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Case report

Traumatic blowout of a duodenal diverticulum: A rare clinical finding

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ABSTRACT

Duodenal diverticula are a common phenomenon routinely diagnosed during investigative imaging studies. A 64-year old female presented with multiple injuries after a motor-vehicle collision (MVC). CT scan confirmed renal, splenic and pulmonary trauma, with sacral and multiple rib fractures. A repeat CT scan was performed 8 h later due to extensive abdominal injuries and persistent tachycardia, and revealed the presence of retroperitoneal air suspicious for a duodenal injury. On exploratory laparotomy, a significant amount of retroperitoneal haemorrhage in the upper abdomen and a perforated retroperitoneal duodenal diverticulum at the antimesenteric border of the second portion of the duodenum were noted. A stapled diverticulectomy was performed. The patient recovered fully despite postoperative left sided hydronephrosis and continued to do well.

Although duodenal diverticula are a common occurrence, their traumatic blow out is rare and has a high mortality rate. A duodenal diverticular blow out requires surgical intervention and stapled diverticulectomy is safe and feasible. The position of the diverticulum relative to the ampulla of vater has surgical implications. In the presence of diverticular-ampullary complex, resection is not advisable and serious consideration should be given to tube duodenostomy to control spillage or if technically feasible a roux-en Y duodenojejunostomy may be performed.

The diverticular blow out in our case is likely due to a closed loop obstruction and duodenal compression caused by the lap seat-belt. The sudden force of impact during the MVC may have compressed the intra-abdominal viscera and caused an explosive rush of air into the lumen of the diverticulum, resulting in diverticular perforation.

In a patient with multiple trauma, extra vigilance and judicious use of available resources in a timely fashion becomes imperative to identify such serious potentially life threatening conditions.

1. Introduction

Intestinal diverticula are relatively common in the gastrointestinal tract with the vast majority being seen in the colon. Although diverticula are mostly seen in the colon, the second most common site for diverticular disease in the alimentary tract is in the duodenum seen in at least 22% of the general population with 82% of those diverticula localized in the second portion of the duodenum [1,3,15]. The vast majorities are found incidentally during endoscopy or radiographic studies and if uncomplicated and asymptomatic require no treatment. Obstruction, pancreatitis, bleeding, stone formation and inflammatory perforation of the diverticulum are some of the pathologies associated with this condition, all of which are relatively uncommon. Blow out of such diverticulum secondary to blunt trauma is an exceedingly rare condition with only a handful of cases previously described worldwide [17]. Such a condition is unlikely to be encountered in the career of an acute care surgeon. We describe a case of traumatic blow out of duodenal diverticulum along with its likely aetiology and surgical management.

2. Case report

A 64-year old female presented to our level one Trauma Center after being involved in a motor vehicle collision (MVC) where she was T-boned by a van. She was a belted driver and was hemodynamically stable at presentation and managed as per ATLS protocol.

Radiographic work up along with a CT scan revealed a femoral neck fracture, grade 4 renal fractures involving the renal pelvis with urinary extravasation and contrast extravasation from the parenchymal laceration, sacral fracture with contrast extravasation, grade 2 splenic laceration, pulmonary contusion and multiple rib fractures. Her GCS was 14 and the calculated ISS was 50. Her

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Fig. 1. CT scan demonstrating free retroperitoneal air beneath right colon (arrow) suggestive of a hollow viscus perforation.

serum lipase was 121 U/L (normal 13–60 U/L) and the amylase was 72 U/L (normal < 100 U/L). She underwent pelvic renal angiography where an actively bleeding segmental branch of the kidney was successfully embolized. No pelvic bleed was noted on angiography and she remained hemodynamically stable.

Given the extent of the renal injury with pelvic disruption, elevated lipase and amylase, and persistent tachycardia, a repeat CT scan was performed 8 h later and revealed no extravasation of urine but the presence of retroperitoneal air suspicious for a duodenal injury (Fig. 1). In view of those findings, the patient underwent exploratory laparotomy, along with ORIF of her left femur and placement of an IVC filter. At celiotomy, a significant amount of retroperitoneal haemorrhage was noted in the upper abdomen beneath the stomach and pancreas. A Kocher manoeuvre was preformed to mobilize the duodenum at which point a perforated retroperitoneal duodenal diverticulum measuring 5 cm long was identified at the antimesenteric border of the second portion of the duodenum (Fig. 2). The diverticulum was stapled (TX60G Proximate linear stapler, Ethicon Endo-Surgery, LLC) at its base and the staple line reinforced with interrupted silk sutures and covered with omentum. Staple dimensions before closure were 4.0 mm × 4.8 mm. Anticipating a prolonged recovery and ileus, an 18 Fr Moss Gastrostomy tube (Mosstubes Inc.) was also placed for decompression of the duodenum and subsequent feeding distal to the injury. A size 10 Jackson-Pratt drain was also placed in the right upper quadrant as well. The abdomen was left

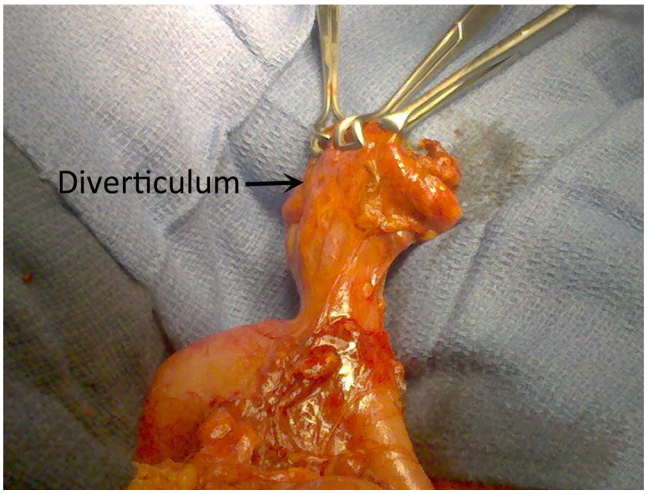

Fig. 2. Intraoperative picture demonstrating blowout of a duodenal diverticulum.

open due to the presence of distended bowel and concern over abdominal compartment syndrome (ACD). Forty-eight hours postoperatively, the patient was taken back to the OR for an uneventful abdominal wall closure. Prophylactic low molecular weight heparin (LMWH) was initiated 72 h after bleeding cessation from the kidney.

Pathologic examination of the diverticulum revealed a 2.2 cm perforation at the apex and no evidence of ectopic tissue or malignancy.

Her postoperative course was complicated by left sided hydronephrosis requiring placement of a ureteral stent and pulmonary embolism despite DVT prophylaxis with Lovenox, IVC filter and sequential compression device placed on the calf at presentation and maintained through the hospital stay. She fully recovered and was discharged to a sub acute rehabilitation facility for continued physical therapy. She continued to do well and the ureteral stent was removed 3 months later.

3. Discussion

Diverticulum of the small intestine is not unusual and can occur anywhere along the small bowel. The duodenum is second only to the colon as the most frequent site for those diverticula. The first case of a duodenal diverticulum was reported by the French pathologist Chomel who described this pathology ion 1710 where it was found to contain a gallstone [6]. In the American literature, Sir William Olser was the first to describe a duodenal diverticulum in 1881 [13]. It has since been described during gastrointestinal contrast studies, endoscopy as well as in autopsies [1,17]. Duodenal based on the type of studies preformed, the incidence of duodenal diverticulum is within a range of 1–23%, with 85–90% of them occurring in the second portion of the duodenum within 2–3 cm of the ampulla of vater [8,11]. The term ''perivaterian'' has often been used to describe such diverticulum. In a study by Scudamore et al., the diverticulum was noted in the first part of the duodenum in 6%, the second 82% with the third and fourth portion of the duodenum being involved in 10% and 2%, respectively [15]. In the same study, laterally projecting diverticula as seen in our case was found in only 2% of cases [15]. This location is of significance to the surgeon as majority of duodenal diverticula are found on the inner medial wall or pancreatic side of the duodenum, whose resection is problematic and potentially disastrous [11]. Hence the importance of this case report.

Duodenal diverticula are generally classified as extraluminal or intraluminal. The extraluminal type consists of an out pouching of mucosa, submucosa and muscle arising from a weak area of the duodenum similar to a pulsion diverticulum. A majority of duodenal diverticula tend to be solitary and are extraluminal similar to our case and are often associated with biliary tract disease [2,7,14]. The intraluminal type generally arises from congenital webs or membranes located in the second portion of the duodenum. A number of co-existent congenital anomalies have been reported with the intraluminal type and include choledochoceles, annular pancreas, intestinal malrotation, Hirschprung's disease, situs inversus, congenital heart disease as well as urinary abnormalities [9,16]. The frequency of duodenal diverticula increases with age and so do the symptoms; however no sex predilection has been conclusively shown in the literature [10]. Only 5–10% of duodenal diverticula are symptomatic and may present with steatorrhea secondary to stasis, abdominal pain, gastrointestinal bleeding, perforation, obstruction or inflammation necessitating a work up [3,12].

Blow out of a duodenal diverticulum is an extremely rare but potentially life threatening complication with a high mortality rate