The International Journal of Surgery

Vol. XIV. MARCH, 1901. No. 3

Original Articles.

THE FATE OF SPONGES, LIGATURES, AND OTHER FOREIGN BODIES, IN THE PERITONEUM.

By Carl Beck, M.D., Chicago.

Professor of Surgery Post-Graduate Medical School.

The fate of foreign material which accidentally enters the human body, or is brought there purposely, seems to be known. Experiments and clinical experience have settled these questions, and to-day nobody seems to doubt the answers which investigators or clinicians have given out as facts. But once in awhile we have an experience which puzzles us and seems to overthrow theories to which we hitherto strictly adhered, so that the critical mind begins to raise the original questions again, or begins to doubt the axioms which he thought irreversible.

Particularly the fate of foreign bodies in the peritoneal cavity has been the subject of very interesting scientific discussions, as the result of which a number of conclusions and laws have been established.

A few cases which have come under my observation and the perusal of those observed by other authors, who simply related them without comment, have led me to consider this common and very exhaustively studied subject, in certain directions hitherto not much discussed. There are a few cases published of sponges and compresses left in the abdominal cavity by accident, and the peculiar outcome of some of them was almost miraculous. These large foreign bodies in some instances passed after severe symptoms into the bowel, and out of the same, leaving not even a trace behind them.

In a number of instances on record death followed, and how many terminated fatally which are not reported in the literature, or even known to the operator, God alone knows.

Rehn (*Archiv für Klinische Chirurgie*, Vol. 60, Pazina 305) reports a case of intestinal obstruction from a gauze sponge, which was left in the abdominal cavity by accident during an operation for pyosalpinx. The bowel, which contained the compress, seemed almost gangrenous, but showed no trace of the place of entrance of the compress. Rehn, nevertheless, believes the compress must have entered the bowel in consequence of a process of softening of the wall, adhesion, and gradual diapedesis.

Analogous observations had been made previously. In 1892, Pilate, in the Surgical Society of Paris, made a communication similar to that of Rehn. A week later Michaux reported a case very much like Rehn's, in which, after a secondary laparotomy, done by an excellent surgeon, after removal of the ovaries and uterus, symptoms of intestinal obstruction appeared, and during a third laparotomy a conglomerated mass of intestinal loops was found, containing an abscess, in which was enclosed an iodoform gauze compress just preparing to enter the intestine. The abscess broke during the manipulation and necessitated an enterectomy, from which the patient died.

These peculiar facts have led Jalagiuer and P. Mauclaire to make a number of experiments on dogs and rabbits, in order to determine what becomes of a compress or sponge left under different conditions in the abdominal cavity. They reached the very interesting conclusions that foreign bodies may be (1) absorbed; (2) encysted; (3) possibly enter into the intestine or uterine cavity. Penetration into the intestine they could not observe in post-mortem examinations, though they could see how the foreign body prepared to enter the cavity, by bulging into it (*la compresse en repoussant la paroi intestinale*). In the uterus, however, they found, in one instance, a compress which had penetrated into it from the peritoneal cavity, in which it had been placed. The foreign bodies tend to produce very vascular local peritoneal adhesions, which by their contraction push the body into the intestine. There it may produce a stercoral fistula with an abscess. From the intestine, which is irri-

tated, micro-organisms may pass and produce an abscess even in the case of sterile foreign bodies. I had a fortunate experience on two occasions with compresses forgotten in the abdominal cavity.

In a case, Mrs. S., upon whom I had to perform five laparotomies before she was cured of a large fibroma with double pyosalpinx, it happened that in the third operation a large laparotomy sponge was left. About a month later an abscess opened in the abdominal cicatrix, and the compress was extracted to the great chagrin of the nurse, who could not explain how she had counted in that instance, and to the dismay of the interne who controlled her counting. No stercoral fistula resulted from this accident, but a hernia, which followed, most probably is attributable to that long-standing abscess.

In another case a sponge was left accidentally by me during an operation of nephrectomy. The case was very much complicated by hemorrhage. The wound healed by primary intention, but the patient suffered severely, especially from tenesmus and foul rectal discharges, which I could not explain, until one day in an attack of syncope from straining at stool, she actually pulled out a large foreign body, which I recognized as one of our laparotomy sponges, which evidently had found its way into the rectum.

But these cases only temporarily interested me, and did not come to my mind again until I observed two other very interesting cases of foreign bodies resembling them in some particulars. I am sure many surgeons may have similar experiences.

Sponges are not left in the abdominal cavity purposely, but ligatures often are, and this applies to silk and other materials usually regarded as unabsorbable. What is the fate of the silk ligatures left in the abdominal cavity? Of course, every student knows it. It required, however, a great number of diligent experiments and observations to obtain the well known facts, and still it seems we don't know it all, at least I was not acquainted with the facts until I experienced them.

After many experiments and critical researches in Czerny's Clinic, Dr. Ludwig Hallwachs (*Langenbeck's Archiv*, Vol. 24, Pazina, 122) came to the conclusion that silk ligatures are encysted and changed in such a manner that the meshes of silk become filled with lymph. He believes that eight months and twelve days (the time he let the dog experimented on live), was too short a period to permit of absorption, which is, perhaps, possible after longer time. At least, Bantock (*Lond. Obstet. Trans.*, cited by Hallwachs) found one year after an ovariotomy a portion of the ligature gone, another portion encysted. Most authors, however, have found the ligature encysted even after years.

It is more likely that the thread perhaps made its way out by a process of suppuration into the intestine. Hallwachs explains a case of Hildebrand, in which he describes absorption of a silk ligature. In a post-mortem, a year after the operation, the stump divested of the ligature was found agglutinated to the ureter, the lumen of which was obliterated. Hildebrand explained the disappearance as absorption; Hallwachs thinks it more probable that the thread left the body by the way of the ureter.

Burdach, R. Wagner, Middeldorf, Maslowsky, Spiegelberg and Waldeyer have all experimented in this direction, and on looking over their observations I find that the nearest approach to an absorption they found was when the thread of silk was loosened and broken up.

Only one case — an operation for aneurysm — is cited in which Lister thought of absorption a silk ligature, because a year later he found the thread, so to speak, corroded. Hallwachs does not regard this argument as conclusive, and leaves the question open whether or not every organic material (vegetable or animal matter) is absorbed or encysted.

Rosenberger (*Archiv für Klinische Chirurgie*, Vol. 25), and Dembowsky (*ibidem*) have also studied the question experimentally; both, however, from different points of view. Dembowsky's studies related to adhesions and their consequences. So down to our times, there has been but one result of theoretical considerations, experiments, and clinical experiences, namely, the teaching that foreign bodies are either encysted or removed by suppuration. The latter occurrence, however, has only been surmised or suspected in many instances. J. V. Mikulicz (*Chirurgie, Bergmann, and Burns*) expresses it as follows: "Silk is infiltrated strongly and quickly, lymph cells immigrate into it, and if the thread is sterile, the silk is encysted and remains surrounded by fibrous tissue for years. While it remains in this state of encystment for years, as we can often prove easily by palpation, there seems to occur a sort of absorption in the peritoneum. The silk is acted upon by the leucocytes, it is broken up and absorbed like other small foreign bodies. So we see, that while the fine serosa sutures have disappeared, the ligatures which protrude into the lumen of the bowel are still *in situ*, even half a year after the operation."

But these conditions also permit of another explanation. Certain facts, and especially my observations in several cases, have led me to doubt this latter explanation. I observed some peculiar symptoms occurring in patients on whom laparotomy had been previously performed. These were often similar to the symptoms reported by other observers, who could verify their views during subsequent lapa-

rotomy. I shall relate some of these peculiar instances.

Case 1. A boy, six years old, was brought to my clinic in 1893, with a large left scrotal hernia, which caused him great pain. I operated upon him in the usual manner by isolating the sac and ligating it with sterilized silk. The incision healed by primary intention. About six months afterward the boy returned on account of recurrence of the pain. This time the symptoms pointed more strongly to the bladder. I now began to understand the hernia. It had been a consequence of the strangury which we had not diagnosed in the little patient. Much to my surprise I found after opening the bladder a stone of small size, consisting of a beautifully encrusted silk ligature. The bladder showed nowhere a sign of a perforation. Nevertheless, as the thread was the one used in ligating the hernia, there is no doubt that it found its way into the bladder where it w s encrusted.

Case 2. Christian D., of Michigan City, called on me last fall at the suggestion of a friend. He was despondent and about to commit suicide. He came from a homeopathic hospital where he had been told that an inoperable cancer was growing in his abdomen. He gave the following history: "Six months ago I was operated in the country for scrotal hernia of large size. The doctor had to remove a large piece of flesh. The wound healed, but broke open again, and the doctor removed a long silk thread. The wound healed again. Three weeks ago, while working, I was seized with a violent pain in my stomach and called the doctor. He said I had appendicitis. I got well, but since then I have the greatest difficulty to move my bowels; it seems as if I was going to burst and have most fearful pains." The examination showed a large irregular and very tender tumor of the size of a small child's head, which appeared very slightly movable. The diagnosis was uncertain, but an exploration was advised. The tumor was found to be a large convolution of the infiltrated omentum, adherent all around. In its center a loop of the small intestine was imbedded, bent at a sharp angle, and as I tried to separate the wall of the intestine the convex side proved to be perforated, and from the omental side a ligature of thick silk thread protruded from a granulating cavity, into the lumen of the bowel.

The explanation of the condition found was clear. The doctor, who operated on the hernia, had ligated the omentum with strong silk, and pushed the stump into the abdomen; here a condition was produced which by some writers is called epiploitis. The thread forced its way into the bowel, and I found it just at the moment when it was ready to slip in. Had I left it, and had the thread passed into the bowel, I could not have explained the condition.

Case 3. Mrs. McG. was operated on by me for a very complicated double pyosalpinx. I ligated the tubes, which were closely adherent to the bowel, applying the ligature close to the uterus, and on account of the adhesions I had to strip the bowel of its coatings close to the mucous membrane. There were many ligatures placed inside. A fistula formed in the lowest angle of the abdominal incision. The patient left the hospital and came back only to be dressed. She had never suffered with leucorrhea, but since the operation this set in. My assistant pointed out that the discharge came directly from the uterus, and I decided to curette before removing the organ. As I entered with the scoop, I pulled out a thread, a ligature of the stump. The leucorrhea ceased, but this case proved another puzzle to me; for now, so long a period after the operation, Mrs. McG. developed a fecal fistula. For a long time I did not understand it; but since I have had personal experiences of this kind, and read the reports of other observers, I understand it clearly. The first thread had found its way into the uterus, just as in the experiments of Mauclaire the compress left in the abdomen of the dog found its way into the uterus. The other thread passed through into the bowel, and this process was so protracted that the patient developed the fistula at so late a period.

Since I have begun to read the literature on this subject, I have found several instances recorded by others. Dr. Belfield, to whom I related my experience, told me of a case, indentical with case 1, and occurring in the practice of Chismore, of San Francisco.

In an article on epiploitis following operation, Dr. Schnitzler, of Vienna, reviews the subject, but from a different point of view. He regards the inflammation of the omentum, which he had observed in three cases, as a special disease. Though in almost every one of the cases cited by him mention is made of the fact that ligatures had been found, or used during the operation, he does not refer to the ligatures or foreign bodies as the cause of the disease, but explains that the omentum is often invaded by microbes and becomes the seat of inflammation. He tabulates twenty-four cases from the practice of other authors, and concludes that it is necessary to use prophylactic measures, to avoid thick silk, and not to tie *en masse*.

If we look over these cases, we find in all the one common fact, that silk ligatures sloughed through into the bowel, bladder, uterus, or in a word, some one of the hollow organs of the body, giving more or less symptoms. And this seems to be the uniform

outcome in many cases, in which the surgeon never suspects the presence of foreign bodies left accidentally in the peritoneal cavity, which do not become absorbed, nor encysted, but gradually slough through. Why should smaller ones of the same quality differ? Of course, we may find them *in situ* some time after the operation if they have been sterile, but only for a time. The gauze pads and sponges in Mauclaire's and Jalagiur's experiments had remained in place, but if they had waited long enough, they might have found them inside of the cavities, as they say themselves. This also explains the statement of Mikulicz, that silk sutures in the peritoneum after enterorrhaphy are absorbed, but those which protrude into the intestinal lumen are still present half a year after the operation. Those hanging into the interior are nothing else than the sutures of the peritoneum on their way into the intestinal cavity, while those which originally were placed into the mucous membrane have passed out already. Mikulicz explains the disappearance of the peritoneal sutures as the result of absorption, but he is uncertain, for he concludes by saying: "But these conditions also permit of another explanation." This process of sloughing of silk material into the cavity must be taken into consideration from two points of view, (1) as to its symptoms; (2) as to its sequelæ.

1. The symptoms may be slight and even imperceptible. The process may pass without any significant disturbance, or it may give rise to most alarming symptoms. (1) Hemorrhage may occur from the bowel, the bladder, or the uterus, as in some cases of laparotomy which cannot be explained in any other way. And these obscure hemorrhages are all the more dangerous, as they may escape notice. The blood changes its color, and all that may be noticed for some time is an anemia.

Dr. Leusman, of this city, consulted me once on account of such an obscure hemorrhage after appendectomy, and I told him I suspected a sponge left in the abdomen.*

2. *Abscess and Discharges.*—I have observed a number of cases of laparotomies which show considerable infiltrations around stumps, which later spontaneously disappeared. The discharge may keep on, and a stercoral fistula may exist, connecting two portions of the bowel, without causing a disturbance immediately, but it may be necessary to operate afterwards, as the symptoms may be most alarming.

Sequelæ.—In the intestine a small scar, if the process is completed, may be without significance; but if two portions of bowel are connected, which are far apart, for instance, duodenum and colon, then the fecal fistula may be very serious, as all the food passes along this short road. If the thread passes into the bladder, then a stone may be formed, and the same may happen in the pelvis of the kidney. What are the conclusions to be drawn from the observation of such facts?

1. Silk ligatures and sutures are not as harmless as universally regarded.

2. We should use, as much as possible, absorbable material.

3. If inabsorbable silk material is used, the thread should be small in size, as it takes much shorter time for such small ligature to pass through.

4. Interrupted sutures should be preferred to continuous sutures, as the latter take a very long time to slough out.

5. Symptoms arising from a buried suture must always be borne in mind, and eventually, if sloughing of a suture is suspected, a way should be opened for the thread so it may not take a dangerous route.

6. Some of the cases show that even absorbable sutures are subject to these laws, but in a minor degree.

*During the discussion it developed from a statement of Dr. Leusman that such was the case; the sponge was discharged by rectum and patient recovered.