Introduction to the catalogue of the collections of calculi of the bladder upwards of one thousand in number (besides foreign bodies) removed by operation.

INTRODUCTION TO THE CATALOGUE

OF

THE COLLECTION

OF

CALCULI OF THE BLADDER

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OF

THE COLLECTION

OF

CALCULI OF THE BLADDER

UPWARDS OF ONE THOUSAND IN NUMBER

(BESIDES FOREIGN BODIES)

REMOVED BY OPERATION

BY

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THE COLLECTION WAS PRESENTED IN 1892 TO THE HUNTERIAN MUSEUM OF THE ROYAL COLLEGE OF SURGEONS IN LONDON, WHERE IT IS NOW DEPOSITED TOGETHER WITH COPIES OF THE CATALOGUE AND INTRODUCTION

LONDON

J. & A. CHURCHILL

11 NEW BURLINGTON STREET

1893

PREFACE

In the summer of 1892, I offered to the Royal College of Surgeons, in Lincoln's Inn Fields, my Cabinet of Calculi, containing all these as well as foreign bodies which I have myself removed by operation from the living subject during my career in London—the whole and no other—together with the history of each patient, taken at the time from the original note-books now in my possession.

The College did me the honour of accepting the Cabinet, and of giving it a prominent position in the Hunterian Museum, an unrivalled collection which is not only the most valuable possession of that venerable and renowned corporation, but is in itself a striking witness to the achievements of British Surgery and Physiology during the nineteenth century.

I have edited, with considerable pains and labour, a Catalogue of the contents of the Cabinet, and copies of this will be found in the Museum. Moreover, I have written an Introduction thereto, which embodies briefly all the statistical as well as much other information, obtained from the experience gained in my practice, embracing as

it does 1,013 operations for the removal of calculi and foreign bodies.

I have ventured to think that the publication of this Introduction as a small volume apart may furnish an acceptable *résumé* of practical work during about thirty-five years, and I have endeavoured to make it absolutely faithful in regard of all the facts which have come under my observation in connection with my personal experience in operating for Stone in the Bladder.

I presented in 1890 to the Royal Medico-Chirurgical Society an analysis of 964 cases. This has now been carried further in point of numbers; the whole has been rigidly examined and revised to render it, if possible, more exact by careful reference to original notes and inquiries relating to after-history, &c. These facts are embodied in the Catalogue, and a small portion, embracing twenty consecutive average cases, is presented at the beginning of this volume as a fair specimen of the system adopted for setting forth the facts in ordinary cases. When cases of exceptional interest have occurred, the records are much fuller in detail.

LONDON: 35 WIMPOLE STREET,
May 1893.

THE

INTRODUCTION

TO THE

CATALOGUE OF CALCULI

NOW AT THE ROYAL COLLEGE OF SURGEONS,
AND REPRINTED THEREFROM, BY ITSELF

THIS volume contains, arranged in a tabular form, a brief account of every case, without exception, of Stone in the Bladder which has been operated on by myself, from the first in 1857, to the present date, April 1893.

The name of each patient, with his or her age, the nature of the operation, the year in which it was performed, the nature and number of the calculi present, and the after-history so far as I have been able to ascertain it, are recorded, each particular in a separate column.

[I offer here an abstract from the Catalogue which accompanies the Cabinet of Calculi at the College of Surgeons, to illustrate these remarks, and those which follow.]

N°	Date	Age	Lithotrity—Name	Lithotomy—Name	Nature and Number of Calculi
50	1865	60	E. T.		Phosphatic
51	„	75	Capt. M.		Phosphatic Ditto
52	„	61	T. O.		Very large, uric acid
53	„	59	H. C.		Phosphatic
54	„	65	J. G.		Uric acid
55	„	53	A. M.		Uric acid Ditto
56	„	62	G. B. (Hospital)		Phosphatic
57	„	71	R. F.		Uric acid: three
58	„	28	E. B. (Hospital)		Phosphatic
59	„	71		J. P. (Hospital)	Uric acid, and much phosphate

If Death followed	Results as to Recovery &c.
	Successful.—In three sittings. *April* 11, 1865.—I used Mr. Clover's exhausting bottle for the second time only, and found it very useful to remove the débris (the action of this instrument is more painful than that of the lithotrite; the patient not taking chloroform). Almost all his urine is passed by catheter from atony of the bladder. After a year he had again symptoms, and I removed a second stone in 1866. No return afterwards. He continued an active life until his death in 1875. I record TWO operations for this patient
	Successful.—Several sittings, aided by the use of Clover's bottle, he being the first patient for whom I tried it, the date being April 8, 1865. A year and a half afterwards I removed another rather large stone; after this I occasionally removed a phosphatic concretion, but he had excellent health, and died at eighty of apoplexy. He was attended throughout by my friend Mr. C. A. Aikin. I record TWO operations for this patient
	Successful.—It was a large stone for lithotrity, and required ten sittings, without chloroform. Mr. B. Hill attended this case with me, and it was seen by Dr. A. Simpson, of Glasgow, and also by Dr. Van Buren, of New York. I used Clover's bottle to remove some of the débris on one occasion, but it gave much pain
	Successful.—He was the subject of advanced albuminuria; and I operated to relieve his sufferings. The stone was large and I used Clover's bottle in this case, also to aid in removing débris. He died a little less than a year after the operation, much relieved by the removal of the stone. I saw him in consultation with Dr. Sharpe, of Norwood; and Dr. Van Buren was present at a sitting
	Successful.—From Naval Hospital, Plymouth. I heard from him six months after that he was well, but never received any further communications. Also seen by Dr. Van Buren, and by Dr. A. Simpson, of Glasgow
	Successful.—In eight sittings, as the stone was rather large; no chloroform was taken. Sent to me by Mr. Veal, Grimsby, and seen by Dr. Van Buren. Had excellent health, and no return for six years; then slight symptoms, which increased during two years He came to me with a fresh uric acid calculus in 1873, and was again successfully treated by lithotrity. Living and well now, 1879. I record TWO operations for this patient
	I crushed twice, and could find no more calculus; the bladder was evidently much thickened and diseased, and the symptoms were not much relieved. He went home to Framlingham, Suffolk, whence his attendant, Mr. Jeaffreson, wrote me that he passed two very small fragments after his journey. Some time afterwards he died of peritonitis. Autopsy: Bladder involved in a mass of cancer on one side, and sacculated; no fragments of calculus remained. The death here was clearly due not to the lithotrity, but to the cancer
	Not very successful at first; but much relieved. The prostate was very large, and I could seize nothing except by using the lithotrite with reversed blades. Clover then gave him chloroform; I used his bottle to remove the débris, showing it to Dr. Van Buren who, as well as Mr. M. B. Hill, was present. He was troubled with chronic cystitis, and six months afterwards I removed a small phosphatic calculus, not reckoned as another operation. Subsequently he was free from trouble, and I heard from him as being well in 1869. Seen in consultation with Dr. A. Simpson, of Glasgow
	Successful.—In six long sittings. He had been in the Birmingham Hospital under Mr. Gamgee, who advised lithotomy, which the man refused, and left. I advised the same when to came to me, but on his refusing I consented to crush, and he made a rapid and sound recovery
	Medio-bilateral lithotomy: successful. He had stricture, and I could not introduce a lithotrite, so I cut him in the manner named. The stone being large, I broke it in the bladder before removing. Fragments weighed 3¼ ounces; uric acid. Recovery rather slow, but ultimately he got well

No	Date	Age	Lithotrity—Name	Lithotomy—Name	Nature and Number of Calculi
60	1865	62	R. B.		Uric acid
61	„	74	Wm. M.		Uric acid
62	„	70	G. M.		Large uric acid Ditto Ditto Urate and phosphate
63	„	62	J. R.		Uric acid
64	„	61	Baron de T.		Uric acid
65	„	73		J. K.	Large oxalate of lime
66	„	39	F. B. (Hospital)		Phosphatic (bony nucleus)
67	„	69	P. B.		Mixed uric acid and phosphatic: two
68	„	47	J. D.		Phosphatic
69	„	65	C. F.		Uric acid

If Death followed	Results as to Recovery &c.
	Successful.—In three sittings, under chloroform; and had no return. Lived in good health and activity several years at his place, Castle Eden, Durham, and died in 1875
	Successful.—In four sittings, without chloroform. He had a very large prostate, which occasioned some difficulty to me at that time. He lived two and a half years afterwards. I saw him in consultation with Mr. C. King, of Highbury
	Successful.—The stone was large, hence Clover gave him chloroform, and I removed much débris with his apparatus. It required, nevertheless, nine sittings. But this patient produced more calculi than any man I ever knew, except one, a notable example, No. 204. After this operation he enjoyed complete freedom from symptoms up to 1867. Then they reappeared, and in 1868 I crushed a moderate-sized uric acid calculus, and he made a good recovery In 1870, a large collection of calculi, some as big as a pea, about one hundred; many washed out by Clover's apparatus In 1871, a mixed phosphatic calculus and urates, large. He lived to 1873, passing all his urine by catheter, and suffering much from vesical troubles, but without further calculus formation, dying at the age of 78. I record FOUR operations for this patient
	Relieved, after seven sittings, the last only under chloroform, in order to use Clover's apparatus; and he had no return of calculus, but had chronic cystitis some time. Seven years afterwards he came again, and was greatly relieved by learning to pass a catheter, as he was then unable to empty the bladder. Since then I have heard nothing more of him. Often seen by Mr. M. B. Hill
	Successful.—Was seen throughout in consultation with Dr. Greenhow
Death	Medio-bilateral operation. Mr. Erichsen held the staff. Stone weighed 2¾ ounces, a specimen of rough mulberry, and difficult to extract. He died, slowly exhausted, with no marked symptoms, on the twenty-third day after operation. He was brought to me by Mr. Morley, of Barton-on-Humber, who was present at the operation
	Successful.—In three sittings, without chloroform. The remarkable circumstance in this case was, that I found and extracted a piece of bone, the nucleus of the stone, on first crushing it. Then I learned that several years before he had undergone long and painful confinement with disease of the hip-joint and pelvis. Bone had been exfoliated externally, as several cicatrices witnessed, and no doubt a portion had also escaped into the bladder. Sent to me by Dr. West, Alford, Lincolnshire *July* 6, 1882.—Learned that he is well, and perfectly free from symptoms For a somewhat similar case, see No. 878, occurring in a lad aged 15, and treated by lithotomy
	Successful.—In seven sittings. Seen with Dr. Buchanan, of Glasgow, who was present at the first. At a subsequent sitting Clover gave him chloroform, and I removed much débris with his apparatus. The patient had been cut three years before, and two uric acid stones removed. He lived several years afterwards
	Successful.—In five sittings. No return two years afterwards when I saw him. Sent by Mr. Rhind, of Shipley, Yorkshire. Dr. Agnew, of New York, was present at one sitting
	Successful.—In seven sittings, one under chloroform, to use Clover's apparatus. Saw him quite well one year afterwards. Three years after I saw him again with some troubles due to chronic cystitis; there was no calculus whatever, but he did not empty the bladder on account of enlarged prostate, and learned to pass the catheter. Sent to me by Mr. Warwick, Southwell, Notts. Dr. Seegen, of Vienna and Carlsbad, was present at a sitting

In addition to these facts, the distinction between patients treated by me in University College Hospital, and those who belonged to my private practice, is indicated by the word 'Hospital' following the name of each patient in the former class. These ceased in 1874, when, compelled by the heavy claims of other professional work, I resigned my appointment there. When the word is absent, the patient consulted me in private. In all the latter cases, with very few exceptions, the name of the medical man who sent the patient, or who saw him with me, is appended. The exceptional cases are those of patients who had no other medical attendant than myself.

It is to be observed that the first column contains a series of numerals only, from 1 upwards; each of these numbers indicates a single patient, with all the particulars relating to him; and thus including not merely one operation, but occasionally more. The highest figure of the series on any page, therefore, represents the precise number of individuals operated on up to that date, and not the number of operations performed, which is considerably larger, inasmuch as a few patients have been operated on both by lithotomy and lithotrity, and several by lithotrity twice or three times; there are indeed in the entire series seven persons on each of whom four operations have been performed, a number which has in no instance been exceeded. Such patients have frequently had uric acid and phosphatic concretions removed weighing from five to fifteen grains or thereabouts, but these have never been reckoned by me as calculi.

The cases are divided into three separate classes.

Class I.—The first class contains cases of Calculus in

Male Adults only. It commences with the number 1, and ends with the number 857.

Class II.—The second class comprises cases of Calculus in Women, and also in Children of both Sexes. It commences with the number 860, and ends with the number 889. The number of patients operated on is therefore 887. But the total number of operations performed for stone by all methods is 1,007, as will be shown in detail in the tables given at pages 23 *et seq.*

Class III.—The third class contains only cases in which a Foreign Body recently introduced into the bladder, and not being the nucleus of any calculous product, has been removed by operation. There are six examples, which are numbered 1 to 6.

Respecting all these I may state that I possess full notes of every one, recorded at the time of its occurrence, on a system adopted at the outset, and never subsequently changed, from which the leading particulars briefly stated in this catalogue are taken. The name of the medical man who sent me the case, or who was present at the operation (for such there almost invariably was), is here given, as well as the after-history, often embodying observations extending over several years. Every fact named can be verified by evidence under my hand. I have adopted this plan as satisfactory at all events to myself, desiring before all things to make a clear exposition of my entire experience, having often in past time regretted the want of details relating to that of some skilled and practised operators who have left no numerical statements, and only imperfect records or 'general impressions' of the results they obtained. Whatever I offer here may be accepted as the outcome of my entire

work in this department of surgery. Not a single case has been omitted. My object has been to present here an accurate, although necessarily very brief study of the data obtained chiefly in relation to treatment and its consequences. And here let me be permitted to state respecting treatment at the outset, that I am not conscious of having entertained undue predilection for any particular methods, and have therefore selected them, according to my judgment, for the requirements of each individual patient. I may say, however, that after following the method of Civiale, of Paris, the celebrated inventor of lithotrity, I adopted it with confidence for all cases in which the stone was not unduly large.

The operations which I have employed are, Lithotomy by various methods, and Lithotrity; and for a few among the female cases, Dilatation and Extraction.

I. Lithotrity.—Regarding lithotrity, the first case was that of a girl, and it bears date of 1854. But it was not until a few years later that this series really commenced. At this time the sittings for a stone of moderate size were short and numerous, and generally without anæsthesia; the débris being permitted for the most part to issue by the natural act of micturition, assisted occasionally by washing out the bladder with a syringe through a large silver catheter. For the first five or six years I employed Civiale's instruments (which were much superior to those then used here), having learned to do so during two or three visits to him at Paris for the purpose, circumstances which led to a very friendly intercourse, terminated only by his death in 1867. Previously to that event, however, I had designed the first lithotrite with a cylindrical handle, an idea which Messrs. Weiss

and Son carried out for me ;[1] and Civiale himself during the last year or two of his life approved and employed my new instruments, made for him at his own request by that firm.

It was early in 1865 that Mr. Clover contrived his method of removing the débris produced by the lithotrite through the action of an exhausting indiarubber bottle and silver evacuating catheter. I used this apparatus for the first time in April 1865, for a patient (case No. 51) whom I saw with my friend Mr. C. A. Aikin, Hyde Park ; and I continued to do so more or less for about twelve or thirteen years, during which time it was modified and improved. As my experience increased, I employed it more freely than at first, and thus diminished materially the number of sittings before considered necessary. Hence the value of an anæsthetic became obvious, and I always advised it when the 'bottle' (or, as it was subsequently termed, the 'aspirator') was employed, since the action was more painful to the patient than that of the lithotrite. After 1872, I rarely operated without it, and therefore preferred the aid of chloroform, which was invariably administered for me by Clover. But previously to the last-named date I was in the habit, whenever severe cystitis appeared in a case undergoing lithotrity, of employing an anæsthetic at once, that I might empty the bladder at one sitting ; having learned by experience that the best way to treat the cystitis was to remove every fragment of calculus, accomplishing this chiefly by means of Clover's aspirator. This principle of procedure I strongly advocated in my lectures here. I also once made it the subject of clinical remarks after operating

[1] See letter from Messrs. Weiss & Son, *Lancet*, August 20th, 1864, p. 229.

for stone at Hôpital Neckar, in Paris (1876–7), at my friend Dr. Guyon's request, before a large number of students there. I contended that the plan of emptying the bladder at a final sitting, under these circumstances, constituted a great improvement on the method by baths, demulcents, rest and waiting for irritation to subside, much employed for cystitis during lithotrity here, and always abroad. But it did not occur to me that this practice would be advisable in every case of calculus, as was, soon after this, to become apparent.

In 1878, Professor Bigelow, of Harvard, U.S., made public his proposal to crush the entire calculus, whenever possible, at a single sitting; assuming that less injury was sustained by the bladder from prolonged manipulation, provided the whole stone was removed at once, than from inflammation caused by prolonged contact with numerous fragments left therein for several days, to await subsequent sittings. I was quite prepared to accept this principle, and testing it without delay soon recognised its importance and value. Since that time I have adopted it, with three or four exceptions only, for all those cases to which I considered lithotrity applicable; using, however, the same lithotrites as before, namely, those made on the model designed by myself, with the cylindrical handle &c. I have made various modifications which experience has suggested from time to time in the apparatus for removing débris, arriving finally at the aspirator which I have used during the last few years. Hence, having employed the same instruments for crushing, and the same system for removing the material crushed, since 1878, as before that date, I am unable to adopt a new name to denote the improvement which

Bigelow introduced. I have continued to perform the crushing operation, Lithotrity, the term given by its illustrious inventor, Civiale, whose sagacity and extraordinary perseverance established it, saving thousands from the knife—alone used before his time in every case—to distinguish it from Lithotomy; and I indicate the essential and important modification of Bigelow by speaking of Lithotrity 'at one sitting,' instead of several sittings, as before.

In connection with the specimens preserved here, it is necessary to point out that, in endeavouring to collect the calculous matter removed by Lithotrity of the early type, that is, by numerous sittings, it was never possible to obtain and preserve the whole of the débris. A certain quantity was always lost; the task of collecting having been necessarily confided in part to the nurses, not always sufficiently attentive to this portion of their duty. Among such, however, the specimens may be taken as representing about three-fourths of the calculus in each case. It is advisable, when the débris of a stone removed by Lithotrity is to be preserved, that it should be first dried, then weighed, and the result recorded. Since adopting the method by a single sitting, which renders the proceeding easy, this has been done in every instance. Accordingly, almost every case catalogued here, from No. 503 (1878) to the end of the series, has been thus weighed, and the amount reported in grains.

Each one of these calculi has been placed in a glass cell, marked by the number which in the Catalogue gives the history of the patient, particulars of the operation, description of the calculus, &c.; so that reference can be readily made from the specimens to the particulars, and

vice versâ. Thus, the first calculus requiring operation in any given case is, in the great majority of instances, not followed by another; and the specimen bears a single number. Of this condition, the first thirty cases of the Catalogue are examples, and the specimens are marked 1 to 30. But in cases where the operation was repeated for an entirely new formation, as for example in Case 510, the first specimen is marked with that number only, while the second is marked 510 *a*, and the third 510 *b*. In this instance the first was removed in 1879, the second in 1883, and the last in 1890. All three belong to the patient denoted by the number 510, and do not appear in any other place. Thus each number denotes an entire history, so far as it is known to myself.

There is a feature in the collection of which I have to say a few words. Although it contains many large calculi, including a few of remarkable size, there is a considerable proportion of small ones, when compared with most of the old existing collections, obtained only by Lithotomy, brought together as they were before the middle of the present century. When the knife was the only means available to remove the stone, few patients ventured to encounter the risk of operation until after some years of suffering; while the surgeon himself rarely recommended it until the stone had attained certain proportions. But as soon as the great superiority of Lithotrity, particularly for cases where the calculus is small, had become evident, the idea which dominated my practice and my teaching was the extreme importance of discovering the stone in the early stage; since the dangers incurred by the patient with a large stone, either from repeated sittings by Lithotrity, or from the knife, were thus to be avoided.

I lost no opportunity of seeking for the calculus when recently developed, and learned slowly, with surprise, how much more frequently it was to be found in the bladders of elderly men than I had been taught to expect. So far from the stone being more common in children than in adults, according to the universal belief at the period referred to, justified as it was by the records of hospital practice, I was soon in a position to affirm, and did so, that stone was more common among men of sixty years of age and upwards than at any other period of life. For let it be remembered that all existing records of practice, whether found in museums or reported by the operators themselves, from all sources previous to the middle of the present century, showed that half the total number of operations for calculus occurred in childhood and youth.[1] The truth nevertheless was, that a very large majority of calculous cases was then, as now, to be found in persons above fifty years of age; but the fact was then unknown; the calculi were simply overlooked, not being suspected to exist. And one obvious cause of the oversight is to be found in the truth of the axiom, that the early symptoms in elderly subjects are extremely slight—a rule with only a few exceptions—contrasting strongly with the marked and painful symptoms rarely absent in the young.

Thus the slight irritation, scarcely felt unless considerable exercise is taken, was naturally attributed in elderly patients to commencing enlargement of the prostate, to undue acidity of the urine, to 'irritation consequent on gout,' &c. &c. Hence examination of the bladder for calculus had usually been deemed for such

[1] See Appendix, page 39.

slight symptoms unnecessary. But further, at the period referred to, when such cases were examined by an instrument, as sometimes happened, it was obvious, on observing the method usually followed, that the sounds employed, as well as the method of using them, were only adapted to find large calculi; and that a formation about the size of a bean or an almond could only be struck by the merest chance, and had indeed never been seriously sought for or thought of. Such can only be detected with certainty by light and delicate handling with the small curved or beaked sound, at that time unknown, but of which I availed myself some time after its introduction by Mercier of Paris. Yet it is manifest that no greater boon could be conferred on the calculous patient than that of finding his stone while it is still small; and I venture to regard the keen pursuit of this object, and its realisation in two or three hundred cases of elderly men, as one of the most important results illustrated by this collection. Of small uric acid calculi—including a few oxalic acid, but not reckoning phosphatic calculi, so frequent in age—that is, weighing from twenty grains to a drachm, occurring among men of advancing age, say from fifty-five to seventy-five years, there are no less than two hundred examples. The fact that a very large number of patients could thus be freed from calculus almost without risk, was one of the highest importance. But there was another result not less valuable which subsequently appeared, namely, that such patients could almost invariably be prevented from forming fresh calculus by adopting dietetic precautions at an early period, before the morbid tendency had become too strongly marked, and this has, I confess, been to me a source of extreme

satisfaction. I possess a great number of subsequent records concerning patients on whom I have operated once for uric acid calculus, who, having followed instructions in respect of diet and regimen, have had no return. While, on the other hand, the instances in which a fresh acid formation has appeared have taken place in those who have not materially changed their previous habits of life, or in whom those habits had long been confirmed, or the tendency had been intensified by marked hereditary influence.

But at an earlier stage still, calculous matter may not infrequently be detected and removed, while existing only in the form of 'gravel' or 'concretion.' We may often remove these small bodies by the aspirator only, particularly those of uric acid, weighing two or three grains or even larger; or we may occasionally dispose of them by a single crushing of a lithotrite. In connection with this subject I may remark that it has long been customary to employ certain terms to describe these bodies according to their size and importance: the visible crystalline deposits as 'sand,' and the ovoid or irregularly shaped bodies, like grains of wheat, peas, or small beans, as 'gravel' and 'concretions.' The object being to convey general impressions respecting these less considerable formations, and to reserve the word 'stone' for bodies of greater size and importance. Nevertheless all these terms, including even the last named, are sometimes very loosely employed. No doubt it is difficult, perhaps impossible, to define precisely the limit of their meaning in regard of size and weight. But in order to conform as far as possible to the practice of our predecessors, I have invariably refused to recognise as 'stone,' the small bodies

described above, maintaining for them a well-defined class of 'gravel' and 'concretions'; and especially because the removal of small calculous bodies, now that a formidable operation by the knife is no longer necessary, is a matter of extremely small difficulty and gravity. Hence I have uniformly declined to enter, in this series of 'Stone in the Bladder,' any calculous body removed from adult patients (of whom alone I now speak) weighing less than about twenty grains. When a smaller one has been met with I have described it as 'gravel' or 'concretion.'[1] I know that the distinction is quite arbitrary, but I contend that any weight, whatever it may be, which is agreed to as marking the limit between 'stone' and 'gravel' must be equally an arbitrary one. Still, it is highly desirable that a distinction should be drawn, and, if possible, agreed to, or we may have the washing out of tiny bits of gravel of one or two grains represented and recorded as 'an operation for stone in the bladder,' even of an adult patient![2] Taking what I venture to believe may be regarded as a common-sense view of the question, I have adopted the twenty-grain limit for myself. Had I reckoned the removal of uric acid and oxalate of lime formations of the size just named, I should have very largely augmented my number of cases; and still more so had I thus regarded the phosphatic concretions which are so often crushed and removed from the bladder of prostatic patients who have long passed all their urine by catheter. Many

[1] *Thus some years ago I washed out from a patient's bladder some 500 minute uric acid formations, about the size of a pin's head. The total weight was* $2\frac{3}{4}$ *drachms. Smaller quantities I have frequently removed, of which examples are presented in the cabinet. But it never occurred to me to regard these as instances of 'stone in the bladder,' or to enter them as cases of operation.*

[2] This actually has taken place. See *British Medical Journal* (1887), vol. ii. p. 1376.

persons live, subject to this calculous complication, in tolerable comfort for ten or twelve years or more. Such an one after some months of freedom from pain gradually becomes the subject of calculous symptoms, often severe, due to the presence of a phosphatic concretion, weighing perhaps ten or fifteen grains, too large to wash out, but which a single introduction of the lithotrite suffices to remove. This proceeding may be performed sometimes once or twice a year, or even more frequently; and thus, for a single individual, the surgeon may have to repeat the process many times. Had I included all these examples in my series of calculi, the total number would have reached *at least three hundred cases* more than it now does.

In relation to the calculi of infants and young children, any small body of a grain or two in weight and upwards requires a skilfully conducted operation, the employment of slender lithotrites, and aspiration through small and delicate tubes; the product for such small patients, of course, ranking as 'a stone.' Deposits of uric acid in minute crystals are common also among children, and are in them, as in the adult, described as 'sand.'

II. Lithotomy.—Regarding the series of operations by lithotomy, I commenced with the ordinary lateral operation for the largest calculi, employing the median for those which about thirty years ago were regarded by many as just outside the scope of lithotrity. Subsequently I tried the medio-bilateral of Civiale, and the bilateral of Dupuytren for the first named, not acquiring any marked preference for any one of these methods. It so happened that during the first fifteen or twenty years of my experience no calculus of very unusual size presented itself. I

met with several, weighing from one and a half to three ounces, and usually removed them by the lateral operation. The suprapubic operation I performed for the first time in 1864, not for a calculus, but for a foreign body in the bladder of a young woman, in University College Hospital. It was a hair-pin lying across the bladder, tightly impacted in this position, and defying any fair attempt to remove it by the urethra. The next occasion was in 1877, for a gentleman whose legs were immovable and extended, as the result of spinal disease. The position for lateral lithotomy being impossible, I performed the suprapubic in this, as in the preceding case, on a staff (the method adopted at that time), removing a large uric acid calculus. (Case No. 456 in Catalogue.)

But in the year 1883 I became acquainted with the modification of this operation made by Petersen of Kiel; and from my experience of its results in the hands of Guyon of Paris, and others, I advocated its merits in my lectures at the Royal College of Surgeons in 1884. Immediately afterwards a case of large calculus presented itself, and I performed the new suprapubic operation for the first time in this country, in July of that year (see Case 690). Several other examples soon came under my notice, one of pure uric acid reaching the weight of 14 ounces;[1] and this method, which I have employed seventeen times for stone patients, yielded me the results which surpassed any before obtained from the lateral operation, considering the size of the calculi removed. In connection with the subject it may be permissible to add here that I have also performed the same operation eleven times for the purpose of removing tumours of the bladder

[1] The patient is still living and in good health, 1893. See Case 717.

(none of which cases of course appear here), with only one death following the proceeding, viz. from septicæmia.

The following tables summarise the leading facts relating to the sex, age, nature of calculus, operations employed, their results, etc., in regard of the patients who have come under my care, both in hospital and in private practice, from the first case down to March 1893.

Total of all Cases of Stone in the Bladder operated on in Hospital and in Private Practice between 1857 *and March* 1893

Total number of cases of operation . . .	1,007	Male Adults . . .	857
Total number of patients	887	Youths and Boys . .	16
		Females	14

—	HOSPITAL			PRIVATE			TOTAL		
	Number of Patients	Number of Operations	Deaths	Number of Cases	Number of Operations	Deaths	Number of Patients	Number of Operations	Number of Deaths
Male Adult Patients—Lithotrity	55	63	6	669	781	43	724	844	49
Lithotomy, Perineal . .	24	24	10	91	91	32	115	115	42
„ Suprapubic, old method	—	—	—	1	1	1	1	1	1
„ „ new method	—	—	—	17	17	4	17	17	4
	79	87	16	778	890	80	857	977	96
Youths and Boys—Lithotrity .	3	3	—	—	—	—	3	3	—
Lithotomy, Perineal . .	10	10	1	2	2	—	12	12	1
„ Suprapubic . .	—	—	—	1	1	—	1	1	—
Female Adult Patients—Lithotrity	—	—	—	2	2	—	2	2	—
Lithotomy	—	—	—	9	9	1	9	9	1
Dilatation and extraction .	—	—	—	2	2	—	2	2	—
Girl—Lithotrity . . .	1	1	—	—	—	—	1	1	—
	93	101	17	794	906	81	887	1,007	98
Foreign Bodies in the Bladder—									
Removed by Lithotrite (males)	—	—	—	5	5	—	5	5	—
Removed by suprapubic operation, old method (female) .	1	1	1	—	—	—	1	1	1

On examining the preceding table it will be observed at once that the proportion of children to adults is extremely small. Among these only sixteen males fell to my lot, thirteen of whom were in hospital practice; three were cases in private practice: a fresh illustration of the rarity of calculus in the children of parents among the middle and upper ranks of life. Sir William Fergusson stated that he had but once received a fee for operating on a child. Deschamps in the latter part of the last century stated that he had never seen an example among families in easy circumstances.

The number of females operated on was fourteen—thirteen adults and one girl—and of those little need be said here. The mode of operating is described for each case in its place in the Catalogue, nearly at the end, pages 96, 97. Circumstances vary considerably, demanding modifications in treatment. When the calculus was large, a moderate incision, like the deep one in lateral lithotomy, answered well.

I have therefore now to deal with male adult cases only. Deducting these two series of 16 and 14 respectively from 1007, the number of male adults remaining is 977: 844 by lithotrity, and 133 by lithotomy.

Respecting these operations, it will be seen that they were performed on 857 individuals: due to the fact that several of the patients operated upon by lithotrity formed fresh calculi subsequently, and again required surgical treatment. As before observed, the word 'operation' has been applied solely to the removal of an important formation, and not to that of removing the small, often frequently recurring concretions already referred to.

Next, it should be stated that there were six patients

among the entire number who were operated on by me at different periods of their lives, and for different stones, both by perineal lithotomy and by lithotrity; but in each case at a more or less considerable interval of time. These cases are numbered in the Catalogue as follows—170, 233, 341, 396, 474, 714.

Among the 844 cases of Lithotrity in the Male Adult—the sum total of hospital and private practice—there were seven patients who had the operation performed four times for different calculi, with considerable intervals of time (several years) between each. There were ten patients operated on three times; and seventy-eight patients operated on twice.

Hence there were 630 patients operated upon by lithotrity *once only*, at all events by myself. A very few of these have to my knowledge been operated on a second time by some other surgeon; but almost the entire number have remained free from stone-formation subsequently.

Nature of the Calculi removed.—The calculi removed from male adults in hospital practice were 87 in number: viz. 24 by perineal lithotomy, and 63 by lithotrity = 87.

The calculi removed from male adult patients in private practice are 890 in number, as follows: 91 by perineal lithotomy, 18 by suprapubic lithotomy, and 781 by lithotrity = 890.

		Hospital		Private		Total
Uric acid	Multiple calculi	8	53	106	498	551
	Single calculi	45		392		
Uric acid and phosphate		8		84		92
Oxalate		3		31		34
Oxalate and urate		4		31		35
Oxalate and phosphate		—		18		18
Phosphates		18		226		244
Cystine		1		2		3
		87		890		977

The calculi in fourteen female cases (one a girl) were :— [Brought forward 977]

Uric acid	10	
Uric acid and phosphate	2	
Phosphates	2	
	14	14

The calculi in sixteen cases of male children were :—

Uric acid	10	
Urate and phosphate	3	
Oxalate	1	
Oxalate and urate	1	
Phosphate	1	
	16	16
Total number of cases		1,007

The age of male patients with calculus will be next examined. I have already referred to the very large proportion of elderly men who are affected with calculus, in calling attention to the circumstance that this important fact has not been hitherto recognised. The statements now made will illustrate this view.

Of the entire record of 1,007 cases, the number of male patients (adults and children) operated on was 993. Their ages are shown in the following table, which presents them in five classes, for reasons which will appear.

Class 1. Contains all from the earliest age to puberty, say from the 1st to the 15th year.

Class 2. The period from 15 to 25 years, at which stone is most rare.

Class 3. From 25 to 50, during which it gradually becomes more frequent.

Class 4. From 50 to 70, when stone, especially uric acid, abounds.

Class 5. Contains all cases above 70 years, when stone is also frequent; but the proportion of vesical phosphatic formations is greater than in the preceding class.

—	Below 16 years	16 to 24 years	25 to 50 years	51 to 70 years	Above 70 years	Total
In the hospital . .	13	5	22	56	4	100
In private . . .	3	8	93	583	206	893
Total . .	16	13	115	639	210	993

The mean age of the whole of the adult male cases occurring in hospital and private practice is within a fraction of 62½ years. The greatest age at which I have operated is 91 years, by lithotrity, for a stone of considerable size (Case No. 797, occurring in January 1888); the patient, who passed all his urine by catheter, was greatly relieved, and was living in the beginning of 1889, in fair health for his age, free from his calculous complaint, but died soon afterwards.

Number and Nature of the Fatal Cases.—I have made it a rule to accept as a 'fatal case' any instance in which death took place within six weeks of the operation from any cause, a very few instances only excepted. In four of these it suddenly and instantaneously occurred from failure of the heart's action, the result of long standing organic disease; the patient in each case being completely convalescent and in apparently good health. In the others, death occurred in similar circumstances; such as an attack of acute bronchitis acquired within the period named, supervening on old chronic asthma. In all cases these attacks were unconnected with blood-poisoning in any form, this latter being always recognised as a case of death due to the operation. I am satisfied that this rule

is a stringent one, laid down as it was at the outset; but I have preferred to err, if at all, in accepting a rather too large proportion of deaths, than by adopting the opposite course.

In considering the question of death, it is of course absolutely necessary to deal with children and adults in separate classes. The different degree of risk incurred from lithotomy in childhood and manhood is so great as to render practically useless any numerical inferences regarding the mortality of cases in which this distinction of age is not kept clearly in view. The number of children is so small in this collection that my remarks will be very brief. There were 16 male children and 1 female. Four were treated by lithotrity, and 13, being mostly large stones, by lithotomy, a very large one being by the suprapubic method. I commenced on the principle of employing lithotrity for children whenever the calculus could be crushed at one sitting, and the very first case of stone which fell to my lot occurred in a girl, and was thus crushed in 1854.[1] Three other cases followed, at University College Hospital, the first being in the year 1860, and all successful. This treatment I advocated at some length in my first work on Calculus published in 1863, alluding to the practice adopted in the Children's Hospital in Paris, where large calculi were crushed at numerous sittings, with very unsatisfactory results.[2] Among the ten lithotomies in children, there was one death, a case of deformed pelvis from rickets, which, as well as the calculus, I exhibited at the Royal Medical and Chirurgical Society (see Trans. vol. xlvii.), in

[1] Vide *Lancet*, Oct. 21, 1854.

[2] *Practical Lithotomy and Lithotrity* (Churchill, 1863), pp. 207–211.

which with great difficulty I removed the calculus through a preternaturally contracted outlet. Had I been aware of the fact beforehand, I should have performed a supra-pubic operation.

Hence I have first to deal briefly with the mortality following 977 cases of operation in the male adult only: 844 treated by lithotrity, and 133 by lithotomy.

At the middle of the present century, soon after which my own series commenced (the first case being in 1854, and only three more before 1860), the relation between lithotomy and lithotrity was that of rival systems for the relief of the calculous patient, the respective claims of which for preference were under consideration by the profession. Sir B. Brodie had declared in favour of lithotrity for cases in which the calculus was small, and the passages favourable and healthy.[1] The practice, however, then and for ten years after, was to employ lithotomy as a rule, and lithotrity only in exceptional instances. It was much later even than this before half the cases were generally submitted, in this country, to the crushing operation. When Sir William Fergusson, in 1865, gave a summary of his entire experience, the total number of his cases was 219—namely, 110 of lithotomy, and 109 of lithotrity (an equal division between the two methods); although the latter had occurred in an increasing ratio during the later years of his practice.[2] My observation of Civiale's practice in Paris, who performed lithotrity in fully seven-eighths of the calculous cases which at the rate of about fifty a year passed through his hands, convinced me that

[1] *Roy. Med. Chir. Soc.* 1855.

[2] *Lectures on the Progress of Anatomy and Surgery.* By Sir Wm. Fergusson, Bart. F.R.S. (London: Churchill, 1867) Lect. ix. p. 220.

this proportion offered far better results than those attained by the English practice, provided Civiale's instruments and procedure were adopted. This conclusion was also shared by Mr. William Coulson, surgeon for many years to St. Mary's Hospital, who acted on it until the end of his career in 1874.

But the present relations between lithotomy and lithotrity have gradually been changed. There is no longer any rivalry between the two systems; one operation is complementary to the other; lithotrity has in fact superseded lithotomy for all ordinary cases of stone, whatever may be the age of the patient; and a cutting operation of some kind is now only necessary or desirable in certain exceptional conditions, extreme size and hardness of the stone being those which chiefly render it necessary.

I commenced practice under the influence of impressions received from Civiale, reserving only my own opinion that lithotomy might occasionally have been adopted with advantage for some of the calculi crushed by him in Hôpital Neckar. Accordingly, among my first 200 patients lithotrity was employed in the proportion of about 4 or 5 cases to 1 of lithotomy. In my next 300 it rose to about 8 to 1. And for the last ten years, during which cases of large calculi have been sent to me in an unusual number, the ratio of lithotrity has slightly diminished, the latter seven years having furnished 17 cases of high operation in the adult, which I have substituted for the lateral with considerable advantage. In relation to this proportion of large calculi, it is necessary to note in passing, that one of the results to an operator of large experience in calculous disease is the attraction to him of advanced, hazardous, and difficult cases. Hence the proportion of patients

demanding lithotomy on such grounds increases during the third period of his career, as compared with his experience in the middle and early periods.

Mortality after Lithotomy.—But with the large proportion of cases just referred to, treated by lithotrity—844 in number: and let it be remembered that male adult cases alone are now referred to—it necessarily followed that a residue of very unpromising patients was left for lithotomy. Each one of these furnished an example, either of an unusually large calculus, or of some complication with organic vesical, and often renal, changes of a marked kind. Thus this group differed very widely from the average stone cases, all of which, before the employment of lithotrity—say, anterior to 1840–50—were treated by the knife. The results of the cutting operation in our metropolitan and large country hospitals for fifty years or more, before this period, had been carefully examined and collated by myself so as to ascertain the rates of mortality at various periods of life. I devoted much labour to this inquiry, visiting the chief provincial localities to inspect the collections and the records.[1] I found the death-rate following the lateral operation, then alone employed, to be, in the mature adult patient 1 death in 5 cases, but in the aged 1 death in $3\frac{1}{2}$ cases. In the selected bad cases of the series here considered it was 1 in 3; but in lithotrity, of which the proportion was very large, it was in its recent form little more than 3 per cent.; accepting, as I have done, contingencies often not really attributable to the operation.

[1] This subject is treated at length, with tables, &c. in an early work of mine, *Practical Lithotomy and Lithotrity* (London, 2nd edition, 1871), chapter vii. pp. 137–148. A brief analysis of this inquiry is given as an appendix at p. 39.

Then it should be further stated here, that I have rarely refused to any applicant the last chance of life which an operation might afford him, having done so in fact but five times throughout my career. These were patients who were obviously unfitted by disease and exhaustion to undergo any surgical proceeding whatever.

The group of exceptionally hazardous cases thus set apart in my series for operation by the knife amounted in number to 133, of which 115 were dealt with by perineal lithotomy, one by the old suprapubic, and 17 cases by the modern suprapubic operation. In the 115 cases of perineal lithotomy 42 deaths occurred, or a mortality rather more than one in three cases. It is manifest also that the mortality was considerably less after lithotomy of the late as compared with that of the early period. This is unquestionably due to the superiority of the modern suprapubic operation to the old procedures by the perineum.

The mortality of the 17 cases of suprapubic operation by the new method was 4 cases; 3 of these occurred in patients whose condition was exceptionally bad; one had been for six years the subject of vesico-intestinal fistula, and his death was certainly not due to the operation, although it was hastened thereby; while the other two would certainly have been rejected by me for perineal lithotomy, but I gave them the chance of the less formidable suprapubic operation. But it may be mentioned here that 11 cases of the same operation for vesical tumour already referred to, and of course not included in this Catalogue, were followed by death in one case only —making 28 cases for the modern suprapubic opera-

tion, as employed for all purposes, in the adult with five deaths.

Mortality after Lithotrity.—This relates to the result in a total of 844 adult cases, and is here set forth in a tabular form.

This number includes 472 cases by the old method of multiple sittings, and 372 cases by that of one sitting.

—	Number of Cases	Number of Deaths	Percentage of Deaths
1. Cases reported to the Royal Med.-Chirurg. Soc. in 1877, and published in the 'Transactions,' 1878; all performed on the system then in vogue of 'multiple' or numerous sittings, according to the size of the calculus	422	32	7·83
Subsequent cases by the same method, which ceased in 1878 . .	50	5	
2. **Cases of lithotrity 'at one sitting,'** commencing with No. 503, December 1878, to March 1893, No. 857	372	12	3·22

The above figures testify to the efficiency of 'lithotrity at one sitting,' for calculi of large and moderate sizes, but excluding every formation weighing less than twenty grains; and occurring chiefly among men of advanced age (fifty to ninety years), the mortality being only a small fraction over 3 per cent.

Causes of Death.—The first 500 MALE ADULT cases in this collection were presented to the Royal Medico-Chirurgical Society in 1878, and published in Transactions, vol. lxi. These contained 61 fatal cases, which were tabulated as follows:—

—	Lithotrity	Lithotomy
i. Pyæmia	5	1
ii. Diseased kidneys and dilated ureters	6	2
iii. Acute nephritis	3	2
iv. Chronic Bright's disease	3	1
v. Pyelitis and fever	2	—
vi. Peritonitis, large sacs of the bladder in two cases	—	7
vii. Perforation of the bladder	—	2
viii. Acute cystitis and fever	4	—
ix. Exhaustion	7	11
x. Hæmorrhage	1	3
xi. Mania	1	—
Total	32	29
	61	

The technical distinctions there employed have been somewhat changed in dealing with the mortality in the

Causes of Death occurring in 477 *Male Adult Cases operated on since preceding Report of* 500 *Cases in* 1878

—	Lithotrity	Lithotomy	Suprapubic Lithotomy
i. Septicæmia, with deposits in various parts of the body	2	3	1
ii. Nephritis, uræmia, and suppression	3	—	—
iii. Chronic disease of the kidney, with dilatation of the pelvis and ureters, often associated with sacculus of the bladder	4	1	—
iv. Peritonitis	—	1	1
v. Acute cystitis and advanced disease of bladder	2	1	—
vi. Exhaustion in feeble and aged patients, no other cause of death being obvious	5	3	2
vii. Hæmorrhage	—	1	—
viii. Delirium tremens	—	1	—
ix. Erysipelas	—	1	—
x. In confirmed diabetic patients	1	1	—
	17	13	4

477 cases which have passed through my hands since that date, in accordance with the progress of pathological knowledge. The foregoing table will show the later results in three columns: Deaths after lithotrity; after perineal lithotomy; and after suprapubic lithotomy.

Unusual Cases.—I shall close this memoir by calling attention to cases which, by the rarity of their occurrence, or by reason of unexpected circumstances connected with them, possess more than ordinary interest.

In Case 7 the nucleus was a piece of sealing-wax, the stone formed upon it being phosphatic.

In Case 66 the nucleus was a portion of bone exfoliated from the pelvis after disease of the hip-joint: the stone was phosphatic.

In Case 878 the nucleus of a large phosphatic calculus, removed from a boy by lithotomy, consisted of a portion of the head of the femur (?), or a bony fragment resembling it, which found its way into the bladder long after the occurrence of severe fracture of the pelvis.

Case 430 is that of a phosphatic calculus formed upon an inch of india-rubber catheter as a nucleus; all removed by lithotrity.

The following are examples of encysted calculi; particulars respecting each may be found by referring to their respective numbers:—

In Case 193 one calculus was free, another was almost entirely contained in a sac close to the neck of the bladder.

In Case 323 a calculus was embedded in a sac at the neck of the bladder, and was removed by lithotrity, in six sittings.

In Case 472 several calculi were removed by median lithotomy from a sac at the neck of the bladder.

In Case 497 there was a large calculous mass, above two ounces in weight, occupying a pouch in front of the bladder.

No. 554.—I suspected a case of encysted calculus, as I found a body with hard surface which I could not move with a lithotrite; on operating, it proved to be a tumour coated with calculous matter, and I removed it successfully; no return has taken place, and he is now living and well.

In Case 653 two calculi occupied a cavity close to the neck of the bladder.

In Case 714 there was a sac containing six small calculi, which, with other peculiarities, renders it one of extreme interest and rarity, details of which are given in their place in the Catalogue.

In Cases 643, 653, and 728, the calculus occupied a sac close to the neck of the bladder, and was removed by median lithotomy.

In Case 883 about a fourth of the stone was contained in a cyst, as the form indicates, and was removed. A female patient.

In Case 887 the whole of the stone was encysted, and was removed by the knife. A female patient.

Case 116 was one of the first cases (1867) which, owing to the extreme difficulty which the patient found in passing his catheter—no urine having been passed otherwise for years—I relieved by making a suprapubic opening into the bladder; removing all the urine through a tube by that route entirely, and thus affording him great comfort during the last two months of his life. This I adopted in four other cases as a permanent channel in similar conditions during the subsequent fourteen years.

Case 717 is the largest calculus in the collection; it weighed 14 ounces, and consists of pure uric acid without any coating of, or admixture with, phosphates.

Case 690 was that of a cystic oxide calculus, the largest I have found on record.

No. 127 is a rather large cystic oxide calculus also, which was crushed by the early method, 1867.

Case 814, a case of suprapubic operation performed for a stone of medium size, because, owing to a considerable vesico-intestinal fistula which had long existed, lithotrity and the use of the aspirator were inadmissible.

Case 253.—I did lithotomy for a case of large uric acid calculus, in which spontaneous fracture had recently occurred, producing formidable cystitis.

Case 333 was a case of fracture of calculus caused by sounding; and another is alluded to in the notes thereon.

Cases 268 *and* 631.—Cases in which a large phosphatic calculus was developed by the use of 'constitution water' —a strong solution of bicarbonate of potash.

Cases 143, 466, and 491 are examples of patients operated on who were the subjects of confirmed saccharine diabetes; in two cases death soon followed the operation.

I have met with two accidents to lithotrites in the performance of lithotrity. In the first case, 224, in 1870, I was crushing a calculus with a lithotrite which proved not to be sufficiently powerful for the stone then within its blades. In the act of crushing, the beak of the male blade broke off close to its junction with the shaft, so that a bit of steel three-quarters of an inch long remained in the bladder. I withdrew the instrument, cut the patient on the following day, removing the stone and the piece of metal, and he made a good recovery.

In Case 204, another accident is described in which a lithotrite had to be removed, not on account of fracture, but on account of large impaction. The mode of dealing with this somewhat formidable condition is described. The patient made a good recovery (in 1874) and was living in 1889. After this experience I designed the 'semi-fenestrated lithotrite,' with which such an accident cannot take place, and used the flat-bladed instruments only for very small products, and small fragments at the close of a lithotrity operation. This semi-fenestrated lithotrite has been the most generally serviceable one I have ever employed, and I have used it largely to the present day.

APPENDIX: containing a brief analysis of the inquiry made by the author about the year 1860 relative to the results of lateral lithotomy as applied in this country to all cases of Stone without exception before the employment of lithotrity, and prior, therefore, to the middle of the present century (about 1790 to 1840); referred to at page 31.

Lateral Lithotomy in the chief Metropolitan and Provincial Hospitals before the adoption of Lithotrity, embracing patients of all ages, half of which were below puberty.

	Cases		Deaths		Cases
Norwich (Crosse) . .	669	with	91	about 1 in	$7\frac{1}{3}$
Since that time .	124	,,	15	,, 1 in	$8\frac{1}{4}$
Cambridge	183	,,	13	,, 1 in	14
Oxford	110	,,	14	,, 1 in	8
Leicester	90	,,	8	,, 1 in	11
Leeds	29	,,	4	,, 1 in	$7\frac{1}{4}$
Birmingham . . .	102	,,	10	,, 1 in	10
Guy's Hospital . . .	230	,,	33	,, 1 in	7
St. Thomas's Hospital .	200	,,	29	,, 1 in	7
University College Hospital	90	,,	12	,, 1 in	$7\frac{1}{2}$
Total .	1,827		229		

The Ages of the above Hospital Patients operated on, and the Rate of Mortality following therefrom at different Periods of Life.

During the years	Cases		Deaths		Cases
1 to 11 inclusive . .	850	including	49	about 1 in	17
12 to 16 ,, . .	178	,,	19	,, 1 in	$9\frac{1}{2}$
17 to 48 ,, . .	337	,,	46	,, 1 in	$7\frac{1}{3}$
49 to 58 ,, . .	191	,,	40	,, 1 in	$4\frac{3}{4}$
59 to 70 ,, . .	233	,,	63	,, 1 in	$3\frac{3}{4}$
71 to 81 ,, . .	38	,,	12	,, 1 in	$3\frac{1}{6}$
Total .	1,827		229		

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