

Further observations on the treatment of stone in the bladder / by Reginald Harrison.

Contributors

Harrison, Reginald, 1837-1908.
Royal College of Surgeons of England

Publication/Creation

London : Bailliere, Tindall & Cox, 1885.

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FURTHER OBSERVATIONS
ON
THE TREATMENT
OF
Stone in the Bladder.

By REGINALD HARRISON, F.R.C.S.,
OF LIVERPOOL,
SURGEON TO THE LIVERPOOL ROYAL INFIRMARY.



REPRINTED FROM THE ANNALS OF SURGERY, JUNE, 1885.

LONDON:
ANNALS OF SURGERY. BAILLIERE, TINDALL & COX, PUBLISHERS.
1885.

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ANNALS OF SURGERY.

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PRESENTED
by the
AUTHOR.

FURTHER OBSERVATIONS ON THE TREATMENT OF STONE IN THE BLADDER.

By REGINALD HARRISON, F.R.C.S.,

OF LIVERPOOL.

SURGEON TO THE LIVERPOOL ROYAL INFIRMARY.

IN May, 1882, I read a paper at the Liverpool Medical Institution, entitled Observations based upon sixty operations for stone in the bladder in children and adults, including lithotomy and lithotripsy;¹ these remarks were subsequently published in an extended form.²

During the time which has elapsed since the former communication was made, my personal experience of these two operations in public and private practice has been considerably extended, and the occasion is again presented to me for taking a retrospective view of this portion of my work. In thus referring to my experience of these two operations, it is merely with the object of affording some evidence to those who have had no opportunity of witnessing my practice and judging for themselves, that the basis on which certain conclusions are drawn is fairly ample for the purpose.

The diagnosis of stone in the bladder. This, in ordinary cases, is neither difficult nor doubtful; the presence of a stone in a normally shaped bladder, is readily demonstrable by the sound, both to the touch and the ear. Where the bladder has lost its shape, either by the encroachment of the prostate or by the development of saccules, the detection of a small cal-

¹ *Liverpool Med. Chir. Journal*, July, 1882.

² *Lithotomy, Lithotripsy and the Early Detection of Stone, with a Description of a New Method of Tapping the Bladder*; Churchill, London, 1883.

culus is often attended with considerable difficulty, or may be doubtful. In the publication I have already referred to, I drew attention to instances of ill-shaped bladders, having recesses where a stone might lodge, which recesses were practically inaccessible to the sound. The thorough exploration of such bladders, where the prostate is large, is a process which is sometimes not only exceedingly painful, but is followed by consequences of a most disastrous kind. I have seen more than one person die within a week with sudden suppression of urine, after searching explorations of the bladder for a stone that did not exist. Where the stone cannot be readily reached with the sound, means are to be taken to bring the stone, should one be present, in contact with the sound. This may be readily done by a device which I first adopted systematically after reading a paper by Dr. Treyer,¹ where it is remarked, "a most careful search was made by means of sounds of various kinds, but no calculus could be detected till the aspirator was employed, when a distinct click was felt during exhaustion of the water from the bladder, and due to the calculus being carried with force against the eye of the canula by the outward stream. The sound of the fragments clicking against the eye of the canula during the evacuation of the fragments of a calculus, in the operation of litholapaxy, suggested this mode of diagnosis, and I am now in the habit of having recourse to it when the symptoms of stone are well marked, and the sound fails to detect the presence of one in the bladder." In cases where stone is suspected, but cannot be readily detected on the introduction of a sound, by reason of some alteration in the shape of the bladder, I at once substitute what I shall speak of as the aspirator catheter-sound. I have, by this instrument, been enabled in at least a dozen instances, not only to detect the stone without distressing the patient, but at once to remove it.

The apparatus I use for this purpose is Morgan's² aspirator. I have a junction pipe fitted with a stop-cock, between the aspirator and catheter-tube, which facilitates the process of injecting water into the bladder, and enables the surgeon to

¹ *Indian Medical Gazette*, March, 1884.

² *The Lancet*, September 2, 1882.

conduct the examination without wetting the patient or the bed.

In a recent case of irritable bladder with cystitis, which I saw in consultation with Mr. Richard Williams, where we had reason to suspect stone in the bladder, the process was adopted and may well serve as an illustration. We first carefully examined the bladder under ether, with a sound, but failed to detect a stone in consequence of the great irregularity in the shape of the inferior portion of the viscus. The aspirator catheter was substituted for the sound, when calculi were at once felt clicking against the eye of the instrument. In this way, not only was the presence of stone demonstrated, but these were readily removed when we were able to declare that the viscus was free. By this simple process the operation of sounding has been rendered more certain, and freer from those consequences which are sometimes inseparable from the more usual method when required in the case of abnormally shaped bladders.

Stationary Calculi. In the next place, I will refer to what I am in the habit of speaking of as stationary or motionless stones. Amongst the cases treated by lithotomy or lithotripsy I can recognize some where the stone had previously been motionless in the bladder.

This term includes those well-known instances where the calculus has been encysted, either as a consequence of a pre-existing sacculated condition of the bladder or prostate. I am not referring particularly to these, but to others where the stone becomes, as it were, moulded into some inequality of the bladder surface. I have had opportunities of studying instances of this kind, both in the operating theatre and the post-mortem room, and shall refer to certain structural effects observed in the bladder-walls, as well as to some results which sometimes follow the removal of these stones. It seems to me that the formation of certain stones within the bladder is closely analogous with the deposition of concretions in other parts of the body in connection with structural alterations in shape and relations. Take for example the formation of tartar about the inequalities and crevices of the teeth. There can hardly be a doubt that the deposition of phosphate of

lime under these circumstances is in the first instance for the purpose of removing depressions which would be inconvenient, if not to some extent detrimental. So long as this deposition is not in excess, nothing is complained of, but a time comes when, by the amount of the deposit, or by its actual pressure on adjacent parts, it becomes inconvenient, and either falls away accidentally or is artificially removed. So with some instances of stone in the bladder which are disconnected with any renal symptoms, and seem to serve the purpose of leveling up inequalities which a growing prostate has in the first instance created.

Nor does the analogy I have taken entirely cease at this point, for we are conscious of the friction and inconvenience the sudden loss of teeth-tartar causes until the process of smoothing down and filling up is again repeated. So in the removal of a motionless stone from the bladder by lithotrity, it sometimes happens that the first development of bladder symptoms of irritation and distress are coincident with the discovery and removal of these bodies.

Passing on in connection with this subject to pathological and clinical facts, I would, in the next place, point out the structural effects on the bladder walls caused by a motionless stone. These may be defined as consisting in the complete structural deterioration of the bladder in immediate relation with the stone. This was particularly well shown in one instance, where it seemed impossible, under any circumstances, to imagine that the part of the bladder wall upon which the stone pressed could ever again recover its structure or function. The clinical features of motionless calculi are exemplified in those instances where the stone has grown until either by accident or design it has become displaced or has outgrown the limits of comparative comfort.

A few months ago a gentleman consulted me for distressing symptoms of bladder irritability which had suddenly followed a fall from a horse. I cracked and removed a small stone which must have been stationary prior to the fall.

More recently, I examined with a sound, a gentleman who, I had no reason to suspect, had a stone, other than the fact that he had occasionally a little hæmaturia after much exer-

cise—as a rule, the urine was absolutely clear—the patient enjoyed excellent health. The detection of a stone with the sound, and its displacement, was followed by an acute cystitis, which was only diminished by the removal of the stone by lithotrity. For long after the operation, that portion of the bladder-wall which had become deadened and atrophied by constant contact with the stone, furnished an area which, by its inability to discharge its expulsive function, was a source of constant annoyance which could only be alleviated by regular catheterism and ablutions.

The study of the recorded instances of lithotrity shows examples where the removal of a stone gave little or no relief. In one instance the continuance of these symptoms after the removal of the stone by crushing by an experienced surgeon, led to the suggestion that it was possible a portion of stone had been left behind and was impacted somewhere. I performed cystotomy, but nothing was discovered to account for the symptoms beyond what was believed to be due to the altered condition of the bladder walls, both in shape and structure.

The popular notion that a stone in a bladder is something like a die in a dice-box, no doubt applies to a considerable number of cases; in these the symptoms are usually well marked, and whatever operation is selected is followed by satisfactory results. In the cases referred to of motionless stones, where, by reason of the atrophy the bladder walls have undergone, complete relief after lithotrity is never entirely obtained, the question naturally forces itself upon us whether with our improved means of draining the bladder, a lithotomy is not the better operation, when the bladder is then rendered incapable of emptying itself by its own unaided efforts.

The results of modern lithotrity, as a whole, are so strikingly beneficial and satisfactory in cases where this operation is distinctly indicated, that we are apt to overlook those instances I have referred to and have endeavored to explain, where, though life is preserved, yet the relief is not as complete as we could desire. It is only by a careful scrutiny of a number of cases, and the results obtained by lithotomy, that we are enabled to discover shortcomings in the proceeding

relatively to individual cases, which are not explainable by the mere removal of the stone from the bladder, however skillfully it is effected. From such imperfections no series of lithotrity operations, indiscriminately recorded, is altogether free.

Some years ago, a patient who was well known to many of my dressers and two or three of my house surgeons, from the fact that I used often to send for him when I wanted to demonstrate and to teach the operation of lithotrity, by reason of the tolerable certainty with which I could depend on finding a small but well-formed phosphate stone in his bladder. His history was that he had a large prostate, and was not particularly careful in keeping his bladder clean. After I crushed a stone for him, he did not get a complete relief for some little time; then he enjoyed a period of comfort, followed again by signs of irritability. Then again the same process was repeated. His bladder was a very shapeless affair, the irregularities of which were constantly being filled up with a sort of phosphate mortar, which up to a certain point seemed to give him at least a temporary relief. I might mention other instances of this kind of stone formation. We can further study it with advantage in the coating process of hard calculi and foreign bodies when dropped or introduced into the bladder. Again, these resting places for urine or for calculi in an ill-shaped bladder serve to explain certain phenomena frequently observed in persons with large prostates, which are not always at once obvious. We all know how liable such persons are to recurring attacks of cystitis, and though these symptoms are for the most part traceable to cold and to errors in diet, the purely mechanical manner in which the local inflammation is produced, is sometimes not fully appreciated. So long as healthy urine traverses the pouched bladder, no harm follows its temporary lodgment, as the constant mixture of recent secretion with that which may have been retained for some time, prevents the product becoming injurious. But let urine, charged with lithates, as in febrile attacks, or with uric acid, as in gout-storms, remain in these recesses of the bladder even for a comparatively short period, irritation is created, mucus is thrown out in excess, and all the factors are pro-

vided for the production of urine-decomposition, and co-incident with this a corresponding degree of cystitis.

An enquiry into the causation of stone as effecting the urinary passages, indicates at least two conditions under which these concretions are formed: (1) by altered relations of the urinary fluids, which are capable of being determined by general causes, and (2) by structural changes which favour a stagnation of the urinary fluids and the precipitation and decomposition of their respective constituents.

The shape of many urinary calculi, before they have been cased with phosphates, seem to indicate the frequency with which they have been roughly cast in the depressions and crevices of a bladder, distorted by the encroachment of the prostate.

Cases will be found recorded where symptoms of stone have shown themselves with much severity after the body has been subjected to a severe shock, as leaping from a carriage in motion. It has been noticed in some instances of this kind that the stones, after removal, presented indications of their recent fracture, and this theory, it is supposed, served to explain the suddenness and severity of the symptoms produced. In one case which came under my observation, two angular stones were removed by me by lithotomy, and it was suggested that they had been subjected to a fracture, and hence the acuteness of the symptoms produced. I feel sure, however, that this was not the case; they had been cast in an ill-shaped bladder, and the accidental disturbance of one by a sudden shock applied to the body, was followed by the escape of the other into the general cavity of the bladder, just as the displacement of one brick in a wall causes its neighbour to become loose, and ultimately to fall away.

Pouching of the bladder.—Changes in the shape of the bladder, for the most part due to excess in growth of the prostate, preventing the complete discharge of the urine spontaneously, have an important relation to stone and its treatment. In the first place, as I have endeavoured to show, they are a frequent cause of stone; secondly, they explain the concealment of calculi, and lastly, by the changes a motionless calculus is capable of effecting in the bladder-wall in contact with it, is

explained the imperfect relief that sometimes follows its removal by lithotripsy, as well as the recurrence of the disorder.

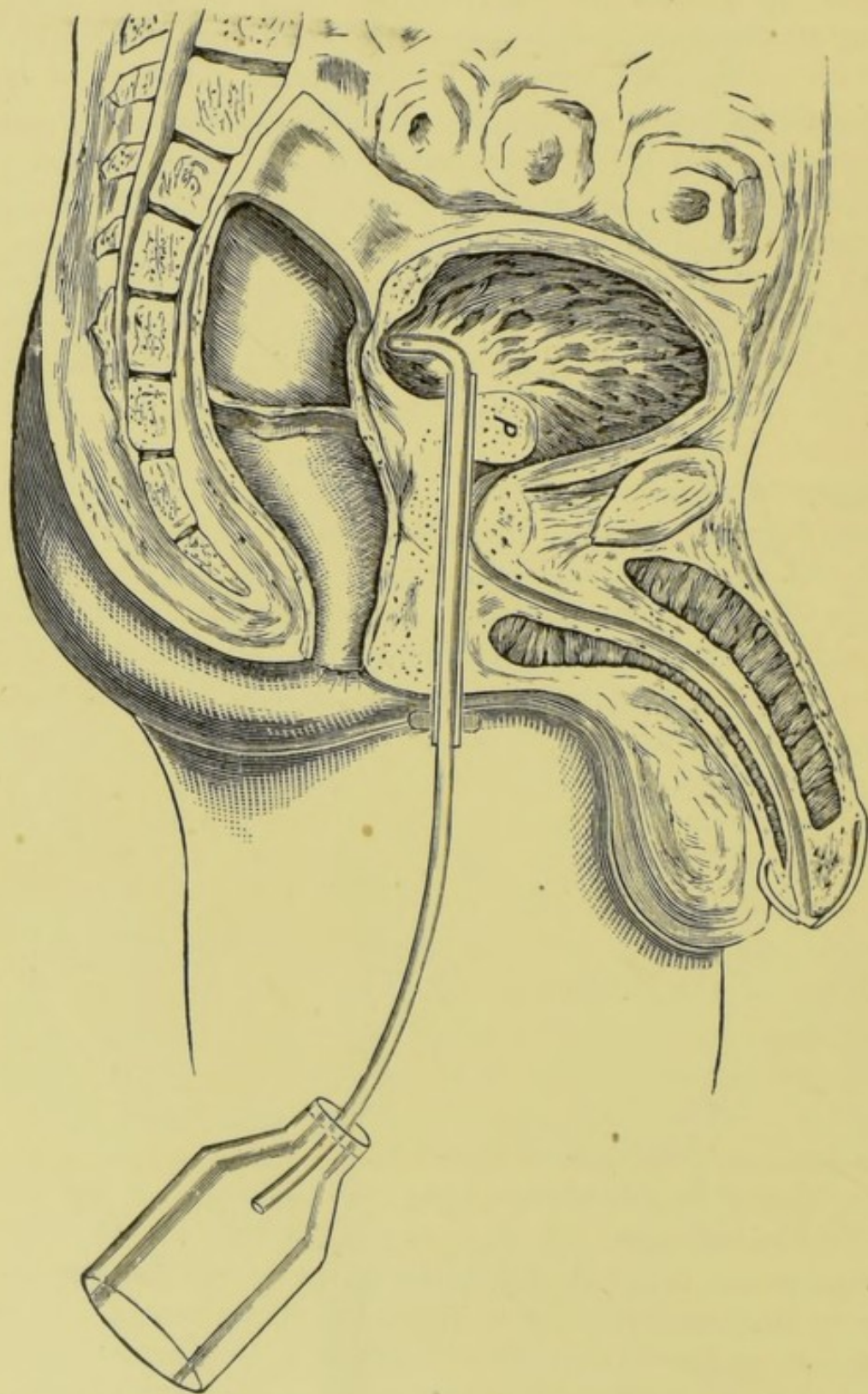


FIG. I. BLADDER, WITH DOUBLE DRAINAGE TUBES.

I have also endeavoured to point out how, under such circum-

stances, it may be necessary, either after a trial of lithotrity, or even without it, to proceed to lithotomy, not only for the purpose of draining such recesses in the bladder, but of removing them.

There are many instances of chronic cystitis connected with stone, and following upon alterations in the form of the viscus, due to old standing stricture and obstruction, where it would be desirable if we were merely to regard the bladder in the light of an abscess cavity which was most imperfectly drained by an abnormal urethra. The recognition of such a view of this position has often been the means of saving life under apparently desperate circumstances, and would, I am sure, contribute still further toward this end, if we were to hesitate less in adopting the course indicated. The principle is a well tried one in surgical practice, where a suppurating cavity has to be dealt with. I have recently described in detail the application of these principles to the bladder, together with such appliances as I have found best adapted to the special object before us.¹

The following case will illustrate many points in connection with these remarks :

A gentleman, aged 59, came to me from Scotland in October, 1883, with the following history : In 1880 a stone was removed from his bladder by lithotomy by the late Professor Pirrie, of Aberdeen. A month previously an attempt had been made by the same distinguished surgeon to remove it by lithotrity, but without success. For six months afterwards he was relieved, when his symptoms returned, which Dr. Pirrie considered was due to an enlarging prostate. In 1882 he was again operated on by another surgeon in Scotland, but nothing was discovered. A week after this operation it was noticed that there was a communication between the bladder and bowel, and ever since this a portion of the urine passes into the bowel. His bladder symptoms were not relieved by the second operation.

He now complains of a great uneasiness after making water, continued irritability, and pain at the end of the penis ; he is unable to sit on an ordinary chair, and is only comfortable when reclining with his knees apart, supported by pillows. He micturates about every hour, both by day and night, passing each time a small quantity of offensive

¹ *The Lancet*, November 8, 1884.

urine. When he has an action of the bowels his urine is usually mixed with blood. Before the first operation his weight was 14 stone; it is now 10 stone. The journey to Liverpool was accomplished with much difficulty and pain.

On examination I found that the bladder contained over three ounces of offensive residual urine. The prostate was large and nodular, and in front of it there was a communication between the membranous urethra and the bowel behind. He takes five grains of morphia every twenty-four hours. He cannot pass a motion with comfort except by reclining on his side over a bed-pan. I sounded him, and above a large prostate found a calculus which seemed tolerably stationary. The conclusion I came to was that he was suffering from his prostate, which had led to pouching of the bladder and the formation of calculi; this I determined to attempt to remedy by operation, the patient expressing the hope that I should be able to remove his prostate, which he believed was the cause of all his troubles.

On November 5th, the patient was placed under ether by Mr. A. Barron, and I had the valuable assistance of Mr. Mitchell Banks in carrying out the plan of procedure I had determined upon, which mainly consisted in endeavouring to permanently improve the condition of the prostatic urethra, which clearly was responsible for the other symptoms described.

Having opened the prostatic urethra by the usual incision for lateral lithotomy, so as to permit the entrance of my finger into this portion of the canal, I freely divided its floor, including almost the whole thickness of this part of the prostate, upon the staff well carried into the bladder. This enabled me to have access by means of the section to either side of the gland. I then endeavored, with the assistance of volsella, to draw the prostate towards me, with the view of enucleating it, or pulling away some portion of it with my finger; this I was not successful in doing, except to a very limited extent. The gland seemed very indurated, and I was not able to find any portion of it that was loose or pediculated, or any part that could be included in a noose or compassed within a large tonsil guillotine. I thus had to content myself with the free incision through the floor of the gland, which I had made partly with my knife and partly with the instruments I had employed for attempting enucleation. Through this opening I readily introduced a pair of lithotomy forceps, and extracted three phosph-uric calculi of moderate size, which clearly, from their shape, had not been moving about much within the interior of the bladder. I then passed in through the wound a gum-elastic lithotomy tube about as thick as my thumb and eight inches long, by means of

which the prostatic incision was to be kept open and the bladder drained. The operation was followed by some rather free oozing of blood, which was controlled by temporary pressure with lint round the tube. The treatment consisted in keeping in the tube, and seeing that the bladder was thoroughly drained by the double tube, as shown in the drawing (Fig. 1).¹ The immediate effect of this treatment was that the constant pressure of the large tube on the prostate produced a marked effect in reducing the size of the enlarged gland, for it is noted, November 27, that it is now found that a shorter tube is more comfortable and drains better; consequently, from this date the tube is reduced by cutting off lengths from time to time of about half an inch. The urine about this period was also noted to drop from the tube with an acid re-action.

December 12. Withdrew the tube temporarily, and passed a No. 12 bougie (English) along the whole length of the urethra; this was repeated daily until the 17th inst., when the bladder-tube was finally withdrawn, catheterism and the retention of a catheter for a few hours daily being substituted. By this means the continuity of the urethra was established. The lithotomy tube had been retained for six weeks after the operation, by which time it was concluded, from the ease with which the ordinary catheter passed, that the cleft in the prostate had been permanently established. Of course new tubes were substituted when ever the gum elastic became worn or rough by constant contact with the urine. I would mention here that for a similar purpose I have tried specially made silver and vulcanite bladder-tubes, but I prefer the gum-elastic.

On December 31, the patient returned home. His recovery was complete, except the atonic condition of the bladder, which had been too long standing. His present condition is best described in his own words: "I am quite a new man, have no pain of any kind; can walk and sit like other men, and travel anywhere. I am still obliged to make water through a catheter, but I can do so without pain or trouble. I make water with the catheter as quickly as I could do in the ordinary way. I have increased from ten to thirteen stone in weight, and attend my works every day."

The chief point of interest in this case was the recognition that physical changes in the shape of the bladder were alone responsible for all that followed, and that no method of treatment which failed to deal directly with the change would be at all likely to give satisfactory results. Nor must the course

¹ *Vide* page 8.

that was pursued in this case be regarded as exceptional and difficult to accomplish; other illustrations, if necessary, and space allowed, could be added. Further, the treatment of the enlarged prostate by direct interference has previously to these instances been approached by me in different ways, and led to the adoption of the practice I have just referred to. I would ask permission to remind your readers of the communications I have made from time to time directly bearing upon this point. In 1881, I published some remarks to show the advantages of mechanical treatment in the prevention of prostatic obstruction to micturition.¹ The extended adoption of this practice has furnished results which have been highly satisfactory. Unfortunately, I have not yet been able to prepare a second edition of the pamphlet, which was out of print a few months after it was issued.

In 1881, I recorded in the *Transactions of the Royal Medical and Chirurgical Society*, of London (Vol. LXV.), a case where a tumor of the prostate was successfully enucleated, with remarks on the removal of such growths. This patient, as well as another, who was similarly operated upon by my colleague, Mr. Bickersteth, are both perfectly well up to this date, and have had no recurrence of stone or of difficulty in micturition.

In 1884, at the International Medical Congress at Copenhagen, I read a paper entitled the treatment of certain cases of prostatic obstruction by a section of the gland, based upon a series of cases where I had then operated with good results. These cases show not only how the form of the bladder may be permanently improved by thorough drainage, but that atrophy of the enlarged prostate can be artificially produced.

Lastly, as indirectly bearing upon the subject, I would mention two other cases under my own observation, where the prostate was submitted to operation—first, a case where the bladder was tapped and drained (the canula being retained for some weeks) through the perinæum² and hypertrophied prostate. This person, though now approaching ninety years of age, is alive and well, and is known to have undergone atrophy of his prostate.

¹ The Prevention of Stricture and Prostatic Obstruction; Churchill: London, 1881.

² *British Medical Journal*, December 24, 1881; April 8, 1882.

Secondly, a case where a carcinomatous prostate was removed through a central perineal incision.¹

I venture to submit that this series of cases has an important bearing on the management of the prostate when enlarged and associated with either primary or secondary stone in the bladder.

Large stones and their removal.—Owing to improved means of diagnosis, and to the fact that a good surgeon may now be found wherever civilization has advanced, instances of very large calculi are comparatively rare. That stones grow by retention within the body, and when small, may be painlessly and safely removed, are truisms which cannot be too generally known or acted upon. In my own series I have only met with three examples where the stones were between four and six ounces in weight. As to the safest method of removing calculi of these and larger dimensions, I entertain but little doubt.

Lithotrity under these circumstances, as a rule, is certainly out of the question, though in the case of soft phosphatic stones, considerable masses may, in this way, be removed. A large stone may, and frequently has, a very soft outside, but proves very hard after the outer layer has been peeled off. I have seen more than one lithotrity abandoned for this reason. With the exception of some phosphatic calculi, lithotomy, I believe, still remains alone applicable to the largest varieties of hard urinary calculi.

As to the precise method of cutting, lateral lithotomy, with some modifications, has shown itself equal to dealing with stones; at all events up to nearly nine ounces in weight,² and is to be advised. Some extremely large calculi have been successfully removed by the lateral method, by surgeons practising in India and the East, where large stones are not uncommon, in consequence of the procrastinating habits of the natives. My friend, Dr. Machie, of Alexandria, gave me numerous illustrations of this from his own practice in lithotomy, which have been very successful.

¹ *The Lancet*, September 20, 1884.

² Dr. Underhill: *The Lancet*, Vol. II., 1882; Mr. Spanton: *British Medical Journal*, January 31, 1885.

In formulating rules for our guidance in the case of large stones, which, until their removal has been accomplished, we can only roughly estimate by size, and not by weight, it will be observed that the difficulties connected with their extraction by the lateral method arise either (1) from obstacles presented by the soft parts, or (2) from the bony pubic arch. On seizing a large stone with the forceps, after the bladder has been opened by the lateral incision, it is not difficult to determine which of these two obstacles we have really to deal with. If, as is usually the case, it is the soft parts, there are several additions to the ordinary incision which will safely provide more room. Of these, I may particularly mention two, viz: (1) A bilateral section of the prostate, without any corresponding division of the external skin or textures composing the perinæum. This has so far sufficed in the instances where I have practised it. And (2) a bilateral section of the prostate, including the corresponding thickness of the perinæum covering it. This, of course, forms a triangular wedge or cone, having its apex towards the pubes and its base to the rectum. I have not had occasion to do this, so I will quote from a case recently recorded by Mr. Spanton, where he successfully removed a stone consisting of phosphates and uric acid, and weighing eight and a half ounces:

"The operation was commenced with the usual lateral incision for lithotomy. The forceps being introduced, the stone was grasped, but the incision was found to be too small to allow extraction. The incision was then enlarged to the greatest possible extent, and the stone was again grasped, but without success. Another incision was then made on the right side, converting the previous incision into a bi-lateral one, but as this did not admit of the extraction of the stone in its entirety, a pair of bone forceps was introduced into the bladder, the stone cleft, and the pieces severally removed. *Subsequent treatment:* The triangular flap was first supported and held in position by a pad in the perinæum, with a T bandage, and subsequently by one silver wire suture. The operation was performed on November 22, and the wound was entirely healed on January 14th."¹

¹ *British Medical Journal*, January 31, 1885.

When, however, the difficulty of extraction is occasioned by a normal, or by an abnormally contracted pubic arch, the line of proceeding will obviously be different. If by ordinary extracting forceps, or even by cutting forceps, carefully introduced, as in Mr. Spanton's case, it is found impossible to break up the stone, all further attempts at breakage had better be abandoned, and we should at once proceed to open the bladder above the pubes.

It may be urged, if it is known beforehand, as it should be, that the stone is unusually large, why not proceed with epicystotomy in the first instance? There are two answers I would give to this proposal. First, you do not know for certain what you can extract by a lateral lithotomy, with its modifications, until you have tried. I have known more than one instance where an epicystotomy was almost decided upon, but where the stone came out through the perinæum. Secondly, if extraction by a lateral lithotomy has to be abandoned, by reason of the impossibility of getting the stone through this way without jeopardy, you are in no worse position, and your patient is in a better one relatively to the circumstances of his case, if the alternative operation has to be then proceeded with. Frère Côme, whose high operation for stone was so successful, was in the habit, before performing epicystotomy, of opening the urethra in the perinæum. Nor are instances wanting in more modern practice: cases by Billroth, Patterson of Glasgow, Howe of New York, and others, with substantially the position that is here urged.

An epicystotomy, unless, as it were, you turn your patient upside down, by making him lie on his belly for a couple of months after the operation, means opening the bladder without providing a convenient exit for the urine until the process of healing is almost accomplished. Nothing I have yet seen in connection with the operation of epicystotomy, except in females, where the conditions are very different, would induce me in the case of vesical stone, to resort to it without previously verifying the necessity by a lateral perineal incision. The latter need only amount to a digital exploration of the bladder and the stone it contains, and if abandoned at the last moment, it will be found to contribute in no small measure to

the success of what has been known for centuries as the high operation for stone.

irritability / *Irritability*.—In the two following instances, death followed the operation which was selected. In both, the issue from the first seemed unavoidable; both had their lessons to teach, lessons which have already proved useful to myself, and may not be unacceptable to others:

J. W., æt. 64, came under my notice in consultation with Dr. Hugh Williams, during 1883, for irritability of the bladder and recurring attacks of cystitis. He was sounded on several occasions, but no stone could be felt. In consequence of the continuance of his symptoms, he came into the Infirmary. His prostate was large, and I had reason to believe that something might be concealed behind it. What I determined to do was to make a section of his gland, as I have already described.

On January 5, 1884, he was placed under ether, which permitted the sound to be used with more freedom than previously; this led to the detection of a stone in the position that was suspected. Lateral lithotomy was performed, and a section made of the floor of the prostatic urethra, and three triangular stones, which lay concealed and wedged in above the prostate were removed. The double tube was introduced. This patient was an unfortunate subject for any operation, as he became much depressed about his business affairs, and the possibility of the loss of his situation. Though his kidneys were not the soundest, he never had a bad symptom, yet he failed to make progress in repair beyond a certain point, and died five weeks after the operation. I could not obtain a post-mortem examination.

This case not only served to substantiate the views I have stated in reference to motionless calculi and their effects on the water of the bladder, but to illustrate that the accepted method of sounding or investigating the condition of the interior of the bladder, was not as perfect as could be desired. Had I then been provided with the aspirator catheter-sound, these stones would have been detected earlier and removed,—possibly without resorting to lithotomy.

The second fatal case was that of a feeble, anæmic looking man, who was sent to me by Dr. E. Riding. He had the appearance of being completely worn out, and was consequently not a favourable subject to attempt to relieve by operation. Examination by the sound indicated the presence of a large oxalate stone, which I decided to remove by lithotomy, which I did on July 25, 1884.

The operation was followed, shortly after the patient was removed to

bed, by a sharp attack of hæmorrhage, to suppress which, Brown's tampon was effectually used. In spite of every care, a tendency to bed sores showed themselves from the first; the patient also became slightly delirious. On the night of the 29th he was greatly alarmed by the conduct of a semi-delirious patient in the same ward, which shocked him much, and he died unexpectedly on the 30th, five days after the operation. A post-mortem examination showed nothing wrong in the wound, or anything to account for the bleeding. The kidneys were sound. The hæmorrhage, I believe, just turned the scale, which was very fairly balanced, against the patient, and determined the issue.

The treatment of immediate and secondary hæmorrhage in cases of lithotomy, prostatotomy and cystotomy, has given me much consideration, as in a large experience of these operations, instances of these complications have from time to time arisen. When an artery has been divided, and is evidently spouting, it must be tied; this can generally be done with the aid of retractors without much difficulty; to plug a spouting vessel, if it is possible to avoid it, is to court the recurrence of a bleeding. More usually I have noticed, as in section of the prostate and adjacent parts, this bleeding is of a freely oozing nature, as if from spongy textures, but in this way many ounces of blood may be quickly lost. I have invariably noticed in the cases referred to, when the bleeding has been of this oozing nature, how easy it is to control it with the point of the finger introduced and well carried into the bottom of the wound, sometimes even by the finger in the rectum. For the finger in the wound I now (since the fatal case just recorded) substitute a lithotomy tube of a size which precisely fits the wound-cut in the bladder that has been made. The drawing, Fig. 2, represents the exact size of one of the tubes I employ. I have them made of different calibres, so that they may fit with tolerable accuracy. They are tied into the bladder by the usual perineal band, and drainage through them is carried on by the inner rubber tube (marked B), which can be changed at will, and by which the bladder is washed out and the urine carried into a vessel by the patient's bed side.

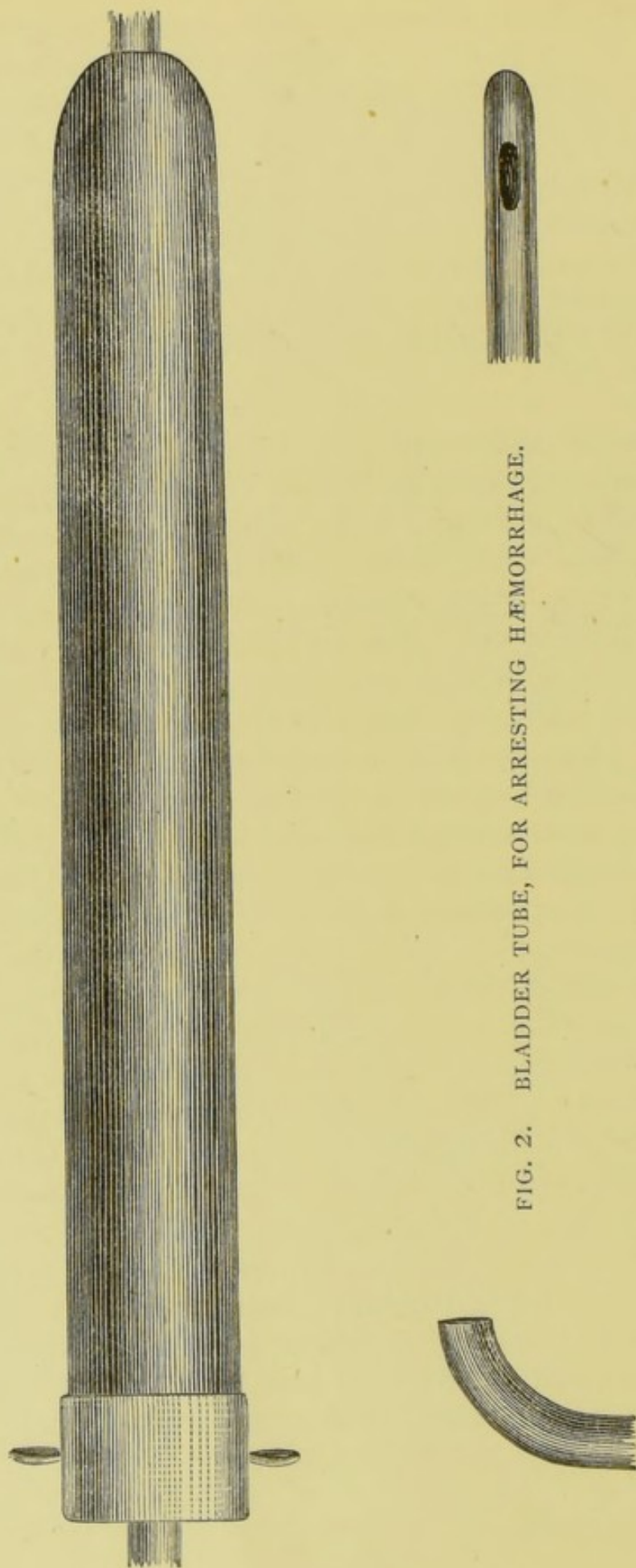


FIG. 2. BLADDER TUBE, FOR ARRESTING HÆMORRHAGE.

These tubes have now been tried on several occasions, with entire success. If I am at all doubtful about bleeding, I introduce one of them, and retain it for twenty-four hours or so, according to circumstances. Since I have used them, I have had no fear or trouble in dealing with primary or secondary hæmorrhage, either in lithotomy or in some of the deep sections of the prostate or prostatic bars I have made. It has, in fact, proved a most reliable plan of exercising digital compression on bleeding vessels, which cannot be tied, and where styptics of all kinds are undesirable. These tubes can be readily removed; thus the wound is kept clean and free from the collection of septic influences. Though the size of these tubes may be taken as representing considerable openings into the bladder, I do not think exception can be taken to them on these grounds. When the proper time arrives for closing a bladder, which, in its construction, provides cause for the production of stone, for the maintenance of cystitis, and the symptoms that one or other of these, conjointly or independently, produce; when urine escapes from the open bladder with an acid, and not a foetid alkaline reaction, then it will be found that a large opening heals quite as quickly, and much more soundly relatively to the parts above it, than a small one.

