TABLE II.

CASE II.—*Pernicious Anaemia*—Showing the Results of Treatment.

Date.	Treatment.	Dose.	Red Corpuscles.	Haemoglobin.	Colour Index.	White Corpuscles.	Blood Pressure.
November 15, 1910 ...	Arsenic begun	2 m., t.i.d.	990,000	Per Cent. 30	1.6	4,600	108
December 16, 1910 ...	Arsenic stopped	9 m., t.i.d.	1,460,000	45	1.5	4,200	94
December 24, 1910 ...	First injection "606"	0.3 gram	1,760,000	52	1.48	3,000	102
January 7, 1911 ...	Second injection "606"	0.3 gram	2,450,000	68	1.38	4,000	108
January 24, 1911 ...	Third injection "606"	0.3 gram	3,125,000	74	1.19	7,000	98
February 9, 1911 ...	Fourth injection "606"	0.3 gram	3,350,000	78	1.16	7,600	98
February 18, 1911 ...	—	—	4,140,000	88	1.07	7,600	102
February 21, 1911 ...	—	—	4,020,000	88	1.1	6,200	—

Previous History.

Two years ago Professor Caird removed a tuberculous tumour from the sternum; otherwise she had enjoyed good health until the present illness commenced. Some three weeks before her admission she suffered from sore spots on the mouth and tongue. For many years past her teeth have been extremely bad. There is no suspicion of syphilis, unless two miscarriages and the death of a child, aged 8 months, were due to syphilis. The patient has six children alive and well.

State on Admission to Hospital.

The patient was very pale; during the past two years she has lost more than a stone in weight. There is a curious patch of herpes on the nose.

The condition of the blood was as follows: Red corpuscles, 990,000; haemoglobin, 30 per cent.; colour index, 1.6; whites, 4,600. Differential count: Polymorphs, 74 per cent.; mononuclears, 17 per cent. (large 6 per cent., small 11 per cent.); eosinophiles, 7 per cent.; basophiles, 2 per cent. The red corpuscles varied very greatly in size and shape. There were some nucleated reds; no granular degeneration or polychromasia.

Blowing systolic murmurs were present in the mitral, pulmonary, and aortic areas. The pulse numbered 100. The systolic blood pressure was 108 mm. of mercury. The tongue was pale and clean; the teeth very bad. The urine was dark in colour, specific gravity 1010, and contained no abnormal constituents. There were no haemorrhages in the retina.

Treatment and Results.

The arsenical treatment was commenced on November 15th; 2 minims of Fowler's solution three times daily. The dose of arsenic was gradually increased until December 16th, when the patient was taking 9 minims of Fowler's solution three times daily. On November 26th, 1910, a slight thrombosis developed in the lower part of the right calf, but this rapidly yielded to treatment.

On December 16th Fowler's solution was stopped. The red corpuscles then numbered 1,460,000, the haemoglobin was 45 per cent., and the colour index 1.5. From December 16th to 24th no drugs were given.

On December 24th the red corpuscles numbered 1,760,000; haemoglobin, 52 per cent.; colour index, 1.48.

On December 24th, January 7th and 24th, and February 9th, 0.3 gram of "606" was injected into the buttock. Coincidentally with this treatment very marked improvement has occurred. The patient now (February 23rd) looks and feels quite well.

On February 21st the blood count was as follows: Red corpuscles, 4,020,000; haemoglobin, 88 per cent.; colour index, 1.1. The white corpuscles, which before the administration of "606" numbered 3,000, now number 6,200. The systolic blood pressure has remained practically unaltered during the treatment.

Considerable hardness and tenderness in the buttock resulted from each injection, but there was little or no constitutional disturbance except after the last, which was followed for a few days by a swinging temperature.

March 3rd. Since the last note there has been pain and pleuritic friction over the lower part of the left chest, and some painless enlargement of the glands in the neck.

The condition of the blood at different dates is shown in Table II.

IN a report to the Persian Sanitary Council, Dr. MacConaghy, the representative of the council in the Persian Gulf, states that the sanitary facilities at Bender-Abbas, Jask, Bouchir, Lingah and Mohammerah are relatively satisfactory. Each of these ports has a disinfecting apparatus, and at Bouchir there is also a Clayton installation for what is rather quaintly called the "de-ratisation" of ships. Bouchir also possesses a portable disinfectant which can, when necessary, be sent to any point on the coast.

The Lettsomian Lectures

ON

A REVIEW OF THE OPERATIONS FOR STONE
IN THE MALE BLADDER.

DELIVERED BEFORE THE MEDICAL SOCIETY OF LONDON.

BY

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LECTURE III.

AN attempt was made by Deschamps in 1796 to revive the Marian operation on modified lines by what he termed a "mixed method." This resembled the lateral operation in the external incisions and the Marian in dilatation of the prostate and neck of the bladder, and he says, "who knows but at some future time surgeons may not be tempted to return to this method?" In 1819 Sir Astley Cooper extracted a stone as large as a walnut by this mixed method; in 1830 it was advocated by Dr. Buchanan of Glasgow, and in 1842 it was again brought forward by Dr. Willis. It received the name of "lithectacy," and then was heard of no more. By this time the lateral operation was becoming firmly established, and in 1853 Coulson says, "The lateral operation is now universally adopted, not only in this, but in all other countries, and hence we have *prima facie* reason for concluding that as a general method it is the best." The rectangular staff of Buchanan was by some preferred to the ordinary curved staff as facilitating the opening of the urethra and the passage of the knife through the prostate, but this in no way modified the steps of the lateral operation, nor was it at all widely used.

The first idea of the bilateral operation appears to have been due to Le Dran, who, in performing the lateral operation, sometimes found his internal incision was not sufficiently free. He therefore divided the right side of the prostate as well as the left. Sir Astley Cooper and others adopted the same practice. These operations, however, resembled the bilateral method only so far as the double incision of the prostate. The bilateral operation as a definite procedure was finally established by Dupuytren in 1824, and is described by William Coulson in his work on lithotomy and lithotomy published in 1853: "The patient is placed in the same position as for the lateral operation, an assistant holding the staff in an exactly vertical direction. The surgeon keeps the integument tense with the fingers of the left hand, and with a double-edged knife makes a semilunar incision in front of the anus. The incision commences on the right side, between the anus and the right ischium, ascends towards the raphe, and terminates on the left side, on a level with a point whence it set out. The middle point of the semilunar incision should traverse the raphe about ten lines in front of the anus. It involves the skin, the superficial perineal fascia, and the anterior fibres of the sphincter ani. The left forefinger is now passed into the wound, and guides the knife during a second incision which lays bare the membranous portion of the urethra; the nail now guides the point of the knife

into the groove of the staff at this part, and the membranous portion of the urethra is opened transversely to the extent of two or three lines, in order to avoid any danger of wounding the rectum. The extremity of the double lithotome is next introduced into the groove of the staff through the small incision alluded to, with its convexity turned towards the rectum, and, once fixed in the groove, it is pushed on into the bladder. The staff is now withdrawn, and the lithotome turned so as to present the concavity downwards, the blades are opened, and the instrument withdrawn in a perfectly horizontal direction. The parts divided in this second stage of the operation are the membranous portion of the urethra along the middle line, the prostate, and the neck of the bladder on both sides, in a merely transverse direction, and to an extent proportioned to the separation of the blades of the lithotome." The quadrilateral method of M. Vidal de Cassis was proposed in 1823. The first transverse incision was made as by Dupuytren, and then the prostate was divided in four directions, but the operation was never taken up. In 1824 Aston Key of Guy's Hospital published "a short treatise on the section of the prostate gland in lithotomy with a safe and easy method of conducting the operation on the principles of Cheselden"; in this he gives an account of the staff he invented for the purpose. This he designed to obviate the dangers attending the use of the gorget, and at the same time to adhere closely to the principles laid down by Cheselden in his second operation. His first attempt was made on a child who had died with a stone in its bladder, and having no proper instruments at hand he used a scalpel, a director and a pair of dressing forceps, and was struck with the ease with which the director entered the bladder. His original staff was therefore made straight, but, thinking that in depressing the handle its point might be caught by a projecting fold in the bladder, it was made subsequently with a slight upward curve at its extremity. The groove was deeper than in the common staff, to prevent any risk of the knife slipping out. The extremity was not grooved but rounded to prevent abrasion of the prostate, or mucous lining of the bladder. He points out the advantages of a straight over a curved line as a conductor to a cutting instrument, but its chief superiority consists in allowing the surgeon to turn the groove in any direction he may wish.

Before carrying the knife into the prostate, the groove, which has been held downwards for the first incision, may be turned in any oblique line towards the patient's left side that the operator may think preferable. If the surgeon preferred to use a gorget he could do so. The knife used resembled an ordinary scalpel, but was longer in the blade, and both superficial and deep incisions were made with this. The opening in the prostate could be regulated by the angle the knife made with the director. The operation was performed by passing the staff, making the usual lateral incision down to the urethra; the point of the knife was then placed in the groove in the staff. The handle of the staff was next taken in the left hand of the operator and depressed, and the groove in the staff and the edge of the knife were both turned obliquely to the patient's left side. The knife was passed on into the bladder and the prostate divided; on removing the knife the finger was introduced into the bladder and the staff withdrawn. The forceps were then passed and the stone removed.

This operation found great favour at Guy's Hospital, where it was practised for many years. Skey, however, in his *Operative Surgery*, published in 1850, criticised the straight staff of Key. He considered that "however successful in his hands, it has this defect, that it forms no guide, and as it were gives no support to the first incision. It is, however, very efficient as an agent of directing the second incision into the bladder, when its groove is once opened." He therefore had a staff "made convex in the perineum and straight beyond the curve to the point," allowing "facility of exposure of the groove, and ease in the transmission of the knife into the bladder." He also advised that the whole operation should be performed with one knife, as was first done by Aston Key.

The recto-vesical operation is said to have been performed by the Egyptian lithotomists from time immemorial, and was written about in the sixteenth century by a writer under the assumed name of Vegetius. It was described by Hoffman in 1779, and by Martin in 1817. M. Sanson

brought it before the notice of the profession in France in 1817. He performed it in two ways. By the first method the patient was placed in the lithotomy position, and a staff was introduced into the bladder, the assistant being directed to keep it perfectly vertical. The left forefinger was introduced deeply into the rectum, and a straight bistoury was passed sufficiently high up (10 to 12 lines) into the gut. The edge was then turned upwards, the point of the bistoury was passed through the anterior wall of the rectum, and, with a single cut as the knife was withdrawn, the external sphincter and the inferior portion of the rectum were divided along the middle line; the lower surface of the prostate was thus exposed. The forefinger then easily felt through the thin walls of the bladder the groove in the staff. The point of the bistoury was now made to enter the groove in the staff just behind the prostate, and the wall of the bladder was divided in the middle line for about an inch in length. Sanson, however, soon gave up this method, and substituted for it the one practised by Vacca. In this, the point of the knife having passed through the wall of the rectum, the sphincter ani and the perineum were divided from the anus to the bulb. The prostate was now exposed, and in front of it the operator felt the groove in the staff in the membranous urethra; he then inserted the blunt end of the bistoury in the groove at this part, and, raising the staff a little, he passed the bistoury forwards until its point was just beyond the neck of the bladder. The handle of the bistoury was then lowered, and the prostate was divided directly downwards on the middle line. This incision did not go beyond the limits of the gland, or touch the incision already made in the intestine. This method does not seem to have received any real support, for though by it the stone could be easily extracted, the danger of a recto-vesical fistula resulting was found to be a very real one.

The median operation was to some extent a modification of the Marian. In 1727 Douglas having observed the capability of distending the urethra under a gradual dilatation, suggested making an opening through the perineum into the urethra and then dilating with gentian and other tents; he came to the conclusion that "these artificial fistula may be dilated so as to extract any stone without cutting the body of the bladder or lacerating any of its parts." In 1796 Deschamps proposed a mixed method, but his incision was oblique and not median, and he dilated as in the Marian operation but more slowly. In 1819 Sir Astley Cooper extracted a stone through a fistulous perineal opening enlarged by the hydraulic dilator of Dr. Arnott. The dilatation lasted thirty hours, the stone was as large as a small walnut, the diameter of the passage being dilated to the extent of $\frac{3}{4}$ in. In the *Medico-Chirurgical Review* for 1846 there is an account of an operation by Joseph Bresciani de Borsa. This operation was a modification of one by Signor Manzoni of Verona published in 1808, and de Borsa states that of 100 cases operated on by that surgeon and himself only one died, and that from causes irrespective of the operation. Manzoni's operation consisted in cutting into the spongy portion of the urethra only, and then dilating the proximal portion sufficiently with the finger to admit the introduction of the forceps and the removal of the stone. De Borsa, however, carried his incision from the bulb to the prostate, not dividing this but dilating the prostate with his finger. A keen advocate of the median operation in this country was Allarton, who in 1854 published a work dealing with it under the title of *Lithotomy Simplified*. His method was as follows: After introducing a grooved staff into the bladder the left index finger was inserted into the rectum, its point resting against the prostate so as to fix the staff and serve as a guide to the knife. The perineum was next pierced just above the anus and the knife pushed on with its back to the rectum until it touched the groove in the staff. Its point was then pushed into the prostate for a distance of $\frac{1}{4}$ in. to $\frac{1}{2}$ in., and the membranous urethra slit up to its full extent. As the knife was withdrawn the external incision was enlarged to from $\frac{3}{4}$ in. to $1\frac{1}{2}$ in. by cutting upwards. A bullet probe was then passed along the groove of the staff into the bladder and the staff was withdrawn. The left index finger was next gradually introduced along the probe into the bladder and the forceps being inserted the stone was removed. He claimed the following advantages for this operation:

The impossibility of missing the bladder, the smaller amount of cutting than in the lateral operation; the neck of the bladder was uninjured; only a small quantity of blood was lost as the prostate was dilated and not incised; the urine was passed at once by the urethra as well as by the wound; the stone was easily reached; it was possible to break or crush the stone if necessary and to wash out the fragments from the bladder; the small amount of pain; the absence of danger from urinary infiltration; no muscle or vessel of any consequence was divided; there was no danger of wounding the rectum, the operation was easy to perform and recovery was rapid. The operation, however, though extensively practised in the provinces, never found much favour in London.

LITHOTRITY.

The occasional passage of a stone by the urethra must have suggested to the careful observer the possibility of dilating the urethra so as to facilitate the passage of a small stone, or to enable one to be seized with a suitable instrument and drawn through the urethra, or of being able to break up a stone, already too large to pass, into small fragments which could be voided with the urine. Indeed, the breaking of a large stone had been practised from time to time for many centuries, when it was found to be impossible to extract it through the incision made in the Celsian operation. The Egyptians practised the removal of small stones by dilating the urethra, and the same method was adopted by the Arabians. Tolet, in his *Treatise of Lithotomy* published in 1683, quotes Prosper Alpinus, in his book of the medicine of the Egyptians, who describes their practice of extracting a small stone without making incision, but only by dilatation of the urethra by blowing into the yard. He, however, owns that he does not comprehend this method, nor does it seem that it could have been of much value. Like many other surgical procedures, the origin of lithotripsy can be traced back for many centuries, though it was not placed on a sound footing until nearly one hundred years ago. The idea of extracting a calculus from the urethra without cutting was naturally suggested when it was impacted in that canal and was within reach. Such calculi were sometimes extracted whole, at others broken up to facilitate their removal. Hippocrates refers to Ammon of Alexandria, who broke up calculi with a mason's chisel, and was therefore called Lithotomos. The operation of breaking up urethral calculi was described by Albucasis, a Moorish surgeon, who lived at the end of the eleventh century (1090). The penis was tied between the stone and the bladder to prevent the stone slipping back, which was then broken by a kind of drill. Franco, in 1561, refers to the breaking of a stone, and gives the drawing of an instrument for perforating the calculus which he borrowed from Gui de Chauliac (1546). Franco also employed an instrument which he calls vesical & quatre for the extraction of calculi from the bladder. This consisted of an iron rod supporting four branches at its extremity, and enclosed in a cannula. Hildanus used a similar instrument having three branches, and later on these were reduced to two. Similar instruments were used by Hunter and by Sir Astley Cooper. The shape of these instruments may have been suggested by the ball extractor of Alphonso Ferri (1553), which was a three-branched instrument enclosed in a cannula, and both worked by a screw. With such instruments calculi were extracted from the bladder as well as from the urethra. In 1506 Antonio Benevieni broke up a stone in a female bladder by percussion; he fixed it by passing a hook behind it, and then struck it with an iron rod. In 1519 Alsaharavius suggested the idea of breaking small friable stones in the bladder with an instrument, but gave no description of it. In 1626 Sanctorius gave the plan of an instrument composed of a tube, one extremity of which was divided into three flexible branches. He says that if a fragment of a stone or an entire stone descended from the kidney and was not expelled with the urine soon after its descent into the bladder, it might be extracted by first filling this organ with water and then introducing the instrument through the urethra, the branches of which, when arrived in the bladder, should be expanded and applied close to the neck. He thinks that by then letting the water escape the stone would be carried forwards towards the three branches, seized by them, and extracted

by withdrawing the instrument from the bladder. The next advance on this was to suggest that if the stone was too large to be removed it should be perforated, and this Haller seems to have suggested, though he believed it to be impracticable. In 1671 Ciucci, an Italian surgeon, speaks of a "tenacula tricuspis" for seizing the calculus and breaking it into fragments; and in 1791 Thomassini broke up small friable calculi in the bladder. In 1559 an Irish gentleman was cured of a stone by instruments being passed into his bladder, by which the stone was broken. The case of Colonel Martin is a somewhat similar one. He first tried to break off fragments of his stone with a catheter with small holes in it, but, not bringing away much, he then tried a bougie with a serrated extremity with more success; but, from his own account, it is evident he never really got rid of the stone. The case is referred to by Sir Everard Home in his *Disease of the Prostate*, and, though the colonel wrote an account of his case to his friends in 1791, saying that he was completely restored to health, Sir Everard says:

There is nothing in his own narrative that gives the idea of his being free from considerable distress during any part of the time after the stones are stated to have been removed; and as he was allowed by his best and most intimate friends to shoot with a long bow upon ordinary subjects great allowances are to be made for him upon this, which was his hobby horse, on which he was anxious to be carried down to posterity as a conspicuous character.

In 1813 a Bavarian physician, Dr. Gruithuisen, demonstrated, what was known before, that a large straight sound could be passed on the living subject, and conceived it possible to attack stones in the bladder by mechanical power. Through a straight tube introduced into the bladder he recommended another to be passed conveying a metallic wire nicely adapted to encircle the stone and fix it against the open mouth of the second tube; a small trephine was to be introduced through this tube, and with this the stone, which was to be fixed by the loop of wire, was to be perforated. The trephine was to be worked by means of a drill bow; the instrument was, however, never used, and the project was soon forgotten. In 1819 an English surgeon, Dr. Elderton, proposed a somewhat similar instrument, but this was curved instead of being straight. In 1822 Amussat and Leroy introduced two instruments for breaking stones in the bladder. In M. Amussat's the destruction was effected by the pressure of the branches of which it was composed, which were made to act alternately by means of a lever. M. Leroy's instrument consisted of a hollow straight sound, through which passed a metallic rod turned by a winch handle and by this means the stone was to be perforated. The stone was secured by four watch springs, united together at one end by a kind of button, which, when the instrument was shut, formed the extremity of the sound, and when pushed out the two loops crossed and grasped the stone. M. Leroy successfully demonstrated its action on the dead body. He was not, however, satisfied with the instrument, and designed another made of a steel tube supporting three branches of the same metal, diverging from each other by their own elasticity and closing again by means of the external tube which drew them together when they were drawn into this. A drill was passed down the tube for the purpose of perforating the stone. To Civiale is due the credit of establishing the operation of lithotripsy. In 1817, when an impecunious medical student, working under Dupuytren, he made some models in wood of an instrument for breaking up a stone in the bladder. He then applied to the French Minister for pecuniary assistance towards constructing his instruments, and forwarded a short memoir, entitled, "Some Details of a Lithotriptic." The matter was referred to the Faculty of Medicine, but no notice was taken of his invention. Nothing daunted, Civiale, who was convinced that his method would in time be successful, continued his researches, and in 1819 he reduced the six branches of his instrument to four, and in 1820 to three, adding the bow drill and other improvements. In January, 1824, he again addressed a memoir to the Institute of Medicine, and on the thirteenth day of that month he performed his first operation in the presence of the Commissioners who had been appointed to report on his work. The patient was freed from his stone in two sittings. On February 4th his second patient was operated on and the stone removed in four sittings, and on March 4th he secured a

similar success. On March 22nd, the Commissioners, Barons Percy and Chaussier, reported favourably on Civiale, and considered that he not only discovered the principle but the means of carrying it into practice. As the result of this impartial report, M. Civiale may fairly be regarded as the discoverer of lithotripsy. The actual destruction of the stone was effected, after it had been seized, either by perforation, by percussion, or by crushing.

In 1825 Dr. Haygarth invented a sliding instrument for the purpose of extracting small calculi from the bladder, and at the suggestion of Mr. Hodgson, of the General Hospital, Birmingham, a screw was attached to the instrument so that it might be used for crushing, and in the same year Mr. Hodgson tried the instrument. Mr. Weiss had made in the previous year a crushing instrument, with the blades placed one over the other and having a gliding movement. True crushing appears to date from 1832, when Baron Heurteloup produced his percussor; this was soon modified so that it could be used either for percussion or for crushing. Some surgeons, however, returning to the principle of Mr. Weiss, gave up percussion, and crushed either by pressure with the hand alone or with a screw. Baron Heurteloup's percussor instrument may, therefore, be regarded as having led on to the adoption of crushing. In the same year Dr. Costello introduced to the Westminster Medical Society his improved instrument consisting of a male and female blade, and a controversy arose between him and Mr. Weiss, whose original instrument was made in 1824, as to priority of invention. Mr. Weiss had at that time demonstrated the power of his screw instrument to Sir Benjamin Brodie, and the screw acted with so much force on a hard calculus that it was feared the bladder might be injured by the force with which the fragments would fly apart, and to avoid this risk Sir Benjamin suggested the addition of a saw.

The principle of crushing by means of a screw was, however, rejected for a time until the use of Heurteloup's percussor showed that the danger from flying fragments was imaginary. Since that time many improvements in detail have been made, but the principle remains the same. The object of the surgeon was to crush the stone by repeated operations or sittings as they were called, each lasting only a few minutes and repeated at intervals of three or four days. Some of the debris was brought away in the lithotrite, and of that remaining in the bladder the smaller fragments were expelled by the urethra, and the larger portions were again crushed and the process continued at suitable intervals until all were removed. There was then, as indeed there is now, much difference of opinion as to the respective merits of cutting and crushing operations. In the *Lancet* for 1835 there is much discussion on this point, and in an annotation in the number for May 2nd the position is summed up as follows:

So far as our own observations and inquiries have extended, we are inclined to believe, that if lithotripsy were to be taught generally in the schools, and brought into ordinary use amongst practitioners, the cutting operation for stone would in a few years become obsolete; because the facility with which small stones could be crushed, would leave no large calculi to require the use of the knife.

Twenty years later Sir Benjamin Brodie read some "Notes on Lithotripsy" before the Royal Medical and Chirurgical Society on March 13th, 1855, in which he says:

Although the operation of lithotripsy has been for many years extensively and successfully practised in a neighbouring country, it has hitherto been adopted only to a limited extent by British surgeons: yet if I may be allowed to judge from the results of my own experience of it, it must be regarded as a method of relieving those who suffer from calculus of the bladder which is attended with much less uncertainty and danger—being at the same time much less formidable to the patient—than the operation of lithotomy.

He then quotes the figures of Mr. R. Smith of Bristol, published in Volume XI of the *Transactions* of the same society, as to the deaths after lithotomy—in Bristol they were 1 in $4\frac{1}{2}$, in Leeds 1 in 5, and in Norwich 1 in $7\frac{1}{2}$ —and remarks "there is no reason to believe that the success of lithotomy is greater now than it was when Mr. Smith collected his observations"; the truth of this observation is borne out by these statistics of the cases operated on in

the London Hospital in 1854, collected by Mr. Charles Hawkins: Fifty-nine patients were operated on and 10 died, being in the proportion of rather more than 1 in 6. The deaths in children were 1 to 14 recoveries, while among adults the deaths and recoveries were equal.

In spite of the obvious objections to lithotripsy as then practised, and of the fact that the instruments were being improved as further experience was gained, no great advance was made until 1878, when Bigelow of Boston showed that it was possible to break up a stone so completely at one operation that all the fragments could be washed out through a large evacuator. For some years previously to this various attempts had been made to remove fragments by suction through evacuating catheters, such, for instance, as the apparatus designed by Clover, but there had been no recognition of the fact that it was possible completely to remove a large calculus on these lines at one operation. Moreover, the use of these evacuating catheters had not proved satisfactory to those best qualified to judge of their efficiency, so that the method introduced by Bigelow was a veritable revolution and struck a blow at the rules previously laid down by experts for the safe performance of the operation. He boldly used large lithotrites and large evacuators; the patient was placed under an anaesthetic, and he did not hesitate to prolong the operation until all fragments were removed. To this procedure he applied the name of "litholapaxy," though at the present time the older name of "lithotripsy" is perhaps more generally used, and is understood to refer to crushing and evacuating completely at one operation. The earlier lithotritists were in favour of short and frequent crushings, and when anaesthetics came into use they considered it undesirable to employ them for fear of possibly inflicting injury to the bladder by prolonged efforts on an unconscious patient. Some few, however, and notably Sir Henry Thompson, frequently used anaesthetics for this operation, and did not meet with any bad results by so doing.

With the establishment of Bigelow's operation surgeons were enabled to consider the possibility of dealing with larger stones by crushing than was formerly the case, and also of extending the operation to boys who up to this time were not considered suitable for this method. Their efforts in this direction were assisted by the improvements made in the construction of the lithotrite, for it was found that, while its size could be materially diminished, its efficiency for such calculi as were likely to be met with in boys was in no way impaired. Lithotripsy does not occupy the position in this country that it does in India or Egypt. In those countries it is the operation of choice, and the brilliant results that have been obtained there are ample testimony to the skill of the surgeons, who have, with an unrivalled experience, brought this operation to a state of perfection that leaves little room for improvement. The large number of cases of stone coming for treatment has enabled them to acquire great manipulative dexterity, and they have demonstrated, beyond any doubt, that in skilled hands and with suitable instruments the operation is well adapted for almost any stone that may be met with. For these advances we are indebted to Keegan, Freyer, Forbes Keith, Dennys, R. Baker, Milton, and many others. It is probable that lithotripsy will never be so generally adopted in this country as in those where stone is so common, for it is essentially an operation that requires much practice to enable the surgeon to become thoroughly efficient, and it is evident that with us the opportunities for treating cases of stone are becoming less frequent; while, therefore, it is practised by some in certain selected cases, there is no doubt that, under the circumstances here, the suprapubic operation is on the whole preferable. The operation of perineal lithotripsy was first performed as a definite procedure by Dolbeau, a French surgeon, in 1862, and some years later was reintroduced by Mr. Reginald Harrison. It was performed by passing a grooved staff into the bladder, and making a small incision with a tenotome through the perineum into the membranous portion of the urethra, which is then dilated to the required dimensions either by the index finger or by a specially constructed pair of forceps, or by the passage of metal bougies. This dilatation must be just sufficient to allow the lithotrite to pass without difficulty. If too extensive, the water will escape from the bladder, and difficulties will be caused by the contracted condition of that organ.

The advantages claimed for this operation by Mr. Reginald Harrison (*Lancet*, April 7th, 1894) were:

1. That it enables the operator to crush and evacuate large stones in a short space of time.
2. It is attended with very small risk to life as compared with other operations when any cutting is done, and is well adapted to old and feeble persons.
3. It enables the operator to wash out the bladder, and any pouches connected with it, more effectually than by the urethra, as the route is shorter and the evacuating catheters employed are of much larger calibre.
4. The surgeon can usually ascertain, either by exploration by the finger or by the introduction of forceps into the bladder, that the viscus is cleared of debris.
5. It enables the surgeon to deal with certain forms of prostatic overgrowth and obstruction complicated with atony of the bladder in such a way as to secure not only the removal of the stone, but the restoration of the function of micturition.
6. It allows of efficient drainage by means of a tube through the wound.

Mr. W. H. Henderson refers to this operation in the *Indian Medical Gazette* (August, 1900), and points out that it can be performed when the urethra will not admit a sufficiently large instrument, or when the stone is large and hard; that convalescence is very rapid, and that micturition is usually a voluntary act, the wound consequently is not irritated by the constant passage of urine. Dr. P. Darrell Pank, writing in the same journal, says, "Lateral lithotomy is, in my opinion, the best operation when it is necessary to do a cutting operation at all, and if the stone be so large that the surgeon has doubts of successfully extracting it through the perineum, then I think the best thing he can do is to make a small median perineal incision on a grooved staff into the bladder, sufficiently large to admit a lithotrite big enough to crush the stone, the fragments of which should be removed by a large cannula and aspirator, as one would operate by litholapaxy in the female." He reserves this operation only for those cases which from some very uncommon cause cannot be operated on by litholapaxy. This method has not met with much support, and it is doubtful whether even in the few cases that are considered suitable, it offers any advantages over a suprapubic operation.

In order to ascertain what operations surgeons are performing for vesical calculus in this country, I ventured to send out certain questions to those attached to the larger hospitals, with a request that they would favour me with replies. I should like to take this opportunity of thanking all those who have returned answers to my inquiries for the trouble they have taken in supplying me with the information I required. Before dealing with the several points at issue I wish to draw attention to some general remarks that have been made on the subject; and first, as to the prevalence of stone. Quite a number of surgeons have remarked that they do not see so many cases of vesical calculus in their hospitals as formerly, and this statement does not refer to any particular part of the country but to districts widely separated. For instance, from Norwich: "We scarcely get any cases of stone in the bladder now, though fairly common in the kidney, this is a great change, as I can remember about thirty years ago seeing three lithotomies in one morning." From Liverpool: "Stone in the bladder is comparatively rare here, certainly ten in the kidney to one in the bladder." From Northampton: "Used to have a number of stone cases, but for the last ten years have been almost none." A London surgeon says: "Very few cases of stone (vesical) come into the London general hospitals." From York it is stated that "cases of stone are very scarce in this district," and practically the same remark is made from Oldham, Sunderland, Sheffield, Bradford, Chester, Bristol, Cumberland, and Huddersfield. There seems to be a very strong expression of opinion that vesical calculi are not as commonly met with as formerly, though renal calculus is regarded as being more frequent. It may be that improved methods of diagnosis have demonstrated the presence of calculi in the kidney that formerly would have been undetected, and that might not have shortened the patient's life. Why stone in the bladder should be less common now than formerly is an interesting and difficult question, but is one that is outside the scope of these lectures.

Another point to which attention has been incidentally drawn is how far it is advisable for a surgeon to perform lithotripsy when his opportunities of acquiring practical experience of it are limited. Several surgeons have expressed

their opinion on this point, and the views they hold may be summarized by saying that unless you see enough of stone to become proficient in lithotripsy it is better to cut.

To the first question—What operation do you usually perform on the removal of a stone before the age of puberty?—there were 221 replies, which may be grouped as follows:

- Suprapubic lithotomy, 144.
- Lithotripsy for small stones, suprapubic lithotomy for others, 35.
- Lithotripsy if possible, 9.
- Lithotripsy, 7.
- Suprapubic lithotomy as a rule, sometimes lithotripsy, 9.
- After 4 years lithotripsy; before, suprapubic, 2.
- After 7 years lithotripsy; before, suprapubic, 1.
- Lithotripsy almost invariably, but in large hard stones in very small children suprapubic, 6.
- Lithotripsy if no permanent cystitis, 2.
- Lithotripsy or suprapubic, 1.
- Lithotripsy or lateral lithotomy, if the stone is large, suprapubic, 1.
- Median lithotomy, 1.
- Lateral lithotomy but lately suprapubic, 1.
- Suprapubic, and if the stone re-forms median or lateral lithotomy, 1.
- Lateral lithotomy, rarely lithotripsy, 1.

From an analysis of these figures it is clear that the suprapubic operation is the one usually performed. Seven only refer to lithotripsy as the method adopted, without any reference to the size of the stone or other circumstances. The others who perform lithotripsy do so only after making choice of such cases as seem suitable in their opinion for the operation. The lateral operation as well as the median are still mentioned, though apparently are very seldom performed.

To the second question—What operation do you usually perform for the removal of a stone from the male bladder after puberty when there is no evidence of prostatic enlargement?—there were 240 replies, as follows:

- Suprapubic lithotomy, 116.
- Lithotripsy, 29.
- Lithotripsy as a rule, 28.
- Lithotripsy for small stones, suprapubic lithotomy for others, 48.
- Almost always suprapubic lithotomy, otherwise lithotripsy, 8.
- If the stone is small and smooth, lithotripsy; an oxalate or a stone of 1 in. diameter, suprapubic lithotomy, 3.
- Lateral lithotomy occasionally, especially when the urine is foul, 2.
- With persistent foul cystitis, suprapubic lithotomy in two stages, the bladder being attached to the deep part of the incision in the parietes and opened in forty-eight hours, 1.
- Formerly lateral lithotomy, of late suprapubic lithotomy, 1.
- If the stone is large median urethrotomy with crushing after the method of Reginald Harrison, 1.
- If stone is small, median or lateral lithotomy; if large, suprapubic, 1.
- Lithotripsy except with sacculation or sepsis, then suprapubic lithotomy, 1.
- Lithotripsy if possible, if not, suprapubic lithotomy, 1.

These returns show that surgeons are prepared to consider the advisability of performing lithotripsy in the adult more frequently than in boys, but the number of those who practise the suprapubic operation is in excess of those who use lithotripsy, and it should be noted that of these a large number reserve it for small stones, doing the suprapubic operation for large ones.

The third question, as to the treatment of stone when there is evidence of prostatic enlargement, elicited 224 replies, as follows:

- Suprapubic lithotomy, 202.
- Perineal prostatectomy and lithotomy combined, 1.
- Suprapubic operation if there is obstruction with residual urine and cystitis; crushing and washing out if no cystitis, 1.
- Suprapubic operation and perineal drainage, 2.
- Suprapubic operation, rarely a perineal with enucleation, 1.
- Lithotripsy with well-elevated pelvis or suprapubic if necessary, 2.
- If slight enlargement, lithotripsy; if considerable, suprapubic lithotomy, 6.
- Lithotripsy if possible, if not, suprapubic lithotomy, 5.
- Lithotripsy in the majority of cases, 3.
- Sometimes perineal lithotomy with removal of prostate, 1.

For the treatment of stone in the presence of an enlarged prostate, the suprapubic operation is, from these

returns, the method adopted by almost all surgeons, only 16 out of 224 being prepared to discuss the desirability of attempting lithotripsy under these conditions.

The fourth question dealt with the treatment of the wound in cases of suprapubic lithotomy. There were 230 replies, as follows:

- Complete suture of the bladder and of the abdominal wall without drainage, the urine being normal, 33.
- Complete suture of the bladder, suture of the greater part of the abdominal wall with drainage, either by a tube or by gauze above the pubes, 71.
- The same with in addition a catheter in the bladder, 9.
- Complete suture of the bladder and of the abdominal wall without suprapubic drainage, but with a catheter in the bladder, 5; or with the passage of a catheter at regular intervals, 1.
- Partial suture of the bladder and of the abdominal wall with drainage by a tube entirely, 9; by a tube for a time and then by some apparatus, 5; or by a catheter, 1; or by drainage at once by some apparatus, 1.
- No suture of the bladder or of the abdominal wall, drainage by a tube entirely, 42; by an apparatus, 18; by a tube for a time and then an apparatus, 24; by a tube and catheter, 1; by pads only, 2.
- Suture of bladder to abdominal wall and drainage by a tube, 4; by an apparatus, 1; without either tube or apparatus, 1.
- Perineal drainage, 1.
- No sutures or drainage, 1.

The chief point of interest in this question is as to suture of the bladder and of the abdominal wall, and whether a drain is used or not. It is evident that there are few surgeons who venture to sew up the bladder and close the abdominal wound without some form of drainage, though there are many who will close the bladder and use a drain to it; while rather more than half the number prefer to use either partial suture or none at all.

Such is the condition of practice for stone in this country at the present time, and though it is always uncertain what changes may take place in the future, it does not seem probable that there will be any great alteration in the immediate future. No doubt, under modern conditions, the lateral operation would yield good results, so far as the mortality of the operation is concerned, if done by surgeons who had fairly frequent opportunities of performing it. But, in addition to those dangers which might be avoided by a skilled operator, there is the possible injury to the ejaculatory ducts, and consequent sterility, which is beyond the control of the surgeon. There does not seem to be any real effort at the present time to displace the suprapubic operation by crushing, nor does it seem likely that any great improvement can be made in the details of the former, so that we may fairly regard the mode of treatment of to-day as likely to continue for some time. I have ventured to bring this subject before this society in the belief that it is good at times to review the methods we adopt. I can only hope that by so doing I have aroused an interest in the past, and have shown that we are indebted to no small extent to the labours of those who have preceded us.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

TREATMENT OF THE URETHRA FOR LOCOMOTOR ATAXIA.

AFTER the notice on Dr. Jaworski's book, in the JOURNAL of January 21st, 1911, page 142, some observations on this treatment may be of interest. For the past year I have been practising this method after instruction from Dr. Denslow. Dr. Harry Campbell sent me most of the cases, which have reported progress to him from time to time. There have been seven, of one to ten years' standing. One suffering from phthisis after showing decided improvement in tabetic symptoms during February and March, 1910, developed acute phthisis in July and died in September. Six others have all improved, they say, more than under any other treatment. Three may at present be considered clinical cures (Cases 1, 2, and 5).

1. S., aged 39, an incipient case of about a year's standing, with loss of knee-jerks, marked Rombergism, Argyll Robertson pupils, and neurasthenia, with depression; is now apparently well.

2. V., aged 57, a case of nine years' standing, with "pains," advanced ataxia, amblyopia, anaesthesia of feet, and numbness of hands; has practically lost all these symptoms; he can now read without glasses and walk several miles at a stretch without the aid of a stick. Previously to walk a few hundred yards was a task. No longer emaciated.

3. D., aged 46 (ten years), improved considerably in gait, but has not lost his rectal crises.

4. W., complete ptosis of left eyelid, is now partial, and he "feels much better." He had no ataxia.

5. The case of B., aged 42 (ten years), is interesting, for though frankly admitting gonorrhoea and bad stricture, he denies convincingly that he has had syphilis. He was previously laid up for a week or so in nearly every month, with "pains," but since August, when he began treatment, he has not so suffered. His pains during this ten years did not get much worse. He is now practically free, and, like W., feels better, indeed well.

Knee-jerks do not seem to return, nor has the pupi improved noticeably in any case yet treated.

A noteworthy feature has been that urethral dilatation seems to reproduce symptoms at the time, while diminishing them in the interim. Two got violent erections; one does still; the other then had his worst attack, and, save for a few minor erections, did not so suffer again, though they had been of almost daily occurrence.

B. always gets pain down his left leg during treatment. His lightning pains were only in this leg.

I can bear out Dr. Jaworski's advice to "go slow," for I believe rapid dilatation does more harm than good.

The conclusion would seem to be that with an organism vitiated by a syphilitic virus the symptoms of locomotor ataxia can be produced by constant impulses from a peripheral focus of irritation (not necessarily an obvious stricture), and it is conceivable that changes in the cord could be effected by disturbance in the blood supply there, caused by the same or accompanying impulses. Further, cases like those of B. suggest that if the exciting cause (stricture) be sufficiently intense tabes may be produced without the predisposing cause (syphilis). The prevalence of tabes in males seems to favour the foregoing. Sclerosis of the cord was, I take it, made to account for the symptoms and has not been proved to be the primary cause, the whole cause, and the only cause of the symptoms.

I may add that, save in Case S, who was told that he had deranged nerves, no patient has been promised improvement. All were told only that some good results have accrued from the treatment. If they are now hypnotised, they must have hypnotised themselves or one another.

The late histories of syphilitics known to have had stricture might throw some light on this subject.

London, W.

E. T. JENSEN.

TEAR OF THE PERINEUM: ENDOCARDITIS: RECOVERY.

A PATIENT was admitted to the Royal Infirmary, Edinburgh, on October 30th, 1909, with the following history: She was a dairymaid, aged 19, and at 4 a.m. on the same day was attending to her duties in a cowshed and cleaning out a feeding-trough; she was bending down just in front of one of the cows which had its head down eating, when the animal suddenly raised its head and one of its horns struck the girl on the perineum. The girl lost a considerable amount of blood before the arrival of a doctor at 4 p.m., and she was sent to the infirmary, where she arrived at 6 p.m.

There was a complete tear of the perineum, and the recto-vaginal septum was torn through for about one inch. As the wound was not very clean, no attempt was made to repair the perineum at the time. Three weeks after admission the girl had a rigor, felt sick, and the temperature rose suddenly to 104° F.; a soft blowing murmur was discovered over the heart in the mitral area. A diagnosis of endocarditis was made, and, after other remedies had failed, polyvalent antistreptococcal serum was given by the rectum, with the result that the acute symptoms gradually subsided, although for three weeks the girl's condition was very grave. After her recovery from the endocarditis the perineum was repaired, and she left hospital ten weeks after admission, well but with a systolic mitral murmur.