

which I prefer to make slightly to the side of the summit of each band. The skin is then undermined on all sides, and it is surprising how much can be done through a small opening if the surgeon be possessed with the necessary patience and if he exert a proper amount of care. The band being freed, it is excised. In beginning cases portions of glistening palmar fascia, macroscopically as yet unchanged, are seen in the vicinity of the bands; these should be removed as thoroughly as possible. The palm should now be placed upon the stretch and carefully examined for other points of contraction. Bleeding is generally considerable; I prefer to control it, with this method of small incisions, by an Esmarch bandage about the wrist, being careful that hemorrhage has absolutely ceased before suturing. The edges of the wound are coapted by a through-and-through continuous suture of fine silk.

The fingers are placed in extension upon a dorsal wooden splint. Passive movements should be begun as early as possible; I have removed the splint and made these movements as early as the sixth day. The splint is omitted after the tenth day. The endeavor should be to perform the work thoroughly through a small incision, for operative wounds of the hands often do not heal kindly, and a large resulting cicatrix will not only be unsightly but may limit motion. I have done the operation under local cocaine anesthesia, but with the above technique I prefer a general anesthetic. Anesthesia for a period of a half-hour may be obtained by infiltrating the median and ulnar nerves with a 2 per cent. cocaine solution.

The method which I have here described is, in general, one which has often been employed, but I have outlined it in order to emphasize the fact that it is possible to perform the operation through smaller incisions than have heretofore generally been used.

TORSION OF APPENDICES EPIPLOICÆ AND ITS CONSEQUENCES.

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ALTHOUGH the anatomical nature of appendices epiploicæ has been thoroughly discussed, and loose bodies, or corpora aliena, in the abdominal cavity or in hernial sacs, resulting from torsion of their pedicles, have been reported at autopsy in quite a number of instances, until quite recently very little was known of their pathology. One of the earliest references to the pathological importance of appendices epiploicæ and their corpora aliena is contained in the

lectures on pathological anatomy by Wilks and Moxon¹ (1889), in which it is stated that "a surgeon found such a body in a hernial sac, and an altered appendix, still attached, was found to have caused the strangulation that made operation necessary." In 1894 Riedel,² of Jena, reported the removal of two corpora aliena which had given rise to symptoms of gallstone colic. No further communications appeared, however, until November 28, 1905, when Riedel³ contributed a paper on "Torsion of Appendix Epiploicæ and Its Consequences," with a report of 8 cases, of which the following is a *resume*:

CASE I.—Attacks of pain simulating gallstone colic; no tumor. Diagnosis of adhesion of gall-bladder. Two corpora aliena, almost as large as a cherry, were removed at the operation. Three years later the attacks recurred, and the patient committed suicide. At autopsy two more foreign bodies were found.

CASE II.—Student, aged twenty-five years. Four years ago an appendical abscess was opened, the distal end of the appendix coming away. Three indefinite attacks recently, apparently of appendicitis. At operation a yellow roundish foreign body 1.5 cm. long and 0.75 cm. thick slipped out of the peritoneal incision. The appendix, well closed distally, and apparently not inflamed, was lightly adherent to the cecum. Recovery.

CASE III.—Max B., aged thirty-two years; apparently typical attacks of gallstone colic, with jaundice. No tumor; vague tenderness in the region of the gall-bladder. At operation the liver showed numerous yellow plaques. The gall-bladder contained no stones; the bile duct was not distended. The omentum was adherent to the liver and the transverse colon, and two corpora aliena adiposa were lightly adherent to it. They were flat, roundish, calcareous bodies, one 0.75, the other 1.25 cm. long. A third body, still smaller, was lying free in the mesocolon. A number of appendices epiploicæ were hanging by a mere thread from the transverse colon, their distal ends not more than 2 or 3 cm. thick; none was twisted. Recovery.

CASE IV.—Mrs. W., aged forty-one years, symptoms of peritonitis, including fecal vomiting. Operation: Cloudy serum and shreds of fibrin in the peritoneal cavity. Jejunum and large intestine much distended; ileum less so. No appendicitis or cholecystitis. A crescentiform appendix epiploica, attached to the descending colon, with a flat, gray, foreign body about 1.5 cm. long and 1 cm. wide, lying free between it and the abdominal wall, was seemingly the sole cause of the peritonitis. The appendix epiploica was not twisted. Apparently it had straightened out after separation

¹ Lectures on Pathological Anatomy, 1889.

² Ueber Adäsv-Entzündungen in der Bauchhöhle, Arch. f. klin. Chir., Berl., 1894, xlvii, 153-215.

³ Münch. med. Woch., November 28, 1905.

of the distal end. The peritoneal cavity was flushed out and the wound closed. Patient died on the third day. At autopsy no further cause of peritonitis was discovered. A luxuriantly growing bacillus, apparently *Bacillus coli communis*, was cultivated from the central part of the corpus alienum.

CASE V.—Vomiting for fourteen days, finally fecal; general condition good. Operation: An oblong corpus alienum, somewhat constricted in the middle, and about as large as a bean, lay free in the peritoneal cavity. The parent appendix epiploica seemed to spring from the cecum, and was adherent to a coil of small intestine in such a way as to act as a constricting band. The small intestine was greatly distended. The appendix epiploica was easily removed. Recovery good.

CASE VI.—Gustav Gerhard, aged forty years; obstruction of the bowels. Operation: Fluid in the peritoneal cavity; jejunum greatly distended; ileum less so. In the right iliac fossa, arising from the left wall of the cecum, an appendix epiploica stretched across the ileum and was adherent by its twisted middle portion to the mesentery of a coil of small intestine, and compressed the ileum firmly against the posterior abdominal wall; the distal end, about the size of a bean, and still attached to the twisted part, was gangrenous. The ileum was greatly contracted at the point of crossing. The appendix epiploica was quickly removed; the ileum was opened about 20 cm. above the obstruction and the entire small intestine, which was very much inflamed, was emptied of its contents. The patient died on the following day. Autopsy showed peritonitis of a mild grade, as had been demonstrated at the operation.

CASE VII.—Hulda G., aged fifty-six years; admitted April 27, 1904. Eight days previously patient had complained of pain in left abdomen, and consulted a physician. In the right inguinal canal was a reducible hernia as large as a small apple, and on the left side, below Poupart's ligament, was a hard, insensitive, irreducible tumor of the size of a walnut, which, on operation, proved to be a femoral hernia. A necrobiotic appendix epiploica twisted once on its axis and adherent at the distal end was found in this hernial sac. Removal. Recovery.

CASE VIII.—Anna B., aged twenty years; admitted August 14, 1905. Has had reducible femoral hernia on left side for two years and an irreducible femoral hernia on the right side for fifteen months. Was taken with abdominal pain on the afternoon of August 13; left hernia sensitive and irreducible, but was reduced spontaneously during the following night, after a hypodermic injection of morphine. At 2 P.M. of the next day a corpus alienum 1 cm. by 0.5 cm., hanging by a fresh and still bloody thread of fibrin, was found in the left hernial sac.

Virchow, who, as quoted by Riedel, has given us a careful description of corpora aliena in all their phases, mentioned a case in which

the patient died with symptoms of peritonitis, and at autopsy a hard body, larger than a cherry, was found free in the peritoneal cavity; the vermiform appendix was normal.

The fact that changes in the fatty appendices of the colon may give rise to pathological complications of such magnitude as those described by Riedel excited considerable interest among other observers. Six further cases have been reported during the brief space of time which has elapsed since the publication of Riedel's paper, and the literature now contains detailed accounts of 14 cases in which appendices epiploicæ, or resulting corpora aliena, necessitated surgical intervention. In 8 of these cases the appendices were situated in the hernial sac, intra-abdominally in the other 6.

Lorenz⁴ reports a case of irreducible right labial hernia in a woman, aged thirty-three years, in which operation revealed a narrow, tense pseudoligament about 6 cm. long, among loops of intestine, inserted mesially to the neck of the hernial sac, and around which an appendix epiploica, arising from the colon, had become twisted and strangulated. The immediate parietal and visceral peritoneum was covered with fresh deposits of fibrin, and the twisted appendix showed several slight subserous hemorrhages and necrosis of the pedicle at the point of strangulation. The hand and strangulated appendix epiploica were removed, the intestines returned to the abdomen, and the patient made an uneventful recovery.

Shortly after the appearance of Lorenz's article, v. Bruns⁵ reported a case of irreducible left inguinal hernia in a woman, aged fifty-five years, who was suddenly taken with pain about eight days prior to operation. The skin over the hernial area was red and cedematous. Incision allowed a small quantity of fluid to escape, and revealed a gangrenous strangulated appendix epiploica, which was removed. The patient made a good recovery.

Muscatello⁶ reports 2 cases of hernial incarceration of appendices epiploicæ. One occurred in a woman, aged fifty-six years, who was suddenly attacked by violent femoro-inguinal pain, radiating all over the abdomen, and in which the diagnosis of strangulated crural hernia of the omentum was made. Operation under cocaine-adrenalin anesthesia allowed the escape of a clear yellow fluid, and the exposure of two appendices epiploicæ, measuring 2 cm. and 1.5 cm., respectively, attached by narrow pedicles to the sigmoid colon. One of these bodies was of a dark brown color; both were removed, and the patient recovered.

The other case appeared in a peasant, aged thirty-two years, who experienced a sudden attack of pain in the left inguinal region six months before observation. A month later the pain had entirely

⁴ Wien. klin. Woch., vol. xviii, pp. 1367, 1368.

⁵ Bruchinklemmung einer Appendix epiploica, Münch. med. Woch., 1906, liii, 16.

⁶ Bruchinklemmung der appendices epiploicæ und ihre Folgen, Münch. med. Woch., 1906, li, 1868.

disappeared; a small tumor was observed and continued to enlarge. A diagnosis of oblique external entero-epiploic inguinoserotal hernia led to operation December 9, 1905. Incision of hernial sac and removal of omental flap; an appendix epiploica was adherent to the posterior border of neck of hernial sac and twisted about 0.5 cm. from its colonic origin. A free appendix epiploica was attached about 0.5 cm. below neck of hernial sac. The sigmoid colon was adherent to the neck of the hernial sac for about 3 cm. Removal of appendices. Recovery. The latter case proves that hernial incarceration of appendices epiploicæ may occur and disappear spontaneously, but may later result in secondary changes, such as intestinal adhesions to the neck of the sac, the formation of external hernia, or may cause rapid enlargement of an existing hernia.

To the 2 cases of hernial strangulation of appendices epiploicæ without torsion, reported by Muscatello, and a third, reported by v. Bruns, Mohr⁷ contributes a fourth, which occurred in a rather fat male, aged sixty-two years, who first noticed a small, painless tumor in the region of left inguinal ring, three or four years before observation. It protruded frequently, but was always readily reduced. Recurred ten days ago; irreducible. Diagnosis of probable incarcerated omental hernia. Operation: Exposure of long delicate vermiform, free, fatty tumor, whose distal end was hypertrophied, presented hemorrhagic infiltration and was attached to posterior wall of hernial sac. The tips of two other appendices epiploicæ arising from the sigmoid colon had become strangulated at the neck of the sac and were about to undergo gangrene. They were removed. Recovery complete.

Kruger⁸ reports a case in which torsion of the appendix epiploica occurred within the hernial sac. A revenue officer, somewhat stout, aged fifty-six years, gave history of pain in right groin twenty years ago, which disappeared entirely after a few weeks; recurrence two years ago. Four days before admission to hospital he had another attack, with pain radiating from urethra to umbilicus; firm tumor in inguinal region. Diagnosis: Strangulated epiplocele. Operation, May 17, 1907, revealed an appendix epiploica, 4 cm. long and 1.5 cm. wide, springing from the cecum by a short pedicle, which had passed through the inguinal canal and had become twisted in the hernial sac, giving rise to inflammatory symptoms. The pedicle was ligated about 3 cm. above the inner inguinal ring and divided; removal of appendix epiploica, hernial sac, and neck. Recovery uneventful. Kruger states that it is possible that the inflammation might have disappeared spontaneously, as it did twenty and two years previously, respectively, but the likelihood of recurrence of torsion and gangrene, followed by peritonitis, justified the radical operation.

⁷ Brucheingklemmung von Appendices epiploicæ, Münch. med. Woch., 1907, liv, 170.

⁸ Zur Torsion der Appendices epiploicæ, Münch. med. Woch., 1907, liv, 1813.

Having briefly presented a synopsis of the cases reported in the literature, I now wish to report a case which came under my own observation, making the fifteenth case in which operation was necessary.

S., aged thirty-five years, with no history of previous abdominal trouble, was taken, at 4 A.M., September 26, 1905, with severe pain in the right iliac region. This gradually subsided, and he took the seven o'clock train for Davis, and from there drove several miles into the country. The pain increased so that he was compelled to return to Davis, where he saw Dr. Bates and received a hypodermic injection of morphine. He then took the train for Sacramento, where I saw him at 10 P.M. of the same day. The region of the appendix was painful and sensitive, and a tumor an inch and a half in diameter was distinctly palpable at the usual site of the appendix. The pulse was 80, the temperature normal. These findings remained practically unchanged until October 1, when the temperature rose to 100° F., and the operation was done. Presenting in the incision was a dense tumor about an inch and a half in length and one inch in width, having the appearance of a hematoma with a peritoneal envelop. It was universally adherent and was attached to the cecum by a narrow, rugous, and twisted pedicle. The neighboring glands were enlarged. The appendix, though seemingly normal, was removed. Recovery was uninterrupted. Macroscopic examination, combined with microscopic findings, showed the tumor to be an appendix epiploica, and the vermiform appendix to be normal.

In a study of the cases of torsion of appendices epiploicæ we find that they may be divided into two classes, intra-abdominal and hernial. Of the 15 cases reported, 7 were intra-abdominal, 8 hernial. As regards the intra-abdominal cases, in 5 of the 6 cases reported by Riedel there is no mention of torsion existing in any of the appendices at the time of operation; in 1 torsion was present; the seventh case is my own, in which torsion presented. In the 8 hernial cases, torsion was observed in 5: Riedel, 2; Muscatello, Krueger, and Lorenz, 1 each; strangulation without torsion was reported in 3 cases—Muscatello, Mohr, and von Bruns.

The intra-abdominal variety of cases may be further subdivided into (1) those in which the distal extremity of the appendix epiploica is adherent, and (2) those cases in which the distal end is loose or non-adherent. Krueger states that torsion of the appendices epiploicæ most likely results from disturbances of equilibrium, excentric development within the abdominal cavity (most cases occurring in fat persons during middle life or later) forming pedicles with hypertrophied distal ends. Circulatory disturbances, caused by progressive narrowing of the pedicle, produce inflammation of the distal extremity, which may result in adhesion to the parietal serosa, mesentery, or intestinal loops, thereby stretching

the pedicle into a still thinner band. These bands may give rise to symptoms of obstruction, due to intestinal strangulation.

When the distal portion is free the appendix epiploica may be entirely twisted off, either gradually or suddenly. In both cases free fatty bodies are formed, which may give rise to attacks of pain or peritonitis. It frequently happens that these free bodies undergo calcareous degeneration.

In the hernial group of cases appendices epiploicæ may become incarcerated in femoral or inguinal herniæ, most commonly on the left side. Of the cases reported, 7 occurred on the left, 1 on the right side. In the light forms the acute symptoms may disappear spontaneously, but it seems that the appendix epiploica remains in the hernial sac; it may be loose or it may become adherent and stretched to a thread-like thinness, or it may hypertrophy and be twisted off completely.

Strangulation of the appendix epiploica at the neck of the hernial sac, gangrene due to torsion of the pedicle, or separation of the distal portion of the appendix epiploica causes acute inflammatory conditions, which also involve the hernial sac. The pain is usually violent, frequently radiating to the hypogastrium. When the pain is referred to the back, cecal appendices are involved.

CONCLUSIONS. 1. Torsion of appendices epiploicæ is more frequent than the paucity of references in medical literature would imply.

2. Torsion of appendices epiploicæ usually occurs in persons more or less obese, during middle life and later.

3. Intra-abdominal torsion of appendices epiploicæ may simulate appendicitis, hepatic colic, cholecystitis, and various other intra-abdominal diseases. Torsion of appendices epiploicæ in the hernial sac may cause all the local symptoms of an acute omental or intestinal, femoral, or inguinal hernia.

4. Torsion of appendices epiploicæ may result in corpora aliena adiposa, in adhesions and bands, and their consequences.

5. Corpora aliena adiposa may become infected and cause general peritonitis.

6. In the present state of our knowledge anything more than a tentative diagnosis of torsion of appendices epiploicæ would be rarely possible.

7. Early operation is indicated in all cases.