

TORSION OF THE GREAT OMENTUM*

REPORT OF TWO CASES

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TORSION, or twisting of the omentum on its long axis, has been recognized for a long time as a rare clinical entity although the diagnosis of this condition has seldom been made before operation.

Aimes¹ credited Marchette with the report of the first case of torsion of the omentum, in 1851; Oberst,¹⁹ however, was the first to record this condition, in 1882. Demons⁶ reported another case, in 1893. In each of these two cases, a right inguinal hernia acted as a predisposing factor. Eitel⁹ (1899) was the first to report a case of omental torsion unassociated with a hernia. Since that time many reports have appeared in the literature, notably that by Corner and Pinches,⁵ which collated 54 cases up to 1905 (including three of their own), and that by Morris,¹⁷ in 1932, in which 161 authentic cases of torsion of the omentum, from 1905 to 1930, were compiled, and three personal cases were added. His own series and that of Corner and Pinches permitted Morris to make careful analysis of this condition. The results of this study show that, while torsion of the omentum may occur at any age, it occurs most frequently between the ages of 30 and 50 (83 cases, 52.5 per cent); that males are more commonly affected than females in a ratio of two to one, and that the condition is associated with inguinal hernia (89 per cent in Corner and Pinches's series, and 50.3 per cent in Morris's). The analysis of Morris's cases further emphasized the facts that the herniæ were of the right inguinal variety, were scrotal in type, of long duration, easily reducible, and that they almost invariably contained omentum.

McWhorter,¹⁶ in 1928, reported 26 cases (including two of his own) of torsion of the omentum of the so-called idiopathic type, that is, cases arising within the peritoneal cavity, not associated with hernia, in which the causative factors were obscure.

The series reported here consists of the 16 cases reported in sufficient detail for analysis, since 1932, with two additional cases not previously reported (Farr and Bachman).

The classification offered by Morris is simple, though comprehensive, and facilitates the study and understanding of this condition:

- (A) Complete Torsion:
 - (1) Acute torsion with hernia
 - (a) Hernial
 - (b) Hernial and abdominal (combined)

- (2) Acute torsion without hernia (purely abdominal)
 - (a) Primary or idiopathic (unipolar)
 - (b) Secondary (unipolar and bipolar)
- (B) Incomplete Torsion:
 - (1) With hernia
 - (a) Hernial
 - (b) Combined
 - (2) Without hernia
 - (a) Primary
 - (b) Secondary

Farr and Bachman ¹¹	7 cases	Lucca ¹⁵	2 cases
Bergquist ³	2 cases	Barsky and Schwartz ²	2 cases
Poling ²¹	1 case	D'Errico ¹⁰	2 cases
Total 16			

Under this classification, it is understood that the terms "complete" and "incomplete" refer to the degree of torsion, complete torsion signifying cases in which the twisting of the omentum on its axis has caused sufficient interference in circulation to produce evidence of strangulation in the affected part of the omentum.

It is claimed that incomplete torsion may be of the "recurring" type, and that it is a definite clinical entity which can be recognized as such. Patients suffering from recurring abdominal pain may have temporary twists of the omentum. The "omental ball" and the omental fibrotic thickenings occasionally found, result from these recurring attacks of incomplete torsion of the omentum. The chronic changes occasionally found in the omentum in acute omental torsions seem to substantiate the occurrence of the recurring type of incomplete torsion. The case reported by Barsky and Schwartz,² for example, points strongly toward this possibility. A child, five years of age, had a history of frequent "colic" and, at operation for acute torsion, the omentum showed definite fibrotic changes.

Most cases of torsion are associated with hernia; a certain number, however, are caused by inflammatory foci within the abdominal cavity, which produce an inflammation in the neighboring omentum by contiguity. This may be true in cases of mild or subsiding appendicitis or cholecystitis in which the original focus subsides, but the changes induced in the omentum persist. The presence of a hernia containing omentum may eventually produce changes in the latter by means of constrictions or twisting of the pedicle in the neck of the hernia causing thickenings in the portion of the omentum within the sac. Thus a pathologic locus in the omentum is instituted.

Etiologic factors of torsion have also been traced by some (Robinson²²), to the function ascribed to the omentum, that of "the policeman of the belly." It has been assumed by many that the omentum plugs up a perforation in a hollow viscus, and wraps itself around or attaches itself to an inflammatory focus in an attempt to wall-off the rest of the peritoneal cavity. This view

was flatly contradicted by the studies of Draper and Johnson,^{7,8} whose critical review of the literature and of experiments conducted to clear up these points led them to believe that the only function of the omentum is bactericidal and absorptive, and that it possesses no automotive or ameboid characteristics of negative or positive chemotaxis.

According to Draper and Johnson, only in the quadruped has the omentum any definite function. It serves as a fat pad between the viscera and the hard abdominal muscles, and as a storage place for fat during the lush feeding period. In man, it is a vestigial organ, variable in size and shape. Some persons have an omentum so small that it is hard to conceive its possessing any function at all. Any apparent protective powers displayed by the omentum are purely accidental in nature. The author is inclined to accept this view for, were the omentum to possess a function, it would gain a more definite place in pathology. Pathologic conditions of the omentum are comparatively rare and are associated in the great majority of cases with inguinal hernia or some other intra-abdominal pathologic change.

The more acceptable predisposing causes, in the idiopathic type of torsion, are anatomic and physiologic in nature. The omentum is variable in size and deposition of fat. It may be in the form of an apron, with irregular deposits of fat, or may be composed of several fat-laden strings. The right side of this structure is usually lower than the left and may reach into the pelvis. There may be accessory omental lobules of moderate size attached to the border of the main omentum.

In addition to being the seat of more frequent pathologic processes, the lower right quadrant is also the place of greater physiologic activity; intestinal peristalsis and changes in intra-abdominal pressure tend toward the right side. This seems to be borne out by the significant findings of Bernstein⁴: "That, in spite of ovarian tumors occurring with almost equal frequency on both sides, yet torsion of these is twice as frequent on the right as on the left side." This impression is further strengthened by the fact that almost all cases of torsion are found in the right half of the abdomen, especially in the lower right quadrant.

Payr²⁰ offered another explanation for the occurrence of the abdominal type of torsion on the basis of the fact that the omental veins are more tortuous and more easily compressed than the arteries. According to him, engorgement of the tortuous veins may cause a partial or complete torsion of the omentum. Other factors then enter—the degree of twist, interference with the circulation beyond it, the anatomy of the omentum, or possibly a pathologic condition of the omentum itself. Recovery may ensue or the process may go on to complete atrophy or gangrene. Cases have been reported in which the omental tumor thus produced, became parasitic through its attachment to other viscera.¹³

Contributory factors mentioned in the literature, such as trauma to the abdominal wall, coughing, efforts at lifting, bicycle racing, hard labor, inges-

tion of heavy meals, violent purgation, or the taxis of hernia, probably act to complete an existing process of incomplete torsion. The conclusion may reasonably be reached that, in the greatest percentage of cases associated with hernia, the easily reducible portion of the omentum within a hernial sac undergoes inflammatory changes, the pedicle is gradually thinned-out and the repeated traveling of the herniated portion of the omentum in and out of the sac leads to torsion, incomplete until some sudden physical effort on the part of the patient influences factors within the abdomen to produce complete acute torsion. In two-thirds of the cases, the presence of a hernia is the predisposing cause.

According to Morris, the right side is more often affected because of these two factors: (1) The right side of the abdomen is the seat of more frequent pathologic processes; cholecystitis, gastric and duodenal ulcers, and especially appendicitis. (2) The omentum, lying in proximity to these, becomes secondarily involved and very often fixed to an inflammatory process. Thus an inflammatory condition favoring torsion is established in the omentum. If a point of fixation is produced, bipolar torsion may result.

It is more difficult to explain the idiopathic variety of torsion in which no discernible intra-abdominal conditions predisposing to torsion are found. The fact that torsion of the omentum has occurred in well-developed obese persons would lead one to suspect that the omentum was loaded with fat, the edge of the apron being more heavily laden than the rest, thus serving as a weight on a plumb-line, with the constant peristaltic action of the intestines favoring torsion. The rest of the mechanism has been discussed above. It is quite possible that venous tortuosity, as noted by Payr, is instrumental in initiating the process in these stout persons, causing mechanical changes in the omentum beyond a point of free lymphatic and venous circulation. One questions this mechanism as being the major cause in idiopathic torsion, for, were this factor alone operative, many more cases of intra-abdominal torsion would be recorded instead of 11 per cent in Corner and Pinches's series, 47.8 per cent in Morris's, and 87.8 per cent in this series of 18 cases. In the absence of function of the omentum, a likely explanation of idiopathic torsion is offered in the statement credited by Fuller¹² to Reidel, namely, that no torsion would occur were the omentum free from pathologic change. How this pathologic change in the omentum is produced still needs clarification. Perhaps the cause lies in internal hernial openings operating to produce an "omental ball," or changes in the omentum, produced by the intra-abdominal pathologic processes discussed above. These leave no gross evidence in the organ itself but give rise to sufficient alteration in the omentum to serve as the initial point for torsion under favorable circumstances.

A careful analysis of the 11 cases of the purely intra-abdominal type in this series, fails to reveal any explanation for the condition. It is true that in none of these were observations made seeking the cause. Morris's study also failed to bring forth any more definite explanation for this type of tor-

sion. The immediate causes for the torsion were ascribed to various physical efforts (dancing, lifting a heavy weight, *etc.*). Only two patients in this series gave a history of any possible antecedent cause; in one the torsion followed the ingestion of a hearty meal; in the other, it occurred while the patient was driving an automobile (Farr's case). The etiology of idiopathic torsion of the omentum is still obscure in spite of our greater clinical knowledge and better understanding of this condition.

REPORT OF TWO CASES

Case 1.*—C. S., a waiter, age 37, was admitted to the hospital, August 8, 1932, with the diagnosis of incarcerated hernia. The patient had had a right inguinal, reducible, scrotal hernia for 14 years. The hernia became irreducible on August 24, 1932 (four days prior to admission), and the patient developed symptoms of urgency and frequency of urination, soreness along Poupart's ligament, and swelling and induration of the right testicle. The patient had not had a bowel movement for the four days prior to admission but showed no signs or symptoms of intestinal obstruction.

Physical Examination.—The patient was a well-developed, well-nourished male. There was no tenderness or rigidity of the abdomen, and no abdominal masses were noted except a tender bulge, about 5 cm. from the right external inguinal ring to a point above Poupart's ligament. The right scrotum was filled with a sensitive mass, 3 cm. in diameter. The testicle was felt as a separate mass and was three times larger than the left. No varicocele or hydrocele was noted on either side. No diagnosis was made prior to operation.

Operation.—September 1, 1932: The sac was found to contain omentum only. The abdominal portion of the omentum was found to be gangrenous and twisted six times on its axis. The omentum was removed as high as the transverse colon. Following the operation, the patient developed paralytic ileus and bronchopneumonia, and expired September 5, 1932.

COMMENT.—This case comes under the classification of acute torsion, hernial and abdominal, bipolar.

Case 2.—J. G., a carpenter, age 36, was seen, December 18, 1936, because of an acute intra-abdominal condition. He had always been well and had had no previous operations. Three years previously, the patient had developed a right, incomplete inguinal hernia. He had been told at that time that he also had a large left inguinal ring. He had worn a truss for the three years and had no reappearance of the "lump" at the right external ring for the past two years, in spite of the fact that he had left off the truss on several occasions, for days at a time, while engaged in heavy work as a carpenter on construction jobs.

On December 16, 1936, after a heavy meal of corned beef and cabbage, the patient was awakened in the middle of the night by cramps in the upper abdominal region. He vomited a slight amount once, but the pain was not relieved. The patient slept comfortably the rest of the night but had chilly sensations in the morning. The upper abdominal pain became steady and dull in character. Attempts at eating resulted in an increase in the pain, without vomiting or nausea. In spite of the persistence of pain he had a full meal that evening and a hearty breakfast the next morning. During the next two days the pain recurred but was somewhat less when the patient lay down.

* This case was the only instance of torsion of the omentum which was recorded at the San Francisco Hospital, University of California Service, between the years 1919 and 1937. This is reported through the courtesy of Dr. Harold Brunn, Chief of the University of California Surgical Service at the San Francisco Hospital.

Sleep was disturbed during this period. On the third day, the pain shifted from the upper abdomen to the right lower quadrant, and all the tenderness and soreness in the upper abdomen disappeared. Sodium bicarbonate, by mouth, gave him no relief. An enema made him feel worse. At no time did he have any belching, distention or local tenderness.

Physical Examination.—The patient was a very robust, well-developed male, who looked chronically ill. The heart and lungs were normal. There was moderate rigidity of the entire right side of the abdomen, with tenderness to the right of the umbilicus and some slight rebound tenderness in the lower quadrant. No masses were felt in the abdomen or on rectal examination. The red cell count was normal. The white cell count was 6,500, with 87 per cent polymorphonuclear cells.

An exploratory celiotomy, with the possibility of acute appendicitis in mind, but with no diagnosis having been made, was performed December 19, 1936. The age of the patient, the blood count, and the entire course of the attack during the three days prior to the operation did not conform to any of clinical entities considered. Torsion of the omentum was not even thought of.

Operation.—A slightly injected appendix was found. The omentum consisted of flat semigangrenous tissue, two by three inches in size, suspended by a pedicle which was twisted on its axis five times. There was no free fluid. The mass was removed. Further exploration of the peritoneal cavity revealed no apparent cause for the torsion. The patient made an uneventful recovery.

COMMENT.—In spite of the history of hernia of the right side, we felt that it did not cause the torsion. The hernia was not of the complete reducible type. There had been no evidence of it for the two years prior to the occurrence of torsion. Yet the possibility that the hernia initiated the pathologic process in the omentum could not be ignored.

A comparison of the findings in three series of cases (Corner and Pinches, 53 cases; Morris, 164 cases; and the present study of 18 cases) is of interest. Our series bears out Morris's findings (in his own series and that of Corner and Pinches's) that torsion of the omentum occurs twice as frequently in men as it does in women. Inguinal hernia as the main etiologic factor, however, has lost its importance. It was considered to be the cause of torsion in 89 per cent of the cases reviewed by Corner and Pinches, and in 50.3 per cent of Morris's series, but in only 22.2 per cent of the present series. With more frequent and earlier attention to hernia, this type of torsion has diminished. The age at which torsion occurs has not changed materially. A history of previous symptoms suggesting the possibility of recurring torsion was present in 16 cases in the first series, 27 cases in the second, and in two in the present study. None was more than suggestive, but a history of sudden severe muscular effort, a sharp blow on the abdomen, an abrupt movement involving changes in intra-abdominal pressure, or a hearty meal, was present in a sufficient number of cases to point to these as exciting causes in torsion. The sudden onset of pain in the right side of the abdomen was a constant finding.

The differential diagnosis of acute torsion of the omentum, either hernial or idiopathic, is difficult and has seldom been made before operation. On the other hand, almost every variety of acute intra-abdominal condition has been mistaken for torsion—intestinal obstruction, tuberculosis of the cecum, torsion of the spermatic cord, perforated peptic ulcer, *etc.* There are, perhaps, more

suggestive diagnostic features in the hernial type than in the abdominal. According to Morris, the sequence of events in torsion associated with hernia is somewhat as follows: The patient, an obese man, of about middle age, who has had a reducible, complete, right inguinal hernia for a long time, suddenly—usually after severe muscular strain—finds the hernia irreducible. Pain and swelling appear in the hernial site. Nausea and vomiting are present, and an increase in pain develops. The pain gradually ascends into the abdomen and becomes localized in the right lower quadrant, or at the right side of the umbilicus. The patient's condition becomes progressively worse, abdominal rigidity and tenderness appear and a movable abdominal mass can be palpated. There is a slight elevation of temperature, and leukocytosis may be evident. The usual diagnosis is strangulated hernia, but the possibility of acute appendicitis cannot be ignored. At operation, gangrenous omentum is usually found in the hernial sac.

The abdominal, or idiopathic type of torsion, is even more baffling. Of the six abdominal cases reported by Corner and Pinches, five were diagnosed as acute appendicitis and one as suppurative omental hydatid cyst. These authors credit Lucas-Champonnière with the first reports of two cases correctly diagnosed before operation (1900, 1901). McWhorter, in a collection of 26 cases of the abdominal type, recorded no correct diagnosis, except Lucas-Champonnière's. Morris recorded only three correct diagnoses in cases of the idiopathic variety. In none of the present series was the correct diagnosis made before operation.

The simulation of acute appendicitis and acute cholecystitis, by torsion, is such that it is most often mistaken for one or the other of these conditions (over 75 per cent of cases of torsion were so diagnosed). The diagnosis of acute appendicitis was made twice as often as that of acute cholecystitis. This was especially true in the idiopathic type. The attempt by Smythe, Jeffries, and Mullen²³ to differentiate between torsion and acute appendicitis according to individual symptoms is not helpful. As pointed out by Morris, his largest series did not conform to the clinical picture of torsion as obtained by the foregoing authors. Morris, further, makes the point that no clinical symptom in appendicitis or torsion is specific. The present study tends to substantiate the opinion that it is almost impossible to differentiate torsion from acute appendicitis by means of a consideration of the rise in temperature, pulse rate, the blood count, or the presence of nausea and vomiting. A presumptive diagnosis of torsion may be made, however, when a robust man, in the third, fourth, or fifth decade of life, is suddenly seized with abdominal pain after a severe muscular effort or strain, and when, upon examination, a mobile mass is suspected or definitely felt to the right of the umbilicus. Mullen and Smythe attest the early appearance of such a mass, its mobility, its situation toward the midline, and the percussion of an area of resonance toward its one side. The fact was also emphasized that the symptoms in acute torsion are not so severe or so prostrating as they are in acute appendicitis. This explains the

longer delay in seeking medical attention. In the present series, the average interval between the onset of symptoms and surgery was two days.

One patient had had symptoms for two months. A diagnosis of acute cholecystitis was made but celiotomy disclosed a gangrenous omentum. Similar findings were present in a case of only a few hours' duration. The pathologic changes found at operation, such as hemorrhage or gangrene, depend on the degree of strangulation of the omentum. A serous or bloody exudate is present, and the presence of fluid may sometimes be elicited before operation. The finding of fibrotic changes in the involved portion of the omentum is indicative of a recurrent type. The number of twists (from three to 11) found in some of these cases is suggestive of a slow process of torsion, until the circulation of the omentum is compromised, when all the reflex phenomena express themselves as the symptoms described above.

Both Corner and Pinches, and Morris, stressed the possibility of a combined form of torsion in those cases in which the neck of the sac shows no constriction and the twisting extends into the abdomen. A herniocielotomy is necessary in these.

The various hypotheses as to the rôle played by anatomy and physiology of the omentum in the pathogenesis of torsion has already been considered. Very little actual information is recorded in the reports of cases of the abdominal type of torsion which might help in the understanding of the pathogenesis of this condition. Yet, a thorough exploration in these cases would probably discover possible causes for torsion. A plea is made for obtaining more complete data in the idiopathic type of torsion, noting especially the following:

- (1) Hernial openings, external or internal, which might operate in the production of pathologic changes in the omentum.
- (2) Inflammatory foci, acute, chronic or healed, which might explain initial changes in the omentum.
- (3) Peculiarities in the anatomy of the omentum which might favor torsion.
- (4) Other abnormalities which might serve to explain the occurrence of torsion.

Surgery is the only treatment. Recovery is the rule unless complications set in.

SUMMARY

(1) Sixteen cases of torsion are reviewed, and two additional cases are reported.

(2) An analysis of the hitherto reported cases is made.

(3) Emphasis is laid upon the increasing number of the idiopathic variety of torsion. Attention is called to the more common occurrence of torsion in the right half of the abdomen.

(4) Diagnostic points are stressed.

(5) A plea is made for more accurate observation and study of these cases.

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