THE HISTORY OF LITHOTOMY AND LITHOTRITY

Arnott Demonstration delivered at the Royal College of Surgeons of England

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by

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JAMES MONCRIEFF ARNOTT, who endowed these demonstrations in 1850 during the year of his first Presidency of the College, was elected to the staff of the Middlesex Hospital in 1831, and was one of the founders of its Medical School in 1835. He was chief amongst those who insisted on an eight-day holiday for medical students from Christmas Day to New Year's Day inclusive. An early advocate of the need for specialization in surgery, he undertook in 1843 the duty of running an ophthalmological out-patient clinic in addition to his general surgery. He was a strict disciplinarian but had a dry sense of humour. It was recorded that on a teaching round, after showing a newly invented instrument most completely fitted for the desired purpose, he ended by saying, ' In fact, gentlemen, it is one of those ingenious conceptions which is of no use.'

There are many ingenious conceptions in the collection of Historical Surgical Instruments in this College; some are now ' of no use ', but many are the precursors of modern instruments and serve as historical landmarks in the development of surgical technique. In no branch is this more evident than in the surgery of stone in the bladder and it seems appropriate to base this account of the history of the operations devised for it on the instruments used.

Stone in the bladder has been known since the earliest times. Elliot Smith discovered a stone in the pelvis of a skeleton in the grave of a pre-dynastic Egyptian at El Amara; it was described by Shattock (1905) and was estimated to be more than 7,000 years old. It was in the museum here until 1941, when it was effectively crushed and completely dispersed by enemy bombs.

LITHOTOMY

Operations for stone were done by the Hindu surgeons before the Christian era and by the Egyptians in very early times. There was a barbarous Egyptian method for extraction without incision. The urethra was dilated by a wooden or cartilaginous cannula as thick as the thumb pushed in with great force alternating with blowing down the urethra; the stone was pressed down into the perineum by the fingers in the rectum until it could be reached from the urethra, or sucked out by the mouth. Hippocrates, four centuries B.C., enjoined his followers not to cut for stone: ' I will not use the knife either on sufferers from stone but will give place to such as are craftsmen therein.' He considered that

wounds in the bladder were mortal. Ammonius of Alexandria, surnamed Lithotomus from the instrument he invented to break a stone too large to pass through a perineal incision, practised lithotomy in about 200 B.C. The working craftsmen were itinerant lithotomists and the operation was considered too menial for the physicians of the day. Some of the monks did it; the German Emperor Heinrich II was cut by a Bene-

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Fig. 1. Relief (1513) by Tilman Riemenschneider on the tomb of the Emperor Heinrich II in the Cathedral of Bamberg. After being cut for the stone in A.D. 1022, the Emperor is being given the stone by the Benedictine monk who holds the lithotome. The seated servant sleeps.

dictine at Monte Cassino in A.D. 1022 at the age of 49. He is seen in the carving on his tomb being shown the stone afterwards (Fig. 1); he died two years later from recurrence.

The original route of approach was through the perineum, first through the mid-line and later from the left side. The suprapubic or high operation came into use in the early 18th century. The first median perineal lithotomy was known as the Lesser operation or operation by the

Apparatus Minor as only two instruments were essential, a knife and a hook. For the Greater, or operation by the Apparatus Major, many were needed.

The lesser operation

The method used by the ancient Greeks, Romans and Arabians was described by Celsus, who lived from 25 B.C. to A.D. 50. In England it became known as ' Cutting on the Gripe '. It was to be used only in the spring and only between the ages of 9 and 14. After some days' preparation the patient was treated in this way:

' A strong and intelligent person being seated on a high stool, lays hold of the patient in a supine posture, with his back towards him, and his hips being placed on his knees, with his legs drawn backwards he orders the patient to seize his own hams with his hands, and to draw them towards his body with all his power, and at the same time he secures them in that position.

' Then the physician, having carefully pared his nails, introduces his index and middle fingers of the left hand, first the one gently, afterwards the other into the anus, and places the finger of his right hand lightly on the lower part of the abdomen. . . . First of all the stone must be sought for about the neck of the bladder . . . and when it has been brought into that position . . . a lunated incision must be made through the integuments immediately over and extending to the neck of the bladder near the anus, with the horns a little inclined towards the ischia; then a second incision is to be made in the transverse form in the convex part of the wound so as to open the neck of the bladder.'

The stone was then extracted with the finger or a hook. The original transverse incision was altered later to a vertical one, the breadth of a grain of wheat to the left of the median raphe.

Firm pressure from above was an essential and painful part of the operation and was generally done by an assistant. Persistent haemorrhage after operation was treated by sitting the patient in strong vinegar and salt. The rectum was sometimes damaged and post-operative incontinence of urine was common. Nevertheless this operation, without a staff, remained in use until the middle of the 16th century, at least for children.

The greater operation

In about 1520 a new method of perineal lithotomy was devised by Joannes de Romanis of Cremona; it was first published by his disciple Marianus Sanctus Barolitanus in 1522 and became known as the Marian operation and later as ' Cutting on the Staff ' (Fig. 2). For the first time a grooved staff was passed along the urethra to guide subsequent instruments into the bladder. A vertical incision two to four inches long was made with a sharp-pointed deep-bellied knife, and the tissues divided down to the neck of the bladder. A gorget was passed along the groove and followed by two conductors, female and male; these were curved bars of iron which were separated to dilate the wound. They were followed by Paré's dilator (aperiens) guided by the button and then the forceps of either the duck-bill or crow's-beak type. The dilator tore through the prostate and bladder neck. If the opening was still too

small it was held open by the latera. Forceps with two, three or four blades were used. A stone still too large to be delivered could be crushed with a large forceps and the fragments removed by the scoop or crochet. The wound was left open.

Marianus described these instruments of torture with vicious symbolism; he was proud of them:

'Look but to the aperiens, how it gapes with desire when the conductors have made way for its approaching, and, seizing the stone, it rages like the ferocious soldier ready

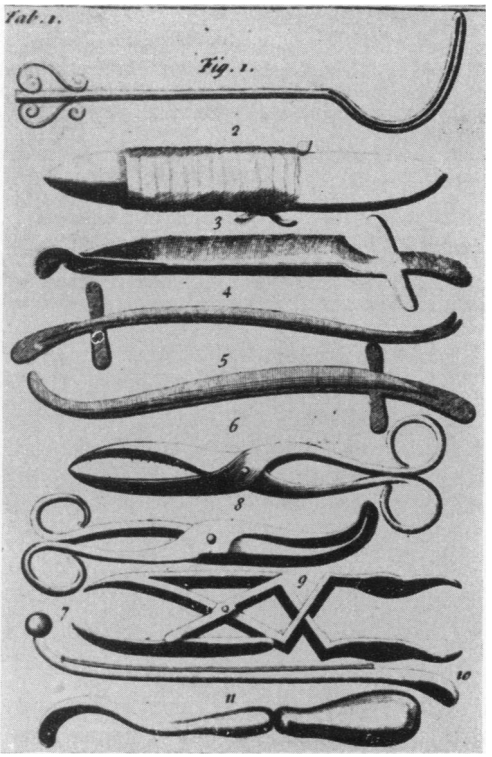


Fig. 2. Instruments used in the operation by the Apparatus Major. From above: grooved staff, lithotome, gorget, conductors, crow's-beak forceps, duck-bill forceps, Paré's dilator (aperiens), button, scoop.

to enter the breach in the walls of the besieged city. Next come the voracious and vociferous forceps themselves, which often, when their morsel is too large for them to devour, cry out for the aid of their two supporters, or latera, which are then laid side by side with the forceps.'

The lesser operation was not entirely abandoned and was still considered preferable for boys. But the Marian operation was adopted by many lithotomists and in particular by the Collots, who were famous lithotomists in France for eight generations. It may have had some

advantages over the lesser operation; it could be used for adults, the transverse perineal muscle was not cut and the ischio-rectal fossa not opened, but the trauma to the prostate and bladder neck was intense, haemorrhage was severe, the extraction of a large stone through the narrow prostatic urethra was very painful; and incontinence, fistula and impotence were frequent sequelae. Tolet (1708) illustrates the use of the dilators and gives some notes on the pre-operative preparation by diet, bloodletting, clysters and purges under the guidance of a physician. After a day's rest from this preparation the patient was put on the special chair and bound hands to ankles; four assistants were usually required, each with different duties. He says: ' It were better to have but few spectators, because a great many may inconvenience the operator, frighten the patient, and put a wrong construction upon the accidents that sometimes accompany the operation. It is fitting as much as conveniently may be that a Churchman should be present to talk now and then to the patient, as it may help to divert his pain and increase his patience during the operation.'

The mortality was high but the itinerant lithotomists were held responsible for their bad results and punished accordingly; their motto was evidently ' Cut and run '.

The Marian operation remained in vogue until towards the end of the 17th century. It was used by Ambroise Paré, who said ' that which is cut is neither so speedily nor easily healed up as that which is torne '. Celsus had said that it was safer to cut than to dilate, an axiom followed later by Frère Jacques and Cheselden (1723). Civiale (1827) described the Marian operation as one of the most terrible in surgery.

The lateral operation

The need for a more successful and less traumatic method than the Marian operation must have been apparent to surgeons and the public alike; it came eventually from a surprising source.

Jacques Beaulieu, born of humble parents in 1651 at Beaufort in Burgundy, served for five years as a trooper in the French cavalry. On his discharge at the age of 21 he was engaged as servant to Pauloni, an itinerant Italian lithotomist. In 1688 he became a monk of some kind, or at least he adopted a semi-religious habit and called himself Frère Jacques. He cut for the stone in many parts of France, getting certificates from spectators before leaving hurriedly for another place. He was a man of simple and charitable habits who despised money, charging only a few pence to set his instruments and mend his shoes. He was also a man of courage and resolution with a sure and steady hand, but was quite ignorant of anatomy and insensible of the dangers that attended his mistakes. He carried out no after-treatment, being content to extract the stone and leave God to cure the patient, but he was very proud of his dexterity.

He went to Paris in 1697 at the age of 46 with the expressed intention of teaching the surgeons of the hospitals there a new way of cutting for the stone. Being armed with many attestations of his skill and having made the acquaintance of Mareschal, later first surgeon to the French King, he applied for permission to cut at the Charité and the Hôtel Dieu. The surgeons demanded that he should first demonstrate his operation on a dead body with a stone inserted into the bladder. Méry, first surgeon to the Hôtel Dieu, was deputed to watch the operation and to dissect the parts afterwards. A solid staff with no groove was first introduced through the urethra. An incision was made with a long bistoury medial to the left ischial tuberosity passing obliquely upwards and cutting everything which came in the way between the tuberosity and the staff. After the stone had been felt by a finger thrust into the wound a dilator or conductor was passed into the bladder and followed by forceps with which the stone was pulled out. This was done with wonderful facili y.

On dissection Méry found that the incision had passed between the erector muscle (ischio-cavernosus) and the accelerator urinae (bulbo-cavernosus) without wounding either and then through the prostate and whole length of the neck of the bladder and about half an inch into the bladder itself.

Méry was impressed by the greater ease of the extraction and his first report was favourable, but after two further demonstrations on the dead body he reported adversely.

Frère Jacques left Paris abruptly and went to Fontainebleau, where he presented himself to the Court physicians. He was allowed to cut a shoemaker's boy who offered himself. The operation was done in the presence of the Royal physicians and surgeons; it was successful and the boy was able to leave in three weeks.

The news of the operation was bruited all over the Court and Frère Jacques was taken into the house of Felix, first surgeon to the King, where he stayed at the King's expense for three or four months before returning to Paris to try his fortune again. There he cut 12 more patients; three died within three days of operation and one within a month. The rest lived, but in such a manner as did this new method no great honour. His application to cut again at the Hôtel Dieu and the Charité was opposed by the Paris surgeons but was granted through the support of the provincial physicians.

His wishes were now crowned but, as James Douglas states, ' a speedy foundation was laid for the ruin of the reputation which he had so unaccountably acquired '. He cut 60 in one season from April to July, 42 at the Hôtel Dieu and 18 at the Charité. Crowds of up to 200 came to watch him; tickets were issued and guards posted. Of the 60 no less than 25 died soon after the operation and 13 went out apparently cured. The remainder stayed in hospital with incontinence or fistulas and were

beyond recovery. At the Charité seven died in one day and Frère Jacques accused the monks there of poisoning his patients, a charge which ' vanished into smoke when their bodies were dissected '. Méry found the bladders cut through and wounded in many places, the bladder neck totally divided or the rectum cut. Jacques' final disgrace was the death of the Mareschal de l'Orge, which happened in the most cruel and lamentable manner the very next day after he had been cut by him.

Finding his credit quite sunk at Paris he moved to Orleans and then to Aix-la-Chappelle, giving notice of his arrival by a grandiose advertisement in which he claimed that his operation never endangered life and no

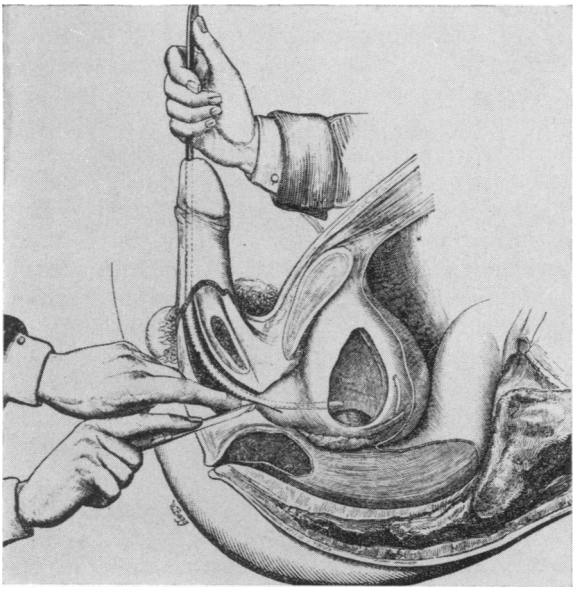


Fig. 3. The anatomy of lateral lithotomy (Sir Henry Thompson). Dissection by Bagg.

fistula was to be feared after it. He eventually went to Amsterdam, where Rau, a pupil of Méry, taught anatomy. Rau copied and modified the method with great profit and displaced Frère Jacques as public lithotomist.

Frère Jacques returned to Versailles and was taught some anatomy by Fagon, surgeon to Louis XIV. As a result he modified his operation, cutting on a grooved staff with an ordinary scalpel. The skin incision was the same but, instead of cutting the posterior wall of the bladder, he divided the prostate and bladder neck on the groove; there was less danger of damage to the pudic artery and the rectum. This method proved satisfactory and he cut 38 successive patients in Versailles without a death. In 1704 he returned to Holland, where he was equally successful

and was presented by the Magistrates at Amsterdam with his portrait and a set of gold sounds, which he had melted down and the proceeds given to the poor. Later he practised lithotomy in Brussels, where he was given a gold medal and £400 raised by public subscription. Afterwards he cut in many continental cities before returning to his native village, where he died on 7th December 1714. He is said to have operated upon 5,000 patients in his time. His career was romantic and full of vicissitudes, but he was the originator of the lateral operation.

John Jacob Rau, born in 1668, discovered by dissection that in Frère Jacques' second method the base of the bladder was not cut but only the prostatic urethra and the prostate. He followed suit, but concealed this important step of the operation by putting his thumb in the wound. Albinus, Morand and even Cheselden were all deceived by Rau's teaching and experienced the same bad results as after Frère Jacques' first operation. Cheselden thought that the incision in the bladder was midway between the ureters. As a good anatomist he experimented to find the best route before putting it to the test. He used a staff with a groove on the left side and made a long oblique incision before cutting between the ischio-cavernosus and bulbo-cavernosus and through the transversus perinei, holding the rectum aside with the fingers of his left hand (Fig. 3). He then cut upon the staff in that part of the urethra beyond the corpora cavernosa and in the length of the prostate gland, cutting from below upwards to avoid wounding the intestine. A gorget was passed carefully along the groove and then the forceps to remove the stone. Bleeding vessels were ligatured. At first he preferred to have the bladder empty as it was easier to grasp the stone, but later he distended it with a syringe mounted with an ox's ureter as a tube.

He cut 213 patients in St. Thomas's Hospital with a mortality of 6 per cent in the first hundred and 12 per cent in the next 113, which included more aged and decrepit patients as his reputation increased. He was a brilliant and rapid though gentle operator; he rarely took more than a minute and his record was 54 seconds from the first incision to the extraction of the stone.

It was inevitable that modifications were made by others in an operation that held pride of place for more than 150 years, but there were more alterations in the instruments than in the principles or technique of the operation. A complete set contained many instruments. Astley Cooper's case had six forceps and Joseph Swan's seven as well as sounds, knives and gorgets. There are no less than 61 gorgets in the College collection. Caesar Hawkins and Cline put a cutting edge on the right side. Cheselden preferred a blunt one. Bromfeild's double gorget had a blunt and a sharp blade. Staffs and knives abounded. Frère Come, perhaps the last of the itinerant lithotomists, devised a lithotome with a hidden blade, the bistouri caché. Dupuytren practised bilateral division of the bladder neck with his double lithotome. He also made a crushing forceps with a

drill in 1824. Brodie had a massive crushing forceps made by Savigny but it was not needed. Both Home and Brodie used a three-bladed forceps for lithotomy and Aston Key had one with four blades.

The high operation

The Hippocratic veto that wounds in the membranous part of the bladder were mortal dissuaded surgeons from suprapubic lithotomy for many years. Pierre Franco of Lausanne in 1561, attempting a perineal lithotomy in a child of two, found it impossible to bring the stone down. At the importunity of the parents he agreed to cut above the pubes. He removed the stone and the patient was cured. However, he did not advise any man to do the like. Cheselden described the high operation in 1723, but was preceded by John Douglas, who had first done it in 1719.

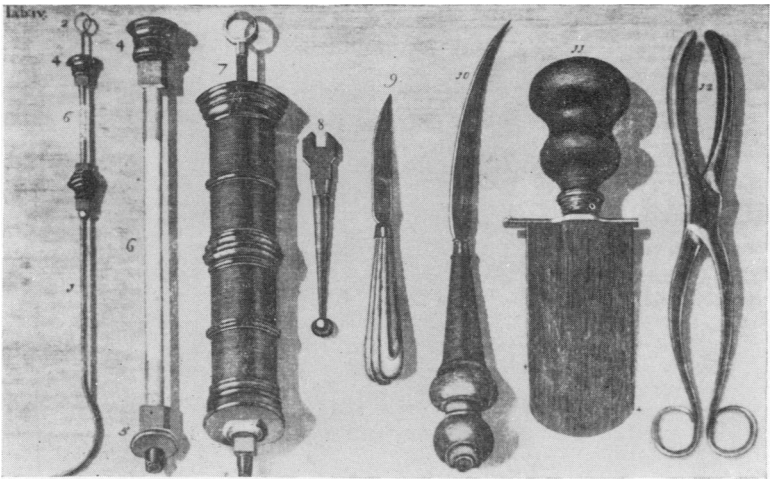
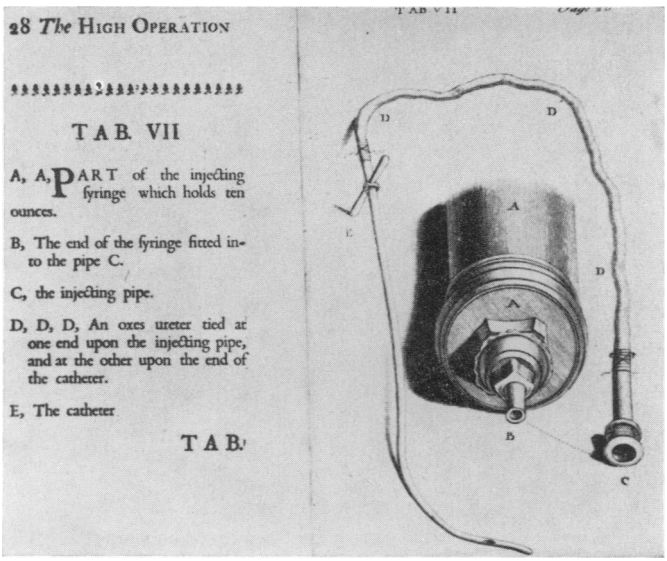


Fig. 4. Instruments for the High Operation used by John Douglas. The 'new instrument' was razor-sharp from + to + but blunt above these marks.

Being accused of plagiarism Cheselden gave it up and continued to perfect the lateral operation. The struggles of an unanaesthetized patient would make the suprapubic operation more difficult, endangering the peritoneum, but the perineal operation easier by forcing the stone down.

Francis Rosset of Montpelier had described and practised the operation on the dead body in 1590; he had hoped to use it on four or more condemned criminals had not the deservedly lamented death of Henry III of France deprived that monarch of keeping his promise to release them. Rosset's instruments included a scalpel for the integument, a sharp-pointed curved knife to puncture the bladder and two hooked knives with blunt points to cut the bladder upwards from behind the pubic symphysis. The danger of cutting the peritoneum was ever present in the minds of all who practised this operation.

In England, John Douglas, Surgeon and Lithotomist to the Infirmary at Westminster, had never seen Rosset's account, but devised his own ' New Operation ' in 1719 and published it in 1723. He was the brother of James Douglas (1731), the renowned anatomist who described the peritoneum, and was no mean anatomist himself. John realized that a full bladder could be safely opened below the peritoneal reflexion. He was encouraged by Franco's success in one case, by the knowledge that wounds in the bladder *would* heal and by the lessened danger of impotence or incontinence when the bladder neck was not cut (Fig. 4). His instruments included a new one, like a flat spatula with a sharp convex lower border, which was designed to cut behind the symphysis but to limit the upward incision



28 *The* HIGH OPERATION

TAB. VII

A, A, PART of the injecting syringe which holds ten ounces.

B, The end of the syringe fitted into the pipe C.

C, the injecting pipe.

D, D, D, An oxes ureter tied at one end upon the injecting pipe, and at the other upon the end of the catheter.

E, The catheter

TAB.

Fig. 5. Cheselden's instruments for filling the bladder using an ox's ureter.

in slitting open the bladder. It appears to belong to Arnott's category of ' ingenious, but of no use '. He wanted seven intelligent assistants, two to hold the knees firm, two for the shoulders, one for the head, one to grip the penis to keep the bladder full and the last to hold the water pot and hand the instruments.

Having succeeded in three of his first four patients—the other, a boy of three, died of convulsions after 15 hours—he showed them before the Royal Society soon after their recovery and offered to cut publicly at St. Bartholomew's or St. Thomas's to teach others; his offer was rejected with scorn except by Mr. Cheselden of St. Thomas's, ' who has always the good of mankind more at heart than any little private view of his own '. One cutter modestly asserted that the scars appeared to have been made with caustics, but the patient, a boy of seven, could not keep such a secret

and gave a reasonable account of what was done to him. One of the 10 advantages claimed for the operation was that there was no occasion to introduce such a load of iron-ware as in the common method.

Cheselden himself cut two by the high operation on 3rd May 1722 and six more in July; all recovered. Of the first 14 cut in London 13 recovered completely.

Cheselden gave credit to John Douglas as the first man to practise the high operation upon living bodies, for which the Company of Barber Surgeons, ' forward to encourage every improvement in surgery, presented him with his Freedom, with an exemption from several expensive offices '. Cheselden's *Treatise on the High Operation* was published in 1723 (Fig. 5). He filled the bladder with warm barley water, connecting the syringe to the catheter by an ox's ureter and used three knives, a convex round-edged for the integument, a straight-edged to lay the bladder bare and a curved sharp-pointed concave one to open it.

LITHOTRITY

Primitive instruments

The idea of crushing a stone in the bladder so that the fragments could be passed had occurred to several lithotomists. Gruithuisen, a Bavarian, demonstrated that a large straight tube could be passed into the bladder and tried to fix the stone by a loop of wire before perforating it by a trephine worked by a drill bow. Elderton, a Scottish surgeon, in 1819 tried the same with a curved instrument.

Even simpler was the invention of General Martin of Lucknow, who claimed in 1783 to have broken up a stone in his own bladder by means of a small curved metal sound with the end slightly roughened; it took him nine months and the operation was incomplete. We have the important end of his instrument in the College collection.

Jacobson used a curved crusher which was probably the first curved lithotrite. The firm of John Weiss made a curved instrument with an ivory handle for Astley Cooper for extracting small stones, with which he removed 84 calculi in seven sessions from the Rev. Mr. Bullen of Barnwell, Cambs. They made another which would crush as well as grasp a stone.

Drilling instruments

Isiah Luken of Philadelphia made a forceps with a watch spring basket and a drill which would perforate the stone when it was caught. This was Luken's lithokonion (1825).

The first effective drilling instrument was made by Jean Civiale. He started to experiment in 1817 whilst still an impecunious medical student under Dupuytren and performed his first operation on a living patient in January 1824. His early instrument, the trilabe, consisted of two straight metal tubes, one inside the other; the inner had three curved arms which

projected when the outer sheath was retracted and in which the stone was seized. It was held in position by advancing the outer sheath, not by retracting the inner. An iron rod with a sharp point or a rose head was passed through the inner tube in order to bore a hole in the stone. It was rotated by a fiddle bow or a handle. Sittings were limited to about five minutes and several were required; the patient was expected to pass the fragments. We have a complete set of his instruments. He was closely followed by Leroy d'Etoilles, with whom he was friendly, and by Baron Heurteloup, with whom he had violent arguments.

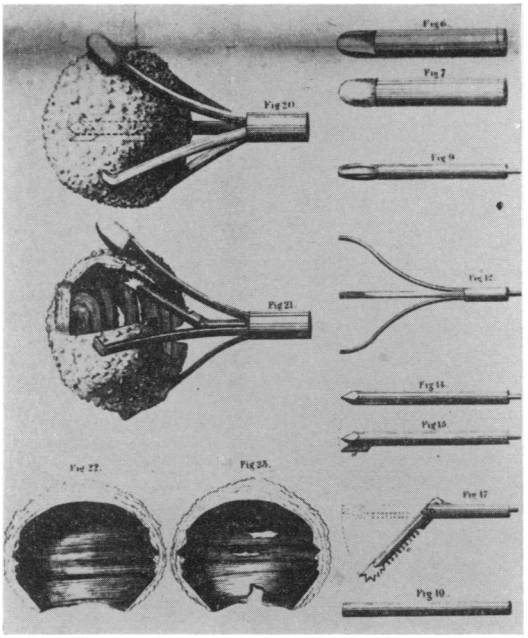


Fig. 6. Heurteloup's Evideur à forceps.

Heurteloup came from France to England and was the first to perform lithotrity in this country. He made many modifications to the instrument. His ' perce-pierre ' was similar to Civiale's but he preferred to try and hollow out the stone instead of making many separate holes in it. To do this he added a projecting ' virgule ' or comma so that the stone became a shell (Fig. 6). His ' évideur à forceps ' completed the process. The shell was finally broken up by the ' brise-coque ', which was actuated by a lever instead of by rotation. All this was done with the instrument (and the patient) fixed to the table. He washed out as many fragments as possible with a syringe and catheter. Other drilling instruments were made and we have an example of Tanchou's drill, introduced in 1830, a development of Leroy's lithoprion.

Crushing lithotrites

Lithotrites of the modern shape came next, actuated by percussion or a screw. Weiss had produced a joint screw and percussion lithotrite in 1830 and from it Heurteloup designed his percussion lithotrite in 1831, with parallel blades designed to hold the stone whilst it was crushed by blows from a hammer delivered at its proximal end. Offord, a mechanic from Stowmarket in East Anglia, where stones were common, made a trigger percussor in 1833 substituting a 3-lb. weight for the hammer. Aston Key tried it at Guy's on a child of eight but it was unsatisfactory.

Some surgeons returned to the principle of the screw made by Weiss, although Brodie thought for a time that it was too powerful. Fergusson in 1835 made a rack and pinion model which allowed percussion as an alternative; his experimental model in oak and the set of improvements made, up to his latest model, are in the collection.

Screw lithotrites

The screw, devised by Hodgson of Birmingham, gradually superseded the hammer as the crushing mechanism. In England Brodie collaborated with Weiss in producing a series of models; the first allowed for percussion as an alternative but this was omitted in subsequent patterns. We have a particularly fine set of Brodie's instruments which belonged to John Hilton (1804–1878), the author of *Rest and Pain*. The main later modifications in Brodie's instruments were in the mechanism of movement of the male blade of the lithotrite. Civiale in France had a similar model made by Charrière. The earlier models had a scoop-like female blade in which the fragments of stone were apt to stick, rendering removal of the lithotrite difficult, but later this blade was fenestrated so that they were pushed out into the bladder. This type of blade, with toothed projections, was adopted by Henry Thompson. The screw mechanism was activated by a wheel.

Evacuation of the fragments

Washing out by a syringe always left some pieces for the patient to pass, but in 1846 Philip Crampton of Dublin tried to remove them by connecting the cannula to an air-evacuated bottle; this was only partly successful. In 1865 Clover, who was anaesthetist for Thompson, devised an evacuator consisting of a rubber bulb by which the fragments could be sucked out and collected in a glass cylinder. This was the prototype of the many different evacuators subsequently introduced.

By this time anaesthetics were in more general use, ether having first been used in 1846 in England. Arnott himself had done the first recorded case of lateral lithotomy under ether at the Middlesex Hospital on 25th January 1847 (*Lancet*, **1**, 132). Bigelow of Boston, U.S.A., in 1878 evolved the procedure of crushing and evacuating all the fragments at one sitting under a general anaesthetic, pointing out that the bladder tolerates

more interference if all the fragments are removed at once; he called the operation litholapaxy. Bigelow modified the lithotrite, possibly improving the screw mechanism by substituting a ball for the wheel and a collar for the locking button, but he reverted to a non-fenestrated female blade which was considered a retrograde step. Freyer adopted the Bigelow handle and the Thompson blades.

Advances in diagnosis

During the past 100 years the diagnosis of stone in the bladder has been made easier. Gone is the need for the bladder sound, even when equipped with Leftwich's earpiece or a sounding board. Desormeaux's endoscope of 1853, illuminated by a gas lamp, was ridiculed by Civiale, who said it was not only tiring for the patient but could give rise to serious accidents. It was replaced by Nitze's cystoscope of 1876 with a platinum filament lamp and by Edison's lamp in 1886. Röntgen discovered X-rays in 1895 and their use was soon applied to the detection of calculi. There were thus two new exact methods of diagnosis; cystoscopy gives more correct results than does radiography.

More recent developments have included the combination of a cystoscopic telescope with a lithotrite so that the stone can be picked up under vision; it is useful for removing residual fragments but an ordinary lithotrite is better for a large stone. The most recent has fibre optics and combines a screw mechanism with manual crushing.

There may soon be available a Russian electronic device which is said to crush concretions of any size or density by the effect of a hydraulic impact produced by an electric discharge in a liquid dielectric medium. The domestic current of 240 volts is increased by a transformer to 16,000 volts. It is guaranteed to be painless and harmless.

Stone in the bladder is much less common than it was a century ago. In England it is rare in children owing largely to better diet. In adults it is more often a complication of urinary obstruction, especially prostatic, and the aim is not only to remove the stone but to remove its cause as well. Yet there is still a place for blind lithotrity.

We must admire the skill and dexterity of our surgical forebears in doing these difficult operations and manipulating their complicated instruments. We must praise the surgical instrument-makers for producing tools which would stand up to the stresses imposed on them. But above all we must pay our greatest tribute to the outstanding courage and fortitude of the patients, both old and young, who submitted themselves to the hazards and terrors of lithotomy without the benefit of anaesthesia. Amongst them was Samuel Pepys, who was cut on 26th March 1658 and kept the anniversary as a festival. The prolonged pain of a stone in the bladder was great; the pain of lithotomy was greater but shorter and they had the hope of relief.

ACKNOWLEDGEMENTS

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CHRISTMAS CARDS

COLOUR REPRODUCTIONS OF the Holbein cartoon of Henry VIII and the Barber Surgeons are available as Christmas cards with a brief message inside the card. These may be obtained from the Annals office, price 1s. 6d. each. Arrangements can be made for overprinting of a name and address if this is required.

THE BRITISH CLUB FOR SURGERY OF THE HAND

AN INSTRUCTIONAL COURSE on the treatment of Tendon injuries will be held at the London Hospital Medical College on Friday, 15th November. Full details are available from Mr. H. Graham Stack, Westhay, Mount Avenue, Hutton, Essex.