasting for about a fortnight, this gradually abated, although it did not entirely disappear. From this time until two years ago patient noticed that, if he lay in bed upon his left side, he suffered from a dull aching pain in the right lumbar region on rising in the morning. This was only relieved after he had walked about for a quarter of an hour or twenty minutes.

In the summer of 1894 the pain became much more severe. He suffered from frequent exacerbations, which often lasted the greater part of the day, and did not readily disappear on walking about.

In 1895 he was seized with a severe paroxysm of pain, which came on suddenly in the right lumbar region and extended down the groin and to the testicles. This was accompanied by severe sickness, vomiting, and sweating.

After this first attack, which, from his description, resembled renal colic, he had several others, and the longest interval between them was two months. Between these acute paroxysms he suffered more or less from the old dull pain in the right renal region.

In March, 1896, he suffered from a very severe attack, which lasted for over eight hours. This was the last previous to the operation.

On examination, patient was found to be a very well nourished healthy looking man. The muscular development was so good that little could be made out by palpation of the abdomen except that the muscular resistance was greater in the right than in the left lumbar region, and pressure over the right kidney caused considerable pain.

The urine when examined was strictly normal, but no opportunity was afforded of examining it during a severe attack. Dr. Newman advised an exploration by lumbar incision, and the operation at which I had the opportunity of assisting was performed in July, 1896.

Dr. Newman found, on exposing the right kidney, that the cortex was deeply injected with blood. The organ was enlarged and moderately movable. In separating the adipose capsule several large veins were torn, but no torsion of the ureter or vessels could be made out. The kidney was sutured to the abdominal wall, a considerable portion of the adipose capsule having been removed. Patient made a good recovery, and in November, 1896, reported himself as perfectly free from pain since the operation.

It will be seen that the symptoms in the above case undoubtedly dated from a fall across a rope, and, in the absence of any other explanation, this must be regarded as the exciting cause of the mobility of the kidney. Many similar cases of movable kidney resulting from acute injury are recorded.

Henoch records a case in which both kidneys became movable in a military officer who had been thrown from his horse, and I will refer later to a case of Dr. Newman's, in which movable kidney resulted from a similar accident.

The injury, however, does not need to be of an acute nature. Any repeated injury or continued exertion, such as lifting of heavy weights while at work, violent straining as in coughing or difficult defæcation, or any similar over-exertion may give rise to movable kidney. In many recorded cases it will be observed that the patients were accustomed doing very heavy work, and were conscious themselves of over-strain.

We have still to explain why movable kidney should occur more frequently on the right side.

Cruveilhier[32] attaches a great deal of importance to the theory that the displacement is often due to the use of tight stays. He believes that when pressure is exercised on the liver by the stays, the right kidney is pressed between the stays and a solid organ, and so dislodged from its natural position. Landau, on the other hand, argues that the greater frequency of displacement on the right side depends on the differences of attachment of the two kidneys. Newman admits that these slight anatomical differences—such as the greater length of the right renal vessels, and the fact that the ascending colon is not so firmly bound down to the right kidney as the descending is to the left—may have some influence, but considers that the inter-

position of a solid organ like the liver between the anterior and posterior muscles on the right side is a more powerful cause of the greater frequency of displacement of the right kidney. He explains this as follows:—

"The posterior surface of the right kidney is practically in contact with the crura of the diaphragm and the great lumbar muscles, while interposed between its anterior surface and the anterior abdominal wall is a large solid organ—the liver. Now, suppose that the patient strains the abdominal muscles, as during delivery or in lifting a heavy weight, both the anterior and posterior abdominal muscles are brought into powerful action, the liver being pressed backwards by the anterior muscles, the kidney pressed downwards by the crura of the diaphragm and forwards by the posterior abdominal muscles. Now, the resultant of these forces will act in a manner similar to that which takes place when one presses a bean between the finger and thumb—that is to say, the kidney will be pressed downwards."

Before passing from the ætiology of movable kidney, reference must be made to an interesting article by Habel,[33] which has recently appeared.

In this he states that among 68 cases of locomotor ataxia admitted to Eichhorst's clinic, a movable kidney was noted 6 times, all in women. Of the 68 cases, 44 were men and 24 women. In the 6 cases, the movable kidney was on the right side in 4, on the left in 1, and on both sides in 1.

The percentage of this affection of the kidney was thus 14·5 among the 68 cases, and 25·6 among the 24 women.

Of 5,393 other women patients admitted into the clinic, a movable kidney was noted in 1 per cent. Thus, the question arises as to whether there can be any relation between locomotor ataxia and movable kidney. Perhaps a

casual connection lies in the general wasting so frequently observed in locomotor ataxia, and perhaps a slackening and diminution in tone of the abdominal ligaments occurs.

This explanation of Habel seems quite a feasible one, and is quite in accordance with what we have stated in studying the causation of movable kidney.

Symptomatology.

There is, perhaps, no disease in which the symptoms vary so much as in movable kidney. In very many cases subjective symptoms are entirely absent, and it may be only by accident that the patient discovers a movable mass in the abdomen. In many other cases the symptoms are either so indefinite, or resemble so much those due to other diseases, that little wonder may be excited at so many errors arising in the diagnosis of this condition.

In several cases the patient complains only of a feeling of languor, associated with a sensation of dragging in one of her loins. Again, there may be a sense of weight and a dull aching pain in the abdomen. If, therefore, a patient should come complaining of such symptoms, and if, moreover, they are aggravated, even in the slightest degree, by walking or any exertion, careful examination of the state of the kidneys should always be made.

The following are good illustrations of such cases:—

Case III.—*Right movable kidney—Symptoms: gnawing, dragging pain in right side increased by exertion—No acute pain—No gastric disturbance—Urine normal.*

Mrs. J., aged 26, married, consulted me in June, 1897, complaining of a "gnawing, dragging pain in the right side of her belly."

She had enjoyed very good health until the birth of her second child, two years ago.

Both her confinements were instrumental, but, although they had been tedious, they could not be described as difficult. After her last confinement she remained in bed for seven days. She then got up, but rigors coming on she was forced to return to bed, where she remained for another week. About three months after this she began to suffer from a "soreness" in the right loin. According to her own description this did not amount to acute pain, but was of a dull, gnawing, and dragging character. After a hard day's work, scrubbing or washing, the pain was always worse, and often prevented her sitting down. It was always relieved by rest in bed. She was conscious herself of a lump in her right side, and fancied that pressure on this side relieved the pain. Occasionally during the past year she had pains shooting up from the right loin towards the right scapula.

The pain was always worse when the bowels were costive, but menstruation did not increase it. Her general health was very good, and she never had any gastric disturbances. She never had any attacks of acute pain, and she never observed anything abnormal either in the quantity or appearance of urine passed.

On examination I found her a healthy-looking and well-developed woman.

The abdominal wall was rather flaccid, and there was slight separation of the recti muscles. Palpation revealed marked pulsation of the abdominal aorta. Pulsation of the right renal artery could also be detected.

A smooth tumour was appreciable in the right lumbar region, corresponding in shape, size, and position to the right kidney. Pressure on this elicited pain and a slight

feeling of nausea. With one hand in front of the abdomen and the other behind, the tumour could easily be made to pass from one to the other. It could also be pushed towards the middle line almost as far as the spine, and also upwards and downwards. Palpation of left lumbar region revealed nothing abnormal, and gave rise to no feeling of pain. Percussion yielded negative results. Urine normal.

As the symptoms were slight I advised her to give up all heavy work, and to take as much rest as possible. These instructions she has carried out, and when last seen, early in August, the pain was not so severe as formerly.

CASE IV.—*Right movable kidney—Symptoms: dull boring pain, increased by exertion and relieved by rest.*

J. M., æt. 55, was admitted to the Glasgow Royal Infirmary on 7th November, 1894.

History.—Although never very strong, patient had no serious illness till the onset of present trouble. Four years ago, while trying to move her invalid mother in bed, she was suddenly seized with a severe pain in her right side, just below the level of the ribs. She had a feeling as if something had given way. She had immediately to sit down. The acute pain gradually passed off, but ever since she has suffered from a dull boring pain in her right side. It is occasionally darting in character. It is entirely confined to the right side, but passes forwards as far as the umbilicus, and downwards to the groin. Occasionally it passes upwards towards the thorax. It is always increased by exertion and relieved by rest in bed. At times she has fancied that the amount of urine passed has been considerably less, but there has never been any sudden increase in the quantity after an attack of pain. She has always been very costive, and her bowels are now never moved without the aid of some

laxative. She has never suffered from any uterine disease, and has had no gastric symptoms.

Examination.—The abdominal walls are found to be rather lax. Hepatic dulness small. Percussion over kidneys posteriorly gives equal results on both sides. Unine normal.

The report of this case is somewhat incomplete, but the history and symptoms all point to mobility of the right kidney as the condition present, and the case was so described in the Journal from which the report is taken.

Many cases similar to the above are recorded.

Many patients suffering from movable kidney are hysterical, nervous, and hypochondriacal. This is no doubt due in many cases to brooding over their condition. This is especially apt to be the case if they have themselves discovered the movable mass in their abdomen.

Neuralgic pains in various regions are not at all uncommon. These may radiate as far as the scapula, or down the thigh, or across the abdomen. We have already referred to cases in which these pains were present—Cases I, III, and IV. These arise reflexly from irritation of the rich plexuses of nerves which surround the kidney.

Gastric disturbances of various kinds are very commonly associated with movable kidney. One must be careful, however, to guard against the common error of attributing all these to movable kidney. In many cases these gastric disturbances may be part of the general condition which has predisposed to the causation of movable kidney by interfering with the nutrition of the patient, and so causing general emaciation. When, however, we find that pressure on or movement of the affected kidney causes sickness, nausea, and vomiting, we must assume that there is some connection between the symptoms. The presence of these

gastric symptoms is the less to be wondered at when we consider the nervous and vascular connections existing between the kidney and other abdominal organs.

These gastric symptoms may vary from the slightest to the most severe. We have already noted a case (Case I) in which there was marked distension of the stomach and profound gastric derangement. In many cases, however, there may be only slight dyspepsia and occasional sickness and vomiting.

These conditions are illustrated by the following cases:—

CASE V.—*Right movable kidney—Symptoms: gnawing dragging pain in right flank; increased by exertion; worse during menstruation; acid dyspepsia; loss of flesh—Operation—Cure.*

Mrs. M., æt. 31, married, admitted to the Glasgow Royal Infirmary on 10th September, 1896, complaining of a dragging sensation in the right flank and general weakness.

History.—When 7 years old, patient had an attack of pneumonia, and has always been rather delicate since then. She has been married ten years, and has four children, the youngest being 2 years old. Her first confinement was a difficult one; forceps were used, but she made a good recovery. All the other confinements were easy. For the past six years she has complained of a constant gnawing pain in the back, at the level of the lumbar vertebræ. This pain was never severe. She knows of no cause for its onset.

For six months before her last confinement she suffered from great gastric disturbance, with sickness and vomiting. After this confinement, when she began to walk about she felt a constant dragging pain in the region of the right kidney. This has been present ever since. It is increased by walking about or working, and is also worse during

menstruation. She distinctly feels a movable mass in the right lumbar region. She is conscious of its movement, and, indeed, is herself able to move it backwards and forwards. She has never had any rigors or symptoms indicative of renal colic. She has lost flesh considerably of late. Her appetite is fairly good, but she is troubled with acid dyspepsia. She has noticed no change in her urine, either in amount or appearance.

Physical Examination.—Patient is pale and rather thin, but not markedly emaciated. She is nervous and easily excited. Palpation of the abdomen reveals the presence of a movable tumour in the right loin. It is somewhat oval in shape. With one hand in front of the abdomen and the other behind, it can be easily made to pass from the one to the other. It can be moved towards the left side as far as the umbilicus. Pressure on it does not give rise to any sensation of sickness or nausea. Urine normal.

In this case nephrorraphy was performed with complete relief of all symptoms. At the operation the kidney was found to be moderately movable.

CASE VI.*—*Right movable kidney—Symptoms: dull pain in back and right side; sense of weight; no acute pain; sickness; vomiting.*

Mrs. L., æt. 47, admitted to the Glasgow Royal Infirmary, 30th May, 1893, complaining of headaches, pain in right lumbar region, and feeling of weight in her back, of twelve years' duration.

Patient enjoyed good health until twelve years ago, when she began to suffer from headaches and pain in the back and right renal region. This pain was of a heavy dragging nature, and was increased by exertion. It was relieved by

* This report is taken from the Ward Journal.

rest in the dorsal decubitus. Occasionally it shot down into the thigh, and she says that if she presses in the right renal region pain shoots across to the opposite side of the abdomen. At no time has the pain been acute.

During last winter she had frequent attacks of sickness and vomiting. These usually came on during the night, and would sometimes last for an hour or two.

Patient has been for some time past wearing an elastic bandage round her loins, and she says she has derived much benefit from this. She would not submit to an operation, and was consequently dismissed on 3rd June, 1893.

CASE VII.—*Movable kidney on left side—Symptoms: dull gnawing pain in left renal region, increased by exertion and during menstruation; sickness—Operation—Cure.*

Mrs. N., æt. 44, nurse, admitted to the Glasgow Royal Infirmary on 31st August, 1896, complaining of pain in left lumbar region of three years' duration.

History.—Although never very strong, patient enjoyed fairly good health until onset of present illness.

Three years ago she remembers lifting a heavy bed, and at the time she felt pain in her left side. Ever afterwards she used to feel pain in this side if she were fatigued.

For the past two years or more the pain has been constantly present. It is not a sharp pain, but rather of a dull gnawing character. It is always confined to the one spot, and at no time has she felt it shooting downwards. It is increased by fatiguing work or by much walking. It is also worse when her bowels are costive; indeed, then she cannot rest on account of it. It is also increased before menstrual discharge begins. Occasionally, lately, the pain has been very severe, and has been accompanied on those occasions by sickness, but never vomiting.

She has observed that if she got out of bed quickly a rigor would come on.

Her general health has remained good, and she has not felt weaker.

Present condition.—Patient is a rather sparely built but moderately healthy looking woman. Complexion is pale, and during a severe attack of pain she says her face becomes of a dirty yellow colour.

There is slight fulness in the left lumbar region, and just at the umbilicus pulsation is visible. Palpation reveals a movable mass in the left lumbar region. With one hand in front and the other behind, the mass can be readily pushed towards the middle line. The spot where she complains of pain is just below the last rib on the left side, and in a vertical line drawn from a point on the iliac crest midway between its middle and the posterior superior spine.

Pressure on the tumour gives rise to a sickening sensation, and, if she bends down, the pain is very severe when she attempts to rise again.

Urine normal.

In this case, also, nephrorraphy was performed with complete success.

The next case to be described is one of special interest, as the patient did not make any complaint of symptoms referable to the kidney when admitted to hospital. She sought admission, complaining of diarrhœa and headache. When examining her I discovered that the right kidney was very freely movable, and on questioning her the history of pain in this region was elicited. She said that she had never liked to refer to this.

CASE VIII.—*Right movable kidney—Symptoms: dragging pain in right loin, increased by exertion, relieved by rest, increased during pregnancy; headache, diarrhœa, palpitation, loss of strength.*

Mrs. S., æt. 41, admitted to the Glasgow Royal Infirmary on 9th February, 1897, complaining of diarrhœa, weakness, and gastric symptoms, of three months' duration.

History.—Since menstruation began, at the age of 14, she has been conscious of a dragging sensation on the right side of her abdomen. Until her marriage this was the only symptom complained of. She was married at the age of 27, and during the last fourteen years has had ten children.

With each succeeding pregnancy the dragging pain became more severe, but she had no attacks of acute pain until three months before the birth of her last child in October last. At this time, when in bed one night, she was suddenly seized with severe pain in the region of the right kidney. The pain was agonising in character, and caused her to cry out. It passed downwards into the pelvis.

Attacks of a similar nature came on nearly every night during the three months prior to her last confinement. They varied in duration from one to six hours. After her confinement she had no attacks of acute pain, but the dragging sensation still remained. It was always increased if she were working harder than usual, and was relieved when she rested. During the acute attacks she did not pay any attention to the amount or character of the urine passed, and cannot say whether or no the quantity was increased after an attack. For the past three months she has suffered a good deal from palpitation, and has been gradually losing strength.

Six weeks before her confinement she had a fall, and received a severe blow on the back of her head.

On 14th October, 1896, she was delivered of a child. Before delivery she had very severe hæmorrhage. Forceps were employed, and, from her description, the case seems to have been one of "placenta prævia."

After her confinement she suffered from severe pains in her head, and sought admission to a hospital for treatment. She remained there for a fortnight. During that time diarrhœa set in, and has continued ever since.

She was able to take nothing except milk and lime water, any other diet causing severe diarrhœa. When the bowels moved she had severe pain in the lower part of the abdomen.

The pains in the head have been present, more or less, since her confinement. They come on suddenly, and are of a darting character.

Present condition.—Patient is thin, but not markedly emaciated. She is extremely pale, and the mucous membranes are anæmic. She is very nervous and easily excited. *Chest:* Percussion note good throughout. Respiratory murmur full and pure. *Heart:* A soft, blowing V.S. murmur is audible at the apex, and also in the vessels of the neck. *Abdomen:* The abdominal wall is very lax. On palpation a movable mass is appreciable, occupying the position of the right kidney, and corresponding to it in character.

The hilus is very readily made out, and looks inwards and upwards. The surface of the mass is smooth. With one hand in front and the other behind, the mass can readily be made to pass from one to the other. It can also be pushed upwards under the ribs, and towards the middle line quite to the umbilicus. Pressure on it elicits slight pain.

Urine pale amber in colour; specific gravity, 1010; slight flocculent deposit; faintly acid in reaction; no albumin.

On the 5th March, 1897, the following note was made:—

Since admission to hospital patient has been confined to bed, and has only felt acute pain in the right loin on one occasion. She says it was very severe and lasted for some hours, but she did not call anyone's attention to it.

She still complains of slight dragging pain in the right lumbar region.

She was allowed up for a little on 28th February, and since then has complained of frequency of micturition.

Under appropriate treatment the diarrhœa and headaches have entirely disappeared, and her general condition is greatly improved.

Through the kindness of Dr. Dougal and Dr. Newman, I had an opportunity of showing this patient to a number of practitioners at one of Dr. Newman's clinical demonstrations. The patient would not agree to any operative treatment.

The cases recorded above, with the exception of I and II, have been illustrations of ones in which the symptoms, although constant, are not of a grave nature; but we have seen in Cases I and II that the symptoms are sometimes of a very severe and agonising character. Indeed, even in some of the other cases described, it will be noted that the patients occasionally suffered from attacks of acute pain.

This brings us to a consideration of the severe symptoms of movable kidney. These will be illustrated by reference to typical cases, and an endeavour will be made to explain clearly the cause of these acute symptoms.

At the beginning of this paper, in referring to the anatomy of the kidney, we found that the pedicle was composed of the ureter, the renal artery, the renal vein, and nerves, and the question at once arises as to whether these structures are interfered with when the kidney becomes movable. When

it is considered that a movable kidney is liable to frequent displacements from its normal position, and that rotation on its short axis is a common result, it will be at once seen that the function of the structures forming the pedicle is liable to be seriously interfered with. If rotation of the kidney takes place, torsion of the vessels and ureter will result; while if the kidney should slip down from its normal situation, kinking of these structures will ensue. In either case their calibre will be either greatly narrowed or, in some cases, entirely occluded.

Having demonstrated how this takes place, we will now consider in detail the results which will follow, and the symptoms which we may expect to find.

Firstly, let us consider the results of interference with the renal vessels.

The walls of the renal vein being much thinner than those of the artery, it is naturally to be expected that venous obstruction will be the commonest result of torsion or kinking of the renal vessels.

Cohnheim,[34] as the result of experiments on dogs and rabbits, has found that ligature of the renal vein is rapidly followed by considerable swelling of the kidney. It becomes of a deep red colour, and on microscopical examination the lymph spaces of the kidney are found to be filled with blood corpuscles. Innumerable blood corpuscles are also found in the lumina of the urinary tubules. This occurs in from one to two hours after ligature of the vein, and as soon as this stage is reached no urine can be obtained from the ureter of the affected kidney. Immediately following occlusion of the vein, however, a fluid rich in blood and albumin flows from the ureter.

If instead of completely occluding the renal vein its lumen be only narrowed, the amount of urine is immediately

decreased, but there is not complete suppression. In this case also, however, the secretion is scanty and concentrated, and contains albumin, blood corpuscles, and a few hyaline casts. Cohnheim states that the result of the venous obstruction is a rise of pressure chiefly in the capillaries surrounding the convoluted tubes. Now, the tension in the efferent artery is considerably below that in the afferent artery, hence the increased tension is propagated from the veins into the glomeruli, but at the same time the amount of blood circulating through the kidney is diminished, and, as a result, the excretion of urine is retarded. It must be remembered that, as the kidney is surrounded by a rigid capsule, the distension of the vessels which results from obstruction of the renal vein will cause considerable pressure on the tubules, and this fact also accounts for the decrease in the amount of urine excreted.

The removal of the obstruction is followed by a copious discharge of urine of high specific gravity.

These being the results of venous obstruction, we now come to consider what occurs when the arterial blood supply is interfered with by obstruction of the renal artery.

Ludwig has shown that the quantity of urine secreted depends directly on the height of the arterial blood-pressure.

The investigations of Hermann,[35] again, have shown that it is the blood-pressure in the glomeruli that determines the amount of urine secreted. Heidenhain,[36] on the other hand, came to the conclusion that the chief determining factor was the amount of blood passing through the glomeruli. Now, if the renal artery be partially or completely occluded, both the amount of blood passing through the glomeruli and the blood-pressure in the glomeruli will be reduced, and, as a result, there will be a greatly diminished excretion of urine.

Again, anything which causes spasm of the renal arterioles

will diminish the amount of blood passing through the glomeruli, and thus cause diminution or suppression of urine, depending on the degree of contraction of the arterioles. This has been proved by Grützner.[37] Now, this is of great importance, as it affords an explanation of the total suppression of urine which sometimes occurs in cases of movable kidney.

Interference with the blood supply of one kidney may induce spasm of the blood-vessels of the opposite kidney, and suppression of urine will result. As soon, however, as the spasm passes off the amount of urine increases. This has been shown in the case of spasm of the renal arterioles occurring in cases of lead colic.

Mr. Reginald Harrison has lately drawn attention to the subject of "Albuminuria Associated with Kidney Tension" in a paper published in the *Lancet* on the 4th January, 1897. After quoting various authorities in support of the fact that albumin is frequently found in the urine under conditions necessitating high vascular tension, he proceeds to say that since the introduction of direct exploration of the kidney a certain proportion of cases have been met with where no obvious cause was found for the symptom or symptoms which led to the operation. Such cases, however, have frequently been cured by the exploration. He states that he has operated on many such cases himself, and has at the time of operation directed attention to the state of tension of the kidney which was often present. He refers to three cases, the first of which was believed by him to be one of scarlatinal nephritis, the second nephritis from exposure to cold and damp, and the last subacute nephritis following probably on influenza. In all of these albuminuria was a prominent symptom, but after an exploratory incision had been made into the kidney this entirely disappeared, and the patients were quite restored to health.

Dr. Newman, also, has published cases in which inflammatory hyperæmia led to considerable pain in the kidney and albuminuria, and these symptoms were relieved by incision. We have seen, then, that interference with the blood supply of the kidney will result in rapid swelling of that organ, the urine will become scanty and concentrated, and will contain albumin, blood, and tube-casts, while in some cases there will be total suppression.

Let us now consider what other symptoms will be present in this condition. If the obstruction take place gradually the patient will complain of dull aching pain in the renal region. If, however, sudden torsion of the renal vessels occur, the patient will have a sudden paroxysm of severe agonising pain, accompanied, in many cases, by giddiness, rigors, vomiting, and, indeed, all the symptoms of renal colic.

The history commonly given is that the patient, after a hard day's work or some strain, is suddenly seized with a severe agonising pain in the loin. This may or may not be preceded by a rigor. The abdomen becomes tender on palpation, and the patient feels weak and more or less collapsed. The body is bathed with cold perspiration, and giddiness and palpitation are complained of. Occasionally the face assumes a dirty yellow colour. Reference to Case VII will show that this latter symptom was present in that case, although the pain was not very severe. There may or may not be actual vomiting, but in nearly every case there is a feeling of extreme nausea. In Case II we have described a fairly typical example of cases of this description, and reference to that case will show that the kidney was found on operation to be enlarged and the cortex engorged with blood. Although no actual torsion of the vessels was discovered at the time, the symptoms were undoubtedly due to interference with the renal circulation.

In the case to be described next the symptoms were almost exactly similar to those found in cases of renal calculus. This is one of the difficulties found in the diagnosis of movable kidney, and it is only by a very careful study of the history of the case, and the individual symptoms, that a correct differentiation of these two conditions can be arrived at. In some cases, indeed, of which the following is an example, it is only by an exploratory incision that the true nature of the case can be diagnosed.

CASE IX.—*Severe paroxysmal renal pain and hæmaturia without gastric disturbance—Occasionally blood-casts in urine, frequently tube-casts, and sometimes albumin independent of blood—Movable displaced kidney—Cured by operation.*

T. L., æt. 50, ironmoulder, admitted to the Glasgow Royal Infirmary on 30th January, 1893, complaining of severe pain in the region of the left kidney, shooting downwards and forwards in front of the abdomen. These paroxysms of pain usually came on after exercise, and lasted for several minutes at a time, while during the six months prior to admission he almost constantly suffered from an aching pain in the left side. At the onset of the attacks of acute pain the urine was of a dark red colour, and contained a large quantity of blood, but gradually the quantity of blood diminished, and the urine became bright red.

The patient was a very well-nourished man, weighed 14¼ st., and was very stout, so that examination of the renal region by palpation yielded negative results. No increased muscular resistance could be made out, and firm pressure over the left kidney did not give pain.

He remained in hospital till 6th March, 1893. During that time he was confined strictly to bed, and, although he

complained of a dull aching pain, he had no paroxysmal attacks, and no hæmaturia or albuminuria. He was re-admitted on 8th May, 1893, having suffered from several attacks since leaving hospital in March.

During all these acute attacks the pain was not limited to the loin, but extended down the left ureter, to the testicle, to the inner aspect of the thigh, and sometimes even to the hip. Frequently a change in position modified the pain, but marked relief to suffering was afforded only by complete rest in bed, and to this the patient had often to resort.

On 10th May the following note was made:—"Until the present time the symptoms all pointed to the presence of a stone in the left kidney. The pain was clearly increased by exercise and relieved by rest, and so also was the hæmaturia. Yesterday he had an attack of renal colic and hæmaturia, and the following is a note of the condition and quantity of the urine:—

1893.	Ounces of Urine.	Remarks.
May 9, 6 P.M.,	12	Urine clear; trace of albumin; a few tube-casts. No pain. Sp. gr., 1013.
,, 10 P.M.,	4	Pale urine. Sp. gr., 1020.
,, 11 P.M.,	...	Severe paroxysm of pain in left side.
,, 10, 5 A.M.,	6	Urine dark porter colour. Sp. gr., 1024. Blood abundant. Blood-casts. Pain still continues severe.
,, 8 A.M.,	18	Pale red blood-stained urine. Sp. gr., 1008. Pain gone.
,, 12 Noon,	15	Trace of blood only. Small quantity of albumen. Sp. gr., 1011.
,, 7 P.M.,	9	Clear urine. Sp. gr., 1015. No albumin; no tube-casts.

The presence of blood-casts in the urine suggests the source of hæmorrhage as being in the renal substance rather than the consequence of a calculus in the pelvis of the kidney. It must be remembered, however, as pointed out by Dr. James Finlayson in a paper on the occurrence of tube-casts in non-

albuminous urine, that tube-casts are found in the urine in cases of renal calculus and gravel, with complete absence of albumin in cases free from nephritis. (See *British and Foreign Medico-Chirurgical Review*, 1876.)

19th May, 1893.—The patient remained well, and since 8 A.M. on the 10th inst. there has been no pain; and no blood, tube-casts, or albumin in the urine since 7 P.M. on the same day.

The presence of blood-casts in the urine was observed for the first time on the 10th of May, and gave quite a new aspect to the hæmaturia, which prior to this time was regarded as due to the presence of a stone in the left kidney.

The patient remained well till the 1st June, when he left the ward, not having had any recurrence of pain or of hæmaturia.

Readmitted 22nd June, 1896.—Since leaving the hospital in June, 1893, the patient has suffered more or less pain in the region of the left kidney, which is increased by exercise and relieved by rest in bed. The pains and the hæmaturia present the same characteristics as formerly, but now there is considerable tenderness on palpation at a spot midway between the crest of the ilium and the last rib on the left side. On account of the stoutness of the patient, palpation fails to reveal the condition of the left kidney.

Considering that rest in bed only gave temporary relief, and that the patient was incapacitated from following his occupation by the frequency of the attacks, he was advised to submit to an operation for the purpose of ascertaining the precise condition of the left kidney, and, if possible, of relieving it permanently.

On the 29th June Dr. Newman made an incision down to the left kidney, when it was found to be moderately movable, displaced upwards and forwards, and rotated on

its short axis so that the lower margin of the organ pointed forwards. The adipose capsule was freely separated from the tunica fibrosa, and a considerable portion of the loose fat removed. The tunica fibrosa was then incised, stripped off the cortex for half an inch on either side of the incision, and stitched to the parietes. A large drainage-tube was inserted, and the deep parts of the wound kept open for ten days, after which it was allowed to heal.

There are several points of interest in the above case. In the first place, his occupation of an ironmoulder exposed him to severe strain, and no doubt this was the main cause of the kidney becoming movable.

Again, the gradual onset of the symptoms may be noted. At first the pain was dull and aching, while at a later period the severe paroxysms supervened. The conditions found at the operation showed clearly that these acute attacks were due to torsion of the blood-vessels and consequent obstruction of the circulation of blood.

The operation was completely successful. The patient has now no renal pain whatever, and a specimen of his urine since examined was free from albumin, tube-casts, and blood.

The next two cases which will be referred to present symptoms of a nature almost similar to the above. They have both been recorded by Dr. Newman.

CASE X.—*Movable kidney, enlarged and hyperæmic from torsion of renal vessels and ureter caused by strain—Symptoms: severe paroxysmal renal pain, hæmaturia, gastric disturbance, &c., simulating those of renal calculus—No albuminuria independent of blood—Operation—Cure.*

R. C., marine engineer, æt. 40, consulted Dr. Newman in May, 1895, complaining of pain in right lumbar region.

This appeared first in 1891, and followed a severe strain

caused by a sudden roll of the steamer while patient was entering the man-hole of a boiler. The edge of the man-hole caught him just under the right ribs. At this time he noticed a quantity of blood in his urine. This lasted for a few days, and then gradually disappeared. The pain, however, was so severe that he had to avoid work for over three weeks, and even after that over-exertion was followed by a recurrence of the pain and hæmaturia. The pain soon became constant, but was of a dull character, and, indeed, sometimes amounted only to a sense of weight on the affected side. He had little or no discomfort while at rest, but any sudden movement of the body caused severe pain.

At first the pain was limited to the right renal region, but when the patient was first seen by Dr. Newman it extended along the course of the right ureter to the perinæum and the testicle, and on rare occasions it passed over to the opposite renal region. Not infrequently the renal pain came on very suddenly, and was accompanied by very severe gastric disturbance, nausea and severe vomiting, faintness, and gastrodynia. When the sickness passed off, the patient endeavoured to relieve himself by contortions of the body, and usually the pain subsided as suddenly as it had commenced. Complete rest afforded marked relief to his suffering.

The urine when free from blood was strictly normal, but when hæmaturia came on the blood was intimately mixed with the urine, to which it imparted a dark smoky-red colour, and the quantity of albumin present was in proportion to the hæmoglobin. No coagula, tube-casts, or histological elements of significance were found in the urine at any time. There was no suppression of urine, but during the attacks the urine was concentrated, and when these passed off, the urine was dilute and copious.

The patient was well-nourished, and the muscles highly developed, so that neither palpation nor percussion of the kidneys yielded satisfactory results. Pressure over the right renal region caused some pain.

The patient was advised to take six months' rest and then report progress. In December, 1895, he again consulted Dr. Newman, and stated that while he was free from pain when he took complete rest, if he used any liberty in the way of exercise an attack of pain nearly always resulted.

An operation was decided upon, and in January, 1896, Dr. Newman cut down upon the right kidney. On opening the adipose capsule the kidney was found not only to be movable, but rotated, so that, even when the patient lay on his left side, the upper extremity of the organ pointed forwards.

On carrying the finger round the fibrous capsule the fatty tunic was found to be only slightly adherent, and the pelvis was dilated to a moderate degree. The ureter was easily made out with the finger, and was found to be kinked over the renal vessels, and the kidney itself was observed to be enlarged, swollen, and engorged with venous blood. The fibrous capsule was exposed and incised along the outer border of the kidney, stripped off the cortex for a third of an inch all round the incision, and sutured to the parietes.

When the fibrous capsule was incised the soft cortical substance of the kidney pouted through the incision, and on separating the capsule free bleeding occurred. The superabundant fat was also removed, and the remaining adipose capsule was sutured to the muscular wall in such a way as to fix the kidney as high up as possible, and so as to maintain the normal relationship of the ureter and renal vessels. A large rubber tube was inserted along the depth of the wound in order to promote adhesions.

The patient made a good recovery, and has since been free from symptoms.

He reported himself in perfect health in October, 1896, having followed his occupation at sea since the beginning of March.

In the above case it will be observed that the interference with the blood-supply of the kidney was due not only to torsion of the vessels, but to the ureter becoming kinked over them. This was caused by the alteration of the position of the kidney, as at the operation the upper part of the organ pointed forwards.

CASE XI.—*History of injury causing movable kidney, renal pain, emaciation, and occasional suppression of urine from torsion of artery and ureter—No tube-casts, hæmaturia, or albuminuria—Cured by operation.*

N. O., æt. 49, came under Dr. Newman's observation in 1882. Prior to this the patient, who was at one time very stout, had been emaciating. He had suffered a good deal from chronic bronchial catarrh, attended with considerable muco-purulent expectoration which, on microscopic examination, was found occasionally to contain a few blood corpuscles and a considerable quantity of pus. The physical signs were indicative of chronic bronchitis accompanied by slight emphysema without bronchiectasis.

The history of kidney trouble dates from the beginning of the year 1882. While out riding one day his horse stumbled, and he fell on his right side and fractured two ribs (the ninth and tenth left). He was kept in bed for a fortnight after the accident. During this time he complained of pain on the right side, immediately below the edge of the liver. The practitioner attending him at that time suspected an

abscess, and treated him accordingly. While he remained in bed he did not notice any swelling or tumour on the right side, but after he got up he discovered a movable tumour seated in the hypochondriac region. At first he complained of pain in the right renal region, attended with vomiting, and sometimes followed by diarrhœa.

The pain usually came on suddenly, and lasted for five or six hours. He noticed that if he took much exercise, or if the bowels were constipated, he was more apt to have an attack. When he took to bed the symptoms soon disappeared, but, on the other hand, if he continued to take even moderate exercise the pain caused him considerable inconvenience.

He was greatly emaciated, and, for a man, the belly was loose and pendulous. Palpation of the abdomen revealed the presence of an oval swelling immediately under the lower edge of the liver, and about 2 inches from the umbilicus. The swelling could be freely moved about in the abdomen, and pushed down into the pelvis, upwards under the edge of the liver, and an inch to the left of the middle line. Percussion over the right renal region or over the swelling did not yield any satisfactory results, but when the right loin was examined, the kidney having previously been displaced, a distinct flattening could be made out. When the swelling was handled a sickening sensation was experienced, resembling, as the patient informed me, the pain produced when the testicle is squeezed.

No pulsation of the kidney or of the renal artery could be detected.

The only other symptom worthy of notice was the occasional sudden suppression of urine, without any very evident cause, and without any apparent relation to the position of the right kidney.

Sometimes it commenced without the organ being displaced,

at least, so far as could be detected by the hand, and there was no increase in the size of the organ during the suppression. Dr. Newman supposes that the scanty secretion of urine was due to the kidney being rotated on its short axis, so that the ureter and blood-vessels were coiled round one another, and the passage of blood to and from the kidney was thereby prevented. This would lead to a very marked engorgement of the kidney on the affected side, while it might also induce reflex spasm of the blood-vessels in the opposite organ, and so bring on suppression, just as the use of a catheter may cause the excretion to cease for a time. When the secretion again became active, the urine passed did not differ from what was voided at other times.

At the time the case was considered to be one of movable kidney, with torsion of the renal artery, without much obstruction to the venous return, as shown by the sudden suppression of urine, unassociated with hæmaturia, albuminuria, or the presence of tube-casts.

When first seen the patient refused to have an operation performed, but the symptoms remained unabated till 1888, when Dr. Newman performed nephrorraphy with a good result.

The above case is one of great interest. As regards its ætiology, there are several points to be observed. The history is that, prior to the onset of the kidney mischief, the patient had been losing flesh considerably. This in itself, we have seen, is a predisposing, if not an exciting, cause of movable kidney. In addition, he suffered greatly from chronic bronchitis, and the severe coughing necessarily associated with this condition would tend to still further stretching and weakening of the renal attachments. Lastly, we have the history of the acute injury caused by being thrown from his

horse. This latter, it seems to me, must be regarded as the exciting cause, and the two former conditions the predisposing causes of the movable kidney.

The history of acute pain accompanied by suppression of urine is somewhat similar to what we have already noted in the three previous cases recorded.

The only other symptom to be noted is the absence of blood, albumin, and tube-casts from the urine passed after an attack, and this fact has been considered by Dr. Newman to be due to the renal artery being the chief structure occluded.

CASE XII.*—*Left movable kidney causing torsion of the renal blood-vessels—Albuminuria, tube-casts, severe pain, and suppression of urine—No hydronephrosis—Operation —Cure.*

J. D., æt. 41, married, and has a family of nine children. She was at one time very stout, but during the last three years had been steadily emaciating. She first complained of pain in the left kidney in 1887, and when Dr. Newman saw her first, in 1894, she was greatly reduced in weight. The abdominal walls were flaccid, and she complained of almost continual pain located in the left lumbar region. At irregular intervals most severe paroxysms of pain set in, and these lasted from three to seven hours, and were accompanied by sickness, nausea, and vomiting. During an attack she always lay on her left side. In one or two instances, after the paroxysms had passed off, the patient suffered from undue excitability, severe and persistent headache, and dimness of vision, pointing probably to some uræmic poisoning. On

* Recorded by Dr. Newman in vol. xxix of the Clinical Society's *Transactions*.

examination of the abdomen the left kidney could be distinctly felt freely movable within the abdomen, and could be pushed upwards under the left costal cartilages, across the middle line in front, and down into the pelvis. Handling of the kidney produced considerable pain, accompanied by sickness. This pain differed in character from that usually felt during a paroxysm. The patient was kept under observation for many months, and although advised to have an operation performed, refused until November, 1895, when Dr. Newman performed nephrorraphy. The result was quite satisfactory, and the patient reported herself well, January, 1897.

The point of chief interest in this case is the occurrence of symptoms of uræmic poisoning during a paroxysm of pain. This is the first mention we have made of this symptom, which is occasionally found in cases of movable kidney. The explanation of this is easy if we consider when uræmia occurs. It occurs, according to Cohnheim,[34] when there is retention of urinary constituents, and this retention may be due to ligature of the renal arteries. Now, if the renal artery become twisted, as in movable kidney, the result will be the same as if it were ligatured. We have already seen, moreover, that interference with the blood-supply of one kidney causes frequently reflex inhibition of the opposite kidney, and consequently total suppression of urine with its attendant symptom, uræmia.

We will see later that the same symptom sometimes occurs from obstruction of the ureter in cases of movable kidney.

We will now pass on to consider the effect of displacement or mobility of the kidney on the ureter. Newman states that obstruction to the escape of urine through the ureter may take place in cases of movable kidney in three ways:—

"(1) The displacement of the kidney may consist of a rotation of the organ on its short axis, so that the ureter is twisted round the vessels; (2) there may be a sudden bending or kinking of the ureter at any part of its course; or (3) there may be an angular insertion of the ureter into the bladder."

With regard to the first of these conditions little need be said. It will be at once evident that when the kidney becomes rotated the ureter will be twisted not only on itself but around the vessels which form with it the pedicle of the kidney. This will result in narrowing, or, in many cases where the torsion is extreme, in completely occluding the lumen of the ureter. This condition is analogous to the torsion of the renal vessels which has been described above. With regard to the second condition—the kinking of the ureter—some explanation is needed. We have stated above that this may occur at any part in the course of the ureter, but probably its most frequent seat is just at the origin of the ureter from the pelvis of the kidney.

We have seen that normally the ureter arises from the lowest part of the pelvis of the kidney, and that there is thus a free passage for the flow of urine when the person is in the erect posture.

But in cases of movable kidney the organ frequently slips down from its normal position. Now, should this occur, it is clear that the relation of the ureter and kidney will be altered materially. The ureter will be curved at a somewhat acute angle, and its lumen will come to communicate not with the *lower* part of the pelvis of the kidney but the *upper*. The result of this will be that the pelvis of the kidney will require to be filled with urine up to its highest level before any can pass into the ureter.

Cases of obstruction to the outflow of urine from this cause have been quoted by Cohnheim and many others, although

the most of these writers have considered the origin of the ureter from the upper part of the renal pelvis to be congenital. Kinking of the ureter in any other part of its course will cause the same obstruction to the outflow of urine by narrowing the lumen of the tube.

With regard to the third condition—angular insertion of the ureter into the bladder—this has long been recognised as a cause of obstruction to the outflow of urine, and if this condition be present it will be aggravated by the dragging on the ureter which ensues in cases of movable kidney. These being the conditions giving rise to obstruction, we have now to consider the results of this obstruction.

A good description of the result of obstruction of the ureter is given by Cohnheim.[38] He states that when the ureter springs from the upper part of the pelvis of the kidney it is impossible for the urine to enter it while the body is in the erect posture until the pelvis has been filled to the level of the ureter. The pelvis, moreover, is bounded by a yielding and distensible wall, which will gradually dilate under the influence of the accumulated urine till the size of the sac when full allows of its completely compressing the ureter, which lies upon the pelvis as it passes downwards. When, however, a person with such a condition of the kidney assumes the recumbent posture, the urine will flow uninterruptedly from the sac into the bladder.

The above is an exact description of what occurs frequently in cases of movable kidney. When displacement occurs, the outflow of urine through the ureter becomes obstructed by the change which takes place in the relations of the ureter and the pelvis of the kidney. This results in distension of the pelvis, as described above. When, however, the patient assumes the recumbent posture, and the kidney slips back into its normal position, the normal relation of

the ureter and the renal pelvis is restored, and the flow of urine becomes re-established.

Again, when kinking of the ureter occurs at any other part of its course, the urine collects behind the obstruction. The tension in this part of the ureter gradually rises, and the section of the ureter above the kink is gradually elevated. When this part is raised sufficiently, the urine is able to pass the obstruction. This re-establishment of the flow, however, results in a fall in the tension, and the kink reforms, and so on. When, however, the kidney falls back into its normal position, the kink is removed for the time being, and the flow of urine is unimpeded.

Again, supposing the obstruction of the ureter to be due to torsion, the result will be the same—viz., a distension of the portion of the ureter behind the point where torsion has occurred, and a distension also of the pelvis of the kidney; in other words, a *hydronephrosis.*

Now, in cases of movable kidney, the obstruction of the ureter from kinking or torsion is liable to occur suddenly, and to pass off as soon as the kidney is allowed to resume its normal position. This means that the hydronephrosis will only persist for a comparatively short time, and this is what has been termed *transitory hydronephrosis.*

But it has been proved that it is in cases where the obstruction to the outflow of urine is not permanent, but alternates with periods of non-obstruction, that the most extreme degrees of hydronephrosis are found; hence it is that in many cases of movable kidney with hydronephrosis the size of the swelling is very great.

When, moreover, the obstruction is not permanent, the secretion of the affected kidney is never completely and permanently suppressed, and when the obstruction is removed the pressure on the glomeruli is at once relieved, and, as

a result, there is a copious secretion of urine of low specific gravity.

Thus, one of the characteristic signs of transitory hydronephrosis is a sudden appearance and an equally sudden subsidence of the swelling, and a copious discharge of urine of low specific gravity. This latter characteristic of the urine at once distinguishes the condition from that found in obstruction to the renal vessels, where, as we have seen, the urine passed is of high specific gravity. Frequently, however, the urine contains a trace of albumin and a few hyaline casts. This is due to the fact that, as has been proved by experiment, when the ureter is occluded there results a mechanical hyperæmia of the affected kidney. Now, hyperæmia of the kidney is manifested by the appearance of albumin in the urine.

We will now consider briefly the symptoms to be expected in a case of obstruction of the ureter, and these symptoms will be illustrated as far as possible by typical cases.

The history usually given is that the patient is suddenly seized with severe pain, accompanied by diminution, or in some cases even suppression, of the urinary excretion. At the same time there rapidly appears a large swelling in the region of the affected kidney. This lasts for a variable length of time, but after rest there is a more or less sudden discharge of a large quantity of urine of low specific gravity. This is followed by rapid subsidence of the swelling and abatement of the pain.

The pain may be accompanied by sickness, vomiting, rigors, and all the symptoms of renal colic.

Occasionally the urine passed after an attack will contain a small quantity of albumin. The only point that needs explanation is the cause of the total suppression of urine which sometimes occurs. Whether this is due to a reflex

spasmodic contraction of the ureter on the opposite side, or to a general contraction of the arterioles of the opposite kidney, is still a subject of discussion, but probably both contribute to the result.

CASE XIII.*—*Right movable kidney—Transitory hydronephrosis.*

Mrs. M., æt. 31, admitted to the Glasgow Royal Infirmary on 22nd January, 1895, to see Dr. Newman.

Patient complains of pain in the right side of abdomen and occasional swelling in this region, these symptoms being of five years' duration.

Patient was married at the age of 24, and has had six children. Until five years ago she enjoyed good health. At that time she fell downstairs and struck her right side on a large stone. She was pregnant at the time, and she suffered continuous pain both at the seat of injury and elsewhere in the abdomen for three weeks, at the end of which time she had a miscarriage. After this the pain was much easier for about three weeks, when it reasserted itself, and became more severe than it had been before. Since then it has been more or less constantly present, and is confined to the region of the right kidney. She is unable to do any hard work, as, if she attempts to do washing or any work necessitating bending or stretching of the body, the pain becomes very severe. She has suffered frequently from indigestion and vomiting. During the past five years she has had three pregnancies, and the pain was always worse at these times.

She is herself conscious of a movable mass in the right loin. When this is palpated she complains of a sickening

* This report is taken from the Ward Journal.

pain. She frequently has attacks of diarrhœa, and movement of the bowels is associated with increase of pain. Micturition also is accompanied by pain both at the tumour and the vulva. At times the quantity of urine passed becomes greatly diminished, and this is associated with a marked increase in the size of the swelling and in the degree of pain.

These periods are of varying duration, and are followed by a sudden marked increase in the quantity of urine passed, with a corresponding decrease in the swelling and pain.

CASE XIV.*—*Right movable kidney, with transitory hydronephrosis from kinking of the ureter, cured by the operation of nephrorrhaphy.*

C. G., æt. 34, single, admitted to the Glasgow Royal Infirmary on the 1st November, 1895, complaining of a dull aching pain in the right loin, which commenced five years ago. This pain is almost constantly present, and has been gradually increasing in severity. In addition she frequently has paroxysmal attacks of severe colicky pain.

During these acute attacks the patient is herself able to feel a distinct swelling in the right lumbar region. This is very tender on pressure.

These paroxysmal attacks have become more frequent, and now occur nearly every second day. Her own description of the attack is as follows:—

"Suppose the pain begins to increase about 10 o'clock in the day, it steadily becomes more severe until about 6 or 7 o'clock; at the same time the swelling in the loin gradually

* Cases XIV, XV, and XVII have been recorded by Dr. Newman in vol. xxix of the *Clinical Society's Transactions.*

enlarges, and sometimes extends beyond the middle line in front; as the swelling increases so also does the pain."

While the swelling was increasing, the urine was scanty and highly coloured, and of high specific gravity. Suddenly a copious flow of pale-coloured urine took place, the swelling subsided, and the pain was at once relieved. While the hydronephrosis was increasing the patient was generally compelled to go to bed; but very soon she was unable to lie in the recumbent posture, and had to sit up with the thighs flexed on the abdomen, and the chest thrown well forward in order to relieve pressure. On examination of the abdomen between the attacks, the walls were found to be very lax. When the patient lay on her back a distinct bulging was observed in the right lumbar region. This, on palpation, was found to be quite soft, but firm pressure elicited pain over a considerable area, extending from the crest of the ilium to the ribs, and as far forward as the middle line.

It is noted that since her admission to hospital the worst attack occurred on the 12th November. The paroxysm of pain began at 5 A.M., and continued until 10 P.M. Towards the end of this period the pain became so agonising that morphia had to be administered. About 10 P.M. there was a copious discharge of urine (1,000 c.c.), the first passed since 6 A.M. This was followed by immediate abatement of the symptoms.

During the paroxysm of pain the swelling could be felt about 2 inches to the left of the middle line, between the umbilicus and pelvis, and extending downwards in the right iliac fossa to within $1\frac{1}{2}$ inch of Poupart's ligament.

During the intervals between the attacks of pain the right kidney was found to be freely movable, with the excursion ranging from the position of the gall-bladder above, to within 4 inches of the symphysis pubis below; at the level of the

umbilicus the kidney could be pushed 1½ inch across the middle line.

The following is a note of the characters of the urine before, during, and after an attack:—

Date.	Quantity.	Sp. gr.			
1895.					
Nov. 13, 3 P.M.	13 oz.	1016	Acid.	No albumin.	
,, ,, 9 P.M.	11 ,,	1014	Do.	Do.	Pain set in.
,, 14, 11 P.M.	40 ,,	1007	Do.	Do.	Pain relieved.
,, 15, 6 A.M.	6 ,,	1010	Do.	Do.	Do.
,, ,, 2 P.M.	13 ,,	1016	Do.	Do.	Do.
,, ,, 9 P.M.	7 ,,	1016	Do.	Do.	Do.

Dr. Newman considered the case was clearly one of transitory or intermittent hydronephrosis, due to torsion of the ureter when the right kidney became displaced. He performed nephrorraphy on the 26th November, 1895, and since then there has been no recurrence of the pain, nor has any accumulation of urine been observed in the pelvis of the kidney.

A point to be noted in the above case is the position assumed by the patient during an acute attack. When hydronephrosis occurs, it will be found in nearly all cases that the patient is unable to remain in the recumbent posture, but sits up in bed, with the knees flexed on the abdomen, and the thorax inclined forward.

This occurred in the following case, which has been recorded by Dr. Newman:—

CASE XV.—*Movable kidney—Transitory hydronephrosis—Suppression—No tube-casts, but intermittent albuminuria—Cure by operation.*

M. H., æt. 35, a housemaid, enjoyed good health until January, 1889, when she commenced to complain of vague

pains, as she thought, in the region of the stomach, but these were not so severe as to interfere with her regular work. She, however, gradually became thin and anæmic; steadily the pain increased, and after a time it became complicated by dyspeptic symptoms, such as nausea, severe attacks of vomiting, diarrhœa, and occasional constipation. When first seen by Dr. Newman in November, 1891, she had developed all the characteristic symptoms of movable kidney on the right side, and on palpation the right kidney could be easily made out. It could be made to move almost to the umbilicus, up under the ribs, and down into the iliac fossa. At first occasionally, but afterwards more frequently, she had more or less sudden attacks of severe pain associated with sudden diminution in the urinary excretion, sometimes amounting to total suppression. This apparent suppression was coincident with a rapid increase in size of the movable tumour in the abdomen, and also with severe paroxysms of pain, which lasted until the swelling was suddenly relieved by the escape of a large quantity of watery and slightly albuminous urine. At all times she suffered from more or less dull aching pain in the loins, extending at times over the whole abdomen, and sometimes down as far as the right knee. This pain differed entirely from what was experienced during an attack. The paroxysmal pain did not last more than six or eight hours, and while it lasted the patient was unable to lie in bed, but nearly always occupied a sitting posture, at first almost erect, but when the hydronephrosis attained a large size she would bend the chest forwards over the abdomen and elevate the knee so as to relieve pressure.

These symptoms were accompanied by sickness and vomiting. The following is a note of the condition of the urine before, during, and after one of these attacks:—

Date.	Quantity.	Sp. gr.	Remarks.
1889.			
May 7, 8 A.M.	5 oz.	1016	Acid ; no albumin.
,, 12 noon.	16 ,,	1014	Do. do.
,, 4 P.M.	6 ,,	1026	Severe pain ; trace of albumin till 8 P.M. on the 8th May.
May 8, 8 P.M.	36 ,,	1008	Pain gone ; trace of albumin.
,, 9 P.M.	4 ,,	1012	No pain ; no albumin.
,, 11 P.M.	6 ,,	1014	Do. do.
May 9, 1 A.M.	5 ,,	1012	Do. do.

At 4 P.M. on the 7th May, 6 oz. of urine of high specific gravity was passed, and almost immediately following the paroxysm of pain set in, and continued with increasing severity for twenty-eight hours, when it was suddenly relieved after the passage of 36 oz. of urine of low specific gravity. Nephrorraphy was performed in this case with a good result.

The following case is taken from Dr. Newman's Ward Journal:—

Case XVI.—*Right movable kidney—Transitory hydronephrosis—Symptoms of uræmic poisoning.*

Mrs. Y., æt. 30, admitted to the Glasgow Royal Infirmary on 20th June, 1894.

Patient states that she enjoyed good health until her last confinement, two and a half years ago. During the six months following this, she says, her health was bad, and she was troubled with symptoms of gravel, and had some trouble with her urine. She had pain on micturition, but had no pain in the back.

Two years ago she first began to complain of pain in the lumbar region of the spine, and this has steadily got worse. She describes it as being of a dull, aching nature, and it came on usually in paroxysms. Towards the end of an attack the

pain became of an acute colicky character. These attacks usually lasted for about three days.

During the attack she passed very little urine, but after poulticing urine was passed in large quantities, and the pain was at once relieved. These attacks came on at first every six or eight weeks, but during the past year they have occurred at intervals of about three weeks. In the intervals she feels weak and ill. About a year ago she first noticed a lump in her right lumbar region. This steadily increased in size during an attack, but subsided after the copious discharge of urine had taken place.

During the paroxysms she suffered from sickness and vomiting. There was a premonitory period, lasting for about two days, during which she felt ill, appeared haggard and slightly jaundiced, and complained of aching pains in the limbs. Dimness of vision, persistent headache, and lethargy were present during the periods of temporary suppression, pointing to uræmic poisoning.

The attacks had no relation to her menstrual periods, but were often brought on, she says, by hard work, such as washing or scrubbing floors.

On admission patient was found to be pale and anæmic. There was pronounced pulsation of the abdominal aorta in the epigastric region, which Dr. Middleton considered to be due to fusiform dilation of that structure.

No lump was present in the lumbar region when examination was made. She left the hospital on 12th July. During her residence she had no paroxysms of pain. She was kept rigidly in bed. The urine never at any time during her residence in hospital contained albumin or blood.

The chief point of interest in the above case is the presence of symptoms of uræmic poisoning. This is the first of the

cases of hydronephrosis we have referred to in which this has been present, although in Case XII, where torsion of the renal vessels took place, these symptoms were also present.

In addition to the above cases, reference should be made to the case of Mrs. K. (Case I), where the symptoms clearly pointed to the occurrence of transitory hydronephrosis.

The last case to be quoted is one in which torsion both of the ureter and renal vein occurred, giving rise to hydronephrosis, albuminuria, and the presence of tube-casts in the urine.

CASE XVII.—*Right movable kidney causing torsion of the ureter and renal vein, and leading to hydronephrosis, albuminuria, and the presence of tube-casts—Operation—Cure.*

The patient, Miss A., came under Dr. Newman's observation at the beginning of 1895. The history of the case, the physical signs, and the symptoms all pointed to right movable kidney of some years' duration. The patient was anæmic and emaciated, and it was considered desirable, before an operation was performed, to try the effect of complete rest in bed. This was continued for three months, with comparatively little success, and it was resolved to perform nephrorraphy early in May. Frequent examinations of the urine were made during the first three months of the year, and on all occasions it appeared to be strictly normal. The day previous to the one on which the operation was arranged for a careful examination was made of the kidney, when it was found to be swollen and unusually tender; and when the urine was examined it was discovered for the first time to contain a considerable amount of albumin, and some hyaline and finely granular tube-casts; but these were not found in the deposit, but only when separated by a centrifugal machine. On

account of the albuminuria and the presence of tube-casts in the urine the operation was postponed, and all the samples of urine were carefully examined, as shown in the following table:—

Date.	Quantity.	Sp. gr.	Remarks.
1895.			
Apr. 29, 9 A.M.,	9 oz.	1023	Acid; considerable albumin and tube-casts; pain severe.
Apr. 30, 8 A.M.,	7 ,,	1023	Do. do.
,, 12 Noon,	10 ,,	1019	Acid; trace of albumin; pain much less; tube-casts.
,, 4 P.M.,	13 ,,	1010	Do. do.
,, 9 P.M.,	6 ,,	1015	Acid; no albumin; no tube-casts.
May 1, 2 A.M.,	17 ,,	1009	Do. do.
,, 7 A.M.,	13 ,,	1009	Do. do.
,, 1 P.M.,	10 ,,	1013	Do. do.
,, 9 P.M.,	7 ,,	1014	Do. do.
May 2, 6 A.M.,	10 ,,	1010	Do. do.

At first the possibility of a nephritis being present was considered, but as no symptoms beyond the albuminuria and the presence of the tube-casts could be discovered, the course of the urine was carefully watched to see if any other explanation of the albuminuria could be discovered.

With the onset of paroxysmal pain, sometimes there was present hydronephrosis, sometimes it was absent or not observable; but high specific gravity of the urine, albuminuria, and tube-casts always appeared at such times, and disappeared at the same time as the pain. Since the operation was performed no albumin or tube-casts have been found.

We have now discussed in detail the *subjective symptoms* of movable kidney, but there still remain a few words to be said on the subject of *physical signs*.

As might be expected, these vary greatly in individual cases. If, for example, the patient be a well developed, muscular,

and stout man, it may be difficult, or even impossible, to gain any information from physical signs. If, however, the patient be thin and emaciated, with lax abdominal walls, the physical signs may be easily elicited.

Inspection.—As a rule little can be distinguished by this means. If the patient be thin, the outline of the movable kidney may occasionally be seen. Where also there is a considerable degree of enlargement of the kidney, from congestion or hydronephrosis, the swelling may be quite apparent. We have seen this in several of the cases we have recorded.

The flattening of the lumbar region observed when the kidney is displaced has been described by Landau [26] as "an untrustworthy and exceptional sign."

Percussion.—Much has been made of the value of this sign by many writers. Rollet,[21] Trousseau,[23] and others have stated that the note over the side corresponding to the displaced kidney is clearer and fuller than on the other side. The same view is held by Guttmann,[39] while Piorry [40] claims to have percussed out the smallest degree of change in the size of the kidney.

On the other hand, Landau and Weil [41] have failed to detect any difference in percussion even after the removal of a kidney, while Skoda [42] states that "the size of the kidney has very little to do with the state of the resonance in the lumbar region."

In the face of so much difference of opinion, it must be admitted that the facts elicited by percussion are of little practical diagnostic value in cases of movable kidney.

Palpation.—This method of examination undoubtedly yields by far the most reliable results. Even here, however, much depends on the individual. We have seen in several cases that no positive results were obtained by palpation

when the patient was well developed and the muscular resistance great. In the majority of cases, however, careful bimanual palpation will reveal the presence of a movable mass in the loin. Pressure on this will usually elicit a sickening sensation. When fixed by the hands it can usually be made to travel towards the middle line, as well as up under the ribs and downwards towards the pelvic cavity. If the abdominal walls be lax and the patient thin, there will usually be no difficulty in making out the smooth outline of the tumour and the characteristic notch—the hilum. The tumour can be felt passing downwards during deep inspiration, and ascending during deep expiration. It can also be noted that its position varies with changes in the position of the patient.

In many cases of movable kidney a marked degree of epigastric pulsation is appreciable, and occasionally, as in Case III, pulsation of the renal artery may be felt on palpation.

Diagnosis.

There are perhaps few diseases which have given rise to so many errors in diagnosis as the condition under discussion. This in many cases is probably due to medical men overlooking the possibility of this condition being present.

Undoubtedly, in some cases the subjective symptoms may be so indefinite, and the physical signs so unreliable, as to render accurate diagnosis difficult or even impossible. We have seen in some of the cases quoted above that it was only after an exploratory incision had been made that the diagnosis was definitely established. As a rule, however, a careful study of the symptoms and physical signs, as detailed above, will lead to a ready appreciation of the true nature of the case.

The points to be specially noted are the history of onset, the constant dull aching pain increased by exertion and relieved by rest, the paroxysms of acute pain, the interference with the urinary excretion, the presence of a movable tumour and its characteristic renal form.

It is unnecessary to refer here to the many conditions which are recorded as having given rise to errors in diagnosis. These will be found in detail in the writings of Landau and others.

Treatment.

This will naturally depend entirely on the degree of severity of the symptoms. In many cases movable kidney gives rise to little or no inconvenience. In these milder cases no treatment will be necessary beyond the avoidance of hard work or violent exercise. At the same time the state of the general health will demand attention, and where it seems probable that the mobility is due to emaciation, careful dieting may yield satisfactory results.

When acute paroxysms of pain set in, absolute rest in bed, with the application of heat and the employment of morphia, is indicated.

In many cases bandages have been employed for the purpose of retaining the kidney in position. When, however, the symptoms become constant and severe, and little if any relief is obtained by rest or general treatment, the question of operative interference will arise. Two operations may be performed—nephrectomy and nephrorraphy.

As regards the first little need be said. It would only be resorted to where the kidney was diseased as well as movable, or where, from the position of the displaced kidney, nephrorraphy was impossible.

Nephrorraphy was first performed by Hahn,[43] of Berlin,

while its first performance in this country was by Newman.[44] The results have been most satisfactory, and it is, moreover, practically free from danger if proper precautions be observed. We have noted in this paper ten cases in which nephrorraphy was performed, and in all of them, without exception, the operation resulted in complete relief of all renal discomfort. There seems no doubt, therefore, that where the symptoms are at all severe or interfere with the patient's ordinary occupation, the operation is not only justifiable, but is urgently demanded.

TABLE OF CASES.

Case.	Age.	Sex.	Occupation.	Kidney Affected.	Symptoms.	Cause Assigned.	Duration.	Treatment.	Result.	Remarks.
I.	56	F.	Housewife.	Right.	Transitory hydronephrosis; suppression of urine; gastric symptoms.	Injury: Spinal caries?	24 years.	Rest.	Relief.	Married, 2 children.
II.	53	M.	Sea captain.	Right.	Severe paroxysmal pain; kidney enlarged and gorged with blood.	Injury.	5 years.	Nephrorraphy.	Cure.	...
III.	26	F.	Housewife.	Right.	Dull aching pain.	Pregnancy?	2 years.	Rest.	Relief.	Married, 2 children.
IV.	55	F.	...	Right.	Dull boring pain.	Strain.	4 years.	...	...	...
V.	31	F.	Housewife.	Right.	Dull aching pain, increased during menstruation; gastric disturbance.	...	6 years.	Nephrorraphy.	Cure.	Married, 4 children.
VI.	47	F.	...	Right.	Dull pain; gastric disturbance.	...	12 years.	Elastic bandage.	Relief.	Married.
VII.	44	F.	Nurse.	Left.	Dull pain, increased during menstruation; gastric disturbance.	Strain.	3 years.	Nephrorraphy.	Cure.	...
VIII.	41	F.	Housewife.	Right.	Dragging pain, increased during pregnancy. Headache; diarrhœa; weakness.	...	27 years.	Rest.	Relief.	Married, 10 children in 14 years; pain increased by each pregnancy.
IX.	50	M.	Ironmoulder.	Left.	Severe renal pain; hæmaturia; albuminuria.	Strain?	Over 3 years.	Nephrorraphy.	Cure.	...
X.	40	M.	Marine engineer.	Right.	Severe pain; hæmaturia; torsion of renal vessels and ureter.	Injury.	4 years.	Nephrorraphy.	Cure.	...
XI.	49	M.	...	Right.	Suppression from torsion of vessels and ureter; renal pain.	Injury.	6 years.	Nephrorraphy.	Cure.	...
XII.	41	F.	...	Left.	Torsion of vessels; severe pain; suppression; albuminuria; tube-casts.	...	8 years.	Nephrorraphy.	Cure.	Married, 9 children.
XIII.	31	F.	...	Right.	Transitory hydronephrosis; pain; gastric disturbance.	Injury.	5 years.	...	...	Married, 6 children in 7 years.
XIV.	34	F.	Nurse.	Right.	Transitory hydronephrosis; severe pain.	...	5 years.	Nephrorraphy.	Cure.	Unmarried.
XV.	35	F.	Housemaid.	Right.	Severe pain; gastric disturbance; transitory hydronephrosis; albuminuria.	...	2 years.	Nephrorraphy.	Cure.	Unmarried.
XVI.	30	F.	Housewife.	Right.	Transitory hydronephrosis; renal pain; uræmia.	...	2½ years.	Rest.	Relief.	Married, 3 children.
XVII.	...	F.	...	Right.	Transitory hydronephrosis; albuminuria; tube-casts; torsion of ureter and renal vein.	...	Several years.	Nephrorraphy.	Cure.	Unmarried.

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