On lithotomy as performed with a rectangular staff / by Andrew Buchanan, M.D.

ON LITHOTOMY

AS PERFORMED

WITH A RECTANGULAR STAFF.

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ON LITHOTOMY.

I INTEND to submit to the Society the results of some attempts in which I have been engaged, during the last eighteen months, as opportunity offered, to modify the operation of lithotomy, so as to render it, if possible, more simple and easy of performance to the surgeon, and, to the patient, less painful and less dangerous in its immediate and subsequent consequences. I am induced to do this, in the first place, because I think the results in themselves not unimportant: and, in the second place, because the modifications which I recommend having been, on several occasions, tried on patients in the Infirmary of this city, have thus become fair subjects of public animadversion; and I feel it due, at once to the Infirmary and to myself, to explain their nature, the reasons for adopting them, and the success which has followed them.

The attempts here referred to originated in the perusal of Dupuytren's splendid posthumous work, entitled "Memoir on a New Method of performing the Operation for Stone." I was satisfied that the bilateral operation recommended by Dupuytren is, in many respects, superior to the lateral operation now commonly in use. I found, however, various difficulties in the performance of Dupuytren's operation, and my attempts were, at first, directed to obviate these. I was thus led gradually to alter some of the most important steps of the operation, and, at length, to abandon altogether the bilateral section, both of the prostate and the external parts, returning to an unilateral section of the former, not differing much from that com-

monly made, but attended with a totally different, and, as appears to me, improved method of penetrating into the bladder, and dividing the more external parts. I shall describe the mode of performing this new operation, and give my reasons for thinking it superior, in all ordinary circumstances, both to the common lateral and to the bilateral operation for stone. There are, however, certain cases in which the bilateral appears to me to be the preferable operation. I shall mention these, and the mode in which, according to my views, that operation is best performed. But, first of all, I shall describe the peculiar staff which I employ, and which I name *rectangular*, from its being bent at a right angle three inches from the lower end; because it is to the new route which this instrument has opened up into the urinary bladder, and the increased facility of access to the bladder thence arising, that the operations to be described owe their peculiar character, and the advantages which I hope to be able to show them to possess.

Instead, however, of simply describing this new staff, and the mode of using it, I think it will be better to give an account of the various trials made to improve the operation of lithotomy, in the order in which they were made, as it will be thus seen in what way one trial suggested another, and how the new staff, and new mode of operating, arose gradually out of the old by a series of successive modifications.

As Dupuytren's bilateral operation has been assumed as the starting-point of these researches, I may commence by briefly recalling to mind the principal steps of that operation. The external incision extends across the perineum in the form of a curve, of which the concavity looks backward, the summit intersecting the raphe or middle line of the perineum, at the distance of from six to nine lines from the anus, while the extremities of it are from eight to ten lines distant from the middle line on either side. The summit or middle of the curve, corresponds to the central tendon of the perineum, or tendinous junction of the sphincter ani with the other perineal muscles. The muscular fibres attached to this tendon being divided, the membranous part of the urethra is exposed and opened. The point of the double lithotome is then introduced into the groove of the staff and passed onward into the urinary bladder, where, the blades of the lithotome being expanded, it is drawn outward and downward, dividing the prostate gland, and the more external muscular parts, in its passage towards the extremities of the first incision.

The first steps of this operation must be acknowledged to be attended with some difficulty, as a delicate dissection is required to reach the membranous part of the urethra, without injury either to the bulb of the urethra above, or to the rectum below. My first object, therefore, was to simplify this part of the operation, by devising some expedient by which the knife might be made to penetrate directly, and without risk of injury, into the urethra from the

middle line of the perineum. To this attempt the position of the rectum seemed, at first, to oppose an insuperable obstacle; for it forms, immediately in front of the anus, a large sinus or bag, extending as far as the bulb of the urethra, and so covering the more internal parts of the canal, that in any attempt to carry a knife directly into it, the coats of the rectum would infallibly be twice transfixed. I found, however, that if the staff, instead of being introduced into the bladder, were carried no further than the apex of the prostate, and there made to rest on the finger of the operator introduced into the rectum, it was then easy to enter the groove of the staff without any risk; for the coats of the rectum were held out of the way of the knife by the point of the staff.

Finding that I could, in this way, at once open the membranous part of the urethra, I made this the foundation of my first modification of Dupuytren's operation. Placing the staff in the position just described, I penetrated into the groove with a sharp-pointed bistoury, making it pass from the middle of the perineum immediately beneath the central tendon, and with the edge looking to the left side. After carrying the knife to the end of the groove, I cut for about an inch outward and downward towards the left ischiatic tuberosity. I then turned the edge of the knife in the opposite direction, and, introducing it again to the end of the groove, made another incision exactly similar on the right side. An angular external wound had thus been made, and the membranous part of the urethra opened. I now passed on the staff into the bladder, and finished the operation by means of a double-edged instrument which I named a prostate knife, of which the beak was placed in the groove of the staff, and the blade cut both sides of the prostate as it was pushed onward into the bladder.

It is needless to describe more in detail an operation which has now no interest but as one of the steps which led to a more perfect method. Suffice it to say, therefore, that this operation had two great defects; first, that after the urethra had been opened, and the external incisions made, there might be difficulty in passing on the staff into the bladder, and so the operation remain half finished; and, second, that though the groove of the staff was opened with ease, yet on shifting the position of the staff by passing it into the bladder, there was no longer a correspondence between the wounds of the skin and of the membranous part of the urethra; and there was, therefore, difficulty in getting the beak of the prostate knife inserted into the groove of the staff.

To meet these difficulties, I had a staff constructed of such a shape, that when the point of it was within the neck of the bladder, another prominent part of it, about two inches further back, might rest upon the finger, in the situation just described, and serve as a guide to lay open the groove, while, into the opening thus made, the beak of the prostate knife might be at once inserted, no change of position being required. I was thus enabled to enter the urethra

with ease, and without any danger to the rectum; and, the staff being already in the bladder, there was no impediment to the subsequent steps of the operation.

The staff so constructed is straight till about three inches from the lower end, where it bends at once forward at an angle of 67½ degrees, measured from the produced straight line; and, an inch further, it makes another but more gradual bend in the same direction, amounting to 22½ degrees, measured in the same way; so that the remaining part of the instrument, two inches in length, is at right angles to the uppermost part. In this instrument it is easy to perceive the idea in which it originated; for, if it were introduced into the bladder, and the part in front of the second angle removed, that angle would become the point of a staff differing little in curvature from the common one, and placed exactly in the situation which I have described above. It is obvious, therefore, that the two inches at the end have been added merely to make sure that the instrument is in the bladder at the commencement of the operation. I found this instrument to be introduced with ease, and to possess the following advantages: First, That when it is introduced the greater angle of it projects in the perineum between the bulb of the urethra and the anus—or immediately above the anus, speaking relatively to the position in which the person operated upon is placed, as I shall do hereafter. The projecting angle is easily felt by the finger, and serves to guide the point of the bistoury with ease and safety to the membranous part of the urethra; for it does not require to travel further than about double the thickness of the skin to enter the groove of the staff. Second, That the extreme part of the instrument, lying nearly horizontally, keeps the coats of the rectum depressed, instead of allowing them, as when an instrument of the ordinary curvature is employed, to be drawn towards the pubis, occupying the whole angle between the skin and the membranous part of the urethra, and thus coming directly into the way of the knife, and rendering the utmost caution necessary to avoid wounding them. Third, That after the external incisions are made, the prominent angle of the staff is so near at hand, that it can be readily made to project at the external wound; and thus no difficulty is experienced in placing the beak of the prostate knife in the groove of the staff.

It will be seen hereafter that I operated once on the living subject with a staff of this form, and that the steps of the operation were nearly the same as in the method described above. Had the patient done well, I might possibly have rested satisfied with the operation as then performed; but the unfavourable result led me to consider, whether I could not devise any further improvement on the operation. It soon occurred to me, that the same means which kept the rectum out of the way of the knife penetrating into the urethra from the middle of the perineum, would be equally effective were the knife to penetrate as far down as the verge of the anus. Getting a staff constructed accord-

ing to this new view, I was enabled to dispense with the double bend in it, and gave to it the shape which it now has,—bent at a right angle three inches from the point. When this staff is introduced into the bladder, the lower or grooved branch of it lies parallel to the rectum, the angle resting on the farthest extremity of the membranous, or rather the commencement of the prostatic part of the urethra; so that, when the knife is plunged into the groove of the staff, the membranous part of the canal escapes all injury,—the incision commencing at the apex of the prostate gland, and being continued along the side of it to the bladder.

This new staff, therefore, while it possessed all the advantages of the former one, had the additional recommendation of doing less violence to the urethra. It enabled me, also, to effect several important alterations in the steps of the operation, and to simplify the apparatus for performing it.

The point at which the knife penetrated into the groove of the staff being now much lower, or immediately above the anal orifice, the direction of the external incisions was somewhat changed. They were, at first, quite horizontal, but acquired an inclination downwards as they extended to the outside, towards the ischiatic tuberosities. Further, as the knife was at once plunged into the substance of the prostate gland, dividing first the one side and then the other, at the same time that it made the external incisions, there was clearly no longer any use for the prostate knife, which I was thus enabled to dispense with. I did not, however, at first perceive this advantage, and intended to have used the prostate knife in case second, narrated below, had I not been prevented from doing so by an accident.

Last of all, as I found that a moderate incision of one side of the prostate and perineum was sufficient to extract a stone of ordinary dimensions, I abandoned the bilateral section in all ordinary circumstances, and had only recourse to it in certain cases, to be hereafter specified. It must not be supposed, however, that in thus abandoning the double section of the perineum and prostate, it was at the sacrifice of any of the advantages which Dupuytren has justly enumerated as belonging to his bilateral operation; for, if these advantages be analysed, it will be found that they depend on two causes; and that of these, that which here remains untouched is the most important and generally applicable,—the direct and short path of access to the bladder; while the other source of advantage,—the double section of the perineum and prostate,—is only important in particular circumstances of rare occurrence.

As this new staff was first constructed, it had an inferior groove, but I found this attended with several disadvantages; for, whether the groove were made deep or shallow, and whether the knife employed were spear-pointed or with a broad shoulder, and whether it had a single or double edge, it was apt, if carried deep into the groove of the staff beyond the verumontanum, to injure the seminal

duct and vesicles, and the resulting incisions were often ragged and irregular. I accordingly abandoned this inferior groove, and tried grooves of a different kind—as, a lateral groove, a groove looking outward and downward, and a spiral groove, commencing below, and twining gradually round to the side, as it passed inwards. The result of all these trials was to make me finally prefer a lateral groove having a posterior opening, so that the point of the knife might pass directly into it from the perineum.

By the use of this instrument, a new route, previously inaccessible, is opened up into the urinary bladder. The knife passes inwards, in a straight line parallel to the anterior surface of the rectum. If we suppose a triangle formed, of which the apex of the prostate is the superior angle, the anterior coats of the rectum and the membranous part of the urethra the sides, and the fore part of the sphincter ani the base, then will the line in which the knife penetrates to the apex of the prostate, be very nearly the line dividing the above triangle into two equal parts. The tissues divided by the incision are the skin, the anterior fibres of the sphincter ani, the superficial perineal fascia, and the most anterior fibres of the levator ani, where they meet under the urethra on the fore part of the rectum. The descending fibres of the levator ani, which are inserted into the side of the rectum, and which are divided in the lateral operation, remain here uninjured. It is chiefly at the outer and lower side of the prostate gland that the muscular mass above defined is incised; for the apex of the gland lies so immediately over the verge of the anus, that the knife at once plunges into the substance of the gland. There is, therefore, not the least danger of wounding the rectum; for, not only is it defended by the lower side of the groove of the staff, but the mass of the gland, progressively increasing in thickness as the knife goes inwards, intervenes; and, more externally, there is a layer of muscular substance of considerable depth. It is also obvious that the knife is far distant from all the large bloodvessels of the perineum.

The anatomist, who has been accustomed to regard the anterior surface of the rectum, not as a straight, but as a highly curved surface, may find difficulty in acquiescing in these statements: and may still be disposed to contend that a knife, penetrating directly inward from the anterior verge of the anus, will necessarily enter the rectum; and, if urged further in the same direction, will transfix a second time the coats of the intestine; and that the only mode of avoiding a wound of the rectum would be to give the knife a curvilinear course, first obliquely ascending as it goes inwards, and then obliquely descending in the same direction. He ought, however, to consider that the difficulty here stated is, in a great measure, of artificial origin; and that, though it be true that the anterior surface of the rectum is naturally somewhat curved forwards, it is converted into a straight line by the introduction of the rectangular staff, just as, by the introduction of a staff of ordinary form, the curve is preternatu-

rally augmented, and that the more so as the instrument is more elevated towards the arch of the pubis. Although contrary to received notions, it is nevertheless true, that in opening the membranous and the prostatic portions of the urethra, there is more danger of wounding the rectum if the staff be held up towards the pubis, than if it be depressed towards the coccyx and sacrum. The rule for holding the staff, in the operations about to be described, is founded on this principle, and is just the reverse of the ordinary rule; viz. to hold the staff firmly downward upon the rectum, instead of elevating it towards the pubis.

I shall now describe the two operations which are performed with this instrument. But I would first remark, to avoid the difficulties of an ambiguous nomenclature, that to all operations in which we penetrate into the bladder from the middle line or raphe of the perineum, I would give the name of *mesial*, or *middle* operations, to distinguish them from the *lateral* operation, in which we penetrate into the bladder by an incision on one side of the middle line. In the mesial operation, again, we may either cut both sides of the perineum and prostate, or only one. We have, therefore, two varieties of this operation, to which I would apply the names of the mesial bilateral, and the mesial unilateral operations.

I shall first speak of the latter of these two forms of the mesial operation, which seems to me to be preferable in the great majority of cases of stone in the bladder: since it is clearly inexpedient, because unnecessary, to do violence to both sides of the perineum and prostate, if an unilateral section of them is sufficient to extract the stone.

The only instruments necessary for this operation are the rectangular staff, which has been already described; and the knife, which ought to have a cutting edge as long as the groove of the staff, with the back straight, and the blade of uniform breadth as far as the point, which should be shaped like that of a scalpel, but fitted to stab as well as cut.

The operator having introduced the staff into the bladder, which is done without difficulty, places the forefinger of his left hand in the rectum, and feels for the horizontal branch of the staff lying over the prostate. He then moves the staff backwards and forwards, till he feels the prominent angle, which guides him in making the orifice of the groove project in the perineum, at the anterior verge of the anus; or just at that point of the raphe, where the skin begins to lose its proper characters, and gradually assume those of mucous membrane. Keeping the staff steady in this position, by means of the forefinger placed within the rectum, and the thumb pressing on it externally so as to indicate the orifice of the groove, he commits the staff to an assistant, with directions to keep it in the same position, and press downward with a moderate degree of firmness, of which, from the instrument resting upon his own fingers, he is enabled to judge. He now takes the knife into his r ght hand, holding it in

what is technically named the third position, with the palm of the hand looking obliquely upward, while the blade of the knife is horizontal, and the edge turned to the left side. He penetrates through the skin and other tissues, till he feels that the point of the knife is within the groove, when he carries it directly onward, till it is arrested at the termination of the groove. As he has now penetrated into the bladder, there is usually a little urine seen to ooze out along the blade of the knife. He finishes the cutting part of the operation, by withdrawing the knife, so as to cut first three quarters of an inch outwards and downwards, in the direction of the fore part of the tuberosity of the ischium, and thereafter three-eighths of an inch almost directly downwards.

The total extent of the external incision is thus one inch and an eighth; but, owing to the vicinity of the anal aperture, and the cut parts subsiding in that direction, the incision is quite sufficiently large to permit a stone of considerable size to be easily extracted; for full advantage is taken of the natural apertures in enlarging the wound, the aperture of the bladder coinciding with it internally, and that of the rectum externally.

It may also be remarked, that the direction of the first part of the incision is almost horizontal, and that the apparent inclination downwards is due, in a considerable degree, to the point at which the incision commences being raised above its natural level by the insertion of the finger into the rectum. Strictly speaking, indeed, the incision has three different directions, corresponding to the sides of a polygon drawn around the anus: the first part of it, formed by the knife passing along the groove, being horizontal, the second inclined downward, and the third vertical; but owing to the retraction of the skin, and to the first of these parts being less than the second, they appear to be in the same direction. If, however, a knife were employed three-eighths of an inch broad, then would the three parts of the incision be each equal to a breadth of the knife, and represent three sides of a polygon circumscribed around the anal aperture; the first part or breadth of the knife being horizontal, the second inclining downward toward the ischiatic tuberosity, and the third being vertical. Such an incision approaches, very nearly, to one half of Dupuytren's incision; only it lies much nearer the rectum, and, although little different in size, involves a larger portion of the circumference of the intestine.

A wound of sufficient size has now been made to admit of the finger being easily introduced into the bladder, which should be done without moving the staff from its place, passing the finger above the horizontal branch of the instrument. The finger of the operator is obviously the measure of the smallest possible incision of the prostate, that can be made in the operation of lithotomy. Now, it seems to me an advantage of this operation, that this smallest incision is always made in the first instance; and then, the finger being introduced, the size of the stone is ascertained. If the stone be small, or

of a moderate size, it will be easily extracted; and if, again, it be too large to admit of extraction, we are enabled, by having ascertained its exact size with the finger, which is the only way in which it can be accurately ascertained, to judge of the means necessary for enlarging the aperture. If it be merely a little too great, dilatation will probably be thought the best means to adopt; if, again, it clearly demands a more ample incision, our knowledge of the size of the stone points out to us what should be the direction and size of the additional incision.

The question, as to the direction of the additional incision, is an important one. It may be thought that, as the wound of the left side of the prostate is of less size than is usually made in the common lateral operation, it would be advisable to cut the prostate more extensively on that side. It seems to me, however, that there would, in this way, be considerable risk of infiltration of urine behind the fibres of the levator ani muscle, which are less freely divided than in the lateral operation. I would, therefore, prefer dividing the right side of the prostate, which is easily done, by shifting the staff a little to the left, passing the knife on the right side of the staff, and guiding the point of it with the finger, along the top of the horizontal branch, into the bladder. The staff being now replaced, and the knife being held in the left hand, while the finger of the right rests on the point of it within the bladder, the blade is made to advance with a sawing motion towards the right, keeping parallel to itself, so as not to make the external incision unnecessarily large. A narrow probe-pointed bistoury may also be employed to divide the prostate and perineum on the right side. After this incision, I would be disposed to try dilatation again, if there was any hope of succeeding in that way, rather than cut the prostate more extensively on either side. If, however, the stone be of very large size, then all risks must be run, and the wound of the prostate enlarged on one or on both sides, so as to permit its extraction.

In extracting the stone, it is best to introduce the forceps, and lay hold of it before removing the staff, which serves as a guide to the forceps, and prevents the neck of the bladder from receding into the pelvis before the stone be secured. Particular attention should also be paid to the position of the patient. The upper part of the pelvis should be raised by a pillow placed under the loins, so as to make the lower brim look obliquely downward; the stone thus descends toward the wound, instead of rolling back into the body of the bladder, as when the patient lies flat upon his back, with the whole pelvis raised. It is also, according to my views, right to have very little urine in the bladder at the time of the operation, so that the cavity may be contracted, and the stone may not be covered by any folds of the relaxed coats of the bladder.

The above operation may be said to be just one half of the bilateral, and its less degree of severity is its recommendation. There are, how-

ever, certain cases in which the bilateral operation is to be preferred. Such cases are of two kinds: first, the cases alluded to above, of adults having a large stone; and, second, the cases of very young children, whatever may be the size of the stone; for, in such young subjects, from the small size of the parts to be cut, a wound of one side of the prostate, capable of admitting freely the finger of a full-grown man, must, of necessity, be relatively large. In cases of the first kind, I would perform the first half of the operation exactly in the way described above; and, after feeling the size of the stone with the finger, I would cut the opposite side of the prostate and perineum to such an extent as might be required. The incision of the two sides of the prostate is thus made symmetrically, while the external incision is larger on the left side than on the right. In young children, again, I would prefer making both the internal and the external incisions perfectly symmetrical, and would limit the extent of the latter, on each side of the middle line, to about half an inch; for, from the subsidence of the anterior coats of the rectum, the opening thus made is as ample as can be required. The inclination of the internal incisions downwards is so slight, that on the healing of the wound the cicatrice appears a straight line. This is exactly the operation that was performed in case second, narrated below—only in that operation a staff with an inferior groove was employed, of which I was not then fully aware of the disadvantages. I would now prefer making use of a staff with a lateral groove, and after penetrating into the bladder, and cutting the left side of the prostate and perineum with the lithotomy knife, using a probe-pointed bistoury to make the incision on the right side.

The prostate, in both these operations, is found to be cut in the very same direction as is commonly recommended in the lateral operation—outward and a little backward from the apex, or in a direction parallel to that of the vesiculæ seminales. This coincidence is not a little remarkable, considering the total difference of the mechanism by which the section is effected. In the lateral operation, the lower half of the prostate which is to be cut lies horizontally, with the staff not pressing upon but a little raised from it, the upper half of the gland being hooked up under the arch of the pubis. Now, in cutting the prostate, the handle of the knife is depressed and held to the left side, as the point of it is pushed along the groove of the staff: the consequence is, that the section is intermediate between the vertical section which would be made if the edge of the knife were held straight downward, and the horizontal section which would result from holding it, on the level of the gland, to the left side. In the operations here described, again, the blade of the knife, while it cuts the prostate, is held almost horizontally, and did the gland itself lie in the horizontal plane, the section would be directly outward; but from the lower half of the gland not lying horizontally, but being pressed obliquely downward by the staff resting on the middle of it, and thus presenting on each side a sloping surface to the edge of the

knife, the incision comes to be made in exactly the same direction as before. But though the direction is the same, the sections themselves are somewhat different. In the lateral section, the substance of the gland and the fibrous covering investing it are incised exactly to the same extent; but, in the operations here under consideration, it is only the anterior half of the gland that is cut through and through, for the section of the posterior half does not go through the whole depth of its substance, and spares the fibrous indusium and adjacent cellular membrane. This circumstance seems to me important, both as guarding against infiltration, and facilitating dilatation, should it be required.

There is one precaution, with respect to the use of the staff, which must not be passed over. On whatever point of the urethra, situated beyond the bulb, the angle of the staff is made to rest, that point is forced outward before it, and made to project in the perineum. Now, the point at which the angle ought to be made to rest is the apex of the prostate: it may rest a little farther onward, without disadvantage; but if it goes as far as the verumontanum, the ejaculatory duct will be injured; and if it be placed farther inward still, the bladder will be opened, through the substance of the prostate, without entering the urethra at all. This happened to me, more than once, in operating on the dead subject, before I understood the reason of it. I found that, without intending it, I had performed exactly the Celsian operation, forcing down the prostate before the angle of the staff, just as it is forced down before the stone in cutting upon the gripe. It is, therefore, an important rule, after introducing the staff, to feel that the body of the prostate intervenes between the finger in the rectum and the horizontal branch of the staff.

In comparing the two mesial operations above described, with the common lateral operation, I labour under the disadvantage of addressing those who, for the most part, have never seen the former operations tried, and who are prejudiced in favour of the latter by long familiarity with it; and they will be apt to think that the prejudice is on my side, when I declare, that it is impossible for me to hold any opinion more strongly than I do of the superiority of the mesial operations. I must add, however, that I here speak of them merely as mechanical operations, since the evidence of experience, by which their practical value must be ultimately tried, is yet awanting.

In the first place, I would say, that the mesial operations are more direct, and more easy and rapid of performance. The common object of all these operations is to reach the apex of the prostate gland, in order to incise it. Now, I would ask, if this is not done in the most direct and natural way in the operations described above? The point of the prostate is not above two lines distant from the posterior extremity of the raphe of the perineum; and by merely piercing the skin and fibres of the sphincter muscle, the knife comes immediately into contact with it, and, entering the groove of the staff, cuts one side of the gland as it goes along into the bladder. In the lateral

operation the prostate is also cut; but by how circuitous a route is the knife made to penetrate to the apex of the gland! In the first place, an incision, from two to three inches in length, is made along the side of the perineum; but this incision does not reach the apex of the prostate, which is almost an inch distant from the nearest part of it; so that after a second incision, dividing the fibres of the levator ani muscle, the knife is carried about an inch inward out of sight, being hid behind the skin and the anterior sack of the rectum, and then it reaches not the apex of the prostate, but the membranous part of the urethra, which it is quite unnecessary to cut at all; and, after cutting it, the knife at length arrives at the apex of the prostate, which, it has been seen, might have been reached by travelling just two lines from the surface of the skin. This is much the same as if a person in going into his own house, instead of opening the door to get into the passage behind, were to make a breach in the wall to the right hand, and, getting into the adjoining apartment, were to make his way thence through the intervening partition, taking care, however, to penetrate through the partition near the roof, so that he might descend into the passage from above.

The lateral operation was obviously devised under the idea, that the rectum presented an insuperable obstacle to penetrating into the bladder directly from the middle of the perineum. The operator is, therefore, made to travel round the obstacle from the left, and get in behind it; in Dupuytren's operation, again, he ascends over the top of it; while, in the operations here described, the obstacle being pressed out of the way, he passes straight forwards into the bladder.

In the second place, The lateral operation is unnecessarily severe. This is chiefly owing to the external incision being so far distant from the neck of the bladder; for it is only by making that incision of large size, that the finger and instruments can be introduced so deep, whence the great disproportion between the external and the internal incisions, although the latter is large enough to allow the passage of the stone. The wound of the membranous part of the urethra is also unnecessary, as already mentioned.

In the third place, There is more danger of hemorrhage in the lateral operation; for as the two first incisions are nearly parallel to the great artery supplying the perineum, and sending its branches transversely inwards for that purpose, they must run almost at right angles to these branches, and are therefore in the direction most likely to do them injury. In the other operations again, the incision is far out of the course of all bloodvessels of importance.

Fourthly, The rectum, notwithstanding the vicinity of the incision to it, is less likely to be injured in the mesial operation than in the lateral; the reasons for which I have already endeavoured to explain.

Lastly, There seems to me to be more risk of deep-seated infiltration of urine in the lateral, than in the mesial operations. This is a question that can only be decided by experience; but the size of the

wound of the prostate, and the extensive division of the fibres of the levator ani muscle, seem likely to occasion that result.

I conclude, by giving a short history of the three cases in which the mesial operation has been performed in the Glasgow Royal Infirmary.

John Bruce, æt. twenty-four, shoemaker, Ward V., *Feb. 12th*, 1847.

Has laboured under symptoms of stone for six months past, and has since then passed seven small calculi. The sound readily detects a stone in the bladder. Urine mingled with viscid mucus, and gives a copious coagulum with heat and nitric acid. Although emaciated, takes his food well, and his general health and spirits are good.

On Feb. 23d, the middle bilateral operation was performed, and six stones, varying from the size of a bean to that of an almond, removed. The staff employed was that which I have described above as having two angles. In every other respect, the steps of the operation were the same as in the first modification of Dupuytren's operation, above described.

The patient had been put under the influence of ether, and said he felt no pain. No febrile or inflammatory action followed the operation. The wound, however, never showed any disposition to heal ; the urine was constantly discharged by it ; and its surface looked unhealthy. A troublesome diarrhœa came on, which resisted all attempts to arrest it. The patient became emaciated to such a degree, that, for some time before his death, the muscles of his face were seen, as if dissected, playing under the integuments when he spoke. He died on the twenty-third day after the operation.

On examining the body (March 20th), the bladder was found contracted, and its muscular coat very much thickened. The kidneys were in a state of granular degeneration ; and in that of the left side there was a hydatid of the size of a marble. There was also a collection of pus in the distended pelvis of each kidney, but most in the left. The wound in the prostate, and the external wound, had made no progress in healing. They were covered with a calcareous incrustation, which was observed also on various parts of the mucous surface of the bladder. Between the uppermost part of the sacrum and the intestinum rectum, there was a very large abscess containing healthy matter.

William Buchanan, æt. thirty months, Ward VI., *May* 1847.

Has laboured, during the last fourteen months, under symptoms of stone ; and, on introducing a sound, a calculus is distinctly felt. Urine slightly albuminous. General health good.

June 8th.—Yesterday three weeks, middle bilateral operation was performed. The external wound was made first to the left, and then to the right, immediately before the anus, dividing the integuments and fibres of the sphincter ani muscle. At this stage of the operation, the rectangular staff, which had been accidentally broken the same day and insecurely soldered, gave way immediately above the angle, and the lower fragment, having a very sharp angular point, slipped into the bladder. An ordinary staff was now introduced into the bladder, and the section of the prostate made right and left upon it. After removing the stone, the fragment of the broken staff was extracted by a bone forceps, but not without some difficulty, from its sharp point having transfixed the coats of the bladder. Has since been going on well, although cure retarded by inflammatory swelling of penis and scrotum. Urine passed almost entirely by the urethra. Wound contracted. General health good.

June 12th.—Dismissed cured.

Robert Banks, æt. twenty, collier, Ayrshire, Ward V., *Aug. 9th*, 1847.

About five years ago had an attack of acute pain in right lumbar region, followed, after a few days, by the passage of a grey calculus of the size of a small

horse bean. Soon after, he began to complain of pain in making water, which has gradually increased. It is referred chiefly to external meatus, and to situation of neck of bladder. No return of lumbar pain. At present a stone, seemingly of considerable size, readily felt by sound. Urine of natural colour, deposits a moderate mucous cloud, of sp. gr. 1·014, pretty highly acid, and not coagulable by heat. General health good.

Aug. 13th.—Mesial unilateral operation performed to-day, and two calculi extracted from bladder.

Sept. 4th.—The morning after operation had chills, followed by languor, debility, and anorexia; and next night by much restlessness, with tendency to delirium. After this his health improved; but on the sixteenth he was attacked by conjunctivitis of left side, and a herpetic eruption over face, and in two days more the integuments around operation wound became red and inflamed. The latter symptom continued, the redness shifting about on buttock, thigh, and loins, until about ten days ago, when it faded, as did also the eruption on face, and the inflammation of conjunctiva. About the same time, bowels became loose, but diarrhœa yielded in two or three days, patient having been put on milk diet, and chalk mixture with catechu. General health is now quite good; and for some days urine has been passed entirely by the urethra. The operation wound is healed up almost to a point. Wishes to go home.

Sept. 6th.—Dismissed well.