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James B. Keplinger
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Duodeno-Jejunal Injuries Following Blunt Trauma to the Abdomen

James B. Keplinger, M.D.; Amod S. Tootla, M.D.; Thomas A. Fox, Jr., M.D. and Melvin A. Block, M.D.*

The distal duodenum and proximal jejunum, fixed in position over the spinal column, are subject to intramural hematoma formation, laceration, and perforation due to blunt abdominal injuries. Experience with four patients illustrates the spectrum of these traumatic lesions from blunt trauma and emphasizes the tendency for their occurrence on either side of the ligament of Treitz. Although one of the patients recovered from a duodenal hematoma without operative intervention, surgical correction is usually required as an emergency procedure for lacerations and perforations. A review of the medical records of Henry Ford Hospital covering the past 14 years failed to disclose any other cases than the four reported, all of which were encountered since 1964.

Patient Material

Traumatic pancreatitis, a more common and well-recognized injury from blunt trauma to the abdomen, has been seen in a number of patients in our institution and is not considered in this report.

Patient One — Duodenal hematoma with spontaneous recovery: A man, age 41, entered the emergency room after he fell asleep while driving and struck a parked car. Fractures of facial bones produced nasal bleeding. He complained of epigastric pain, and mild epigastric tenderness was found on examination of the abdomen. Laboratory studies, including blood hemoglobin and leucocyte count, urinalysis, serum amylase, and x-ray films of the abdomen, were within normal limits.

The volume of gastric aspirate remained large during the first several days of hospitalization; only minimal epigastric tenderness was found by examination of the

*From the Department of General Surgery.
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abdomen. A filling defect, considered to be typical for a duodenal hematoma, obstructing the second part of the duodenum, was disclosed by an upper gastrointestinal x-ray study on the second day (Figure 1). Operation was postponed because of a pneumonitis involving the right upper lobe of the lung, considered to have resulted from aspiration. Progressive diminution of the volume of gastric aspirate led to further postponement of an operation.

![Figure 1](image)

X-ray study of Patient One showing obstruction of the second part of the duodenum. The coiled spring appearance is typical for an intramural duodenal hematoma.

Radiographic evaluation of the upper gastrointestinal tract on the 11th day after admission confirmed diminution in the degree of duodenal obstruction. Oral intake was then started. No further difficulty occurred and, on the 20th day of hospitalization, no duodenal obstruction was present, with evidence only of a residual deformity, on radiologic examination of the duodenum (Figure 2). The patient was dismissed from the hospital.
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Patient Two—Hematoma of proximal jejunum: A man, age 36, was seen in the emergency room after being struck in the abdomen by a fist. The abdomen was negative to examination and the blood hemoglobin, leucocyte count, urinalysis, serum amylase and chest x-ray were within normal limits. Mild dilatation of the large and small intestine was evident by radiologic study of the abdomen. The patient refused to remain in the hospital.

Ten days later, the patient returned to the emergency room complaining of intermittent epigastric pain and vomiting for the past five days. Mild tenderness was present in the epigastrium. The blood hemoglobin and serum amylase were within

Figure 2
X-ray study of Patient One at 20th day after injury demonstrating absence of duodenal obstruction following spontaneous resolution of duodenal hematoma.
normal limits. The leucocyte count was 13,650 cu mm, and the 24-hour urine amylase was slightly elevated at 5,575 Somogyi units. An x-ray film of the abdomen showed considerable dilatation of the stomach and duodenum. The volume of gastric aspirate for the first day was 2,250 cc after which, radiologic study of the upper gastrointestinal tract revealed an incomplete obstruction to the fourth part of the duodenum, with a configuration suggesting the presence of a hematoma (Figure 3). The volume of gastric aspirate continued to be large.

At operation on the fifth day of hospitalization, a hematoma was found to involve the jejunum for four inches distal to the ligament of Treitz (Figure 4). The hematoma was evacuated and a nasogastric polyethylene tube manipulated into the jejunum distal to the involved segment, to be used if needed for alimentary feeding during the postoperative period. Gastrointestinal function slowly returned, and the patient was dismissed from the hospital two weeks postoperatively. At that time, according to an x-ray study, the gastrointestinal tract was considered to be within normal limits.

Patient Three—Transsection of jejunum at ligament of Treitz: This 46-year-old man entered the emergency room after striking an abutment while driving an automobile. He complained of abdominal pain and vomiting. The right abdomen was tender and rigid. The blood hemoglobin, leucocyte count, serum amylase, and urinaly-
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sis were within normal limits. Free air under the diaphragm was evident on an abdomi­nal x-ray film. At operation, an oblique laceration was found which transected the jejunum at the ligament of Treitz except for a small posterior fragment (Figure 5). The involved segment was resected and a duodeno-jejunostomy completed. A small polyethylene tube was placed in the duodenum via a gastrostomy for proximal de­compression. The patient was dismissed on his 18th postoperative day after a satis­factory convalescence.

Patient Four—Duodenal hematoma with delayed perforation: This 17-year-old man sustained a steering wheel injury to the upper abdomen in a tractor accident. He was first seen and hospitalized three days later because of increasing abdominal pain and vomiting. Tenderness was present in the right upper abdomen and flank. The leucocyte count was 13,571 cu mm; a 24-hour urine amylase was elevated at 8,580 Somogyi units, and the renal and psoas shadows were obliterated on an abdomi­nal x-ray. Blood hemoglobin, urinalysis and intravenous pyelograms were within normal limits. The patient improved while under observation and was able to take a full diet. A repeat determination of the 24-hour urine amylase was within normal limits.

One week after hospitalization, evidence of gastroduodenal obstruction appeared. A radiologic study of the upper gastrointestinal tract showed obstruction at the second part of the duodenum. A small polyethylene tube was passed through the obstructing

![Figure 5](image_url)

Diagram of operative finding of laceration nearly transecting jejunum at ligament of Treitz in Patient Three.
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segment, and feeding was started through this tube. On the following day, return of gastric aspirate was also started via the feeding tube after which the patient developed acute abdominal pain. The end of the tube was found to have slipped back into the duodenum, and free air was present under the diaphragm on x-ray studies.

At operation, a hematoma was found to involve the second and third part of the duodenum with a small perforation present in the third part of the duodenum. An inflammatory reaction was present in the region but the pancreas appeared satisfactory on gross examination. The perforation was closed, the hematoma released, a jejunostomy tube passed proximally into the second part of the duodenum for decompression, and an anterior gastrojejunostomy and a vagotomy performed. The patient was dismissed on the 13th postoperative day.

Discussion

Although the duodenum is usually involved when blunt trauma to the abdomen produces intramural intestinal hematomas, our experience indicates that the jejunal side of the ligament of Treitz may also be involved. The rich vascular plexus in this region undoubtedly predisposes to hematoma formation. Intramural hematomas of the duodenal-jejunal segment are manifest primarily by their production of upper small bowel obstruction which becomes evident several days after the accident. A coiled spring appearance on x-ray studies confirms the diagnosis.

Although the probable duodenal hematoma of one of our patients resolved spontaneously, this outcome did not appear likely during a period of observation in the other two patients with this lesion. Babbitt and associates' reported that two of three duodenal hematomas encountered in children resolved spontaneously, leading these authors to advise a period of observation to be certain that operation is actually necessary.

In accordance with recorded experience, evacuation of the duodeno-jejunal hematoma corrects the problem. It appears to us wise to proceed with operation if duodenal obstruction persists for several days and the condition of the patient otherwise justifies this surgery. Although the severity of intramural hematoma formation undoubtedly varies considerably, complete obstruction for several days can be expected to respond best to operative correction. A complementary gastrojejunostomy is unnecessary, although it is conceivable that in rare situations a by-pass procedure would be justified for injury to the proximal duodenum which might later produce obstruction. A gastrojejunostomy frequently does not effectively decompress the duodenum, especially if the obstruction is present in the distal duodenum. In our patients, temporary decompression of the duodenum by an indwelling tube was preferred to a gastrojejunostomy. A small polyethylene tube for temporary feeding during the postoperative period can also be placed in the jejunum at the time of operation.

Varying degrees of damage to adjacent structures can be associated with duodenjejunal injury. A hematoma involving the second part of the duodenum can produce obstruction also to the bile and pancreatic ducts. We have treated successfully one patient
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who sustained a transection of the common bile duct following blunt trauma to the abdomen. Our experience indicates also that lacerations and perforations, alone or associated with hematomas, can result from blunt trauma to the abdomen. Resnicoff and associates\(^5\) emphasize the difficulty in the early diagnosis of retroperitoneal rupture of the duodenum due to blunt trauma and the efficacy of early treatment by debridement and closure of the defect. It is likely that direct trauma, shearing forces, and increased intraluminal pressure, resulting from the development of a temporary closed loop, all contribute to production of lacerations and perforations of the duodeno-jejunal segment.\(^6\)

Concomitant injury to the pancreas was not evident in the four patients reported herein, although slight elevations in the level of urine amylase were found initially in two patients neither of whom had gross evidence of pancreatitis or pancreatic injury at the time of operation. Pancreatic injury does occur in association with duodeno-jejunal injury from nonpenetrating trauma to the abdomen, and we have treated one such patient successfully. Extensive damage to the head of the pancreas, as well as to the duodenum, may require an emergency pancreatico-duodenectomy.\(^5\) The possibility of a serious pancreatic injury, as well as serious duodenal-jejunal trauma, provides further support for a policy of early operation for patients sustaining severe blunt trauma to the upper abdomen which result in prominent findings of peritoneal irritation.

Perforation of the small bowel following nonpenetrating injury to the abdomen appears to occur more frequently in free segments of the distal small bowel than in the duodeno-jejunal segment.\(^4\) Intramural hematomas related to anticoagulant therapy, have occurred primarily in the free segments of the small intestine.\(^7\)

The value of the use of seat belts is again supported by this experience with duodeno-jejunal injuries. None of the three patients involved in vehicle accidents reported here were wearing seat belts. We have encountered injury to the ileocecal region requiring resection which appeared to be related to the wearing of a lap seat belt, but the safety value of the belts surpasses possible injurious effects.

Summary

1. A variety of injuries to the duodeno-jejunal segment resulting from blunt trauma is illustrated by experience with four patients. The injuries include intramural duodenal hematoma, jejunal hematoma at the ligament of Treitz, laceration of the jejunum at the ligament of Treitz, and perforation of the duodenum.

2. Although duodeno-jejunal hematomas occasionally resolve spontaneously, persistence of complete duodenal obstruction for more than several days is an indication for operative correction.

3. The intramural duodeno-jejunal hematomas usually are corrected by evacuation of the hematoma. Proximal duodenal decompression is established for the early postoperative period. The condition of the duodenum usually does not necessitate a gastrojejunostomy.
4. Although treatment for each patient must be individualized, in general, a policy of early operation is advocated for patients with evidence of peritoneal irritation in the upper abdomen following blunt trauma to this region. Life-endangering consequences of delay in operation for injuries to the pancreas and extrahepatic biliary tract, in addition to injuries of the duodeno-jejunal of the intestine, support this principle.

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REFERENCES


