CASE STUDY

Isolated duodenal perforation associated with blunt abdominal trauma

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Introduction

The duodenal injury incidence is 11.2-26% in blunt trauma [1]. They are usually associated with one to four other abdominal organ injuries where an isolated injury is a rarity in surgical practice [2]. Isolated duodenal injury diagnosis and management is a clinical challenge for surgeons due to its anatomical location. Diagnosis is often delayed due to its low incidence and minimal clinical features and is associated with more extensive therapy and increased mortality and morbidity [3].

Case presentation

An 11 years old boy presented to casualty surgical ward with mild abdominal pain with nausea and vomiting following blunt trauma to the abdomen with bicycle handle. On examination, he was not pale and had a pulse rate of 90/min with a blood pressure of 110/70mmHg. There was mild right iliac fossa tenderness. Rest of the systemic examination was unremarkable. The FAST scan showed minimal small fluid collection around the right kidney and minimal free fluid in the pelvis. He was managed conservatively initially with analgesics and intravenous fluids. However, he complained of severe upper abdominal pain with nausea and vomiting next day morning. He was found to have a pulse rate of 120/min with a normal blood pressure of 110/80 mmHg. Repeated ultrasound scan of abdomen and pelvis showed the same findings.

The chest X rays did not reveal any gas under diaphragm. His full blood count showed leucocytosis [13,000/mm3] with predominant neutrophils [80%] with normal haemoglobin and platelet count. His renal, liver function tests and serum amylase were within the normal limits. The mechanism of injury and presence of severe abdominal pain with tachycardia, leucocytosis and fluid collection in the retroperitoneal region suggested possible retroperitoneal bowel injury. Unfortunately computed tomography of abdomen was not available at our hospital on that day. The emergency exploratory laparotomy was performed without

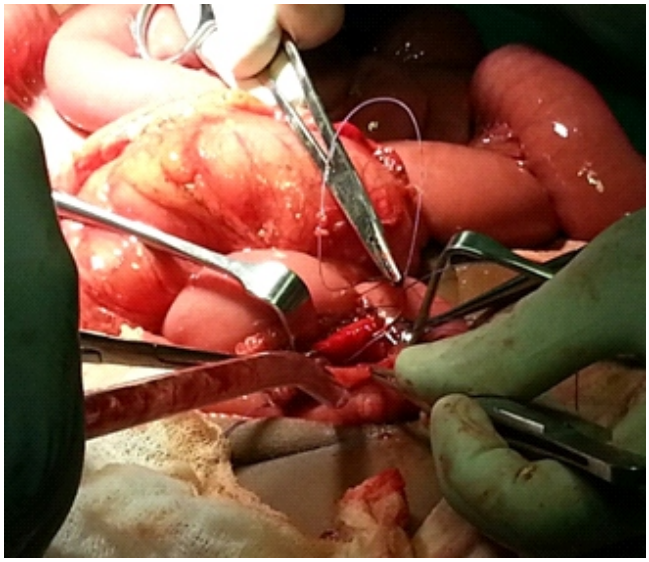

Figure 1. The anterior duodenal rupture was shown in the second part of the duodenum involving more than 70% of the circumference.

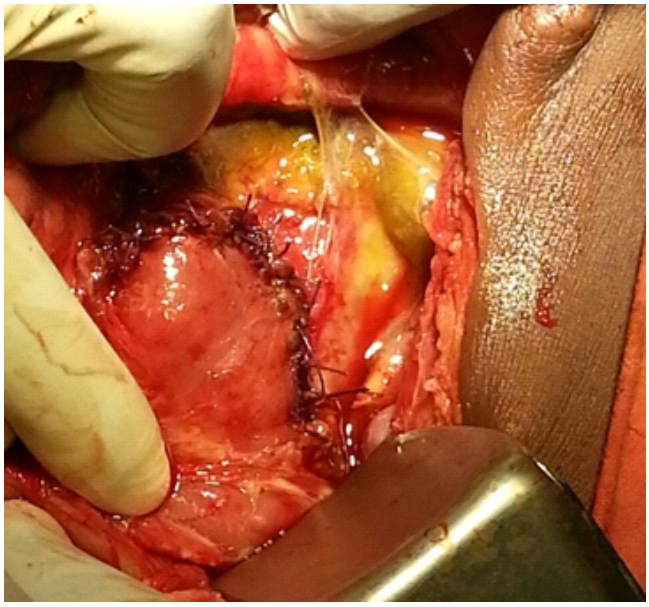

Figure 2. Following primary closure of duodenal rupture, duodenal diversion with gastrojejunostomy and pyloric exclusion.

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delay within 24 hours. Bile staining in the retroperitoneal area noted mainly in the paraduodenal area. We explored the area and did full kocherization of the duodenum and looked for other organ injuries. He was found to have a perforation in the anterior surface of the second part of the duodenum involving around 70% of the circumference proximal to the opening of the common bile duct [Figure 1]. He didn't have any other abdominal organ injuries. We closed the defect primarily and did duodenal diversion. Duodenal diversion was performed with gastrojejunostomy and pyloric exclusion [Figure 2]. He developed wound dehiscence postoperatively on day 10 which was managed surgically, subsequently recovered successfully.

Discussion

Duodenal injury in blunt trauma is often difficult to diagnose unless we suspect it during the initial assessment and tertiary survey of trauma patients [1]. Delay in the diagnosis and treatment results in high morbidity and mortality [3]. If the delay is more than 24 hours morbidity is 43% if it is less than 24 hours it is 29% [10]. Crushing or shearing forces on the abdomen resulting in duodenal injury. The injury mechanism, vomiting, upper abdominal tenderness with tachycardia and elevated temperature suggest further evaluation.

Peritoneal Fluid collection in the ultrasound scan is 86% sensitive but not specific for bowel injury [7]. Contrast-enhanced computed tomographic scan [CECT] of the abdomen with oral contrast is 88-93% sensitive to detect bowel injury following blunt abdominal trauma [8]. But no data available regarding CECT sensitivity in isolated duodenal injury since it's rare. Abdominal CECT is a sensitive indicator to detect trace amount of retroperitoneal air, duodenal contrast leak and paraduodenal hematoma [4]. Presences of retroperitoneal air, contrast leakage around duodenum in [CECT] of the abdomen with oral contrast is more evident in later stages of duodenal injury [4].

Our patient had a suggestive mechanism of injury, mild abdominal pain, nausea and vomiting initially. Subsequently, he was found to have worsening abdominal pain, persistent tachycardia and leucocytosis with fluid collection in the retroperitoneal region. This clinical picture suggested a possible underlying retroperitoneal bowel injury. We made a diagnosis of retroperitoneal bowel injury based on clinical ground. As there was no CT scan facility available on that day to confirm the diagnosis. Also, delay in the surgical management associated with high morbidity [If the delay is more than 24 hours morbidity is 43% if it is less than 24 hours it is 29% [10] so we decided to do an exploratory laparotomy.

It was confirmed during laparotomy with the findings of rupture of the second part of duodenum proximal to the opening of the common bile duct. Our patient belonged to Grade 3 duodenal injury according to the American Association for Surgery of Trauma [6].

There are several surgical methods available to deal with a duodenal injury, which is a simple primary repair to more complex surgeries like resection and anastomosis with duodenal diversion [Pyloric exclusion with gastro-jejunostomy] or pancreaticoduodenectomy [5]. Majority of the cases are adequately managed with primary repair with one or two layers or resection and anastomosis [5]. Some surgeons practice damage control surgery where initial drainage with a large hole drain followed by secondary closure in unstable and heavily contaminated patients.

Surgical technique should be decided on the following factors, early or late presentation, and degree of contamination, patient's hemodynamic status, surgeon's expertise and experience. He was successfully managed with primary closure of duodenal rupture and duodenal diversion with gastrojejunostomy and pyloric exclusion for additional safety [9].

Since of isolated duodenal injury following blunt abdominal trauma is rare most young general surgeon is not experienced in handling this. This case highlights the difficulties experienced during the diagnosis and management of traumatic duodenal injury in a peripheral hospital setting. Suspicion of duodenal injury should be there during blunt abdominal trauma patient assessment and trauma laparotomies for early diagnosis and management of duodenal injury.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

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Learning Points:

- Diagnosis of abdominal injuries after blunt abdominal trauma especially duodenal injury is a clinical challenge for surgeons.
- Clinical presentation is often not straightforward due to nonspecific presentation.
- We suggest a low admission threshold with abdominal pain after blunt trauma for 24 hours of observation.