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Isolated Duodenal Rupture due to Blunt Trauma Abdomen

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Abstract: ***Introduction: Isolated duodenal injuries are particularly rare, and have been reported only as case presentations or case series in the literature. The largest reported case series of isolated duodenal rupture to date contains five patients[7,8,9]. The biggest challenge is early diagnosis and successful meticulous repair of ruptured duodenum which requires experience. Materials and Methods: This paper presents three cases of successfully treated isolated duodenal injuries due to blunt trauma, focusing on with their preoperative diagnosis, surgical management procedure and final out comes. Conclusion: Early diagnosis is very important in isolated duodenal injury due to blunt trauma abdomen. Hence repeated clinical , radiological and biochemical analysis is must. We must follow the dictum of review , resuscitate and repair to prevent mortality and morbidity.***

Keywords: Isolated rupture Duodenum, Blunt trauma abdomen

1. Introduction

Duodenal injuries are rare, occurring in an estimated 3.7% of patients undergoing laparotomy for blunt or penetrating trauma [1,2]. Duodenal rupture following blunt abdominal trauma comprises *2–20% of these patients, often occurring after an injury to the upper abdomen or abdominal compression from a high-riding seat belt. Fourty percent of patients with duodenal injuries have other concomitant surgically important intra-abdominal injuries, such as hepatic (38%), or pancreatic (28%) injuries [3]. Blunt duodenal injury is extremely rare and is associated with significant mortality (6–25%) and morbidity (30–60%), due to its difficulty in being diagnosed [4,5,6]. Isolated duodenal injuries are particularly rare, and have been reported only as case presentations or case series in the literature . The largest reported case series of isolated duodenal rupture to date contains five patients[7,8,9]. We are going to report 2 cases of isolated duodenal rupture following blunt trauma abdomen treated successfully by primary closure of the defect without any pyloric diversion procedure.

2. Case Report

A 24 years male was admitted to our hospital after a road traffic accident with complaints of blunt trauma abdomen and fracture of right femur. There was no h/o vomiting .On examination he was conscious with GCS 15/15. He had normal body temperature. His respiration rate was 22/min, heart rate 96/min regular, blood pressure 116/78 mm hg left arm supine position. His abdomen was scaphoid. An abrasion of size 4cm x 3cm was found over the right iliac fossa. There was mild tenderness and guarding over the epigastrium .Liver dullness was not obliterared .No evidence of intraperitoneal free fluid found.DRE found to be normal. Bowel sound present. IV fluid infusion started. Nasogastric tube placed and urinary catheterization done. Patient sent for X-ray evaluation. X-ray chest PA view and abdomen in erect position did not show free gas under diaphragm .[fig1]

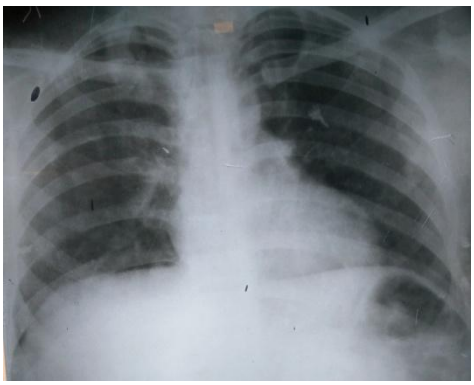

Figure 1: Showing Xray picture of patient with no evidence of free gas under diaphragm

Blood test showed raised TLC, Hb% 12.4 gm%, Serum amylase, lipase levels were within normal limits .USG of abdomen and pelvis was normal. Due to non specific clinical and radiological findings and hemodynamic stability patient was managed conservatively with antibiotics, analgesics, PPI and IV fluids .On 2nd day due to persistent mild guarding and tenderness in epigastrium patient was advised CECT abdomen. CECT abdomen revealed perirenal gas collection.[fig2,3]

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Figure 2: Showing perirenal gas collection on ct scan abdomen

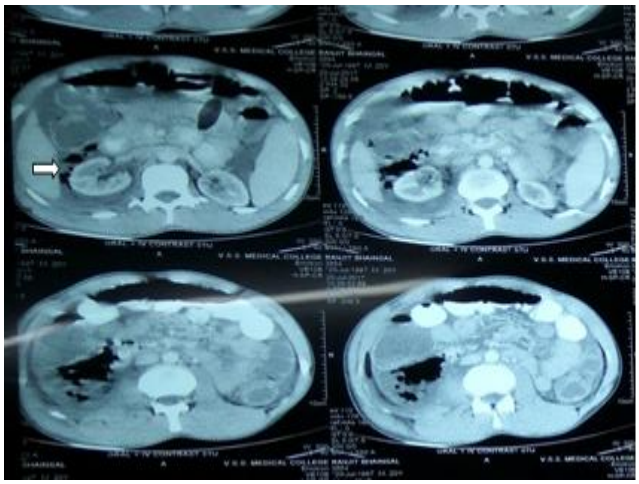

Figure 3: CT scan showing perirenal gas collection on right side with no other injury to pancreas or major vessels.

Patient was immediately subjected to exploratory laparotomy suspecting hollow viscus perforation. Intraoperatively no significant intraperitoneal bowel loop injury found except some bile stained flakes on the lateral side of cecum and the adjacent peritoneum. But no disruption of cecum was found. So Cattell-Braasch maneuver was done and retroperitoneal part of duodenum mobilised. A 2.5 cm full thickness rupture was seen in the 2nd part of duodenum. [fig4]The edge was irregular, mucosa protruded and bile stained. Pancreas was found to be normal. No other injuries found. Trimming of edge and primary closure of the duodenal wall rupture was done by single layer connel suturing[fig 5]. A nasogastric feeding tube was placed proximal to site of rupture and Gastric diversion was done by posterior, retrocolic, isoperistaltic Gastrojejunostomy. Abdomen was closed in layers after thorough peritoneal toileting and fixation of bilateral ADK drains.

Figure 4: Showing second part of duodenum rupture

Figure 5: showing primary closure of ruptured duodenum

Then patient was managed with IV antibiotics, analgesics and PPI with regular wound dressing. On 4th POD bowel sound was audible and patient passed flatus, so patient was advised to take sips of water. On 5th POD patient was advised to take oral liquid diets. Rest post operative period was uneventful. Patient improved gradually and was discharged on 12th post operative day.

Case 2

A 50 yr male presented to emergency with complain of pain abdomen and vomiting on 2nd day following blunt trauma to

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abdomen due to assault. The vomitus contained food particle mixed with clotted blood . The patient was conscious and fully cooperative with pulse 98 /min, BP 110/70 mm hg. His abdomen was scaphoid with mild tenderness and guarding over the right hypochondrium and epigastrium . liver dullness at 5th intercoastal space . Bowel sound absent. Digital rectal examination was found to be normal. On diagnostic peritoneal lavage the fluid contained bilious fluid. On xray chest PA view and abdomen in erect position did not show free air under diaphragm (fig 6). Ultrasonography of abdomen and pelvis showed only distended bowel loops with mild peritoneal fluid collection. So we suspected hollow viscus perforation and planned immediate exploratory laparotomy. After proper resuscitation the abdomen was explored with midline incision and then intraoperatively we did not find any intaraperitoneal hollow viscus perforation or any other visceral injury including biliary tree. So we suspected some retroperitoneal injury. Then cattle brasch manuaver done to approach retroperitoneal part and by Kochers maneuver whole of duodenum was mobilized and inspected. A rupture of size about2.5 cm x 2 cm was found in the posterior wall of second part of duodenum (fig 7). Primary closure of the rupture of second part of duodenum done(fig 8).

Then retrocolic isoperistaltic gastrojejunostomy done(fig 9). Position of nasogastric tube was checked and was placed proximal to the site of rupture. Bilateral drains were given in right subhepatic and pelvic space and fixed. Then abdominal closure done in anatomical layers. On 4th postoperative day there was bilious collection of about 200ml in the right drain. Patient was treated with octreotide and gradually the collection in bilateral drains was reduced to in significant levels. Then pelvic drain was removed on 8th post operative day and right subhepatic drain was removed on 10th day. Post operatively there was superficial wound infection for which stitches were removed and after proper dressing the wound was closed by secondary suturing. Rest of the post operative period was uneventful and patient was discharged after full recovery.

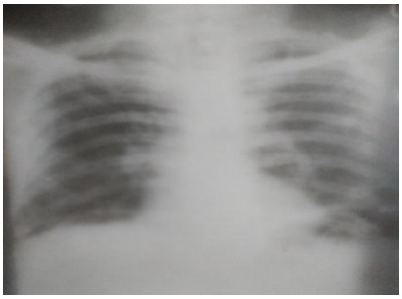

Figure 6: x ray pic showing no free gas under diaphragm

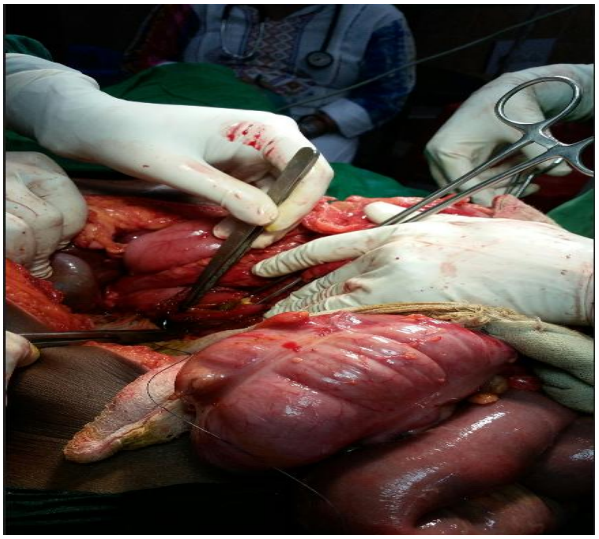

Figure 7: Showing the intraoperative Picture of D2 Rupture

Figure 8: Showing the repair of D2 rupture

Figure 9: Showing the Pic of Posterior Isoperistaltic Retrocolic Gastrojejunostomy done in Patient

Case 3

A 22 year male present to emergency with blunt trauma abdomen due to road traffic accident. The mode of injury was hit by steering wheel of truck. The patient was brought to hospital 12hrs after road traffic accident. The patient also

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had suffered from fracture of both bone of lower leg of both sides. The patient had one episode of vomiting. The patient was conscious. His blood pressure was 90/60 mm hg and pulse was 108/min. on per abdominal examination the abdomen was found scaphoid, with tenderness and guarding present. Liver dullness was obliterated. Bowel sound was absent. Digital rectal examination was found normal. Chest x ray showed gas under diaphragm. The patient was planned for laparotomy. Intraoperatively bilious fluid was found in peritoneum and no solid organ injury was found. After Cattle Brasch and Kocher Maneuver full thickness rupture was found in 3rd part duodenum superiorly near uncinate process of pancreas of size 3x2cm . thus primary closure of defect with t tube drainage of 2nd part of duodenum was done and gastrojejunostomy and jejunojejunostomy was done . Appendicectomy was also done.post operatively the patient recovered well and the patient was discharged on post operative day 17.

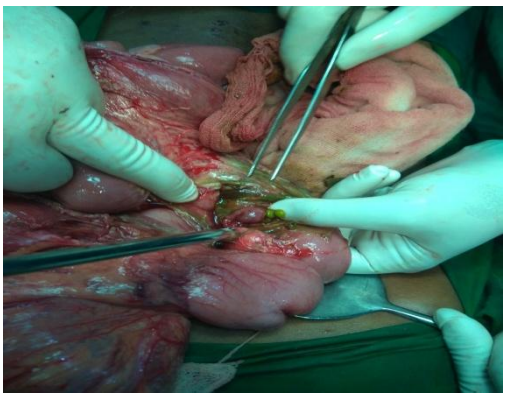

Figure 10: Intraoperative picture of case 3

3. Discussion

Early diagnosis of an isolated duodenal rupture due to blunt trauma abdomen is very challenging because of its retroperitoneal location we don't get early signs of peritonitis. However the severity of injury and back pain and tenderness to back and flanks should be taken seriously to suspect the injury. The anatomical risk of associated injuries to the main pancreatic duct, common bile duct, portal vein, abdominal aorta, inferior vena cava, and superior mesenteric vessels, as well as the increased risk of spleen or diaphragm rupture, make duodenal injury potentially fatal. While the appearance of steering wheel, handlebar, and/or seat belt marks on the anterior abdominal wall may alert the clinician to possible duodenal injury, the physical examination may not be helpful in early identification.

Theoretically, duodenal rupture should be associated with amylase or other digestive enzyme leakage. Therefore, it has been suggested that the serum amylase concentration may be helpful in diagnosis. However, serum amylase levels can also be elevated due to trauma to the pancreas head. Serial determinations of serum amylase are better than a single assay. [10,11]

Upper gastrointestinal (GI) radiologic examination is not usually effective for diagnosing an isolated blunt injury to the duodenum. Abdominal Ultra sound is faster and less invasive than diagnostic peritoneal lavage, and can occasionally reveal injuries in the retroperitoneum. Sonography findings that reveal an intramural hematoma can alert the surgeon to perform further abdominal CT imaging or emergency laparotomy [11]. The anatomical location of the duodenum renders diagnostic laparoscopy a poor modality for determining organ injury, especially in isolated ruptures.

An abdominal CT scan with oral and IV contrast is the principal evaluation method for blunt trauma injuries. CT can be used to accurately diagnose retroperitoneal injuries, and is sensitive to small amounts of retroperitoneal air, blood, or leaked contrast from the injured duodenum [12].CT may also show free intraperitoneal gas or, rarely, gas in the biliary tree [13] CT reveals gas bubbles in the retroperitoneum adjacent to the right psoas muscle, around the right kidney, or anterior to the upper lumbar spine (Fig. 1,2).

In the hemodynamically unstable patient, the optimal treatment is an abbreviated laparotomy [1]. Midline incision laparotomy is favorable for entering and carefully exploring the abdomen, and can aid in identifying any associated injuries. The duodenum is best exposed by the Cattell maneuver, which consists of incising the lateral peritoneum and reflecting the right and transverse colon to the left. During laparotomy, the surgeon examines the area for any evidence of retroperitoneal edema or hematoma,posterior bile leak, gas crepitations, a swollen pancreas head, or vessel rupture. After adequate hemostasis, the Kocher maneuver is performed from the beginning of the duodenum to the ligament of Treitz, followed by division of the ligament to expose the entire duodenum.

Full visualization of the duodenum is achieved by dividing the gastrohepatic ligament to free the first part, performing Kocher's maneuver to free the second part, dissecting the base of the colon to reach the third part, and removing the ligament of Treitz to free the fourth part. Thesecond and third parts of the duodenum are the most frequently injured in isolated injuries. This is likely due to the greater degree of fixation of the second part from the attachment of the common bile duct and pancreatic duct at the ampulla of Vater.

Although primary repair is considered to be adequate for simple traumatic perforations, the management of more complex injuries is controversial.

Primary repair with or without pyloric exclusion is the most preferred surgical option. Duodenal lacerations should be repaired using the hand-sewn method with absorbable and non absorbable suture materials.

The use of interventions in addition to primary repair, such as gastrostomy, feeding jejunostomy, or reverse-tube duodenostomy, depends on the preferences of the surgeon. Extensive local damage of the intraduodenal or intrapancreatic bile duct frequently necessitates a staged pancreaticoduodenectomy. Less extensive local injuries may be managed by intraluminal stenting, sphincteroplasty, or reimplantation of the ampulla of Vater [5].

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Surgeons frequently perform a gastrojejunostomy after primary duodenal repair, in order to allow the duodenum to heal. Gastrojejunostomy is usually performed between the gastrotomy opening with a jejunal loop approximated in the retro-colic position [5].

A feeding jejunostomy and nasojejunal tube insertion in the afferent limb of the gastrojejunostomy are options for early enteral-route nutrition. Especially in patients who have a prolonged injury–operation time lag, a feeding jejunostomy should be considered for nutritional support.

While routine drainage of the area is suggested by almost all authors, no clear consensus exists regarding the administration of prophylactic octreotide. We have given the patients octreotide post operatively and have observed it to be beneficial.

To avoid marginal ulcers and associated complications, some authors advocate adding a vagotomy after gastrojejunostomy. However, marginal ulcers are now rare, owing to the development of modern proton pump inhibitors.

Because of the vital importance of maintaining GI system continuity, pyloric exclusion should always be considered when performing a gastrojejunostomy. Pyloric exclusion via gastrotomy has many advantages, including spontaneous restoration of the pyloric continuity within 3–4 weeks. Pyloric exclusion can be performed using a variety of techniques, including thoracoabdominal (TA) stapling or suturing with long-lasting absorbable or nonabsorbable sutures via gastrotomy. Pyloric exclusion theoretically addresses the issue of gastric content diversion, but its use as a standard surgical modality is controversial.

DuBose et al. reported that the use of pyloric exclusion in patients with severe duodenal injuries may contribute to a longer hospital stay, with no survival or outcome benefit [14].

Nevertheless, pyloric exclusion remains a widely accepted and favorable option for patients with delayed diagnosis and treatment of duodenal trauma. In our case pyloric exclusion was not done and still the patients recovred well post operatively.

4. Conclusion

Early diagnosis is very important in isolated duodenal injury due to blunt trauma abdomen. Hence repeated clinical , radiological and biochemical analysis is must. We must follow the dictum of review , resuscitate and repair to prevent mortality and morbidity.

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