

A treatise on the operation of lithotomy. In which are demonstrated the dangers of operating with the gorget, and the superiority of the more simple operation with the knife and staff. Illustrated by plates / by Robert Allan.

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A
TREATISE

ON

THE OPERATION OF LITHOTOMY.

THE NATIVE

THE OPERATION OF LIBERTY

A
TREATISE
ON
THE OPERATION
OF
LITHOTOMY.

IN WHICH ARE DEMONSTRATED,
THE DANGERS OF OPERATING WITH THE GORGET,
AND
THE SUPERIORITY OF THE MORE SIMPLE OPERATION
WITH THE
KNIFE AND STAFF.

Illustrated by Plates.

By ROBERT ALLAN, SURGEON.

EDINBURGH:
PRINTED FOR THE AUTHOR, BY J. BALLANTYNE AND CO.
AND SOLD BY JOHN MURRAY, 32 FLEET-STREET, LONDON; AND
JOHN ANDERSON, EDINBURGH.

1808.

TREATISE
ON
THE OPERATION
OF
LITHOTOMY

KNIGHT AND STAFF



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TO

ALEXANDER MONRO, SENIOR, M.D.

PROFESSOR OF ANATOMY AND SURGERY IN THE UNIVERSITY OF EDINBURGH,

&c. &c.

SIR,

FROM the distinguished name you hold in your Profession, and the length of years during which you have supported the honour and fame of our Medical School, I must turn to you as the natural patron of a work like this. From the unaffected interest I have ever observed you to take in those operations where your presence was required, I have no doubt you will enter into that question, which I have fairly laid before our Profession, with a liberality of spirit becoming your rank : In a question of surgery, resolvable only by an appeal to anatomy, your opinion must have a powerful influence. As the Professor of Surgery in this University, and a calm and steady supporter of its reputation at home and abroad, it is natural that I should dedicate to you this Treatise on Lithotomy ;

which I beg leave to present, with the respect and esteem of one acquainted with your experience and skill in your Profession, and with the sentiments of a pupil who has profited by your instructions.

I remain,

SIR,

Your most obedient servant,

ROBERT ALLAN.

ADVERTISEMENT.

THE Author of this Treatise on Lithotomy, has endeavoured, in a candid and open manner, to bring under the review of his Profession, a subject which he conceives to be of great importance. In the view he has taken of it, he has perpetually had recourse to anatomy as the basis of all surgical reasoning; and, although a young man, and devoid of that share of experience which must naturally belong to age, he has enjoyed advantages which do not fall to the lot of every practitioner: he has been trained to anatomy with the same labour as to the other parts of his profession, and has undergone the slavish fatigues of the dissecting-room more than the drudgeries of the shop. The Author served his apprenticeship with Mr BELL, during the most active period of his public teaching; and for some years has been associated with him as a partner in business, during which, he has assisted him in all his operations. From an early study of anatomy, confirmed by all that he has seen in public operations, he has always been alarmed at the thoughts of performing, or of witnessing, the cruel operation of the gorget; but candidly confesses, that it was not until he assisted Mr BELL, that he saw the advantages and decided superiority of cutting with the knife. The rapidity and facility with which the largest stones are extracted, and the quickness with which the patient recovers, form a striking contrast with the twisting and tearing with the forceps, and other ineffectual attempts at extraction, when

the operation is performed with the gorget. As there are no distinct rules for operating with the knife, nor good nor faithful drawings, the Author conceived it would be acceptable to his Profession to have that desideratum supplied; he therefore requested Mr BELL, after this Dissertation was composed, to design for him a set of drawings, illustrative of the several steps of the operation with the knife, and these drawings may perhaps be thought to constitute the chief value of this work. The Author, while he has done this, has not neglected to review the operations of the best Lithotomists, from the earlier ages of surgery down to the present day, and to offer such a critique on each as its merits seemed to call for. If the view he has taken of the subject be correct, he trusts the time is not far distant, when the operation with the knife will be universally practised by every well educated surgeon.



PRELIMINARY OBSERVATIONS.

OF all the maladies with which mankind are afflicted, there is none so dreadful as stone in the bladder, nor, in the whole range of surgical science, is there a subject more important or interesting than the operation of Lithotomy. It was accounted an operation of such magnitude and difficulty, that it formed at one time a separate branch of surgery, and was exclusively confined to a set of men trained to this department, who made a mystery of their art. The diverse instruments invented, and the various modes of operating practised by the celebrated Lithotomists in all ages, incontestibly prove this to be a subject of great importance : it is the most difficult operation in surgery, and is therefore justly esteemed the masterpiece of surgical skill. The operations performed on the living body, are merely the dissections we have practised on the dead with the knife ; why then should we intrust the success of our most impor-

tant operation to chance? In this operation, although it requires, above all others, a steady hand, and a correct anatomical knowledge, we have, by the invention of instruments gliding along each other by grooves, and other awkward contrivances, deprived ourselves of every advantage our knowledge of anatomy might give us. It appears to me unquestionable, that there is no operation which requires more to be reformed than the operation of Lithotomy;—the boldest, and most confident operator, shrinks when he drives his cutting director into the bladder, and surrounding spectators are struck with horror, when they see the patient bound like a victim, and impaled with a gorget. The dangers of the gorget are manifold;—its beak is so apt to slip from the groove in the staff, and to be driven amongst the viscera in the pelvis; the bladder, when empty, is so liable to be transfixed; the pudic artery so apt to be cut when the gorget is broad,—that I declare, I would prefer any mode of incision, to one, at once so horrible, so unsuccessful, so plainly murderous as this. The trocar of Foubert, and the lithotome of Le Cat, are equally dangerous with the gorget: if there be any one piece of mechanism more safe than another, it appears to me to be the bistourie cachée of Frere Cosme; yet I should most assuredly prefer operating with the knife. The operation with the knife has been practised in the best ages of surgery, with unexampled success, and possesses advantages which the gorget can never have. With the knife, we have it in our power to make our incision adequate to the extraction of a stone of any size, and such as will readily admit the forceps, and allow of an easy extraction, without laceration. The incision with the knife, is at once easy and sure, in the hands of one acquainted with the anatomy of the

parts; in the hands of one unacquainted with such anatomy, no instrument, formed on any principles of mechanism, is safe.*

Earthy concretions have been formed in almost every part of the human body, but are more frequently met with in the kidneys, and urinary bladder, than in any other part. When once a stone is formed in the bladder, it daily becomes larger by the accretion of new particles; and if it is so large as not to pass with the urine by the urethra, there is no way of removing it but by an operation. Lime water, diluted caustic alkali, soap, alkaline aerated water, and the other medicines styled lithontriptics, have been all found inadequate to the solution of the stone. These medicines can be used in two ways only; either by being injected into the bladder, and immediately applied to the stone, or by taking them internally. If any medicine is endowed with chemical powers, sufficiently strong to dissolve the stone when immersed in it, it will not fail to act also upon the coats of the bladder; and whatever is taken into the stomach, must pass through the whole range of the circulation of the blood, and undergo considerable changes, before it can reach the stone. Such medicines may perhaps be of use in counteracting the calculous diathesis, but can have no effect in dissolving the stone. The formation of the stone in the bladder, appears, in some measure, to depend upon a diseased action of its coats; for, after a patient has been once cut, and a stone removed, the disease, un-

* For the description and illustrations of the surgical anatomy of the parts, concerned in the operation of Lithotomy, and their various relations to each other, I must refer my reader to Mr Bell's Principles of Surgery, Vol. II.

less hereditary, is not very apt to return, although we have reason to suppose, that the constitutional predisposition continues the same. The inflammation produced in the bladder by our incisions, may therefore, perhaps, have some effect in exciting a different and more healthy action of the parts. The period most liable to the production of the stone, seems to be under puberty, and in the decline of life;^b and these are the periods most favourable to the success of our operation, as our patient is at those periods more exempt from inflammation.

I purpose, in this short treatise, to deliver a concise account of the different ways of operating, from the time of the apparatus minor, until the improvement of the gorget by Sir Cæsar Hawkins; to describe the parts cut in each operation; the advantages and disadvantages attending each method; the invention of the various instruments, and the dangers attending their use, particularly that of the gorget; endeavouring to show, that no way of operating is safe, but that with the knife: to lay down some short rules for performing the incisions; and to conclude with a few remarks on the after-treatment of the patient.

^b Voyez Cours d'Operations de Chirurgie, par M. Dionis; and A Treatise on the Origin and Component Parts of the Stone in the Urinary Bladder, by William Austin, M. D.

ON THE
SYMPTOMS OF STONE IN THE BLADDER,
AND ON
SOUNDING.

THERE are no diseases so distressing or alarming as those of the urinary bladder;—nor are the symptoms attendant on any disease productive of such miserable feelings, as those accompanying Stone: the pain and irritation it excites is complete agony; and a man labouring under a fit of the stone, presents to us a picture of the greatest misery we can ever witness. The equivocal symptoms of stone in the bladder, are,

1st, A dull and heavy pain in the region of the bladder, accompanied with a sharp and shooting pain in the point of the glans, which induces the patient frequently to grasp it, and pull the prepuce forward.

2dly, A violent pain in making water, particularly severe in voiding the last drops, which is produced by the stone coming in contact with the neck of the bladder; this pain is therefore proportionate to the size and roughness of the stone.

3dly, Sometimes when the urine is flowing in a full stream, it is suddenly stopped by the stone falling forwards on the neck of the bladder; at other times the patient cannot retain his urine, and it is voided painfully in drops, with violent straining, produced by the irritable state of the bladder. If the patient has been driven any distance in a carriage or a cart, this frequent and violent inclination to make water, is productive of the greatest misery. We see him walking up and down his room in agony, and every five minutes straining on his knees to pass his urine, and generally, after such rough exercise, voiding blood.

4th, A thick mucous sediment in the urine is always an attendant on stone, and frequently the urine is deeply tinged with blood, particularly after much motion.

5thly, Tenesmus, hemorrhoids, and protrusion of the rectum, are other symptoms of stone in the bladder; but as all these symptoms might accompany also a contracted and diseased bladder, and arise sometimes from ulcer, from a diseased prostate gland, or inflamed cervix, they cannot decidedly mark the existence of stone; they can only lead to a suspicion; a perfect reliance is therefore very justly never placed on them, and we can ascertain the presence of a stone only by the Sound. If the patient has been brought from a distance, and from the jolting motion is in violent pain; no instrument should be passed into the bladder until these symptoms have subsided; he should be put into the warm bath, have an opiate, and for two days be left undisturbed. As stones are generally lodged in the lower part of the neck of the bladder, the surgeon should try a sound, neither so long nor so much curved as those in common use, which can be equally well

introduced, and from not being too long, is not so apt to pass over the stone. The instrument may be either introduced, the patient standing and bending forward his body, or after laying him on his back on a bed or couch, with his knees drawn up, and his thighs extended;—perhaps it is better to lay him in this posture on a carpet on the floor: the surgeon then kneeling by his left side, and taking a steel sound, heated and oiled, in his right hand, introduces its point into the urethra, with its concave side towards the pubis, while with his left, he grasps and stretches the penis on the sound; he then pushes it gently on, until he finds he has passed the instrument as far as it will go, while the penis is held over the pubis; he now depresses the handle of his instrument, and it generally starts into the bladder. There is much cunning in this operation; it can never be accomplished by force; the art is acquired only by much practice; and those who have an opportunity of trying it on the dead body, should be at much pains to acquire this slight of hand. If the point of the staff catches on any of the rugæ of the urethra, the surgeon should not use force in pushing it on, as he is in danger of driving it through, and forming a false passage, particularly if he is at the membranous part; he should then withdraw it a little, and try it again. If it catches upon the neck of the bladder, by introducing the forefinger of the left hand into the anus, he will be enabled to raise up the point of the sound, when it will pass very easily. As soon as the staff is in the bladder, the surgeon should take hold of its handle with his right hand; if the stone is large, he will in general have felt it in passing the staff along, and will strike it immediately on entering the bladder, and the touch will convey a sensation which cannot be described, but which cannot be mistaken. It fre-

quently happens that the stone is not easily discovered, by the instrument passing over it; he should therefore introduce the fore and middle fingers of his left hand into the rectum, and by pressing upwards he will bring the stone into immediate contact with the instrument; but, independent of this, although he should feel the stone distinctly, he should never omit this kind of examination, as by it he ascertains the size, the situation, and even the shape of the stone. When the sound is, therefore, withdrawn, and the patient standing in an erect posture, he should be examined by the rectum; and no patient should be cut without this examination. If a small stone is sticking in the end of the urethra, or in the point of the ureter; or sabulous matter is impacted in the prostate gland, it may produce such a sensation as to mislead the surgeon; but he can never be deceived who has been at pains to feel the stone through the coats of the rectum and bladder.

The patient who is so unfortunate as to have a stone in the bladder, can only be freed from it by undergoing a surgical operation; the various methods of attempting which we now proceed to explain.

OF THE

APPARATUS MINOR, CUTTING ON THE GRIPE,

OR

CELSUS'S METHOD.

IN the earlier ages of surgery, when anatomy was little attended to, or little known, surgeons had recourse to the simplest method of extracting the stone from the bladder. The most ancient way of cutting was that practised upwards of two thousand years ago by Ammonius at Alexandria, in the time of Herophilus and Erasistratus, and by Meges at Rome during the reign of Augustus: being described by Celsus, it is hence denominated Lithotomia Celsiana. Celsus, however, considered it as an operation so dangerous, that he says, "it is not to be undertaken precipitately, nor to be attempted in every season, nor at all times of life, nor in every degree of the disease, but only in the spring, upon patients whose age exceeds nine years, and not four-

teen." Although Celsus gives us these directions, it is an operation more easily performed on children, than on boys or youths; and from no other method of operating having been known or practised for nearly two thousand years, it came in succeeding times to be practised on patients of all ages, and in all states of the disease. From cutting directly on the stone, fixed by the pressure of the fingers in the anus, it has been called cutting on the gripe: The only instruments used were a knife and a hook.

When Marianus described to the world, in the beginning of the sixteenth century, the operation of his Master, Johannes de Romanis, this antique operation received the name of cutting with the *LESSER APPARATUS*, to distinguish it from his method, which, on account of the number of instruments employed, was called cutting with the *APPARATUS MAJOR*. The manner of operating was this: The rectum was emptied by a glyster a few hours before the operation; and immediately before cutting, the patient was desired to walk about his chamber, to bring the stone down upon the neck of the bladder; he was then placed in the lap of an assistant, or secured as now in the lateral operation: the surgeon then introduced the fore and middle fingers of his left hand, well oiled, into the anus, while he, at the same time, pressed with the palm of his right hand on the lower part of the abdomen above the pubis, to assist in bringing down the stone: he then grappled it; brought it forward to press on the neck of the bladder; and made it protrude, and form a tumor on the left side of the perinæum. He now took the scalpel, and made a lunated incision through the skin and cellular substance, directly on the stone, and near the anus, down to the neck of the bladder, with horns pointing downwards to the hips. He then made a second incision transversely through the neck of the bladder; and

the stone, being strongly pressed upon by the fingers, started out into his bosom, or was picked out with a hook provided for the purpose.^a

From this description of the operation, it is manifest, that the same parts can never be cut alike in two patients. The parts cut must depend both on the bulk of the patient, and on the force with which the stone is protruded, to form the tumor in the perinæum. If the parts are forcibly protruded, and if the patient be lean, the incision will pass beyond the prostate gland, divide the vesiculæ seminales, and produce the same effects as castration; if the parts are not sufficiently protruded, and the patient fat, the incision will not reach the bladder, but separate the urethra from its neck, and produce incurable fistula; and, lastly, if the parts are just sufficiently protruded, the bladder will be cut upon its neck through the substance of the prostate gland. From the simplicity of the operation itself, and from the dexterity with which it was often performed by itinerant operators, it continued long in repute. It was the chief operation of quacks; it was longer practised than all the other methods for lithotomy put together; and was performed at Bourdeaux, Paris, and other places in France, on patients of all ages, by Raoux, even so late as one hundred and forty years ago.^b It was one of the operations of Frere Jacques, for he had two; in performing it he made a longitudinal instead of a lunated and transverse incision. It was practised with

^a Vid. Celsus, lib. vii. chap. 26.

^b Voyez Remarques sur la Chirurgie de Chauliac, par M. Simon de Mingelouzeaux, Tom. II. Bourdeaux, 1663. La Légende du Gascon; par Charles Drelincourt, Paris, 1665. Van Horne Opuscula, p. 450. Lips. 1707.

great success by Heister;^{*} and, when a staff is used to prevent the wounding of the urethra, it is still the preferable way of operating in boys. Instead of driving a gorget into the bladder of a child, which, from the smallness of the parts, is a most perilous stroke, even in the hands of an expert surgeon, we would introduce a small staff, cut upon it till we reached the bladder, then introduce the fore and middle fingers, well oiled, into the rectum, bring forward the stone, and, by cutting directly upon it, force it out. There is here no difficult dissection; no depth of parts; no protracted sufferings; no mangling with the forceps; no possibility of doing harm,—the staff prevents the bladder from being severed from the urethra. It is performed in two minutes; and this method of operating we would invariably recommend in operating on boys under fourteen years of age.

* Vid. Heister's Surgery, Part II. chap. cxi.

OF
THE APPARATUS MAJOR,

OR
MARIANUS'S METHOD.

THIS was the cruelest and most bloody operation that ever was performed on the human body. It has been called cutting with the Apparatus Major, from the number of instruments employed; and the Marian method, from being first communicated to the world by Marianus Sanctus, in the year 1524, as the invention of his master, Johannes de Romanis.*

It appears to have been a confused operation, and to have undergone, at different times, and in different countries, various important changes, chiefly with regard to the form and use of the instruments; but the general manner of performing it was this:—The rectum was emptied by a clyster a few hours before the operation, and the patient was secured as in the lateral

* See Marianus's Treatise, De Lapide Vesicæ per Incisionem Extrahendo.

method. The operator then took a grooved staff, oiled; passed it along the urethra into the bladder; and its handle being carried over the right groin, the convex part was felt for in the perinæum, on the left side of the rapha: It was then given to an assistant, who kept it firm with one hand, while, with the other, he held up the scrotum. The surgeon took then his lithotome, or scalpel, and, kneeling on one knee, began his external incision upon the staff, immediately behind the scrotum, and carried it downwards to within two fingers breadth of the anus: His next incision cut through the accelerator muscles; entered the urethra at the bulb; passed through it, and through a portion of the membranous part of the urethra: the rest, viz. the neck of the bladder, and the prostate gland, was to be dilated; along the groove of the staff he now passed the first of his dilating instruments, called a Male Conductor; and, after withdrawing the staff, he adapted to it its counterpart the Female Conductor, which he also pushed on into the bladder, and by boring, turning, and opening the handles of these instruments, he began to dilate, or rather to lacerate, the neck of the bladder, prostate gland, and membranous part of the urethra. When he had worked some time with these instruments, and stretched the parts so completely as to admit the forceps, he slid them along betwixt the two conductors, with which he dilated still farther; and after having satisfied himself of the extent of the lacerations, he extracted the stone if the opening was sufficiently large, if not, he either broke it, or allowed it to remain.* Previous to the introduction of the female conduc-

* Vid. Marianus, Hildanus, Collot, Tollet, Le Dran, &c.

tor into the bladder, the Collots, (who were, in the era in which they lived, the greatest lithotomists in Europe,) and some other operators, passed along the male conductor an instrument called a Dilator, with which they stretched the passage most violently; but this dilator was rejected by Marechal, as a superfluous cruelty, and laid aside by succeeding lithotomists, who found they could dilate sufficiently by divaricating the handles of the forceps.

Instead of the male and female conductors, Le Dran,^a and some of the French surgeons, used the conductor of Hildanus, which they called a gorget; this instrument they thrust in along the groove of the staff, and forced the neck of the bladder; they then introduced the forefinger of the left hand, along the groove of the gorget, with which they dilated so much as to allow the forceps to be passed shut into the bladder. It seems strange and unaccountable, that all the regular surgeons of Europe should have abandoned the simple operation by the apparatus minor, which could be performed in a few minutes, and which had been practised for so many ages, for one so cruel, unnatural, and bloody as this; one in which so many murderous instruments were employed; which was so tedious in the execution; having, besides, many defects.

1st, The incision in the Apparatus Major did not pass the anus; the urethra was opened at the bulb; the operator did not cut into that deep triangular hollow in which lies the membranous part of the urethra, and the prostate gland, as in the lateral operation, and which is the

^a Voyez Parallele des Differentes Manieres de Tirer la Pierre Hors de La Vessie, Par Le Dran. Paris, 1730.

only opening that can admit of a free extraction of the stone. The transversalis perinæi muscle, which stands as a bar across this cavity, was not cut; therefore the stone could not be extracted without great difficulty, much contusion, and extensive laceration.

2dly, By opening the urethra at the bulb, they cut into that part of it where the branches of the artery of the penis enter, and profuse hæmorrhagy from its cavernous body ensued.

3dly, By the cruel methods which they employed in dilatation, they often lacerated the neck of the bladder; frequently tore it from the membranous part of the urethra; and in three cases out of four produced impotency, and incurable fistula for life.

4th and lastly, By the contusion, laceration, and long suffering, their patients often died on the third or fourth day.

Notwithstanding the mistaken principles on which this diabolical operation was founded, these cruelties continued to be performed for two hundred years, and it was the sole operation of Paree, Le Dran, Dionis, Le Cat, Mery, Morand, Marechal, Raw, and all the best surgeons in Europe; until Frere Jacques made his appearance in Paris in the year 1697, and taught surgeons a new method of operating, which is the foundation of the operation now in use. But before Frere Jacques' method (adopted by Raw, and published to the world by his assistant Albinus) was known in England, so much was Douglas shocked at the horrors and dangers of the Marian operation, that he began, in 1719, to practise a method first described by Peter de Franco, a surgeon of Turriere, in Provence, in the year 1561, called the High operation, which we shall now proceed to explain.

OF
THE APPARATUS ALTUS,
OR
HIGH OPERATION,

Revived by DOUGLAS, and Performed by CHESSELDEN and other English Surgeons.

THE high operation for lithotomy came into use at a time, when a new method of operating was much desired: the operations of Frere Jacques and Raw were but imperfectly understood in England, and any method was preferable to the apparatus major. De Franco first invented this manner of cutting; he performed it on a child with success, and published an account of it in his *Traite' des Hernies* in 1561. It was afterwards commended by Rosetus, in his book *De Partu Cæsario*, although he never practised it. It was performed by Bonnet in the Hotel

Dieu,^a in England by a Mr Proby in 1700,^b and by Greenfield in 1710;^c but it never was in general use until Douglas began to perform it in 1719,^d when he was followed by Chesselden in St Thomas's, (who cut nine, losing one only), and by all the other surgeons of the London hospitals, and generally by the other lithotomists in Britain, by Heister at Helmstadt in 1723,^e and by Morand at Paris in 1727.^f The object of the operation is to reach the stone by cutting into the upper and fore part of the body of the bladder, and the manner of performing it by the English surgeons was as follows: The patient was laid upon a table, with his legs hanging over the edge, his breech somewhat elevated, and pillows placed below his head and shoulders to relax the abdominal muscles; being then well secured by sturdy assistants, a method preferable to that by ligatures, a catheter with an ox's ureter attached to the end of it, was passed into the bladder, by means of which, and a large syringe, it was filled with tepid water, as full as the patient could bear, without exciting great uneasiness, to the amount of twelve or sixteen ounces of fluid. The catheter was then withdrawn, and a ligature passed round the penis, or an assistant grasped it with his hand, to prevent the injected fluid from escaping. This part of the operation must be

^a Voyez Traite de la Lithotomie, Par Tolet, chap. 15.

^b Philosophical Transactions for the year 1700.

^c See Greenfield on the Stone and Gravel, 1710.

^d Vid. Lithotomia Douglassiana, or a New Method of Cutting for the Stone. Lond. 1723.

^e Heister's Surgery, Part II. chap. cxlii.

^f Morand de Alto Apparatu.

done very slowly, and conducted with great caution, as the bladder may be actually rent by a too sudden and forcible distension; and as the sudden distension creates great pain, it will perhaps be better to put a ligature round the penis eight or ten hours before the operation, and by making the patient drink of barley water, tea, or other diluting fluids, the bladder will be so distended, if not diseased, as to be felt above the pubis. The pubis being shaved, the surgeon next took his scalpel, and made an incision in the course of the linea alba, beginning four inches above the pubis, and carrying it down through the skin and cellular substance to the symphysis, which brought the sheath of the rectus muscle into view. The next incision passed through the rectus and pyramidal muscles, into the cavity of the pelvis. The peritonæum was then felt as a septum betwixt this cavity and the abdomen. The surgeon now with his left hand pressed back the peritonæum and small intestines, while with his right he opened the body of the bladder, into which he passed the fore finger of his left hand to raise its fundus and keep it firm, while with his right he run his history down towards its neck, until he made an opening sufficient for the extraction of the stone. Into this opening he passed down the fore finger of the left hand, to feel the stone, and guide the forceps with which it was to be extracted; the integuments were then brought together, and retained by means of the twisted suture.*

Although this is no doubt one of the easiest, and, to all appearance the safest method of operating, it is subject to many inconveniences.

* See Douglas, Chesselden, Middleton, Sharpe, &c.

1st, It frequently happens, from the continual irritation in which the bladder is kept by the stone, that its coats become too much thickened and contracted, to allow it to be sufficiently distended to rise above the pubis; and if this be the case, the incision for the high operation will not reach the bladder, but pass through the peritoneum into the cavity of the abdomen.

2dly, If the operator should chance to break the stone in its extraction,—though of this, it must be acknowledged, there is less danger,—the bladder cannot be so easily washed out, nor the small fragments carried away by the urine, as in the lateral method; some of them may remain, and form a nucleus for a future stone.

3dly, The urine sometimes does not pass very freely by the wound, but, by insinuating itself into the cellular substance, excites inflammation, and forms sinuses.

4thly, The peritoneum, like the other membranes which line the great cavities, is very susceptible of inflammation; and, from its vicinity to the wound, or from being roughly handled, is liable to become inflamed, and produce general inflammation of the abdomen.

5thly, If the bladder is to be filled by injection, much cunning is required in accomplishing it. If too much fluid be thrown in, it excites great pain, relaxes its fibres, and destroys its tone: if not sufficiently distended, the incision will not reach it.

6thly, and lastly, It is observed, that the wound does not heal so readily in the high as in the lateral operation; which must arise from the contractile power of the sphincter shutting

closely the neck of the bladder, and allowing no urine to escape; therefore, when the detrusor urinæ acts, the urine will be more readily expelled by the wound, than by the urethra.

These are weighty objections, and must for ever preclude the general use of the high operation.

We shall proceed next to consider the history of the lateral operation, and the various changes and improvements it has undergone from the æra of Frere Jacques' innovations, until the invention of the cutting gorget by Sir Caesar Hawkins.

HISTORY
OF
THE LATERAL OPERATION.

I. *Frere Jacques Operation.*

ONE method of operating has been called the Lateral Operation, from the prostate gland and neck of the bladder being cut laterally. It was first invented by a French ecclesiastic of the name of Frere Jacques, and perfected by our countrymen Bamber and Chesselden.

Frere Jacques, a fearless and uneducated man, first appeared at Paris in the month of August 1697. He performed his first operation on a dead body, in the presence of Mery and the other Parisian lithotomists; and in the following year cut, by the king's license, in the hospitals of the Hotel Dieu and La Charite'. He cut all who offered, without regard to age, or

constitution, or the circumstances of the disease; never prepared his patients by bleeding or purging; and never attended to their after treatment. His sole aim was to extract the stone; and so great were the numbers which presented themselves, and such the facility and boldness with which he operated, that he has cut nine patients in three quarters of an hour.

He never tied his patient, but laid him on a table, with a pillow under the head; the thighs elevated; the heels bent back towards the buttocks, and secured in this position by assistants. He used a big round staff without a groove; and, after having passed it into the bladder, he laid hold of it with his left hand, and, by depressing the handle, made, or attempted to make that part of the bladder which he meant to strike protrude, in the perinæum; then taking in his right hand a long bistoury, shaped like a poignard, he struck it into the left hip, near the tuber ischii, two fingers breadth from the perinæum, and driving it onwards towards the bladder, he opened it in its body, as near the neck as he could, directing his incision upwards from the anus; he never withdrew his knife, until he had made an opening proportioned to the size of the stone. He used sometimes a conductor to guide the forceps, but more commonly he directed them with his finger, which he thrust into the wound after withdrawing the knife. When he had laid hold of the stone, he drew it out quickly and rudely, without reflecting on the bad consequences which might follow. If there were more stones, he again introduced the forceps, and extracted them as he did the first. This being performed, he believed his work perfect, and took no charge of his patient.

He seldom entered his knife precisely at the same point. Sometimes he struck the body of the bladder, and sometimes its neck; and, by such irregular incisions, the urethra was often separated from the bladder, and many of his patients had fistula for life. The bladder was sometimes wounded in various places; and not unfrequently he wounded the rectum, and sometimes cut the pudic artery, and produced profuse or fatal hæmorrhagy. From these causes, and from the rudeness with which he extracted the stone, many of his patients on whom he had operated, both in the Hotel Dieu and in La Charite, died. His inveterate enemies, the regular lithotomists, rejoiced at such occasions of reproach, and he was driven from Paris in disgrace.

He then travelled into the Provinces, where he continued to operate; and, in 1699, he made his appearance in Amsterdam and Leyden. Still his career was followed with the same uniform ill success, until Mr Fagon, the king's physician, struck with the dexterity of the operator, and with the superiority of his method over the Apparatus Major, invited him to live in his house, and persuaded him in 1700, to go through a complete course of dissections under that able master Du Verney.

Having made himself well acquainted with the anatomy of the parts, and, at the suggestion of Mery, laid aside his thick round staff for one with a groove, he now operated correctly, and with a success exceeding all belief. He laid aside also his dagger-pointed knife, and cut with a scalpel. He performed his incisions upon regular anatomical principles, and, like the modern lithotomists, reached the bladder by successive incisions; and he never forsook the groove of his staff until he had reached the stone. He cut thirty-eight patients at Versailles, without

losing one. In 1712, and the beginning of the following year, he cut sixteen patients at Strasburgh, with the loss of one only; and he cut twenty-two at Paris, in the hotel of the Marechal de L'Orges, with complete success: In short, he now operated so correctly, that, I believe, he lost fewer patients than we do in the present day, operating with the gorget. To this bold and ignorant man, who cut, in the course of his life, nearly five thousand patients, we are indebted for the Lateral Operation; and although he was persecuted by the regular lithotomists of that age, he continued to be imitated by Marechal at Paris, by Raw in Holland, and by Bamber and Chesselden in England, where his operation was perfected, and reduced to anatomical principles, and a fixed method.^a

Professor Raw's Operation.

Johannes Jacobus Raw, the most celebrated lithotomist that ever lived, was once a surgeon in the Dutch navy, and afterwards applied himself so studiously and so successfully to the cultivation of anatomy and surgery, that in 1713 he was called to succeed Bidloo in the first chair of the University of Leyden, at that time the greatest medical and surgical school in Europe,

^a For the particular history of this extraordinary man, and his manner of operating, my reader may consult Bussiere's Letter to Sir Hans Sloane, in the Philosophical Transactions for 1699. Observations Sur la MANIER DE TAILLER, dans les deux Sexes, pour l'Extraction de la Pierre, Pratiquée par Frere Jacques, par Jean Mery. Lister's Journey to Paris in the year 1698. Cours d'Operations de Chirurgie, par M. Dionis. Garengeot's Traité des Operations de Chirurgie, Tom. II. Morand Opuscles de Chirurgie, Part II, &c. &c.

and was afterwards crowned with the highest academic honours that country could bestow. He was occupied in teaching anatomy and practising surgery in Amsterdam, and in performing, in common with the other surgeons of Europe, the Marian Operation, when Frere Jacques first appeared in that city. He was always present at his operations, which he vehemently condemned, while he applied himself more closely to the study of lithotomy. Frere Jacques, in his first operation, used a staff without a groove; and Raw, an excellent anatomist, being permitted by the magistrates to examine those who died, saw the fatal irregularity of his incisions, and the whole dangers of his operation; he therefore attempted to improve upon it, by cutting into the body of the bladder behind the prostate, leaving the neck entire. This method, difficult to practise, and full of danger when accomplished, (from the urine lodging in the cellular substance upon the rectum, and producing fistula), plainly could not succeed. While Raw was dabbling at this unsuccessful operation, Frere Jacques again made his appearance, and performed his second and more improved operation, founded on the anatomy of the parts, using a staff with a groove. It appears very evident, that this was the operation imitated by Professor Raw, which he afterwards continued to practise with success during the remainder of his life; yet he had not the generosity to avow this, and while (for the love of gain) he had the avaricious meanness to conceal his method, he had also the disingenuity to impress the profession with a belief, that he still continued to cut into the body of the bladder, and leave the neck entire. This DECEIT of Raw's was first made known to the world by Dr Ferrius in his *Inaugural Dissertation de Calculo Vesicæ*, published at Basil in 1716, and afterwards more particularly by his

pupil Albinus in the year 1725. This disingenuous proceeding was the occasion of many murders both in Paris and London. Chesselden confiding in the veracity of Albinus, and trusting to his description, imitated him, and many of his patients died in extreme misery. From the manner in which he operated, and from his success, it appears very clear, that he cut the same parts with Frere Jacques, and performed actually, point for point, the same operation; the only difference I can perceive from beginning to end is, that he used ligatures, and secured his patients by tying their hands to the knee, while Frere Jacques trusted solely to assistants. The invention of the grooved staff claimed for him by Albinus, had been long before proposed by Mery, and also recommended by Duverney and Mr Fagon. Raw cut in the course of his life upwards of three thousand patients; but by concealing his manner of operating even from his best friends, and deceiving those who ought to have possessed his confidence, he has stamped his name with a reproach, which all his talents, and all the good deeds of his life will never efface.*

Chesselden's First Operation.

Chesselden was performing the high operation in London, when Albinus, in 1725, first published the method of Raw. Chesselden, well acquainted with the dangers of the high operation, immediately abandoned it, and appears to have had no higher ambition at first, than to

* Vid. Albinus's *Index Supellectilis Anatomicae*, &c. Ludg. Batav. 1725.

imitate Raw; and as it was his turn, the season following that in which the dissertation of Albinus was published, to operate in St Guy's and St Thomas's, he attempted to perform lithotomy by cutting into the body of the bladder, behind the prostate gland, leaving the neck entire, according to the direction of Albinus. To render this deep incision easy, he moderately distended the bladder with tepid water, as in the High Operation, by means of a catheter and syringe, mounted with an ox's ureter. He then took a scalpel, and beginning his incision about an inch above the anus, on the left side of the rapha perinæi, betwixt the accelerator urinæ and erector penis, he carried it downwards by the side of the sphincter ani, a little obliquely outwards, from two and a half to four inches in length, according to the age of the patient and size of the parts; and this first incision he always endeavoured to make by one stroke of the knife. He now passed the fore finger of his left hand into the middle of the wound, with which he pressed the rectum to one side to avoid wounding it, and then taking in his right hand a crooked bistory, he passed it along his finger, and entered the point of it into the bladder between the vesiculæ seminales and os ischium of the same side; then lowering the hand, he carried this incision upwards, until the point of his knife came out at the upper extremity of the first incision. Having thus made an opening sufficiently large, he with the forceps extracted the stone.* He saved the neck of the bladder entire; and imagined by so doing, that he should prevent fistula, an accident which had occurred very frequently to Frere Jacques, and to those performing the Marian operation. This was his first operation, and al-

* Postscript to Dr James Douglas's History of the Lateral Operation, 1726.

though he found little difficulty in cutting into the body of the bladder, yet from this deep incision, the urine did not pass freely by the external wound, but insinuated itself into the cellular substance surrounding the rectum, causing those very accidents, which this manner of cutting was intended to prevent. Four patients out of ten, on whom he performed this operation, died in extreme misery; and Chesselden soon perceived that Albinus, though long the pupil and assistant of Raw, was no better acquainted with his operation than himself.

Chesselden's Second Operation.

Having lost more than one-third of the patients on whom he had operated, according to the directions of Albinus, and being, in those who survived, much perplexed with fetid fistulous sores in the cellular substance surrounding the rectum, he, disregarding all authorities, betook himself to a new manner of operating, founded on the anatomy of the parts. He divided a portion of the membranous part of the urethra, the neck of the bladder, and prostate gland. He began his incision near the place where the incision of the Apparatus Major ended, carrying it down betwixt the accelerator urinæ and erector penis of the left side, and by the side of the rectum. He then felt for the staff, and cut upon it; and while he held down the intestine with one or two fingers of the left hand, he entered the urethra close by the prostate gland, and divided the neck of the bladder, by carrying forwards the knife, and then with the forceps

extracted the stone.^a—This is the operation which Chesselden taught Morand, and which Morand performed at Paris in 1730.^b

The French surgeons were occupied at that time in performing the Marian Operation; and it so happened that very year, that the superiority of the Lateral method over the Apparatus Major was clearly demonstrated. In the public hospital, eight patients were cut by Perchet, and eight by Morand, according to Chesselden's method, of whom one only died; whereas, out of twelve, cut at the same time by the Apparatus Major, no less than five died. However, notwithstanding Chesselden's general success, he experienced two difficulties in this operation, which soon induced him to change it, or rather to reverse his incisions, for he still continued to divide the same parts.

1st, By carrying his knife forward, he found it very difficult to avoid wounding the rectum, and actually cut it in two different cases.

2dly, When the stone was large, he frequently experienced considerable trouble in the extraction, from the opening in the prostate not being sufficiently large; he therefore resolved once more to change his manner of cutting.

^a Appendix to Chesselden's Anatomy, 1730.

^b Voyez Morand's Opuscles de Chirurgie.

Chesselden's Third Operation.

He made his external incision, as in his last operation, from above downwards. He began it immediately behind the scrotum, on the left side of the perinæum, and carried it downwards, and obliquely outwards, until he passed the middle of the margin of the anus, about half an inch distant from it, in short at nearly an equal distance from the anus and the great protuberance of the ischium. He then dissected by the side of the rectum until he reached the bladder; and, turning the back of his knife to the gut, he struck its point into the groove of the staff through the coats of the bladder, immediately behind the prostate, and drawing it towards him, divided laterally the neck of the bladder, and membranous part of the urethra.*—This operation he continued to practise until his death in April 1752.

When Douglas, in the year 1731, published an account of this operation, Chesselden had cut after this method fifty-two patients, losing two only; and when Chesselden himself wrote his "Short Historical Account of Cutting for the Stone," he had publicly cut in St Thomas's, two hundred and thirteen patients, of all ages, and in all conditions of the disease, of whom only twenty died.

Although Chesselden had reduced the operation of lithotomy to fixed principles, founded on the anatomy of the parts, and performed it with remarkable success, surgeons, instead of em-

* Appendix to Dr James Douglas's History of the Lateral Operation, 1731.

ploying themselves in acquiring a correct knowledge of the parts to be cut, began to invent various instruments, by which they reduced the operation to mechanical principles, and placed on the same footing the anatomist and the tyro, the ignorant and the skilful. The incisions, according to all those mechanical methods, are either inadequate to the extraction of the stone, or are attended with the greatest danger; and, amidst all the instruments, there is none more dangerous than the gorget of Sir Cæsar Hawkins, now so generally used. I am decidedly of opinion, that the introduction of complicated machinery into surgery, and the invention of a multiplicity of instruments, has tended rather to retard than to advance the progress of the art. The man who is a good anatomist can accomplish every thing with the knife; and, when operating, feels resources within himself, which an exact knowledge of his subject can alone supply.

MECHANICAL INVENTIONS.

Of the instruments invented, for the operation of lithotomy, during the last century, there are four only which deserve to be mentioned;—two, the invention of two regular French practitioners, Messrs Foubert and Le Cat; one, by a French ecclesiastic, Frere Cosme; and the cutting gorget of our English surgeon, Sir Cæsar Hawkins.*

* For an account of various inventions of lesser moment,—such as the beaked director of Le Dran, the trocar and concealed knife of M. Thomas, the lithotome and conductor of Mr Daunt of Dublin,—my reader may consult Le Dran's *Operations of Surgery*, *Mémoires de l'Académie Royal de Chirurgie*, Tom. IX., and Dease on Lithotomy.

Although Foubert and Le Cat were occupied, during the greater part of their lives, in making experiments, and improving the form of their instruments, yet their methods appeared so plainly dangerous, the incisions so intricate, the instruments so useless, that no surgeon, either in France, or any other part of Europe, ever thought of employing them. The complicated trocar of Foubert, and the almost unintelligible Gorgeret-cistotome-dilatoire-compose' of Le Cat, we shall therefore not attempt to describe, but proceed to the description of Frere Cosme's bistouri cache'e, and the cutting gorget of Sir Cæsar Hawkins.

Frere Cosme's Bistouri Cachee.

Of all the instruments which have substituted mechanical skill for professional knowledge, I think the concealed bistouri of Frere Cosme, invented about the middle of last century, infinitely preferable to every other. It is now much used in several parts of the continent, particularly in France, and also by some of the first surgeons in London.*

Frere Cosme performed the same external incisions as in the lateral operation; and, after dividing the membranous part of the urethra with his scalpel, he inserted into the groove of the staff the point of his bistouri, and carried it forwards into the bladder. He then withdrew the staff, turned his knife laterally, and by raising it from its sheath, and drawing it towards him, made an incision in the neck of the bladder, proportioned in size to the angle which the knife, when raised, makes with the handle, and similar to the incision of the gorget. He then

* By Mr Lynn of Westminster Hospital.

introduced the forceps, either upon the fore finger of the left hand, or upon a blunt director, and extracted the stone.*

This operation with the bistouri cache'e is subject, like other mechanical inventions, to great inconveniences and uncertainties, and is many ways dangerous; but the dangers are not of so formidable a nature as those which attend the use of the gorget. It is not a naked weapon, like the gorget, apt to slip from the groove in the staff, and to be driven into the rectum. It alarms the spectators with nothing like the horrible plunge of the gorget: no danger can happen until it is fairly lodged in the bladder; but if the instrument be too far introduced, and the blade too much elevated from the sheath, in withdrawing it to make the incision, the fundus of the bladder will be inevitably wounded; whilst, on the other hand, if the incision be not free, the prostate gland being imperfectly cut, the forceps can hardly be introduced; the stone cannot possibly be extracted without much violent turning and pulling, with laceration; and the patient dies of inflammation, in dreadful agony. It is also possible, by raising the knife too much, to cut the pudic artery, or, by inclining its edge too much downwards, to wound the rectum. Although these two accidents have happened even in the hands of Frere Cosme himself, still, I conceive, they may be easily avoided, and can only occur to a rash operator: even if the rectum were wounded, it is by no means a dangerous accident; the wound will easily heal, or, at worst, form fistula in ano, requiring the operation. It appears to me, that the only dreadful accident which can happen

* Voyez Journal de Verdun, 1748.

is the wounding of the fundus of the bladder ; yet, were I to use any other instrument than the knife, I should most assuredly prefer this bistouri cachée to the gorget. It is liable to no inconvenience which the gorget has not ; and it is exempted from many of its dangers, as we shall presently see.

Hawkins' Cutting Gorget.

The invention of the cutting gorget, and its introduction into practice, I hold to be the most dangerous innovation in the whole mechanical department of surgery. It is nothing but the conductor of Hildanus, with a cutting edge. It was one of the instruments used in the Marian Operation, as a dilator and conductor for the forceps ; and it was imagined by Sir Cæsar Hawkins, that, by sharpening its right side into a cutting edge, it might be pushed safely on into the bladder, guided by the staff, and make the true lateral incision in the left side of the prostate gland more easily, and with less risk of injuring the adjacent parts, than it could be done by Chesselden with the knife ; but, alas ! it has led many to attempt an operation, with the anatomy of which they were wholly unacquainted ; and has occasioned the death of numbers, even in the hands of expert surgeons. There are dangers in using the gorget even before it reaches the bladder. At the moment in which it is driven into the bladder, the danger is extreme ; and I am confident, that no man of feeling ever witnessed the plunge of the gorget without an inward horror, nor did it without reluctance. Its dangers are many and manifest.

1st, The beak of the gorget is apt to slip from the groove of the staff, before it reaches the neck of the bladder, and be driven into the pelvis. This has happened in the hands of good operators; and most assuredly will happen, if the surgeon depresses too much the handle of his staff while he pushes the gorget forwards.

2dly, If the operator pushes his gorget onwards too horizontally, the prostate gland, being moveable, will recede, the gorget slip from the groove in the staff, and be driven betwixt the rectum and the bladder.

3dly, If the surgeon, or assistant, depress the handle of the staff too much over the right groin, according to the directions of modern writers, with the idea of making its bend or heel be distinctly felt in the left side of the perinæum, the point of the staff will slip out of the bladder, and, when the surgeon has completed his external incisions, it will start through the membranous part of the urethra, and in that case, pushing his gorget on by this false guide, he will drive it betwixt the bladder and the rectum. I am confident, that this has happened in some cases I have seen, where the surgeon failed to extract the stone, and where, upon dissection, it was found, the bladder had never been cut.

4thly, It is uniformly acknowledged by the best surgeons, that the gorget cuts the prostate gland very imperfectly. Its incision sometimes admits with difficulty the introduction of the forceps; and, if the stone is large, is quite inadequate to its extraction without dreadful laceration, as may be seen from comparing the breadth of the instrument with a stone in the fifth drawing.

5thly, If the cutting part of the instrument be made broad to provide against the last accident, it enters the pelvis with difficulty, grates against the bone, by which the pudic artery is sure to be wounded, and the patient brought into danger by a hæmorrhagy, which generally proves fatal. This may also happen when the cutting part of the gorget is narrow, if the surgeon incline the staff too much to the left side, while he pushes it on into the bladder.

6thly, Whenever the gorget enters the bladder, the patient feels an irresistible inclination to press downwards, by which the fundus of the bladder is pressed against the point of the instrument; and if it be kept long in the bladder, to serve as a conductor for the forceps, this generally happens. It is also possible for a rash surgeon, to push it on with such a degree of violence as to transfix the bladder.*

7thly, When the gorget has been successfully introduced into the bladder, and all the dangers avoided which we have already enumerated, unless the operator be very careful in withdrawing it in the very position in which it enters, it will make another incision; and even this has been accounted a danger so formidable, that our Professor of Anatomy^b has invented a double gorget, to guard against this accident.

I should conceive, that no instrument, liable to any of the objections so dreadful as those we

* See Earle on the Stone.

^b Dr Monro, senior.

have stated, could long maintain its place; and, for the reasons adduced, I should discard the gorget, and prefer any mode of incision to one, at once so avowedly unsuccessful, and so plainly murderous.*

* For various illustrations of the dangers of the gorget, see Mr John Bell's Principles of Surgery, Vol. II. In the cases where I have assisted Mr Bell in this operation, he never used a gorget. He uniformly cuts with the knife, and cares not how the staff is held, whether it be inclined to the one side or the other, if only it be fairly lodged in the bladder. Nothing can disappoint him in reaching the stone.

ON
THE PRESENT METHOD
OF
PERFORMING THE LATERAL OPERATION
WITH THE GORGET.

WHEN the existence of a stone in the bladder has been clearly ascertained by the sound, and its size and position in some measure decided by the introduction of the finger in ano, if the patient is free from acute pain, and do not labour under what is called a fit of the stone, the operation may be performed. If he is of a plethoric habit, sixteen or twenty ounces of blood must be taken from the arm two days previous to the operation. The day before, the bowels must be unloaded by a brisk cathartic; and two hours before cutting, the rectum must

be emptied by a glyster, to prevent it being wounded, to allow the free introduction of the finger, and in order that the patient may not soon be forced to go to stool. If, from the irritation of the bladder, he cannot retain his urine, the penis must be tied up with a ligature, or secured by a jugum, a few hours before the operation, whilst the patient drinks plentifully of tea, barley water, or other diluting fluid, the more effectually to distend the bladder.

The surgeon, or his assistant, must now arrange his instruments, which ought to consist of three grooved staffs, of various sizes; of a sharp gorget, with a beak nicely and accurately adapted to the grooves of the staffs, to glide easily and securely; of a large round edged scalpel, to make his incisions; of forceps, of various sizes, to extract the stone; of a blunt gorget, or conductor, to guide the forceps; of a blunt pointed bistoury, to enlarge the wound in the prostate gland, if the incision of the gorget is not sufficiently large to admit of the extraction of the stone;—for from incision no danger can arise; from laceration, dreadful pain, inflammation, and death;—of a pair of Le Cat's forceps, with teeth to break the stone if too large; of a glyster, bag and pipe, to inject the bladder if necessary, to wash out grumous blood, or particles of sabulous matter; and of two garters, each a yard and a half long, for ligatures to bind the patient.

Every thing being thus arranged, the patient is now to be laid on a firm table, about three feet high, with a blanket under him, and two pillows under his head and shoulders. The ligatures are to be doubled, and a noose put around each wrist; he is then made to

apply the palm of his hand to the outer edge of the foot, grasping the sole with his fingers : by taking several turns with the ligature, the wrist is bound down to the ankle, and the hand to the foot. Having secured the opposite hand and foot in the same manner, a pillow is to be slipped under his breech, which is made to project considerably over the edge of the table, while his arms and legs are supported by two assistants, one on each side ; the hair of the perinæum is shaved. The operating or assistant surgeon, without untying the ligature on the penis, now introduces the grooved staff, heated and oiled, into the bladder ; but before he begins his incisions, the surgeon should again distinctly feel the stone, both by the sound, and by the introduction of his finger into the rectum. He now gives the staff to his assistant, who holds up the scrotum with his left hand, while, with his right, he inclines the handle of the staff over the right groin, in order to make its convex part present on the left side of the perinæum ; but he should not depress the handle, with the view of making its rounded part protrude, otherwise he assuredly brings it out of the bladder, and its point will be ready to start through the membranous part of the urethra the moment the internal incisions are begun. The surgeon kneels, or places himself on a low seat, and taking the scalpel in his right hand, while he spreads the thumb and fingers of his left hand over the perinæum and hip, commences his incision at the place the staff begins to become convex, about an inch from the scrotum, and continues it in an oblique direction at equal distances from the tuber ischii and anus, the latter of which, in a big man, he should pass an inch and a half or more ; for it is a general rule in surgery, to make free

external incisions, as it allows the surgeon to conduct the remaining steps of his operation with greater facility, and no where is it so necessary as where the stone is to be extracted through the incision. In this incision the staff is no guide to the operator; for although he begins upon it, he immediately forsakes it, and is guided by the eye only passing betwixt the anus and tuberosity of the ischium. By repeated strokes of the scalpel, he divides the cellular substance, until he feels the transversalis perinæi, which he cuts across; and it is of the utmost consequence that this muscle be fairly divided, as it stands as a bar across that triangular hollow which can alone admit of the easy extraction of the stone. During this, the surgeon keeps the fore and middle fingers of his left hand deep in the wound; with his middle finger he presses down the rectum, and with his fore finger, turned upwards, he guides the point of his knife until he has laid the urethra bare, by dividing all the cellular substance, with the fibres of the levator ani which cover it. If the surgeon makes his incision in the urethra before he has clearly dissected the levator ani covering its membranous part and prostate gland, the contraction of the fibres of this muscle shuts the opening he has made, so that he cannot introduce the beak of the gorget; he should, therefore, be very careful that every muscular fibre be divided. Upon turning the point of his finger upwards, under the arch of the pubis, close upon the bone, he feels the staff, as if it were bare, through the membranous part of the urethra; and, pushing his finger onwards, he feels the firm prostate gland. He now turns the edge of his knife upwards to cut the urethra, which he should do at one stroke; he enters the knife close by the prostate, and pulling it towards him, should make an opening half an inch in length at least, as, with a smaller opening, he will find great difficulty in introducing the

beak of the gorget, upon the right management of which the safety of the operation entirely depends. Into the opening of the urethra he fixes the nail of the fore finger of the left hand, until an assistant hands him the gorget, the beak of which he slips into the groove of the staff. He now rises from his seat, places himself right before the patient, and taking the staff from the assistant surgeon, raises its handle from the right groin, so that it may form nearly a right angle with the body. He should now, before he attempts to push the gorget onwards to the bladder, slide it backwards and forwards, with a wriggling motion, that he may be sure its beak is in the groove of the staff. He now steadies his hand for a moment, is sure that the staff does not incline too much towards the left side; for in that case the gorget, although narrow, would enter the pelvis with difficulty, grate against the bone, and wound the pudic artery. Having now ascertained that every thing is right, holding the staff firm and perpendicular with his left hand, he slowly, with his right, pushes on the gorget, not straight forwards, but in an oblique direction upwards, keeping its beak close to the groove in the staff. The point of the gorget should be very sharp, and pushed on slowly, otherwise the prostate gland may recede, and start before it; by means of which the neck of the bladder not being cut, the instrument passes betwixt the bladder and rectum. By the want of resistance, and by the flowing of the urine, the surgeon knows he is in the bladder; and it is customary to withdraw the staff immediately, and allow the gorget to remain as a conductor for the forceps; but it also should be immediately withdrawn, for the gorget no sooner enters the bladder, than it is violently excited to contract, and the

patient irresistibly presses downwards, by which this viscus is very apt to be wounded in its fundus. The surgeon withdraws the gorget, as nearly as possible in the direction in which it entered, pressing it towards the right side to prevent it making a second wound in coming out. Before he attempts to introduce the forceps, he should pass his fore finger into the wound to feel if the parts are perfectly divided. If the levator ani is not completely cut, he should accomplish it with the knife; and if the prostate gland is not fully divided, he should insert the probe pointed bistory, guided by the fore finger of his left hand, with which the complete lateral division of the gland should be effected; for if it is not completely cut, it is impossible to extract a large stone without dreadful laceration: The surgeon pulls, turns, and twists his forceps, the stone slips; again he introduces the forceps, it slips again; he struggles in this manner for half an hour, until at last the parts tear, and the unhappy patient expires in a few hours, not of inflammation or gangrene, but merely of exhaustion. He should also endeavour to ascertain the exact position of the stone before he attempts to grasp it with his forceps, in which he will be greatly assisted by passing the fore finger into the rectum, and at the same time feeling with the point of the forceps. The surgeon will, in general, be enabled to pass the forceps upon the fore finger of his left hand; but if he should fail in this, he must pass into the bladder a blunt gorget, or conductor, upon which he can introduce the forceps. When once the forceps are introduced, the surgeon opens the handles, raises them, and depresses the points, by which he generally feels the stone at the anterior

and lower part of the bladder. If he passes over it, or cannot grasp it, he should introduce the fore and middle fingers into the rectum, and raise it up, by which he will, for the most part, seize it at once. He must now hold it moderately firm to prevent it from slipping from the forceps in the extraction; but must not grasp it so forcibly as to endanger its breaking. When he has once secured the stone, he proceeds to extract it, and great attention should be paid to this part of the operation. If he pulls upwards, it will catch upon the bones of the pubis, so that, using all the force of his body, he would find it impossible to deliver it. He must not pull in one uniform direction, but, by first depressing the handles of the forceps, then raising them up, then depressing them again, pulling at the same time, he will generally succeed. If he finds much difficulty, it may arise from the stone being caught in a transverse direction in the blades of the forceps; he should, therefore, introduce his finger, and in this case, attempt to change its direction, or let it go altogether, and catch it anew. If the difficulty arises from the size of the stone, rather than pulling and twisting with ineffectual attempts to extract it, (by which such a degree of laceration and inflammation may be produced as to endanger life,) it will be better to break it, either by the forceps with which he holds it, or by means of Le Cat's large forceps with teeth; taking care to extract all the small pieces, and to wash the fragments out with injections of tepid water, thrown in with a glyster-bag and pipe. If the stone is smooth on one surface, it is generally found that that smoothness is produced by the friction of other stones which are still in the bladder; but, when it is uniformly rough, it is

presumed there is no remaining stone. Those signs may be generally true, still no dependence should be placed upon them; and we should trust only to the touch of the forceps.

When all the stones are extracted, a piece of dried lint is applied to the wound, the thighs laid together, and the patient put in bed, with folded cloths under him to receive the urine; and he should have a large opiate, as after other great operations of surgery.

ON

OPERATING WITH THE KNIFE.

IN performing the operation of lithotomy with the knife, the bladder is cut with the same instrument with which the external incisions are accomplished. The cutting of the urethra and prostate gland is performed entirely by the direction of the finger;—the operator is working deep betwixt the rectum and bladder, and might accomplish his incisions in the dark as safely as at noon-day. Whoever has dissected, and made himself familiar with the parts cut in this operation, will find no difficulty in performing it with the knife: he is guided by what he feels, and what he knows; whereas, when operating with the gorget, he forsakes the guidance of his senses, and commits the fate of his patient to blind chance.

The same preparatory steps are taken in cutting with the knife as when operating with the gorget, except that no attention need be paid to the state of the bladder;—we cut as safely when it is empty as when it is full. Often in irritable and contracted bladders, it is impossible to have it so distended as to protect its fundus from the thrust of the gorget; it is therefore one great advantage of operating with the knife, that we cut with safety in every condition of the parts.

The patient is placed on a table, and secured by ligatures and assistants. A grooved staff is introduced into the bladder, and the urethra laid bare by the external incisions; but the operator then, instead of taking the gorget, continues to finish what he has begun with the knife.

The instruments are simple: a staff, a scalpel, and a pair of forceps. The staff may be solid, and without a groove, such as Frere Jacques used in his first operation; or it may have a groove on its right side, or on its convex part, like those in common use; but as a solid staff does not convey a distinct feel, and might be mistaken for the bone of the pubis, it will be better to employ the grooved staff in common use.

After the urethra is laid bare, the surgeon balances and adjusts the staff, and brings it to form nearly a right angle with the patient's body, feels that it is fairly lodged in the bladder, and then again commits it to the charge of his assistant: this enables him to use the fore finger of his left hand as a director in feeling for the groove in the staff, and in distinguishing the prostate gland; and with this finger he depresses the rectum, and directs the deeper part of his dissection. Feeling the gland with the point of the fore finger of the left hand, and the groove of the staff in the upper part of the wound, the assistant is desired to steady his hand, and the

operator holding his knife as he does a writing-pen, his fingers an inch and a half from the point, turns up its edge towards the staff, and strikes its point through the membranous part of the urethra into its groove, half an inch before the prostate gland. He now turns the back of the knife to the staff, slides it a little backwards and forwards in the groove, that he may be sure he has fairly entered; then shifts the fore finger with which he guides the incision, places it under the knife, and carries it always before the point of it, to prevent the rectum being wounded; he then lateralizes the knife, enters the substance of the prostate, is conscious of running the scalpel through its solid and fleshy substance, and judges by the finger of the extent of the incision which he now makes: The urine flows out; he slips in the finger into the opening, withdraws the scalpel, and gives it to an assistant, who hands him the forceps, which he passes into the bladder, using the fore finger of his left hand, which is still within the wound, as a conductor. The forceps instantly encounters the staff, which serves to conduct them safely into the bladder, while the finger guides them through the wound; and as soon as the forceps are laid in the bladder, the staff is withdrawn. Should there be any difficulty in grasping the stone, as it generally arises from the forceps passing over it, he must introduce his fore finger into the rectum, and raise it up.

This manner of performing the operation is liable to fewer accidents than any other, while it possesses advantages to which no other method can lay claim.

1st, It frequently happens, that when a patient has laboured long under calculus, the bladder is either in a thickened or contracted state, or has such a degree of irritability, as renders

it incapable of containing a table spoonful of urine, in this state, if either the bistouri cachéé or gorget were used, we should inevitably wound it in its fundus; whereas with the knife we operate in perfect safety.

2dly, It is evident, that, if the stone be large, the incision of the gorget must be quite inadequate to its extraction without laceration; nay, the incision of the gorget barely admits the forceps, so that the operator is in danger of passing them betwixt the rectum and bladder, and grasping the stone through the coats of the latter. With the knife he can safely enlarge his incision to any given dimensions.

3dly, There is no danger of the point of the knife, like the beak of the gorget, starting from the groove of the staff, and missing the bladder; we pass it along guided by the finger, and can enter the bladder safely in whatever position the staff may be held.

4thly, Whenever the incision in the neck of the bladder is completed, the knife is withdrawn, and there is no danger of making a second cut in removing it, nor of the bladder wounding itself by contracting around the instrument.

5thly, The only accident that is likely to occur, is the wounding the rectum; and although, by caution, this may be avoided, yet were it to happen, I do not conceive it to be of that alarming nature as to deter us from operating with the knife; it most commonly heals easily, and, at worst, would only form fistula in ano, curable by the operation; but, from what I have seen, I am confident, that it is frequently wounded by the gorget, and passes unnoticed, being productive in truth of no dangerous consequences.

I believe it must plainly appear to my reader, that the only safe way of reaching the stone is by cutting with the knife; and, upon taking a review of the different methods of operating, it will be seen, that Chesselden, in his third lateral, and what he considered his more improved operation, had, (in 1731, when Douglas published an account of it,) cut fifty-two patients, losing two only; and in his hospital practice, where generally the worst cases occur, he lost twenty patients only out of two hundred and thirteen on whom he had operated. Let surgeons search the records of hospitals for the operation of lithotomy since the invention of the gorget,—let them recal to mind the number of cases in which the gorget had slipped betwixt the rectum and bladder; in which the incisions had never reached the stone; in which the unsuccessful operator had imputed his miscarriage to the stone being engaged in a sac;—let them recal to mind the operations of the present day, and say, if they ever heard of, or experienced, success like this?

As I consider the operation with the knife as the preferable method of cutting, I subjoin the following rules for the guidance of the surgeon.

his own result

RULES FOR OPERATING WITH THE KNIFE.

1st, Two days before the operation the patient must have a brisk cathartic, and the day before the surgeon should coolly and deliberately examine the state of the parts. He should first introduce the staff, then place the patient in an erect posture to bring the stone down towards the neck of the bladder; then introduce the finger into the rectum, and keep it there until he has acquired a distinct conception of the relation of the different parts to one another. He will first feel the staff through the membranous part of the urethra, close under the arch of the pubis; then the prostate gland, thick, firm, and fleshy; then the stone, which he touches with the point of his finger, the knuckle buried in the anus. He must now endeavour to ascertain its size from its weight, from its rolling away from the point of his finger, and from the general feel; as the size of the stone regulates the length of the incisions. He must also ascertain the size and flaccidity of the bladder, the length and size of the prostate gland, and the general relation of the rectum to the whole.

2dly, Two hours before the operation, the rectum must be washed out by a glyster, and the assistants must prepare and arrange the necessary instruments, which must consist of a grooved staff; a pair of strong forceps; a scalpel; a glyster-bag and pipe, to wash the bladder out if necessary; two needles with threads, to take up any branches of the arteria transversalis perinæi which may prove troublesome; two garters for ligatures; warm water and sponge; lint; towels; and wine and water. The patient is then placed on a table, the perinæum

shaved, and the assistants secure him with the ligatures, as we have directed in the Lateral Operation.

3dly, Before the surgeon enters the room, he puts the forceps in the waist-band of his breeches, the staff in his sleeve, and gives his knife to the assistant, who is to hand it to him that there may be nothing to alarm or intimidate the patient; for this reason also, he should lay aside the butcher-like appearance of apron and sleeves. He immerses the staff in a basin of warm water, oils it, and invariably introduces it himself; first, because it might be wrong introduced, and actually driven through the membrane of the urethra, and betwixt the rectum and bladder; secondly, by so doing, he renews all his previous conceptions of the relation and proportion of the different parts to one another. After he has introduced it, he withdraws it a little, passes it again deep into the bladder behind the stone, and then again introduces his finger into the rectum to feel that all is fair, to recal every thing to his imagination, and to give him confidence. The operator now withdraws his finger, wipes his hands with a towel, carries the handle of the staff over the right groin, and gives it to his assistant, who keeps it in that position with his right hand, while with his left he holds up and supports the scrotum, and he now prepares for the next step of his operation.

4thly, He seats himself before the patient, takes the scalpel from the assistant, and, extending the wrinkles of the perinæum with the thumb and fingers of the left hand, begins his incision upon the staff on the left side of the rapha, an inch from the scrotum, and carries it downwards in an oblique direction betwixt the anus and tuberosity of the ischium, at equal distances

from both ; the former of which, in a big man, he should pass an inch and a half or more. Although he begins to cut on the staff, he immediately forsakes it, and every successive **STROKE OF THE KNIFE CARRIES HIM FURTHER FROM IT ; IT IS THEREFORE NO GUIDE FOR HIS INCISIONS.** He must now continue, by repeated strokes of the scalpel, keeping in the triangular hollow at equal distances from the tuberosity of the ischium and anus, to divide the cellular substance, until he comes to the transversalis perinæi muscle, which he also cuts across. He should be careful to direct the course of his incisions downwards to the face of the prostate gland, pressing the rectum aside with the fore finger of the left hand, to prevent it being wounded ; for if he cuts upwards towards the pubis, he will inevitably wound the bulb. He goes on in this manner until he has divided all the cellular substance and fibres of the levator ani, covering the membranous part of the urethra and prostate gland.

5thly, The surgeon now raising the handle of the staff from the right groin, brings it to form nearly a right angle with the patient's body, sees that it is fairly lodged in the bladder, and again gives it in charge to his assistant. He now feels with the fore finger of his left hand, the staff in the upper part of the wound close under the pubis, and a little further on the prostate gland firm and fleshy. He then takes the scalpel, turns its edge towards the staff, and strikes its point into the groove, half an inch before the prostate, just at the place the operator usually enters the beak of the gorget ; he then turns the back of the knife to the staff, slides it backwards and forwards in the groove, that he may be sure he has fairly entered ; he then shifts his finger, places it obliquely under the knife, and carries it always before its point, to protect the

rectum. Having adjusted every thing after this manner, he runs on the knife slowly and deliberately, through the prostate gland, giving it a lateral direction, as delineated in the Drawing, No. 4, and making an incision as large as he conceives sufficient for the easy transmission of the stone. He must now immediately withdraw the knife, keeping his finger within the wound as a director for the forceps.

6thly, He next draws the forceps out warm, from being in contact with his own body, and passes them along his finger into the wound; the knife makes the incision in the prostate so free, that they will pass into the bladder with the utmost ease. He then withdraws the staff, and taking hold of the handle of the forceps in each hand, he raises them up towards the pubis, directing the points downwards towards the lower and anterior part of the neck of the bladder, he will generally catch the stone; if not, he fails perhaps from the forceps passing over it, and in that case he must withdraw his finger from the wound, insert it into the rectum, and raise the stone up, when he will immediately grasp it, and holding it moderately firm, proceed to extract it. He must not pull directly upwards, otherwise he catches on the bones of the pubis; nor directly downwards, otherwise he is apt to injure the rectum; but by directing the range of the forceps betwixt the pubis and tuberosity of the ischium, at the same time pulling with a moderate degree of strength, he will in general easily extract it; if not, as the difficulty may arise from the stone being seized in its greatest diameter, he must either attempt to change its position with his finger, or let it go, and catch it anew.

He must have no reliance upon roughness or smoothness as marks of their being one stone only or more in the bladder, but proceed to feel with his finger and the forceps; and after having extracted whatever stones are found, if any fragments have been broken off, the bladder must be washed out with tepid water; if there is no hemorrhagy, he unties his patient, claps a bit of lint upon the wound, puts his thighs together, lays him in bed, and gives him a large opiate.

ON THE
AFTER TREATMENT OF THE PATIENT.

THE two great dangers to which the patient is exposed, and which chiefly claim the attention of the surgeon, after the operation of lithotomy, are hemorrhagy and abdominal inflammation. When the stone has been small and easily extracted, when the operation has been quickly performed, and the patient comparatively suffered little, it has notwithstanding sometimes happened, from the inattention of the surgeon, or the still more unmanageable plunge of the gorget, that an important artery has been wounded, and he has expired of hemorrhagy. The three arteries which are in danger of being cut in this operation, are the *Transversalis perinæi*, *The artery of the bulb*, and *The internal pudic artery*.

1st, The transversalis perinæi is a branch of the internal pudic artery, which runs under the transversalis perinæi muscle, passes betwixt the erector penis and accelerator urinæ, and is always cut in the operation of lithotomy ; but it is a small vessel, the bleeding generally ceases before the operation is finished, or should the hemorrhagy prove troublesome, it is within the reach of the needle, and should be immediately taken up.

2dly, The artery of the bulb was always wounded in the Marian Operation, because they cut through the accelerator muscles, and opened the urethra at this place ; and it is now frequently wounded by the lithotomist directing the course of his incisions upwards to the pubis, and not downwards and forwards to the prostate gland.

3dly, The internal pudic artery, is the great artery of the external parts of generation, of which the other two are merely branches ; hence hemorrhagy from this vessel is the most dangerous that can happen in the operation. It comes off within the pelvis from the great internal iliac, most commonly with the ischiatic artery ; it passes out by the sciatic hole, mounts over the upper sacrosciatic ligament, and again enters the pelvis under the spine of the ischium. It now lies close under the inner edge of the bone, and runs up to the arch of the pubis, where it enters the root of the penis ; it is here where it lies close by the bone, within the tuberosity and spine of the ischium, that it is cut. It is cut by the gorget, if broad, or if the operator inclines his staff too much to the left side while he enters the bladder ; it is cut also by the knife when the operator directs his incisions too close to the bone, endeavouring to avoid the rectum ; at all events the hemorrhagy from this artery is terrible. It lies deep beyond the reach of ligature ; its

bleeding generally proves fatal ; and if it can be stopped at all, it must be by compression. When the operation has been protracted, it frequently lessens, and sometimes ceases ; but five or six hours after the patient has been laid in bed, and when the increased and inflammatory action of the neighbouring arteries takes place, it returns with double fury. If from the quantity of blood on the floor, from the profusion of the hemorrhagy, or the depth of the bleeding vessel, the surgeon should imagine this artery to be wounded, before he leaves his patient, he should insert into the wound a piece of firm sponge, with a large canula passed through its centre. The property of the sponge is to swell and make a firmer compression, in proportion as blood escapes from the vessel ; and the use of the canula is to allow a free passage to the urine. When the patient has been laid in bed, he should have a large opiate ; and it frequently happens, from the sleepless and miserable days and nights he has already undergone, that he falls into rest, and sleeps soundly for many hours ; when he awakes, he feels comparatively easy ; and if the operation has not been protracted, if the incision in the prostate has been free, the stone small and easily extracted, he often recovers without one untoward symptom, as from any of the lesser operations of surgery. However, this does not always happen ; sometimes a few hours after the operation he feels a sharp pain in the region of the bladder, and the urine does not pass by the wound ; the surgeon should in this case insert his finger, when the urine will often flow upon withdrawing it, and if he feels coagula of blood in the cavity of the bladder, he should wash them out with injections of tepid water, thrown in by means of a glyster-bag and pipe ; as coagulated blood excites the same spasmodic pain in the bladder after the operation of lithotomy,

as clots do in the cavity of the uterus after the expulsion of the placenta. If these tormina increase with tension, hardness of the abdomen, painful to the touch, nausea and vomiting, quick and hard pulse, with hot skin, they mark a most dangerous inflammation, and require the prompt interposition of the practitioner. Blood should be immediately taken from the arm, and the bleeding repeated in such quantities as the patient can bear. Warm emollient glysters should be thrown into the rectum; he should be put into the warm bath, and wrapt in blankets to produce perspiration; the use of wine should be forbidden, and he should be confined to a low diet. If these remedies have been early employed, they will generally prove successful; but if he has been kept long upon the operation-table, and suffered much in the extraction of the stone, these symptoms, instead of abating, continue in spite of every measure, to increase; the wound puts on an unhealthy aspect, and the second or third day the patient dies of abdominal inflammation. From the swelling and inflammation of the wound on the second day, the urine sometimes passes by the penis; and when this swelling and inflammation abates, it again passes by the wound; but if the urine passes immediately by the urethra, and continues to do so, I consider it as the mark of an ill performed operation, the contusion and general inflammation preventing the urine passing by the wound. In the whole treatment of the patient, the greatest attention should be paid to keep him dry; he should be laid on his side, with folded sheets under him, dry lint should be applied to the wound, and a piece of folded soft linen above it, all which should be frequently renewed, as nothing proves so distressing as the excoriation produced by the continual distillation of the urine. The first stool must be procured by a glyster, on the

third day, and the subsequent ones by a cup of senna, or a spoonful of castor oil ; he should be kept low and quiet to guard against fever. The urine continues to flow by the wound, sometimes until the 16th or 20th day, when it generally passes by the penis. The wound gradually lessens, the patient begins to walk about ; and he is commonly well in four or five weeks, although not unfrequently an incontinence of urine continues for several months after. This arises from the sphincter vesicæ not shutting the bladder so closely as formerly, owing to the scar produced by the incision ; but as soon as this becomes smooth, the patient is capable of retaining his urine, and feels no lasting inconvenience or distress.

third day, and the subsequent ones by a cup of cream, or a spoonful of castor oil; he should be kept low and quiet to guard against fever. The urine continues to flow by the wound; some- times until the 10th or 12th day, when it usually ceases by the pain. The wound gradually becomes dry, and the patient begins to walk again; but he is constantly well as long as the urine is not removed, or the wound is not completely healed. The urine continues to flow to the 10th or 12th day, when it usually ceases by the pain. The wound gradually becomes dry, and the patient begins to walk again; but he is constantly well as long as the urine is not removed, or the wound is not completely healed. The urine continues to flow to the 10th or 12th day, when it usually ceases by the pain. The wound gradually becomes dry, and the patient begins to walk again; but he is constantly well as long as the urine is not removed, or the wound is not completely healed.

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EXPLANATION OF THE PLATES.

THESE sketches represent what no man can ever see, viz. the manner in which the rectum is guarded, and the knife guided by the fore finger of the left hand, while the knife is struck into the urethra, and run onwards so as to divide the prostate gland. They represent what no one can draw truly, without being at the same time an anatomist, a practical surgeon, and a draughtsman. The parts cannot be so divided and so presented by the anatomist to the artist; what is here represented can never be seen, but only felt in the moment of operating, and can be represented only by one accustomed to operate.

EXPLANATION OF PLATE FIRST.

No. 1. represents the stone, the staff and the finger of the operator, as in searching for the stone, and trying by its pressure and balance to ascertain its weight and size.

For this purpose the rectum should be emptied by a glyster; the staff introduced into the bladder; the fore finger of the right hand inserted into the rectum, and the stone felt for; and the parts traced and compared with external marks, by examining after this manner in every variety of posture, but especially in the erect. The parts are represented in this sketch the size of life, the staff of the common size, the stone large, the bladder as if transparent, and the prostate as seen in a vertical section and lateral view of the contents of the pelvis.

The fore finger (*a*) is passed to its utmost length before the stone can be felt in a big man; through the walls of the rectum (*bb*) may be distinguished first of all the staff (*c*), which is felt close under the pubis; so close, that it is apt to be mistaken for the bone. It is first distinguished by pressing in the finger by the side of it; secondly, by moving the staff a little with the left hand; thirdly, by tracing it onwards into the bladder, so as to feel its curve. The finger being passed to its utmost length, the surgeon begins to feel not the stone, but a degree of resistance and weight, which could not be were there no stone present: and by poising the stone on the point of the finger; by marking the manner in which it rolls away and recedes; by the degree of weight; the mobility of it in various postures of the body, particularly the erect, and various indescribable circumstances; the surgeon, although he never feels the stone very distinctly, obtains yet a perfect persuasion of its existence, and forms a tolerable guess of its size and weight.

He has, by this preliminary enquiry, a better conception of the prostate gland (*d*), which he feels not distinctly as a firm solid globular body, but as a thickness and fleshiness, very distinctly interposed betwixt his finger and the sound, and covering a certain proportion of it; and extending about an inch, or an inch and a half, immediately before the gland, he feels the staff more naked, that being the membranous part of the urethra; and where the gland ceases, he feels the bend of the staff more distinctly through the thin coats of the bladder. It is the rolling and receding of the stone, that prevents its being at once recognised and felt as distinctly as the firm staff: (*e*.) marks in the sketch the membranous part of the urethra; (*f*.) the bulb; (*g*.) the point at which it is first struck with the knife, and the direction in which it is slit open, the incision being carried onwards in the direction of the dotted line (*h*) through the body of the gland.

SKETCHES OF THE MANNER OF PERFORMING
LITHOTOMY WITH THE KNIFE. N^o. 1.



OF FEELING FOR THE STONE FROM THE RECTUM.



EXPLANATION OF PLATE SECOND.

THE design of this Plate is to shew the extent of the external incision; or, in other terms, the manner of dissecting into that deep triangular hollow, under the tuber ischii, and behind the perinaeum, where, by successive strokes of the scalpel, guided by the fore finger of the left hand, the surgeon cuts across the transverse muscles of the perinaeum, and divides some part of the levator ani. By dissecting in this manner along the side of the rectum, he removes every obstacle to the free extraction of the stone, and then turning his finger upwards under the arch of the pubis, he feels in the upper angle of the wound for the membranous part of the urethra, lays bare the prostate, and feels the staff distinctly.

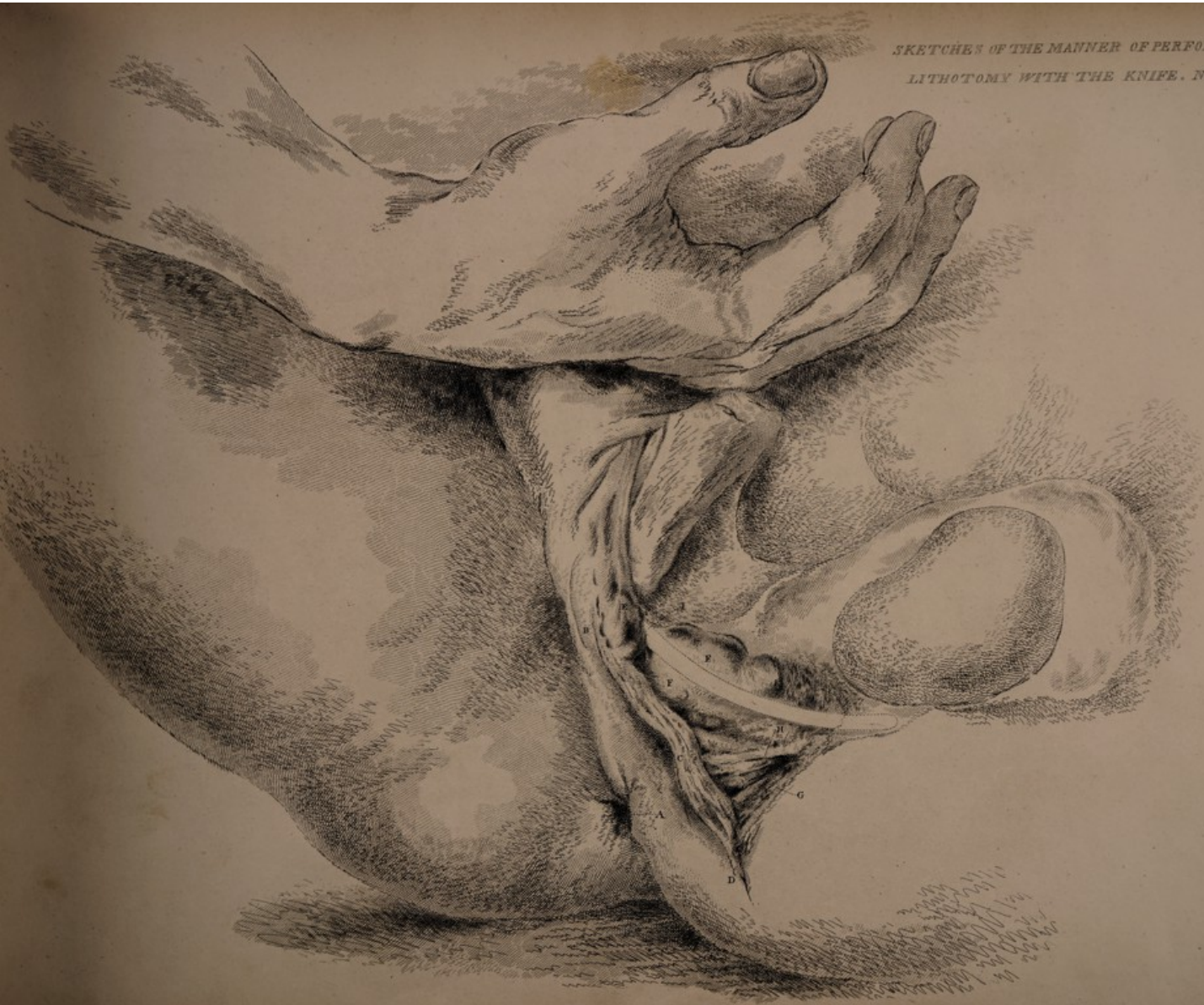
This is a critical part of the dissection, as it prepares for opening the urethra in the right place, and making a sufficient incision in the prostate; and if the operator understands, by feeling with his finger, the parts which are delineated in this sketch, he will perform the most difficult part of the operation with great confidence.

That the true and simple impression may not be lost in the variety of illustrations, the parts are drawn here of the size of life, and encumbered by no greater number of letters of reference than are absolutely required: (*a*,) marks the opening of the anus; (*b c d*,) the length of the external incision of the skin; (*b*,) the beginning of the incision a little below the termination of the scrotum; (*c*,) the middle of the incision, passing (at an equal distance from each) betwixt the tuberosity of the ischium and the opening of the anus; (*d*,) the lower end of the incision, extending nearly two inches beyond the anus, upon the pointed part of the hip. Let it be well marked, that the upper end of the incision (*b*,) immediately under the arch of the pubis, covers (*e*,) the bulb of the urethra, which lies quite superficial in the perinaeum; the centre (*c*) of the incision covers the prostate gland (*f*,) which lies deeper under cover of the arch of the pubis, and in close contact with the circle of the anus, while the lower part (*d*) of the incision opens the great triangular hollow under the tuber ischii, which is occupied only by cellular substance, and which, in a big gross man, contains a prodigious quantity of fat, and requires very deep dissection.

It is worth observing, that it was by dissecting deep into this hollow, to get behind the prostate, that Chesselden found the deep part of the body of the bladder, and struck his knife behind the prostate; and that although we have no such design, this deep dissection is with us also a necessary and momentous part of the operation, as the easy extraction of the stone depends upon its being nicely done. The whole of the external incision and internal dissection, until the last and most critical stroke of the knife, is thus performed. The operator draws his knife steady and strong along the perinæum, and cuts deep through the skin and fat, an incision (*bcd*) of three inches and a half, or four inches long, stretching the skin of the perinæum with his extended thumb and fingers of his left hand, while he cuts with his right; he next lifts his left hand, puts the fore finger of it into the centre of the wound, proceeds in his dissection, cuts downwards and deep into the hollow; and feeling with his finger the bridles of flesh (*gh*), he divides them, pushing his left fore finger still deeper into the hollow, and dissecting downwards and forwards until he feels nothing but a void or hollow, with loose cellular substance, all resistance being removed, his finger being buried in a fat man almost knuckle deep; and during this part of the dissection, he depresses the rectum carefully with the finger, while he cuts with the scalpel, ceasing only when he feels the hollow void, the resisting parts divided, and the staff seemingly bare, or at least distinctly felt.

Next he turns the point of his finger upwards, feels at (*i*), immediately behind the bulb, for the naked or membranous part of the urethra; and if he feels there the staff distinct and naked, and feels beyond that the thicker prostate covering, and in some degree concealing the staff from the finger, he is prepared for the last and most critical stroke of the knife.

SKETCHES OF THE MANNER OF PERFORMING
LITHOTOMY WITH THE KNIFE. NII.



OF THE EXTERNAL INCISION.



EXPLANATION OF PLATE THIRD.

THIS Plate is designed to shew the manner and extent of incision which the surgeon is now to perform. He is now to strike the point of his knife into the membranous part of the urethra, and prolong the incision through the whole length of the prostate, or, in other words, through the cervix vesicae, which that gland surrounds. He feels for the naked part of the staff at (*a*,) immediately behind (*b*,) the bulb of the urethra, and immediately before (*c*,) the point of the prostate: but neither bulb nor prostate does he feel distinctly; he only feels that close under the pubis, at a particular point, the staff is felt more perfectly; he even distinguishes the groove through the surrounding parts, and there he strikes his knife into it through the membrane of the urethra. Some have performed this operation by turning the back of the knife upwards to the groove of the staff, and striking it into the urethra; but it is so easy, and at the same time so natural, to open the urethra in the usual manner, and then to turn the edge of the knife down, and run it onwards through the fleshy prostate, that I prefer this manner. First, then, the urethra is cut with the round edge of the knife, and the groove of the staff distinctly felt lying open in the wound, which should be half an inch in length; then the knife is turned edge downwards, its point entered into the groove of the staff; the prostate is then slit up its whole length, by running the knife backwards, its edge being lateralized, or rather in a slanting or oblique direction, looking downwards and backwards; and while the knife is run onwards through the prostate, the fore-finger of the left hand guides and directs it, goes before it, and depresses the rectum so as to prevent its being wounded.

The manner of performing this last stroke is best seen in the next sketch, No. 4; in the present is demonstrated only the extent and effect of the wound: (*a*,) marks the membranous part of the urethra; (*b*,) the bulb; (*c*,) the point of the prostate gland; (*d d*,) the whole length of the incision through the urethra, and the body of the prostate, little enough to give entrance to the forceps, and to allow the extraction of the stone; (*e*,) the part of the staff that is laid open by the incision; it is felt distinctly by the finger, the fore-finger, viz. of the left hand, which guides the incision. When one

half of this incision is made, the urine runs out profusely: when the whole is completed, the left fore-finger passes into the opening (being no longer necessary to guard the rectum); the knife is given to an assistant; the forceps drawn from the girdle; their beak passed into the opening, and guided by this finger of the left hand into the gaping wound of the prostate. The moment they enter, the iron forceps encountering and chocking against the staff, satisfies the operator that all is right; then he withdraws the left fore-finger from the wound, carries the forceps forwards into the bladder, withdraws the staff, grasps the handles with both hands, gropes for the stone, and grasps it; and when it slips, or the forceps are any way required to be introduced a second time, the fore-finger of the left hand is again passed into the wound, distinguishes easily the opening in the gland, and guides them.—(f,) marks the great hollow through which the stone is to be extracted.

SKETCHES OF THE MANNER OF PERFORMING
LITHOTOMY WITH THE KNIFE. N^o. III.



OF THE INCISION OF THE PROSTATE.

Engraved by J. Marshall.



EXPLANATION OF PLATE FOURTH.

THIS fourth sketch explains chiefly the action of the operator, and his assistant ; the lateralizing of the knife, and the manner in which it is run onwards through the prostate into the bladder. The assistant, with his left hand, holds firm the staff, and that without any very particular care in pressing it downwards upon the perinæum, or turning its heel to the left side: it is sufficient that he keep it perfectly steady, while, with his right hand (*a*,) he supports the scrotum (*b*.) The operator, with the fore-finger of his left hand (*c*,) introduced into the centre of the wound, first directs the knife to the naked part of the staff ; secondly, guides the incision of the urethra, and feels when it is completed ; thirdly, directs the point of the knife into the groove of the staff, when it is turned with its edge downwards, with the intent of cutting the gland ; fourthly, when the point of the knife is settled in the groove, and is about to be run downwards, (the moment of time represented in this sketch,) the point of the finger (*d*,) is advanced a little beyond the knife ; and the rectum being borne down and kept out of the way of harm by the point of the finger, the knife is carried forward as it were in the hook or bend of the finger, until the gland is fairly slit up ; and when, by the free discharge of the urine, the operator is conscious that this incision is accomplished, or almost accomplished, the point of the finger is slipped into the incision, and with it the operator feels the staff, and judges of the extent of the wound, and compares it with the notion he has formed of the size of the stone : he feels whether there is still any stricture from part of the gland being left undivided ; and if there be, or the wound seem too small, he runs the knife onwards a little further, enlarges the incision, and satisfies himself that it is sufficient to admit easily the beak of the forceps ; for if it does, and the prostate be entirely divided, all that remains of the operation is easy.

In this fourth sketch, (e) marks the membranous part of the urethra, and the beginning of the incision; (f,) the body of the prostate, not half divided; (g g,) the vesiculæ seminales, lying betwixt the rectum and the lower surface of the prostate; (h,) the knife, ready to be run forwards through the remaining part of the prostate. There is one thing here particularly to be remarked, that the direction of the knife, when run backwards, is not strictly lateral; its edge looks obliquely downwards, its direction is rather more lateral than it could be easily represented in such a sketch, the blade is seen here broader than it would be in its true position; yet what is here represented, varies very little from the truth; indeed it is more distinct than the very truth would be, and the lateralizing of the knife is a matter of very little importance, while the operator is careful, by his finger, to guide it, and defend the rectum; for the trivial danger of wounding the rectum, is the sole motive of giving the knife a lateral direction.

SKETCHES OF THE MANNER OF PERFORMING
LITHOTOMY WITH THE KNIFE N^O. IV.



THE LATERAL INCISION OF THE PROSTATE.



EXPLANATION OF PLATE FIFTH.

I. *Diagram of the defects of the Gorget.*

NONE will ever be persuaded of the superiority of operating with the knife, but those who, to natural address and courage, having joined a perfect knowledge of anatomy, can perform it with ease. You may attempt to persuade a man, that it is easiest and best to hold a pen, a pencil, or a knife, in a particular manner; but, although it is the manner of a master, and proved by principle and practice to be the best, to him it will never seem easy; he will perversely adhere to that which use has made familiar. But if any thing can prove, to those accustomed to other methods, the superiority of this operation, it must be the following simple sketch, or diagram, in which I have projected, by dotted lines, the diameter of a broad-bladed gorget, upon a stone of no unusual size, lying in the most favourable direction. The gorget is marked (*a*), the extent of its cutting edge (*d*), the projection of that cutting edge, or, in other terms, of the wound it is capable of making, is denoted by the dotted lines (*e f*). The stone, (*c*), is presented in the direction of its smallest diameter, and most favourable posture, and the inadequacy of any opening of no greater length than the dotted line (*b*), to transmit such a stone, is at once obvious.

But many other circumstances are to be taken into account, which are not represented in this first and most favourable view: First, the dotted (*b*) is only a line; it is but one inch in length, and when dilated into a circle, it forms an opening of only one inch in circumference, or one-third of an inch in diameter; therefore it is not through a circular opening, equal in diameter to the dotted line (*b*), that we are to deliver the stone, but through a circle (*b i k*), one-third of an inch in diameter; and this simple demonstration renders probable what I do declare I have often seen, viz. that the opening has been far too small to admit the forceps, which, missing it altogether, have been driven deep betwixt the bladder and rectum, and have seized the stone with the bladder interposed, and slipped, and slipped again, for a full half hour, until at last the bladder has been lacerated, and the stone extracted; or, by thrusting against the opening of the

prostate, just sufficient to admit the extreme points of the forceps, the bladder has been forced away from the urethra, which, by the delicacy of its membranous part, is easily torn. Secondly, though the line (*lm*,) across the stone, is merely an inch and a half in diameter, perhaps two inches, the stone to be delivered is three times that; it is an oval of three, or of five inches in circumference, and this is its shortest axis. Thirdly, It must be recollected, that to this must be added an inch and a half more; for the forceps measure half an inch in actual thickness on each blade, and their gibbous form increases their distance from their common centre by an additional half inch. This is represented by the dotted lines (*no*;) and all these circumstances demonstrate a disproportion betwixt any wound that the largest gorget can make, and the diameter of the smallest stone, and most moderate sized forceps, which, I am persuaded, has been entirely overlooked; it is such as accounts to me for the dismal scenes I have often witnessed: the incision of the gorget less than an inch in length, gives, when converted into circular dimensions, an opening of no more than a quarter of an inch in diameter; an opening manifestly as inadequate as that of the apparatus major; and I am ready to aver, that the pushing, dilating, and tearing, is the same, since I have often seen the patient lie an hour upon the table; while, on the other hand, a stone of an inch and a half in diameter, being of a circular form, requires a circle of nearly five inches to transmit it, an opening which nothing but the knife can give.

II. *Diagram of the properties of the Knife.*

It is the property of the knife to make not a limited incision, but one proportioned to the size of the stone, the firmness of the gland, or, in short, the inclination of the operator; and such is the breadth of blade with which all the best lithotomists of former times have made their incision, and so natural is it to run the knife onwards, not in a direct, but in an oblique way, that the incision it makes is proportioned, not merely to the breadth of blade, but to the breadth of blade and obliquity together; and the slightest variation of the angle, the slightest inclination of the hand of the operator, or the smallest prolongation, increases the opening, so as to admit the introduction of the forceps, and allow of the extraction of the stone very freely. The knife (*a*,) pushed forwards in the direction (*b*,) makes a wound merely corresponding with the breadth of its blade; and such is the first part of the incision, and it has this singular advantage, that the knife being run directly on, through the membranous part of the urethra, and the first or narrowest part of the prostate gland, opens the bladder nearly as freely as the plunge of the gorget; for the dotted line (*cd*,) is three quarters of an inch in length, the urine of course runs out freely, the surgeon is sure of his stroke, and the fore-finger of the left hand is admit-

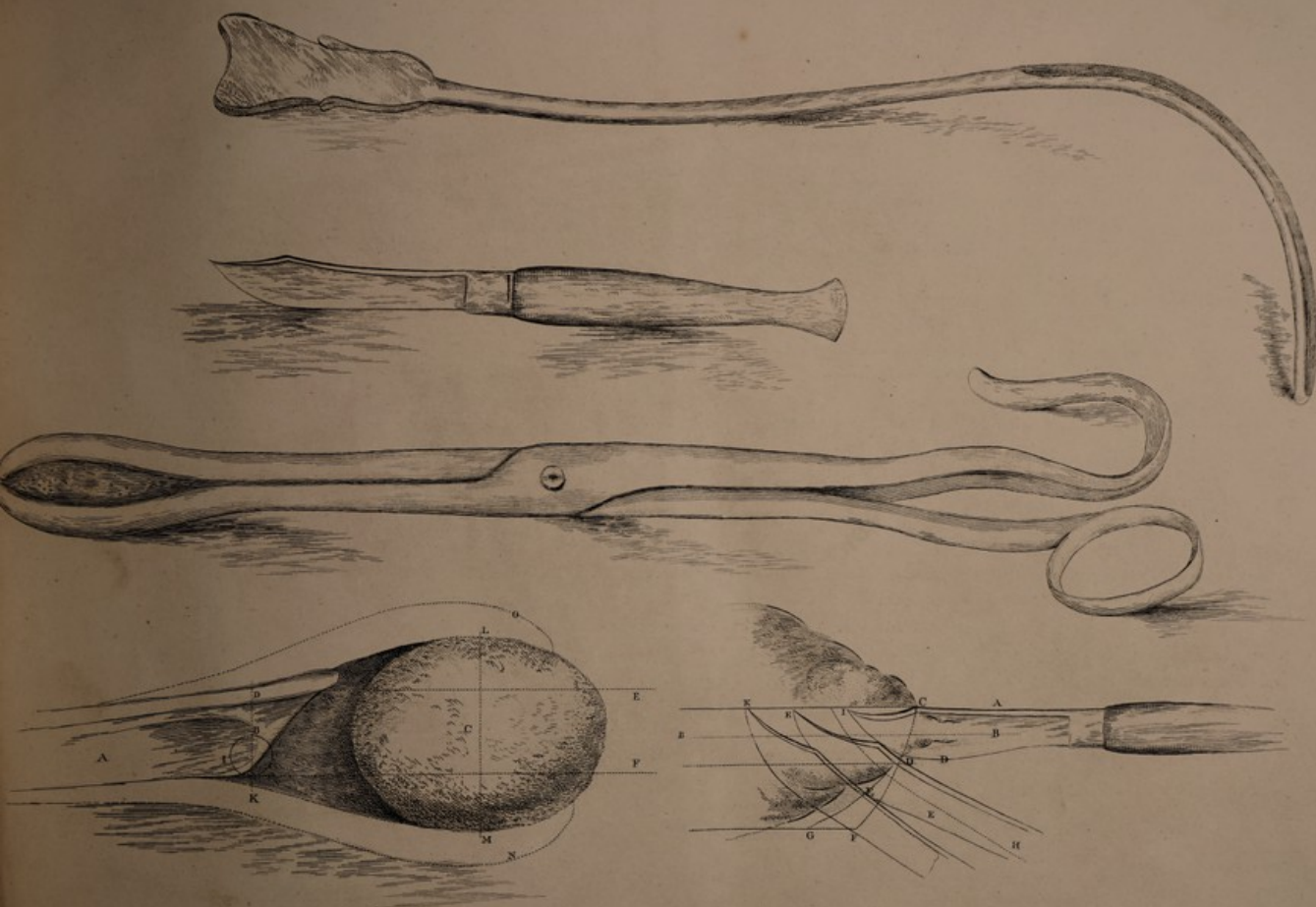


DIAGRAM OF THE DEFECTS OF THE GORGET.

DIAGRAM OF THE PROPERTIES OF THE KNIFE.



ted along with the knife into the ring of the prostate. The second part of the incision, thus guided by the finger, is performed by running the knife still onwards through all that remains uncut of the gland; and the operator now naturally inclines his knife into the direction (*eee*), the effect of which is, to divide the prostate in its whole length, and open the neck of the bladder to the extent, not merely of the line (*cdf*;) but of the line (*cdg*;) for at the same time that the knife is inclined from the direct line (*b*;) to the oblique direction (*h*;) its point and edge are advanced from (*id*;) to (*kf*.)

In short, the mere breadth of the knife makes, without the shadow of risk, an incision equal to that of the gorget; and the slightest inclination of its blade, makes it whatever the surgeon would have it.

FINIS.

