

TORSION OF THE OMENTUM *

BY CHARLES E. FARR, M.D., AND R. F. BACHMANN, M.D.
OF NEW YORK, N. Y.

TORSION of any organ is rather uncommon. It is of interest chiefly from the etiological standpoint and from the variety of symptoms produced. The pathological findings are fairly simple, the end-results well known. The prognosis depends upon the tissue or organ involved and upon timely surgical intervention.

Torsion of the omentum is probably more common than is generally appreciated. Corner and Pinches,¹⁰ in 1905, were able to collect only fifty-one authentic cases. Morris,¹⁶ in 1932, added 160. Probably every surgeon of experience has had one or more but few are reported. For this reason the following seven cases are given in some detail—five collected from the First Surgical (Cornell) Division of the New York Hospital and two observed by one of us (Bachmann) at the Burbank Hospital, Fitchburg, Massachusetts. Our most appreciative thanks are hereby expressed to the various operating surgeons for the privilege of reporting their cases.

CASE I.—(DOCTOR FARR, New York Hospital.) D. C., an obese Italian male of twenty-one years, a chauffeur, entered the hospital January 31, 1932, complaining of a sharp pain in the right upper abdomen of three days' duration. Onset acute while driving auto. Pain constant, unrelated to meals, non-radiating, unaccompanied by nausea and vomiting or symptoms of collapse, but gradually increasing in severity until admission. At no time was there any nausea or vomiting, jaundice, gaseous eructations or other symptoms of gastric distress. Bowels slightly irregular of late; stools normal in color and consistency. Moderate tenderness in the right upper quadrant. No history of previous attacks. His abdomen was rather obese with a firm anterior wall. Tenderness with slight rigidity in the right upper quadrant where an indefinite sensation of a mass was elicited. Rebound tenderness was referred to the right upper quadrant. No herniæ. Leucocytes 15,400; polymorphonuclears, 72 per cent.; temperature, 99.2°; pulse, 80; blood-pressure, 116/32; icteric index, 10.3; urine, negative. A provisional diagnosis of acute cholecystitis was made and operation performed.

Operative Findings.—Moderate amount of free clear fluid on opening abdomen. The great omentum was divided into strands of which one had a very large terminal portion. This had become twisted about five times clockwise. It was gangrenous and the gangrenous portion was a flat disc about ten by eight by one-half centimetres. To this gangrenous omentum was attached another of the tongues of the healthier omentum, evidently a recent attempt to protect the gangrenous portion. Both pieces of omentum resected by double ligation. Exploration negative except for the appendix which was somewhat injected. There was a raw area on the appendix which was bleeding slightly, suggesting that the omentum had been attached to it and torn loose by manipulation. Appendix was removed by double inversion. Closure without drainage.

Pathological Report.—Chronic obliterative appendicitis and twisted omentum with hæmorrhage. Microscopical examination of omental tissue showed congestion of vessels and scattered small extravasations of red blood-cells.

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Post-operative Course.—Uneventful except for development of slight cough on third day. Stitches removed and dressing changed on sixth day. He was seen May 12, 1932, and was in excellent health.

CASE II.—(DOCTOR FARR, New York Hospital.) H. P., a male adult of forty-eight years, admitted to the hospital July 6, 1931, complaining of acute pain in epigastrium of one day's duration, severe and constant with no radiation. He continued to work and slept that night. The next day he tried to work and could not stand erect because of the pain. There was no vomiting.

The past history showed much belching of gas for three years with periods of freedom from discomfort. He was troubled with constipation for about one year.

Physical examination was negative except for definite rigidity in the right upper quadrant and epigastrium. There was severe pain on pressure in the epigastrium and rebound tenderness. No masses were felt. The leucocytes were 10,700; polymorphonuclears, 69 per cent.; temperature, 100.6°; pulse, 76; respirations, 20. Urinalysis was negative. The flat plate of the abdomen was negative save for hypertrophic changes in the lower lumbar spine. A preliminary diagnosis was made of subacute cholecystitis or perforating peptic ulcer.

Operative Findings.—No ulcer could be found and there was no free gas. The gall-bladder was normal. In the mid-line of the epigastrium was an omental tag of the lesser omentum, about three inches long, which hung down in the region of the pylorus and was slightly adherent to the adjacent viscera. It was freed and elevated and was found to have twisted 720° clockwise; three centimetres of the distal portion were gangrenous. The omental tag was removed after ligation of the base. Complete exploration of the abdomen was negative except for a small Meckel's diverticulum about two feet above the ileocecal valve. It bore no relation whatever to the gangrenous omentum. The appendix was normal and was not disturbed.

Pathological Report.—Only a hæmorrhagic tag of omentum. It is brown-red due to hæmorrhage beneath the surface and deep in. On frozen section there is much necrosis. The outlines of the fat cells are not distinct, but are suggested by the network of capillaries.

CASE III.—(DOCTOR CORNELL, New York Hospital.) H. W., a male adult of thirty-three years, admitted to the hospital September 10, 1927, complaining of sharp pain in the right lower abdomen of three days' duration. Onset of pain was sudden; pain was intermittent in character, but gradually increased in severity. He was slightly nauseated, but did not vomit. Bowels were constipated; no urinary symptoms.

Rigidity in the right lower quadrant of abdomen with tenderness and a suggestive mass. There was slight resistance in the left side of the abdomen, but very little tenderness. Rectal examination was negative except for tenderness in the right gutter. Temperature, 100°; pulse, 80; leucocytes, 12,000; polymorphonuclears, 76 per cent.; urine, negative. *Diagnosis.*—Acute appendicitis.

Operative Findings.—Appendix long, adherent and containing concretions; it was removed. Exploration of abdomen revealed that omentum was twisted and tip bluish-red in color. This was delivered into wound and found twisted nine times. Ligated and removed gangrenous area.

Pathological Report.—Infarcted fat—hæmorrhage and twisting of the omentum; sclerosed appendix.

Post-operative Course.—Patient had some discomfort (pain) first two days. After that recovery uneventful. Patient discharged cured on ninth day.

CASE IV.—(DOCTOR WEEDEN, New York Hospital.) L. S., a woman of thirty-two years, admitted to the hospital September 29, 1925, complaining of abdominal pain of forty-eight hours' duration. She had had a mild pain in the right lower quadrant two days before; twenty-four hours later it became severe, localizing in the right lower quadrant and epigastrium. Pain did not radiate to the shoulder, back or groin. No nausea nor

vomiting. Appetite, good; constipated. No jaundice. No previous attacks. Family and past histories negative.

Marked tenderness and moderate rigidity to deep palpation in the right lower quadrant over McBurney's point. The tenderness extended up the right side as far as the umbilicus. There was slight tenderness in the right upper quadrant over the gall-bladder. Left side negative. Urine showed trace of bile; leucocytes, 12,200; polymorphonuclears, 72 per cent.; temperature, 101°; pulse, 96. *Pre-operative Diagnosis*.—Acute appendicitis.

Operative Findings.—As peritoneum was opened a mass of omentum about six inches long and three inches wide which came from the transverse colon was found to be very much inflamed and somewhat necrotic. No reason for this condition could be found, as the omentum was not in contact with any other organ and there was no demonstrable twist of the pedicle. It was removed after ligation. Gall-bladder was swollen to half again normal size, walls were considerably thickened and it contained numerous stones. It was removed. Closure with drainage.

Pathological Report.—Cholecystitis subacute and cholelithiasis; peritonitis fibrinopurulenta—piece of omentum eight by five centimetres, much thickened, dark brown in color and in parts almost black. Microscopically showed marked engorgement of vessels, large blood extravasations in the interlobular connective tissue of omentum. Peritoneal covering of omentum much thickened by a fibrinopurulent infiltration of sub-endothelial connective tissue. This infiltration extended into neighboring fatty tissue.

Post-operative course.—Uneventful recovery. Discharged cured on fourteenth day.

CASE V.—(DOCTOR HITZROT, New York Hospital.) A. F., a woman of forty years, admitted to the hospital September 23, 1920, with intense pain in the right upper quadrant of the abdomen radiating to the right scapular region and left side, existing ever since discharge following first admission two months previously, at which time a diagnosis of cholelithiasis was made, although no definite evidence of gall-stones could be shown by X-ray. X-ray at that time was also negative for renal calculus, and any organic change in stomach or duodenum. Pain had existed for past seven months, especially after eating. She had considerable gas on stomach; unable to raise it. Nauseated but did not vomit. No jaundice except in scleræ. Difficulty in breathing during attacks. Since last admission pain has increased in severity and frequency. A very well-developed and well-nourished female of forty years, appearing in some pain. Abdominal examination showed moderate tenderness in the right upper quadrant, very severe in epigastrium just below xiphoid. Upper half of right rectus rigid. No organs palpated; no masses definitely felt, though there was an indefinite sense of a mass in the right upper quadrant. Stools normal. Urine showed a trace of bile. Leucocytes, 15,000; polymorphonuclears, 81 per cent.; temperature, 99°; pulse, 80. *Pre-operative Diagnosis*.—Acute cholecystitis.

Operative Findings.—On opening abdomen, gall-bladder seemed a little distended, but it was not adherent, contained no stones, and emptied quite readily. Further exploration showed an inflamed piece of fat attached to the gastrohepatic omentum and adherent to the suspensory ligament of the liver. After freeing this from the ligament an inflamed piece of fat was found plastered down on the anterior wall of the stomach in the region of the lesser curvature. After freeing it from this region, the stomach wall, except for a superficial irritation, was not involved and there was no evidence of any lesion in the stomach wall on careful examination. The piece of fat evidently originated from a pedicle which had become twisted, there being at least three turns in the pedicle. The fat itself was hæmorrhagic. Fat was excised between ligatures. Further exploration of the abdomen showed an appendix which was bound down at its base by a band of adhesions. The appendix was removed and its base inverted by double row of chromic. Examination of the uterus was negative. No cause for the symptoms was found other than the piece of strangulated fat above described. Abdomen closed without drainage.

Pathological Report.—Appendix showed nothing remarkable. Piece of fat, dark red

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in color, one and one-half by three by three centimetres; it had a short pedicle, around which the specimen had rotated, producing infarction of the fat.

Post-operative Course.—Recovery uneventful. Discharged cured on the thirteenth day.

CASE VI.—(DR. P. O'DEA, Burbank Hospital, Fitchburg, Mass.) M. H., a female of fifty-six years, entered the hospital in August, 1931, complaining of abdominal pain of four days' duration. Onset gradual, beginning as a dull ache in the lower abdomen, aggravated by walking. No nausea. Pain relieved by lying down. Bowels regular. No previous attacks. On morning of admission while walking she was seized by a very acute pain in the right lower abdomen, so severe she felt faint. She went to bed and the pain subsided; but she had a feeling that if she got up and walked she would have a recurrence of pain.

Some tenderness on palpation over the whole lower abdomen, most marked over right groin. No spasm. Rectal examination showed uterus to be small and movable; a mass was felt posterior to uterus, very tender, quite hard and not attached to uterus. Temperature, 97.4°; pulse, 99; respirations, 20. Urine showed one plus albumen, many leucocytes and pus, much epithelium. Leucocytes, 11,600; polymorphonuclears, 75 per cent. *Pre-operative Diagnosis.*—Undetermined; exploratory laparotomy decided upon.

Operative Note.—(Dr. R. H. Miller, of Boston.) Uterus contained one fibroid in fundus, size of cherry. Behind uterus a firm boggy mass which turned out to be a lump of semi-necrotic omentum about the size of an egg. Pedicle twisted on itself three to four times. Mass easily removed. Fibroid enucleated. Appendix not remarkable; removed.

Post-operative Course.—Uneventful recovery.

CASE VII.—(DR. G. P. NORTON, Burbank Hospital, Fitchburg, Mass.) G. Q., a woman of thirty-seven years; admitted to the hospital August 7, 1931, complaining of abdominal pain of a few hours' duration. She was suddenly seized with pain in the epigastrium, and vomited; the pain continued, but two hours later it localized in the right lower quadrant with tenderness throughout. Patient gave history of previous attacks of abdominal pain. Abdominal examination revealed tenderness in the right lower quadrant with some spasm; otherwise negative. Temperature, 100.4°; pulse, 76; respirations, 20; urine, negative; leucocytes, 12,000; polymorphonuclears, 85 per cent. *Pre-operative Diagnosis.*—Chronic appendicitis.

Operative Findings.—Twisted piece of omentum that was very much discolored and beginning to become gangrenous, about size of an egg. This mass was ligated and removed. Appendix long and inflamed, and tied down almost its entire length; removed in routine manner. Uterus and adnexia normal in size and position. Gall-bladder palpated; it was tense and stones could be palpated in it. Because of patient's condition and the great amount of fat, it was deemed advisable not to do any further operative procedure. Abdomen closed in layers.

Post-operative Course.—Uneventful recovery. Discharged on thirteenth day.

None of the cases were associated with hernia; it is true that in some of them the presence or absence of hernia is not stated, but it is assumed that such a pathological finding was not present. The same may be said of the presence or absence of free fluid in the peritoneal cavity upon opening the abdomen. Thus, the torsion was either idiopathic or associated with some other intra-abdominal pathological process, although in some of the cases it seems a little difficult to decide the exact status.

In addition to the above cases the senior author has seen on several occasions omental and epiploic tags which gave some, but not conclusive, evidence of having undergone torsion. It is quite probable that such occurrences are not rare. They may account for some of the evanescent attacks of abdominal pain, slight fever and malaise which are so difficult to explain.

To us the most interesting feature of torsion is its etiology. All torsions seem to occur in closed cavities, with low atmospheric pressures and smooth gliding surfaces. Such factors are common to torsion of the ovary, perhaps the most common of all, the testis, the tubes, the appendix, the bowel and finally the omentum. All are attached at one or both ends. The shape of ovary and testis is not unlike, the others are quite diverse. All have some sort of pedicle formation. All contain arteries, veins, lymphatics and nerves. All are subject in varying degree to external forces and changes in pressures, by muscular action, by the diaphragm, by the abdominal wall or by peristaltic wave. External violence as from blows, falls, manipulations, *etc.*, is common to all. Change of body position affects all alike.

Change in tissue structure or density preceding torsion may conceivably be a factor, for example, mild inflammations, œdema, adhesions, excess deposit of fat. Surely such factors are pre-disposing only.

The inciting cause of the first quarter turn (90°) is very easy to understand. Any change in body position, in intra-abdominal pressure, or any sudden increase in peristalsis, could easily rotate an organ in unstable equilibrium one-quarter turn. Why does the twisting continue, even to the point where untwisting becomes difficult or impossible? Many theories have been advanced, mostly based on the continued application of the forces above mentioned. Aside from peristaltic action, which is very impressive to one who has observed it on the operating table, these forces do not appear sufficient. They are either too feeble or not continuous enough, or have too little point of application, to effect complete torsion and strangulation.

Our only remaining common factors in organs subject to torsion are the structures themselves, namely the blood-vessels, lymphatics and nerves. Of the last it may be stated that we know little. It is conceivable, however, that they are able to send messages of distress which call for increase or at least change of action, principally as to blood supply and peristaltic motion.

Lymph flow must have considerable bearing. When retarded by even one-quarter turn of the pedicle, stasis results, œdema begins, the weight of the organ increases, and a tendency to sag, possibly even to twist can easily be imagined.

This tendency is much more pronounced in the case of the blood-vessels. The arteries are shorter than the veins, firmer, thicker walled. A beginning twist will cut off venous return long before arterial supply is greatly impeded. The veins distend, become tortuous and begin to wind around the arteries. The process of rotation is thus carried on, probably accentuated by hyperperistaltic action in neighboring organs, possibly aided also by muscular overactivity of the diaphragm, the abdominal wall, *etc.* In the meantime, passive congestion increases the weight of the organ and hinders any tendency to right itself. œdema is increased, hæmorrhages occur and finally infarction. Atrophy, complete necrosis or gangrene, or infection and peritonitis may be the end-results.

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We must confess that no one of these various hypotheses seems adequately to account for torsion of the extreme degree not rarely seen. Probably a combination of forces, rather than any one, is responsible.

Elaborate classifications of torsion of the omentum have been proposed by several authors, notably Morris.¹⁶ They are, in general, based on the presence or absence of hernia as an underlying cause and on the question of one pedicle or two, that is, whether the omentum is attached by adhesions to a hernial sac or ring, or to some other part of the peritoneal lining. The natural classification of acute or chronic or recurrent type is also used.

The symptomatology of torsion of the omentum presents no outstanding characteristic or pathognomonic features. Perhaps the one striking observation in our series is that the surgeon was never convinced of the accuracy of his pre-operative diagnosis. The signs and symptoms, the history and the laboratory findings pointed to an intra-abdominal surgical emergency but never to a definite positive diagnosis. The correct diagnosis was never made, never even suggested or considered. It is perhaps only fair to state that in this series hernia did not appear.

Diagnosis of torsion of the omentum has seldom been made pre-operatively. The presence of a hernial orifice, a history of pre-existing, easily reduced hernia, and the finding of a soft, rather doughy mass in the right abdomen, are suggestive. The remaining signs and symptoms with the laboratory findings point only to an intra-abdominal lesion of moderate intensity but without indications as to the specific organ involved. The absence of nausea and vomiting, the low leucocyte and polymorphonuclear percentage, the relatively mild reaction to palpation in our series are interesting observations.

The prognosis in omental torsion is quite favorable if timely surgical intervention is instituted. There was no mortality in our cases. The natural risks from anaesthesia and laparotomy in stout people of adult years must be considered. Post-operative pneumonia, embolism, wound infection, peritonitis are ever-present dangers.

The treatment is purely surgical. It consists of removing the strangulated mass and covering the stump with peritoneum if possible. Any attempt at untwisting is unwise, usually is impossible.

CONCLUSIONS.—(1) Torsion of the omentum is an abdominal condition occurring more frequently than is ordinarily supposed; it is difficult to diagnose pre-operatively, but would probably be recognized more frequently if considered more often in the differential diagnosis of abdominal pain.

(2) Torsion may occur without apparent cause (so-called primary idiopathic torsion) or may be secondary to other pathological processes, such as inflammation, neoplasia and hernia.

(3) The condition is especially apt to occur in obese or well-nourished individuals, and may be initiated by abdominal trauma or severe physical exertion.

(4) The symptoms and signs are those of peritoneal irritation plus the rapid formation of a mass, palpable in many cases.

(5) Torsion is most often confused with acute appendicitis with appendiceal abscess; less frequently with acute cholecystitis. In cases associated with hernia it is often diagnosed as incarcerated or strangulated hernia.

(6) The prognosis is excellent with timely surgical intervention. Stout, middle-aged patients are poor surgical risks at best. The mortality is due to complications.

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