

FOREIGN BODIES LEFT IN ABDOMEN.

This is a subject the importance of which is frequently not appreciated by the physician until he is involved in a lawsuit concerning the same. Consequently in the following pages the author details some illustrative cases to call attention to the subject, that the danger may be recognized and avoided.

Lawsuit, Small Gauze Strip Extracted from Abdominal Sinus. In a case of retroflexion, Wiggin did a vaginal fixation and also removed the left ovary. Suppuration followed presumably from the stump. Later, laparotomy was performed for the removal of the ligatures. This was followed by an abscess in the abdominal wall and a persistent sinus. The patient then went to another institution, and later a small gauze strip was taken from the sinus. Suit was entered for \$10,000.

Dr. Wiggin contended that the gauze was not the kind he used in sponging, and that the small strip had probably been left in the sinus while the patient was being dressed at the other institution. Verdict for the defendant.

Lawsuit, Small Gauze Sponge Removed by Secondary Operation. The patient was operated on for appendicitis by Gillette. After the abdomen was open it was found that the trouble was tubal pregnancy. The appendix incision was closed and a median incision made, and through that the operation was completed. About four days after the operation the appendix incision began to discharge pus. Gillette treated this sinus persistently under the impression that it was kept up by unabsorbed kangaroo tendon, which might at any time be wholly absorbed and thus permit healing. After twelve months of this treatment the patient went to another physician, who, eighteen months after the first operation, did a secondary operation and found a small gauze sponge, after which the patient recovered. Suit was entered for \$5,000.

In the trial court the verdict was for the defendant on the ground that the cause of action, if any arose, was barred by the statute of limitation. The Circuit Court held that the trial court was in error and reversed the decision. The Supreme Court was divided equally on the subject, hence the decision of the Circuit Court was allowed to stand—verdict for the plaintiff.

Lawsuit, Sponge Left in Abdomen. Baldwin was made defendant in a suit, and a question that assumed much importance in the case was as to whether the responsibility for the count of the sponges lay with the surgeon or with the nurse. The suit against the surgeon was finally withdrawn, and legal action was begun against the hospital where the operation occurred.

Lawsuit, Sponge Removed at Secondary Operation. The patient was operated on for an abdominal tumor by Thorne. Several months later a secondary operation was performed by another surgeon and a sponge was found in the abdominal cavity. The patient recovered. Legal proceedings were begun against the first operator (Miss May Thorne) on the ground that she was guilty of negligence in not personally counting the sponges used in the course of the operation before the wound was closed.

The defendant denied negligence and held that the leaving of a sponge was an accident that could not always be avoided. She further said that, like a large number of other operating surgeons, she left the counting of the sponges to a responsible nurse—considering that it was the duty of the surgeon to keep his or her eyes continually upon the patient until the wound had been closed.

The judge, in summing up the case, said there was no doubt that the defendant was a skillful surgeon, but the question in this case was not as to her skill, but whether she had been guilty of want of reasonable care. The points for the jury were: (1) whether the defendant was guilty of want of reasonable care in counting or superintending the counting of the sponges; (2) whether the nurse was employed by the defendant and under her control during the operation; (3) whether the nurse was guilty of negligence in counting the sponges; and (4) whether the counting of the sponges was a vital part of the operation which the defendant undertook to see properly performed.

After a lengthy consideration the jury returned a verdict for the plaintiff.

Criminal Trial, Sponge Found at Autopsy. The patient was subjected to exploratory laparotomy by d'Antona. A carcinoma of the liver was found, and an unfavorable prognosis given. The patient recovered from the immediate effects of the operation, but died after a month. At the autopsy a gauze pad, 70 by 40 cm., was found and also two liters of pus. The physicians who made the post-mortem examination gave out a statement to the effect that the death was due to the presence of the sponge and the peritonitis and secondary pleuritis resulting therefrom. The public prosecutor then had d'Antona indicted and placed on trial for criminal negligence.

The verdict was that the patient would have died from the other causes present. The prosecutor then claimed that the hospital records had been falsified, hence a new trial was granted. In the second trial ten experts were called and they all testified that there was sufficient cause for death outside of any influence which the sponge within the abdomen might have had. The trial was then discontinued because of the absence of prosecuting evidence.

This case was reported by Prof. Pio Foa, who stated that, if the autopsy had been conducted by competent pathologists, such an erroneous report would not have been made, and the unfortunate trials would not have occurred.

Lawsuit, Sponge Left in Abdomen. The patient was subjected to abdominal section by Schooler. Later developments indicated that a sponge, sixteen inches square, had been left in the abdomen. Suit was entered for \$1,500. Verdict for the plaintiff.

Lawsuit, Sponge Left in Abdomen. The husband of the plaintiff was operated on for appendicitis by Hageboeck. It was charged that a surgeon's sponge had been left in the abdomen and that this caused an abscess which resulted in death. Suit was entered for \$50,000.

In two trials the jury disagreed. It was reported that in each trial the jurors stood 11 to 1 in favor of the plaintiff. The case was to come up for a third trial the latter part of the year.

Criminal Trial, Forceps Found in Abdominal Cavity at Autopsy. A patient with a large fibroid was operated on by Lassalette. Death occurred a few hours after the operation. Autopsy disclosed a forceps in the peritoneal cavity.

At the trial the operator was condemned to two months in prison for homicide through negligence. The sentence was served.

After serving the sentence, Lassalette put in a plea that the patient's death had not been caused by the retention of the instrument, but by nux vomica. The death occurred too soon to have been due to the presence of the instrument. It was proven that a midwife of bad reputation had a bottle of nux vomica in her hand at the house on the day of the death. This was an entirely new phase. The body was exhumed. Lassalette was acquitted.

Criminal Trial, Two Artery Forceps Found in Abdomen at Secondary Operation. The patient was operated on for ovarian cyst, December 22, 1897, by Prof. Kosinski and Dr. Solman, in the latter's private hospital. After a few days there appeared fever and a mass, which continued. In the meantime two artery forceps had been missed, and it was thought they might be in the abdomen. The disturbance persisted, and six weeks after the operation the abdomen was reopened and the mass of exudate investigated, but neither forceps nor pus was found. The patient was better afterward and went home, but did not get well. Later a hard mass developed near the umbilicus. Kosinski still thought the forceps might be in the abdomen, and insisted on another operation and offered to perform it gratis. But the sons would not hear to this, and the patient was taken to several other physicians, one after another, hoping to be cured without operation. Finally, six months after the primary operation, the symptoms became acute and threatening, and the physician who was called in insisted that the patient be taken to Kosinski at once, that he might perform the operation, which had then become imperative. This the family refused to do and called in another physician, who operated. On opening into the mass at the pelvic brim he found a cavity in which lay the two artery forceps. Both forceps had forced an entrance into the external iliac artery. The removal of the forceps was attended with a furious hemorrhage, from which the patient died on the table.

Legal action was entered against Kosinski and there was an extensive trial, with an imposing array of legal and medical talent. Six experts were appointed to testify in the case—Przewoski and Troichij to consider the pathologico-anatomical features, Krajewski to describe a modern laparotomy, Maksimow to criticize the operation as performed in this case, Pawlow to consider the various complications and mistakes that may occur in a laparotomy, and Neugebauer to supply the statistics which might be required in the trial. It was for use in this trial that Neugebauer compiled the list of

cases that he published the following year (1900), which publication has done so much to enlighten the profession on this subject.

The trial resulted in the acquittal of the accused as far as causing the death of the patient was concerned—it having been shown that he strongly insisted on a line of treatment which would probably have prevented the patient's death had the treatment not been peremptorily rejected by the family.

A curious clinical feature of this case was that, during the patient's illness, a number of radiographs of the suspicious area were made, but not one of them showed the forceps—the failure being due doubtless to defective technique.

Lawsuit, Artery Forceps Extracted From a Sinus. The patient was subjected to operation for a sarcomatous growth in the abdominal wall by Dollinger. The patient was three months pregnant at the time of the operation. She recovered from the operation and was delivered at term without any special disturbance. She became pregnant again. Her health was excellent and she was able to do all her housework. In the latter part of the pregnancy there appeared in the operative scar a swelling, which opened and discharged much offensive pus. The abscess was still further opened by the family physician. Within a few days she was delivered. A few days after the delivery an artery forceps was discovered in the abscess wall. The patient was sent to the hospital and the forceps removed by operation. The patient died two days later.

The husband of the patient demanded money of Dollinger, which demand was refused. He then went to the public prosecutor and endeavored to have a criminal prosecution brought against the surgeon. The prosecutor asked Dollinger for a written statement of the case, which was given. The prosecutor saw no evidence to warrant criminal proceedings, and dropped the matter.

The husband then brought civil suit, and for thirteen months Dollinger spent all his time defending himself. Sensational reports appeared in the public press, and it is said that the comic papers made capital of it and pamphlets on the subject were sold at the cigar stands. Though acquitted, Dollinger suffered irreparable damage from the sensational newspaper reports and the consequent notoriety. He urges strongly that some means should be provided by which reputable physicians may protect themselves from this species of blackmail and newspaper persecution, which necessarily results in serious loss.

Criminal Trial, Piece of an Instrument Left in Abdomen. A Paris surgeon lost part of a broken instrument in the abdominal cavity. The patient died. The surgeon was put on trial for manslaughter due to negligence. Result of trial not stated.

Lawsuit, Pair of Spectacles Found in Abdominal Cavity. The patient had three operations—the first in America, the second in Germany and the third in

France. The French surgeon found a pair of spectacles in the abdomen. The patient sought redress in the courts.

The outcome of the trial is not given, neither is it stated definitely who was sued. Neugebauer, who cites the case, blames the German surgeon—noting that he either left the spectacles himself or missed finding them if left by the previous operator.

Lawsuit Threatened, Gauze Compress Discharged Per Rectum. The patient had been subjected to vaginal section, for pelvic suppuration, by MacLaren. It was a very severe case. There was persistent bleeding requiring packing, and there were two secondary hemorrhages requiring repeated packing. The patient recovered. Two months afterward a very offensive discharge appeared and the patient extracted a twelve-inch strip of iodoform gauze from the vagina.

Suit was threatened, and, on the advice of his attorney, MacLaren paid the patient a considerable sum to avoid further proceedings.

Lawsuit Threatened, Cotton Compress Discharged Per Rectum. The patient had uterine fibroids, which Borysowicz removed by abdominal operation. Three weeks later a gauze compress was passed per rectum. Evidently the compress had been left in the peritoneal cavity at the time of the operation. The patient recovered and thanked the operator most gratefully for his services and left him her photograph. Six years later he received a number of letters from the patient's husband, threatening prosecution for malpractice if he did not at once pay a certain sum. The husband had no doubt heard of a lawsuit (Kosinski's?) then on at Warsaw, and thought it an easy way to obtain some money from Borysowicz. Apparently nothing came of the effort.

Lawsuit Threatened, Forceps Alleged to Have Been Passed Per Rectum. The patient was operated on for a suppurating ovarian cyst by Tuholske. It was an extremely severe case, but the patient recovered and regained her health rapidly. Twenty months later she wrote that she had given birth to a fine baby and felt well. Labor had been uncomplicated. The account continues: "Some five or six months after that (more than two years after the operation) the husband called on me and stated that for two or three months his wife had had some rectal trouble, supposed to be piles, and that a week ago, under considerable suffering, she had passed a forceps at stool. He brought it to me; it was a forceps such as is usually carried as dressing forceps in a pocket case—not a hemostat. I did not claim ownership. At any rate, if that forceps had been in the pelvis for two and a half years, during pregnancy and labor, without giving rise to a symptom or modifying labor, it was a remarkable occurrence. Three months after this episode the patient was reported well." In a later reference to the case, Tuholske stated that several demands were made for money, accompanied by threats of a suit. No attention was paid to the demands and finally they ceased. He expressed the opinion that it was an attempt to obtain money by blackmail.

The Question of Deception, Intentional or Otherwise. The repeated occurrence of this accident in the past and the possibility of its occurrence at any time gives an opportunity for designing persons to obtain money under false pre-

tenses. Neugebauer calls attention to this fact, and remarks that, following the newspaper publicity given the Kosinski trial, a number of damage suits, alleging the accident, were filed, and that in most instances they were cases of blackmail or extortion.

A case has been reported of a patient who, following convalescence from an abdominal operation, expelled pieces of gauze or thin cloth from the mouth. The patient claimed that the expelled pieces were vomited sponges, which had worked their way into the stomach from the peritoneal cavity. Suit was threatened. The matter was dropped, however, when the practical impossibility of the occurrence, as detailed, was explained to the patient.

When discussing the subject of foreign bodies left in the abdominal cavity, a physician related to the author some of the details of a case in which he had been involved. He performed an abdominal operation, and, some time following the convalescence, the patient came to him and exhibited a surgical needle and stated that the needle had been passed per rectum. The patient's statement was confirmed by a physician who claimed to have treated him at the time the needle was passed. Suit was threatened. On examination of the needle the operator found it was not the kind he used at the operation, and he became convinced that the alleged occurrence was an attempt at blackmail.

The matter dragged along for some time. The operator accumulated all the information he could concerning the subject and concerning the parties involved, and finally confronted them in such a way that they were forced to make a written statement, acknowledging that the needle had not been passed per rectum, as alleged. The needle exhibited had been obtained elsewhere for the purpose of threatening suit and extorting money.

Porter gives an account of a peculiar case bearing on this subject. The operation was for a parovarian cyst and hydrosalpinx and chronic appendicitis. The convalescence was normal and the patient left the hospital twenty-two days after the operation, feeling well. Eight days later, Porter received a telephone message from the patient's family physician, stating that he had removed several pieces of gauze from her vagina.

Quoting from the report, "On inquiry from him I learned that the pieces did not tear off, but came away, or rather were removed with forceps, in the shape of rolls about the length and size of a lead pencil, and after all presenting were removed others would present in a few hours, requiring that he visit her two or three times a day to take them away. The doctor thought that the pieces came from the pelvic cavity through an opening in the right side of the vagina about the size of a lead pencil.

"On the next day after learning of the matter, I visited the patient at her home with her doctor, and found the patient on a cot apparently suffering some pain, which she said was due to more pieces 'coming down.' She did not look sick. In reply to my question she said she felt well until she got a jolt on the car on her way home and that since then she had been having pain, which was worse at times, and had not been so severe since the pieces began to come away.

The first knowledge the doctor had of the nature of the trouble came through the patient's husband, who told him that there was a piece of gauze protruding from the vagina. I asked to see what had been removed and was shown a large number of pieces of different texture, whereupon I remarked that the goods were not such as I had used as sponges, that there were more pieces than had been used all told in the operation, and that consequently they had not been left in the woman's belly by me. It was averred that they could get into her belly only through the wound made by me and at the time it was made, because it had been closed, healed by first intention, and was still closed. The patient facetiously remarked that she 'supposed she swallowed 'em.' 'No,' I replied, 'had you swallowed them they would not come out through the vagina.'

"Dr. F. now asked the patient if she thought more 'pieces were down.' Being answered in the affirmative, he introduced a speculum and found that she was right. I removed the speculum, and, introducing my finger, came upon a small wad of something which, upon removal, proved to be a piece of ordinary white muslin about three inches wide by seven inches long, twisted into a rope and doubled upon itself so as to make a small ball or wad. It was perfectly clean, and was so saturated with what looked and smelled like urine that on squeezing between the fingers several drops were squeezed out. I examined the vagina with my finger, assuring myself that there were no more 'pieces' there, that there was no hole leading into the pelvic cavity and that, in fact, it was a perfectly healthy vagina and in nowise unusual except its cleanliness, for which, of course, the frequent wipings it received were accountable.

"In the presence of the patient, her mother-in-law and the doctor I said, pointing my finger at the patient, 'Doctor, I don't know where those rags came from, but that woman knows very well, and could tell if she would.' The mother-in-law objected to my statement rather forcibly, but the patient said nothing. I then took the doctor outside, told him that the woman was a malingerer and that we would give her a chance to put some more rags in for removal. We received one more piece before we left. Before leaving I insisted upon both the doctor and myself making a thorough inspection of the vagina with the eye and the finger as well. This was done, but no abnormality was found. It should be stated that some of the 'pieces' were tinged with blood, but not any of those removed at my visit."

Dr. Porter exhibited ten pieces of different size, shape and texture, and continued: "Eight days after my visit, Dr. Fisher reported 'no more exhibits.' So far as I know, no threat was made of a suit for damages, nor did the patient or her mother seem out of humor with me. The husband was at work and not present during my visit, although he presumably knew the day before that I was to be there, as I had sent word that I was coming."

In regard to the possible cause for the deception, Dr. Porter mentioned: 1, desire for money; 2, desire for sympathy; 3, desire to avoid work; 4, sexual perversity. He stated that during the patient's stay in the hospital nothing pointing to a neurotic condition was noted.

Schaefer gives the details of a case which emphasizes the fact that when a

piece of gauze is found in the abdominal cavity it does not necessarily follow that it was left there in a previous operation. The case occurred in the practice of Pryce Jones. Jones was called to see a woman with an abdominal swelling. This proved to be an abscess, which was opened and discharged a piece of cloth.

There had been no previous operation. The woman was insane, and had been in the habit of tearing up pieces of cloth and swallowing them. The swallowed cloth had evidently caused ulceration of the stomach wall, with subsequent perforation into the peritoneal cavity.

The noted intestinal "hair-balls," requiring operation, constitute another class of foreign bodies in the abdomen which were not left there by the surgeon.

Again, the professional "knife swallows" and "glass eaters" and their amateur imitators must be kept in mind. Fortunately the menu of these persons is limited, as a rule, to household articles. However, some such "actor," who has been relieved of his accumulated load by surgical art, might, from the intimate acquaintance, acquire a taste for surgical forceps instead of the usual nails and pocket knives. In that case a condition might easily develop that would make it very uncomfortable for the previous operator, though wholly without fault on his part.

THE REMEDY.

To make absolutely certain that no sponge or other foreign body is left in the peritoneal cavity at operation is a hard problem. The solution of this problem is considered in Chapter xv (see continuous sponges and long instruments).

4. Foreign Bodies Left in the Abdomen.

The absolute certainty of the removal of all articles carried into the peritoneal cavity is a subject that deserves most careful consideration. It is surprising how easily and quickly the intestinal coils will enfold an object and carry it out of sight and touch. The articles that have caused most trouble in this respect are sponges and forceps.

Sponges. A sponge left in the peritoneal cavity following an operation constitutes one of the most deplorable accidents of abdominal surgery. This is not a new subject. Much has been written upon it and many cases have been reported and many suggestions have been made as to preventive measures. But all such measures hitherto* proposed have broken down under the various circumstances and vicissitudes of surgical work, as evidenced by the records subsequently cited. In connection with this subject the author wishes to call attention to the following facts:

1. Sponges are lost in the peritoneal cavity much more frequently than is generally supposed. The accompanying table of reported cases will indicate the importance of the subject. And it must be kept in mind that the reported cases represent only a small portion of the recognized cases, for, naturally, the accident is not given publicity except where there is some special reason for doing so. In any large body of surgeons a little experience meeting, in which testimonies are freely given, will bring to light a number of unreported cases of this accident.

Furthermore, many cases are not even recognized. The patient dies with evidence of peritonitis; there is no suspicion of any foreign body having been left in the abdomen, no post-mortem examination is made and the death is supposed to be due to ordinary peritonitis. The possibilities in this direction are indicated by the fact that, in the series mentioned, in thirty-nine of the cases the accident was recognized only on post-mortem examination, when the sponge was found, but would have remained unknown had there been no autopsy.

*Before 1909. This text, up to the tables, is taken from the author's paper (*Am. Jour. Obstet.*, 1909, Vol. 59), in which the subject was considered in detail and a new and effective method described.

2. It is a most serious accident. In the large series of cases collected, more than one-fourth of the patients died, and of those who recovered many went through weeks and months of suffering.

3. To persons outside the profession the accident seems absolutely inexcusable. They can understand how other complications may arise, such as hemorrhage or sepsis or kidney failure, in spite of every precaution, but they can imagine no reasonable excuse for allowing a sponge to be lost in the patient's interior. To those not familiar with surgical work it seems past belief that the surgeon would carry into the peritoneal cavity anything the removal of which was not provided for with absolute certainty.

The growing cognizance of the public in regard to the occurrence of this accident and the feeling in regard to the responsibility for it are reflected in the increasing number of lawsuits connected therewith.

4. There has hitherto been no sure preventive method which was applicable in all the varied circumstances of abdominal surgery. The list of preventive measures recorded shows that much thought has been given to devising means for preventing this accident. Rules interminable have been proposed, and expensive and cumbersome racks and stands devised for the purpose. Not one of these devices, however, has proven absolutely safe, for the reason that in their use the certain removal of all sponges carried into the abdomen depends on the studied attention of the operator or on a system of attentive coöperation among assistants or nurses. While such attentive coöperation is entirely feasible under ideal conditions and with ideal persons, the fact remains that it is not secured and is not likely to be secured under the variable circumstances of abdominal work. The many emergencies which arise in the course of abdominal operations, the changing assistants and nurses, the hurried operations at night in the hospital with short help, the operations in private homes where the patient cannot be gotten to the hospital at all—all these conditions play havoc with safety arrangements depending upon a nicely-balanced system of rules and coöperation or on the use of cumbersome racks or stands.

There is not space here to take up in detail the various ways in which mistakes have occurred; suffice it to say that a review of the cases where dependence was placed on counting shows an appalling list in which a sponge was left, because one was hastily torn in two and one-half forgotten or an extra one was primarily included in the bundle and missed in the counting or an extra one was secured for an emergency during the operation or some loose piece of gauze, not intended for intraperitoneal use, slipped in while near the wound or a mistake was made in the final count of the sponges removed. It is astonishing what a slight inattention may lead to a sponge being left, and the consequent death of the patient.

The method of attaching a tape to each sponge and then fastening a forceps to the tape and at the same time to the abdominal sheet, is the method probably in most general use. It has a record of many accidents—the tape pulled off the sponge or there was a failure to attach the forceps or the forceps failed to hold

well. In one recorded case the sponge, tape and forceps were all lost in the cavity.

The difficulty of guarding absolutely against leaving a sponge in the abdomen is such that entire security against this fatal accident is counted one of the unsolved problems of abdominal work. Practically all writers on the subject state that there is no guaranty against its occurrence, even in routine hospital work and with all the rules of coöperation and the special apparatus designed to prevent it. Neugebauer, in a most exhaustive consideration of the subject, comes to the conclusion that the accident is, to a certain extent, unavoidable. Schachner, in an excellent paper, states, "So long as surgery continues an art, just so long will foreign bodies continue to be unintentionally left in the abdominal cavity." Findley states, "In former years the abdominal surgeon was seriously disturbed by well-grounded fears of secondary hemorrhage and sepsis, but surgery has mastered these problems to a large degree and they are little feared and seldom experienced. Now it is the thoughts of the sponge that disturb the night's repose when the report comes that something has gone wrong with our patient. The operator never can rid himself of the feeling of uncertainty as to the possibility of leaving a sponge." This expresses very well the feeling of those who have given attention to this subject and particularly of those who have personally experienced the accident and have thus been brought face to face with a concrete exemplification of the inadequacy of the usual methods.

The continued occurrence of this fatal accident and the failure of the preventive methods in general use constitute sufficient reason for calling attention to a method which the author has used with much satisfaction for several years. This method gives entire security and at the same time is simple and inexpensive, and is effective in all conditions of abdominal work—in the emergency operation in the country with unfamiliar assistants, as well as in the routine hospital work. The failure of the safety methods in general use is due to their dependence upon sustained attention concerning the sponges, which attention on the part of the surgeon cannot be given to the sponges, for it is required elsewhere. A method, to be effective under all circumstances, must be practically *automatic*, insuring the removal of all gauze without particular attention on the part of anyone at the time of the operation.

THE METHOD.

The underlying principle of this method is the elimination of all detached pads and sponges. In place of them long strips of gauze are used, each strip being packed into a small bag in such a way that it may be drawn out a little at a time as needed.

The author was led to a study of the subject and the adoption of this method by an unfortunate experience. Following the usual technique, he operated for years without accident, but finally some years ago he left a gauze pad in the abdomen. The case was one of diffuse pelvic suppuration, requiring extensive drainage, and, fortunately, the pad was discovered and extracted through the drainage opening about two weeks later. The patient recovered without serious

result from the accident—but the lesson was not lost. The author determined to find some method that would really prevent such an accident—a method which would be entirely under the control of the operator and first assistant (a greater division of responsibility increases the danger) and one which would occasion no delay in the closing steps of the operation. There had to be taken into consideration the large pads for holding the intestines out of the way and the small pads and gauze pieces for sponging. In place of several large pads for packing back the intestines, the large roll of gauze, then in use by a number of operators, was adopted and found satisfactory.

The matter of small pads and sponges, however, was not so easily disposed of. It was imperative to find some method that would do away entirely with dependence on the counting of the sponges at the close of the operation. As long as there was dependence on counting of the numerous small pads and sponges there would be mistakes, and consequently sponges would occasionally be left in the cavity. To eliminate this hazardous dependence on counting, and to provide a method that would make the leaving of a sponge in the abdomen practically impossible, was not an easy task. The problem was worked over for the greater part of a year. Various methods in common use for keeping track of the small pads and sponges were tried, such as clamping an artery forceps to a tape attached to each sponge, attaching a heavy ring to each tape before sterilization, clamping each tape or a corner of each sponge to the sterile sheet about the wound, and so on. But no method was found that was practical under all circumstances and absolutely safe.

It then became evident that if safety were to be secured, the detached pads and sponges must be eliminated entirely. In pursuance of that idea the author devised the method here described. The principle of this method is that no detached piece of gauze shall enter the abdominal cavity. Each piece of gauze introduced for sponging is simply part of a very long piece, the greater part of which is always outside the cavity. To make assurance doubly sure, provision is made for putting the large roll of gauze above mentioned into a bag, similar to the bags for the narrow strips, except that it is open on the side. As used, therefore, the set consists of the following:

CONTINUOUS SPONGES FOR ABDOMINAL SECTION.

Four narrow strips—10 yards (9 meters) long, 3 inches (8 cm.) wide—6 thicknesses.

One wide strip—5 yards (4.5 meters) long, 9 inches (23 cm.) wide—4 thicknesses.

Have another set of strips (4 narrow and 1 wide) in reserve.

For the Narrow Strips the yard-width of gauze is divided into two strips, and each of these, when folded to six thicknesses, is about three inches wide. For the Wide Strip the full yard-width of gauze is used—when folded to four thicknesses it is nine inches wide. Turn in all raw edges so that no raveling can be left in the abdominal cavity.

Pack each Narrow Strip into a separate small cloth bag, 5 inches wide and 10 inches deep (Fig. 740A) and attach a large safety pin to the bottom of the bag. The safety pin is to pin the bottom of the bag to the abdominal sheet at operation. Make the bag of extra heavy muslin or drilling, and sew with French seams to avoid raveling on the inside. The end of the strip first introduced to bottom of the bag should be fastened there securely by

stitching through and through. Then pack the strip firmly into the bag (Fig. 741) in such a way that it will come out easily, a little at a time as needed (Fig. 744). Four of these filled bags belong in each set (Fig. 743,A).

For holding the Wide Strip use a bag 6 by 10 inches, and open on the side instead of at the end (Fig. 740,B). Fold the strip back and forth, thus forming a flattened pile about five inches wide (see Fig. 742). Fasten one end of the strip securely to the bottom of the bag by sewing through and through. Then place the folded strip in the bag in such a way that, when pulled upon, it will come out, a little at a time, as a wide strip suitable for packing back the intestines. Fold over the open side of bag and pin with two large safety pins (Fig. 743,B). The safety pins are for fastening two corners of the bag to the abdominal sheet (Fig. 745).

One wide strip and four narrow strips constitute one set and are to be wrapped together in a cloth for sterilization in the usual way. Have also an extra sterilized set in reserve. At the operation the bag containing the wide strip is to be placed in hot normal saline solution. The narrow strips are to be used dry.

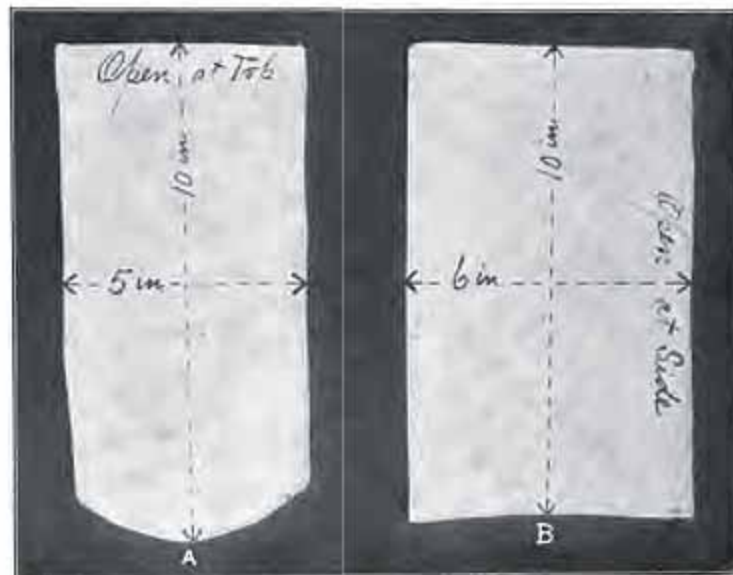


Fig. 740. The Cloth Bags Empty. A. Bag for each Narrow Strip. It is five inches (13 cm.) wide and ten inches (26 cm.) deep, and is open at the top. It is made of extra heavy muslin and is sewed with French seams, so that there is no chance for any raveling to be pulled out with the gauze. B. Bag for the Wide Strip. It is six inches by ten inches (15 by 26 cm.), and is open at the side. This bag is the same as those for the narrow strips except that it is one inch wider and is open at the side instead of at the end.

This method eliminates all chance of leaving a piece of gauze in the abdomen, for a large part of the strip is always outside the cavity, and the end is fastened securely outside. An important point is that the sure removal of all gauze is practically *automatic*. It does not depend on the accuracy of a hurried counting of sponges at the close of the operation nor on catching each sponge or sponge-tape with a forceps as it is put into the cavity nor on a studied "watching what sponges go in and what sponges come out of the cavity." Those methods that depend for safety on the observance of complicated rules or on the

strict following of a regular routine or on the constant attention of the operator, have all broken down under the difficulties and vicissitudes of abdominal surgery, as the reported cases clearly show. A method, to be safe and suitable for general use, must be practically automatic in the removal of all gauze carried into the cavity, must be comparatively inexpensive in materials and preparations, must be fairly simple and convenient in use, and must be applicable in every environment, including emergency work in the country. These requirements are met by the method here described.



Fig. 741.



Fig. 742.

Fig. 741. Packing the Narrow Strip into the bag. The end of the strip is caught with a forceps and carried to the bottom of the bag, where it is fastened securely by sewing through and through, and then successive portions are rapidly packed in with the forceps. When packed in thus, the gauze strip may be drawn out a little at a time as needed.

Fig. 742. The Wide Strip folded and ready to put in the bag. One end of the strip is first introduced to the bottom of the bag and fastened there securely by sewing through and through. Then the whole strip, folded as shown, is placed in the bag. When the strip is folded in this way it will, when pulled upon, come out as a wide strip, suitable for packing back the intestines (see Fig. 745).

The dangers from hemorrhage and sepsis in clean cases have been largely done away with through improvements in technique, and now this other serious menace in abdominal work should be eliminated. The patient has a right to demand, and is demanding as many lawsuits show, that *real protection* be afforded against leaving a sponge in the abdomen. It seems only justice to those who intrust

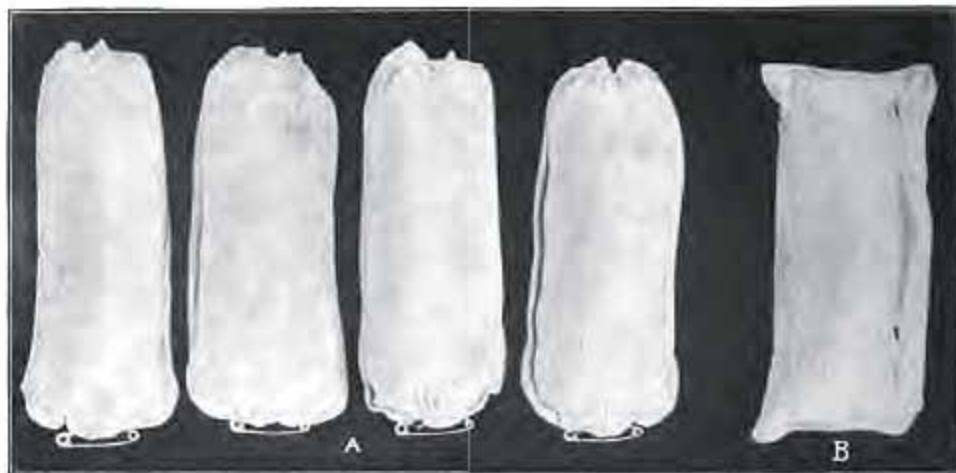


Fig. 743. A Set of Continuous Sponges. *A*. Four Narrow Strips. The safety-pin at the bottom of each bag is for fastening the bag to the abdominal sheet (see Fig. 744). *B*. Wide Strip. The two safety-pins closing the bag are used later for fastening the corners of the bag to the abdominal sheet (see Fig. 745).

themselves to our care that we should provide absolute security against this fatal accident, so far as such security is practically attainable.

The method here described simplifies the preparations for abdominal section—all the many pads and sponges of various sizes being replaced by five strips of gauze. The gauze is simply folded and then tacked by a few stitches at each end to prevent unfolding. Nurses as a rule welcome the method, stating that it is much less troublesome than the sewing of the numerous small pads and sponges. The bags may be used again and again after sterilization.

Many *questions* have been asked the author concerning this method by surgeons contemplating its use, but there is room here for only two.

"Do not the methods in general use give practical safety?"—The facts previously mentioned and the table of cases subsequently given answer that question to a large extent. Hitherto there has not been a method, practically applicable in all the vicissitudes of abdominal surgery, which would entirely prevent this accident. Practically all authorities state that it is to a certain extent unavoidable. Notwithstanding all the methods hitherto proposed, many lives are still being sacrificed to this accident. In spite of widespread interest in the subject in past years and of much study and investigation of it and several excellent papers by different authorities, there has been no signal advance. Ten years ago operators were using the same preventive measures now commonly employed. The sponges were counted, tapes were attached to the sponges that were counted, forceps were attached to the tapes that were attached to the sponges that were counted, etc. Yet with all these complicated precautions, many sponges were left in the cavity, as the records show.



Fig. 744.



Fig. 745.

Fig. 744. Method of Using the Continuous Sponges. Just before the incision is made, a bag containing a Narrow Strip is fastened at the side of the abdomen by pinning the bottom of the bag to the sterile sheet. If desired, the top of the bag may be pinned in like manner. The mouth of the bag lies conveniently near the wound, but not in the way. The end of the gauze strip is caught with the forceps or fingers and pulled out as needed for sponging, as here indicated. In a case where but little sponging is required, one bag will be sufficient. In a case where more sponging is likely to be required, it is well to fasten a bag on each side of the abdomen at the beginning of the operation. The bag on each side gives a sponge immediately at hand for both the operator and the first assistant. The convenience of this will be appreciated by those who have had to wait, in an emergency, for a sponge to be handed to them. [For photographing, the checked toweling was used instead of the usual white abdominal sheet, so as to show the white bag and strip better by contrast.]

Fig. 745. Method of Using the Continuous Sponges. As fresh portions of the strip are drawn out for use, the soiled portions are *not* cut off, but simply dropped down beside the bag and off the table. It is the *continuity* of the strip that insures safety, hence the strip should not be cut during the course of an operation. Troublesome accumulation of folds of the strip about the wound (with consequent tangling with instruments) may be prevented by always dropping the soiled portion outside the field close to the bag, as here shown. This photograph shows also the Wide Strip in place, ready to be used for packing back the intestines or walling off a large area or any other purpose for which large pads are ordinarily used. The bag containing the wide strip is preferably wrung out of hot saline solution just before use. It is then laid on the abdomen, opened, two corners pinned to the abdominal sheet, as here shown, and the strip drawn out as required. No detached pads or other pieces of gauze are allowed about the operative field, hence none can be carried into the abdominal cavity to be left there.

"Is not the strip of gauze extending from the forceps to the bag inconvenient and in the way when sponging?"—Sometimes it is in the way to a slight extent, but not as much as would at first appear. Any new method seems somewhat awkward at first, and this is no exception to the rule. However, in his experience so far, the author has not found any situation in which there was serious interference with satisfactory sponging or with any other operative manipulation. Like any other important step in technique, it should be studied until it is clearly understood before an attempt is made to use it. There are two particular points that may be mentioned. To prevent the accumulation of loose folds of gauze in the vicinity of the wound, the used portion of the strip should always be

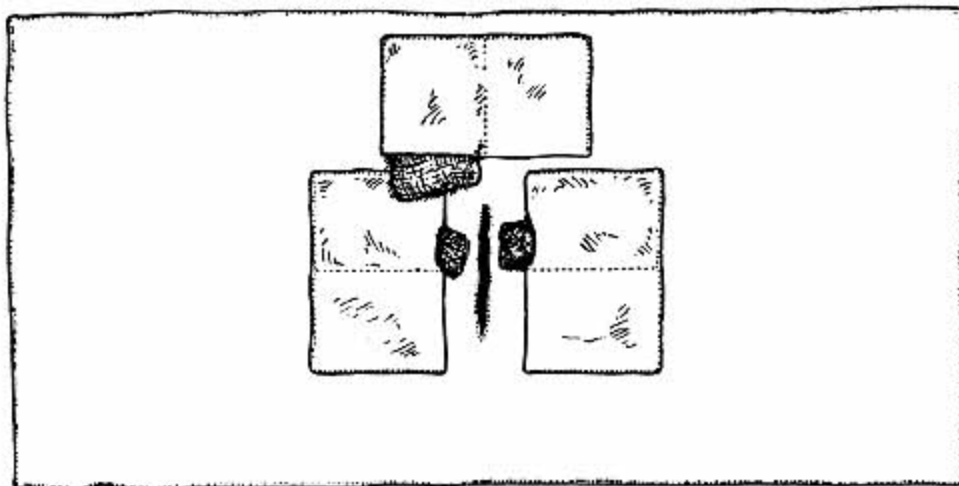


Fig. 746. Wakefield's Modification of the author's Continuous Sponges and Bags. Pockets are made in the laparotomy sheet and in these the continuous sponges are placed. Pocket space is provided, also, for the soiled strips.

promptly placed outside the operative field. Again, when taking hold of a fold, to sponge with, draw it out of the bag for some distance, so that it can be introduced into the abdomen as far as desired freely and without tension.

Modifications. Various modifications of the continuous sponges have been made by operators, some of the modifications seeming to be improvements and some seeming to be otherwise. Certain operators have apparently lost sight of the essential safety factors, namely, that the end of every strip must be fastened securely to the bag and that there must be no cutting of a strip during the course of the operation.

Wakefield's modification (*Am. Jour. Obstet.*, Oct., 1912) presents two improvements. First, the bags are fastened together, being formed by pockets in the laparotomy sheet, as shown in Fig. 746. Second, pocket space is provided for the soiled strips.

J. F. Percy uses bags made of exceedingly heavy canvas. The bags are large

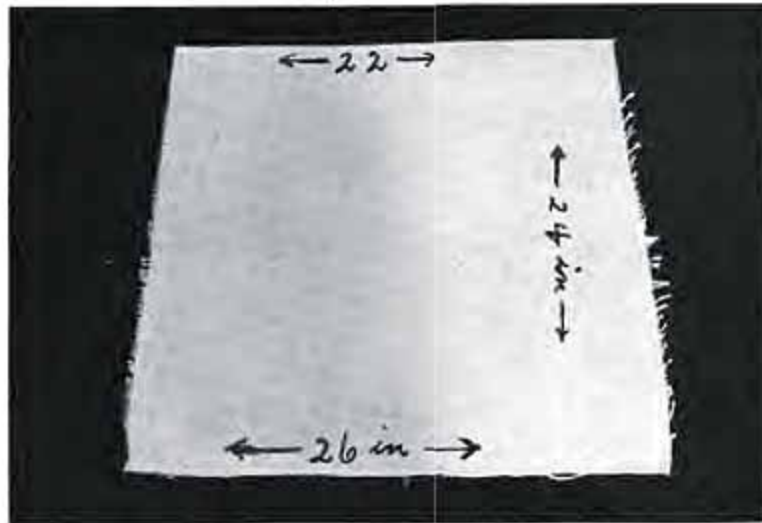


Fig. 747. Author's Modification of the Continuous Sponges and Bags. The piece of heavy duck (48-inch No. 4 duck) for making the bags for one side, is here shown. The dimensions are, top 22 inches (56 cm.), bottom 26 inches (66 cm.), and top to bottom 24 inches (61 cm.).

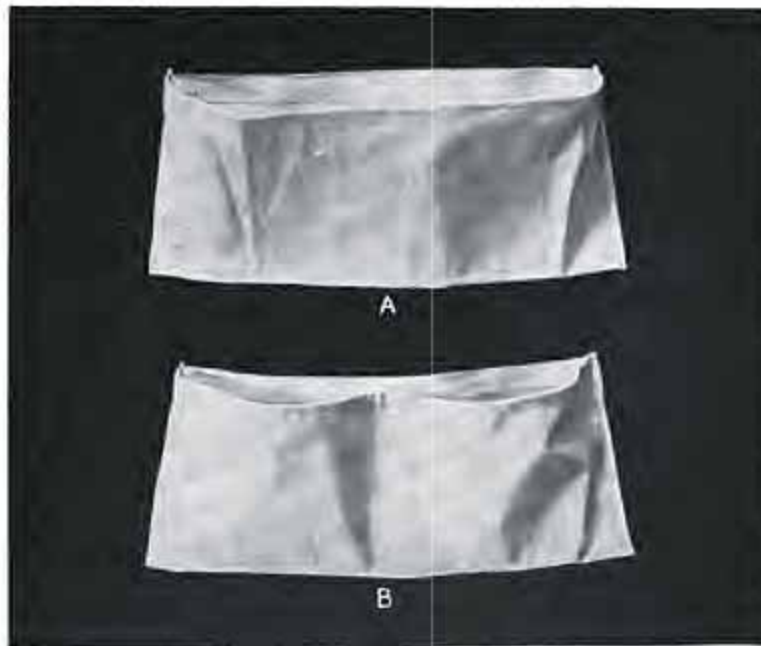


Fig. 748. Stages in the sewing of the bags. *A*. The first sewing has been completed, giving a large bag with the front edge longer than the back. *B*. The sewing which divides the bag into two large pockets has been completed. On one side, one of the large pockets is to be sewed down the middle, giving two small pockets, as shown in Figs. 749 and 750.

and contain spaces for the soiled strips. The bags are fastened together by tapes across the median line and fit over the abdomen somewhat like a pair of saddle bags.

AUTHOR'S MODIFICATION. In the modification shown in Figs. 747 to 750, the author has combined the good points noticed in other modifications, with some further ideas of his own. The same gauze-strips as in the original are used, but the bags are combined, instead of being separate, and a place is provided for the



Fig. 749. The bags filled and sterilized and ready to be applied to the abdomen. The end of each small gauze-strip is sewed securely to the bottom of the bag, as indicated by the black threads. The wide gauze-strip is to be removed from the large pocket, wrung out of hot saline solution, dropped back into the pocket and the tapes tied about the belting, as indicated in Fig. 750.

soiled strips. Also, the bags are fastened together across the median line and hold each other in place, thus eliminating the necessity of pinning the bags to the abdominal sheet.

You will notice (Fig. 749) that there are two narrow strips on one side and one wide strip on the other side, with a pocket on each side for the soiled strips. One end of each narrow strip is fastened by a stitch to the bottom of the pocket. This is shown in Figs. 749 and 750, where black thread was used so that it would show in the photograph. The wide strip is folded, as shown in Fig. 742, and is the same in every respect as there described, except that a small piece of tape is fastened to one end, as shown in Fig. 749.

The bags are made of very heavy duck (48-inch No. 4 duck), which presents three advantages—(a) it holds the shape better than lighter material, (b) it prevents bloody fluid leaking through from soiled strips, and (c) it keeps the hot saline strip from cooling so rapidly.

Attention to details in making the bags is necessary, in order to secure the most satisfactory results. From the 48-inch goods, a piece 26 inches long is cut. This is then divided in half, giving two pieces each 24 inches by 26 inches. Be-



Fig. 750. Indicating how the bags are to be used about the abdominal wound. The tape of the wide strip has been tied about the belting and part of the strip has been packed within the cavity, as in holding back the intestines. The first narrow strip has been used and the used strip has been packed in the large pocket for soiled strips on that side. The other narrow strip has been pulled out slightly, ready for use in sponging.

ginning at the selvage edge, a triangular piece, two inches wide at the top and running out near the bottom, is cut off from each end, giving the piece shown in Fig. 747, which is 24 inches long, 26 inches wide at the lower edge and 22 inches wide at the upper edge. The lower edge is hemmed, giving three thicknesses. This stiffens the edge. The piece is then folded, bottom to top, and the raw ends bound with tape as they are stitched together, so that no ravelings can be exposed. The front edge has been stiffened by the hemming and it is four inches longer than the back edge—hence the bag stands open, as shown in Fig. 748,A. It is next stitched down the middle, forming two large pockets, as shown

in Fig. 748,B. Another bag is then made just like this first one except that one of the large pockets is stitched down the middle, so as to form two small pockets, as shown in Fig. 749. The two bags are then fastened together with two-inch belting, leaving 8 inches between (Fig. 749). The end of a narrow strip is carried to the bottom of a narrow pocket and fastened there, as indicated by the black stitch in Fig. 749. The strip is then packed in the same as in Fig. 741. The other narrow pocket is filled in the same way. The wide strip, folded as in Fig. 742, is laid in a wide pocket of the other bag. The bags are then wrapped and sterilized.

At the operation, when the field has been prepared and the sterile towels and sheets placed, the two bags are laid on, as shown in Fig. 750. Being fastened together across the median line, they hold each other in place. The wide strip is removed from the pocket, soaked in the hot saline solution, wrung out and replaced in the pocket. The tape is then tied about the belting near the pocket, as shown in Fig. 750. Here a piece of black paper has been slipped underneath the tied tape so it would show in the photograph. The wide strip is then used to pack the intestines out of the way and the narrow strips are used for sponging. Fig. 750 represents the stage at which a part of the wide strip has been packed inside the abdomen, one narrow strip has been used and consequently is in the pocket for soiled gauze, and the other narrow strip is ready to be used for sponging. The stiffness of the heavy duck, hemmed, causes the pockets to stand open conveniently for tucking in the soiled strips.

The author finds it most convenient to so place the bags that the wide strip is on the same side with the operator, as in Fig. 750, supposing the observer to be the operator standing beside the patient. This places the two narrow strips on the assistant's side, where they are convenient for him in the sponging.

After the operation the tape is untied, releasing the wide strip, the stitches holding the narrow strips (black in Fig. 749) are cut, and the strips are removed, thus making the bags ready to send to the laundry.

When an additional large strip is required, it is wrung out of the saline solution and dropped into the pocket and the tape at the end tied, as was the first wide strip. For additional narrow strips, it is well to have a few packed in separate small bags, as in Figs. 741 and 743,A. When one of these additional narrow strips is required, the bag containing it is dropped into one of the emptied pockets and the strip is drawn out as needed.

Forceps. In about one-fourth of the recorded cases of a foreign body left in the abdomen, the article left was a forceps or piece of an instrument or other small object used about the wound. This calls attention forcibly to the fact that small instruments should not be allowed about an open abdominal wound. Neugebauer long ago directed attention to this danger of small instruments, and urged the use of long instruments exclusively in abdominal work.

Many surgeons have adopted this safety measure, but there are many others who seem to give no thought to the matter, and continue to use numerous small instruments in this dangerous locality. It may not be possible at present to