

Isolated double gastric rupture caused by blunt abdominal trauma in an eighteen months old child: A case report

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Abstract

We report a case of an isolated double gastric rupture, resulted from blunt abdominal trauma, that we successfully repaired by primary closure. A 18-month-old girl injured in a motorvehicle accident was admitted to our hospital where the plain X-ray and the CT findings revealed the presence of free abdominal air. An immediate performed exploratory laparotomy disclosed two full-thickness ruptures of the stomach (on the greater curvature and the posterior wall). The ruptures were closed primarily by a two-layer closure. Twenty-four hours post-operatively the patient developed delayed shock as a result of chemical peritonitis. On the 8th postoperative day the girl developed septic shock and gastrorrhagia. She underwent a gastroscopy which revealed stress-ulcer, and was treated conservatively in the children intensive care unit of our hospital. She was discharged home on 20th postoperative day. At 3-month follow up, she was doing well with normal growth and eating a regular regimen about her age. Gastric rupture following blunt abdominal trauma is rare, with a reported incidence of 0.02—1.7%. The morbidity and mortality are directly related to the number of associated injuries, the delay in diagnosis and the development of intraabdominal sepsis. In this paper we emphasise the need for early diagnosis and the aggressive surgical treatment as a key to decreasing the mortality and morbidity from this relatively rare injury, especially in this age group of children. Hippokratia 2008; 12 (1): 50-52

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Trauma is the leading cause of mortality and morbidity in children from ages 1-14 years and results in more deaths and disability than all other childhood diseases combined¹. Abdominal trauma accounts for 8-10% of all trauma admissions to pediatric hospitals and more than 80% of traumatic abdominal injuries in children result from blunt mechanisms². Penetrating injuries in children are less common and result in 8-12% of the abdominal trauma admissions in most trauma centers². Blunt trauma to the abdomen commonly occurs due to motor vehicle accidents³. Other causes are fall from height, seat-belt injuries, and even vigorous resuscitation³. Blunt abdominal trauma occurs more commonly in childhood³. Following the head and extremities, the abdomen is the third most commonly injured anatomic region in children². The abdominal contents are very susceptible to injuries in children because the abdominal wall is thin, the diaphragm is more horizontal and the ribs are very elastic⁴. Gastrointestinal tract injuries in children may occur by either blunt or penetrating mechanism⁵. The incidence of hollow viscus injuries following blunt abdominal trauma varies from 4 to 15%⁶ and especially is present in 3% of pediatric abdominal injuries². Blunt gastric injuries are even rarer occurring in only 0.02–1.7% patients with blunt abdominal trauma⁶. Although some authors find that the incidence is higher in childhood, other reported series failed to demonstrate such a correlation with age⁷. Blunt gastric injuries are uncommon in isolation, being associ-

ated with other intra- and extra-abdominal injuries as a rule⁶. Knowing the infrequency of this sort of injury and especially of double rupture, we present our experience of treating an eighteen month old child, who had an isolated double gastric rupture after blunt abdominal trauma in a car accident, without any other intra- or extra-abdominal injury. No similar case for a so young child has been reported in the accessible to us literature.

An 18-month-old girl was referred to our emergency departement about half an hour after a vehicle accident, as a rear seat car passenger, conscious and without any other evident of trauma. On physical examination she was haemodynamically stable with blood pressure at 110/60 mmHg and pulse rate 128/min. Her Glasgow coma scale was 13, and her respiratory rate was 28/min with SpO₂: 95%. Palpation and auscultation of the abdomen was grossly normal. No visible seat belt sign and no other external injury were present. A nasogastric tube was inserted and blood-stained gastric contents were aspirated. An immediate abdominal plain X-ray film followed by a CT revealed free intra-abdominal air (Figure 1) and ascitic fluid in the peritoneal cavity.

Emergency laparotomy revealed extensive peritoneal contamination with recently ingested food and two tears of the stomach (Figure 2a). The first gastric rupture, about 6 cm in length, was located on the middle of the greater curvature (Figure 2b). The damage was detected after the opening of the greater omental sac, which was full of in-

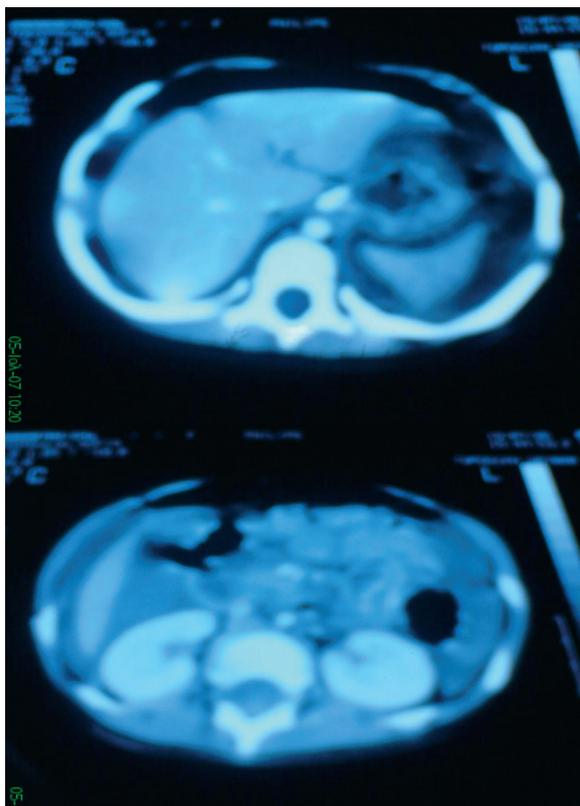


Figure 1. The abdominal CT findings revealed free intra-abdominal air

gested food. The second gastric rupture, 2 cm in length, was located on the posterior wall of the upper third of the stomach, parallel to and near the lesser curvature. This minor rupture was found on opening the lesser sac. After copious irrigation, both perforations of the stomach were sutured in two layers. Drain was imposed in the Douglas space.

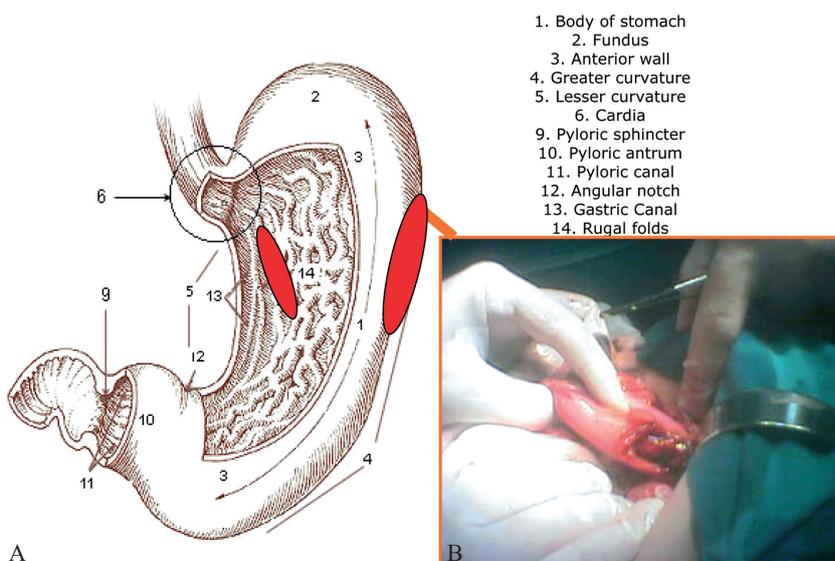
Twenty-four hours post-operatively the patient developed delayed shock as a result of the chemical peritonitis, which was treated by crystalloid solutions and corticosteroid administration. The 8th postoperative day the girl developed septic shock and gastrorrhagia. She underwent a gastroscopy which revealed stress-ulcer, and was treated conservatively in the children intensive care unit of our hospital. She was discharged on 20th postoperative day. At 3-month follow up, she was doing well with normal growth and eating a regular regimen about her age.

Discussion

In blunt trauma there are three

different mechanisms that causing distinct patterns of injury to gastrointestinal organs⁸. First is a crush injury that occurs when an organ is compressed violently against the spine⁸. Burst injury occurs when rapid compressive forces are applied to a filled and distended hollow viscous, without direct mechanical compression⁸. And finally shear injury caused by rapid acceleration-deceleration of an organ at one point of fixation⁸. In young children, the intestine is not fully attached within the peritoneal cavity, potentially making it more vulnerable to injury due to sudden deceleration and/or abdominal compression². Blunt injuries to the stomach are relatively infrequent and occur when a compressive force causes a burst injury in a patient with a full stomach⁵. The stomach has very strong walls and these are not torn by blunt trauma unless it is very severe or the stomach is full, or both⁹. Other protected factors are the anatomical position of the stomach and his high degree of mobility¹⁰.

Blunt gastric rupture can occur in any portion of the stomach and usually occurs as a single lesion, which is commonly debrided and repaired by primary closure¹⁰. The anterior gastric wall is the most common site of rupture, followed by the greater curvature^{10,11}, the lesser curvature and the posterior wall¹⁰. A full stomach usually ruptures at the greater curvature with a blowout or stellate configuration⁸. However, the greater curvature is the site most often affected in the paediatric age group¹². Apart from these injuries, total rupture of the gastro-oesophageal junction¹³, complete circular avulsion of the stomach from the duodenum¹⁴, and rupture of both gastric walls¹⁵ have been reported due to blunt abdominal trauma and were associated with a solid organ injury. In the literature only one case of isolated gastric rupture of both walls reported in a 13 years old boy¹⁶ and an isolated double rupture of the posterior wall in a 14 years old³.



A

B

Figure 2. (A) Two full-thickness ruptures in the stomach (on the greater curvature and the posterior wall), (B) The first gastric rupture, about 6 cm in length, was located on the middle of the greater curvature

Gastric rupture is well known for its association with injuries of adjacent organs: liver, pancreas and spleen¹⁷. Associated solid-organ injury, lung injury and pneumo- or hemothorax have been reported in 83%¹⁸ to 93%¹⁷ of cases. Gastric rupture is often associated with injury to the extremities¹⁷. In our case there was no other organ injury.

When rupture occurs with a full stomach, massive peritoneal contamination results¹⁶. The majority of patients either present in shock or develop hypotension shortly after arrival¹⁶, as a result of blood loss from associated injuries¹⁰. Although the blood loss from the rupture itself is generally insufficient to induce shock, patients may become hemodynamically unstable as a result of the chemical peritonitis induced by the spillage of gastric acid^{19,20}. Signs and symptoms of an acute abdomen are almost invariably present¹⁶.

Gastric perforation following blunt abdominal trauma requires prompt diagnosis²¹. Free intraperitoneal air on plain abdomen and chest x-ray films is seen only 16-66% of the cases^{19,22}. CT may be also helpful in establishing an early diagnosis thereby decreasing the period of peritoneal contamination, sepsis and shock²¹ and is more useful for visualization of intra-abdominal free air¹⁷. It can also reveal associated solid-organ injuries. The CT findings which are suggestive of gastric rupture are free subdiaphragmatic air, visualization of an "outlined" falciform ligament, intraperitoneal nasogastric tube location, and intraperitoneal fluid-fluid layer²¹.

Repair of the stomach with two-layer suturing is the treatment of choice for blunt injury-associated gastric rupture²³. The air test is useful for assessing of the integrity of the repair and searching for any untreated perforation¹¹. Thorough and adequate peritoneal lavage and drainage are also necessary¹¹.

Gastrointestinal injury from blunt abdominal trauma in children carries a high mortality, usually from associated intraabdominal or extraabdominal injuries²⁴. The mortality has been reported to range from 0-66%¹⁹. It is mostly related to associated injuries, septic complications and, less frequently, to fatal shock⁷. The majority of complications related to gastric rupture is septic in nature¹⁸, and relate directly to massive intraperitoneal contamination¹⁶. The most common complication is intraabdominal abscess formation but gastric fistulae may also occur⁷. In our case our patient developed postoperatively septic shock with an incident of stress-ulcer gastrorrhagia.

In conclusion, we encountered a case of an 18-month old child with an isolated double gastric rupture resulting from blunt abdominal trauma in a car accident and successfully managed surgically by primary closure. Although gastric rupture usually occurs as a single lesion in the stomach, surgeons should be aware of the possibility of multiple ruptures. Preoperative CT study was effective for a prompt diagnosis and treatment. Copious intraperitoneal irrigation and drainage are essential for the patient's survival.

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