LECTURES ON THE SURGICAL TREATMENT OF STONE IN THE BLADDER.

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LECTURE II.

Hæmorrhage after Lithotomy.—Stone left behind.—Various Symptoms.—Causes of Death.—Recurrence of Stone after Lithotomy.—Stone in the Female.—Suprapubic Lithotomy.

Hæmorrhage during or after Lithotomy.—A few years ago, in a paper by an eminent lithotomist, written chiefly to advocate a novel method of arresting bleeding, he mentioned having adopted it six times in twenty cases. I felt some surprise that he should have had so large a proportion of cases of bleeding. On looking over my own list, however, I was equally surprised to find that, out of 168 cases of lithotomy, there were nearly forty in which bleeding was so troublesome as to need special means to arrest it. In many of these, it was wholly unavoidable, but in some, I am free to admit that it was due to the fault of opening the urethra too far forward, and so cutting either the bulb or its artery. Sir H. Thompson says that the knife may be made to touch the staff at the first incision, and that it is pleasant to feel it do so. I have experienced this pleasure; I remember it in my very first case: the operation was quick, and apparently satisfactory, but the patient had troublesome bleeding and made a tedious recovery. This interference with the bulb and its artery should, I think, be deemed to be a mistake; for it in no way facilitates extraction of the stone, and an unnecessary incision is always an evil. Liston, who, take him for all in all, was probably the best lithotomist of his day, seldom had any serious hæmorrhage in his cases; and it was a feature of his operation that he was never in a hurry to reach the groove of the staff, and always entered it at a considerable depth. Indeed, he sometimes erred in the opposite direction; for, in his very last case (a thin elderly man), who recovered from the operation, but died a month after it of erysipelas of the head and face, we found that the urethra had never been cut at all; but that he had worked his way by the side of it into the bladder, and then struck the groove. This fault, however, never probably befel him before; the man was thin, the prostate small, and the bladder at no great depth.

However it occurs, whether from the transverse artery of the perineum, from the bulb or its artery, from the venous plexus around the prostate, or from the separation of sloughs at a later period, bleeding, to any considerable extent, is a real evil, and may prejudice the recovery of the patient, either by its lowering effect on the vital power, or by the indirect effect of the means adopted to arrest it. Combined with the shock of a great operation, it may cause death in a day or two, or, by its repeated occurrence, in one, two, or three weeks. I notice that, out of these forty cases of hæmorrhage, there were twelve deaths, and some of them I attributed to the consequences of the restraining plug. Whether we use the air-tampon or the umbrella-cannula, or, as we in Norwich prefer, simply long pieces of dry lint, pushed carefully in alongside the silver tube, there is this risk: the plug prevents the flow of blood externally, but it is well-nigh impossible to plug a lithotomy as effectually as an ordinary surgical wound, and the blood is apt to infiltrate into the cellular tissue in the pelvis, and extend sometimes along the ureter towards the kidneys, or around the bladder towards the abdominal wall, even so that a faint yellowish colour, as of a bruise, may appear on the skin, near one groin. Decomposition may take place in this extravasated blood, and lead to pelvic cellulitis and abscess. So much objection have I to a plug of any kind, that I have often in hospital-practice, where a surgeon and good nurses are at hand, put a piece of ice into the wound, held it there with a sponge, and allowed the patient to be removed to bed while some degree of bleeding was still going on. Frequently, the oozing, free though it be, will cease in an hour or two; sometimes, however, it will cease at first; and, as reaction comes on, so does the straining and expulsion of clots. Then, when it is clearly shown to be necessary, the plug is resorted to, and seldom fails.

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There are cases, however, in which no form of plug is effectual. A few years ago a young man, aged 22, consulted me three weeks after his marriage, with all the symptoms of stone, which had been going on since boyhood. I removed, by lateral lithotomy, a round rough mulberry stone, which weighed an ounce and a half. The bleeding was moderate at the time, but in two or three hours the straining and extrusion of clots made the plug necessary. On my return, in the evening, from a journey, I found him deadly pale, and the bleeding still going on; a fresh plug was applied, and all went well for some days; the tube and plug came away, and clear urine flowed. On the fifth day a few coagula escaped, next day some more; still nothing was done, and on the eighth day there was no bleeding; on the ninth, however, it returned, and he became blanched and faint. I reintroduced the silver tube, drew off half-a-pint of urine, and tied it in; in a few hours there was more blood, and the tube was blocked. It was removed, and the air-tampon was introduced; still blood and urine escaped through the tube, forcing came on and continued, so as somewhat to displace the tampon. Seeing this, and seeing also that the bleeding was a slow oozing into the bladder from some deep source, it appeared useless to repeat the plugging, and I determined to trust to passing a large flexible catheter through the wound every two or three hours, so as to keep the bladder quiet. At this time, I first learned that he was of an hæmorrhagic diathesis, very liable to free epistaxis, and that every little cut bled freely and stopped unwillingly. On the tenth day, he had a considerable discharge of coagula; then it ceased entirely, and he recovered rapidly. When the artery of the bulb is the source of the bleeding, difficulty will be found in applying a ligature at such a depth in so narrow a wound; but I have sometimes found that the pressure-forceps used in ovariectomy will control it, and may be safely left in the wound for a day or two.

Bleeding which comes from a deep source and passes into the bladder, and is expelled with straining, in the form of coagula chiefly, is very difficult to deal with; the tampon or plug will scarcely arrest it, and the only caution I can give is to keep the bladder as quiet as possible, by passing a large soft catheter through the wound as often as necessary. It may be kept in permanently, but, when this is attempted, it is apt to become choked with blood and inefficient. It is possible that moderate dilatation of the whole wound by a Todd's rectum dilator, or by a full-sized gum-elastic bougie, having a central passage for a catheter, as recommended by Mr. Reginald Harrison, might succeed in these troublesome cases; but I have no experience of either of them, nor have I any of the injection of hot water, which has been found so efficient a hæmostatic in other wounds.

Stones Left in the Bladder after Lithotomy.—Leaving stones or fragments of a stone in the bladder after lithotomy is an accident which may greatly hurt the credit of the surgeon, and is assuredly a great misfortune for the patient. I believe this mishap to be of more frequent occurrence than is commonly supposed; it has occurred to me repeatedly, not only when I was younger, but even of late years, when I have been most fully alive to the risk, and have used every possible means to avoid it. It is especially liable to happen in old men, whose prostate gland is enlarged and the bladder honeycombed and ill-shaped; the finger is probably unable to reach and explore the bladder, small stones or fragments become enveloped in soft clots, or hidden in the recesses of the bladder; they may give no sound or sense of contact to the searcher, and the vigorous use of a syringe, although most proper and necessary, will not certainly insure their expulsion. There is a general belief that multiple stones are smooth and faceted, but this is by no means always the case. Here, for instance, are two stones, each weighing nearly an ounce: neither is particularly smooth, and yet they lay together loose in a man's bladder for several years. Sometimes a large and a very small stone exist together; and it is very conceivable that the smaller, unless it escape with the larger one, should be unsuspected and elude detection. Generally, multiple stones are about the same size, and grow pretty equally; but it may happen that, when a stone of considerable size occupies the bladder, an attack of renal colic may take place, and a fresh stone descends into the bladder; and thus this unequal size is explained. It has more than once occurred to me to witness an attack of renal colic, while a patient was under treatment by lithotomy or lithotripsy.

With these several conditions present in his mind, the surgeon cannot be too wary of this danger, both for his own and the patient's sake. He should not consider that the operation is over when a stone has been removed; he should at once ask himself if, possibly, another, or more than one other, may yet linger in the bladder. Especially he will think of this if the stone have broken in the forceps, or if he have had several stones to deal with. He should deliberately and repeatedly examine with finger and with sound, and explore every

corner of the bladder. He should use a good enema-syringe, with a small tube, which will allow a free return-stream; or distend the bladder with a larger tube, and then, by withdrawing it, allow the water to escape with a rush, which will bring any small piece of stone with it. Again he will use the sound after all clots and mucus have been washed away. In this manner, he will do his utmost to clear the bladder entirely, and will not consider appearances or the time occupied; for, with anaesthesia, time is of little moment.

In these cases, where several calculi have been removed, or a soft one broken, a most narrow watch should be observed during recovery. In ordinary cases, there is very little pain or straining after the operation; when they do ensue, the surgeon should look closely to ascertain the cause; if they come on soon after the operation, they may be caused by coagula or urine retained in the bladder, or by an enlarged prostate, still more swollen from rough handling, or by cystitis. These causes will quickly abate; the blood dissolves or escapes, urine is drawn off and when necessary, the bruised prostate becomes quiet, and the cystitis subsides under proper treatment. The irritation caused by a portion of stone left behind is slower in coming on, and less vivid in its effects; it may escape with the urine in a few days; or, the bladder becoming easy by the removal of the bulk of stone, and the patient resting quietly in bed, it is more likely to remain, and cause but little trouble for a short time. It is not unfrequent in old men with a weak bladder and enlarged prostate, that partial retention of urine follows the removal of the lithotomy tube, and requires the frequent introduction of a flexible catheter through the wound; and with this catheter, in the suspicious cases of which I am speaking, the grating of it against small pieces of stone may be felt, even when the patient has made no complaint of pain. Should a fuller examination prove the presence of a piece of stone, the patient may be placed on his left side, and the bladder well washed out; then, the exact position of the piece of stone being ascertained, it can generally be picked out by long slender forceps, or by one of the numerous instruments contrived for removing small stones without breaking them. In this way, the bladder may be wholly cleared, and the patient will be safe from recurrence of stone. It is quite unlikely that any but small pieces or small stones will have been left behind; if, unfortunately, a piece too large to come away in the manner described be present, it would be right to administer ether, tie the patient up again, dilate the wound, and use such forceps as may be necessary. This proceeding, however, is almost equal to another lithotomy operation, and I have never had recourse to it, but have preferred to let the patient recover, and then remove the remaining stone by lithotripsy. Thus, many years ago, I removed by median lithotomy eight or ten small round stones from a gentleman, aged 61. Lithotripsy might easily have been adopted, but he was resolute for lithotomy. He was a large fat man, and I could barely reach the bladder through the small median wound. Finding these small stones, I used every possible means to clear them all out of the bladder, syringing repeatedly, and searching with sound and scoop. Two experienced lithotomists who were present examined, but could not reach the bladder. As recovery proceeded, in about ten days, he began to complain of the old symptoms of bladder irritability; and a horrible suspicion came over me that I must have left one or two calculi in the bladder, notwithstanding all the precautions taken. I was young; this was my seventeenth case of lithotomy; the patient was a man of rank and high position, and well known to everybody in the district. He had been advised to go to London for treatment; and now, as he had put his faith in me, I felt that his recovery and my credit were painfully at stake. With a sound, a stone was detected. A day or two afterwards, Mr. Clover administered ether; an unfenestrated lithotrite caught the stone at once, and, feeling sure that it was small, like the others, I tried to extract without breaking it; it passed easily to within a few inches of the meatus; then the instrument was screwed home, the stone was all removed, and he recovered at once. I mention this case in some detail, that it may be a lesson to those who have yet to acquire experience.

Various Symptoms following Lithotomy.—There are some morbid conditions which occasionally follow lithotomy which deserve a brief notice. It has repeatedly occurred to me to witness alarming symptoms of cardiac disturbance, syncope, or angina, coming on suddenly after lithotomy when the patient appeared to be progressing favourably. These symptoms have generally been observed in elderly men, who probably had some degree of fatty or other degeneration of the heart's structure, but who had, nevertheless, surmounted the shock and excitement of a great operation and an anaesthetic combined. These attacks seemed to threaten life, and, in one case, did prove fatal. They may not be restricted to the operation for stone; but I have seen them so often after it, that I have

been obliged to think that there was something more than mere coincidence in their association.

Hiccup occurring after lithotomy is generally a grave symptom, especially if it be accompanied with abdominal distension and fever, pointing to peritonitis or pelvic cellulitis; but it sometimes occurs as a very troublesome but not a dangerous symptom, lasting, perhaps, for two or three weeks. In one patient—an enormous man—it endured for fully three weeks, during which time he had at first vomiting, but no fever, and no signs of abdominal mischief. Gregory's powder, as an aperient, and chlorodyne, seemed to afford most relief, and he gradually recovered. Humphry mentions a case of a fat man who suffered from hiccup both before and after the operation; it subsided in a few days, during which the progress towards recovery was favourable. Then he committed some dietetic excess; the flatulence and hiccup returned, with collapse and speedy death. No abdominal or pelvic lesion appeared at the *post mortem* examination. This form of hiccup probably is due to intestinal disorder, and I only allude to it to show that it is not always a dangerous or formidable symptom.

Another condition which has been occasionally noticed is the foetid or faecal odour of the urine after lithotomy, to such an extent, that the person of the patient and the room even were almost unbearable. In one case, the wound had been plugged on account of hæmorrhage. There was no difficulty in preventing its escape externally, but it evidently infiltrated the tissues around the bladder, and a tender spot was felt and a yellow stain was seen in the skin above the groin. The man was feverish and low; and ten days after the operation the urine became horribly offensive and continued so for several days, until an abscess discharged itself through the wound, when by degrees the urine lost the foetid smell and he recovered. In another case, there was no fever and no evident abscess, but simply stubborn constipation. On the second day, the urine was noticed to be peculiarly foetid—almost faecal—in odour; there was flatulent distension, but no serious illness. Still, it was noticed that a week after the operation the urine contained a good deal of pus, and I cannot doubt that there was some small purulent collection near the bowel which allowed a diffusion of bowel-gas, just as we sometimes see in common abscesses near the rectum. This faecal smell of the urine after lithotomy should therefore beget the suspicion of, and cause a strict search for, abscess near the base of the bladder.

Another symptom which I have occasionally noticed to accompany—I will not say to depend on—stone, both before and after operation, either lithotomy or lithotripsy, is the secretion of a large amount of non-albuminous urine, almost amounting to diabetes insipidus. In the case of a boy aged 13, it followed scarlet fever, and amounted to five or six pints daily of pale, opalescent, non-albuminous urine, of low specific gravity. A large stone, weighing six ounces, was removed; but the patient died, after a long illness, of pelvic abscess. At the *post mortem* examination, the kidneys were found to be atrophied, and the calyces, pelvis, and ureters greatly dilated. In other patients, generally elderly men, recovery took place; but I have always felt distrust of such cases, and have been at a loss to explain and account for the condition. True diabetes is occasionally associated with stone; and it would appear, when it exists in a mild and chronic form, not much to prejudice the recovery after operation. When, however, the disease is present in its more serious and aggravated form, the danger of lithotomy or any other severe operation cannot but be greatly increased. One such case has occurred to me, that of an eminent and well known physician, whose constitution and health were utterly broken by confirmed diabetes. He was pale, anæmic, and emaciated. A lithic stone of moderate size had to be removed; and there seemed good reasons, in addition to his own strong wish, for preferring lithotomy. The operation was quick and easy; but the blood was so watery, and so deficient, apparently, in fibrine, that a light plug was required to stop the oozing. Death took place on the tenth day, from exhaustion. The *post mortem* examination showed that the urinary organs were all healthy and uninfamed, and that the apparent cause of the diabetes was a tumour connected with the dura mater, which pressed on, and deeply indented, the surface of the brain. It may be added that, during life, the patient never had headache, or any cerebral symptoms whatever. Such a case, in a patient with such a frail state of health, would undoubtedly, at the present time, be treated by litholapaxy.

One other symptom may be mentioned, because, in one case, it misled me, and might mislead others. A man, aged 66, had two full sized stones removed by lithotomy; there was troublesome bleeding, which was arrested by the air-tampon. For some days, a good deal of mucus was observed on each draw-sheet, and it was supposed that this was the product of cystitis. On the fourth day, while I was trying to remove the tampon, I observed a quantity of glairy

mucus coming from the rectum; quite two or three ounces bubbled out in a few minutes, and more followed; it was white, like jelly, and odourless, and soon ceased after the removal of the tampon, which, I apprehend, had caused the secretion by undue pressure on the coats of the bowel.

The causes of death after lithotomy are especially deserving of attention, because they may point out some error in the diagnosis of the case, in the operation, or in the treatment after it. How often has it occurred to me to confess, at the *post mortem* examination, that, had I known or suspected beforehand this or that morbid condition, I would have done differently, or not have operated at all. I can scarcely call to mind having declined to operate in more than two or three cases; several were done under circumstances which almost precluded hope of recovery, but in obedience to the pressing desire of the suffering patient to be relieved of the stone at all hazard. Looking through my note-books, I find that the black list is a long one, namely, 29 deaths out of 169 operations; about 1 in 6, or 17 per cent. Of the 29 deaths, 13 cases were aged from 60 to 70, and 10 were over 70. The average age of the whole was 60, and the average weight of stone was 2 ounces. In a man, aged 80, the stone weighed 6½ ounces; in a boy, aged 13, it was 6 ounces; and in a middle-aged adult, it was over 4 ounces. The considerable size of the stones, the great age of the patients, and the serious complications existing in many of the cases, may explain—I was going to say, extenuate—the heavy mortality; and it may be further mentioned, that the most favourable cases were reserved for lithotripsy. In like manner, Sir H. Thompson, after deducting a very large number of cases of lithotripsy, gives his mortality after lithotomy at 35 per cent. It is a curious coincidence that, although my cases of lithotomy have largely consisted of old men with renal, prostatic, and other complicating diseases, the first fatal case was in an infant a year and a half old, who died of convulsions the day after the operation.

The following table shows the age, date, and cause of each of the twenty-nine deaths, from which it will be seen that phlebitis and pyæmia account for nearly a quarter of the whole; and with reference to this, I may say that, for some years, our hospital suffered greatly from pyæmia, and that all efforts to abate it were without avail, until the whole system of nursing was changed, and the entire charge was given over to a skilled nurse, a lady of great force of character and untiring energy. A revolution in management was established; pyæmia almost disappeared as if by magic; a new hospital has since been built, but both in the old and in the new, from the time mentioned, now nearly ten years, I have not had to register a death from pyæmia; and we have almost ceased to think of it. In ten cases, there was marked disease of the kidneys. This is by far the most formidable obstacle to successful lithotomy; it is a complication of stone which no amount of experience seems to enable one to diagnose with accuracy; no symptoms, marked and prominent, and constant enough, exist to indicate it. The condition of the urine throws but slight light on it; the presence of albumen, pus, or mucus, cannot be relied on, for the state of the bladder, with some concurrent cystitis, is probably there to impair this means of diagnosis. The aspect of the patient—pallor, flabbiness, and debility stamped on it; the nature of the stone—phosphatic, with chronic cystitis and vesical atony; these conditions may well produce suspicions of kidney-disease; but, on the other hand, not a few cases have occurred of hard lithic stones in ruddy-faced farm-labourers, in which death from renal disease followed lithotomy, and in which it was wholly unsuspected. The form of kidney-disease which most frequently causes death after lithotomy is nephro-pyelitis, in one or other of its varieties; either acute interstitial nephritis, with scattered abscesses, or more chronic pyelitis, with dilated suppurating pelvis and ureters; this form is that in which the pale and anæmic physiognomy alluded to is seen. Another form is that in which the kidney is either in a state of atrophy and contraction, or where it is enlarged and coarse and soft in structure; and this form is that in which there is often, but not always, a florid healthy aspect.

I have only seen two instances of stone combined with Bright's disease—that is, with albuminous urine of low density, and some degree of anasarca and anemia. Both these cases recovered from the operation, but died some months after of the more serious malady. In two, probably three, cases of kidney-disease, suppression of urine was the proximate cause of death.

Infiltration of urine, pelvic abscess, and peritonitis, separately or in combination, were formerly considered to be the most frequent cause of death after lithotomy. Sir W. Ferguson, however, denied this, and went almost so far as to say that urinary infiltration never occurred. The truth, as usual, I believe lies between these two extreme views. In my own cases, I have never seen pure urinary extravasation

leading to sloughy cellular tissue around the bladder; but several cases have occurred of pelvic abscess and peritonitis, which have been attributed to slight infiltration of urine or to decomposition of extravasated blood; and peritonitis also of a purely septic or pyæmic origin has been observed.

Exhaustion due to shock and hæmorrhage combined, to diabetes and anæmia, to chronic pulmonary disease, and to previous hemiplegia, has proved fatal occasionally. Lastly, I have noticed in three fatal cases great enlargement of the spleen; this has occurred in very florid elderly men, with blue feet and legs, and universal congestion; this condition and class of patients would now lead me to prefer lithotripsy in all practicable cases, and, where it is not practicable, to adopt the suprapubic operation.

Causes of Death after Lithotomy.

No.	Age.	Weight of Stone.	Remarks.
1	14	—	Convulsions; on second day; no <i>post mortem</i> examination; median operation.
2	66	—	Median operation; prostatic retention; catheter used; death fifth day; bladder thin and dilated; kidneys diseased; ureters large; pyæmia (?).
3	66	5iss	Median; died sixth day; rigors violent; ague (?); bladder sacculated; one very large; kidneys healthy; prostate very large.
4	64	5xss	Median; nearly recovered; died of acute peritonitis three months after operation; abscess behind pubes, opening into bladder; kidneys diseased; stone in right one; prostate large.
5	62	5xi	Median; death fifteenth day; old hemiplegia, diptheria, pyæmia visceral abscesses; contracted kidney.
6	52	8vij	Median; death eleventh day; phlebitis and pyæmia.
7	60	3iv	Lateral; hæmorrhage and shock; death second day.
8	68	3v	Lateral; death seventh day; pyæmia, hepatic abscess; opium-eater; great enlargement of prostate; chronic retention.
9	66	3ij	Median; death in ten weeks from exhaustion and kidney disease, pyelitis, chronic prostatic retention.
10	64	3ij	Median; death from pyæmia fourth day; rigors and fever; enlarged spleen.
11	70	5x	Lateral; death tenth day; exhaustion, fatty liver, and kidneys.
12	60	3iiss	Median; death fourteenth day; pyæmia, phlebitis.
13	11	3ij	Lateral; death tenth day; pyæmia, visceral abscess.
14	73	3ix	Lateral; death second day; shock and hæmorrhage.
15	71	3xij	Lateral; death fifth day; kidneys diseased, hæmorrhage.
16	70	3ij	Lateral; death eleventh day; rigors, kidneys diseased, ureters dilated; bladder contracted, and sacculated encysted stolid.
17	64	3v	Median; recovered, and wound healed, then phlebitis and pyæmia.
18	34	—	Lateral; death seventeenth day; pyæmia.
19	63	3iv	Lateral; death eleventh day; diabetes and exhaustion; tumours of dura mater; no other organic disease.
20	65	—	Lateral; death eighteenth day; cause not clear; no <i>post mortem</i> examination; would not eat; probably kidney-disease.
21	80	3viss	Lateral; exhaustion; death fourth day.
22	78	3ij	Lateral; three stones; great enlargement of prostate; catheter used for years; death fifth day; suppression of urine.
23	13	3vj	Lateral; death from pelvic abscess three months after operation; kidneys atrophied; ureters dilated and tortuous; pelvis and pelves dilated; had diabetes insipidus.
24	73	3vi	Lateral; death in two months from lung disease; no <i>post mortem</i> examination.
25	57	3iv 5j	Lateral; death in a month; secondary hæmorrhage; no <i>post mortem</i> examination.
26	61	—	Female; death seventh day; peritonitis, encysted stone, sacculated bladder.
27	70	3xij	Suprapubic operation; death fourth day; suppression of urine, kidneys diseased, ureters dilated, injury to rectum.
28	70	3v	Lateral; death fifth day; enormous man; kidneys diseased, pulmonary congestion; spleen 8 ounces.
29	72	—	Death eighth day; secondary hæmorrhage; death suprapubic retention; pyelitis; stone in kidney; enlarged prostate.

Recurrence of stone after lithotomy is a matter of much interest, because of its bearing on the choice of operation, on the one hand, between perineal and suprapubic lithotomy, and on the other hand, between lithotripsy and lithotomy. If it can be proved that recurrence is far more frequent after lithotripsy than after cutting, this fact should decide one to adopt lithotomy—and in my own practice it not unfrequently has done so. On this matter of recurrence, the records of the Norwich Hospital afford valuable, if not quite conclusive, evidence. A short time ago, Mr. Donald Day, our late house-surgeon, very much at my suggestion, carefully examined these records, and compared them with the stones in the museum; and he has given the results of his inquiry very clearly and succinctly in the BRITISH MEDICAL JOURNAL (February 13th, 1886). He ascertained that, out of 884 individuals (males), forty-five were cut a second time, an average of about one in twenty, or 5 per cent., and five were cut a third time. Of course, this does not give the whole number of recurrences, but only the number of repeated operations of lithotomy. Doubtless there were some, especially in the pre-anæsthetic period, who declined

to submit to further treatment, or went elsewhere; but, as the same motives would exist in recurrence after lithotripsy, the figures are good for comparison.

There are two chief causes which lead to recurrence of stone; namely, 1, the descent of a fresh calculus from the kidney; and 2, the leaving of stone or fragments of stone undetected at the first operation. Of the fifty instances of repeated operation mentioned, rather more than one-third were due to an entirely fresh stone descending from the kidney. Uric acid or urates was the composition of nearly all of them; the second formation was generally the same, and the interval between the operations was frequently long, giving an average of five to six years. The second class, or those in which stones or fragments of stone were left behind, include nearly two-thirds of the whole, and shows the enormous importance, when a stone breaks in extraction or there are multiple stones, of making the most careful search, and the most resolute efforts to effect a thorough clearance of the bladder. In these cases the second stone is often composed of phosphates, or mixed phosphates and urates, and the interval between the operations is much shorter than in the first class. Some few of these cases should perhaps, as Mr. Day suggests, be placed in a separate group; cases in which the bladder has been entirely cleared at the first operation, but in which soft porous masses of white phosphates have subsequently gathered, and have been caused by enduring cystitis, by fistula, or more likely by the incrustation of the deep portion of the wound by phosphatic deposit in weakly patients after a severe operation. This sabulous coating comes away from the wound, and the latter cleans as the patient gains strength; but occasionally some of it at the neck of the bladder remains, and forms a nucleus for fresh phosphatic stone in a few months. Cystitis will not lead to deposit of phosphates, unless some ulcerated or abraded surface, or a clot of blood or concrete mucus, be present, in which case rapid aggregation of soft stone will take place. I will, however, again refer to this matter, in speaking of recurrence after lithotripsy.

Stone in the Female.—It must be in the experience of all surgeons, how seldom the sound detects a stone in the female bladder, although the symptoms are present even in vivid intensity. Vesical irritability and cystitis, not dependent on stone, are probably as frequent in women as in men, and are fully as difficult to remedy. They depend on somewhat the same causes; namely, on cold, on tuberculosis, on neglected gonorrhoea, and, as special causes, from pressure on the bladder when distended during labour, or from uterine displacements and versions. When calculus is present, the symptoms are nearly the same as in men; if the stone be small and freely movable, the suffering is great; if it be large and heavy, and weigh down the floor of the bladder into the vaginal canal, so that by this prolapsus it becomes fixed, the suffering may be mitigated and even masked. Paget, of Leicester, reported a case of stone in a woman, which weighed 27 ounces; it was prolapsed between the labia pudendi, and caused so little inconvenience, that the woman never consulted a medical man, and did hard work. In some cases of this kind, nature accomplishes a kind of cure, by a process of inflammation and ulceration of the contiguous mucous membrane and spontaneous escape of the stone. This large stone, weighing over 6 ounces, passed from a woman after a process of prolapsus and ulceration. I once assisted a surgeon to remove a full-sized calculus, which had become partially prolapsed, and had been mistaken for a procidentia uteri.

Dr. Emmet speaks of stone in the female following the operation for vesico-vaginal fistula, and being due either to the ends of the metallic suture having been left, and escaping into the bladder, or to faulty adjustment of the edges of the wound, by which a projecting part or some denuded surface is left, on which phosphatic deposit takes place. In 1,125 operations for stone, at the Norwich Hospital, there have been only 50 in the female, a proportion of about 1 to 20 in the male. In my own experience of 300, I have only met with six in the female.

The earlier hospital cases were, I believe, done by cystotomy; but, for many years, dilatation and extraction, with occasionally a slight incision, has been the plan adopted; lithotripsy never, suprapubic lithotomy once, and vaginal lithotomy once or twice only. I say only once or twice, because I have heard of no others, and Mr. Crose makes no mention of any; but it is just possible that, in the very earliest years of the hospital, that method may have been practised, because Benjamin Gooch, who, if not the originator of it, was one of the first to adopt it, lived at Norwich, and was the chief founder of the hospital, in 1771. He thus describes the operation (*Cases and Remarks in Surgery*, vol. ii, p. 178): "After putting her in the usual position for the operation, I intended to have proceeded in the common manner, by dilating the urethra, and making an incision, as should be found necessary, to facilitate the extraction of the stone; but finding,

with my finger, that it lay very favourably to be cut upon, through the vagina uteri, now considerably dilated, I altered my original design, and, with the approbation of two experienced practitioners, cut directly upon it, and extracted it with very little pain to the patient and trouble to myself, compared with what a stone of between 3 and 4 ounces weight must have unavoidably occasioned, by performing the operation in the common method. The symptoms after the operation were most gentle, and she was perfectly cured in three weeks, without any defect remaining in the retentive faculty." He refers, also, to two other similar cases by other surgeons, he being present. Thus, then, vaginal lithotomy, which is generally regarded as a modern operation, due chiefly to Marion Sims and Aveling, and which Emmet describes as nearly the only fitting way by which to remove stone in the female, is at least a century and a half old. Good as the operation is, however, for the removal of stones of about the size of a hen's egg, it is not, I think, adapted for the removal of very large calculi. The distance between the internal orifice of the urethra and the os uteri is limited, and, although an aperture, say of an inch, or an inch and a half in length, would dilate a good deal, there would not be room enough to extract a very large stone with safety. Lately, one of my colleagues removed a stone weighing 7 ounces, by vaginal lithotomy. It was an operation of some difficulty, and the wound was extended unavoidably, by laceration, nearly up to the external orifice of the urethra; and there was, necessarily, a good deal of bruising of the soft parts. Emmet describes a case in which he was unable to extract a stone through the vaginal incision, until he had diminished its bulk by inserting two fingers behind the stone, and chipping off portions of the outer layers, by cutting-pliers or scissors. Moreover, although, as Gooch describes, and as we see in the male, a wound in the bladder will generally heal of itself, it is always thought necessary, in vaginal operations, to close it accurately by sutures; and, if there have been much bruising of the edges during extraction of the stone, union may fail, and this may entail several operations to cure the fistula, and this is, besides, an operation of nicety, requiring an experienced hand. On the whole, it is probable that, for stones of 3 ounces and upwards, the high operation, done by the modern method, will come to supplant the vaginal incision. While I say this, however, it must be borne in mind that, while there is no reason to expect a less mortality in women than in men, from the high operation, we know that all other operations for the removal of stone in women are far less fatal than in men; so that, unless the improved method of the suprapubic operation shall prove to be more successful than the old, there can be no such supplanting as I have mentioned.

In female children, in whom the vagina and urethra are small and undeveloped, the bladder high in the pelvis, and the tendency to urinary infiltration slight, the suprapubic operation is, undoubtedly, the best for all cases, except those in which the stone is very small; and, for these, litholapaxy, according to recent Indian experience, is well adapted.

Having had but small personal experience of stone in the female, I desire to speak with diffidence as to the merits of the various modes of treatment; but I may say that the conclusions to which I have come are, that, for stones of small size—for instance, not larger than a filbert—in the adult female, rapid dilatation of the urethra, and careful extraction, is the best method; that litholapaxy is, probably, the best operation for those which are larger—say, from half an ounce to an ounce, or even more; that, for those which are about the size of a hen's egg, vaginal lithotomy is well adapted, and the high operation for all above that size. Further experience, however, may somewhat modify these conclusions.

Suprapubic Lithotomy.—Suprapubic lithotomy in its revived and modern method requires careful notice and examination. Its past history has been chequered and uncertain, and the results obtained have not been satisfactory, but its future is full of hope and promise. At the present time, surgeons are divided in opinion as to its methods, its capabilities, and its merits.

History repeats itself. In this very year, several cases have occurred in which stones of great magnitude have been attacked by perineal lithotomy without success, and have been at once removed by the high operation. Precisely the same thing occurred to Peter Franco in the middle of the sixteenth century. He attempted to remove a large stone from a child's bladder by perineal section, failed, and was persuaded by the child's parents and others to attempt its extraction by abdominal section. He succeeded; the child recovered, and this was the actual beginning of the history of suprapubic lithotomy. So doubtful, however, was Franco as to the wisdom of the proceeding that was to perpetuate his name, that he warned others against attempting it. It is needless here to trace its history or to relate fully how it was at first greatly extolled by Rosset; how it fell

into neglect until it was revived in 1720 by I. Douglas and Cheselden; how at that time, influenced, no doubt, by Cheselden's success, the surgeons of St. Thomas's and St. Bartholomew's hospitals took it up; how, in consequence of fatal accidents, such as opening the peritoneal cavity, bursting of the bladder by over-distension, etc., it soon became discredited, while the lateral operation practised and perfected by Cheselden gave it its *coup-de-grâce*, in this country at all events, as a general operation for stone. Abroad, it could still reckon its advocates; Frère Côme, who, in 1770, modified it by omitting the injection of the bladder and introducing the *sonde-à-dard*; Souberbeille, in 1818, who nearly followed Côme's method; Valette, of Lyons, who recommended that the bladder should be opened by caustic at a second operation; and many others. In England, for the last 150 years, it has been adopted only in cases in which the stone is very large; and even in those, lateral lithotomy has generally been preferred. Thus we read of stones of 10, 12, or even 15 ounces having been successfully removed through the perineum, and it is not a little singular that in the Norwich Hospital the high operation has, so far as I know, never been done until two years ago by myself. Still, it must be admitted that perineal lithotomy has been unsatisfactory in its results when applied to stones above a moderate size; it is difficult to do; laceration and rough instrumentation are unavoidable, and the mortality has been great, probably not less than 35 to 45 per cent. when the stone has weighed over 2 ounces. I have long felt this difficulty, and have often, during the last twenty years, asked myself, and those friends who have much practice in lithotomy, what is the best way of removing a stone of 3 or 4 ounces, and whether the high operation did not call for fresh examination, considering the advances of abdominal surgery and the antiseptic method? In 1878, a discussion took place at the Clinical Society on a paper by Mr. Hutchinson on suprapubic lithotomy. The general tone of the meeting was rather deprecatory of than favourable to the operation. Its difficulties and disadvantages were prominently spoken of, and I mention this to show the contrast between the tone then and that confident, buoyant, and laudatory account which was recently given of it at the Royal Medical and Chirurgical Society, and we may now consider the reason for this difference.

At the Clinical Society, in 1878, Mr. Heath said that "he had recently seen a pamphlet in which it was said that distending the rectum did good in making the bladder project above the pubes." This was the paper by Dr. Garson, then just published in the *Edinburgh Medical Journal*, which, beyond all doubt, laid the foundation for, and acted as the pioneer to, the re-examination and revival of suprapubic lithotomy. The facts therein related, and the effects of fully distending the rectum in facilitating the steps of the operation so plainly stated by Garson, attracted little or no notice from British surgeons; but the paper, having been communicated to a Medical Congress at Berlin, in 1878, was not neglected there. Professor Petersen, of Kiel, took the subject up, and, having first repeated Garson's experiments on the dead body, applied his knowledge to the living, and operated on several cases of stone successfully. He has been quickly followed by many in Germany, Russia, and France; and the papers in various continental journals, and at medical congresses, one so lately as April last in Berlin, are too numerous even to mention. In England, we have been somewhat slow to take up the inquiry. Sir H. Thompson alluded to it from this chair two years ago, and soon afterwards performed his first operation. Having followed that by several other cases, he has recently, as we all know, published his views in an excellent essay. Having started in the inquiry, there is no fear of our lagging behind our continental brethren. Rather I should say there is some fear that our enthusiasm should outstrip discretion, that the operation should be applied to all kinds of cases, fit and unfit, and to stones of all sizes, and to persons of both sexes and of all ages, and not only for stone in the bladder, but for tumours of all kinds, and even for stricture of the urethra. While this keen interest in the subject is going on, let us consider (1) the principles on which the modern operation is based, and (2) the advantages and disadvantages of it as compared with other methods. The principle consists in the fact that moderate distension of the bladder and rectum raises the bladder well above the pubes, brings every part of it well within the reach of the finger, and elevates the prevesical fold of the peritoneum considerably above the symphysis pubis. All this is, I think, fully proved by numerous experiments, both in England and abroad; but it may be worth while to examine them somewhat in detail.

The position of the peritoneum lining the anterior wall of the abdomen is, the bladder being empty, that it passes down to the symphysis pubis, and is then reflected over the posterior wall of the bladder, so that an incision in the median line, close above the pubes, would inevitably come directly upon it.

Distension of the bladder only, the rectum being empty, will generally raise this fold of peritoneum, from one and a half to two inches above the pubes. Pirogoff, Braune, Garson, Bouley, indeed all, or almost all, observers agree that full distension of the bladder will not only have this effect, but that the effect will be greater in fat than in thin people. There are, however, many exceptions to this rule. The capacity of the bladder varies greatly. Langenbuch says that, by extreme injection, room enough may be obtained above the pubes without filling the rectum. Fehleisen, on the other hand, holds that, the rectum being empty, distension of the bladder has very little effect in raising the fold of peritoneum; that, with twenty ounces in it, the fold will be only three-quarters of an inch above the pubes; and he assigns as a reason for this, that the bladder, as it fills, presses backwards and downwards rather than upwards, filling the hollow of the sacrum. Much caution is required in this proceeding in the living, especially when there is a stone. In old people, there may, and probably will, be sacculi; and the walls of these, being thin and unsupported by muscular fibres, might yield to the distending force. Sometimes, too, the bladder is thick and contracted, and will scarcely distend at all; while M. Polaillon believes that, in one case, the fluid, instead of distending the bladder, found its way into the enlarged ureters, and distended them, instead of, or as well as, the bladder. All things considered, therefore, it may be said that, in operating by the suprapubic method in the adult, we ought not to depend solely on vesical distension.

Distension of the rectum only, the bladder being empty, raises the floor of the latter very considerably; but, according to my observations, it has but little effect on the upper part of it, or on the fold of peritoneum. Whoever will distend the rectum with twelve to fifteen ounces of fluid in a rubber bag, and then examine the parts, will see that the distended bowel fills the whole hollow of the sacrum, where it is bound down by the cellular connections of the gut to the walls of the pelvis; that it elongates the membranous and prostatic urethra, and elevates the vesical orifice and the whole lower fundus of the bladder to such an extent that the finger, passed through an aperture above the pubic symphysis, can reach every part of it easily, and if, while the finger is doing this, the fluid in the rectal bag be allowed to escape, the floor of the bladder will sink almost out of reach.

When both bladder and rectum are moderately filled, the former, not being able to occupy the lower half of the pelvis, is forced upwards and forwards against the abdominal wall, and carries up the prevesical fold of peritoneum from one and a half to two and a half inches, according to the amount of fluid injected into the two cavities. It is needless to recount the actual measurements given by various observers; they have not all been taken precisely in the same way, and they are approximate rather than exact; still, they are tolerably uniform, and liable only to occasional exceptions. It is probable that, in the living body, with its animal heat and less solidified condition of adipose tissue, the separation and elevation of the fold of peritoneum would be easier and more considerable than in the dead body; this, however, cannot be demonstrated. Mr. Barwell, in a carefully conducted series of experiments, has found that distension of the rectum, in addition to that of the bladder, does not sensibly increase the raising of the prevesical fold of peritoneum; he maintains that this is almost entirely effected by distending the bladder only; and he, therefore, in his operations, dispenses with the rectal bag. His investigations, however, were made with the abdomen fully opened, and this may, as Dr. Garson suggested, account for the different results which he has obtained. My own experiments would rather tend to confirm those of Mr. Barwell; but I should still strongly advocate the use of the rectal bag, not only for its influence, slight though it be, in helping to carry the peritoneum out of danger, but chiefly because it brings the floor of the bladder within easy reach of the finger.

As to the method of operating, I have but little to say; that adopted by Sir H. Thompson is probably the best, namely, to use the knife, as little as possible, and the finger-nail, or some blunt instrument, as much as possible as the bladder is approached; push up the peritoneum if it be seen; fix the bladder with a hook before opening it; use no suture for the bladder-wall after removal of the stone, and only one or two for the upper part of the external wound. Some surgeons stitch up the bladder accurately, and introduce and retain either a full-sized catheter through the urethra, or a drainage-tube through the perineum. These means, however, will seldom prevent the urine from escaping by the upper bladder-wound; the catheter or drainage-tube may become blocked, or may slip a little; urine gathers in the bladder, and immediately makes its way upwards between the sutures. There can, I think, be little doubt that the safest course is to leave both the external and the bladder-wound freely open; all fluids—blood,

serum, and urine—can then readily escape, and the risk of infiltration of urine is reduced to a minimum. A good-sized rubber, or silk-elastic tube may be used to facilitate drainage for two or three days. I have made this tube of sufficient length to reach into a basin placed by the bedside, and have fastened it to one edge of the outer wound to prevent its being accidentally dragged out; by this means the patient is kept comparatively dry and comfortable; he lies first on one side and then on the other, the nurse carefully carrying the tube from side to side with him. There are two kinds of rectal bag in use: one, a simple pear-shaped rubber bottle, which will dilate to any size; the other has a layer of linen in its walls, and will only hold a certain quantity; the former, when empty and rolled up, is rather the easier to introduce, but it should be filled from a graduated glass vessel, so that the exact quantity desired, say twelve or fourteen ounces, may be introduced. These, and other details of the operation, however, may come to be modified as experience increases.

In females, in whose bladder a full quantity of water cannot easily be retained, Sir H. Thompson has recommended the use of a hollow sound, with a slit at the end, fitted by a stylet; this is made to push against the front wall of the bladder, close behind the pubes, where it is felt in the wound; the stylet is withdrawn, the slit is struck by the scalpel, and the bladder opened. It is doubtful whether this manoeuvre will, in practice, be found necessary. I have found that, in the dead body, the pressure upwards of the rectal bag is sufficient to close the vesical orifice, and retain a fair quantity of fluid in the bladder; or the finger of an assistant, pressing the urethra against the pubic arch, would readily retain the water until the bladder is opened from above.

In children, even when the bladder and rectum are empty, the peritoneal fold is generally from half an inch to an inch above the pubes; but, with a distended bladder, with three or four ounces even, it will be carried well up out of harm's way. No distension of the rectum is required, but the finger of an assistant may be of use in helping to raise the stone and the floor of the bladder.

CLINICAL LECTURE ON CIRRHOSIS OF THE LIVER.

By ROBERT SAUNDY, M.D. Edin.,
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GENTLEMEN,—I wish to direct your attention this morning to the case of the man, J. R., who died, last Tuesday, in Ward VI. He was an engineer, thirty-six years of age, lodging at a tavern in Mott Street. On September 20th last, he was admitted into the hospital, after vomiting about a pint of blood in the surgery. At that time, he told us that he had always enjoyed good health, with the exception of some "rheumatic" pains seven or eight years ago. He admitted that he had drunk spirits freely up to a year ago, but, since then, had confined himself to beer. Two weeks before admission, he vomited a large quantity of blood, and had felt weak and ill ever since. His face and mucous surfaces were very pale; he complained of great thirst, but was in no pain. There was no tenderness anywhere over the abdomen, and there was neither distension nor ascites. The liver-dulness extended only from the sixth to the eighth ribs in the vertical mammillary line. The spleen was not enlarged. He had no pain after food. The case was regarded as one of hæmorrhage, dependent upon cirrhosis of the liver; an ice-bag was placed over the epigastrium, and potash imperial was given to allay the thirst. Under this treatment, the hæmorrhage did not recur; and he was ultimately discharged, after being in the hospital three weeks. Six days later, he was re-admitted for hæmatemesis; this being the second attack since his discharge. In spite of the use of similar remedies, the hæmorrhage returned a few days after his re-admission, and he died on October 23rd, after a very severe attack of sickness, attended with pain so violent as to make him roll over in his bed.

I should like to tell you that Dr. MacMunn, of Wolverhampton, found in the urine a pigment called uro-hæmatin, an imperfectly oxidised urine-pigment. Urobilin is the principal pigment of the urine; it is formed by the oxidation of bilirubin, or bile-pigment, which itself is derived by oxidation from effete blood-pigment. Bile-pigment is formed normally by the liver; and we can readily understand that, in conditions where its structure is much altered, this function becomes impaired, and an imperfectly oxidised product is the result.

At the *post mortem* examination, a well marked scar was noted on the penis, and the prepuce was seen to have been, at some time, partly destroyed by sloughing; the left tibia also showed old thickening. The brain appeared healthy; the lungs were anæmic; the pericardial cavity was dry; there were several large milk-spots on the heart; very much thicker and larger than I ever saw before—in one place actually forming pendulous flakes, half an inch in length. There were no adhesions between the opposing surfaces of the pericardium, or any other evidences of pericarditis.

The peritoneal cavity contained no fluid; the liver was irregular in shape, reduced in size, of a pale colour, with a fissured and lobulated surface, and deeply notched at its anterior edge. The capsule of the liver was, in some places, half an inch thick; on section, the hepatic tissue was pale yellow, and divided by bands of fibrous tissue. With iodine, waxy degeneration was well marked.

There was a large depressed cicatrix on the surface of the spleen, which, on section, presented the characters of the "sago" spleen, and gave the waxy reaction with iodine. The kidneys were granular, and waxy.

The intestines contained a quantity of altered blood, and were waxy. The œsophagus showed great varicose dilatation of its veins, some of which contained hard thrombi.

I show you the heart, liver, spleen, and œsophagus. The veins of the œsophagus have been injected so as to display their size. Under one of the microscopes there is a section of the liver showing the characters of the growth, which not only surrounds, but invades the lobules, and forms extensive areas of richly nucleated connective tissue.

This case is an example of the combination of alcoholic and syphilitic cirrhosis.

In Dr. Murchison's classical work on the liver, he places "cirrhosis" under the heading "chronic atrophy of the liver," including it in the following group.

1. Cirrhosis.
2. Hyperæmia from cardiac or pulmonary disease.
3. Soft granular liver.
4. Atrophy from perihepatitis, including syphilitic disease.
5. Chronic atrophy of Frerichs.

I do not think this is a satisfactory classification. Cirrhosis is not a true atrophy; but, in addition, this group leaves out types now recognised, while it includes some which are vague and, to me, meaningless, notably 3 and 5.

The modern French school, led by Charcot, proposes a classification based on certain anatomical features of the morbid process, and would like to group all forms under three heads.

1. Multilobular, hob-nail, or common cirrhosis.
2. Monolobular, or biliary cirrhosis.
3. Monocellular, or syphilitic cirrhosis.

Careful study of this question has led me to reject this classification, while I recognise most cordially the valuable contributions made by this school to our knowledge of the histology of these diseases.

I believe the best division to follow, for the present, is an etiological one, and I distinguish the following types.

1. Alcoholic cirrhosis.
2. Cardiac or cyanotic cirrhosis.
3. Biliary cirrhosis.
4. Syphilitic "
5. Tubercular "
6. Malarial "
7. Scarlatinal "

I accept the last, provisionally, on the authority of Dr. Barlow, because there are many cases of cirrhosis in children which, while presenting the anatomical characters of ordinary cirrhosis, cannot be ascribed to the abuse of alcohol. I would add, that Dr. Crooke, our present able pathologist, has shown that a microscopical interstitial hepatitis exists almost invariably in scarlatinal livers, while Wagner, Biermer, and Klein, have observed the same thing. It is therefore desirable to differentiate this type, and to draw attention to the suggestion, that scarlatina may cause changes in the liver analogous to those undoubtedly caused by it in the kidneys.

You observe I do not use the terms "atrophic," or "hypertrophic;" and I avoid doing so, because I believe neither atrophy nor hypertrophy to be a fixed character of any one type.

Under the microscopes I have placed specimens illustrative of the changes observed in nearly all these types; and while I cannot, at the present time, go fully into the question of their clinical relationships and anatomical characters, I must say a few words in explanation of them.