

Part First.

ORIGINAL COMMUNICATIONS.

ARTICLE I.—*Brief Retrospect of the Recent History of Lithotomy, with an Account of a New Method of Performing the Operation.*
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(Read before the Medico-Chirurgical Society of Edinburgh, 19th Feb.)

WHAT is the best mode of performing lithotomy? Formerly, surgeons were pretty generally agreed in recommending the ordinary lateral operation. This unanimity no longer exists. Even those teachers whose skill and success had rendered the lateral, *par excellence*, THE OPERATION in this country, have been lately confessing their doubts whether, after all, there may not be a better way of performing lithotomy than the time-honoured operation of Cheselden.

Among the reasons alleged why this has again become one of the open questions of surgery, is the introduction of lithotrity. Since the crushing operation has come into more general use, the simpler cases of stone are less frequently treated by the knife; hence lithotomy has been reserved for the graver cases, and a corresponding increase in the rate of mortality has been the result. This applies more particularly to the practice of a few of the leading surgeons, who carefully weed out their best cases for the lithotrite, and in whose practice the cutting operation has doubtless become more hazardous. It is, after all, however, a matter of doubt, whether lithotomy is a more fatal operation now than formerly. Up to the present time lithotrity has not been so generally resorted to as materially to affect the statistics of the operation. The late Mr Holmes Coote remarked that, in St Bartholomew's Hospital, the mortality has been about one in ten since the days of Cheselden down to the present time. This certainly is a remarkable fact; and all the more so if the mortality of this operation in the London hospitals generally be (as some have reckoned it) at from 20 to 25 per cent., one in five to one in four.

When we examine the annals of this operation in the past, we find that statistics then were quite as flexible as now. Raid, whose success induced Cheselden in England to adopt the lateral instead

of the high operation, stated that he had operated in 1547 cases without losing a single patient. The only trustworthy statistics of his operation, preserved in the register of the College of Surgeons of Amsterdam, show that, in twenty-two cases operated on in that city, he lost four. This gives an average of one death in five and a half cases. Altogether, it is probable that the mortality at the present day is not greater than that formerly obtained. Be this as it may, there can be no doubt that the reopening of this question is, in a great measure, due to the fact that the success attained by other methods has been such as to cast doubts upon the assumed superiority of the lateral operation. The splendid results obtained by Cheselden, Crichton, Liston, and above all by Martineau, have not by any means been achieved by operators generally. The success in the lateral operation seems to depend a good deal on an uncommunicable knack—a sort of instinctive appreciation of the proper amount of work to be accomplished by the knife—an ability to measure accurately the force to be employed. As this can neither be taught nor acquired by rule, it has happened that the best surgeons and anatomists have often proved the most unfortunate in the practice of the lateral operation. The results of this method have been very unequal; by it have been obtained the *highest individual successes*, and the *lowest general averages*.

As this fact has forced itself on the attention of surgeons, many modifications of the operation have, from time to time, been suggested, some of which are now beginning to be adopted; others, after having been prematurely lauded, have fallen into neglect.

There has never been much diversity of opinion about the *principles* of perineal lithotomy. Two points have been admitted by most surgeons. First, the necessity of an external wound, so situated, and of such an extent, as to afford free access to that part of the urethra to be opened, and allow ready escape of urine and other discharges without risking important structures. Secondly, an internal or prostatic wound, not larger than is absolutely necessary to permit the extraction of the stone without undue violence.

The exact position, form, and extent of the external opening has justly been looked upon as a matter of secondary importance. And so it is in itself; but the advantages of having direct and free access to the membranous portion of the urethra, for the purpose of rendering the subsequent steps in the operation more easy and precise, has, until recently, been rather overlooked.

What size of internal wound suffices to fulfil the admitted conditions has given rise to much discussion. Thus, we find the late Professor Syme, in 1842, stating that he considered it necessary to "cut freely through the whole thickness of the prostate,¹ in order to obtain room for extracting an ordinary calculus; and he said that he had never seen any bad consequences follow this practice. While in the succeeding year Fergusson advocated the principle of

¹ Lond. and Edin. Monthly Jour. of Med. Science, Dec. 1842.

limited internal incisions; and, so far from *cutting through*, advised that only a *slight notch* be made into the left lobe of the prostate.

That the advocates of smaller incisions frequently made wounds *unintentionally*, not much different from those advocated by Professor Syme, is very probable.

Mr Bryan, a London surgeon, writing about this time in the *Lancet*, says:—"I examined, at every opportunity I had, the wound made in those subjects which had been used in exemplifying to surgical classes the manner of operating. In every case which I met with, I found the prostate completely divided, and the vesiculæ sliced into; although the incisions had evidently been made according to rules taught in the schools of surgery."

Those who believed that complete section of the prostate was the smallest wound, fulfilling all the requirements of the case, as well as those who aimed only at notching the gland, all agreed as to the desirability of rendering the wound as exact as possible, both as regards site and extent. Although generally content with the ordinary lithotomy staff and knife, doubts seem now and again to have arisen in the minds of some, belonging to either party, whether the desired degree of exactness could be attained by the ordinary instruments used in the ordinary way. Thus, we find Syme in 1844¹ describing a peculiar knife called a prostatome, but he does not seem to have long continued its use. He also used, for a time, a straight guide upon which to make the prostatic wound. About the same time, or shortly before, Sir William Fergusson recommended a knife² peculiar for the narrowness of its blade.

With the same object in view—viz., that of securing an internal opening of definite size, Sir Philip Crampton, in operating, made the deep wound with "a narrow knife, blunt for half an inch from the point," which lay concealed within the groove of the staff. After pushing this into the bladder, he removed the staff, and, lateralizing the knife, passed his forefinger along its back into the bladder. He remarked that, by this means, "the opening into the bladder is, in all cases, and without reference to the prostate, exactly sufficient to receive the forefinger of the operator, plus the blade of the bistoury." The importance attached to this point in the operation is further evinced by the interest taken at the time in the discussion about the way in which Liston held his knife—whether "overhand" or "underhand?" It was simply a question whether he held it in such a manner as to make an indefinite thrust into the prostate, or so as to be better able to guide and control the advance of the blade along the groove in the staff.

In 1844, Sir John Fife³ operated by a method which seems to have been precisely similar to the medio-lateral operation lately introduced by Sir William Fergusson. Two years later this same

¹ Lond. and Edin. Monthly Jour. of Med. Science, Aug. 1844, p 642.

² Lancet, Feb. 18, 1843.

³ Prov. Med. Jour., Aug. 21, 1844.

mode of operating was practised with very good results in the Manchester Infirmary by Mr Ransome;¹ but it did not at that time receive much attention from the profession.

In the year 1848, another, and what has proved a most important effort towards improving and simplifying lithotomy, was made by Professor Buchanan of Glasgow,² who then described his mesial operation with the rectangular staff, the mode of performing which I need not detail. He claimed for it the following advantages: ease of performance, a small incision into the prostate of definite size, with less risk of hæmorrhage and deep-seated infiltrations. This operation, practised with a success that has compelled respectful attention, must be recognised as the first successful effort at median lithotomy. There are men who condemn all attempts at improved modes of operating with new instruments as dangerous devices to make up for deficiency of surgical skill. Such men had nothing good to say of what was then somewhat contemptuously styled the "rectangular operation."

We may just notice, in passing, that Dr Alfred Post of New York, Dr Warren, Dr Steven, and others in America, were about the same time advocating and practising modifications of the bilateral. Dr Warren adopted the Celsian external incision, opened the membranous part of the urethra in front of the prostates, and after introducing into the bladder a probe-pointed knife having a long handle, he withdrew the staff. He then directed the knife, supported by the forefinger of the left hand, first towards the left tuberosity of the ischium, then towards the right, cutting the prostate to the extent of three-fourths of an inch in either side. He advocated this operation on the following grounds:—1st, The parts cut are more simple; the nerves and vessels being smaller, the pain and hæmorrhage are less. 2d, The access to the urethra is more direct. 3d, The prostate can be cut with great precision. 4th, The opening can be made double what can be attained by the lateral, without transgressing the limits of safety. The advantages of the external semilunar incision are thus clearly recognised and stated—directness of access to the urethra allowing of greater precision in the prostatic incision.

The result of Dr Buchanan's ingenuity and success was evident in the renewed attention paid to median lithotomy. In the year 1850, Fergusson³ recorded a case in which he operated by a Λ -shaped external incision, as suggested by Professor Eve of Nashville. He has stated lately that from this time, although he continued to teach and practise the lateral operation, his leaning towards the central part of the perinæum had been leading him, instead of beginning his incisions on the left side of the raphe, to venture more and more to the right.

¹ Lancet, Jan. 16, 1868.

² Monthly Journal, Feb. 1848, p. 556.

³ Lancet, March 30, 1850.

Allarton's median operation was first described in 1854.¹ In this operation the prostate and neck of bladder are left untouched by the knife, and dilatation pure and simple is made to take the place of incision. Many surgeons, both in London and in the provinces, gave this operation a trial; and various instruments were invented for effecting dilatation.

The mortality in the patients operated on by this method contrasts favourably with that in the lateral operation; but the impression obtained by a study of the reported cases is, that many surgeons judiciously restricted its employment to those cases in which the stone was small, and in which dilatation would suffice for its removal. The greater number of the cases of death after this method have just been when dilatation equivalent to laceration had to be practised in order to extract a large calculus. One thing is certain, that this operation paid little respect to that structure demonstrated by Liston and others, to which the late Professor Syme directed attention and attached great importance—"the sensitive ring which surrounds the neck of the bladder, at the base of the prostate in the male, and at the corresponding part in the female, which forms an obstacle admitting of ready removal by incision, and cannot be overcome by tearing without almost certain death."

The results of Allarton's median lithotomy, as well as Willis's operation of lithectasy,² proved that the danger from forcible dilatation, although real and considerable, had been exaggerated.

Allarton's median operation differs from lithectasy as proposed by Willis, inasmuch as the former effects by rapid, what the other accomplishes by slow, dilatation. Slow dilatation is safe enough when applied to the intact female urethra, but following and affecting a wound, it is both painful and dangerous. The danger in the case of lithectasy arises from the continued irritation of slow and increasing tension acting on parts particularly disposed to inflammatory action from having a wound on the one side and a foreign body on the other. Rapid dilatation, again, although harmless when not carried beyond a certain point, becomes dangerous when it exceeds that limit. It is probable that, if the urethra be dilated much beyond one-third of an inch, the process then becomes another name for laceration; and when a large stone is dragged through a wound so dilated, bruising follows laceration. Such injuries cannot be treated lightly, especially when, as in the case of lithotomy, they involve large venous plexuses and friable glandular tissues, exposed to the passage of irritating fluids, and at the entrance of a viscus having extensive sympathetic connexions. Experience has confirmed what might have been guessed *a priori*, that death, when it occurs after such operations, is due to violence. The fact that the fatal results are not more common after such procedures, is confirmation of the truth of the observation, that laceration and bruising

¹ Lithotomy Simplified, by G. Allarton, Lond. 1854.

² Willis on Stone.

ing, with limited incisions, although far from harmless, are less fatal than an excess of cutting.

The late Mr Lloyd's recto-urethral operation is also a median one, and is the same as Allarton's, in so far as the treatment of the prostate is concerned. It has one advantage, however, over Allarton's, for it gives a freer external wound, thus facilitating the dilatation as well as the subsequent extraction. The wound in the rectum communicating with the urethra, not with the bladder, readily heals, as I can myself testify. He continued to use this operation for many years with excellent results, but it has never met with much favour from the profession generally.

We have already observed that various operations, which may be called medio-lateral ones, had been practised by different surgeons years ago. These, if we except Dr Buchanan's, never attracted much attention. In 1867,¹ Sir William Fergusson operated on a boy by an external semilunar incision, making the deep wound precisely as in the lateral operation. He lays it down as a rule, that "the deeper the wound, the more difficult and dangerous the operation," particularly in respect to the seizing and extracting of the stone, and insists that the lunated incision gives a much more extensive, patent, and direct external opening than any straight line could afford. The reports of cases treated by this operation by so eminent a surgeon, and who had all along been one of the most illustrious advocates of the lateral operation, and who had practised it with acknowledged success, directed the attention of the profession to this subject, and brought out the fact that several of the leading surgeons had already given up the exclusive use of the lateral operation.

Thus, Erichsen writes in the *Lancet*, 11th January 1868:—"Although practising, as a rule, lateral lithotomy by Cheselden's method, as modified by Liston, I have for a long time had grave doubts whether it was really the best way of getting into the bladder, and especially of extracting a large stone out of it." He prefers Dupuytren's operation, but performed with a rectangular staff. The external wound is semilunar, but he makes the deep wound with a lithotome caché, cutting equally into both lateral lobes of the prostate.

In the same way, Sir Henry Thompson informs us that he also has given up the exclusive use of the lateral. He practises Civiale's operation, the essential features of which are a vertical mesial external incision, as in Allarton's, with a deep incision similar to that practised by Erichsen, made with a similar instrument. Hutchison, who, so early as 1857, had made use of a rectangular catheter staff, which was simply a modification of Buchanan's, reported that he had for some time operated by various forms of the double-cutting gorget, and with a mesial incision.

It is thus evident that the lateral operation is no longer held in

¹ *Lancet*, Jan. 4, 1868.

the same esteem that it once was. No doubt, there are fashions in surgical incisions and operations just as in other things; but the growing opinion in favour of the semilunar incision cannot be so accounted for. The men who have declared in its favour are men who are well able to compare and contrast it with the lateral incision. The same remarks apply to the pretty general adoption of the rectangular staff.

Before the publication of these innovations, I had abandoned the lateral in favour of an operation which I shall now describe. The staff I use is simply a modification of Buchanan's rectangular one, the acute angle being replaced by a gentle curve, and grooved on its inner aspect. I may just remark, in passing, that Buchanan's staff, as modified, is an excellent instrument for performing any of the ordinary operations. It forms a useful guide to that part of the canal which is to be opened, conducts straight into the bladder, without endangering the rectum. The form of the external wound in the operation I am now describing is semilunar, curved somewhat lower and deeper upon the left side than the right, in order to afford a freer drain on the side on which the prostatic wound is situated.

Having exposed the membranous part of the urethra, this is opened, and a guide is introduced along the groove in the staff into the bladder. This guide, consisting of two parallel and connected bars or blades, capable of being separated by means of a screw, forms, when approximated, an instrument about five inches long, somewhat like a female catheter in size, straight, slightly flattened from above downwards, and grooved on the left side so as to permit the bottom point of the knife to slide along without escaping from it. When this guide has been fairly introduced into the bladder the staff is withdrawn, and the blades are separated by the screw *to such an extent as to render the tissues tense*. The knife used has a button-shaped extremity to fit the groove in the guide. The blade is narrow throughout, but is slightly triangular, becoming a little broader towards the handle than at the point. This knife is then carried along the groove so as to divide the tense resisting structures, *by its edge being brought into contact with them rather than by actual cutting*. The blades of the guide are now expanded to a sufficient extent. Should it be found, however, that the required degree of separation cannot be effected without force, the knife may be passed along a second time to cut the structures that still resist. In no case should anything be incised except what is found to oppose gentle dilatation. The size of the calculus determines the extent to which the knife is to be used and dilatation effected.

The blades of the instrument having now been separated so far as the size of the stone seems to demand, it serves as a conductor for the forceps into the bladder. They slip along between the blades of the instrument. The stone is then extracted in the usual way. Should the calculus be very large, the knife may be applied

in precisely the same manner to the right side of the prostate, thus making a bilateral incision. This is seldom required.

The chief advantages of this, as compared with other perineal operations, are the following:—In the lateral operation, the incision passes indefinitely into the prostate, sometimes dividing it entirely, and at other times only notching it, and this *quite apart from the purpose of the operator*.

There is thus a want of exactness as regards the extent of the wound in the prostate. Then there is no less a want of discrimination as regards the structures cut; those that require incision, in order to permit easy dilatation, being sometimes left intact, while as frequently the knife passes indefinitely into or through the prostate without reference to resistance. Further, the incision bears no proportion to the size of calculus to be extracted. Mr Oliver Pemberton, in his Address on Surgery at the last meeting of the British Medical Association, notices this point, and says:—"I hold that it cannot be necessary to make incisions to the same extent to remove a body the size of a pea as we should make for one the size of twenty." I hold so too; but, in lateral lithotomy, this is practically the case. A similar vice, however, lies at the root of Allarton's operation, which Mr Pemberton has adopted instead of the lateral. It treats all stones, whatever may be their size, in the same way; and if the stone be large, and the tissues tense, then more force must be applied.

In the lateral operation, the manual dilatation which follows the incision has reference to the admission of the forceps; the subsequent dilatation, which is practised in the act of extraction, is the complement of the incision. The extent to which this is carried, and the force required to effect it, vary according to the size of the calculus. In the median operation, laceration and bruising are inevitable when the stone is large. The same holds true of the lateral, when merely the apex of the prostate has been notched.

In the operation I have described, the incision and dilatation are in proportion to the size of the stone and the resistance of tissues.

Mr Martineau of Norwich, who cut eighty-four patients, with only two deaths, has been reckoned amongst the advocates of large incisions. More truly he may be regarded as an advocate for *discriminating* incisions—incisions bearing reference to the size of the stone—incisions also bearing special reference to the *resistance of tissues*. He says:—"Should the stone be large, or there be any difficulty in the operation, rather than use much force, while the forceps have a firm hold of the stone, I give the handles to the assistant, who is to draw them outwards and upwards while the part forming the stricture is cut; which is easily done, as the broad part of the blade becomes a director to the knife; and rather than lacerate, I have often repeated this enlargement of the inner wound two or three times."¹ I have little doubt that this practice of incis-

¹ Med.-Chir. Trans., vol. xi. p. 411.

ing what resisted, and in proportion to the resistance and to the size of the stone, explains his exceptional success. One of the most difficult parts of the operation, or it may be one of the most dangerous, even when not difficult, is the introduction of the forceps. The neck of the bladder is apt to be somewhat rudely disturbed in this part of the operation, more especially if the wound be deeply situated, and just sufficient to admit the forefinger. Remove the forefinger, and the wound contracts, so that the forceps are more likely to push up the neck of the bladder than enter it. Introduce the forceps along with the finger, then the forceps and finger jointly produce a considerable degree of bruising. To introduce the forceps *while in the act* of removing the finger is a good precept, but somewhat difficult to follow out. In this operation the guide for the knife acts as a conductor for the forceps at the same time.

Some of the special accidents of lateral lithotomy are less likely to occur in this operation. Troublesome or even fatal hæmorrhage is one of the worst of these. One in eight cases of death after lateral lithotomy is due to this cause. It has occurred to such men as Sir Charles Bell in England, Klein in Germany, and Dr Physic in America. Mr Pemberton of Birmingham relates such a case in his practice, in which death followed after twenty-four hours. The patient was a boy. This surgeon remarks:—"I could find nothing in the post-mortem to account for the bleeding. . . . It was clear the cutting did it somewhere, and I naturally thought I should like, in the future, to extract such a stone as the one I then removed with less of the cutting in the dark." In operating as I have described, from the open nature of the wound and its situation, dangers of cutting in the dark are prevented. Inflammation of the neck of the bladder and pyæmia caused by bruising, and infiltration of urine and pelvic abscesses, the result of too extensive incisions, are alike avoided.

Statistics.—The number of cases operated on in the Antananarivo Hospital by this method since the arrival of my colleagues, Drs Borchgrevink and Mackie, is 32. Of these, 11 were operated on by myself, and 21 by my colleagues. One of my cases was followed by a fatal result about a month after the operation, and a few days after the patient had actually left the hospital. A post-mortem examination revealed extensive disease of both kidneys. There were several stones and abscesses in the right kidney; the left kidney also contained a few small calculi, and was excessively engorged. The prostatic wound had completely healed, but the external wound was not entirely cicatrized. Of the 21 cases operated on by Drs Borchgrevink and Mackie, 13 had occurred before I left the island fifteen months ago; and 4 were still in hospital when I heard last, and were reported as progressing favourably. One death occurred amongst the 13 operated on before I left. He was one of Dr Mackie's patients. No post-mortem examination was obtained,

but the symptoms pointed to kidney disease. I am not able to give at present exact details of the ages of the patients and the size of the calculi in these cases. I hope to publish these particulars on a future occasion.

The cases I operated on myself were most of them very favourable ones for the operation, the patients being all under puberty, and the stones of moderate size. The largest stone that I have extracted *by this operation* weighed 2 oz. and 3i., from a boy, aged 5 years, who had suffered from the symptoms of calculus ever since he had been a year old.

The patients operated on by my colleagues were some of them adults. I believe I am safe in saying, that none of the stones extracted in the 13 cases operated on while I was there weighed above 2 oz.

In one of the cases that occurred after I left, the stone extracted weighed 1590 grains, *i.e.*, considerably above $3\frac{1}{2}$ oz.

Were the object in view to *contribute* to the already superabundant mass of lithotomy statistics, the four cases (the final result in which may be looked upon as more or less doubtful) would have to be eliminated, and, according to the principles upon which statistics are compiled, the fatal case which occurred in my practice, since it took place after the patient had left the hospital, would also be left out of the calculation, giving a mortality of 1 case in 28. But there is no sufficient reason to exclude this case, as the object of all operations is the lengthening of the life of the patient. In this case I have little doubt that the operation shortened his life to some extent. The general result—1 in 16—attained by this operation, I consider, has been above the average, even admitting, as I do, that the cases were upon the whole more favourable for the operation than those met with in hospital practice at home.

ARTICLE II.—*On the Changes undergone by the Cervix Uteri during Labour.* By J. MATTHEWS DUNCAN, M.D.

(Read before the Obstetrical Society of Edinburgh, 23d April.)

THE cervix uteri is a part whose limits can generally be easily made out, for over its inner surface there is displayed the arbor vitæ, and its internal os frequently is the seat of constriction.

Modern inquiries¹ have shown that, during pregnancy, it is greatly thickened, softened, and sometimes slightly elongated. Indeed, it undergoes hypertrophy or enlargement in every dimension. Up till the very end of pregnancy—that is, till the supervention of active labour—it is, usually, and remarkably in cases of placenta prævia, a part quite separate from the body of the uterus, its cavity forming no part of the cavity containing the ovum (as is also the case in at

¹ See the Author's "Researches in Obstetrics," p. 243.