TRAUMATIC RUPTURE OF DUODENUM (CASE REPORT)

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Resume Duodenal injuries present approximately 4.3% of all abdominal injuries and in 25% occur as a consequence of blunt abdominal trauma. It is a very challenging diagnostic problem and may have a mortality rate up to 40%. The first segment of the duodenum is the least commonly affected (13%). The paper deals with a discussion of such a rare clinical case: perforation of the duodenum following a blunt abdominal trauma.

45 years old male was hospitalized because of chest and abdominal pain, palpitations, tachycardia, excessive perspiration, dyspnea, generalized weakness. The complaints started gradually 4 days ago following a blunt abdominal trauma. Symptoms increased and reached an unbearable state which led to the patient's admission.

Because of late hospitalization As the seek of medical help was delayed, on admission day his condition worsened abruptly and resulted in the need of mechanical ventilation and later, universal peritonitis. Despite the life-threatening clinical picture, patient underwent a successful surgical intervention (Graham's patch technique) and was discharged after full stabilization, without any further complications.

Key words: blunt abdominal trauma, duodenal injury, duodenal perforation, duodenal rupture

INTRODUCTION

Duodenal injury can be quite challenging diagnostic problem due to its possible retroperitoneal location. This may even lead to misdiagnosis or delay in identification and further approach. As a consequence, mortality rate can increase up to 40% [1]. Duodenal injuries present approximately 4.3% of all abdominal injuries [2] and in 25% occur as a consequence of blunt abdominal trauma [1]. Males are affected five times more frequently compared to a female population, with a mean age of 23 years [2].

In 2015, Santos et al. analyzed the cases of 1042 patients with abdominal injuries and second portion of the duodenum was identified as the most common anatomic location of all duodenal injury (36%); the first segment was defined as least commonly affected (13%) [2].

The paper deals with a discussion of such a rare clinical case: rupture of the first segment of duodenum following a blunt abdominal trauma.

CASE DESCRIPTION

A 45 years old male was admitted to clinic by his family members after four days from blunt chest and abdominal trauma complaining of chest and abdominal pain, palpitations, tachycardia, excessive perspiration, dyspnea, generalized weakness. At the moment of traumatic injury, the patient had alcohol intoxication. Chest pain was left sided, exacerbated by movement and deep breathing. The symptoms had increased gradually and due to a negative dynamic, medical attention was addressed. Past medical history is significant for alcohol use disorder, COPD, obesity and hospitalization in ICU 2 years ago because of acute respiratory distress.

The physical examination of the patient revealed SpO2 of 87%. On auscultation breath sounds were heard bilaterally, diminished in the lower lobe of the left lung. Oxygen mask was applied (8-10L/min) with an improvement of SpO2 up to 92%. Ps – 135 bpm, T/A – 110/60mmHg. Abdomen was distended and sounds of peristalsis were barely heard. Both light and deep palpation revealed diffuse abdominal tenderness, rigidity. Sign of acute peritoneal irritation was positive. Posttraumatic bruises were visible on the left flank.

Abdominal ultrasound revealed enlarged liver and intraabdominal fluid up to 400mL.

Chest CT scan identified the fracture of the 6th, 7th, 8th, 9th and 10th ribs on the left axial line with minimal displacement locations. Subpleural zones and layer of the costal pleura were swollen and infiltrated. Lung contusion and small amount of left intrapleural effusion were also present. Any current need of surgical intervention was denied by a thoracic surgeon.

Abdominal CT scan with contrast revealed significant amount of fluid in subdiaphragmatic and subhepatic spaces, between small bowel loops and in the small pelvis. Walls of the duodenum were moderately thickened and swollen. Intraabdominal fat, greater omentum and intestinal mesenteries seemed inflamed. Air is identified along the anterior abdominal wall.

Because of most likely presence of viscus perforation, open abdominal surgery was planned.

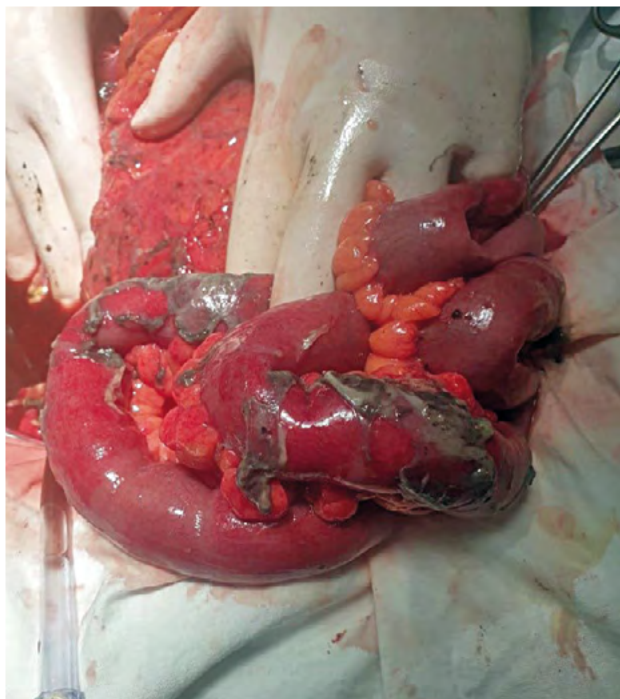

Figure 1. Intraoperative image. Fibrin, pus and bile containing exudate covering intestine and its mesentery.

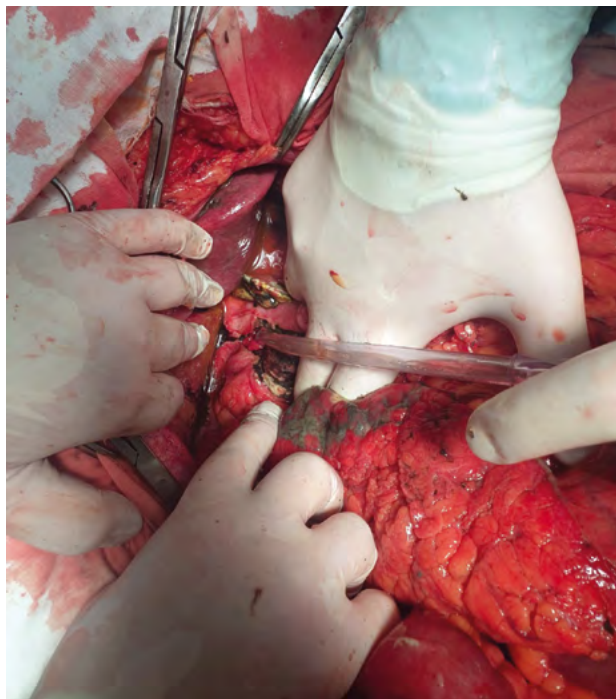

Figure 2. Intraoperative image. Aspirator inserted in the ruptured first segment of the duodenum.

During the surgery, approximately 2000mL foul smelling, pus and bile containing exudate and intestinal contents were identified. Pus was diffusely distributed inside the abdominal cavity (Fig. 1).

Both parietal and visceral layers of peritoneum were hyperemic, inflamed and were covered by thick green-colored fibrine. The most significant amount of exudate was present in the subhepatic and right subdiaphragmatic spaces and rectovesical pouch. Exudate was removed from the peritoneal cavity. During the further exploration, approximately 3cm transmural rupture was identified in the first segment of duodenum, through which discharge of gastric contents was seen (Fig. 2).

Edge of the ruptured duodenum was soft without local perifocal infiltration like in case of peptic ulcer perforation. Duodenum was closed by tension-free sutures and was covered by appropriate-sized patch of well-vascularized omentum (Graham's patch technique). The omental patch was fixed in place by interrupted sutures placed through healthy mucosa on either side of the ruptured duodenum. After subsequent suction of the abdominal cavity, the gastro-enteral tube was inserted below the ligament of Treitz for early enteral nutrition during the postoperative period. Besides this, nasogastric tube was placed in the stomach for postsurgical decompression. Three drains were placed into the peritoneal cavity with separate incisions: in the subhepatic region, pelvis and right paracolic space. Parenteral and enteral nutrition, antibiotic therapy and analgesics were introduced during the postoperative period. No complications occurred during the postoperative period. The abdominal ultrasound performed after surgery revealed no presence of fluid, and the sutured site was described as not leaking. The wound was healed with primary intention and patient was discharged on 20th postoperative day without complications.

DISCUSSION

Perforation of the duodenum is defined as a transmural injury to the duodenal wall. A partial thickness laceration may over time develop into a transmural injury. [7]

Diagnosis of blunt duodenal injury is often delayed unless a very high index of suspicion is kept during initial assessment and tertiary survey after resuscitation and stabilization of patients. [8]

Duodenal perforation can cause acute pain associated with free perforation, or less acute symptoms associated with abscess or fistula formation.

Perforation of the duodenum with spillage of intraluminal contents into the peritoneal cavity causes acute chemical peritonitis. This is followed by a systemic inflammatory response syndrome (SIRS), which can progress to secondary bacterial peritonitis and sepsis. Patients with retroperitoneal perforation may lack peritoneal signs and present more indolently.

Double-contrast computed tomography (CT) scan is the most valuable method for diagnosing duodenal perforation. It should be performed whenever there is a clinical suspicion and the patient does not need immediate surgery. CT features of perforation may show discontinuity of the duodenal wall and the presence of extraluminal air or extravasated oral contrast. Other CT findings include duodenal wall thickening, fat stranding. [7] It should also be taken into account, that occasionally, contrast-enhanced computed tomographic scan may also be negative when

performed early or may suggest subtle findings like small amount of unexplained fluid or unusual bowel morphology due to paraduodenal hematoma. [8]

Duodenal perforation is caused by a variety of different mechanisms, therefore the approach is different as well. Some duodenal perforations can be managed conservatively or endoscopically, while others require prompt surgical treatment. The main goals of treatment are resuscitation, control of infection, nutritional support and restoration of gastrointestinal tract continuity.

The type of treatment should be individualized and depends on the mechanism of injury, the timing, location and extent of the injury and the clinical state of the patient. [7]

Duodenal injury should be treated surgically depending on the extent of the injury, but optimal treatment remains controversial. [4] There are multiple techniques for the closure of the duodenal lumen. In the literature there are described: triple-ostomy technique (gastrostomy, duodenostomy and jejunostomy), jejunal serosal patch, jejunal mucosal patch, vascular pedicles, duodenal resection (duodenal duodenostomy, duodenal jejunostomy), duodenal diverticulization (antrectomy and gastrojejunostomy, troncular vagotomy, wound excision and duodenorrhaphy, duodenostomy, Kehr's tube and feeding jejunostomy), pyloric exclusion (temporary pyloric closure and transit reconstruction by gastrojejunostomy) and duodenal pancreatectomy (Whipple procedure). [2] Primary suture repair should be the initial approach considered for most injuries. [3]

Graham's omentoplasty (plugging) and modified Graham's omental patch repair (omentopexy) are also very effective repair in terms of morbidity and mortality. Simple closure of the perforation by primary suture, then loosely suturing the omental flap over the closure with the ends of the primary suture (modified Graham patch repair/omentopexy) is the preferred method of dealing with perforation of <5 mm diameter. However, in several occasions with larger perforations the omental plugging seems a better choice to the omental patch reinforcement technique (omentopexy). [5]

Minimally invasive treatments are slowly emerging as alternative methods to open surgery in the treatment of duodenal perforation, but for now open surgery is still the gold standard for patients that need surgical intervention. [7] During the open laparotomy, careful surveillance is extremely important.

Zeli et al. reported a case of complete transection of the duodenum at two places, one just beyond the pylorus and the other between the second and third part of duodenum. [9] According to the study published in Journal of emergencies, trauma, and shock highlights the possibility of duodenal injury occurring at multiple sites. [8] As we have discussed in this publication, duodenal rupture was evident in one site only, but it is strongly suggested 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, [8] as it was done in our patient's case.

Isolated duodenal injury following blunt abdominal trauma is rare; therefore, most general surgeons have a low index of suspicion and may not be experienced in handling such problems. [8]

The authors of the same abovementioned article state that when diagnosed late, especially when the patient's general condition is severely compromised, simple duodenorrhaphy with duodenal decompression by triple tube technique may be a good selection because the procedure is simple, rapid, and provides a portal for early enteral feeding. [8]

An article published in Scandinavian Journal of Gastroenterology suggests that, The routine placement of abdominal drains after surgical repair is controversial. The literature suggests no benefit in preventing postoperative fluid collections or abscesses. Furthermore, drains may be associated with increased morbidity such as drain wound site infection. [7] However, another study which describes the two cases of duodenal perforation, mentions that the triple tube decompression was preferred as the feeding jejunostomy associated with the procedure helps in early enteral feeding, thereby avoiding the need for more expensive total parenteral nutrition (TPN) with its attendant complications. [8]

The main prognostic factor remains the time interval between the perforation and treatment. Mortality increases when the delay is greater than 24 h. Other prognostic factors have been reported but are mainly related to clinical signs of sepsis, such as increased Acute Physiology and Chronic Health Evaluation II (APACHE II) score. Old age and co-morbidity are also strong adverse prognostic factors. [7]

CONCLUSION

In this article, we discussed a rare case of duodenal transmural rupture due to blunt abdominal trauma. This case highlights the difficulties that can be encountered during diagnosis and management of duodenal perforation, especially in its first segment. Blunt small intestinal injury can be difficult to detect because a full-thickness bowel injury may not be immediately present in contrast to the immediate intestinal leakage that is typical of penetrating intestinal injury. Following blunt intestinal injury, full-thickness necrosis and intestinal rupture may develop over days [6], as it happened in this case. The diagnosis depends on a high index of suspicion not only during the initial clinical evaluation but also during trauma related laparotomies. [8]

As mentioned above, the seek of medical help was delayed by the patient and this caused worsening of his condition and resulted in the need of mechanical ventilation and later, universal peritonitis. Despite the life-threatening clinical picture, patient underwent a successful surgical intervention and was discharged after full stabilization, without any further complications.

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რეზიუმე თორმეტგოჯა ნაწლავის დაზიანება მუცლის ღრუს დაზიანებების 4.3%-ს შეადგენს და მათი 25% გამოწვეულია მუცლის ღრუს დახურული ტრავმით. ზემოაღნიშნულის დიაგნოსტირება არც თუ ისე მარტივია და სიკვდილიანობამ შესაძლოა 40%-ს მიაღწიოს. თორმეტგოჯა ნაწლავის პირველი სეგმენტი ყველაზე იშვიათად ზიანდება (13%). ჩვენი ნაშრომი სწორედ ასეთი იშვიათი კლინიკური შემთხვევის განხილვას ემსახურება. მასში აღწერილია თორმეტგოჯა ნაწლავის პირველი სეგმენტის გახეთქვა მუცლის დახურული ტრავმის შემდეგ.

45 წლის მამაკაცი მოყვანილი იქნა გადაუდებელი დახმარების განყოფილებაში გულმკერდისა და მუცლის ტკივილით, გულისცემის გახშირებით, ოფლიანობით, ქოშინითა და ზოგადი სისუსტით. ჩივილები დაეწყო 4 დღის წინ მუცლის და გულმკერდის დახურული ტრავმის შემდეგ. დაუდგინდა ნეკნების მრავლობითი მოტეხილობისა და მწვავე მუცლის დიაგნოზი, რის გამოც ჩაუტარდა სასწრაფო ოპერაცია. ინახა 12 გნ ტრავმული დაზიანება მთლიანობის დარღვევით ბოლქვის დონეზე. ნაწლავი გაიკერა და ზემოდან დაკერდა დიდი ბადექონის ნაწილი. პოსტოპერაციული პერიოდი წარიმართა გართულების გარეშე. პაციენტი გაეწერა ამბულატორიულ მკურნალობაზე. შემთხვევა საინტერესოა, ვინაიდან შეეხება მუცლის ღრუს დახურული ტრავმის იშვიათ გამოვლინებას, კერძოდ 12 გოჯა ნაწლავის ბოლქვის მიდამოს ტრავმულ გახეთქვას.

საკვანძო სიტყვები: მუცლის დახურული ტრავმა, თორმეტგოჯა ნაწლავის დაზიანება, თორმეტგოჯა ნაწლავის პერფორაცია, თორმეტგოჯა ნაწლავის გახეთქვა