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Isolated traumatic rupture of the duodenum: Case report - Perforations, preferences, patches and parachutes

Dr. Mehboob Alam Pasha[*], Dr. Michael Wong Pak Kai[*],
Dr. Khairunissa Che Ghazali[*],Dr.Nur Zawani Zainuddin[*]
[*]*Department of Surgery, School of Medical Sciences, Hospital Universiti Sains Malaysia,Kubang Kerian, Kelantan, Malaysia*

Abstract: *Isolated duodenal rupture following blunt abdominal trauma is extremely rare , and hence liable to be missed. Even when the diagnosis is suspected , a "wait and see" approach may delay the diagnosis and management. Morbidity increases due to ongoing leak of duodenal content from the perforation. This may require more complex procedures for successful repair. The case of a young traumatised patient with isolated duodenal rupture is presented to highlight these issues.*

keywords :*Blunt trauma, diagnostic dilemma, isolated duodenal rupture, serosal patch, tube decompression*

I. Introduction

Duodenal injuries account for 4.3% of all abdominal injury ranging from 3% - 5%. 25% of them are caused by blunt trauma mainly from MVA (motor vehicle accidents)[1]. Because of its retroperitoneal location close to organs such as liver, pancreas,stomach and great vessels,associated injuries of these organs is the rule. An isolated rupture of the duodenum is therefore considered an exception, and involves mostly the second part [1]. Overall mortality at 5.5% - 30% is mainly due to the presence of associated injury. Morbidity rate of 27.1% is mainly due to fistula formation following failed repair or suture line dehiscence [2] . We report a case of isolated rupture of the duodenum in a young male following a motor-cycle crash. The initial diagnostic dilemma and subsequent successful repair are discussed.

II. Case Report

A 21 year old male was admitted to our hospital 4 hours after his motor cycle crashed into a drain. The handlebar of the motorcycle had struck his abdomen. On admission he was well oriented, with Glasgow Coma Scale (GCS)of 15,and respiration was normal. Blood Pressure , Heart rate and Temperature were normal. A 3x2 cm, contusion was noted over the upper abdomen . His abdomen was not distended, soft, with mild tenderness over the epigastrium. A Focussed Abdominal Sonography for Trauma(FAST) scan revealed the presence of free fluid in the Morrison pouch and pelvis. The erect Chest Radiograph (CXR) did not show presence of free air under the diaphragm. Blood tests showed a raised White Cell Count (WBC) of $17x10^9$/L (reference range: 4-$11x10^9$/L) and Haemoglobin (Hb.) was 12.6g/dL (reference range: 12-16g/dL). Serum Amylase was normal. Preliminary CT scan of abdomen was suggestive of duodenal injury.

In view of the nonspecific clinical symptoms and haemodynamic stability , he was closely monitored and covered with Antibiotic (Cefuroxime 500 mg IV Q 6 hrs). After six hours of admission, he complained of increasing abdominal pain . A rise in pulse rate and temperature was also noted. A repeat CT scan using Oral and IV contrast ,showed definite evidence of duodenal perforation as seen by presence of air pockets and extravasation of contrast around the duodenum .There was also a perirenal collection of fluid in the right kidney(Figure 1) Exploratory laparotomy confirmed the findings. The duodenum was mobilised using a wide Kocher manoeuvre .A 2.5cm full thickness rupture was seen in the posterior wall at the lower end of the second part of the duodenum. The edges were irregular, with duodenal mucosal protrusion and bile stained(Grade III injury) (Figure 2).

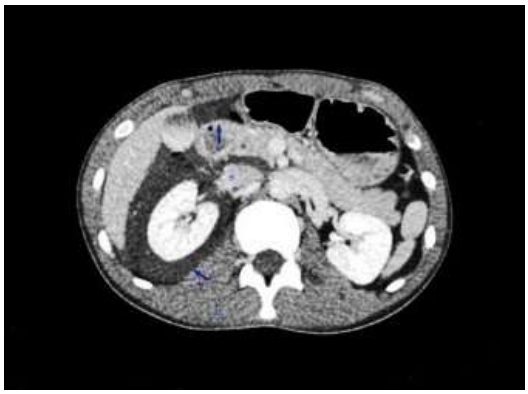

Figure1.CECT showing periduodenal air pockets and perirenal fluid collection.

Figure2 Clinical photograph showing duodenal rupture and bile leak.

No other associated injuries were found . After thorough debridement and copious lavage with saline, the duodenal wound was closed in 2 layers. A jejunal serosal loop was used in continuity to reinforce the primary repair (Figure 3).

Figure3 Clinical photograph showing the jejunal serosal loop being placed over the primary repair.

A nasogastric tube(NGT) was placed in the first part of the duodenum . A retrogradely placed tube through the jejunum was also used for decompression of the duodenum . A distal feeding jejunostomy completed the procedure. Patient ‘s progress was unremarkable. After two days of Total Parenteral Nutrition (TPN), jejunostomy enteral feeds were started. The tubes were removed on the 8th postoperative day when the contrast study showed no evidence of leak . Patient was discharged on the 12 th day and remains well .

III. Discussion

25% of all duodenal traumas arise from blunt injury in the form of a direct blow on the abdominal wall. Since the duodenum is closely related to other abdominal and thoracic organs and vessels, an isolated duodenal injury due to blunt trauma is considered a rarity[1,2]. In a prospective analysis of 30 patients, Jansen could find only 1 patient with isolated duodenal rupture identified at surgery [3]. Most series report MVA as the commonest cause[1-2,4].

The mechanism of rupture has been explained on the basis of the duodenum behaving as a closed loop which is compressed forcibly against the spinal column behind, by a direct blow on the abdominal wall in front [2]. In this patient, the handlebar was the probable cause as seen by the contusion mark on his abdomen. Fang found this to be a common occurrence in Taiwan where motorcycles are a common means of transport [5].

Because of its well protected and deep location blunt injury of the duodenum may escape detection . A high index of suspicion is required to avoid misdiagnosis or delayed diagnosis as occurred in our patient. Allen noted that 20% of his patients with blunt injury of duodenum had a diagnostic delay [6]. The initial physical examination is usually negative or the patient minimally symptomatic. When the duodenal content extravasates into the peritoneal cavity signs of peritonitis may manifest later[4]. Initial investigations may not be helpful. The sensitivity of a positive FAST scan in a haemodynamically stable patient such as ours is debated [7]. Even the erect CXR and serum amylase have little predictive value as seen in this case [2,4]. The raised WBC can occur in any abdominal trauma [4].

In stable patients, CT scan of the abdomen is the best method to visualize retroperitoneal organs. When performed with oral and IV contrast, the extravasation of contrast indicates complete laceration or rupture requiring surgical repair. However in some cases especially when done early , CT findings may be doubtful or subtle as noted in our patient[8]. Allen also noted that in the majority of his patients with delayed diagnosis, there were findings suggestive of blunt duodenal injury on the initial CT scan. He attributed this to be the cause of the delay [6].

The literature suggests that the majority of duodenal injuries(80%) can be primarily repaired. However more severe injuries (20%) such as noted in our patient have high risk for sutureline dehiscence and leaks. More complex procedures are required for their successful repair[2,4,9-11] . McInnis reported the effecetiveness of jejunal serosal patch used to reinforce primary repairs of the lacerated duodenum[9] The serosal patch acts as a surgical parachute [10]. Triple tube decompression was done for biliogastric diversionIvatury however found increased incidence of duodenal fistula and complications when duodenal decompression was used [11]. Nevertheless prospectively designed randomized studies are needed to settle the controversies and optimize the best procedure for individual cases.

IV. Conclusion

Isolated duodenal rupture following blunt abdominal trauma is rare, requiring a high index of suspicion for its early diagnosis and management. Awareness of available options and sound judgement to choose the best option is necessary for successful repair. Concerns about the rising incidence of MVA need to be addressed.

Consent

Written informed consent was taken from the patient for publication of this case report and the accompanying images. Copy is available for review.

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