On the Relative Merit of Lithotomy and Lithotripsy.

by

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If the profession had been satisfied with an operation which has prevailed for so many centuries for the cure of a formidable disease, it is obvious that the inventive faculties of man had not been roused for the purpose of superseding it. That an apparently insuperable obstacle to that hitherto adopted has been finally overcome by steady perseverance, is the best evidence that the old operation, whatever the dexterity of its performance, and however comparatively successful the issue, possessed inherent defects in its principles, and in their application. Whatever comparative success may have attended its performance in hands the most dextrous and the most practised, it is undeniable that any operation that required a wound to be made of some two inches in length, and yet greater in depth, which exposes an important cavity, and extracts therefrom a stone of unknown dimensions,
form, and composition, in which, there can be no determinate relation between the sizes of the object to be extracted, and that of the artificial canal or passage through which it is drawn, and often dragged by main force, and thus dragged, too, in the immediate neighborhood of large arteries, an important gland, and ducts essential, if not to the individual, at least to his successors— it must be acknowledged that any such operation must be attended with danger, and if danger of a fatal result be not the invariable accompaniment, yet that danger is too near at hand, and in too close relation to the operation, to warrant our wilful indifference to any rational substitute. That such danger is within reach, may be inferred from the occasional fatality attending operations of Lithotomy, the progress of a case of which, may have been unmarked by any evit of an untoward or unpromising nature, and in which neither the condition of the bladder, nor the
form, nor size, nor composition of the stone could reasonably excite apprehensions as to the result. The question of danger deserves some consideration. Employed in its widest sense it embraces risk, or peril, in every form and degree. It has, however, no definite line, no positive ascertainable boundary. If we imagine an operation, the results of which were successful, as frequently as 99 in 100, we could hardly affix to such an operation the title of dangerous; but if we narrow the circle to the total of 20, or of 15, or 10, and find one case fatal, I doubt whether the remainder could be deemed exempt from the imputation of positive danger. And such is the fact in the operation of Lithotomy, because, although individual members of the profession may justly boast a success greater than I have specified, who have extracted stone by the aid of the Knife successfully from more than twenty bladders without one single death, yet in the aggregate of rigorous, the proportionate number of deaths is greater, and though it is diffi-
cut to obtain results with any exactness, yet the fatal consequences are probably in a considerably greater ratio than 1 in 10. If, therefore, we find any given operator in whose hands the old operation has been so successful as to materially widen the circle, all that can be said is that the operation involves less amount of danger in his hands, and that he, individually, has less reason than others for the substitution of the new operation. It now becomes my duty to consider, in all fairness, whether the operation of Lithotrity, which has been so widely resorted to in this, and other countries, possesses advantages more or less concurrent with the ultimate object of both operations—the extraction of a stone from the bladder.

I will first briefly allude to the advantages, and also to the demerits of the operation of Lithotomy, for it would be useless to discuss that subject of the relative merits of the two operations, unless we have a clear starting-point by which to gauge the question of merit or demerit.
The great and palpable advantage of Lithotomy is derived from the fact, that it removes the stone at one operation, and that, under favourable circumstances, in a short period of time— for a period of one to four minutes, during which the offender, perhaps, of years, is entirely removed from a bladder, may well be considered short—and the operation, when dexterously performed, may justify the term "brilliant." But the applause which attaches to such an operation should not in justice be awarded to the operator, till a later stage of the proceeding, and even a more critical period, at which the real hero of the drama has passed the crisis of danger, and entered on the path of all but certain recovery. It is too true that the very facility with which the operation has been completed, and which has appeared to justify the applause of the spectators, may have been occasionally obtained at no less an expense than the life of the patient. Some interrup-


may be allowed the surgeon while extracting the stone from the cavity of the bladder, especially if it be above the average size. This interposition gives, at least, evidence that he had not committed one grievous error, that of making an incision into the neck of the bladder beyond the limits which prudence and safety dictate. If we grant this one great merit, viz. that the stone is removed entire, in a short time, and without any great extent of suffering to the patient, we have perhaps at once placed the question of the merit of Lithotomy on its highest eminence. But, unhappily, there are many alternatives to this occasional success—many that are common to the skillful and the unskillful—many that are proper to the unskillful only. There are attendant evils on the operation, and evils attendant on its consequences; and as it would not be a fair gauge of the character of an operation to involve in it the unskillfulness of its
agents, I shall presume that every operation is performed with an average amount of tact and dexterity. The difficulties attendant on the operation are:

1. Enlarged prostate gland.
2. Stone of unusual size, or

The consequences which either retard recovery or which lead to a fatal result are:

2. Hemorrhage occurring immediately, or consecutively.
3. A protracted operation from one or various causes.
4. Wound of the rectum.
5. Inflammation of the bladder, involving the substance of the organ.

I place collapse at the head of this list, because I consider it perhaps the most frequent cause of death. There are many persons whose constitutional peculiarities should, were it known, protect them from the knife employed for other than the simplest
purposes, whose nervous system is fitful and unstable, and in whose persons a slight attack of inflammation greatly aggravates the danger of their condition.

Among this class no operation of the magnitude of Lithotomy can be deemed free from very positive danger. These are the cases in which death ensues before the local irritation has had time to build up inflammation to any injurious or fatal extent.

I have enumerated three chief difficulties attendant on the operation. Enlarged prostate, stone of unusual size, small outlet between the bones of the pelvis. I do not enlarge on the two first, because they equally apply to the operation of Lithotripsy, but not in the same degree. The evil of enlarged prostate in lithotomy is immense. There is no greater satisfaction to the Lithotomist than that obtained from the introduction of his finger into the bladder, and the bringing it in contact with the stone. Indeed, this introduction of the finger
for the purpose of dilating the prostatic portion of the opening by pressure is a great safeguard to the patient, and shows that the neck of the bladder remains untouched. This is inapplicable in enlarged prostate, not because the third lobe of Sir W. Hone opposes an obstacle to the finger within the bladder, but because the whole gland is so swollen, pressing both forwards and backwards, and so materially affecting the position of the neck of the bladder, that no finger of ordinary length can reach, or nearly reach, the cavity of the organ. There is no certain or approximate criterion of the size of the stone, and if large, more than ordinary force is required to extract it through the gizzard-like structure of the gland.

The third difficulty relates to the too-vertical direction of the rami of the pubes and ischia. This evil, however, ought to be ascertained before the operation, and should be met by a division of the structures as low as possible.
Collapse is promoted by two not uncommon circumstances attendant on the operation of Lithotomy—loss of blood, and protraction of the operation. In the constitutions alluded to, the loss of blood, if considerable, is always serious—be it arterial or venous—obtained by a wound of any secondary branch of the pudic trunks, whether the artery of the bulb—an accident, I am satisfied of no in frequent occurrence—or the transversalis perinei, or other vessels of irregular distribution, or by that of the large veins which in some bodies are found to occupy the lateral prostatic and vesical region. These veins are literally enormous, several of them equalling in diameter one-fifth of an inch. Under these conditions, any amount of hemorrhage is not surprising, especially in advancing life. With regard to a large operation which exposes a cavity of the body, into which instruments of a麻木和 variety are introduced, and repeated with frequency, and
often with that increasing force which not unnaturally actuates the operator whose "time has been called" long since, who has his work yet incom-
completed, and who is more oblivious than at starting, of the requisite delic-
cacy of the (Manipulation), such pro-
traction is most serious.

Among other consequences must be mentioned the liability to injury to the rectum, an evil which had been repeatedly seen. This injury is caused rather by the negligence of the assis-
tant than of the chief operator, and is produced by the depression of the staff somewhat excusable, perhaps, in a 
protracted operation, when the arm of the assistant becoming fatigued he supports it by resting on the staff, and instead of the instrument being drawn upwards towards the arch of the 
pubes, it becomes depressed upon the 
rectum. It is, moreover, an objection to an operation that it demands the co-
operation of a person who may be per-
fently inexperienced in its chief require-
ments. Such injuries are often protracted and sometimes permanent.

These are heavy weights on the scale of lithotomy, from which the rival operation is nearly exempt. But there remain two other consequences of lithotomy that merit attentive consideration in calculating the possible evils that result from its performance—I mean inflammation, and sloughing.

If we speak of inflammation in the abstract, the fact is, I think, unquestionable that inflammation is by far a more frequent consequence of lithotomy than of the cutting operation, but it is of a totally different character. The inflammation of the bladder which follows the latter, occurs at the expiration of three or more days after the operation, and is accompanied by great intolerance on the part of the bladder of its ordinary function—local pain increased by pressure on the hypogastricum—constitutional fever indicated by the condition of the skin, the pulse, the attitude, and
the expression. The inflammation of lithotripsy has none of these accompaniments. The one is inflammation of an acute character, affecting the entire organ, although commonly in the mucous membrane, and involving the pelvic peritoneum; the other, a chronic form of inflammation, attacking, and confined to, the mucous membrane. If there be little comparison between the relative frequency of the two results, neither is there any comparison to be drawn between their relative intensity, or relative danger to life. The one is serious, the other not.

Sloughing of the cellular tissue of the pelvis, extending from the inner extremity of the wound to the side of the bladder and rectum, may be deemed an occasional, and when it does occur, a very serious consequence of lithotomy. It is very true that it owes its origin to a fault in the individual operation, and to be greatly charged against the operator. There is no principle more universally contended for by the experience of all practised
lithotomy, than that which involves the smallest possible division of the prostate gland—a division scarcely more than sufficient to admit the finger into the bladder—and most religiously to abstain from division of any part of the neck of the organ.

If this division be made to any extent, the urine is liable to become infiltrated, and death of the part as is well known, is thus inevitable. Now, I believe such cases to be almost invariably fatal—albeit the extent of mischief on examination is not very large; and, if so, we need no better proof that the system is already greatly reduced, because we have sloughing from urinous infiltration following structure to a far greater extent, but with less danger. The difference is due, no doubt, partly to the infiltration and consequent sloughing taking place, in the one place, within, and in the other without, the cavity of the pelvis.

How all these results are peculiar to lithotomy, and find no parallel
in the rival operation; and however truly we may point to the great aggregate of success that has attended the practice of a chosen few, yet when we consider that this success has been acquired only through the medium of frequent opportunity, and that it is probably calculated, not on early, but on cases of later years, when experience had been already achieved and purchased, not without some expense to the community, it would appear not an unreasonable deduction, that the fatality attending the operation is considerably greater in the wide aggregate of cases, than appears on the face of any published statistics of this disease. Certainly the principle of centralisation does not prevail as regards the practice of operative surgery: and there are, perhaps, few aspirants to surgical reputation throughout the country who are not sufficiently endowed with a spirit of enterprise, to reject the cooperation of the more experienced operator. If we may be supposed to improve by
repetition, if we may be allowed to have acquired any benefit from experience, it is almost palpable that early operations must be imperfect; and it is of such operations that we hear nothing. I am inclined to consider the records of any given operator to be of the smallest value only, and no statistics can be available for our guidance, but such as embrace the results of many operations performed by many surgeons, whether with, or without experience.

When we come, then, to consider the question of the average mortality in cases of lithotomy, etc., in reality, enter on an inquiry of no small difficulty, founded on the disinclination of any class of men to reveal to the public their own misfortunes and their own failures. The same tone of mind, the same hope of distinction, the same enterprise, the natural aspirations of the mind which prompted the undertaking, all tend to the concealment of any adverse, and an injurious issue. The great averages which prevail,
therefore, require modification, and instead of inferring a mortality such as may be obtained from any statistics, we should rather make the statistical report a starting-point from which to form additional deductions. The reported mortality in England is about 2 cases of death in 13 operations, or 1 in 6 1/2. In France about 1 in 5; while in the practice of individuals such as Cheselden, of Dalrymple, of Crose, and of Liston, the average reached in some cases as high as 1 in 20, and in others as 1 in 35; among which may be justly mentioned the Birmingham County Hospital, and the yet more remarkable example of success that has attended the practice of Mr. Crichton of Dundee; and in St. Thomas's Hospital one death only occurred in 58 cases. In the face of such reports, I should be inclined to place the average mortality of lithotomy in persons of all ages, as 1 in 31. Can it then be reasonably asserted that positive danger to life
does not attend on the operation of lithotomy? With a view to avert this evil, the ingenious device was adopted, by means of which the stone is broken and crushed within the bladder, and thereby reduced in size to fragments sufficiently small, to pass along the track of the urethra.

It is, however, obvious that the treatment must be protracted, and the escape of the stone piecemeal when of considerable size, in small fragments, must occupy a period of many days, or even weeks, for its completion. There is one prominent advantage which lithotripsy presents over lithotomy, viz. it greatly contracts the circle of danger to life, and this is the greatest and most striking merit it possesses; and can any argument more powerful be urged in favour of a given course, than that it offers recovery from a severe and painful disease, without danger to life? What then is the penalty? What is the alternative, which yet retains, sub judice, the expediency
of the substitute? Whence the hesitation? It is founded on the general belief, that although the question of liability to a fatal result is thereby rendered much more remote, yet that it still exists in some insidious form or other, to interrupt too frequently the progress towards recovery. I am prepared at once to acknowledge that in commencing the treatment of a case of stone by the operation of the lithotrite, we still enter on a career of danger, but it is danger in its most diluted and most equivocal form.

In considering the advantages of this operation, it must at once appear obvious that they are almost entirely of a negative character. They consist in the greatly modified form in which danger presents itself, if it presents itself at all; the absence of all the difficulties incidental to the cutting operation, and the absence or the great modification of the evil consequences, which lead to its frequent fatality, such as collapse, and inflammation of the
substance of the bladder, and of the far greater rareness of infiltration and sloughing. Hemorrhage is rare, and is yet known rarely formidable, supposing the operation to be performed with requisite skill and caution.

It may, I suppose, be assumed as incontestible that if a stone can be removed from the bladder at the close of from three to five weeks of time, however valuable to the subject, without great suffering, and that only occasional, with health and strength unimpaired, that such a result may well be denominated brilliant.

It appears to me eclat holds a nearer affinity to danger, than we are apt to consider. It is by the magnitude of the danger that brilliancy or eclat is born. Better for the subjects of operative surgery that both were buried in oblivion, than that the sundering of one man should reflect the credit of another.

The evils of lithotrity.

Neither the evils often inseparable from the operation of lithotrity, nor
its consequences, are less numerous than those of the rival operation; for I am of opinion that there are few cases of lithotripsy, however ultimately successful, that do not present complications and difficulties of one kind or other. The question hereafter to be considered, is whether such complications are incompatible with the complete restoration of the health of the affected person.

For the present I shall reserve the subject of evils attendant on the operation; and presuming that moderate skill has presided at its performance, I proceed to enumerate its injurious consequences; and these are—

1. Profuse and occasionally severe pain.
2. Inflammation of the mucous membrane of the bladder.
3. Lodgment of fragments of stone in the urethra.
4. Hemorrhage from the bladder or urethra.
5. Extravasation and abscess, from rupture of the mucous membrane of the urethra.
6. Collapse from disease, aggravated by a series of operations of the urinary system.
involving either a pacculated bladder, from the cysts of which the remaining fragments of the stone cannot be disengaged; or positive disease of the kidneys themselves.

1. The supposed difficulty of removing every fragment from the bladder.

With regard to physical pain, there is no doubt that it is the attendant on both the operation, and the after treatment. The question is not dissimi- lar from that of danger to life. We suffer a multitude of positive evils rather than encroach within the circle of one danger; and we gladly compound for a repetition of many smaller suffer- ings, to avert the real misery of a single large one. The degree of suf- fering from the action of the lithotrític may, however, be inferred from the fact that the employment of anes- thetlic agents is seldom resorted to, to mask the operation; still, pain is an evil to be thrown into the scale against the operation. It is not often that the pains are so severe, however, as not to be held greatly in subjection
by the employment of opiates, and this fact explains all that I need say with respect to physical pain consequent on the operation, while we always possess the alternative of chloroform for the operation itself, if required.

2. Inflammation of the mucous membrane of the bladder may be acknowledged to be a frequent consequence of the operations. This inflammation is of far more frequent occurrence than the inflammation following lithotomy. It may follow the first, or any subsequent operation; and, I believe, it occurs in some degree or other in the majority of all cases operated on. But in this form of inflammation we see the extent of the evil. It appears circumscribed. It does not extend to the other tissues of the bladder. It is chronic, not acute. It is attended by a certain amount of pain, often trifling in degree, by frequent micturition, indicating intolerance of the
organ and a certain well-known rosy, viscid discharge, that separates from the urine, and adheres to the vessel into which it is conveyed. The intensity of the disease is determined by the quantity of this mucus, and in cases of positive severity it is occasionally tinged with blood. When it presents this feature the pain is permanent, and often severe, and the intolerance is great. In this condition the subject of the operation may reasonably claim a large amount of sympathy. It is a curious and important fact, however, that these symptoms often subside immediately on the repetition of the crushing operations, as has been pointed out by so able an authority as Sir B. Brodie. One is almost inclined then to doubt the correct pathology of this curious disease, and to ask, Is this truly inflammation of the mucus membrane? Of this condition of the bladder, be it what it may, we have, as I have already said, the frequent occurrence, and we call it inflammations. Possibly it is truly so.
But whether inflammation or not, it will never be denied by the practiced lithotritist, that it often subsides on the repetition of the exciting cause, and it may be safely asserted that it rarely reaches the level of an intensity incompatible with the perfect recovery of the patient.

3. Lodgment of fragments of stone in the urethra. - This evil, consequent on the operation of lithotomy, is, like the last, one of frequent occurrence, and, like it also, presents itself in varying degrees of intensity, from the temporary lodgment of a small fragment unattended by more than simple inconvenience, to that of a large piece, which, becoming permanently fixed in the urethra, occludes the canal and produces retention of urine. In the first case, it is most probable that the lesser fragment will be carried off by the next act of expulsion, and it produces little more annoyance than is occasioned by a sense of itching or pricking. The second example is more important. The detention of the water
is in itself a great evil, and gives rise to a feeling of distress and anxiety which is quickly depicted in the countenance. The organ is erected by the violent, but futile efforts at expulsion, the veins become gorged, and the whole condition becomes severe suffering.

There are two parts of the urethra deemed particularly obnoxious to this evil; the first is the membranous, the second the fossa navicularis at the root of the glands; but in truth, stone may lodge anywhere. A different proceeding is required in settled cases. If the lodgment has occurred low down in the membranous portion of the canal, unless it can be seized and extracted by a pair of urethral forceps, it is far better to return it into the bladder. The attempt to remove it will probably prove futile, but it should be made, and by the simplest form of instrument that can be obtained. If seized at all, i.e. if it can be brought into the grasp of the instrument, it should be pushed backwards.
about the one-eighth of an inch, and
then turned round on its axis, and,
if possible, drawn forward. It is not
improbable that it will experience
newed detention at the fossa navicular.
Should this plan fail, the surgeon
should pass down the urethra the
largest sized catheter, and when he
feels it in contact with the fragment
of stone, push it forcibly, and some-
times by repeated jerks of the instru-
ment, into the bladder. The difficul-
ty of effecting this will be increased if
many hours have elapsed. If these
measures fail, we are still only required
to adopt more active treatment, provided
the fragment is a cause of positive in-
convenience. If it produce a degree of
suffering that is amenable to sedatives,
dry reasonable quantity of opium is a
preferable alternative to incision; but
if its presence cause pain and distress,
and, still more, retention of urine,
there remains to us no proceeding but
that of incision, whether in the perine-
um, the scrotal portion of the canal,
or along the penis. A strong impression prevails against opening the canal within the limits of the scrotum, from the greater liability to infiltration in this situation; and it is recommended to push the stone forwards or backwards, and cut on the fragment either behind or in front of the scrotum. But in truth, this is impossible. If the stone can be removed from the spot into which it has become impacted, there can be no necessity for an operation at all. But we have no alternative. As a general rule, if we can insure rest for a few hours to the divided parts, no evil will follow, and the urine will pursue its natural track without escaping through the wound. If there be any tendency to escape in any quantity, we must have recourse to the introduction of a catheter at every act of micturition. Should urine escape from the wound, it by no means follows that it becomes infiltrated. It cannot be denied that lodgment of fragments of stone are occasionally
a source of great evil and suffering. Of all the common ills attendant on the operation, this is deemed the greatest by the patient. Any unexpected mechanical obstruction to the expulsion of the urine is always more or less alarming to the mind. It excites the double distress—pain, and alarm. There is, however, no real danger, although the requisite proceeding may be both painful and troublesome. It is quite remarkable how capacious is the urethra of a healthy man, and how dilatable.

4. Haemorrhage from the bladder is an occasional consequence of the operation of lithotripsy, but it is very rare under good management. There appear to be two conditions to its occurrence; 1. a congested state of the vesical vessels, with a more than ordinary tendency to bleed on rupture; and 2, coarse or catty manipulation by the operator. If, for example, an attempt be made to expand the lithotrite before the instrument is fairly introduced into the
Bladder, the result is pressure of the upper blade against the neck of the organ—a very painful proceeding at all times. This violence, conjointly with the increased vascularity of the membranes, will produce hemorrhage. As there is no reason to be assigned why the two exceptions to a general rule, viz. unusual vascularity, and unusual violence, should come into juxtaposition in any given case, and as both appear essential to the result, so we may reasonably expect that, as we become more and more familiar with the art of lithotomy, this accident will be more and more rare. In the earlier operations it was by no means very uncommon to detach portions of either the mucous membrane of the bladder or of the urethra. Such an occurrence we should now feel to be attributable only to mismanagement, and to be as revolting as some other of the numerous evils which credulity has conjured up, to confound the fair estimate of the operation of lithotomy. In considering the evils consequent on the operation of
lithotrity, I am anxious to do full justice to that of hemorrhage, but nothing more. Certainly, it is an uncommon event, and when present, is only occasionally severe. The question may be asked, Does it in any material degree retard recovery? I think not, and if I am not incorrect in my creed, that without violence to the bladder, always to be restrained by the operator, it will rarely, if ever, occur, it will take its position among the most unusual events incidental to the practice of lithotrity. But an exception to these remarks may be made in behalf of a bladder which is already the seat of disease. But if so, the person is not a fit subject for this, or for any operation, and inasmuch as the provocation to cause bleeding is little greater in the operation itself than in the previous introduction of instruments, so we may suppose some positive knowledge ought to have been acquired as to the condition of the organ. Indeed, hardly say that any form of malignant growths, and the operation of
lithotripsy, are obvious incompatibilities.

Extravasation and abscesses. Among the evil consequences of the operation of lithotripsy is that of extravasation and abscess consequent on laceration of the urethra. If from any cause the mucous membrane is torn and separated from its sub-tissue, the efforts at micturition, when unusually potent, force the urine from the channel into this tissue, and abscess is almost inevitable. This accident may happen, and may exist, either in consequence of the operation, or from the extraction of stone from the urethra, on a small, or on a large scale; but in either, it will probably show itself early after the occurrence of the cause. If in the perineum, that region will become swollen as in the early stage of ordinary perineal abscess; if more forward, a thickening may be felt along the track of the corpora spongiosae, varying in form and size. This swelling, when opposite the scrotum, occasionally presents itself forwards in the form of a
conical thickening, the base of which is placed on the urethra, and is quite movable under the hand, so much so as to be readily mistaken for the testicle. If it attach itself to the lower part of the canal, in the neighbourhood of the membranous and prostatic parts of the urethra, and especially if posterior to the triangular ligament, its consequences may be most serious, because the escape of urine will probably be large, and the communication with the pelvic tissue more than merely probable. Moreover, the nature of the injury is in this region more obscure, and less tractable.

Under all circumstances this is a most disagreeable complication, but when low down and in the locality I have specified, it is dangerous, and we have no alternative but that of a free incision into the urinous abscess; and it will simplify the case rather than otherwise, if the stone were at once extracted from the bladder, inasmuch as the requisite incision is in the direct
line of the operation of lithotomy, and is little short of it in extent. If the
membranous part of the canal is to be laid open, including the triangular
ligament, the dilatation of the prostate gland and the extraction of the frag-
ments of stone, would add comparatively little to the difficulty; while the
removal of the primary evil would probably give the patient the best and prob-
able the only chance of recovery. In case abscess form forward in the perine-
um, along the serotum, or on the under surface of the penis, so long as it
exist in the form of thickening, and neither be attended with pain, nor cause
obstruction to the passage either of the urine or of the fragments of stone,
there is no immediate necessity for interference, while positive suffraction,
inindicated by fluctuation, or indeed if the tumour be painful with-
out a sense of fluctuation, compels the employment of the lancet.
6. Collapse from disease incipient
or advanced, is not surprising, supposing
the strength of the constitution already invaded by its presence. But an operation in this condition of the urinary organs is in contravention of sound judgment, and correct diagnosis. If it be resorted to, as a "pig aller," let it be so understood, but do not throw on lithotomy the demerit of an operation undertaken in violation of the most sacred rules which guide us through the great crises of operative surgery.

If disease exists, it is our duty, if possible, to detect it by inquiry and examination, and to reject the case as inapposite to the operation. In the preliminary inquiries prior to lithotomy we require a certain condition of both genital and urinary organs. The negative of these, which such cases as those I am now alluding to present, should at once proclaim to the mind of the Surgeon, the probability of a fatal result. The negatives I refer to are embraced in the following:--a stone of many years' existence, accompanied by frequent micturition,
great irritability of bladder, pain, distress, loss of health. These are important indications of failure, not to be lost sight of. If stone be present with these indications, if relief must be obtained, it is preferable to resort to lithotomy, because it presents the better prospect of a successful issue. It is more probable that the bladder, or even the kidney will recover under one positive shock to its system, which encompasses the primary object of the removal of the stone, than from the repetition of a crisis of irritation, to which it is morbidly sensitive, and which must be resorted to with unusual frequency, and each repetition of which, building up fresh mischief, forms an advancing step towards its fatal consummation.

A few words on the subject of scattered Bladder. These sessulae, I presume, caused by excessive contraction of the muscular fibres of the organ, for the purpose of overcoming some obstacle to the transmission of its contents.
It is, of course, impossible to ascertain their presence with any certainty during life, or to afford any relief, if detected. It seems difficult to imagine how the stone could be retained within the sacculi in all the varying attitudes of the body, when by the simple act of turning round to expel urine it appears intolerable that they gravitate into the bladder.

That the presence of sacculi is a great and serious complication is unquestionable; but it should be fully admitted that their formation is by no means confined to the operation of crushing, but may exist in any condition of the bladder or urethra, requiring powerful contraction of the muscular coat; and, ceteris paribus, it must be acknowledged that in very protracted cases, in such as are accompanied by chronic inflammation, great intolerance of the presence of urine, and strangury, or an irresistible tendency to contortion of the muscular coat, after the bladder has expelled its urines,
content, these sacculi are very liable to form, and the fragments become forced by the contractile efforts of the organ into them. In the case of lithotomy, the case is different; 1st, because the recovery, if so destined, is rapid, and the bladder, when relieved from its difficulties, is not liable to this mobidly violent action; and 2nd, if it were so liable, if the bladder be free from the presence of stone, the sacculi, quad, the present disease, are harmless. In like manner we find sacculi occupying the sides and occasionally the base of the bladder in cases of old structure, to the number of four, five, or six. The liability, therefore, to their formation occurring in protracted and untoward cases, must be classed among the evils attendant on the operation of crushing, though rather in the light of an effect in the chain of objectionable symptoms, than as objectionable symptom itself.

The last evil laid to the charge of lithotripsy is that founded on the difficulty, I may say the supposed
difficulty of removing the last fragment of stone contained in the bladder, and the probable result of which would be the re-formation of another stone. Before I refer to the subject of statistics, on which, indeed, little reliance can be placed, I would say that I do not see the difficulty of ascertaining the presence of a fragment that the urethra will not receive.

If it be so small as not to exceed the calibre of the canal, it will of course pass away without difficulty. If it be too large to reach its destination through the canal, I maintain that it requires no erudite tact to detect it with a fine point, well and carefully employed in exploring the bladder. This inquiry may be made, and repeated with instruments of varying form and magnitude. The best resources, both of touch and hearing, are of course brought into requisition in perfect silence, but beyond this no refinement is necessary. We have, indeed, no evidence in the
reported cases of relapse, that reformation of stone is attributable to this cause. The operation of linctotomy conveys to the bladder no exemption from return of disease, while the only evidence of return of stone after linctotomy is derived from the practice of M. Civiale, who gives a proportion of about 10 per cent in his own practice. This is certainly a far greater average than follows the operation of linctotomy, but I have no doubt English recent evidence would enlarge the average, very considerably. Besides, granting that a fragment of stone remained in the bladder after the final introduction of the linctotrile, too large to be expelled by the urethra, and too small to be detected by skilful sounding, if such be possible, why not leave it to increase in size till it prove worthy of one more operation? The case which has already proved itself an exception to a general rule, which at the greatest average has assigned only 10 in 100 cases to the liability
to return, is most unlikely to become again an exception to the same rule. The possible presence of polypi should be alluded to. The general structure of these vesical polypi is that of ordinary mucous membrane, i.e. it is composed of the several elements entering into the composition of that tissue, viz. fibro-cellular, covered with a thick layer of tessellated epithelium. It is a remarkable fact, that the epithelial scales are generally much larger and more flattened than those covering the normal mucous membrane of the bladder itself.

Having now considered in sufficient detail the consequences that may occur after the operation of lithotomy, I will now inquire under what conditions, which any given case presents, should we decide in favour of the one or the other operation. I shall accomplish this end more readily by adopting the negative, and by stating under what symptoms the operation of lithotomy is not
the operation to be selected: 1st. It is incompatible with infancy or youth, simply because the young urethra is too contracted to admit a lithotrite of sufficient size to ensure safety. But between the period of childhood and the matured age of manhood, there exists the whole period of boyhood, of which it is difficult to fix the exact date either of its beginning or its end. Before we can determine the applicability of the operation to the period in question, we must ascertain two points of considerable interest to the operator; 1st, to what extent the urethra of a boy (say of 12) is dilatable; and 2nd, whether the lithotrite that is of a size capable of being introduced into such an urethra, is possessed of strength sufficiently great to crush any given stone that it may meet with.

1st. If it be proved that the urethra is dilatable without great suffering or ultimate injury, if the
wetness of a boy of 12 years of age can be sufficiently enlarged to admit of a lithotrite of the size of No. 4 catheter, and if the instrument of that size be competent to crush any moderate-sized stone such as may be found in the bladder of a boy of 12, we then have all the required conditions, and may without hesitation adopt the operation of lithotomy, so far as regards the size of the canal, and the required strength of the instrument.

2ndly. The case is unsuitable for lithotomy unless in manhood the urethra will permit without effort the passage of the instrument, or rather, so long as its introduction is difficult. It is not true that this condition of the canal presents an equal objection to the operation by cutting; because a lesser-sized staff may be carried into the bladder on one occasion even with force, without injury. The operation is completed, and the urethra may return to its ordinary degree of contraction.
without affecting the issue of the case; whereas, it is a positive evil in the operation of crushing to have to contend with a morbibly contracted canal. The tendency to the contraction would occupy much time in the intervals of the operation, and hamper the surgeon while performing it, and moreover, it is of no slight importance that the canal of the urethra be brought into a condition of perfect tranquility, not only before the operation, but especially so after it.

In this decision, however, much depends upon the nature of the constriction, and on the degree of irremovability of the canal. If, by the introduction of instruments, it can not only be sufficiently dilated, but show a disposition to remain dilated, the operation is not contra-indicated; but we must not forget that stricture of many years, especially if tight, is most likely to re-act on the bladder and thus entangle us in fresh difficulties.
The case is unsuitable for lithotrity if there be any tendency to organic disease, whether of the bladder or the kidneys. If we detect no disease of the kidneys— if the urine on critical examination be chemically unobjectionable— if the bladder be neither irritable nor intolerant— in other words, if the organ can receive and retain from four to five ounces of water, we have all the requirements with which the bladder can furnish us, and we have, in the absence of positive evidence, no reason to apprehend evil from the condition of the kidneys. This is all that is required on behalf of the urinary system: a bladder free from pain, except at the time of miction, when the presence of pain may be expected and explained.

I need hardly say that frequent miction indicates irritability of bladder, and that a certain degree of tolerance of urine is favourable to the future operation, as indicating the absence of that irritability which is the most infrequent
concomitant of calculous disease. But this is all that we can look for or expect, and nearly all that we can desire; our information, however, is but negative, and I know of no form of inquiry by which it can be converted into knowledge of a positive kind. We believe we have no disease, simply because we see no evidence of it.

4thly. The case is unsuitable for lithotomy if the stone be of unusually large size, and especially if accompanied by an irritable bladder. In proportion to the size of the stone, must be that of the lithotrite. If a full-sized lithotrite be admissible into the bladder, it may be found not too small to grasp the stone. If the attempt be repeated again and again without success, there is no alternative, and we must resort to the cutting operation. But supposing the stone to be grasped by the instrument, it does not necessarily follow that it will be prudent to crush it. I consider that a moderate-sized stone will
require from four to six operations. A large stone will, therefore, require from nine to twelve. And in the case of a large stone, it is always probable that the irritation to the bladder will follow in an almost compound ratio, consequent on the condition of the organ which has been the seat of irritation, probably for many years, from the necessarily greater violence in the attempt to crush the stone, and from the large amount of detritus caused by the fracture.

If the stone be large, it is probable that the escape of the fragments of the stone, however satisfactorily crushed, will be slow, occupying probably six months, caused by the inability of the organ to contract freely on the urine, and on the fragments conjointly, by reason of the presence of the stone. On all accounts, therefore, we should avoid a very large stone.

In considering the evils consequent on the operation of lithotomy with a view to calculate their value, and to determine their weight in the adverse
scale, it is most important, that we distinguish those that arise from defective manipulation, from those unavoidable evils which are incidental to the condition of the patient; for it is only just to give to dexterity and to experience all their tribute, and to throw on coarse or careless manipulation the demerit of failure. I have classed these evils under seven heads.

1. Restrained pain; 2. Inflammation of the mucous membrane of the bladder; 3. Lodgement of fragments; 4. Haemorrhage from the bladder or urethra; 5. Extravasation of urine, and accesses; 6. Collapse; and 7. the liability to the retention of stone in the bladder. Of the above seven evils and liabilities, I conceive that four are of far less frequent occurrence in the hands of experience, or in an operation in which the dictates of experience are strictly obeyed. The operation of lithotomy of all operations in surgery, requires the exercise, not so much of dexterity, as of the utmost gentleness.
in its every stage. Every indication of suffering should be noted by the operator, and as carefully avoided, not solely for the purpose of preventing present discomfort, but with a view to avert future evils of an important kind. To defective manipulation may be referred, not infrequently I think, at least four of these consequences—haemorrhage, extravasation, and re-formation of stone on the old nucleus, to say nothing of present suffering during the actual operation. Pain, though invariably caused by unnecessary violence, is often an insuperable attendant, and the frequent companion of chronic inflammation and its concomitants.

Chronic inflammation may occur under the best management. For the lodgement of fragments, for collapse, rigors, founded on indetectable disease, the lithotrist is not responsible; for there can be little doubt that the seeds of diseased kidneys, and probably more than the seeds, have lain dormant in the system,
and for some period prior to the operation. But who shall detect these forms of disease in the kidney in their early stages? Acute observation has declared their detection to be beyond the reach of art. Some conclusive evidence may be obtained if we can ascertain that such evils are of more frequent occurrence among the earlier than the later operations of the lithotritist, and this I strongly suspect to be the case.

I have now to advert to a very important and interesting part of this subject, viz. that of the accidents that may occur during the operation of Lithotripsy. These accidents may be reasonably subject to a division into occurrences, the result of defective or coarse manipulation, and occurrences of a purely accidental nature, that neither caution nor forethought could evade. Among the first, we must look backwards into the past history of lithotripsy, to the time when, following on the
track of the invention, such accidents were occasionally met with, and the new occurrence of which has formed the foundation of modern exemption. We have been taught not only how to act, but what to avoid. Peril has taught us wisdom. We avoid the Shibals that beset the course of early adventurers, and obtain our ends by the light of their, or I might say of our own early experience, so recent is the invention.

The accidents which recent experience has averted, result from injury or violence done to the organisation. This was formerly no uncommon event, and we heard of ruptured urethra, ruptured and even punctured bladder, extravasation of urine, and death. But I will not enlarge on a subject so full of painful retrospect, while I have so much faith in our power of converting evil, formerly incident to novel machinery and new manipulation.

I have before stated that the
exercise of the utmost delicacy is required in every stage of the operation. Such delicacy of touch, such refinement, which is the best and safest substitute for dexterity, is the sure safeguard against every danger of this class; and without this safeguard I, for one, would unhesitatingly consign the subject to the former operation, with all its attendant evils.

The accidents which are more or less unavoidable relate to the almost necessary imperfection of the instrument employed: 1. The convex blade of the lithotrite may be so strained by the pressure of the screw as to fail in its complete closure into the corresponding blade. 2. The blades may be so clogged by fragments, that it is impossible, by reason of their accumulation, to push home the convex blade. 3. The rear or convex blade may snap off in the act of crushing the stone.

As regards the first of these accidents, it may be observed that unless...
the balance be maintained between the resistance offered by the metal, and the power exercised by the screw, aid
ed by the lever, no instrument can be reported safe. All that British craft can effect in giving strength to iron, is done; but if the process of hardening this metal were rendered abso-
lutely perfect, the instrument may be so overcharged with mechanical power as to become a source of inherent danger; for unless this occurrence be rendered quite controllable, I do not see how we can honestly detach the operation of lithotripsy from the impression, and from the reality of danger.

It cannot be denied that stones are met with in the bladder that try the power of the lithotrite severely; and this is dependant on one of two causes—indeed, occasionally on both. The first and simplest cause is that founded on the hardness of the stone. If the stone be unusually large, and composed of oxalate of lime, its first
disruption is obtained by great effort, and should only be attempted with the strongest instrument. The degree of force causing this strain is necessarily greater as the stone approaches the point of the instrument; and, looking to the construction of the lithotrite, every stone tending to a cylindrical form is liable to be pushed upwards towards the point when pressure is applied upon it. A third element of difficulty is founded on the mode in which the stone is caught. A lithiacid stone, of an oval form, if seized in the long axis, requires immense force of pressure, on the same principle as that which applies to the resistance presented by an egg compressed in the same direction between the hands.

Under such circumstances, the only course to pursue is to drop the stone, and endeavour to seize it by its shorter axis, or, in the case of the more rounded stone of oxalate of lime, to seize it again and again, relying on the aid afforded at each effort by
the partial disintegration of its atoms by the previous one.

If the defect of contact of the blades, caused by excessive strain, does not exceed a few lines, or the one-eighth of an inch, the lithotrite may yet be withdrawn from the bladder, provided it be done very deliberately, occupying perhaps, a period of some minutes to allow the urethra to dilate without injury, because the edges are smooth, and there is no necessary abrasion of the lining (membrane); but this difficulty is far more serious when the instrument is clogged by projecting and pointed fragments; and they will probably, be both projecting and pointed, if many and repeated attempts to crush the stone have been made in the bladder. In this difficulty, the lithotrite should be withdrawn with force, if practicable. If great force be required, it is better to leave the instrument in the bladder for half an hour or longer, and to trust to the influence of the water injected to dissolve...
the continuity of the pulverised mass, aided by percussion against the head of the instrument. Whenever effort in withdrawal is made, the mucous membrane will, probably, be torn in some part of its course; and we must look with some interest to the possible formation of abscess, or of slight vesicular infiltration as a not improbable result.

Such are among the accidents to which the operation of lithotomy is liable; and if their importance is to be tested by their severity, let them also be judged by their infrequency. In the aggregate of cases they are rare; and the worst alternative that the most serious form can involve, is an appeal to the knife, and to extract the stone by means of lithotomy. This refers to the fracture of the instrument, for which we have obviously no other resource.

I have endeavoured to place before you the relative merits and demerits of each operation, without
bias or prejudice. I have already adverted to the most striking difference between them, viz. the certain presence of danger inseparable from one form, and its occasional, though rare, presence in the other. Against the evil of danger in lithotomy is opposed the loss of time in the other operation. I do not speak of consequent illness or physical suffering, which frequently appertain to the operation of lithotripsy, because they find their equality in the rival operation. The same principle now urged is a recognised principle in another operation in surgery, which involves a structure whose extreme delicacy claims for it the highest kind of interest. I allude to the operation for cataract, in which, in all appropriate cases, the operation for solution is certainly preferable to that for extraction of the lens. Whence the preference? Why prefer an operation which demands for its completion a period of many weeks, to the rejection of that which
removes the entire disease by one "coup" at an expense of days only? It is the consideration of danger that is thrown into the scale, by which the preference is determined; and if the question of danger to a single organ is the turning point of the minds operation, a fortiori, where life itself is involved, the principle should prevail with tenfold force.

If Conservative Surgery be a desideratum, if preservation not only of a part, but of the whole machine, which is equivalent to life, be the object, and the necessary issue, of scientific inquiry into the best means of alleviating disease, we may class the operation of Lithotrity among the most valuable resources of modern surgery.