

Blunt gastric rupture. A report of 2 cases and review of literature

Rupture gastrique sur traumatisme fermé de l'abdomen: à propos de 2 cas et revue de la littérature

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ABSTRACT

Gastric ruptures in blunt abdominal traumatism is extremely rare accounting for 0.02 to 1.7 % of cases of blunt abdominal injuries. They are frequently associated with other intra- and or extra-abdominal lesions, which generally influence morbidity and mortality. We report two cases of gastric rupture, one with splenic and maxillo-facial injury, the other with forearm fracture, with good outcome after surgical treatment.

Keywords : blunt abdominal trauma, abdominal trauma, gastric rupture, gastric transection

RÉSUMÉ

Les ruptures gastriques dans les traumatismes abdominaux fermés sont extrêmement rares, retrouvées dans 0,02 à 1,7 % des cas de contusions abdominales. Elles sont fréquemment associées à d'autres lésions intra-abdominales et / ou extra-abdominales, qui influencent généralement la morbidité et la mortalité. Nous rapportons deux cas de rupture gastrique, l'un avec une blessure splénique et maxillo-faciale, l'autre avec une fracture de l'avant-bras, avec une évolution favorable après traitement chirurgical.

Mots-clés : traumatisme abdominal fermé, traumatisme abdominal, rupture gastrique, section gastrique

Introduction

Blunt abdominal trauma is a leading cause of morbidity and mortality amongst all ages [1]. It mostly occurs due to motor vehicle collisions and falls from height [1]. The incidence of hollow viscus injuries following blunt abdominal trauma varies from 4 to 15 % [2,3]. However, blunt gastric injuries are very rare, occurring only in 0.02-1.7% of patients with blunt abdominal trauma [3-5]. The first case of blunt gastric rupture is credited to Piancastelli in 1922 [6]. Since then, few cases have been reported in the literature [4,6,7]. Association with other intra- and extra-abdominal injuries, like splenic injury and fractures, is very common and influence mortality and morbidity [1]. The management requires rapid and prompt diagnosis and adequate surgical care [4]. We describe 2 cases of successfully managed blunt gastric rupture with associated lesions and review the literature.

Case 1

A 28 years old male patient was admitted 24 hours after a motor vehicle accident. He was driving a motorcycle while he hit a horse drawn vehicle. On admission, he was fully conscious with a coma Glasgow scale at 15/15, a compensated cardiovascular shock with blood pressure 90/45 and the pulse rate at 96/min. He had peritoneal signs with abdominal distension and tenderness and the presence of bruises at the epigastrium. He was complaining of a pain at the right forearm. He reported having taken a light meal few hours before accident. The hemoglobin was 11 g/dl and the hematocrit 43,1%. The abdominal CT Scan extended to the thorax showed free air and fluid in the abdomen. Solid abdominal organs were normal. X-ray of the right wrist showed a joint fracture of the distal end of the radius. The patient underwent emergent exploratory laparotomy which showed serosanguinous fluid in the peritoneum contaminated with food particles, complete gastric transection at the pyloro-duodenal junction (Figure 1).

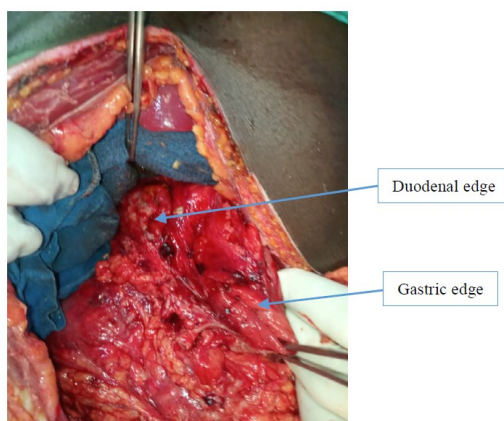


Figure 1. Intra-operative view of complete gastric transection at pyloro-duodenal junction

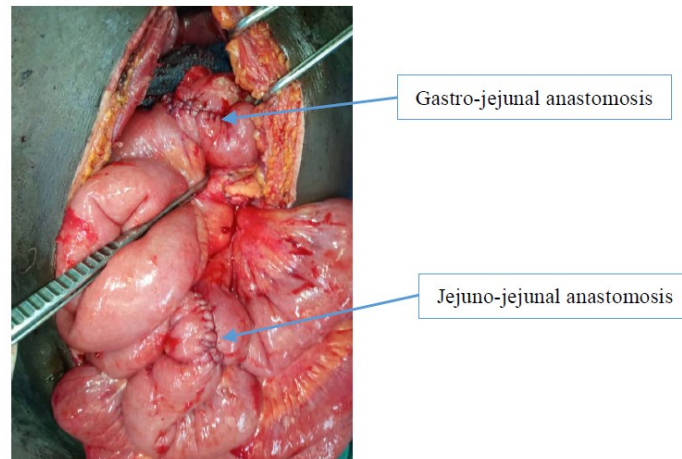


Figure 2. Intra-operative view of the hand sewn Roux-en-Y gastrojejunostomy.

The 2 edges were bruised. We noted pancreatic and liver laceration with slight bleeding. We performed a perihepatic packing first before closing the duodenal edge with running absorbable suture, then we performed a hand sewn Roux-en-Y gastrojejunostomy (Figure 2) with placement of nasojejunal tube.

The hepatic pads were removed followed by a generous abdominal lavage. The closure of the abdominal wall was done with passive peritoneal drainage. We started the feeding with liquid food by nasojejunal tube 3 days after surgery. On post-operative course the patient developed a benign acute pancreatitis treated conservatively and a wound infection which healed with local care. On day 28 after surgery, he was referred to the orthopedic surgeon and benefited from osteosynthesis of the fracture of the right radius. He was discharged on day 32 after surgery. Three months after surgery, he was found to be asymptomatic and tolerated well normal diet.

Case 2

A 18 years old male patient was admitted 1 hour after an accidental fall from the second floor of a building, at home. He had no particular past medical history. On admission, he was in hemorrhagic shock with coma Glasgow scale at 10/15, blood pressure at 80/30 and pulse rate at 130 beats/min. He had also epistaxis. His parents reported he took meal 2 hours before traumatism. He received intensive resuscitation which stabilized his condition. A body scan was then performed and revealed a massive hemoperitoneum with a maxillo-facial fracture. The patient underwent immediate laparotomy. He had a massive hemoperitoneum contaminated by undigested food, a fracture of the spleen with active bleeding of the splenic pedicle and an 8 cm full thickness rupture of anterior wall of the antrum along the transverse axis with a hematoma of the gastro-colic ligament (Figure 3).

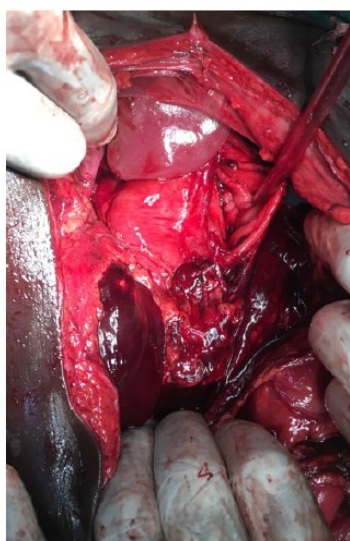


Figure 3. Intra-operative view of anterior gastric wall full thickness rupture.

He underwent a splenectomy followed by closure of the gastric wall with one layer running absorbable suture with placement of nasogastric tube. The abdominal wall was closed with drainage after generous peritoneal lavage. On post-operative course, he developed a wound infection which healed with adequate antibiotherapy. He underwent vaccination against flu, tetanus, meningitis, pneumococcus, haemophilus influenza. The nasogastric tube was removed on day 5 and the patient put on soft diet. The maxillo-facial traumatism was treated conservatively. He was discharged on day 22 after surgery. At 6 months follow-up, he was well and tolerated a normal diet.

Discussion

Gastric rupture following blunt abdominal traumatism is rare [1,6,8]. The rarity of this injury is due to anatomical factors that include the well protection afforded by the overlying rib cage, the relative fixity of the stomach and the thickness and strength of gastric wall [6,7]. Blunt gastric injury is mainly caused by road traffic accidents and count for about 75% of patients [4]. Our first patient was involved in a motor vehicle accident while the second fell accidentally from a height. Fall from height has also been described as cause of blunt gastric injury as well as direct violence, cardiopulmonary resuscitation, seat belt injury [4,9-11].

Three main mechanisms have been postulated in the occurrence of blunt gastric rupture [4,7]. The most common mechanism, according to Yajko *et al.*, is a sudden, acute and intense rise of intraluminal gastric pressure resulting from a direct blow to a full stomach [4,6,12]. This mechanism may explain the gastric lesion in our second patient who fell from height few hours after taking meal and probably heat the ground with his front. According to Laplace Law, with this mechanism the lesion is located mostly in the anterior wall as it happened to this patient [4]. The second mechanism result from a rapid deceleration causing a shearing of the stomach wall at fixed points of attachment. As the stomach is relatively mobile organ, this type of injury tends to happen at the pyloro-duodenal junction, the gastroesophageal junction or at sites of perigastric adhesions [4,6]. This mechanism seems to explain the complete pyloro-duodenal transection in our first case involved in a violent road traffic accident. In the third mechanism, the gastric rupture is due to compression or a crush of the stomach between the anterior abdominal wall and the vertebral column or posterior thoracic cage [6,7]. All this emphasizes the fact this well protected organ is injured if the blunt traumatism involved high velocity or the stomach is full or both situations are present [13].

Our two patients had full stomach and were involved in traumatism with high velocity impact. One had a lesion in the anterior wall, which is the most common site of gastric lesion, followed by the greater curvatum, the lesser curvature and the posterior wall [4,14], while the other patient had a complete gastric rupture at the pyloro-duodenal junction, an even rarer type of gastric lesion which is not specially included in the accepted stomach injury classification as postulated by Begossi *et al.* [15,16]. Gastric rupture is well known for its association with solid organs injuries like spleen, pancreas, liver. It is also frequently associated with extra abdominal injuries of the thorax or extremities [3,9,17]. Our 2 cases confirm these statements as they were all associated with other injuries. One with a splenic injury, the most common associated injury [4] and a maxillo-facial fracture, the other with upper limb fracture.

Pre-operative diagnosis of blunt gastric rupture may be difficult [3]. Most of the patients present on admission in shock or in symptoms and signs of acute abdomen [3,4,12,18]. These presentations are not specific of blunt gastric rupture and were found in our patients. Plain abdominal X-ray is less useful in the diagnosis as free intraperitoneal air is present in only 16-66% of cases [13]. Computed Tomography (CT) is now the gold standard for early diagnosis of blunt gastric injury [1]. The CT findings that are suggestive of gastric rupture are free sub diaphragmatic air, visualization of an "outlined" falciform ligament, intraperitoneal nasogastric tube location, abrupt wall thickening density associated with adjacent dirty fat density and intraperitoneal fluid collection [1,19]. Recently, Salazzo *et al.*, according to this CT findings, have proposed a CT grading to better evaluate the blunt gastric lesions [20]. CT is also useful for the detection of other intra-abdominal or extra-abdominal lesions [1,19]. In our patients, presence on CT of massive peritoneal free air and fluid led us to perform emergent exploratory laparotomy. Emergent exploratory laparotomy is required for blunt gastric injury [15]. Through a midline incision, the control of hemorrhage is the first priority before control of gastric spill [6].

Aboobakar *et al.* have suggested a management of blunt gastric injury according to the grade of injury [7]. A full thickness blunt gastric rupture is repaired by primary two-layer technic with absorbable suture after a proper debridement and refreshing of edges [7,13,15,21]. In case of complete gastric transection direct repair by end-to-end anastomosis has been practiced by most authors [15,22]. In situations in which there is an associated duodenal injury requiring bypass, a gastrojejunostomy is appropriate [15]. In case n°2 we did first a splenectomy to control hemorrhage before a one-layer running absorbable suture as in elective surgery with good outcome, while in case n°1, a perihepatic packing was done before a Roux-en-Y gastrojejunostomy as the rupture was located at pyloro-duodenal junction and the surgery done over 24 hours after the traumatism. The most common complication is intra-abdominal abscess formation related to the massive intraperitoneal contamination with undigested food [4]. That's why generous and adequate peritoneal lavage and drainage are necessary [13]. Gastric fistulae may also occur [4]. Mortality following blunt gastric rupture is reported in the range of 0-66 % and is mostly due to fatal shock as a result of associated injuries and septic complications [13,14]. Our patients recovered from our management without major complications.

Conclusion

Gastric rupture from blunt abdominal traumatism is rare and uncommon in isolation being associated often with major other injuries that can influence the mortality rate. The CT findings suggestive of gastric injury should be well known by radiologist for an early diagnosis and prompt management. One-layer repair is quite feasible, while restoring gastrointestinal continuity in some cases may require gastrojejunostomy reconstruction.

Déclaration d'intérêts : l'ensemble des auteurs ne déclare pas de conflits d'intérêt en rapport avec cet article.

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