ably delayed digestion, and that the stronger the solution the greater was the retardation.

b. Weak solutions, such as $\frac{1}{8}$ or $\frac{1}{4}$ of a saturated solution had little effect either in accelerating or delaying digestion, but when a solution of $\frac{1}{4}$ of a saturated solution was employed delay in digestion took place.

c. Strong or weak solutions had no marked effect in retarding putrefaction.

ON THE IMPORTANCE OF PERFORMING THE RADICAL CURE AFTER OPERATIONS FOR STRANGULATED HERNIA.¹

By C. B. LOCKWOOD, F.R.C.S.,

Surgeon to the Great Northern Hospital; Senior Demonstrator of Anatomy and Operative Surgery in St. Bartholomew's Hospital.

It is now the established custom amongst surgeons to complete the operation for strangulated hernia by ligaturing and removing the hernial sac. Others go further, and in addition to removing the sac, endeavour to repair the abdominal wall, and thus effect a cure. There is little doubt but that the mere removal of the sac has had a favourable influence upon the mortality of the operation, whilst the further proceeding of repairing the abdominal wall has effected many cures. In what follows I merely propose to bring together the kind of evidence which has induced surgeons to supplement kelotomy with removal of the sac or with a curative operation.

Of course patients with strangulated hernia are sometimes so critically ill that the idea of performing a prolonged operation, such as that of repairing the abdominal wall, cannot be entertained, or it may be forbidden by the condition of the intestine. But in the absence of such contra-indications it will be allowed that the ligature and removal of the sac is imperative, and the repair of the abdominal wall most expedient. The correctness of this proposition is very clearly borne out by the records of cases which were operated upon many years ago, and before removal of the sac was practised. Whilst working at another branch of this subject, I collected a number of such cases from the surgical records of St. Bartholomew's Hospital, to illustrate the accidents which used to happen. It is to be remembered, however, that these cases have been chosen from the records of a very large number of cases of strangulated hernia, because of their unusual character; and further, it is to be remembered that nearly all of them occurred before the operation of radical cure had taken its present position, and before antiseptic surgery had attained its present degree of perfection. And here I wish to thank the surgeons who have most kindly allowed me to mention the cases under their care, and my friend Mr. Bowlby for the assistance he has given me in obtaining the notes.

As far as possible the cases have been arranged so as to illustrate the accidents which used to happen, and which may reasonably be put down to non-removal of the sac, in the order in which they occur. Of course I am aware that the inferences which I have drawn from the facts are not always the only ones which could have been arrived at; but I trust that, even if the inferences be not accepted, the facts themselves may not prove uninteresting.

Taken thus in what may be called chronological order, we find that, when the hernial sac is not ligatured and removed, the intestine not infrequently comes down again. When this happens a few hours after the operation, there is no doubt but that the *recurrence* has taken place into the original sac. For instance, a man aged 59 was operated upon for a strangulated femoral hernia,² the sac having been opened but not removed. Soon afterwards the bowel descended again, and a finger had to be introduced into the sac to push the bowel back into the abdomen. This patient afterwards died of general peritonitis, and it seems reasonable to suppose that, had the neck of the sac been ligatured and fixed in the manner described later on, the "recurrence" at least might have been prevented.

¹ Read before the North London Branch of the British Medical Association.

² I regret that I have not always been able to ascertain the names of the surgeons who performed the operations.

In another case an accident similar to the last happened. A woman aged 63 had been operated upon for a strangulated femoral hernia of the right side, and reduction was effected without opening the sac. The obstruction seems to have been relieved, but next day the hernia recurred; the patient afterwards died, and, although the return of the hernia was not the actual cause of her death, yet it was a source of anxiety, and might have been prevented by a curative operation.

This case opens the question whether, when reduction can be effected without opening the sac, a curative operation would not be an unjustifiable addition to the risks. In the first place, we must not begin by assuming that reduction without opening the sac is in itself free from risk. The condition of the returned bowel or omentum is an uncertain factor, and they may have suffered so much from strangulation as to be in a dangerous state. Next it has been ascertained³ that the fluid which is effused into the sac of a strangulated enterocele becomes after awhile septic and capable of causing peritonitis, and ought not, when it can be avoided, to be squeezed into the abdomen. My own experience is that aseptic surgery has made the risks of opening and dealing with the hernial sac so trivial that they need hardly be taken into account; at all events, they are less than those of prolonged taxis. But, to continue with the question of recurrence, we find that when the neck of the sac is not ligatured the tendency of the hernia to recur may be very persistent. For example, a woman, aged 53, was operated upon for an inguinal hernia of the right side. The sac was opened and the bowel replaced, but next day the bowel came down again and was again replaced, only to return on the following day. The sac also became highly inflamed and full of purulent fluid, and there was general peritonitis. Sometimes it is the omentum and not the bowel which comes down again into the unobliterated sac. For instance, the sac of an oblique inguinal hernia of the left side was opened for the reduction of its contents, which consisted of bowel and omentum. These were replaced, but the omentum returned and protruded from the wound. There was also suppuration in the sac, but the man recovered. As might be expected when the hernia recurs, the loop of intestine which comes down into the unobliterated sac is not always that which was originally strangulated. A woman, aged 56, was operated upon for a right femoral entero-epiplocele which had been strangulated for four days. The strangulated bowel was deeply congested and covered with lymph. It was returned into the abdomen, but the patient sank, and it was afterwards ascertained that a fresh loop of ileum had entered the hernial sac, where it lay free from strangulation; whilst the damaged loop was within the abdomen, close to the femoral ring. In reading the notes of the examination of similar cases it is by no means an infrequent thing to find it noted that the sac contained a fresh loop of intestine.

The above extracts are, I trust, sufficient to show that when no attempt has been made to obliterate the hernial sac, or to perform a curative operation, a recurrence of the hernia is not a very improbable event. But, inasmuch as the hernial aperture has usually been enlarged, this accident is not of necessity followed by a return of the obstruction. Nevertheless, it is not devoid of immediate risk and anxiety, and may be the source of future dangers.

Another very rare complication may supervene when the sac is not removed. Mr. Marrant Baker operated upon a woman aged 20 for a right femoral epiplocele. Next day the sac protruded from the wound, but it shortly afterwards granulated over, and the patient recovered. It is to be expected that this accident, when it does occur, will usually happen in cases of femoral hernia, because in them the sac lies loosely in its bed, and has no firm connections.

I will now proceed with another accident which has already been incidentally mentioned, namely, *suppuration* within the sac. But first it is to be remembered that this accident is not always attributable to the operation. For instance, a woman aged 58 came in with an inflamed femoral hernia of the right side. The tumour gradually increased in size, and the skin over it became red and oedematous, with clear signs of fluctuation. The sac was opened, and found to be full of pus,

³ Bönneken : Ueber Bakterien des Bruchwassers eingeklemmter Hernien und deren Beziehung zur peritonealen Sepsis, *Virchow's Archiv*, Band cxx, Heft 1; also *Centralblatt für Bakteriologie und Parasitenkunde*, Band viii, No. 5, p. 147. See also Clado, note in *BRITISH MEDICAL JOURNAL*, October 26th, 1889, p. 928.

together with an adherent coil of intestine. The patient recovered, and left the hospital wearing a truss.

Or, again, in the following case, the suppuration in the sac may not have been altogether due to the sac having been left behind, as will be seen from its history. A young man of 19 was operated upon for a strangulated inguinal hernia of the right side. The sac was opened, and afterwards there was orchitis and suppuration, but the patient was suffering from gonorrhœa. More often, however, suppuration of the sac followed operations, and, as the cases show, does not seem to have been a very dangerous complication. For instance, it happened in a man, aged 51, who was operated upon for a congenital inguinal hernia of the left side, which, curiously enough, had only existed eight years. The operation was done in the usual way, and without dealing with the sac, which afterwards suppurated, but without preventing a safe recovery. It would be disingenuous to argue that a curative operation could have prevented suppuration in such a case as this, for it is obvious that the sac, consisting as it did of tunica vaginalis, could not have been taken away. But it is also evident that a curative operation would have greatly diminished the danger of infection of the peritoneum. That this is not an imaginary danger is shown by a case which has already been mentioned, in which, it may be remembered, the hernia twice recurred, and in which there was suppuration in the sac, together with general peritonitis. Therefore, inasmuch as the lower testicular part of a congenital inguinal sac cannot be removed, I am accustomed to irrigate it very freely with perchloride of mercury lotion (1 in 2,000), and afterwards sew it up with a continuous suture. Sometimes fluid collects in it, but I have never seen this kind of "hydrocele" give any trouble, and it soon subsides.

As a further instance of suppuration in the sac, and of the comparatively slight danger which seems to attend it, the case of an old man, aged 76, may be mentioned. He was operated on for a strangulated inguinal hernia of the right side. The sac was opened but not removed, and it afterwards suppurated, but the old man recovered. Other cases of suppuration in the sac might be mentioned, and they suggest that if the sac be not taken away—as can be done without risk in most inguinal and all femoral hernia—special care ought to be taken to irrigate and perhaps to drain, and thus guard against infection.

Sloughing of the sac is another complication which is to be apprehended, especially after rough taxis, and quite apart from any ligatures having been applied to its neck. For instance, in the case of a man, aged 34, who had had a right congenital inguinal hernia for ten months, which had been acutely strangulated for sixteen hours, rough taxis had been used before admission. This had been quite fruitless of good results, because the strangulation was due to bands within the sac. The intestine was quite black, and was returned, but the patient was constantly sick after the operation, and died twenty-eight hours after it had been performed. It was afterwards found that the bowel—which was quite black, thin, and rotten—had relapsed into the sac, but was neither perforated nor constricted. The sac itself had partially sloughed.

Should a patient survive the immediate danger of the operation of kelotomy, and should no attempt have been made to perform a curative operation, there is still danger of the hernia *relapsing*. There seems to be an idea abroad that after hernia operations the sac becomes obliterated and that, therefore, when the rupture forms again, it manufactures for itself an entirely new sac. That this belief is far from true is easily proved by reference to cases of congenital inguinal hernia such as the following:

A man, aged 29, had a right inguinal hernia, which came down into the sac of an undescended testicle. Upon four occasions this rupture became strangulated; on the first it was reduced by taxis; on the second the sac was opened, and its contents, which consisted of gut and omentum, returned; and on the third and fourth occasions he was again so fortunate as to escape with the aid of taxis. I suppose that now-a-days there would be no question about the propriety of performing the operation of radical cure upon such a case as this. Nor can we conceive that fresh sacs can have been formed in many of the following instances, which also exemplify the dangers of relapse.

A femoral hernia of the right side appeared suddenly in a woman, aged 48, and at once became strangulated. Sir William Lawrence operated, and put it back. She wore a truss, but fifteen months later the hernia was strangulated again, and the same distinguished surgeon operated successfully. Twice afterwards the rupture became strangulated, and was each time reduced by taxis. We may suppose that by this time the femoral ring was large enough to render the latter an easy procedure.

But when the hernia relapses a long time after kelotomy, then it seems not unreasonable to suppose that sometimes a fresh sac may have been formed. For instance, Mr. Thomas Smith performed a successful herniotomy upon an old woman, aged 70, for a strangulated femoral hernia. The rupture, which had existed for forty years, had been operated upon twenty years previously for strangulation.

Another woman had been operated upon twelve years before at St. Thomas's hospital for strangulated femoral hernia. Most probably the sac was not removed, for although she wore a truss, the hernia came down four times afterwards, and was reduced on three of these occasions by the late Mr. Callender, by Mr. Thomas Smith, and by Mr. Willett respectively; but the last time it was only reduced after an operation, performed by a surgeon whose name I do not know, which resulted in the patient's death from peritonitis.

It is curious to note the way in which these patients go from one hospital to another. Another woman had been operated upon by Mr. Hutchinson at the London Hospital, and when, some time after, the hernia relapsed, she came to St. Bartholomew's, where it was reduced by taxis.

The foregoing cases illustrate the dangers of relapse after ordinary kelotomy, and it may be assumed that a curative operation would have prevented many of these accidents. But it is not to be supposed that all could have been prevented, because, as I have shown, in my Hunterian Lectures on Hernia, in older people hernia is frequently due to prolapse of the mesentery. Now, when owing to this prolapse the excursion of the intestines out of the abdomen is many inches more than normal, and when the abdominal contents have gravitated into the lower part of the abdomen, it seems unreasonable to suppose that an operation on the aperture in the abdominal wall could always resist unusual strains. However, the curative operation is, under ordinary circumstances, no addition to the dangers of kelotomy, but quite the contrary; and, if it does not cure, it at all events prevents immediate recurrence of the hernia, suppuration in the sac, sloughing of the sac, prolapse of the sac, and infection of the peritoneum, should the wound have become infected. Indeed, the cases which have been mentioned seem fully to justify the present line of practice amongst surgeons.

Nor ought curative operations to be restricted to femoral and inguinal herniæ. This applies with especial force to congenital umbilical herniæ, for these, as is well known, are particularly dangerous when strangulated.

A woman was operated on at the age of 39 for a strangulated congenital umbilical hernia. The sac was not removed or its mouth closed, and strangulation occurred again seven years after. An operation was performed, but she died of peritonitis. Another case of umbilical hernia was operated upon for strangulation without removing the sac. The hernia came down again six years later and became strangulated, but was reduced by taxis. A curative operation was successfully performed upon another woman, aged 49, who suffered from a relapse of umbilical hernia a year after having had it operated upon for strangulation.

It may not be amiss to remark that relapse is more especially to be feared in cases of double or multiple hernia, such as the following, because the existence of several herniæ is indicative of prolapse of the mesentery. For instance, a woman, aged 63, had a right inguinal hernia, which had been operated upon for strangulation, and afterwards came down again. She also had a left inguinal hernia, which had to be operated upon, but which again became strangulated and was fortunately reduced by taxis. Also a patient of Sir William Savory had three herniæ, namely, a left oblique inguinal enterocoele, a right irreducible inguinal epiplocele, and a right femoral hernia. This man was 64 years old and 20 years before his femoral hernia had been operated upon by Sir William, but had afterwards relapsed. In such cases as these it seems

improbable that the abdominal wall could be made strong enough to resist the pressure of the prolapsed intestines, therefore, in them obliteration of the hernial sac and suture of the abdominal wall should be followed by the wearing of a truss.

In conclusion I ought, perhaps, to refer to the operations of radical cure which may be performed after ketotomy. But so much has been written and said upon this subject that this may be done very briefly. First, however, it is not to be expected that any of these procedures can be undertaken without danger unless perfect aseptic precautions are used and attained, and too much stress cannot be laid upon the importance of sterilizing the sponges, ligatures, instruments, and materials used in the operation.

No operation for radical cure can be relied upon which does not achieve two things: first, absolute obliteration of the sac without leaving a depression at its opening into the peritoneum; and secondly, the repair of the abdominal wall. Macewen's operation fulfils these conditions, and, as he and others have shown, can be practised with safety.

However, I have found that as regards the treatment of the sac it has not always seemed wise to fold it into a pad, as Macewen recommends. In femoral herniæ the sac is sometimes in such a condition that it has been impracticable to convert it into a pad, and therefore I myself have usually dealt with it as follows. Its neck is transfixed and then encircled with a long and moderately thick silk ligature, and securely tied. Next the ends of the thread are passed separately, about an inch apart, through the abdominal wall, well above Poupart's ligament, so that when they are pulled upon the neck of the sac ascends the crural canal and is fixed by tying the ligature. Afterwards Hey's ligament and the pubic portion of the fascia lata are brought together by suitable sutures, and the wound closed after having been irrigated with perchloride.

The operation for the cure of inguinal hernia is more difficult to perform, and is now described in all the recent works on operative surgery. However, before undertaking its performance, it is highly desirable to take opportunities to practise its several steps. Macewen's operation, as regards its difficulties, seems comparable to staphyloraphy and requires a good knowledge of anatomy and considerable dexterity for its efficient execution.

OVARIOTOMY PERFORMED FOR THE THIRD TIME IN THE SAME PATIENT.

By GEORGE BUCHANAN, M.A., M.D., LL.D.,
Professor of Clinical Surgery in the University of Glasgow.

OVARIOTOMY has never been the monopoly of gynecologists in Glasgow. Indeed, the first successful case was performed by myself in 1864. Since that time it has been done by the operating surgeons in the hospitals as one of the ordinary operations of their service; and of late years with an amount of success equal to that of the gynecological operators in special hospitals or wards elsewhere. All the particulars with regard to preparation, operation, and after-treatment are so well known and practised that we look forward to an ovariectomy with less apprehension than to most of the major operations of surgery.

In consequence, there is little written about it at the present day unless when some specialist desires to compare his results per hundred or per thousand with those of some other operator, or when a case which has been seen by one gynecologist, or become known to him, appears among the cases of another, with, perhaps, a slight difference of phase from that which it appeared to possess when first seen, or the result has been somewhat different from what appears in the report.

As, however, the following case appears to me, if not unique, at least most unusual, I shall report it in a few lines.

Miss F., a patient of Dr. Robert Pollok, Pollokshields, is at present aged 42.

In December, 1877, with Dr. Pollok's assistance, I removed a large unilocular cyst. The pedicle was tied with a silk liga-

ture, and dropped into the cavity. Recovery was rapid. She continued to menstruate.

In October, 1882, I again operated, and removed a large multilocular ovarian tumour from the left side. Recovery was rapid; menstruation continued afterwards, but gradually became somewhat irregular.

About January, 1891, she again became aware that the lower part of the abdomen was becoming fuller, with occasional pains. An ovarian cyst was again diagnosed by Dr. Pollok.

On June 30th, I again operated, and removed a cyst about the size of an adult head—thick-walled, with limpid fluid contents—but with a number of cysts projecting into the interior from the walls, and also a few thin-walled cysts on the exterior, near the pedicle, which was long. There were no adhesions, and no difficulty was experienced in the manipulation. The third day after the operation menstruation came on; thereafter the progress to recovery was regular.

REMARKS.—I presume that the first cyst was parovarian, and that the pedicle being long and slender, the ligature was applied to it distal to the substance of the ovary. The second cyst was decidedly the ovary; either the one not formerly involved, or the other, from which the unilocular cyst had proceeded. The third cyst was multilocular, and therefore probably ovarian. The menstruation which occurred on the third day was imminent before the operation.

A METHOD OF PERFORMING INGUINAL COLO TOMY, WITH CASES.

By F. T. PAUL, F.R.C.S.,
Surgeon to the Liverpool Royal Infirmary.

ONLY a few years ago lumbar colotomy was regarded as one of the most satisfactory of surgical operations. Its mortality was low, and the relief granted by it in some cases almost unequalled. Now the advocates of the inguinal operation give us a host of reasons intended to show how many may be the causes of failure in the lumbar operation. Strange that one practically meets with them so seldom. In my experience the only marked source of failure, in either right or left lumbar colotomy, has been the difficulty in completely cutting off the passage of *faeces per rectum* in some cases in which it was very important to do so. In the light of recent experience, I consider that when it is only necessary to open the bowel to relieve urgent distress the extraperitoneal operation is the more prompt, safe, and suitable; but that when it is desirable to divide the bowel, cutting off all communication with the part below, the inguinal operation is safer, easier, and better than Madelung's modification of lumbar colotomy.

The inguinal operation is undoubtedly easier to perform than the lumbar, but it has a source of danger from which the other is or ought to be free, and that is the danger of allowing faecal discharge to bathe a wound directly communicating with the peritoneal cavity. So serious is this that the pioneers—Messrs. Harrison Cripps, Jessett, and H. Allingham—all counsel delay in opening the bowel until adhesion has taken place between it and the wound. Each has his own special method of performing the operation, but the variation is directed in each case chiefly towards the ultimate opening of the bowel without risk of contaminating the peritoneum.

The object of the present communication is to point out how, by a very simple plan, this desirable result may apparently be safely accomplished without the usual delay.

CASE I.—In February, 1890, Dr. T. Eyton Jones, of Wrexham, sent me a case of extensive cancer of the rectum, occurring in a man, aged 46. His illness began in May, 1889, with diarrhoea, which continued off and on until he was operated on. In June he first noticed blood and slime in the motions. Sometimes they consisted of slime alone. He often suffered severely from pain over the lower part of the abdomen and back, which was usually relieved by the passage of motion. The constant loss of blood had rendered him very weak and anæmic. On admission he was well nourished, but very pallid. The rectum was painful and irritable. There was a copious discharge of mucus and a daily loss of blood. On in-