Renal tension and its treatment by surgical means / by Reginald Harrison.

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RENAL TENSION, AND ITS TREATMENT BY SURGICAL MEANS, by REGINALD HARRISON, F.R.C.S., President of the Surgical Section of the British Medical Association; Surgeon to St. Peter's Hospital.

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PREFACE.

THIS Paper was read in the Surgical Section (over which I had the honour to preside) at the Annual Meeting of the British Medical Association at Cheltenham, in 1901, as introductory to a Discussion on Renal Tension and its Treatment by Surgical Means.

I have also included in an Appendix some articles which have appeared in the *Medical Press*, as being valuable contributions to the subject, as well as criticisms. The acceptance of the views I have endeavoured to enunciate and illustrate will probably lead to important revisions in kidney pathology, as well as to some additions to the treatment of renal affections.

July, 1901.

6, LOWER BERKELEY STREET,
PORTMAN SQUARE, W.

Renal Tension and its Treatment by Surgical Means.

It may be remembered that in 1896[1] I drew attention to some cases where patients suffering from albuminuria and other renal symptoms, which might have been produced by a stone or other removable cause, had completely recovered after an exploratory operation on the kidney, by puncture or incision, though no calculus nor recognisable cause was discovered. It seemed reasonable to infer from these results, as well as from the examination of the parts operated upon, that this satisfactory termination might be ascribed to the relief of tension and congestion, thus allowing the escape of that which caused these conditions and permitting the return of a natural circulation in the organ. Further, I urged that the recognition of tension as a factor in kidney disease had not hitherto

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[1] Presidential Address, Medical Society of London.

received adequate attention, and that its consideration might lead to some revision in our views relative to renal pathology and treatment.

The publication of my paper was followed by many favourable criticisms in the medical press both at home and abroad, and clearly indicated that others shared my views and regarded them as original and worthy of attention. For these reasons it has been thought that this subject, now sufficiently ventilated and further matured, might for the first time in its history, as far as I can gather, be submitted for discussion, and it is with this object that I have prepared this summary. I propose to deal with it briefly under three headings.

(1) What grounds are there for believing that the immediate effects of tension may be, amongst other causes, the starting-point for some of those pathological changes in the kidney which are included under the term of Bright's disease or nephritis?

(2) In what class of cases are there reasons for thinking that direct surgical intervention for the relief of tension and its effects is applicable, and how are we to arrive at this conclusion?

(3) In what manner should the latter be practised?

In reference to the first point, it must be

borne in mind that the more recent information we possess about certain pathological states of the kidney has been mainly derived from the actual inspection of the organ during life, and from the impressions conveyed by touching or handling it. When, in 1827, Dr. Bright recognised the association of albuminuria with various disordered conditions of the kidney which still bear his name, our knowledge of some of the latter states was then, and up to a recent date, almost entirely gained, so far as their morbid anatomy was concerned, from *post-mortem* examinations, and under circumstances where the means for recognising degrees of consistence during life were imperfect and unreliable. It is hardly remarkable, therefore, that the effects of tension as a factor in these diseases could at that time be fully appreciated. Now a living kidney may be seen and explored with ease and safety *in situ*.

In going through descriptions of the pathological states connected with various forms of nephritis, such as may be found in the more recent text-books, it is difficult to reconcile, on the one hand, the following phrases used by eminent and accurate authors with an entire absence of all reference to tension as a cause of subsequent lesion and disease

and the necessity that may arise for its removal artificially.

If we turn, for instance, to Dr. Delafield's admirable article in the *Twentieth Century* (New York), published so recently as 1895, we shall find numerous references, such as the following, to kidney states in connection with nephritis: "commencing exudation," "commencing transformation of the exudation," "extravasations of blood in the Malpighian bodies, the tubes, and the kidney tissue, and by filling of the tubes with coagulated fibrin," "the tubes are filled with degenerated epithelium, granular matter, and fat globules, or with homogeneous exudation," "if the exudation between the tubes has become organised, we find masses of connective-tissue cells and fibres," and so on.

Still more striking and suggestive is the following passage: "Sometimes, particularly when the attack is the result of a definite exposure to cold, and the subject middle-aged and intemperate, an acute form of nephritis manifests itself, which is characterised by extravagant congestion, even to chocolate or purple, and great and rapid swelling of the gland; so that, as I have seen at least in one instance, the kidneys have burst their capsules. Short of this exceptional result the whole organ,

but chiefly the cortical tissue, is enormously swollen, the cortex changed to a deep coffee colour and the cones to purple, whilst the tubes are distended chiefly with epithelium and blood." [1]

It is difficult to understand how, under all these circumstances, repair can be carried through to a successful issue without occasionally requiring some mechanical assistance; on the other hand, it is not always easy to draw a line where the latter is indicated.

The question has been raised, how is it that the tension of acute nephritis never or rarely proceeds to suppuration or gangrene, as happens elsewhere in the body? The answer is obvious. These extremes are anticipated by death.

There is another phase connected with pathological lesions of the kidney which should not be lost sight of. In my Lettsomian Lectures before the Medical Society of London (1888), I showed that it was not uncommon to find either as a consequence of direct injury or disease that the lining membrane of the urethra had, at one or more points, lost its power of transmitting urine without some

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[1] Professor Albutt's "System of Medicine," vol. iv., "Diseases of the Kidney," by Dr. W. Howship Dickinson, p. 354.

degree of slow leakage or exudation of certain of its constituents in the direction of the peri-urethral tissues occurring. I attributed this to the destruction of the epithelial coat, which was found to be absent at these points, as shown in the drawing (fig. 1). This led to lymph barriers being thrown out in the peri-urethral tissue, which by their subsequent organisation and contraction formed strictures and indurations, and sometimes by their extent involved the perineum.

The same, I believe, may happen in the inflamed kidney as a consequence of tension, and by the slow exudation of urine tend in aiding its disorganisation. The fact, I think, is not sufficiently appreciated, that in transmitting a fluid so damaging as healthy urine may prove, nature specially provides against such a contingency in the construction of the tubes and reservoir employed for this purpose. We recognise this from the very point where the urine is first formed and collected. Thus, as with all of the hypertrophies, these provisions may bring with them their own liabilities.

Apart from evidence to be obtained from ocular and digital exploration of the kidney, which will be referred to later on, there are some important analogies bearing upon internal

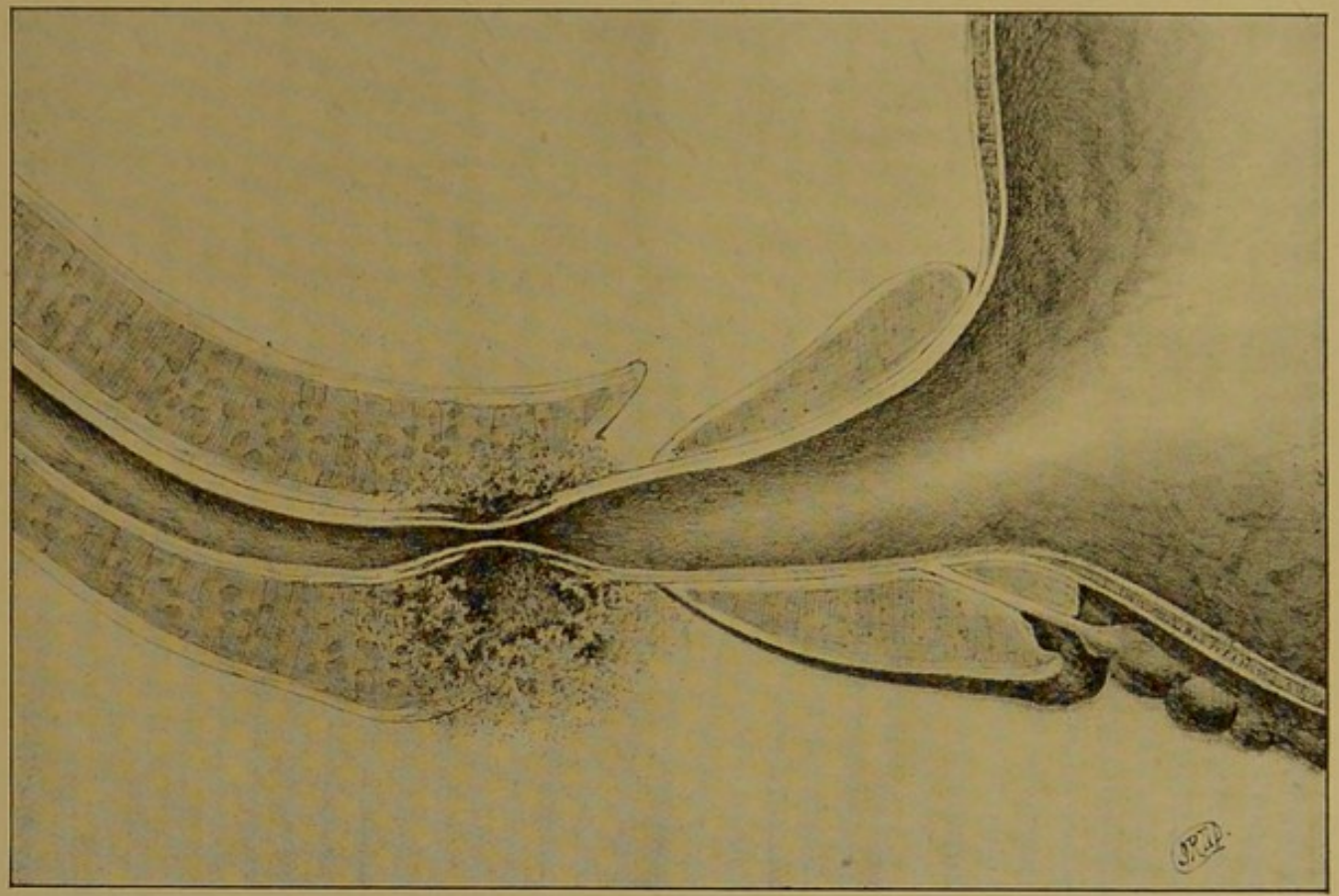

FIG. 1.

tensions which must not be passed by unnoticed.

Probably the most striking one is the relation of intraocular tension to certain diseases of the eye. The recognition of the true pathology of glaucoma and the adoption of mechanical treatment by iridectomy, or an allied operation for the removal of tension and the prevention of the degenerative changes thus initiated, at once resulted in the saving of a large number of eyes, which previous to this discovery would undoubtedly have been lost. By this means Von Graefe converted an incurable disease into a curable one, and at the same time demonstrated the true nature of the disorder. Hence it has been suggested to me that the term "renal glaucoma" is not an inappropriate one.

Again, in the testicle, when it becomes inflamed, we have not unfrequently transient as well as permanent evidence of the damage that inflammation and tension are capable of effecting in an organ which, relative to its secreting and investing structures, is not unlike the kidney. The late Mr. Henry Smith was the first to draw attention to the advantages that followed puncture or limited incision through the capsule in acute forms of orchitis. It was correctly alleged that not only was

the pain of tension in a highly sensitive organ relieved, but structural damage averted. In fact, sterility, so far as this organ was concerned, was by this simple means rendered unlikely to occur.

It is, however, to the ocular and digital examination of the kidney during life that I would attach most importance relative to the subject that is now before us. This is a proceeding which may be regarded as an outcome of the general use of anæsthetics and antiseptics for almost all surgical proceedings. Before these were introduced the living human kidney was only seen on rare occasions in connection with abdominal wounds accidentally inflicted and when the organ involved was in a healthy state. Now, the operating surgeon may be said to be familiar with its appearance and consistence in all states of disease and injury.

From my earliest explorations of the kidney I soon learnt to recognise that both in regard to its colour and consistence, apart from its size, there were very important variations to be observed which I had never seen in the organ after death. Later on I observed that in some cases of albuminuria the albumen permanently disappeared from the urine after the kidney

had been opened and permitted to drain, and thus the excretion became normal.

The cases I would select in illustration are these :—

Case I.—In 1878 I cut down on the kidney from the loin in a youth aged 18, expecting to find a suppuration either within or around the organ. The patient was suspected to have had scarlet fever three weeks before this was done, and had since suffered from intense lumbar pain. He had had a slight rash, some desquamation, a sore throat, and albuminous urine with casts. I undertook the operation with some hesitation, and limited my incision so as just to enable me to put my finger on the kidney. It felt so tense that I extended my incision and opened it with confidence, expecting to find matter. This was not the case, and I closed the proceeding with the feeling that I had made an error in diagnosis. There was a full discharge of blood and urine from the wound for some days. The latter was lightly plugged with lint, and in the course of ten days or so healed soundly. After the incision was made the excretion of urine became far more abundant, and the albumen gradually and completely disappeared.

Case II.—In 1887 I operated upon a man aged 50, who, by nature of his occupation, spent a large amount of his time underground. Occasionally he suffered from hæmaturia in conjunction with colicky pains about the groins, and I came to the conclusion that he was suffering from renal calculus. As, however, the symptoms were neither urgent nor confined to one kidney, the consideration of operation was postponed. In the course of a few months after I first saw him, and whilst he was continuing his work underground, the urine became largely and constantly albuminous, and there was some pain referred to the right loin. I took him into the Royal Infirmary at Liverpool, where I was then residing, and explored the right kidney. The

organ was found to be enlarged and tense. An incision of an inch in length was made through the cortex and the pelvis was explored with the finger, but after careful examination no stone could be found. There was a considerable discharge of blood and urine, which continued for a fortnight or so, a drainage tube being retained in the wound. On the withdrawal of the latter healing followed, and the urine became quite normal. I heard some time afterwards that the patient remained in excellent health, and was able to resume his ordinary occupation.

Case III.—This case is one that came under my observation in 1893. It was that of a woman aged 44, who had suffered from slight hæmaturia at times for a year previously; occasionally the urine was albuminous. Shortly after I saw her she had a severe attack of influenza, which was followed by an aggravation of her renal symptoms. She complained of pain on pressure over the left kidney, and the albumen not only increased in quantity, but was constantly present in the urine. As she believed she had passed a small calculus some months previously, I thought it a proper case for exploration, and this was accordingly made. The late Mr. Durham saw the patient in consultation with me. The left kidney was found to be swollen and very tense. It was opened and explored with the finger, but no calculus could be discovered. There was a free drain of urine with some blood which continued for about a fortnight, when the wound closed. The patient is now quite well, and the urine normal.

Case IV.—The following case appeared to be one of contusion to a kidney passing through—probably with its fellow—a stage of nephritis.

It happened in a man aged 42, of decidedly intemperate habits, whom I saw in 1896-97 for recurring pain about the right kidney, with albuminuria of four months' standing, to my knowledge. The amount of the latter was considerably more than a trace, and the urine contained a sediment of renal epithelium and tube casts. It some-

times showed a trace of blood. The pain was lumbar and not referred. There were indications present which pointed to cardiac hypertrophy and arterial tension. The patient informed me that he had been rejected for life assurance. I looked upon the case as one of nephritis and not stone.

Some weeks after I first saw him he told me that he had either fallen or been thrown from a cab during the night, which had considerably increased his pain in the lumbar region. There was a trace of blood in the urine, but I could find no external mark of injury except on the knees. The urine was much scantier than usual, and was very high coloured, but not differing from the account previously given.

As the pain complained of was rendered acute, I opened the right loin a few days after the injury and explored the kidney. The latter was extremely tense, purple and patchy, shiny and swollen. I divided the capsule by incision along the convexity to the extent of about two inches, and explored for stone but could find none.

There was some extravasated blood beneath the capsule, and on gently pressing the kidney with my hand there was an exudation through the renal wound of much thin prune-looking fluid, which was probably broken-down clot, urine, and some of the products of the concurrent nephritis. A drainage tube was introduced and retained for ten days, when it was finally removed and the wound gradually healed.

I lost sight of the patient until a few weeks ago, when he saw me about another matter. He had quite recovered his health and his urine was found to be normal. He had been so alarmed by the injury and what followed, that he had forsaken alcohol in all forms. I suggested that he should apply to the insurance office for re-examination, but I have not heard whether he has done so or not.

This case certainly appeared to be rapidly drifting in the direction of chronic nephritis, cardiac hypertrophy

with arterial tension, and probably general dropsy, until arrested by, so to speak, fortuitous circumstances.

Case V.—In 1889 I saw a man aged 30, who six days previously had fallen down the hold of a ship and struck his right loin with much violence. The part was ecchymosed, swollen, and tender to the touch. The excretion of urine was reduced to 16 ozs. in the twenty-four hours. The temperature had risen and was variable. Thinking that suppuration was imminent I made an incision into the loin and explored the corresponding kidney. From the former I removed some extravasated blood-clots. The kidney was found very tense and congested. I punctured it in several places with an exploring trocar and incised the capsule in one. Apparently only blood and serum escaped. The wound was packed lightly with antiseptic gauze and left to drain. There was a free discharge of blood and urine for some days. It was calculated that over double the amount of the latter was excreted in the twenty-four hours after the incision. The patient made a good and rapid recovery. Here the tendency towards suppression of urine was apparently connected with the intense congestion following the injury, in which probably both organs were involved.

Case VI.—In March, 1899, I saw a man aged 31, whose history was as follows. Two years previously he had an attack of hæmaturia, without pain, which lasted for ten days and was repeated on two occasions. He had a fourth attack ten days before I saw him, and the urine, at the time of my examination, was not entirely free from blood. He recently had had attacks of spasmodic pain, not unlike colic, in the region of the right kidney. There was a strong family history of gout and the patient had passed uric acid crystals, but no stone. He now frequently complained of penile pain at the close of micturition. On deep pressure over the right kidney stabbing pain was also complained of. Some indications were present pointing to cardiac hypertrophy with arterial tension.

I sounded him under cocaine, but no stone in the bladder was found. As the symptoms, both local and general, were becoming urgent, I advised an exploratory examination of the right kidney.

On his admission to hospital for this purpose, in April, 1899, his condition was noted by Mr. Brodribb, the house-surgeon, as follows: Urine acid; sp. gr. 1011, and containing a trace of pus and albumen. There was some fulness in each lumbar region above the crest of the ileum. Both kidneys were felt to be enlarged and were tender, the right more than the left, but both were distinctly nodulated and uneven.

The right kidney was explored by an incision through the corresponding loin. As expected, it was found cystic, but not presenting any appearance of malignancy or of being involved in a growth. As I thought it possible the pain might be due to a calculus, I made an incision through the cortex which enabled me to enter the kidney pelvis and explore it carefully with my finger for a stone, but none was found. The bleeding was unimportant and readily controlled.

As there appeared nothing more to be done surgically a drainage tube was introduced within the kidney and the wound closed to this extent. For some days afterwards a large quantity of urine was discharged by the latter as well as naturally; the temperature remained normal, and on the tenth day the tube was removed. The incision gradually closed and on the twenty-first day after the operation the patient was able to return home. The cardiac circulation diminished in frequency with less tension, and the patient expressed himself as conscious of considerable relief generally. It was concluded that the nature of the disease was that described by Roberts[1] and others as cystic degeneration of the kidneys. On his return home the wound re-opened and for thirteen months it continued to discharge urine, when it finally closed.

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[1] "Urinary and Renal Diseases."

I saw him again in February, 1901, nearly two years after the operation. He was in good health and actively engaged in business and had been so for twelve months. The urine was examined by Mr. Pardoe and reported as containing a trace of albumen, but otherwise normal. The condition of the patient compares favourably with what it was at the time of operation. Though both kidneys are still somewhat nodular, their further enlargement and degeneration appear to have been arrested. The prolonged drainage of the kidney extending over twelve months, though an uncontemplated incident connected with the operation, has apparently proved satisfactory and checked the course of the disease. I am not aware that opening and draining a kidney undergoing cystic degeneration has ever been tried before. Having regard to the progressive nature of this disorder and the fact that so little has been done for such cases, I should not hesitate to repeat the process described. I would, however, prefer doing so at an earlier stage, on the ground alleged by Roberts[1] that this disease has "evident affinities with the granular atrophic forms of Bright's disease." Though by reason of its bilateral nature, as Mr. Henry Morris[2] has pointed out, cystic degeneration may not often come within the scope of certain operations for the removal of a diseased kidney, it seems a reasonable proposal to bring it within the reach of incision and drainage, as in the instance recorded. It is curious to notice, in going over cases where adventitious cysts, such as hydatids, have exercised grave pressure on the kidney, certain effects of the latter relative to the urine are described "as similar to Bright's disease." In a case, for instance, recorded by Dr. Fotheringham[3] it is stated that the latter symptoms at once disappeared on the removal of the pressure thus exercised.

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[1] "Urinary and Renal Diseases."

[2] "Surgical Diseases of the Kidney."

[3] *Brit. Med. Journal*, December 6, 1884.

Looking at four of the cases I have briefly related, I believe that the first was scarlatinal nephritis, the second nephritis from exposure to cold and damp, the third subacute nephritis probably following upon influenza, and the fourth nephritis further complicated with an injury. Amongst other features, all four cases were characterised by the presence of albumen in the urine, which I am inclined to attribute to inflammation or its immediate effects. The fifth and sixth cases represent other phases of renal tension.

I will now pass on to specify, in the second place, the class of cases to which direct surgical intervention for the relief of tension may be applicable and how we are to arrive at this conclusion.

Eliminating as they do various materials of disease, which by their quantity or quality are liable to excite congestions and inflammations within the kidneys, it is not remarkable that in this way high degrees of tension are occasionally induced. Of the causes for the latter may be mentioned those irritants derived from various infectious conditions, such as scarlet fever, diphtheria, measles and the like, from alcohol and food intoxications, and from the excessive use of such drugs as turpentine and cantharides.

I can best put the case before you by taking types representing three states of acute nephritis which not uncommonly come under notice in connection with scarlet fever.

The first is the common type, where there are varying degrees of fever, rash, and desquamation, with nephritis indicated by blood in the urine, albumen, casts, and epithelium. The fever may be high and the kidney complication severe, but the tendency in every direction is towards recovery and complete restoration of the organs involved.

Cases included in this large class certainly do not require surgical attention, for recovery is steadily progressive, and after a few weeks' interval of illness and convalescence the congested organs return to their normal condition.

The second group of cases, though apparently belonging at the commencement of the attack to the preceding class, does not end in the same way. The previously healthy adult or child passes through the early stage of the disorder much as in the former instance, but convalescence is delayed, and the signs of the nephritis, as evidenced by albuminuria and casts in the urine, do not disappear. The disease does not progress towards recovery, but is stationary or trends in the opposite direction.

These are the instances which furnish a

considerable proportion of the cases of chronic nephritis or Bright's disease, and a more or less invalid life is the prospect. It is to this class and the following that the relief of tension by a surgical proceeding, which will be discussed later on, may be said to be applicable.

My third illustration is taken from what has been described as the malignant type of scarlatinal nephritis. Here the kidneys appear to be at once overwhelmed in the pathological changes that supervene, suppression of urine occurs, and death rapidly follows from uræmia, with coma and convulsions. After death under these circumstances it is usual to find the kidney intensely congested, the capsule tense and shiny, and over-filled with blood.

However capable of gradual distension the capsule of the kidney may be, there is no doubt that it is very intolerant of any sudden increase of intrarenal tension, and experience gained in operating on that organ teaches that in certain conditions of congestion the capsule is so tightly stretched and its substance exposed to such pressure as quite to explain any interference with its function. The results of operation also tend to show the importance of increased tension, for sometimes after mere incision the quantity of urine excretion is

found to have doubled within twenty-four hours.

Here, then, we have two states of nephritis where little can be expected from the medicinal treatment alone which hitherto has been tried, the one being indicated by the persistence or increase of albumen in the urine and further evidences of impending disorganisation at a stage in the disease when recovery should be steadily progressive, and the other where the kidney is, so to speak, suddenly paralysed by the extreme tension to which it is submitted.

There is another indication of tension in connection with renal inflammations and congestions which should not be ignored in determining what may be required to meet the pressing emergencies so occasioned. I allude to the tension which is thus thrown on the heart and the circulatory apparatus generally.

This form of tension is generally recognised in connection with renal disease, though the explanation of it is not, I believe, so universally appreciated. I have often used for demonstration a comparison between the generation of steam as applied for motor purposes and the excretion of urine. In the former case to secure the rapid production of steam a circulatory apparatus is required and a boiler made up of a number of tubes by

means of which the water can be quickly heated and transformed. Should a number of the tubes become damaged and inoperative, their temporary loss is provided for by a more rapid circulation of the water through those tubes that remain. This is brought about by a mere mechanism.

In the same way with the kidneys, when their uriniferous tubes become damaged or rendered inoperative by pressure or blockage an increased circulatory force becomes excited. In the human subject this means cardiac hypertrophy and vascular tension throughout. If a certain amount of blood has to be driven through the kidneys in twenty-four hours for the excretory purposes of the body, it stands to reason that the force to effect this must be relative to the resistance offered. Cardiac effort may, therefore, be regarded as only proportionate to and determinable by the latter.

If the kidneys were as immediately situated relative to the heart as the lungs are, no one would question the direct influence of the congestion and blockage of the former in producing cardiac hypertrophy in this way. The increased distance, however, that these organs occupy relative to the circulation rather adds to the probability of this explanation, as

well as of the incidence of increased arterial tension generally and of its varied local manifestations and effects.

In relieving kidney tension surgically, I have frequently noted its general effects upon the circulation and the increased urinary excretion that has almost immediately followed. Dr. Dickinson[1] observes: "I have distinctly recognised hypertrophy of the heart as a result of nephritis of not more than six weeks' duration."

The following may be regarded as some indications for relieving tension surgically in cases of nephritis, however arising: (1) Progressive signs of kidney deterioration, as shown by the persistence or increase of albumen when it should be diminishing or disappearing from the urine, as in the natural course of inflammatory disorders ending in resolution; (2) Suppression of urine or approaching this state; (3) Where a marked disturbance of the heart and circulatory apparatus arises in the course of inflammatory renal disorders.

How far the mechanical removal of kidney tension may be utilised in connection with the prevention and treatment of some heart

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[1] Professor Albutt's "System of Medicine," vol. iv.

hypertrophies, is an aspect of the subject which is not without its own interest.

In the third and last place I will pass on to consider the precise method of giving relief to kidney tension under the conditions referred to. The simplification of all surgical processes by the use of anæsthetics such as gas and ether in preference to chloroform, and the introduction of antiseptics, makes one approach a reference to wound-making for purely therapeutical purposes with very different feelings to those which prevailed before the discovery and application of these agencies.

The operation of exposing and, if necessary, incising a kidney is one attended with but a small degree of risk, and should be entertained where there is a fair prospect of saving a person from imminent death or from the invalid life which is inseparable from a chronic albuminuria arising out of a nephritis. It is a lesser proceeding than those abdominal sections where the peritoneal cavity is opened with so much safety and advantage for exploratory and other purposes.

In a statement, published apparently on good authority, a calculation had been arrived at that out of one million deaths that occurred, scarlet fever was responsible for 48,000, a

number considerably in excess of all other causes. Doubtless a large proportion of these were directly occasioned by nephritis.

In my earlier investigations relative to the subject of kidney tension and the application of well-recognised surgical principles to this condition, in several instances I confined myself to puncturing the distended organ in one or more places, and at the suggestion of the late Sir William Roberts, who was deeply interested in the subject, I made use of the term "reni-puncture" as descriptive of what was done. Though this proved sufficient in cases where it was unnecessary to explore the interior of the organ for any other cause of congestion, there were others where a further search rendered a limited incision through the capsule advisable. On the whole, I think that in the majority of cases the latter proceeding is to be preferred. I speak of it as a capsular nephrotomy, indicating by this term the limit I would, as a rule, put upon the proceeding.

The patient being anæsthetised and placed in the position for a lumbar nephrotomy, the kidney is exposed by a transverse incision through the loin about parallel with, and a little lower than, the last rib (fig. 2). The length of the incision varies relative to the

consistence of the patient and the individual connections of the kidney to be searched. In spare subjects an incision of three inches probably suffices. The various musculo-fascial layers are divided until the supra-renal fat is seen. The connective tissue covering this

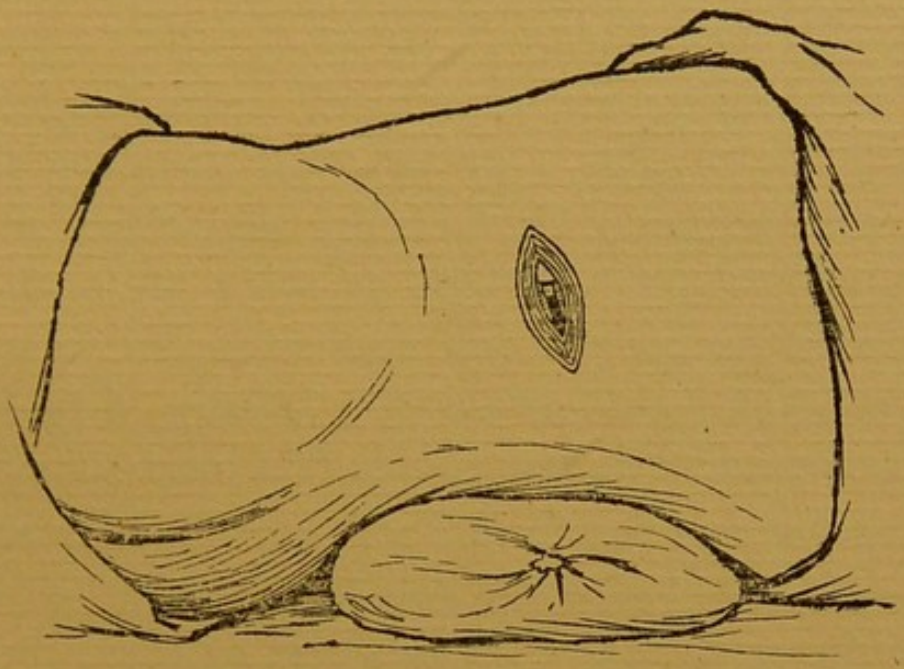

Fig. 2.

should be opened up with probe and forceps, when the kidney may be recognised, help being rendered by an assistant pushing up the organ in the direction of the operator. There is seldom much bleeding or even necessity for tying a vessel.

If the organ has to be further explored, as, for instance, for a possible stone, the kidney may be withdrawn through the wound for

more thorough examination with the finger. This, however, is not necessary where tension alone exists. Sufficient prominence for a limited incision through the capsule so as to relieve tension and secure drainage, or even to puncture the organ, as for reni-puncture, can be given by an assistant in the way already mentioned.

In incising the capsule of the kidney for relieving tension I prefer doing so along the convex border. Occasionally the incision may be indicated to one side or other of the free border, as congestions and extravasations of blood are not necessarily evenly disposed throughout. Punctures may be made almost anywhere where the engorgement seems greatest, but it is as well to avoid the pelvis of the organ, either in the case of these or of incision. I have frequently seen, on puncturing the capsule for the purpose of exploring, blood spurt out in jets, as if projected under considerable contractile pressure and eager to escape.

The desired object being effected, whether it is limited to the partial division of the tense capsule, or the more thorough exploration of the organ, as for stone, a drainage tube is carefully inserted so as to remain in contact with the kidney, and the wound is closed round the rubber outlet with silk

sutures (fig. 3). The incision is dressed with gauze antiseptically.

As drainage is an essential part of the process, and may be continued for some days, or even weeks, before the tube is removed, an ample supply of absorbent dressings should be used, and renewed as often as is necessary.

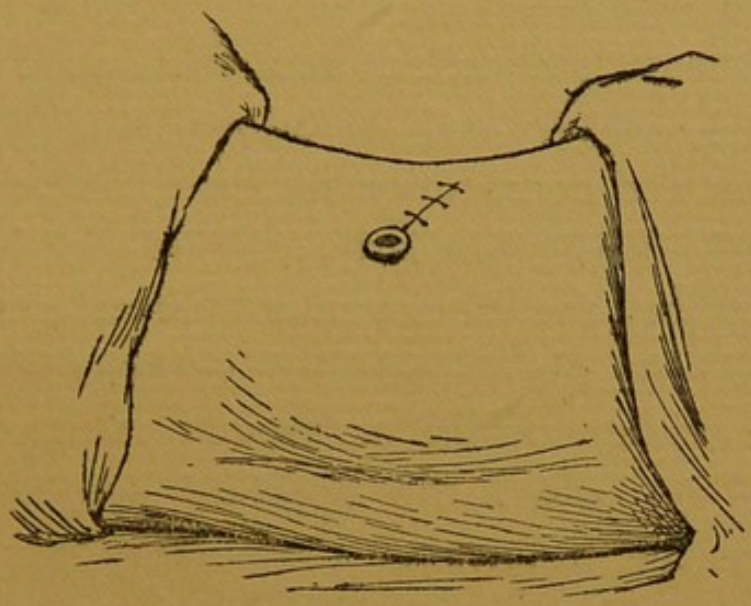

FIG. 3.

The drainage tube usually remains *in situ* from a week to ten days, but this entirely depends upon the nature and degree of the sanguineo-urinary discharge, which is sometimes profuse and continuous. On the removal of the drainage tube the wound usually heals rapidly. I have never seen a permanent urinary fistula follow this proceeding.

The question in a case of nephritis sometimes arises as to which organ should be

selected for exploration. Unless there is something to indicate it, such as the presence of pain, my experience would lead me to believe that this is not a matter of much importance. Both organs are usually involved in the inflammatory condition, though perhaps it may turn out not to the same degree. In double nephritis the relief of tension in one organ aids the other, and thus, as I have noticed on several occasions, the normal amount and constitution of the urine becomes re-established. Similarly, aid to an injured kidney by the removal of direct pressure caused by the accidental extravasation of blood, either within or around it, has been shown to assist the opposite one, and to restore the balance of the urinary excretion when this has been diminished or entirely suppressed.

In this statement I have endeavoured to give prominence to those points which seem most deserving of consideration, relying mainly upon direct testimony, than upon inferences drawn from lines of practice which can hardly be said to cover all varieties of this disordered condition.

Nor have I made any attempt to elaborate my argument at this stage, from such side-lights as chemistry, physics or physiology

might furnish, but have confined myself chiefly to that which is clinical. Propositions involving changes in well-worn pathologies and practices must be approached with deliberation, and no one is more conscious of this than myself.

"How far," to use the words of a recent writer, "the operation of incision of the kidney can prevent or relieve the effects of congestion, time alone can show, but the subject deserves the careful attention of all surgeons."[1] I think enough has been said to show this.

I thank you for your presence, and commend this subject to your candid consideration.

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[1] Annotations. *The Lancet*, June 15, 1901.

APPENDIX.

RENAL TENSION.

From *The Lancet*, October 24, 1896.

Albuminuria Treated by Reni-Puncture.

The subject of Mr. Reginald Harrison's Presidential Address to the Medical Society of London was a happy instance of the benefit which may be obtained from the careful consideration of unexpected results. Many times have surgeons cut down on the kidney in a patient with severe lumbar pain, albuminuria, and other renal symptoms, in the expectation of finding a renal calculus or some other gross lesion, and have been disappointed; yet when the wound has healed the symptoms of which the patient has complained have completely disappeared. The explanation that was usually given was that some constricting band had been divided or that the result was due to the effect of the operation on the mind of the patient; but there is much to be said in favour of the view put forward by Mr. Harrison, that the result, in some cases at least, is due to the relief of tension. That increased pressure in the renal veins will lead to albuminuria and to a diminished secretion of urine has long been known. The explanation is less certain, though numerous theories are not wanting; but whatever theory we may adopt to explain the presence of the albumen, or even if we consider none of those advanced to be satisfactory, yet we cannot doubt that the venous congestion does give rise somehow to the albuminuria, and in active hyperæmia of the kidney albuminuria is no less certain. In other parts of the body more accessible than the kidney we can diminish congestion, whether arterial or

venous in origin, by local blood-letting; so we have good *à priori* reasons for thinking that it is possible to relieve a congestion of the kidney by punctures or incisions, and if this were done it cannot be doubted that, at least in some cases, the albumen in the urine would disappear and the amount of urine excreted would increase. So many conditions that used to be considered wholly within the province of the physician have now come under surgical treatment that we can hardly be surprised at a further advance in the same direction, but no one anticipated that the aid of the surgeon would ever be invoked in acute nephritis and other allied pathological conditions. The matter is, of course, not yet one on which a decided opinion can be expressed, for the cases are too few; but the unsatisfactory results of the treatment ordinarily pursued in albuminuria and in suppression of urine from nephritis are amply sufficient to justify a method of procedure which promises so much.

From *The Lancet*, June 15, 1901.

Puncture of the Kidney for Nephritis.

The surgeon is ever invading the province of the physician, and so accustomed have we become to this that we hear without surprise of some new surgical method of treatment for a disease always hitherto assigned to the physician, but of all morbid conditions inflammation of such an organ as the kidney might have been thought the least likely to be subjected to the surgeon's knife. A few years ago Mr. Reginald Harrison, in his presidential address to the Medical Society of London, drew attention to the numerous cases which have been recorded in which a kidney has been cut down upon in expectation of some gross lesion being found, and nothing of any importance has been discovered, yet decided improvement in the symptoms has followed the operation. Mr. Harrison suggested that the improvement was due to the relief of tension.

This was a novel idea, but the results of the ordinary medicinal treatment of acute inflammations of the kidney are so unsatisfactory that we can only welcome any treatment which seems to offer a reasonable prospect of success. The subject is to be discussed at the Cheltenham meeting of the British Medical Association, the introductory paper being read by Mr. Harrison. We may hope to have the matter fully elucidated at that meeting. When we consider analogous cases we see how much damage may be done to delicate organs by mere increase of tension, and the damage is in a large degree proportionate to the tenseness of the capsule. In the eye a very slight increase of internal pressure suffices to damage irreparably its essential structure, and the name "renal glaucoma" has not inaptly been suggested for the truly analogous condition in the kidney. How far the operation of incision of the kidney can prevent or relieve the effects of congestion time alone can show, but the subject deserves the careful attention of all surgeons.

From *The Medical Press*, October 21, 1896.

The Relief of Visceral Tension by Surgical Means.

Many of the diseased conditions of the internal viscera which ultimately give rise to morbid symptoms indicative of organic change, are initiated by a more or less marked condition of vascular tension, and although this tension is rather the effect than the cause of already-existing disease, it probably paves the way to ultimate disorganisation and functional inadequacy. The early stages of cirrhosis of the liver and granular kidney often, if not always, begin with increased tension, which impedes the function of the particular organ, and ultimately determines structural changes characterised by hyperplasia of the connective tissue and consequent strangulation of the secretory structures. Mr. Reginald

Harrison has placed before the profession certain facts observed by him in performing operations on the kidney, which seem to point to albuminuria being in some cases directly due to vascular tension and amenable to surgical measures. In the admirable address with which he inaugurated the Session of the Medical Society of London last week, Mr. Harrison quoted a number of instances of patients who presented symptoms referable to the region of one or other kidney which were severe enough to warrant an exploratory exposure of the kidney in search of a calculus or a focus of suppuration. In these cases he was fain to admit that his diagnosis was at fault, but the error is hardly to be regretted, seeing that the result of incision or puncture of the congested kidney was to restore functional harmony, the albuminuria, pain, hæmaturia, &c., disappearing *pari passu* with the healing of the wound. The operation of cutting down on the kidney has of late years been rendered comparatively safe, so that, in presence of symptoms sufficiently severe to justify the slight risk entailed, no surgeon need hesitate to ascertain for himself whether the condition of the kidney is such as to warrant puncture or limited incision with this object in view. The cases related by Mr. Harrison do not enable us as yet to state with any degree of certainty in what class of cases surgical measures are likely to be attended by benefit to the patient; they merely prove that there are cases in which surgical intervention, undertaken on quite other grounds, has paved the way to immediate and usually permanent recovery. It can obviously only be in cases of nephritis tending to a rapidly fatal issue, or cases in which the condition of the patient steadily becomes worse, that such radical measures can be justifiable. We do not open the abdomen and scrape the peritoneum because in a few cases laparotomy done for concomitant conditions has determined the retrogression of peritoneal tuberculosis, and physicians may rest assured that cases of nephritis which they have hitherto regarded as peculiarly their own are not yet on the eve of falling wholly into the domain of surgery.

From *The Hospital*, October 17, 1896.

In his opening Presidential Address to the Medical Society on October 12, Mr. Reginald Harrison described a mode of treatment for certain forms of albuminuria which may not improbably take a prominent place in the means at our disposal for the relief of certain cases of kidney disease. The greatly increased safety with which exploration of the kidney can now be carried out has led not unnaturally to the performance of exploratory operations in some cases in which, speaking in the grosser sense, "nothing has been found," *i.e.*, no pus, no stone, no tumour. Nevertheless, in some such cases Mr. Harrison has found that, negative as the result of the operation had seemed at the time, its ultimate result has been good—albuminuria and pain, which had before been persistent, having ceased after its performance—and he has come to the conclusion that this good result is due to the relief of tension.

In this connection he points out the disastrous results of tension in other organs, referring to intraocular tension in glaucoma and to its relief by iridectomy and allied measures, and to the striking results which in many cases follow puncture of the testicle, as recommended by the late Mr. Henry Smith, in orchitis, cases in which not only is pain relieved, but ultimate damage to the structure is prevented. However capable of gradual distension the capsule of the kidney may be, there is no doubt that it is very intolerant of any sudden increase of intrarenal tension, and experience gained in operating on that organ teaches that in certain conditions of congestion the capsule of the kidney is so tightly stretched, and its substance exposed to such pressure, as quite to explain any interference with its function. The results of operation also tend to show the importance of increased tension, for sometimes after mere incision the quantity of urine excreted is found to have doubled within twenty-four hours.

The cases in which Mr. Reginald Harrison would

especially advise reni-puncture are those of acute congestion or inflammation, arising either from scarlet fever or chill, in which death seems imminent from suppression of urine, and others in which as time goes on the tendency does not seem to be towards recovery—albuminuria and casts persisting, and the functional efficiency of the kidney not being restored.

The operation itself need not be a serious one, the incision required being only moderate in extent, sufficient, that is, for digital exploration and for the making of three or four punctures, or a limited incision, according to the requirements of the case ; while the conditions for which he advises it are in the one case quickly fatal, and in the other very prone to end in serious damage, not only within the kidney but throughout the blood vascular system.

From *The New York Medical News*, March 23, 1901.

Surgical Prophylaxis of Nephritis.

We present in this issue of the *Medical News* a lengthy abstract of the address of Mr. Reginald Harrison (London) to the students of Cornell Medical College on "Retrospects and Prospects in Genito-Urinary Surgery." One feature of the prospect in the surgery of the urinary tract Mr. Harrison touched on but lightly, perhaps because its initiation was due to his own labours. It is the question of the significance of kidney tension in the production of albuminuria and even of suppression of urine, and the problem of operative relief for the condition.

Kidney diseases remain one of the therapeutic opprobria of scientific medicine. We have learned to diagnose the various forms of nephritis, but we are utterly unable to influence their course. Of late years we have come to realise more and more our helplessness in treating this class of patients, owing to the wear and tear of the strenuous life, and the greater addiction of men generally

to spirituous liquors and irritating concentrated foods has become far more frequent than it was. It is universally conceded now that the acute nephritis which frequently follows scarlet fever and other infectious diseases not rarely is the starting-point of the chronic nephritis which so often proves fatal in adult life. Even with the most careful prophylaxis, however, these acute nephritides develop in certain patients. At times they run so insidious a course as to be unsuspected. In others they produce very marked symptoms.

Mr. Harrison proposes to interfere surgically in some of these severe cases. He considers that the effort to eliminate toxins present in the circulation leads to overcongestion of the kidney. The irritating nature of the toxic substances in solution in the blood provokes additional congestion by interfering with the vasomotor apparatus of the kidney. The delicate secreting material of the kidney is surrounded by an absolutely unyielding fibrous capsule. In addition to this there are partitions of fibrous tissue extending down to the hilum of the organ that prevent compensatory dilatation of congested portions. The result of this continued congestion is permanent injury of the secreting mechanism of the kidney. This state of overcongestion is not merely imaginary nor theoretical. After death from scarlatinal nephritis it is usual on autopsy to find the kidney intensely congested, the capsule tense and stretched, the whole organ of a shining dark colour and overfilled with blood.

The clinical feature of these cases is the suppression of urine that leads to the fatal termination. Oliguria gradually progresses to absolute anuria, and then so-called uræmia develops. This urinary suppression Mr. Harrison attributes to what he calls renal glaucoma, that is, to a state of intrarenal pressure that inhibits function by interfering with the normal action and nutrition of delicate cellular tissues. The analogous condition in the eye from intraocular tension is well known, its sad results are now recognised, and surgical

measures for its relief are considered the only justifiable treatment. Mr. Harrison's suggestive name has been well chosen, and he proposes to relieve the corresponding condition in the kidney by an incision that will relieve the intrarenal pressure.

He has had experience himself in several cases. In the first case it was expected that suppuration would be found in or around the kidney. The patient had had scarlet fever some three weeks before, and scanty albuminous urine with great lumbar pain were the permanent symptoms. When the kidney was opened a gush of blood relieved the pressure. The pain ceased at once. The urine gradually became more plentiful and the albumen disappeared. Until the improvement of symptoms took place it was thought that under mistaken diagnosis a needless operation had been done. Mr. Harrison has had some experience also in cases of persistent chronic congestion in which disorganisation of the intricate secreting mechanism of the kidney was prevented by incision. Subsequent drainage prevented the recurrence of the congestion until the vasomotor mechanism of the kidney regained its control.

Mr. Harrison suggested, in an article in the *Lancet* some time ago, that "the operation should be reserved for cases in which there is evidence that the recuperative power of the kidneys suffering from nephritis is overweighted. When after an attack of this kind the albumen is not disappearing from the urine and there is a prospect, unless some relief is found, of permanently damaged kidneys resulting, then a trial of this expedient (exploration through a small transverse lumbar incision with division of the kidney capsule where deemed advisable) may be undertaken without adding to the gravity of the circumstances." As these cases are absolutely unamenable to medical treatment, and as, even when an immediate fatal termination does not follow, subsequent chronic nephritis is not unusual, Mr. Harrison's suggestion may prove of great value in hitherto discouraging and almost hopeless conditions.

The subject is well worthy of the most careful study, and would seem to justify surgical boldness that may lead to precious results in a field where present-day medicine feels itself almost more than anywhere else at a loss.

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