AN ANALYSIS
OF
ONE HUNDRED AND EIGHTY-FOUR CASES
OF
STONE IN THE BLADDER OF THE ADULT
TREATED BY
LITHOTRITY.

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DURING the thirty or forty years which have elapsed since lithotritry first claimed to be recognised as a surgical operation, more or less applicable to a large number of cases of extreme importance, occasional attempts have been made to determine with precision the results derived from its employment. At first sight this object might be thought easily attainable, since it would seem necessary only to compare a sufficiently large number of cases so treated with a similar number of cases by the single pre-existing operation, that of lithotomy. The capabilities of that method

were well known or might be obtained without difficulty. The cutting operation had been applied under all circumstances, and to all cases, to young and old, to stones of all sizes, small and large ; and the effect of it in any case could never be doubtful.

With lithotrity, however, it was soon found to be a much less easy matter to arrive at an accurate appreciation of the results. After a few years of trial it was quite obvious that the crushing method was even more hazardous than cutting, for large stones ; and for a few stones of particularly hard structure, it was impracticable. For a great majority of the cases of infants and children, it was certainly less successful than lithotomy. It was applicable then only to a certain proportion of adult cases ; and did not include among them the most formidable. On this ground alone the comparison between its capabilities and those of the old method could not be easy. One thing was clear, namely, that as it was only applicable to what might be called to some extent, selected cases ; its results for these ought to be very successful, or lithotomy ought not to be set aside for it. At the same time, it was not to be forgotten, that although lithotrity necessarily demands, as a condition of successful performance, a stone of not too large a size, it does not necessarily demand youth or strength of constitution, that it makes no insuperable difficulty of any age, nor a serious objection to whatever feebleness of body great age involves, provided only that the first condition exists, viz., that the stone shall be small.

An absolute comparison of results, therefore, is difficult. Lithotrity cannot be judged in this matter, unless the ages of the patients and the size of the stones dealt with, are accurately known. For it is obvious that if the lithotrity of one surgeon embraces only stones of three drachms in weight, while that of another surgeon deals with all that occur, up to five or six drachms or more, the operation of the latter will in the aggregate be a more hazardous proceeding, and will be attended with more numerous and graver casualties than the former. After much consideration of the question, I

confess it appears to me that owing to these and other circumstances, an accurate and careful appreciation of the results of lithotritry has not hitherto been made. That, perhaps, which most approaches to it is the valuable paper contributed by the late Sir B. Brodie to the Transactions of this Society, fifteen years ago, one which excited great interest at the time. To those who heard it then, or may have studied it since, it must be evident that the author made no endeavour to establish a case either for or against lithotritry. He recorded all the casualties and made no attempt to lessen their importance, or in any manner to explain away their relation to the operation. On the other hand the number and the ages of the patients, the size of the calculi, and other important particulars were not supplied.

And in regarding this record of Sir B. Brodie's experience as nevertheless one of the best existing contributions to a real knowledge of the value of lithotritry, I do not overlook the fact that during the last few years the late M. Civiale has published annual reports of his practice, giving the number of patients, and in part the results of his operations. These reports, however, never at any time contained the particulars which are essential in order to enable others to form a judgment, and which I have felt it a duty to furnish in the table of cases now presented.

It was impossible to know that accomplished operator without feeling that his natural bias for an operation he had mainly designed, was the first to perform, and with which he has been so intimately identified during life, led him, as is universally confessed, to estimate his results more favorably than an unbiassed looker on could venture to do. In short, he barely admitted that lithotritry could occasion death. It is useless to deny this fact, nor that it influences all his writings on the subject. He invariably attributed death, when it occurred in the course of or after a case of lithotritry, to some other cause, never to the operation. Such was without doubt his conscientious belief, and practically for him, although he never quite said as much, lithotritry was never fatal. But the mode of reasoning he employed would

render almost every operation in surgery innocent of fatal results. To Civiale I desire on every ground, public and private, to render due homage. It is no small boon that his skill and indomitable perseverance have conferred on suffering humanity. But the mode of estimating the results of an operation which he adopted in relation to lithotrity is not one which is, or can be, accepted here. As long as it is an accepted formulary that death may be produced by a surgical operation, and that the liability to cause death is a quality which can be approximatively estimated by observation, and the knowledge of which enables us to speak of an operation as more or less grave according to the amount of such liability proved to exist, we cannot make an exception of lithotrity.

Lithotrity does not less surely destroy life in certain cases, although no palpable lesion may be produced, than lithotomy does when the necessary wound proves fatal. The catastrophe is only much more obvious in the one case than in the other.

With this conviction I have, therefore, made it my object to test as carefully and impartially as it is in my power, the operation of crushing the stone as applied to all cases up to a certain weight, with regard to its after results, immediate and remote, the main objects of inquiry being the number per cent. of recoveries after the operation ; the proportion of cases in which the stone recurs ; and the condition of the recovered patient in after life ; the last being from the nature of things a less easy inquiry.

With these prefatory remarks I may state that in August, 1867, I presented to a meeting of the British Medical Association in Dublin, an analysis of 100 cases of stone in the bladder, 84 of which were operations by lithotrity. Since that time I have operated, not reckoning lithotomy, on another 100 cases by lithotrity, making a total of 184 cases, occurring consecutively in my practice, not one having been omitted. All have been performed within about the last six years, at the commencement of which term I began to employ my present instruments, and had developed my

present method, and by these all have been treated. They are, therefore, well adapted to be regarded as one group with reference to the question of results.¹ The object of this paper is to offer a brief *résumé* of the facts presented by these cases, as well as of those inferences which this large number of clinical histories, carefully watched and recorded, enable me to draw.

Of every case I possess full written notes made at the time, as well as the stone itself (with a very few exceptions), carefully preserved and labelled for reference.

I adhere to my original system of verifying each one, by naming some gentleman who has seen it with me, a system unnecessary, I am quite ready to believe, for my contemporaries, but which will prove a guarantee of accuracy to unknown or future observers and commentators. The whole of the cases are placed in an appendix at the end of this paper.

In offering an analysis of these 184 consecutive cases of lithotrixy, I must first state that the 100 fresh cases now published for the first time, like those which preceded them, were all adults and for the most part of an advanced age. It is still necessary to call attention to this fact, in comparing statistics relative to the operations of lithotomy and lithotrixy, and to remind the reader that all numerical tables are worthless which do not separate the cases of children from those of adults, so different are the results of operations, especially by the knife, which occur above and below puberty respectively. Next, I must state that almost all these cases are those of distinct individuals. Only thirteen cases are recorded twice. The relapses, a subject which we shall consider hereafter, were few, and when a *third* operation has been necessary in one individual's life time, which has occasionally, though rarely happened, I have not noted it, making a rule that no patient should appear more than twice in the list. Otherwise, "cases" might be unduly multiplied;

¹ See a "*postscriptum*" at the end of the paper, in which it will be observed that the number of cases has been increased from 184 to 195, the deaths remaining as before.

as, for example, were operators disposed to register every occasion on which some calculous matter is removed from those patients who are constantly or frequently forming it.

Thus, in the paper by Sir B. Brodie already referred to, 115 cases of lithotripsy were recorded. But Sir B. Brodie frankly states that eight of these occurred in the person of one individual, in the course of as many years, and that other cases of a similar kind were included,* so that the 115 cases might by no means represent even, or more than, a hundred individuals, while in Civiale's cases we are left altogether uninformed as to the number of individuals. In the present list the 184 cases occurred in 171 individuals.

Lastly, it must be remembered that the expectation of life, and the general quality, as regards health, of these patients is a little below the average, since it includes so many of those old and confirmed cases which seek the aid of a well-known operator as a forlorn hope, and are attracted for this purpose from every part of the world. Most of these patients are from different parts of Great Britain; but the table includes also patients from France, Germany, Turkey, Russia, Canada, Belgium, the United States, California, the East Indies, and New Zealand.

In commencing this analysis it is necessary to bear in mind certain important facts relative to age. They may be briefly stated as follows:

The mean age of the 184 cases is rather more than 61 years.

The youngest patient was 22 years old, only 3 were below 30 years, the eldest was 84 years. There were 46 cases of 70 years of age and upwards; *no less than 113 of the 184 were 60 years and upwards*. Next, with regard to that important point the size and weight of the stone, I may say that I have, as a rule, to which very few exceptions have occurred, applied

¹ Vol. xxxviii, p. 185.

lithotritry to every case of stone under my care, which has been obviously beneath an ounce in weight, a matter easy to determine in sounding. At one ounce and upwards I have preferred lithotomy. I may say, for the sake of giving a criterion as to size, that a uric-acid stone which weighs an ounce equals in size a large date. I know no better comparison.

In examining the results of the operation in these cases I shall inquire—first, what is the rate per cent. of recovery after the operation? secondly, what is the general condition of the patient after it? and thirdly, in how many instances is there a return of the malady?

In considering the first subject, viz. the number of recoveries per cent. which took place, I must request attention to the following statements, which are extremely important in relation to the question :

First, that I have never in my life found it necessary or desirable to complete by the knife a case of stone in which I have commenced the operation by crushing.¹ This has not

¹ I once removed a considerable phosphatic crust from an oxalate of lime stone, and so diminished its size previously to performing lithotomy; that is the only case which might have the semblance of an exception to the rule, although it is not so in reality.

The only other case in which I ever performed lithotomy and lithotritry on the same patient is that of No. 135. It might at first sight be supposed to furnish a single exception to the statement made above, but it certainly is not so.

I crushed at six sittings for a gentleman several small uric-acid calculi during October, 1868, and the first week of November. In the middle of November he left for the country to recruit his strength, and there, after exposure to cold and wet in exercise, in inclement weather, he had severe cystitis, followed by orchitis, and by a series of abscesses in the scrotum and the abdominal walls, lasting more or less until April, 1870. He then had retention of urine from deep perineal abscess, and a catheter was tied in for some days. His distress was then so severe that it was decided to have an examination under chloroform, and if anything were discovered, to perform lithotomy. I performed the operation on the 21st, Sir William Fergusson holding the staff, Mr. Pollock, Mr. Marshall, Mr. Hutchinson, and others being present. At the first incision a half pint of matter issued; quickly dividing a large prostate, I

unfrequently been done, especially in Paris, when the patient's life has been in danger; and in such circumstances, if death has occurred, it has not been placed to the account of lithotrity.

Secondly, that I have not left incomplete or unfinished a single case of stone on which the operation of crushing has once been commenced; a plan which has been pursued, also in Paris, when great difficulty or danger has arisen. The result of sending a patient into the country in these circumstances can very rarely be otherwise than hazardous or fatal. But when death has so taken place abroad it appears likewise not to have been placed to the account of lithotrity. It may, perhaps, surprise some to be told that in Paris it has been the custom to send away as uncompleted cases, or to refuse any operative aid to, a considerable proportion of the stone patients who apply for relief. This is a proceeding wholly unknown to English surgeons, and one which must receive no little weight in dealing with the results of the operations under consideration.

Thirdly, I have never refused to operate on any case of stone by one means or the other; and I have sometimes consented, rather than refuse the patient all chance of life, to perform lithotrity, when he has absolutely refused my advice that lithotomy would be for him the better operation. I am certain that two or three of the fatal cases in my table occurred in individuals for whom, had I not been fettered by circumstances, lithotomy would have been the preferable proceeding.

Certainly, as a rule, the surgeon must decline to perform any operation but that which appears to him the better of

removed two small uric-acid calculi, not coated with phosphatic matter, and quite probably of recent formation; they were not fragments, but small entire calculi, and may have been present, or not, during the period of lithotrity; on this point there is no evidence. The long period of five months had intervened between the lithotrity and the lithotomy, so that I cannot regard this as necessarily a failure in lithotrity finished by lithotomy. The patient is at this moment, July, 1870, enjoying excellent health.

two courses; but in rare instances he cannot refuse to be influenced by circumstances, and adopt the less promising course, when by its means some hope of saving life exists. I may now say that the deaths which occurred from all causes during or after the conclusion of treatment among the 184 cases of patients averaging 61 years of age, were 12 in number, although one of them, Case No. 49, ought, I think, not to be so reckoned; but I wish to err on the wrong side, and am content to accept 12. This constitutes a rate of recovery of 93 per cent. My first 84 cases included 4 deaths, or a rate of 95 per cent. of recovery. The last 100 were a little less promising, on the grounds named above, and I consider the result, therefore, to be even better than the preceding. For two or three bad cases only, tell heavily against a small per-centage rate of mortality in the total.

The seat and nature of the malady which immediately induces a fatal issue may next be considered. That which appears to have been the most common in these cases is inflammation affecting the kidney of one or both sides. A certain amount of cystitis is common enough in some degree, but usually slight and evanescent in character; it is generally met with at some time or another in cases of lithotrity, where several sittings are necessary. In some individuals, however, invasion of the kidney follows it, and is announced by a severe rigor, succeeded by other rigors at intervals of a few hours. Several severe rigors occurring consecutively, as, say, one or two daily during three or four days, should arouse anxiety on this head. It is rare, indeed, with these signs that some affection of the kidney is absent. Fever continues, and slowly increasing exhaustion, and if recovery does not take place, the patient sinks in from seven to twenty-one days; suppression of urine occasionally, but not generally taking place. The autopsy reveals marked traces of inflammatory action in one or both kidneys and ureters, and mostly deposits of pus are formed in the renal structure and in the course of the ureter. Cases No. 109, 126, 127, 133, 147, 158, more or less illustrate this condition. I am satisfied,

also, that in some or all of these chronic pyelitis, if not chronic nephritis also, has existed, occasioned by the calculous affection, before any operative interference took place. It must be admitted that at present we have not an unfailing means of ascertaining the existence during life of these conditions. There may be no albumen in the urine, and not necessarily are there any deposits in the urine significant of the renal affection. The urine of a calculous patient frequently contains mucus, pus, and blood; but whether the origin of these is in the bladder (naturally its most common source from the irritation of the calculus) or in the organs above it is impossible always to determine, and usually there are no casts or other pathognomonic signs of disorganising renal structure. In fact, neither physical signs nor subjective symptoms are by any means frequently present, and yet advanced pyelitis, and even sometimes chronic nephritis, may exist.

Another cause of death is acute cystitis, apart from any serious renal affection. In such cases the bladder may or may not be sacculated to some extent, most frequently the latter state exists. When these pouches, not by any means necessarily large, have been formed in the bladder, any instrumental interference which is continuous or repeated (such as mere catheterism, for the purpose of relieving an atonied bladder) is liable, not unfrequently, to induce slowly cystitis or pyelitis, which ultimately proves fatal. Cases No. 61, 69, and 80, are examples of death by this way. No. 49 might also be regarded as another instance. The patient was suffering severely from the affection described, and was much exhausted, but he died suddenly while sitting up in bed to a meal from failure in the heart's action.

Lastly, cases 87 and 161 were instances of that affection unhappily liable to follow all surgical proceedings, viz. pyæmia. I imagine there are few operations, however slight, which are followed by so small a number as two in 184 cases. Certainly in any serious operation by the knife the risk of pyæmia is very much greater than this proportion would indicate.

In the paper of Sir Benjamin Brodie already alluded to, in considering the causes of death, he placed them under the two following heads, and I quote his words as most suitable to our purpose here: "First. Cases in which there was a fatal result arising solely from the operation itself. Secondly. Cases in which a similar result was to be attributed to the co-existence of some other disease, brought into an active state by the shock of the operation, but which disease would in itself have been sooner or later the cause of death, even if the operation had not been performed."

Now although it is not possible to draw a hard and fast line by the indications here given, still they furnish a useful and fair classification, by which it will not be difficult to arrange the cases of death before us. I take it for granted that the existence of advanced organic disease of the bladder and of the kidney must be held to place any case exhibiting it in the second category, or that in which death must have occurred, sooner or later, even if the operation had not been performed. Having made numerous anatomical examinations after deaths occurring through disease of the urinary organs, and following surgical operations upon them of various kinds: I may say that the organic changes alluded to are distinctly definable, and they are as follows: 1st. Marked sacculation of the bladder. 2nd. Chronic pyelitis with distended ureter. 3rd. Marked organic changes of a chronic character in the kidney structure.

Could the existence of these conditions be accurately diagnosed beforehand, it might become a question whether the crushing operation, or any operation at all, should be performed. For there is little doubt that the existence of such organic changes is almost as surely a source of fatal issue in lithotomy as in lithotrity. Now, in the twelve cases before us, one or other of these conditions certainly existed in five; and, had it been possible to be aware of them, the operation might not have been performed, and the patient might have lived a little longer—with much suffering it is true—and he ultimately must have died at no distant period. Eliminating these, we have but seven cases out of 184, in

which the death might be attributed to the surgical operation.

The causes in these seven cases were in some mere exhaustion, in others, acute cystitis and fever: both occurring in constitutions of a feeble kind; and pyæmia. And this gives a recovery-rate of 96 per cent., or, in other words, a mortality in the 184 adult cases of not quite 4 per cent.: and this is undoubtedly the fair view to take of the subject.

Table of fatal cases.

In the 184 cases of lithotrity, performed on adults, the mean age of whom was 61 years, 12 deaths occurred. The numbers are as follows, and the causes are appended.

No. 87. Pyæmia.

- „ 161. Ditto.
- „ 49. Inflammation, acute, or chronic and advanced,
of one or both kidneys.
- „ 109. Ditto ditto.
- „ 126. Ditto ditto.
- „ 127. Ditto ditto.
- „ 133. Ditto ditto.
- „ 147. Ditto ditto.
- „ 158. Ditto ditto.
- „ 61. Cystitis and pyelitis.
- „ 69. Acute cystitis.
- „ 80. Ditto.

Five of these were unquestionably subjects of advanced organic disease of the urinary organs before operation, viz., Nos. 49, 61, 109, 127, 133; and must be classed as “cases in which death was to be attributed to the co-existence of some other disease, brought into an active state by the shock of the operation, but which disease would in itself have been sooner or later the cause of death, even if the operation had not been performed.”

The details of all will be found under their respective numbers in the appendix.

Secondly.—The general and local condition of patients after lithotripsy. This is a subject which has not been studied, perhaps, so much as it deserves. Very little space can be accorded to it here; but there are nevertheless matters of much interest attaching to the after-history of an individual who has formed a stone, and has submitted to an operation issuing in its successful removal. By far the larger number of the patients recorded in my list are living still, quite free from any sign of the old complaint, and enjoying very fair health, age considered. Thus, three were masters of hounds, and above seventy years of age when operated on. Each one has returned to his duties, and two have enjoyed many a hard day's riding since; the third, though not hunting, still attends the meet, and is comfortable in the saddle. If he lives, as there is no reason to doubt, he will hunt next year. Such examples I could adduce in great number throughout the list. So completely true, in most cases, is the axiom which Deschamps chose as the motto of his classical work on stone,

“Causâ sublatâ tollitur effectus.”

With a few it is otherwise, and more so in middle life, I think, even than in advanced age. In these exceptional instances a little chronic inflammation still affects the bladder, or it may be the organs above, and impaired health and local troubles of some kind still persist. The operation can but remove the stone, and those troubles which were due solely to its existence. Symptoms due to other causes, associated or not, as the case may be, with calculous formation, will not disappear with the removal of the foreign body.

It would be interesting to know to what extent a kidney, in which a calculus has once been formed, is damaged in the process. Necessarily not much, perhaps, or at all; but sometimes no doubt it is irretrievably deteriorated, and is a cause of future ill health.

Then the irritation produced by the operation itself may

in some cases tell for something in the production of after troubles. But I am bound to say it ought to be exceedingly small. It was formerly not small, with the clumsy apparatus, the enormous lithotrites, evacuating catheters, and repeated washings once thought essential in lithotrity, and now for the most part swept away from practice. Again, it is not small, if large and angular fragments are dragged through that delicate organism, the neck of the bladder, and along the whole track of the urethra; a practice which more than any one I know has proved damaging in after life to patients, and consequently, to the credit of the operation, of which in reality it forms no part. In order to ensure, first, recovery and subsequently a complete and lasting cure, it is impossible to avoid too sedulously all unnecessary mechanical interference; nor is it possible to conduct all the manipulations with too much care and gentleness. All this holds good equally, within certain limits, in relation to the question of the future re-appearance, or recurrence, as it has been termed, of another calculus in the bladder, and this subject naturally follows here.

Thirdly. Recurrence of calculus. Among the 184 cases, there are 13 in which the calculus has reappeared and in which the operation has been again performed. Let it be repeated here that the mere removal of a few phosphatic debris, subsequently occurring, has not been reckoned as an operation; but only the reformation of a fresh calculus after a year or more of absence on the part of the patient.

Now there are two ways by which calculous matter reappears after an operation of lithotrity. First, there may be a fresh descent from the kidney into the bladder; either a uric-acid or an oxalate of lime formation, and occasionally, but rarely, a phosphatic calculus, may be produced in the pelvis of the kidney, and having found its way into the bladder may form the nucleus of a larger stone, if it is not expelled naturally, or removed by artificial means. This occurrence may follow equally either the cutting or the crushing operation; and does take place in a certain propor-

tion of all cases. It was noted in five of the 184 cases, and at the respective ages of 71, 49, 63, 73, and 74, and the intervals between the first and second stone was in each case, respectively, two years, three years, four years, and in two latter cases one year. Secondly, another and a wholly different mode of calculus formation has to be described; and this is probably somewhat more common than the other. To a certain extent, but not altogether, it is to be accepted as an opprobrium to lithotritry. Happily, the frequency of its occurrence is to be diminished by perfecting the crushing operation in all its details. At the same time it is by no means unknown after lithotomy, although it is rare after that operation. It occurred in 8 cases of the 184, I think it may have occurred in three other individuals, whom I have lost sight of or have since died, but I cannot affirm this. It will be fair I believe to add three, making 11 altogether of recurrence through persisting chronic cystitis, for this is the real cause in most of these cases. If severe prolonged chronic inflammation of the bladder is produced or perpetuated, by mechanical disturbance, due in part to the pre-existence of the stone itself in the organ, in part to the employment of instruments, and in part to the presence of sharp irritating fragments necessarily produced in the operation, it sometimes happens that a large quantity of triple phosphate is rapidly formed within the bladder, and becomes a more or less persisting deposit. If neglected, fresh calculus is very likely to result. No doubt in most cases by much care, by emptying the bladder daily, injecting it, &c., this reproduction may be prevented. In some constitutions the tendency to produce phosphatic deposit thus, is much more marked than in others, and the formation in question by no means corresponds precisely with the degree of inflammation which has been present. A small degree will give rise to it in some individuals; a very large degree will fail to do so in others. Still it is quite clear that the more perfect is the operation of lithotritry, that is, the smaller the amount of irritation produced by the mechanical means employed, the smaller is the risk of its occurrence. Hence

it is unquestionably a sequence of lithotrity, the chance of which is diminishing and has diminished in proportion to improvements in the manner of performing the operation. It is an additional reason, if one were wanting, for avoiding by every means possible, all sources of injury or irritation to the bladder and urethra; such as the forcible removal of large fragments, over-exercise by the patient in the intervals of the sittings, over-instrumentation generally, &c. &c.

In some cases the tendency to form these phosphatic deposits is subdued by treatment, or wears itself out in time. Among the eight patients so troubled, in three cases it persists, in the remaining five it has disappeared altogether. In all cases the morbid product can be always removed easily and the patient relieved, at all events for a time. One cause of persisting phosphatic formation, although a rare one, is beyond doubt encysted calculus. This I have been able to verify. A sac of the bladder, perhaps, usually a small one, contains a calculus, the narrow neck of the sac not permitting the possibility of escape to the foreign body. A small surface of the calculus is thus exposed in the bladder. On this surface phosphatic salts are encrusted, and as the deposit goes on, a more or less spheroidal body is produced, the attachment of which to the encysted calculus is by a narrow and brittle neck. Ultimately this snaps, and a phosphatic calculus is set free in the bladder. This is removed, the symptoms disappear or are much relieved, and the process again commences as before, and is reproduced again and again. I may repeat that I have several times observed this condition; in the dead body not infrequently, in the living three or four times; one of these latter cases was identified by examination with my friend Mr. Cadge, of Norwich, when in consultation on a long and troublesome case of this kind. I have exhibited and recorded several post-mortem examples of this condition at the Pathological Society and elsewhere.

I now come to the important practical conclusion, which I beg to submit is logically derivable from the data before us. It is not offered here as my opinion, or as the opinion of any

other person experienced on this subject ; it is a conclusion which the facts recorded inevitably indicate. I have long ago had to contend that lithotritry properly performed is an eminently successful operation ; the proof that it is so is now before us. For a certain, and by no means limited, number of cases its success may be regarded as a certainty, absolutely without fear of any contingency, except such as attends the minor operations of surgery—for example, the opening of a small abscess or the removal of a finger. *For I have never lost a single patient in the whole course of my experience after crushing a stone which was no larger than a small nut.* And this is a size at which with very very few exceptions indeed every stone ought to be discovered. But this very fact leads me to remark that the success of lithotritry cannot, therefore, be considered, apart from a knowledge of the extent, in regard of the magnitude of the stone and the constitution of the patient, to which the capabilities of the operation have been pushed.

When it is employed for stones as large as a date or a small chestnut—and it is impossible to deny the excellent chance of success which this method offers to the subjects of such stones—a certain, but still only small proportion of deaths must be expected ; and the rate of mortality will correspond with augmentation in the size of the stone, and with the amount of existing disease and age on the part of the patient. Given a small stone in a fairly healthy person, and success is certain ; the possibility of contingency in such a case depending only on the presence of those remote and excessively rare conditions which will make for an individual here and there the mere passing of a catheter a cause of death.

As to the extent to which I have pushed the capabilities of the operation here, the formation of a judgment is easy, for the stones are placed before you. Many of them were as large as a small chestnut, some were larger, as may be seen from the *débris*, a portion of which only, I need scarcely say, is present in any case, since some of it always escapes the nurse whose business it is to collect and preserve it.

As to the composition of the calculi, 122 of the 184 were

composed of uric acid and the urates; 40 were phosphatic, 16 were "mixed," 4 were oxalate of lime; 1 was pure phosphate of lime, and 1, a rather large one, was cystic oxide.

The whole have been removed by the two lithotrites produced, one a fenestrated, the other a non-fenestrated or flat-bladed lithotrite, and almost entirely by the latter instrument. Certainly the fenestrated lithotrite has not been used for more than 15 cases, and in these not more than once for each stone: just to divide it into large fragments at the outset. So powerful and capable an instrument is the flat-bladed lithotrite of the construction produced, and so much less likely is it to irritate than the fenestrated instrument.

The recurrence of calculus, common as it was in the earlier history of lithotrity, need be rarely now the result of an overlooked fragment. With the cylindrical handle which I designed for the instrument before you, it is perfectly easy to find a fragment no larger than a split pea, and to elicit a sound audible to bystanders; and equally easy is it, having done so, to seize and withdraw the piece. This I have demonstrated on innumerable occasions, both in private and in hospital practice; and last year in public before M. Verneuil and a large number of students in the wards of Lariboisière in Paris.

The bearing of all this on the results of an operation, the success of which depends on removing the stone completely, and at the same time on avoiding the production of irritation in the organs involved, must be sufficiently obvious.

I have thus far pointed out as briefly as I could what appear to me to be some of the more important facts exhibited by these 184 cases of lithotrity. My object has been to make an impartial estimate of the operation; to ascertain its real value, and its place among surgical operations, and not to make out a special case, either for or against it. The uniformity of the method pursued, the number and the variety of the patients and the record of important facts relative to each, as well as the large proportion of calculi of considerable size, for which it has been employed, produced

for inspection here, are circumstances which constitute this group an excellent opportunity for study, since so complete an appendage of the data necessary to the formation of a judgment has never, as far as I am aware, been given to the profession, either here or elsewhere.

It is a study which I hope to continue, and, whatever results arise in the future, to report them on the same plan which has been adopted to-day.

NOTE, July 20, 1870.—Since reading the above paper in May, I have operated on eleven fresh patients by lithotrity, of the respective ages of 63, 70, 61, 73, 58, 43, 72, 50, 74, 81, and 59 years without one death: making 195 cases, instead of 184, as the sum total to which the foregoing proportion of accidents may be held to apply.—H. THOMPSON.

CASE 1.—A gentleman at Boulogne, æt. 65; seen in consultation with Dr. Perrochaud there. Two uric-acid stones, medium size. Six sittings, autumn, 1863. Success perfect.

CASE 2.—T. P—, æt. 59. University College Hospital. Uric-acid stone. Four sittings, autumn, 1863. Success perfect.

CASE 3.—P. B—, æt. 60. University College Hospital. Phosphatic stone, medium size. Bladder perfectly atonied. All urine removed by catheter for years past. Four sittings, autumn, 1863. Success perfect.

CASE 4.—A gentleman, æt. 45. Large phosphatic stone. Patient paraplegic. Bladder paralysed. Twelve sittings, autumn, 1863. Success perfect. Seen in consultation with Mr. T. W. Cowell.

CASE 5.—A gentleman, æt. 74. Uric-acid stone, medium
VOL. LIII. 10

size. Seven sittings, January and February, 1864. Seen by Mr. Clover, who gave him chloroform at the patient's special request at first sitting, but was not repeated. Success perfect.

CASE 6.—A gentleman, æt. 69. Two uric-acid stones of considerable size. Eighteen sittings, spring, 1864. A patient of Mr. Gayleard, of Devonshire Street, who was present on every occasion. Success perfect.

CASE 7.—A gentleman, æt. 70. Phosphatic stone, medium size. Five sittings, October, 1865. Eighteen months had elapsed since the patient had two large uric-acid stones removed. During the first twelve months following he had been free from symptoms. His prostate is remarkably large. Mr. Mapleson was in constant attendance with me. Success perfect.

CASE 8.—A gentleman, æt. 45. Uric acid and urates, full medium size. Eight sittings, spring, 1864. Dr. Koepl, of Brussels, who was then in town, was present at two sittings. Success perfect.

CASE 9.—A gentleman, æt. 69. Small uric-acid stone. Five sittings. The symptoms disappeared, and he returned home. A fortnight afterwards the patient called on me to complain of a little return of pain. I advised waiting a week or two before sounding. This was at the beginning of June. At the end of the month he had severe rigors and fever, no instruments having been used. He gradually sank in the middle of July. At the autopsy a calculus the size of a bean and smaller ones were found in the right kidney; in the left was a large abscess. In the bladder there were four calculi like those in the kidney, which had probably recently descended. The operation was incapable of removing the graver part of the malady, viz. that of the kidneys. Dr. Koepl was present at the first sitting.

CASE 10.—A gentleman, æt. 46. Oxalate of lime, small

medium size. Five sittings, spring, 1864. Dr. Pancoast, of Philadelphia, then in town, was present at one or two of the sittings. Success perfect.

CASE 11.—A gentleman, æt. 70. Large mixed calculus. Eleven sittings, summer, 1864. All symptoms of stone disappeared. Some trouble remains with pre-existing enlarged prostate, but he rides, drives, and is actively engaged. Seen two or three times by Mr. M. B. Hill.

CASE 12.—A gentleman, æt. 76. A smallish phosphatic stone. Five sittings, April and May, 1864. This case was seen by Sir William Jenner two or three times. Success perfect.

CASE 13.—A gentleman, æt. 48. A medium-sized uric-acid stone. Six sittings. Mr. Hilton was present at one sitting. Success perfect.

CASE 14.—A gentleman, æt. 69. Large uric-acid stone. Ten sittings, summer, 1864. Mr. M. B. Hill saw this patient frequently; my friend Mr. Norman, of Southsea, also on one occasion. Success perfect.

CASE 15.—A gentleman, æt. 68. A rather small calculus, mixed. Five sittings, summer, 1864. Mr. Harris, of Gower Street, present at every sitting. Success perfect.

CASE 16.—A gentleman, æt. 48. A rather large uric-acid stone. Eleven sittings, summer, 1864. Mr. Hilton was present at one or two sittings. Success perfect.

CASE 17.—A gentleman, æt. 62. Small uric-acid stone. Three sittings, autumn, 1864. Mr. Hammerton was present each time. Success perfect.

CASE 18.—A gentleman, æt. 62. Large calculus, uric acid

and urates. Thirteen sittings, autumn, 1864. Dr. Harley present at one sitting. Success perfect.

CASE 19.—A gentleman, æt. 59. Small uric-acid stone. One sitting. Mr. Clippingdale saw this case with me in November, 1864. A subsequent severe illness, from which he slowly recovered; but he writes me now that he has “no return of the old complaint.”

CASE 20.—J. H—, æt. 59. University College Hospital. Rather small uric-acid stone. Eight sittings, November and December, 1864. The calculus could never be found or seized in any other way than with the blades of the lithotrite directed downwards immediately behind the prostate, however high the pelvis was raised. Discharged free from all symptoms.

CASE 21.—A gentleman, æt. 75. A rather small phosphatic stone, broken up and removed at one sitting in December, 1864. Mr. Tatham, of Brighton, was present. The patient had long passed no urine except by catheter. This condition, of course, remains, minus the symptoms of stone.

CASE 22.—A gentleman, æt. 77. Phosphatic stone. Three sittings. Same patient as No. 21, but eighteen months after previous stone. Successful.

CASE 23.—A gentleman, æt. 58. A uric-acid stone of rather more than medium size. Five sittings, December, 1864. Mr. P. Jackson and the late Mr. C. Jackson, of Wimpole Street, were present at each sitting. Success perfect.

CASE 24.—A gentleman, æt. 57. A small oxalate-of-lime calculus, crushed at one sitting in November, 1864. Mr. M. B. Hill was present. Successful as far as the removal of the stone is concerned. The patient is still subject to the

formation of small calculi, which he has passed in great number.

CASE 25.—A gentleman, æt. 84. Small uric-acid calculus. Five sittings, January, 1865. I had the pleasure of meeting in consultation Mr. Solly several times in this case. Success perfect.

CASE 26.—A gentleman, æt. 60. He has passed all his urine by catheter for some years. Smallish phosphatic stone. Six sittings, January, 1865. Mr. Hill saw this case for me several times during a temporary absence. Success perfect.

CASE 27.—The same patient, æt. 62. Crushed a second phosphatic stone in autumn, 1866. Three sittings. Since that small portions of phosphatic stone have been removed; but for one year he has been perfectly free from this affection, and is now (1870) in excellent health.

CASE 28.—A gentleman, æt. 75. Phosphatic stone, medium size. Seven sittings, April and May, 1865. Prostate large; bladder has not been emptied without catheter for years. This case had the advantage of Mr. Aikin's constant care and attention. Success perfect.

CASE 29.—The same gentleman. Had perfect immunity from stone for one year and a half, then symptoms reappeared, and I again removed a considerable stone in six sittings with perfect success.

CASE 30.—A gentleman, æt. 61. Large uric-acid stone. Ten sittings, April and May, 1865. Dr. A. Simpson, of Glasgow, and Mr. M. B. Hill saw this case several times. Success perfect.

CASE 31.—A gentleman, æt. 59. A large phosphatic stone; disease of kidneys. Eight sittings, April and May,

1865. A patient of Dr. Sharpe, of Norwood, who frequently saw him with me. Success perfect.

CASE 32.—A gentleman, æt. 65. Rather small uric-acid stone. Four sittings, April and May, 1865. Seen by Mr. M. B. Hill, also by Dr. Van Buren, of New York. Success perfect.

CASE 33.—A gentleman, æt. 53. Uric-acid stone, medium size. Eight sittings, April and May, 1865. Seen by Dr. A. Simpson, of Glasgow, and by others. Success perfect.

CASE 34.—B—, æt. 62. University College Hospital. Small phosphatic stone. Three sittings, April and May, 1865. Recovered. About five months after he died of cancer in the bladder. (See Hospital "Mirror," December 16, 1865.)

CASE 35.—A gentleman, æt. 71. Two or three smallish uric-acid stones. Nine sittings, April, May, and June, 1865. All removed and greatly relieved, but now a tendency to deposit phosphates; removed by washing out the bladder. Often seen by Dr. A. Simpson and others.

CASE 36.—A gentleman, æt. 70. Medium size phosphatic stone, with, perhaps, few urates. Five sittings. Very large prostate. Success perfect.

CASE 37.—B—, æt. 28. University College Hospital. Hard phosphatic stone of medium size. Six sittings, May, 1865. Success perfect. (See the 'Lancet,' Hospital "Mirror," December 16, 1865.)

CASE 38.—A gentleman, æt. 62. Rather small uric-acid stone. Three sittings, May, 1865. Seen by Mr. Clover, who gave chloroform. Success perfect.

CASE 39.—A gentleman, æt. 74. Small medium uric acid.

Four sittings, May and June, 1865. Prostate very large. M. C. King, of Highbury, was in constant attendance with me. Success perfect.

CASE 40.—A gentleman, æt. 70. Large uric-acid stone. Nine sittings, May and June, 1865. Prostate large. Mr. M. B. Hill watched this case constantly with me. Mr. Clover gave chloroform. Success perfect.

CASE 41.—A gentleman, æt. 62. Medium sized, uric acid. Seven sittings, June and July, 1865. Stone completely removed. Greatly relieved, but some derangement of the bladder continues. Seen also several times by Mr. B. Hill.

CASE 42.—A gentleman, æt. 61. Uric acid, of medium size. Seven sittings, June and July, 1865. This patient was well known to Dr. Greenhow, who saw him occasionally. Success perfect.

CASE 43.—B—, æt. 39. University College Hospital. Small phosphatic stone. Three sittings, June and July, 1865. Sent to me by Dr. U. West, of Alford. Success perfect.

CASE 44.—A gentleman, æt. 69. Two calculi, medium size, mixed phosphates and urates. Seven sittings, June and July, 1865. Seen with me several times by Dr. Buchanan, of Glasgow. This patient had been cut in Edinburgh three years before, and two uric-acid stones removed, but smaller than the present. Success perfect.

CASE 45.—A gentleman, æt. 47. Phosphatic stone, medium size. Five sittings, September and October, 1865. The patient had been under the care of Mr. Rhind, of Shipley, Yorkshire, who advised him to undergo the operation. Success perfect.

CASE 46.—A gentleman, æt. 65. Uric acid, of large medium size. Seven sittings, October, 1865. This patient was sent to me by Mr. Warwick, of Southwell. Success perfect.

CASE 47.—A gentleman, æt. 64. Uric acid, of medium size. Four sittings, October, 1865. Seen by Mr. M. B. Hill, Dr. Seegen, of Vienna, and by others.

CASE 48.—A gentleman, æt. 65. Small, uric acid. Two sittings, October, 1865. Mr. Clover gave chloroform. Success perfect.

CASE 49.—A gentleman, æt. 64. Medium size, hard, phosphatic stone. November and December, 1865. I stated at my first consultation with Mr. E. Wright, of Clapham, with whom I had the opportunity of frequently seeing this patient, that the case was unpromising, either for lithotomy or lithotrity; but that his symptoms being severe, I could not refuse the chance afforded by the latter operation. I also thought it necessary to make the same statement to his relatives before commencing. The prostate was exceedingly large, the cavity of the bladder small, and the stone difficult to seize. Besides this he had organic disease of the heart. Without detailing all the particulars which were adverse to success in this case, I may say that it presented as many difficulties as any case which it has fallen to my lot to encounter. In Paris I am satisfied that this operation would have been declined; but his condition was so hopeless and so miserable without it, that I did not think it right to refuse him the chance. There were five sittings during the first month, conducted with the greatest care. Then fever set in; he gradually became weaker, and died suddenly while sitting up in bed and taking food, about a month after the last sitting, although he had rallied so much at times as to afford great hope of ultimate success. At the autopsy considerable suppuration was found about the base of the bladder. One half of the stone was removed, the other half remaining in

the best condition—that is, in one piece, all the débris having been removed. I am satisfied to accept this as a death following the operation of lithotritry, although the actual cause of death at the last was clearly diseased heart, because the suppuration in the pelvis would have been almost necessarily fatal. It would have been politic to decline this case, but not right, I think, all things considered, to refuse the chance which the exercise of great care and gentleness in management might offer him, and I therefore consented. Had I not done so, there would not have been one fatal case. As it is, there is one out of twenty-four cases in this year. Reckoning the nineteen antecedent cases of 1864, it was the first death after a series of forty-three consecutive successful cases.

CASE 50.—A gentleman, æt. 66. Large, uric acid. Eight sittings, November and December, 1865. The patient was sent to me by Mr. Foster, of Huntingdon. The stone is completely removed, and its symptoms have disappeared. At present a good deal of irritation remains, with phosphatic deposit.

CASE 51.—A gentleman, æt. 69. Very large phosphatic stone. Eight sittings, December, 1865, and January, 1866. Seen with me by Mr. W. Morris, of Petworth. Success perfect.

CASE 52.—A gentleman, æt. 56. Two rather small uric-acid stones. Five sittings, December, 1865, January, 1866. Seen also by his medical man, Mr. W. Morris. Success perfect.

CASE 53.—A gentleman, æt. 65. Several hard phosphatic stones; severe disease of bladder. Five sittings, January, 1866. Seen, with me, by Mr. Foster, of Huntingdon. Success perfect.

CASE 54.—A gentleman, æt. 53. Stones, uric acid and

phosphatic, mixed. Eight sittings. Disease of bladder, and tendency to produce phosphatic matter, subsequently for some months. Finally cured, and now in a state of comfort, January and February, 1866. Sent to me by the late Dr. Brinton, and known to Dr. Phillips, of Coventry.

CASE 55.—A gentleman, æt. 67. Rather small uric-acid stone. Three sittings, January, 1866. Known to Mr. C. S. Webber. At this and all the foregoing cases Dr. Mazanowski, of St. Petersburg, was present. Success perfect.

CASE 56.—A gentleman, æt. 67. Large medium size uric-acid stone. Nine sittings, January and February, 1866. This case was seen throughout by Mr. John Foster, of Upper Wimpole Street. Success perfect.

CASE 57.—A gentleman, æt. 66. Small uric-acid stone. Two sittings, January, 1866. Extreme fever following, from which he made a perfect recovery. He was seen throughout by his medical attendant, Dr. Monckton, of Maidstone.

CASE 58.—A gentleman, æt. 63. Medium-sized uric-acid stone. Five sittings, February, 1866. Seen by Dr. Charles Mayo, and Dr. Taylor, of Guildford. Success perfect.

CASE 59.—A gentleman, æt. 72. Large phosphatic stone. Six sittings, February, 1866. Seen, with me, by Mr. Charles Butler, of Ingatestone. Success perfect.

CASE 60.—The same patient, about a year afterwards, applied with another stone, phosphatic, considerable size. Four sittings. He passes all his urine by catheter, and has had no return of the formation since (1870), and is in excellent health.

CASE 61.—A gentleman, æt. 69, with very advanced disease of the bladder, and enormously enlarged prostate; but he was suffering so severely from several hard phosphatic stones, and

with exhaustion therefrom, that I could not decline to make an attempt to remove them, notwithstanding his very unpromising condition. He gradually sank from debility. Seen throughout by Mr. W. S. Foster, of Newport.

CASE 62.—A gentleman, æt. 74. Large uric-acid calculus. Six sittings, chiefly under the influence of chloroform, given by Mr. Clover, and much débris removed, March, 1866. Has hunted regularly this present season. Success perfect.

CASE 63.—A gentleman, æt. 56. Rather small uric-acid stone. Four sittings, March and April, 1866. Attended throughout by Mr. John Foster, of Upper Wimpole Street. Success perfect.

CASE 64.—A gentleman, æt. 70. Several uric-acid stones. Six sittings, March and April, 1866. Seen, with me, by Dr. Radcliffe. Success perfect.

CASE 65.—A gentleman, æt. 48. Phosphatic stone. Four sittings. March and April, 1866. This patient was seen, with me, by Dr. Hudson, of Cork Street. Success perfect.

CASE 66.—A gentleman, æt. 67. Rather small uric-acid calculus. Four sittings, April, 1866. Seen, with me, by Dr. Owen Rees. Success perfect.

CASE 67.—T. H—, æt. 49. University College Hospital. Two rather large uric-acid stones. Eight sittings, May and June, 1866. Success perfect.

CASE 68.—D. E—, æt. 39. University College Hospital. A large uric-acid stone. Seven sittings, June and July, 1866. Success perfect.

CASE 69.—A gentleman, æt. 73, with a very large and hard uric-acid stone. He was very much averse to lithotomy, which would, perhaps, have been better for him; and I con-

sented to crush the stone. It turned out to be even a little larger than I anticipated. It was entirely removed in several sittings, but he succumbed to fever and exhaustion from severe cystitis. June and July, 1866.

CASE 70.—A gentleman, æt. 67. A medium size phosphatic stone. Renal disease existed, œdema of the legs, and advanced disease of the bladder. There was complete phymosis. The urethra was blocked with phosphatic débris, and the urine dribbled off involuntarily. I operated first on the urethra and cleared it, then crushed the stone, in five sittings, with perfect success. All his other symptoms have been greatly relieved since, and he has no trouble whatever now with the bladder or urethra, May and June, 1866. Seen, with me, by Mr. P. C. Chadwick, of Wrington.

CASE 71.—A gentleman, æt. 70. Five or six small uric acid stones. Six sittings, June and July, 1866. Mr. Swaine, of Devonport, was present at one sitting. Success perfect.

CASE 72.—A gentleman, æt. 55. Medium-sized hard phosphatic stone. Five sittings, July, 1866. Attended throughout by Mr. John Foster, of Upper Wimpole Street. Success perfect.

CASE 73.—W. M—, æt. 40. University College Hospital. A man, with advanced renal disease, whose symptoms were aggravated by the presence of two or three phosphatic calculi in the bladder. These were removed in three sittings, July, 1866, and he left the hospital with his bladder free from calculous matter, and was so far relieved. He died from the organic disease of the kidneys ultimately.

CASE 74.—R. W—, æt. 52. University College Hospital. Enormously large and hard phosphatic stone. Fifteen sittings, October and November, 1866. He had been the subject of lithotomy before. Success perfect.

CASE 75.—A gentleman, æt. 76. Two uric-acid calculi of small medium size. Five sittings, October and November, 1866. Was also under the care of Mr. Blaker, of Brighton. Success perfect.

CASE 76.—R. E—, æt. 60. University College Hospital. Mixed uric acid and phosphates. Four sittings, November, 1866. Success perfect.

CASE 77.—A gentleman, æt. 54. Medium-sized uric-acid stone. Five sittings, November and December, 1866. Was also under the care of Dr. Lionel Beale. Success perfect.

CASE 78.—A gentleman, æt. 75. Large uric-acid stone. Six sittings under chloroform, December, 1866. Was seen with me throughout by Dr. F. Davies, of Gower Street. Success perfect.

CASE 79.—A lady, æt. 64. Uric-acid stone, rather small. Removed in two sittings, December, 1866. Seen with Dr. Owen Rees. Success perfect.

CASE 80.—A gentleman, æt. 80. Uric-acid stone, full medium size. Four sittings, January, 1867. Notwithstanding his age he appeared to be a hale, strong man. After the second sitting severe cystitis came on, and he sank rapidly from exhaustion. Seen with Mr. Clover.

CASE 81.—T. G., æt. 70. University College Hospital. Mixed urates and phosphates. Five sittings, January, 1867. Discharged free from stone, but with much trouble resulting from enlarged prostate and irritable bladder.

CASE 82.—A gentleman, æt. 69. Large phosphatic stone. Six sittings, spring, 1867. Much relieved, but a good deal of irritation of bladder continues. A similar calculus was crushed for him six years ago, and he has never been free from phosphatic deposit since. Seen in consultation with Dr. O. Rees.

CASE 83.—A gentleman, æt. 61. Uric-acid stone, small medium size. Four sittings, spring, 1867. Sent to me by Dr. Seegen, of Carlsbad. Success perfect.

CASE 84.—A gentleman, æt. 63. Three or four smallish uric-acid stones. Five sittings, spring, 1867. Seen throughout by Mr. John Foster, of Upper Wimpole Street. Success perfect.

CASE 85.—A gentleman, æt. 57. Very large uric-acid calculus. Ten sittings, spring, 1867. Seen with Mr. R. Lamb, of Barnsbury. Success perfect.

CASE 86.—Dr. C—, æt. 71. Medium size, phosphatic. Seven sittings, April and May, 1867. Success perfect.

CASE 87.—A gentleman, æt. 59. Medium-sized uric-acid. Two sittings, April, 1867. Pyæmia and death. He had two easy sittings within five days, without a bad symptom. Two days after, fever and swelling on right side of neck. In two days more breathing was difficult; next day pain in the abdomen; on the following day he died. An extremely large abscess was found deeply seated at the base of the neck, the result of pyæmia, and others were commencing elsewhere. Seen with Mr. Marshall, of Bedford Square.

CASE 88.—A gentleman, æt. 77. Two or three small uric-acid stones. Six sittings, April and May, 1867. Seen with Mr. Newton, of Upper Wimpole Street. Success perfect.

CASE 89.—A lady, æt. 42. A large phosphatic stone. Two sittings, May, 1867. With Dr. Meadows, of London. Success perfect.

CASE 90.—A gentleman, æt. 64. Medium-sized uric-acid. Five sittings, May and June, 1867. Seen by Dr. Gibson, of Dundee. Success perfect.

CASE 91.—A gentleman, æt. 42. Small phosphatic. Two sittings, May, 1867. Operation for stricture at the same. Mr. Clover gave chloroform. Success perfect.

CASE 92.—A gentleman, æt. 66. Small uric-acid. One sitting, May, 1867. Seen by Dr. Allen. Success perfect.

CASE 93.—A gentleman, æt. 35. Small phosphatic. Two sittings, June, 1867. Seen with Mr. Priece, of Stamford Hill. Success perfect.

CASE 94.—A gentleman, æt. 61. Large uric-acid. Eight sittings, June and July, 1867. Seen by Dr. Heslop, of Birmingham. Success perfect.

CASE 95.—A gentleman, æt. 71. Numerous small uric-acid calculi, perhaps forty. Three sittings, July, 1867. Seen by Dr. Painter. Much relieved.

CASE 96.—A gentleman, æt. 81. Large cystic oxide. Nine sittings, July and August, 1867. This case has been seen by several of my professional brethren, the extreme rarity of the formation rendering it one of great interest. The success was perfect, and the gentleman is enjoying excellent health at the present time (1870).

CASE 97.—A gentleman, æt. 67. Rather small uric-acid. Four sittings, July, 1867. Success perfect.

CASE 98.—A gentleman, æt. 65. Two uric-acid stones. Six sittings, October, 1867. Sent by Dr. Thomas Keith, of Edinburgh. Success perfect.

CASE 99.—A gentleman, æt. 71. Small uric-acid. Four sittings, October, 1867. Mr. Clover gave chloroform. Success perfect.

CASE 100.—A gentleman, æt. 59. Three or four uric-acid

stones, small. Six sittings, August, 1867. Seen by Dr. John Murray. Success perfect.

CASE 101.—A gentleman, æt. 57. Medium-sized calculus, mixed phosphates and urates. Six or seven sittings, autumn, 1867. Relieved.

CASE 102.—A gentleman, æt. 60. Numerous rather small uric-acid calculi. Ten sittings, November and December, 1867. Seen by Dr. Nash, of Notting Hill. Success perfect.

CASE 103.—A gentleman, æt. 41. Small uric-acid. Three sittings, November, 1867. Mr. C. Heath was present at the first sitting. Success perfect.

CASE 104.—A gentleman, æt. 47. Large uric-acid. Nine sittings, December, 1867. Seen by Mr. Pritchard, of Retford. Success perfect.

CASE 105.—J. S—, æt. 55. University College Hospital. Mixed calculus, medium size. Five sittings, January, 1868. Success perfect.

CASE 106.—S. R—, æt. 50. University College Hospital. Rather small uric-acid. Six sittings, January and February, 1868. Success perfect.

CASE 107.—G. S—, æt. 51. University College Hospital. Large uric-acid. Nine sittings, February and March, 1868. Success perfect.

CASE 108.—E. B—, æt. 55. University College Hospital. Two medium size uric-acid. Eight sittings, January and February, 1868. Success perfect.

CASE 109.—A gentleman, æt. 68. Large uric-acid stone. This gentleman came from Paris, and was one of the most nervous and susceptible patients that I ever had to treat. I

should have preferred to do lithotomy, but he would not listen to the proposal. I consented to crush, but towards the conclusion of the case, when nearly all the stone was removed, he sank from fever and exhaustion.

CASE 110.—A gentleman, *æt.* 58. Several small uric-acid calculi. Five sittings, February, 1868. He was the subject of stricture and also of diabetes. The calculi were successfully removed by means of a small lithotrite constructed for the purpose. Dr. Ringer gave chloroform.

CASE 111.—A gentleman, *æt.* 76. Two uric-acid stones. Eight sittings, February and March, 1868. Sir Thomas Watson saw this case. Success perfect.

CASE 112.—A gentleman, *æt.* 76. Rather small uric-acid stone. Four sittings, April, 1868. Success perfect.

CASE 113.—J. K—, *æt.* 35. University College Hospital. Rather small uric-acid. Three sittings, April, 1868. Success perfect.

CASE 114.—S. C—, *æt.* 58. University College Hospital. Medium-sized uric-acid. Five sittings, April and May, 1868. After the operation was finished, and he was awaiting only the final search for a last fragment, he caught cold, and had sore throat followed by *œdema glottidis*, for which laryngotomy was performed. He apparently recovered in a week's time, and the tube was removed. Ten days after this the *œdema* reappeared. The wound was reopened and the tube introduced; but he gradually sank in three or four days. The post-mortem examination showed the bladder to be perfectly healthy, and one tiny piece of *débris* only remained. This death cannot therefore be reckoned to lithotrity.

CASE 115.—A gentleman, *æt.* 49. Medium-sized uric-acid. Five sittings, May, 1868. Dr. Keith, of Aberdeen, was present at one sitting. Success perfect. This case is the

same as No. 8. He had no symptoms for three years. A new uric-acid stone has existed, according to symptoms, about twelve months.

CASE 116.—A gentleman, æt. 62. Medium-sized uric-acid stone. Five sittings, May, 1868. Dr. Keith, of Aberdeen, present at one of the sittings. Success perfect.

CASE 117.—A gentleman, æt. 65. Two rather large uric-acid stones. Thirteen sittings, June and July, 1868. Dr. Ringer gave chloroform. Success perfect.

CASE 118.—A gentleman, æt. 62. Several small uric-acid stones. Six sittings, June, 1868. Seen by Dr. Pakeman, of Ware. Success perfect.

CASE 119.—A gentleman, æt. 58. Medium-sized uric-acid. Five sittings, May and June, 1868. Seen by Mr. R. Phillips. Success perfect.

CASE 120.—A gentleman, æt. 60. Small oxalate-of-lime. One sitting, May, 1868. Seen with Mr. Aikin. Success perfect.

CASE 121.—A gentleman, æt. 59. Mixed uric-acid and phosphates. Five sittings, June and July, 1868. Seen by Mr. Aikin. Success perfect.

CASE 122.—A gentleman, æt. 71. A phosphatic stone, medium size. Four sittings, summer, 1868. The same patient as No. 82, for whom I crushed a stone two years before. He is liable to the formation of small phosphatic masses from time to time, which have to be removed, although otherwise now in good health (1870).

CASE 123.—A gentleman, æt. 73. Uric-acid, rather small size. Three sittings, April, 1868. Same case as No. 40. He had perfect freedom from all symptoms until about three

months ago, when their reappearance led me to sound him, and I found a new formation, which has been removed with perfect success.

CASE 124.—A gentleman, æt. 70. Three uric-acid stones, rather small. Six sittings, July, 1868. Seen by Dr. Gavin Milroy. Success perfect.

CASE 125.—Dr. P—, æt. 65. Uric-acid, rather small. Three sittings, July, 1868. Success perfect.

CASE 126.—G. B—, æt. 70. University College Hospital. Full medium-sized uric-acid, July, 1868. Two days after first crushing, much *débris* having been passed, he had a severe rigor. Next day complete suppression of urine for thirty hours. Urine then reappeared and was perfectly clear. On the next day rigors again, and two days after he died; the urine having continued perfectly clear up to the last. At the post-mortem examination the bladder was found free from any sign of inflammation, rather more than half the calculus in one piece was found there, the rest having been passed. One of the kidneys was healthy, the other showed marks of recent severe inflammation. No sign of disease elsewhere. I assume that this man rapidly succumbed to an acute attack of nephritis of one side. It is a remarkable circumstance, but not without parallel in my experience, that this state of the kidney should occur after an operation on the bladder, without any inflammation of that organ, the urine being clear to the last.

CASE 127.—A gentleman, æt. 72. Large uric-acid stone. I decided to perform lithotritry in this case, although I now believe lithotomy would have been preferable. The size of the calculus was considered to be just within the reach of the crushing operation; a size for which it is impossible to say decisively beforehand which of the two operations was preferable. Under these circumstances the patient's strongly expressed wishes decided the question. During October I

crushed seven times, the patient suffered severely in passing débris. At the end of the month he had a severe attack of suppression. The urine was clear, and I have no doubt that the pathological condition very much resembled that of the preceding case. He greatly improved, so that in November I crushed again, having disposed of nearly all the stone. He gradually sank and died a few days after. At the post-mortem examination the right kidney was found to be the subject of well-marked fatty degeneration, the left showed marks of recent inflammation, and contained an abscess. Two or three small fragments were found in the bladder. He had been under the care of Dr. Bayntun, of Bath.

CASE 128.—A gentleman, æt. 58. Uric-acid stone. Four sittings, October, 1868. Seen with Mr. Price, of Dublin. Success perfect.

CASE 129.—A gentleman, æt. 52. Uric-acid. Small medium. Four sittings, October, 1868. Seen with Mr. Newnham, of Wolverhampton. Success perfect.

CASE 130.—J. L—, æt. 63. University College Hospital. Uric-acid. Small medium. Seven sittings, October, 1868. The stone was successfully removed. A good deal of irritation remained, but this gradually subsided.

CASE 131.—A gentleman, æt. 49. Rather large mixed urates and phosphate. Nine sittings, October and November, 1868. Seen with Dr. Macaldin, of Islington. Success perfect.

CASE 132.—J. H—, æt. 63. University College Hospital. Uric-acid. Small medium-sized. Four sittings, October, 1868. Success perfect. Same case as No. 20, crushed four years before. Had immunity from symptoms three years; then formed a new uric-acid stone, of which he has had symptoms during the past year.

CASE 133.—W. W—, æt. 65. University College Hospital. A large uric-acid stone. After ten sittings, during the months of October and November, 1868, by which the greater part of the stone was removed, he had much fever and cystitis. During the next fortnight he gradually sank. At the post-mortem the bladder showed marks of chronic inflammation. One kidney was tolerably healthy, the other was largely diseased, with deposits of pus in the pelvis and along the ureter to the kidney. The patient was feeble at first, or I should have performed lithotomy, which, after all, might have been the safer proceeding for a stone of this size.

CASE 134.—A gentleman, æt. 61. Phosphatic stone, small medium size. Three sittings, October, 1868. Successful. This patient has passed all his urine by catheter for several months, and is the same as No. 102. He has a tendency to produce phosphatic matter in the bladder, and it is occasionally removed. The tendency is gradually diminishing, and he is in good health (1870).

CASE 135.—A gentleman, æt. 64. Several rather small uric-acid stones. Six sittings, October and November, 1868. Relieved subsequently, that is, five months afterwards; two small calculi removed by lithotomy with perfect success. Seen by Sir William Fergusson and others.

CASE 136.—A gentleman, æt. 51. Large uric-acid. Ten sittings, October and November, 1868. Seen with Dr. Langmore. Success perfect.

CASE 137.—A gentleman, æt. 73. Several rather small uric-acid stones. Eight sittings, October and November, 1868. Seen with Mr. Garlick, of Bloomsbury. Success perfect.

CASE 138.—A gentleman, æt. 68. Very feeble, requiring constant catheterism. Stone small medium. Mixed urates

and oxalates. Five sittings, November, 1868. Seen with Mr. Barrett, of Welshpool. He made a good recovery and returned to the country, having learned to pass the catheter for himself. Subsequently he had severe fever, and shortly after died.

CASE 139.—A gentleman, æt. 59. Rather small uric-acid stone. Three sittings, December, 1868. A patient of Dr. Dansey, of Devonport. Success perfect.

CASE 140.—T. R—, æt. 29. University College Hospital. A large phosphatic stone; advanced disease of kidneys. This patient entered the hospital in a low condition of health. I dared not submit him to the knife, and resolved to offer him his only chance of temporary relief, by lithotripsy. His case much resembled that of No. 31, in which I successfully relieved a patient with long-standing Bright's disease, of a large phosphatic stone, and who had nearly twelve months of comfortable existence afterwards. I made two small crushings in the end of November, 1868, and he passed some débris. But his condition did not encourage me to proceed, and I did not repeat the attempt. He had a large amount of albumen in the urine, and gradually sank in two or three weeks. At the post-mortem there were well-marked signs of chronic disease of one kidney, with abscess, chronic cystitis, and two large portions of phosphate of lime calculus in the bladder. The death must be attributed to the renal affection.

CASE 141.—A Turkish gentleman, from Constantinople, æt. 48. A medium-sized uric-acid stone. Five sittings, January and February, 1869. Seen with Mr. J. G. Forbes, of Hyde Park. Success perfect.

CASE 142.—A gentleman, æt. 67. Small medium uric-acid. Five sittings, February, 1869. Seen by Dr. M'Cleod, of Glasgow. Success perfect.

CASE 143 —A gentleman, æt. 32. Two small uric-acid

stones. Three sittings, October, 1868. Mr. Newnham, of Wolverhampton, was present at one sitting. Success perfect.

CASE 144.—A gentleman, æt. 79. Two or three hard phosphatic calculi. Nine sittings, February and March, 1869. Seen with Mr. Taylor, of Clapham. Success perfect.

CASE 145.—A gentleman, æt. 67. Three uric-acid calculi. Seven sittings, February, 1869. Seen in consultation with his medical attendant, Mr. Bostock, of Horsham. Success perfect.

CASE 146.—A gentleman, æt. 74. Uric-acid medium-size. Eight sittings, February and March, 1869. Conjointly under the care of Mr. Clover and myself. Success perfect.

CASE 147.—A gentleman, æt. 62. Uric-acid, of rather small medium size. Seen in consultation with Dr. R. Mc Donnell, of Dublin. I crushed the stone easily and rapidly on the 31st March, 1869. No frequency of micturition; a fever during the first three days. Appetite good and in all respects well. At the end of that time he had an attack of rigors; urine was retained, became bloody, required the catheter, and in spite of unremitting attention he gradually sank with increasing fever, and died on April 17. There seemed to be a peculiar want of reparative power in this patient. To the last he ate and drank well of solid food, like a healthy man, but notwithstanding gradually and steadily declined. There was no autopsy.

CASE 148.—A gentleman, æt. 73. Two mixed calculi of considerable size; urates and oxalate of lime. Fourteen sittings, spring, 1869. Seen conjointly with Dr. O. C. Maurice, of Reading. Success perfect.

CASE 149.—A gentleman, æt. 73. Small medium, mixed

urates and phosphates. Four sittings, April, 1869. Seen by Mr. Clover, who gave chloroform. Success perfect. The same patient as No. 99. He passed fresh uric-acid calculi, and had much phosphatic deposit with them. He has now been perfectly free for one year, and is quite well (1870).

CASE 150.—A gentleman, æt. 66. Large phosphatic stone. Seven sittings, spring, 1869. Dr. Ringer gave chloroform. Success perfect. The same patient as No. 117, a tendency to form phosphatic deposit after the first operation, which has since quite disappeared, and he is now perfectly well (1870).

CASE 151.—A gentleman, æt. 72. Rather small uric-acid stone. Five sittings, May, 1869. The general progress of this patient, seen in consultation with Mr. Macilwain, during the operation was satisfactory. He had a little fever, was occasionally rather low, and consequently each crushing was made as short as possible. He had an enormous prostate, which was in some degree disadvantageous for him. At the termination of the case some cerebral symptoms occurred, and I had the advantage of Dr. Owen Rees' opinion. No albuminuria was present. On the 1st of June symptoms of effusion on the brain suddenly appeared, and he died in a few hours. In this case it is impossible to consider the operation as the cause of death. That there had been cerebral changes of long standing little doubt could exist, and in so far as the operation weakened and disturbed the patient, its effect must have been prejudicial, but to this extent only can any casual relation be admitted.

CASE 152.—A gentleman, æt. 56. Rather small uric-acid stone. Two sittings, May, 1869. Seen conjointly with Dr. Connor, of Battersea. Success perfect.

CASE 153.—A gentleman, æt. 66. Several small uric-acid calculi, the aggregate being considerable. Seven sittings, June, 1869. Seen conjointly with Dr. Cribb, of Highbury. Success perfect.

CASE 154.—A gentleman, æt. 76. Uric-acid, small medium size. Four sittings, June, 1869. Seen conjointly with Sir William Fergusson. Success perfect.

CASE 155.—J. W—, æt. 50. University College Hospital. Mixed calculus, uric acid and phosphates, medium size. Four sittings, summer, 1869. Success perfect.

CASE 156.—A gentleman, æt. 57. Rather small phosphates. Two sittings, summer, 1869. I crushed an oxalate-of-lime calculus for this gentleman in 1864, with the late Mr. Ray, of Dulwich (case No. 24). There had been no intermediate formation. Success perfect.

CASE 157.—R. H. W—, æt. 26. University College Hospital. A man in the third stage of phthisis, with large cavities, was transferred from a medical ward to one of mine in June, 1869, with severe symptoms of stone. I found a small calculus, mixed oxalate-of-lime and uric acid, which I crushed in two sittings. He was sent back, free from his urinary troubles, to the physician's ward, where I believe he ultimately died of phthisis.

CASE 158.—A gentleman, æt. 55. Uric-acid stone of medium size. Six sittings, July, 1869. Seen conjointly with Sir William Watson, Dr. Hassall, and others. Nothing apparently could be more promising than the aspect, temperament, and condition of this patient at the commencement. The first two or three sittings were followed by slight and nauseant feverish attacks, but the urine gradually became charged with much blood and mucus, and this to an extent not easily to be accounted for. This condition seemed to be due to the presence of numerous sharp fragments, at the same time débris did not pass well by the natural efforts. Soon the patient became unable to pass more than a small quantity of urine by his own efforts, and catheterism several times a day became necessary. Meantime the patient, who took nourishment well, and was to a remarkable extent in

stamina and disposition all that his surgeon could desire, gradually declined, and the local condition steadily got worse. The question arose whether the bladder should be at once emptied by lithotomy, or by crushing and with the use of Clover's instrument; and on this point I had the advantage of the opinion of my friend, Sir William Fergusson. We decided on the latter proceeding, and eventually the whole of the stone was removed in the middle of July. After this the patient continued very much in the same state, with a quick pulse, hectic flush, and using his own catheter, which he had learned to pass easily several times in the twenty-four hours. At the end of the month he appeared to improve, and took drives in the open air, going to his country house on the 30th July. I saw him there next day; he took a little walking exercise, was cheerful, and looked better, but the quick pulse existed, and frequent catheterism was necessary, the urine secreted being remarkably large in quantity, but free from constitutional albumen or sugar. Day by day he became more exhausted, and he sank gradually on August 11th. There was no autopsy, but I have no question of the existence of considerable suppurative pyelitis on one or both sides, and probably of chronic inflammation affecting the kidney itself.

CASE 159.—A Russian medical man, æt. 47. Uric-acid medium-size. Five sittings. This gentleman travelled from a remote part of Siberia, for the purpose of the operation, and returned perfectly well after not quite four weeks' residence in London. He was seen by several medical men here, who were interested in him as a brother practitioner.

CASE 160.—A gentleman, æt. 60, a judge in California, who came to me for the operation. Large uric-acid. Seven sittings, July and August. Mr. Clover gave chloroform. This and the two previous patients were seen also by Dr. Stilling, of Hesse Cassel. Success perfect.

CASE 161.—A gentleman, æt. 62. Uric-acid small

medium. A German gentleman of extremely irritable temperament, July, 1869. After the second crushing, he had a severe rigor, and soon after pyæmia with affection of the joints, and died in ten days. Seen with Dr. Bäumlér, of Finsbury Place.

CASE 162.—A gentleman, æt. 61. Uric-acid medium-size. Six sittings, October, 1869. He ultimately made a good recovery, rendered slow by severe orchitis. Sent to me by Dr. Savile, of East Retford.

CASE 163.—A gentleman, æt. 52. Uric-acid, rather small. Five sittings, autumn, 1869. Success perfect.

CASE 164.—A gentleman, æt. 61. Uric-acid, small medium. Four sittings, autumn, 1869. Seen with Mr. Ryott, of Newbury, who also saw the previous patient.

CASE 165.—W. B—, æt. 65. University College Hospital. Large uric-acid stone. Nine sittings, October and November, 1869. Sent to me by Dr. Druitt, of Wimborne. Discharged cured, end of November.

CASE 166.—W. L—, æt. 57. University College Hospital. Uric-acid, rather large. Nine sittings, October and November, 1869. Discharged convalescent in December, but with some irritation of the bladder. Returned to me in March, 1870, with a small phosphatic formation, which was rapidly removed. He is recovering by the daily use of injections into the bladder. Sent to me by Mr. Jalland, of Horncastle.

CASE 167.—J. M—, æt. 69. University College Hospital. Urate of soda calculus, large. Seven sittings, October and November, 1869. Sent to me by Dr. Canham, of Ramsgate. Success perfect.

CASE 168.—W. W—, æt. 65. University College

Hospital. Uric-acid, large medium. Eight sittings. Much fever and debility; discharged relieved end of November, but in a very weak condition.

CASE 169.—A gentleman, æt. 48. A medical man from the country. Urate of soda, medium size. Four sittings, November, 1869. The urgencies of practice compelled this patient to leave immediately after the last sitting, but successfully relieved of his calculus and with rapidly improving symptoms.

CASE 170.—A gentleman, æt. 73. Rather small phosphatic calculus, crushed at one sitting, December, 1869. Mr. Clover gave chloroform. Success perfect.

CASE 171.—A gentleman, æt. 75. Urate of soda. Calculus of large medium size. Removed in five large crushings under chloroform, December, 1869. Seen conjointly with Dr. Pavy. Success perfect.

CASE 172.—A gentleman, æt. 59. A medical man from Ireland. Uric-acid, large medium. Six sittings, November and December, 1869. He was much relieved, but his professional duties removed him from my care much sooner than was desirable.

CASE 173.—A gentleman, æt. 40. A medical man from the country. Uric-acid, small. Two sittings, November, 1869. Success perfect.

CASE 174.—A gentleman, æt. 64. Mixed calculus, urates, and phosphates. One sitting, greatly relieved; apparently cured, but patient declined further examination. Mr. Clover gave chloroform, summer, 1869.

CASE 175.—A gentleman, æt. 35. Large calculus of pure phosphate of lime. Patient had formerly suffered from spinal disease and recovered under the care of Mr. Brodhurst. Four sittings, December, 1869. Success perfect.

CASE 176.—A gentleman, æt. 69. Uric acid, medium size. Five sittings, December, 1869. In consultation with Dr. Price Jones, of Surbiton. Success perfect.

CASE 177.—A gentleman, æt. 33. From Brussels. Small mixed calculus of peculiar formation, the basis being the triple phosphate with organic matter, mostly fat. Two sittings, December, 1869. There is a tendency at present for this material to reappear; but it is quite controlled by daily washing out the bladder. August, 1870, quite well.

CASE 178.—A gentleman, æt. 55. Uric-acid stone, medium size. Four sittings, January, 1870. Success perfect.

CASE 179.—A gentleman, æt. 73. Uric-acid, small medium size. Five sittings, January and February, 1870. Seen conjointly with Dr. Smith, of Little Hadham, Herts. Success perfect.

CASE 180.—A. R—, æt. 22. University College Hospital. Small oxalate-of-lime calculus. Two sittings, January, 1870. Success perfect.

CASE 181.—A gentleman, æt. 49. Uric-acid, small medium size. Five sittings, February, 1870. Seen conjointly with Mr. J. Storey, of London. Success perfect.

CASE 182.—A clergyman, æt. 65. University College Hospital. Two uric-acid calculi of medium size. Eight sittings, February and March, 1870. Treatment much delayed by extremely severe attacks of gout. Successful.

CASE 183.—A gentleman, æt. 74. Small uric-acid stone. Two sittings, January, 1870. Success perfect. I crushed a large stone for this gentleman a year ago. He was perfectly well until a fortnight ago, when he had violent vomiting and pain in the back, announcing the descent of a fresh uric-acid calculus, about the size of a bean. Success perfect.

CASE 184.—W. H—, æt. 57. University College Hospital.
Uric-acid stone of medium size. Five sittings, spring, 1870.
Success perfect.