Management challenges of Isolated duodenal trauma : A case report and literature review

Abstract

We report a case of an isolated duodenal injury following blunt abdominal trauma and highlight its management challenges. The diagnosis of duodenal injury was early but associated with the hemodynamic instability of the patient. A short resuscitation was done before admitting the patient to the operating room. The Jordan technique was the surgical procedure performed on this patient.

Keywords: Management, Challenges, Isolated duodenal Trauma

Introduction

"The management of duodenal trauma remains controversial. These injuries are relatively rare. Their management is made challenging by the retroperitoneal position of the duodenum and by its physiological function" [1]. "Mortality is not negligible, it is mainly increased by the delay in the diagnosis, the frequency of associated lesions and the technical difficulties. There is no consensus on the surgical technique which ranges from primary suturing to complex resections depending on the severity of the lesions" [2]. In the present case, we report a patient with a diagnosis of duodenal trauma, and aim to present the treatment approach to this rare injury.

Case report

A 60-year-old male, motorcyclist who slipped, skidded and fell after hitting a parked vehicle during the rain. He presented in our emergency department four hours after the accident for epigastric pain. He sustained a blunt injury to the upper abdomen from impaction on the steering wheel. There was no associated loss of consciousness. Initial clinical examination revealed stable patient with epigastric minimal tenderness. All biological tests, abdominal ultrasound and chest radiograph that were requested returned without any abnormalities.

The patient was discharged under analgesic treatment. However, the patient returned in the emergency department 2 days later, with severe abdominal pain and vomiting. Clinical examination on readmission revealed an unstable hemodynamic state: hypotension of 80/50 mmHg, tachycardia of 115-120 beats per minute, and polypnea of 24 cycles per minute and a permanent and invincible contraction of the abdominal rectus muscles. The biological tests revealed a c-reactive protein at 150 and white blood cells count at 16,000; renal function was preserved but with hypokalaemia which was corrected. An abdominopelvic Computed Tomography(CT) scan was performed urgently without oral contrast medium and revealed the presence of pneumoperitoneum in the inter hepato-diaphragmatic space and also in the Morisson space. This was associated with a peritoneal fluid effusion suggesting the perforation of a hollow viscus (FIG1.).

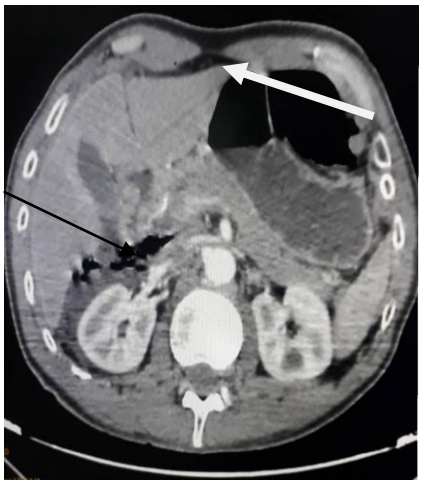

Figure 1: Abdominal CT scan image showing pneumoperitoneum and a peritonealfluid effusion.

After a short fluid resuscitation and antibiotic administration, the patient was admitted to the operating room. Under general anesthesia, a laparotomy with a mid-line incision was performed. Exploration found bilious liquid in the inter hepato-renal space and the right parietocolic space and crepitus in the periduodenal region. Greenish spots of the transverse mesocolon with a grade III rupture of the second duodenal portion were discovered (FIG2).

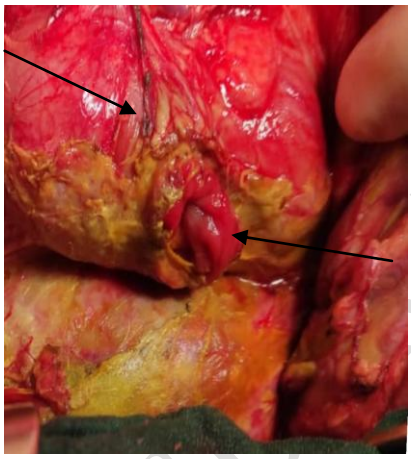

Figure 2: Per-operative image showing a breach of the second duodenal portion

In this context, a surgical intervention by the Jordan technique was performed. The Pyloric exclusion was achieved through a gastrostomy, subsequently, the gastro-entero-anastomosis and duodenal primary repair were carried out associated with a wide drainage system. Recovery after the operation was uneventful and the patient was discharged from the hospital on the fifth postoperative day.

Discussion

“The anatomy of the duodenum is unique and complex because of its close relationship to adjacent structures. Lying deep within the abdomen, the duodenum is well protected in the retroperitoneal space. Therefore, the isolated duodenal perforation is exceptional, found only in 0.6% of abdominal contusions. Duodenal trauma has low diagnostic accuracy before the operation, with the rate of definite diagnosis before the operation always below 10%. It is

usually accompanied by other injuries due to its special and complicated anatomy. Duodenal trauma has a high incidence of missed diagnosis during operation which represents 20% of all cases" [2]. If other abdominal organs are injured simultaneously, the diagnosis normally becomes more difficult. It has been shown that if the interval between injury and operation is longer than 24 hours, the injury would be considered severe. This is why early diagnosis is capital and the clinical signs detected should be particularly emphasized.

However, surgeons need to know that the absence of clinical signs and symptoms does not exclude the possibility of a duodenal injury [3]. On the first round, our patient had just a moderate epigastric pain but 2 days later, he developed severe abdominal pain and permanent and invincible contraction of the abdominal rectus muscles.

Abdominal plain films, ultrasound tests, and CT scans can also help in the diagnosis of duodenal injuries. Retroperitoneal air, free intraperitoneal air, or other signs such as obliteration of the psoas muscle shadow and scoliosis of the lumbar vertebrae can give a clue of the existence of an injury. Gary S Allen and all, in the retrospective study of 35 patients with blunt duodenal injury, found that 7 patients (20%) had a delayed diagnosis of blunt duodenal injury after 6 hours (groupI) and this was associated with increased abdominal complications when 28 patients (80%) had an early diagnosis (group2) before 6 hours. In the group I, CT scans of 5 patients (83%) out of six patients evaluated, showed findings suggesting blunt duodenal injury. Among the 28 group II patients, 7 had suggestive findings of blunt duodenal injury. 14 patients (50%) had a CT scan and 14 (50%) underwent initial diagnostic peritoneal lavage. "Diagnostic peritoneal lavage was initially equivocal (red blood cell count 5 5,000 to 100,000) in the remaining one group I patient compared with three of the group II patients who had diagnostic of peritoneal lavage" [4].

"There is no specific data available about the sensibility and specificity of multidetector CT in the diagnostic of duodenal injuries. Extraluminal air on CT images was present in 60% of duodenal perforation without extravasation of contrast material" [5]. "In the absence of positive signs, air or water-soluble radiopaque contrast agent can be injected through a nasogastric tube just before the abdominal film is taken. If leakage happens, rupture of the duodenum can be confirmed" [6]. The CT scan performed without oral contrast medium showed the presence of pneumoperitoneum in the inter hepato-diaphragmatic space and in a Morisson space; without highlighting the injured area. Laparoscopy also helps in the diagnosis of patients seen early and hemodynamically stable. "Although routine laboratory tests are not helpful in the preoperative diagnosis of duodenal rupture, some authors find that serum amylase is an important marker. Serum amylase is elevated in 50% of patients with duodenal or upper gastrointestinal injury" [7].

In our case, the operative decision was based on clinical and radiological elements. Explorative laparotomy remains the ultimate diagnostic method if there is a high degree of suspicion of duodenal injury. "The explorative procedures should be careful, comprehensive, accurate, and quick. The duodenum should be explored if such signs appear: free gas or fluid looking like bile with an undetermined origin, extraction of intestinal juice or fluid like bile from the retroperitoneum, hematoma, edema, ecchymosis or crepitus in the periduodenal region or root of mesentery and mesocolon. It requires careful detection for an accompanying injury to the pancreas as well as the bile duct and the ampulla, especially when the second portion of the duodenum is injured" [2]. "The principle of treatment of duodenal injuries is to take into account the overall situation and handle matters in order of importance and urgency.

“The literature has increasingly favored simple primary repair over complex strategies designed to divert and reduce the flow of secretions over the repair” [8]. “Options are limited for a patient presenting late withs sepsis. Sometimes, damage control surgery in the form of polypropylene mesh laparostomy after duodenorrhaphy, tube gastrostomy, reverse tube duodenostomy, and a feeding jejunostomy can be performed. Salvage procedures like quick damage control with delayed definitive surgery, Foley catheter duodenostomy, and duodenal decompression by quadruple tube technique are sparingly reported” [9]. Our patient underwent the Jordan technique, consisting of performing a pyloric exclusion via gastrostomy, a gastro entero-anastomosis, and duodenal primary repair. “Mobilization of the duodenum is known to reveal significant injury even in the absence of apparent signs of trauma to it. Thus, a case of complete transection of the duodenum at two places has been reported, one just beyond the pylorus and the other between the second and third part of the duodenum” [10]. This report highlights the possibility of a duodenal injury occurring at multiple sites. We strongly suggest that in all major blunt trauma cases, even in the presence of obvious perforation on the duodenum, the duodenum should always be mobilized and evaluated for additional injury. During our exploration, the duodenal injury was unique, categorized as grade III according to the American Association for the Surgery of Trauma Organ Injury Scale (AASTOIS: American Association for the Surgery of Trauma Organ Injury Scale) [11]. “Duodenal lesions are also associated with a high morbidity rate; complications are mainly represented by fistula resulting from surgical repair failure due to suture line dehiscence and are occasionally represented by duodenal obstruction. In a view of 7 series” [12], with a total of 341 patients, a morbidity rate of 22% was observed. Fifty-one (51) cases of an intra-abdominal abscess (15%), 21 of duodenal fistula (6%), 3 cases of duodenal obstruction (0.9%), and 2 cases of recurrent pancreatitis (0.5%) were reported. Fakhry et al.[13] a multicentre retrospective study comprising 318 patients with duodenal trauma recorded a morbidity rate of 27.1%. The location of the injury at the duodenal level has long been described as associated with high mortality. However, this would be largely due to the frequent association with other lesions within the abdomen. In a series of 2220 patients with isolated duodenal perforation, a fistula rate was 2.3% with tube decompression and 11.8% without tube decompression. The mortality rate was 6.6%. This mortality is however higher when there is a delay in managing the lesion [14].

Conclusion

Isolated duodenal injury following blunt abdominal trauma is rare. Knowledge of typical mechanisms of injury and frequently associated patterns of organ injuries may aid in the initial assessment of the trauma. CT scan, which is the gold standard in imaging acute abdominal trauma. Diagnostic delays of more than 6 hours are associated with increased complications and an adequate resuscitation and stabilization are recommended and capital. There are several treatment options for duodenal injury, ranging from simple repairs such as primary closure (duodenorrhaphy) to more complex procedures such as resection and anastomosis, duodenal diverticulation, pyloric exclusion, and pancreaticoduodenectomy. Our patient underwent a surgical procedure which was the Jordan technique with a simple postoperative course and discharge from the hospital on the fifth postoperative day.

Declarations

We certify that all possible efforts have been made to protect the identity of the patient mentioned in this Manuscript.

Consent

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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