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A Case of Delayed Duodenal Obstruction Due to Traumatic Fibrosis Following Seromuscular and Intramural Injury

Yoshihiro Moriwaki, Shinju Arata, Hiroshi Toyoda, Takayuki Kosuge, Masayuki Iwashita, Yoshio Tahara, Noriyuki Suzuki

Critical Care and Emergency Center, Yokohama City University Medical Center, Yokohama, Japan

Objective: Traumatic duodenal obstructions are rare, and most are caused by compression from intramural or retroperitoneal macroscopic hematomas. This report describes a very rare type of delayed traumatic duodenal obstruction without macroscopic intramural or extraluminal hematoma caused by traumatic fibrosis due to seromuscular and intramural injury and microscopic hemorrhage.

Case presentation: A 31-year-old man was transferred to our center due to polytrauma with nausea and vomiting on day 53 after an accident. Gastrointestinal fiberscopy (GIF) on day 57 revealed an active stage small duodenal ulcer with patency of the pyloric ring. Although the patient underwent subdural drainage, the nausea and vomiting continued. A repeat GIF on day 91 revealed a duodenal ulcer with severe pyloric stenosis. GIF after nasogastric drainage on day 102 identified a severe pinhole stenosis. We performed surgery on day 106 and observed a constricted duodenal bulb due to a tumorous scar. We resected the stenotic section of the duodenal bulb including the pyloric ring.

Conclusion: The histopathologic examination revealed constriction and fibrosis. Surgical options should be considered for patients with delayed duodenal obstruction without macroscopic hematoma around the duodenum after several months of hospitalization.

Key words: Duodenal trauma – Delayed traumatic duodenal obstruction/stenosis – Traumatic duodenal fibrosis

We often encounter traumatic duodenal injury, including intramural hematoma and ischemic mucosal injuries such as ulceration and duodenal disruption. However, we rarely encounter

Corresponding author: Yoshihiro Moriwaki, MD, PhD, Department of Surgery, Unnan City Hospital, 96-1 Daito-cho Iida, Unnan 699-1221, Japan.
Tel.: 81 854 43 2390; Fax: 81 854 43 2398; E-mail: yoshimoriwaki@gmail.com

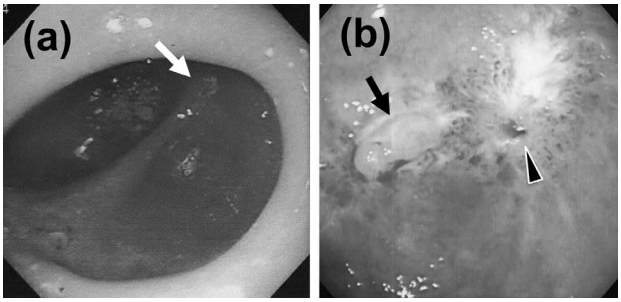

Fig. 1 GIF on day 57 showing active stress ulcer in the duodenal bulbus (arrow) without stenosis (a) and GIF on day 102 showing duodenal obstruction with pinhole stenosis anal to the pyloric ring (arrowhead) and reflux of duodenal juice beyond the pinhole (b).

traumatic duodenal obstructions, and most are caused by macroscopic intramural and retroperitoneal hematomas.[1–4] This case report describes a very rare type of delayed traumatic duodenal obstruction without massive intramural or extraluminal duodenal hematoma; we also present a series of gastrointestinal fiberscopic (GIF) images of the lesion.

Case Presentation

A 31-year-old man was transferred to our emergency center because of polytrauma due to a motorcycle accident. The patient had the following injuries: acute subdural hemorrhage (ASDH); right lung contusion; fractures to the clavicle, second rib, scapula, C7, and Th1; and liver injury (grade II on the American Association for the Surgery of Trauma's liver injury scale) involving no vascular trauma. The patient was transferred to another hospital after his general condition stabilized with good oral feeding without laparotomy on day 28. The patient presented nausea and vomiting on day 53, and a GIF examination on day 57 revealed an active stage small duodenal ulcer with patency of the pyloric ring (Fig. 1a). The administration of a proton pump inhibitor (PPI) did not improve the nausea and vomiting. A brain computed tomography (CT) scan on day 78 revealed worsening of the ASDH, and the patient was returned to our center. Although he underwent subdural drainage, the nausea and vomiting continued. A GIF examination and gastroduodenography on day 91 revealed a severe duodenal stenosis anal to the pyloric ring with a small passage (Fig. 2a). The patient was treated with a gastric tube placement and intravenous hyperalimentation for a week resulting in no improvement. On day 102, a GIF examination showed duodenal obstruction with pinhole stenosis anal to the pyloric ring and reflux of duodenal juice beyond the pinhole (Fig. 1b), and an abdominal CT showed a membranous structure in the duodenal bulb (Fig. 2b). The patient underwent surgery on day 106. The duodenal bulb was a hard tumorous scar adhering to the front of the pancreatic head and covered with the antrum without macroscopic organized intramural, periduodenal, or retroperitoneal hematoma. After releasing the adhesions, we found a constricted duodenal bulb and performed a partial resection of the stenotic segment of the duodenal bulb including the pyloric ring and a gastroduodenostomy (Fig. 3a and 3b and Fig. 4a). The patient resumed oral feeding and was transferred to a second hospital on day 120. The histopathologic examination of the resected specimen revealed constriction and fibrosis of the pyloric ring without macroscopic hematoma (Fig. 4b).

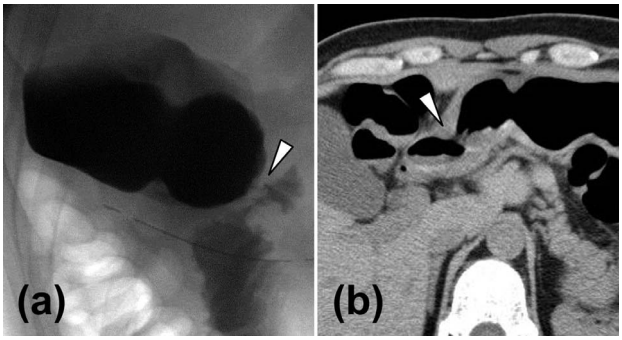

Fig. 2 Gastroduodenography on day 91 showing severe stenosis anal to the pyloric ring with a small passage [arrowhead; (a)] and abdominal CT on day 109 showing a membranous structure in the duodenal bulb anal to the pyloric ring [arrowhead; (b)].

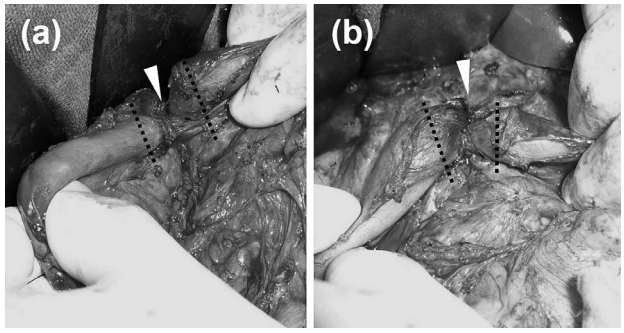

Fig. 3 Operative findings showing constricted duodenal bulb as a whitish hard tumorous scar covered with the antrum and adhering to the front of the pancreatic head (a and b).

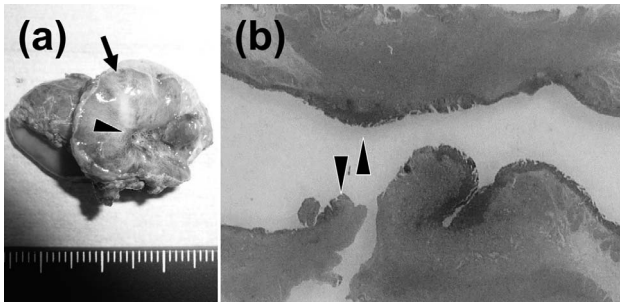

Fig. 4 Macroscopic findings of the resected specimen showing constriction and obstruction in the duodenal bulb just after the ulcer (a) and loupe results showing submucosal contusion, scattered old microscopic hemorrhage, and fibrosis without massive hematoma (b).

Discussion

Traumatic duodenal obstruction due to intramural hematoma and extraluminal hematoma, including retroperitoneal hematoma, is common in trauma centers. However, traumatic duodenal ulcer and obstruction not due to these hematoma is rare. We conducted a PubMed literature review of the data available from 2000 to March 2015 using the keywords "duodenal stricture, stenosis, obstruction with/without ischemia," "duodenal stenosis, obstruction with/without injury," and "duodenal ulcer with/without ischemia." There are no previous reports of post-traumatic duodenal obstruction and severe stenosis without massive intramural, extraluminal, or retroperitoneal hematoma. Furthermore, there are no previous reports of duodenal ulcers resulting in obstruction and severe stenosis due to abdominal trauma. Su[5] reported a case with duodenal ulceration after blunt abdominal trauma and subsequent duodenal segmental narrowing. Jang[6] reported a case with moderate duodenal stenosis with no disturbance of the fiberscope passage as a result of a reduced duodenal blood supply after abdominal trauma. These conditions were not obstructions and were mild stenoses. Each case was treated successfully using a single balloon dilation.[6]

Traumatic duodenal ischemic mucosal injury such as ulceration and tearing of the muscular layer often results in severe stenosis but rarely leads to obstruction. Notably strong forces on the duodenum usually cause duodenal disruption. It is well known that nontraumatic duodenal ulcers often cause duodenal stenosis and obstruction. Both the endoscopic findings of this complication after duodenal ulcer and the treatments are well known. However, after the widespread adaptation of H2-receptor antagonist (H2-RA) and PPI, we have rarely encountered these severe complications of duodenal ulcer in the past decade.

We described the series of endoscopic findings of the traumatic duodenal obstruction. Although they showed fresh and active ulceration in the first portion of the duodenum that did not heal, the stenosis and obstruction were just distal to the duodenal ulcer. The endoscopic results, CT images, and operative findings did not show macroscopic intramural hematoma or extraluminal hematoma, including retroperitoneal hematoma. These results indicated that the obstruction of the duodenum in our case was not due to these pathological conditions after hematoma. Although previous reports of delayed traumatic duodenal obstruction without macroscopic intramural or extraluminal hematoma cannot be found, case reports of small intestinal delayed traumatic obstruction without macroscopic hematoma were noted.[7,8] In some of these cases, the interval between injury and symptom was 3 months, such as in our case. The pathologic mechanism of these delayed obstructions was suspected of resulting from traumatic intramural inflammation and fibrosis due to mesenteric injuries, seromuscular and intramural injury, and microscopic hemorrhage.[7,8] The delayed duodenal obstruction in our case was thought to be caused by the same mechanism.

The duodenal obstruction in our case was thought to be caused by traumatic seromuscular and intramural injury and hemorrhage absence of macroscopic hematoma. The initial injury resulted in direct mechanical and ischemic damage to the seromuscular and intramural tissues, such as duodenal contusion, including tearing of the muscle and fasciae, and mucosal damage, such as traumatic duodenal ulcer and erosion, which caused a delayed fibrosis and severe stricture of the duodenal wall, resulting in a secondary decrease in the blood supply to the duodenal wall. Conversely, a decreased blood supply to the ulcerating mucosa may explain the cause of the refractoriness in the duodenal ulcer for PPI. The refractory chronic duodenal ulcer induced constriction and fibrosis. This mechanism of delayed traumatic duodenal obstruction is supported by the histopathological examination of the resected specimen showing constriction and fibrosis of the obstructing point without massive intramural hemorrhage. Traumatic tissue injury usually does not occur related to

anatomical structure and cannot be anticipated in most cases.

Concerning treatment options, we chose a primary surgical procedure in this case. Image-guided or endoscope-guided balloon dilation and/or self-expanding metallic stenting have been established as alternatives to the standard surgical treatment of intestinal stricture and may be the least-invasive methods.[9–13] Metallic stenting has been generally used in patients with malignant stenosis but balloon dilation has not only been performed in patients with malignant stenosis but also with benign stenosis. However, there has been some controversy, such as the risk of perforation by balloon dilation.[9,11] This procedure is blind destruction of the stenotic tissue even under fluoroscopy or endoscopy using pneumatic or hydrostatic pressure in all directions with equal pressure. It often breaks the weakest point of the stenotic tissue that we do not want to break, not the area we wish to break, resulting in perforation.[11] Traumatic injuries usually do not occur according to anatomical structure. Moreover, we often encounter cases with restenosis after the primary dilation requiring subsequent or additional dilation and eventually surgery after a long treatment period.[12,13]

Because our patient was 31 years old, we expect a long maintainable effect of the treatment needless of repeated therapeutic management. As he was hospitalized for 3 months before delayed duodenal obstruction due to polytrauma including severe head injury, we hoped to help him recover as quickly as possible. We chose this procedure from the perspective of safety and certainty despite the fact that it was slightly invasive. Surgical options should be considered for patients with delayed duodenal obstruction without macroscopic hematoma around the duodenum after several months of hospitalization.

Conclusions

We have described a rare type of delayed traumatic duodenal obstruction without massive intramural or extraluminal duodenal hematoma. The delayed duodenal obstruction in this case was caused by traumatic fibrosis due to seromuscular and intramural injury and microscopic intramural hemorrhage with refractory duodenal ulcer. Surgical options should be considered for patients after several months of hospitalization.

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