In this Branch, there are those who are officially connected with some of the finest educational establishments in the kingdom; and this must be my justification, if excuse at all is necessary, for my bringing this subject before the Association to-night.

OBSERVATIONS ON SUPRAPUBIC LITHOTOMY.

A Paper read before the Harveian Society of London, February, 1887.

By SIR WILLIAM MAC CORMAC, F.R.C.S.,
Surgeon to, and Lecturer on Surgery at, St. Thomas's Hospital.

(Concluded from page 555.)

Indications for Suprapubic Lithotomy.—In pre-æsthetic days, an operation which could be quickly completed possessed enormous advantages, and the lateral operation is performed in favourable cases and by accomplished operators more rapidly, perhaps, than any other great operation in surgery. But in some respects it is a dive in the dark; important structures may be and have been wounded; and we do not see what we are cutting. In case of hæmorrhage, the bleeding is difficult to arrest, and in children the parts are so small that there is a considerable risk of pushing the neck of the bladder before the tip of the finger, in which case the viscus will not be reached, and the stone may never be found. The high method occupies more time, but everything is visible while being divided; there is no considerable hæmorrhage, and that which does occur can be promptly and readily checked. Dulles (*American Journal*, July, 1875, and April, 1878) speaks favourably of the high operation, and thinks it merits further trial; but he finds by statistical comparison that, in regard to mortality, the suprapubic is far less favourable than the lateral operation for stones below one ounce in weight. There is but little difference where the calculus is between one and two ounces; but for calculi above two ounces the high operation is much more favourable than the lateral. Sir Henry Thompson formulates a similar opinion when he says, "I believe in the hands of most surgeons the suprapubic proceeding is a safer and far easier method than lithotrity for hard stones of an ounce and a half to two ounces in weight. A stone of two to three ounces cannot be extracted by the lateral method without much tearing and bruising of the neck of the bladder. No proceeding is comparable to the suprapubic for large stones." It is generally admitted that for large calculi the lateral operation is so dangerous as to be practically set aside in favour of the high method, and we have to consider its applicability to cases of smaller stones in adults, to women, and to children. But for adults lithotrity is generally applicable for ordinary-sized stones. It is an operation very safe as regards risk to life, yet of difficulty in unpractised hands, while in all there is a liability to recurrence of the stone—according to statistics, about 1 in 7. It may be fairly assumed that the larger number of these cases of relapse are due to the fact that some fragment has been left behind.

After lithotomy recurrence is very rare; only 40 out of 1,030 individuals were operated on a second time. In Sir Henry Thompson's cases of lithotrity there was recurrence in about 13 per cent., which constitutes a serious drawback to the operation. Up to an ounce and a half in weight, lithotrity is superior to lithotomy, so far as mortality is concerned; above that weight, say from an ounce and a half to three ounces, lithotomy is probably more safe and successful.

Surgeon-Major Keegan has lately demonstrated (*Lancet*, 1886) that lithotrity may be successfully employed in quite young children, and also for very much larger stones than have hitherto been dealt with in this manner. He has successfully removed a mulberry calculus of four ounces in weight, and a phosphatic one of eight ounces, by lithotrity in a single sitting.

He found the urethra in boys larger than has hitherto been supposed, and that a No. 7 lithotrite will pass into a bladder of a boy of 2 years. A No. 6 catheter will even enter the bladder of a child 1 year old, through which a fair sized stone may be evacuated. He does think the lateral operation is frequently followed by emasculation, and while he admits the suprapubic to be the easier method in young children, he does not consider it so successful. Freyer, for instance, has cut 143 boys for stone in India by lateral lithotomy without a death, and Dr. Keegan does not think that in India the high opera-

tion will obtain much vogue as a substitute either for lateral lithotomy or lithotrity.

The usual indications for the performance of the high operation are the presence of a large stone in a contracted bladder, a calculus projecting into the urethra, encapsulated and very hard calculi, cases of numerous stones, foreign bodies which cannot be broken up or otherwise extracted, ricketty deformity of the pelvis, and ankylosis of the hip-joint. Some would include amongst indications, considerable hypertrophy of the prostate, stricture of the urethra, irritable bladder, and cases of "bleeders." The high operation certainly affords the straightest, shortest, and broadest way to the bladder; each step is under the eye of the surgeon, and the operation throughout is capable of being done antiseptically. The stone can be easily removed, the whole interior of the bladder may be explored by the finger, or its surface examined by means of a suitable light. In cases of encysted calculus this method of operation affords obvious advantages. There is never subsequent incontinence of urine, and fistula is very rare, nor can sexual impotence happen. A hernial protrusion along the line of cicatrix may possibly take place, especially if any transverse division of tissue have been made. By a combined distension of the bladder and rectum the former is pushed forward and upward, the vesical wall closely approaches the abdominal, and an ample area of the bladder, where it is uncovered by peritoneum, is exposed for the purposes of safe incision.

One risk to life is the possibility of septic infection. It is scarcely possible to purify the bladder effectively when there is a stinking catarrh. In such cases the perineal incision is to be preferred to the high, as it affords better drainage. Good drainage is difficult to ensure after the suprapubic lithotomy, and unhealthy inflammation is then not unlikely to occur, for in no tissue does an infective process spread more readily than in the subserous areolar layer divided in the operation. After all, the question must mainly be decided by an estimate of the comparative mortality. Cadge states that in cases of stone weighing more than three ounces the deaths after lateral lithotomy in Norwich were 46 per cent. In such as these the suprapubic method would probably be much less dangerous. In children with fairly large stones the high operation possesses great advantages, and in adult women, when lithotrity is inapplicable, it will probably supplant all other methods.

The collection of statistics by Dulles and others, which I here quote, shows that hitherto the suprapubic operation has proved more dangerous to life than lateral lithotomy.

Mortality Statistics of the Suprapubic Operation for Stone.

Authors.	All Ages.		Adults.		Children to 15 years old.	
	No. of Cases.	Mortality.	No. of Cases.	Mortality.	No. of Cases.	Mortality.
		percent.		percent.		percent.
Gunther, 1561-1851 ..	257	23.7	54	44.4	59	20.3
Flury, 1851-1878 ..	92	32.6	37	48.6	48	20.8
Garcin, 1879-1883 ..	94	24.4	48	29.2	43	14.0
Tuffier, 1879-1883 ..	120	27.0	—	—	—	—
Dulles, 1561-1875 ..	364	28.2	231	32.4	133	21.0
Murray-Humphry ..	104	29.8	—	—	—	—
Recent Foreign Cases ..	101	21.4	46	19.6	55	23.6
Recent British Cases ..	90	31.0	37	31.0	33	0

Many have accomplished admirable results with the lateral operation. Zett, in 106 cases, had three deaths. Surgeon-Major Freyer, as before stated, performed the lateral lithotomy in boys in 143 cases with uniform success. Werewkin has given 147 cases of children operated on by the perineal method, with a mortality of 6 per cent., the last 72 being without a death. Heusinger records 222 cases, with a mortality of 6.7 per cent. The results of the high operation cannot be favourably compared with these.

Schmitz divides his series of high operations into two groups: 18 cases were in what he calls the pre-antiseptic period, from 1870 to 1877, attention being only paid to cleanliness, while the technique of the operation was not quite so perfect as now. Only 8 of these patients recovered, and 10 died, a mortality of more than 50 per cent. In consequence of this, Schmitz abandoned the operation for four years. In 1881 he began to operate again with every possible antiseptic precaution. Of 20 patients thus treated, 16 recovered and 4 died, a mortality of 20 per cent. which, although very greatly reduced, is still high. The figures, however, do not differ materially from those collected by previous observers, *vide table*. He has been able to trace the

causes of death in 82 cases, peritonitis and suppuration in the cellular tissue being the most frequent, *vide* table.

Causes of Death in a Collection of Eighty-two Cases.

	Cases.
Peritonitis	30
Pericystitis	20
Pyelonephritis	18
Cystitis	3
Gangrenous urethritis	1
Collapse	4
Erysipelas	2
Marasmus	1
Result of necropsy negative	3

Kidney affections seem to occasion an unusually large proportion of the deaths, probably on account of the number of cases of large stone, and the long duration of the cases operated upon; this explanation, however, does not apply to the more recent cases.

Dittel, and the French authors, are against suture of the bladder. Schmitz never practised it. In Garcin's collection of 94 cases the average mortality is 24.4 per cent., but in 20 cases where bladder suture was practised there were seven deaths, or 35 per cent. Tuffier gives a similar result, and Jacobson, Etienne, and Meyer, are also opposed to the introduction of sutures. Sir Henry Thompson does not suggest it.

However, nearly one-third of the cases of suture of the bladder have healed by first intention, and where the suture has given way the most dangerous period of the first three days has passed by. Tiling introduces outside the row of interrupted sutures a second continuous suture, which may be of advantage. I am of opinion that primary union of the wound is the object to strive for. Immediate suture is the ideal method of after-treatment; but it is difficult to carry out, and in cases of putrid urine it would probably do harm.

In Meyer's collection of forty-one cases of bladder-suture the wound re-opened seventeen times, and eight died from sepsis. I believe, nevertheless, the future of the operation depends in a large measure on the possibility of successful suture; and in the light of several recent successful cases of suture after the high operation, and two successful cases of suture after intra-peritoneal rupture of the bladder reported by me in the *Lancet* (December, 1886), I think that an endeavour should, as a rule, be made to suture the bladder after extraction of the stone, if the urine and bladder-wall be healthy.

Mr. C. A. Ballance and Mr. R. J. Langley have taken much trouble to obtain for me the cases recently occurring in English hospitals. All the London hospitals, and a large number in the provinces and Scotland, were applied to. A list of ninety cases has been thus obtained, which afford matter for some interesting conclusions.

List of Cases of Suprapubic Lithotomy since January 1st, 1885, from Accounts published in English Journals, and through the courtesy of Sir Henry Thompson and the Surgeons and Registrars of Hospitals in London and the Provinces.

Children under 15:

Recoveries	31
Deaths	0
Result not stated	1
Still under treatment	1
	— 33

The bladder was sutured in 18 cases; primary union obtained in 8.

The weight of the stone varied from 2½ ounces to 35 grs.

Adults:

Recoveries	35
Deaths (2 not due to operation; see analysis)	18
Result not stated	2
Still under treatment	2
	— 57

The bladder was sutured in 8 cases; primary union obtained in 2.

The weight of the stone varied from 24 ounces to 10 grs.

In one case operation was discontinued owing to peritoneal reflection completely covering bladder	1
Total number of cases	— 91

In regard to the use of a permanent catheter, it was observed that, in the eight cases where primary union was obtained in children after suture of the bladder, the urine ran alongside the instrument rather than through it, and it was in all instances withdrawn within two days; and where the bladder was not sutured, the urine escaped by

the abdominal wound, so that the catheter proved useless. In adults it proved equally ineffective for the purpose of drainage, and was never kept in for more than a day or two.

Stated Causes of Death in 19 Cases:

1. Ruptured rectum; 18 ounces of fluid injected.
1. Uræmia. Operation complicated by lateral lithotomy; stone 24½ ounces.
1. Asthenia. Patient aged 70.
1. Double pneumonia. Temperature at time of operation, 102.4°.
1. Peritonitis.
1. Cardiac and renal. Calculi in kidney.
1. Renal. Operation performed by desire of patient, against advice of operator.
3. Surgical kidney.
5. Suppurative nephritis. Of these, one had calculi in kidneys, and one was complicated by perineal lithotomy.
2. Unconnected with operation. Both patients were discharged as cured, one subsequently dying from "some disease of liver," the other from apoplexy.
2. Cause of death not stated. Condition of patient complicated by "very large prostate."

A sufficient number of cases of the modern improved method of operating does not yet exist upon which to base either a positively favourable or unfavourable judgment. The high operation has certain inherent risks which may jeopardise the patient's life. Septic causes appear to account hitherto for the largest proportion of deaths, arising for the most part from putrefactive changes in the abdominal wound. In Tuffier's statistics of 120 cases, as much as 34 per cent. of the deaths are ascribed to infiltration of urine of a septic character; and Meyer records an even greater percentage of deaths from this cause. But the seat of operation is open; the actual removal of the stone is rendered very easy; one can remove a large stone or numerous stones with less danger and less trouble; and we possess means of maintaining the wound aseptic in the larger proportion of the cases.

The high operation is a new one as regards the employment of antiseptics, and the best means of using them is not yet fully worked out; but we cannot, by any form of after-treatment, wholly exclude the risks which result from putrid urine. Trendelenburg's abdominal position affords, perhaps, the most efficient means of drainage; but it is extremely irksome, and cannot be carried out in all cases, especially in those who have often most need of it, those in whom the bladder-affection has been of long continuance, those suffering from pyelitis, or in old persons with a fatty heart.

In the discussion on suprapubic lithotomy, at the meeting of the Deutsche Gesellschaft für Chirurgie, 1886, Ebermann, of St. Petersburg, quotes the mortality after the lateral operation as 1 in 7. Thompson puts it at 1 in 8.2. Professor Ssinnisin, also of St. Petersburg, performed 154 lateral operations, with seven deaths, or 1 in 22. The age varied from 13 months to 56 years. Neither of these Russian surgeons believes in the occurrence of impotence as a result of the lateral operation. On the other hand, Langenbeck regarded it as frequent. Haemstadt, of Pottsville, Pa., says that, out of eighteen persons who came under his observation, grown to manhood and married, who had been cut when boys, only one had issue (*Lancet*, April 10th, 1886). The avoidance of all possible injury to the genital apparatus is, therefore, an argument in favour of the high method.

The mortality of the suprapubic method is, as we have seen, a high one; it varies between 22 and 30 per cent. The average mortality of the lateral operation in adults is almost the same as after the high operation. Probably for all stones of two ounces or more in weight, in which lithotripsy is inapplicable, the high operation should be performed. In children, the danger of the high operation, according to records coming from abroad, contrasts very unfavourably with that of the perineal lithotomy; while, in the English cases collected by me, although not very numerous, there has been hitherto an unbroken series of successful results. If the rate of mortality in adults cannot, however, be reduced, the high operation must, I fear, be reserved in the future, as it has been in the past, mainly for the removal of large stones, or for those cases in which lithotripsy and perineal lithotomy are for some reason inapplicable.

The collection which I have been able to make, although a limited one, appears to point to a much more hopeful prospect of successful operation in children than any previous statistics would warrant.

Mr. President and gentlemen, I have to thank you for your courteous attention.