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Case Series

A case series on diagnosis, management and outcome of second part of duodenum perforation

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ABSTRACT

Duodenal injuries are uncommon after Blunt and penetrating trauma to abdomen and are potentially life threatening. Iatrogenic injuries caused by interventional procedures like endoscopic retrograde cholangiopancreatography (ERCP) is only 1%. Duodenal trauma can often pose diagnostic and therapeutic challenges due to its subtle clinical features as 2nd part of duodenum being a retroperitoneal organ and its rarity to get injured following blunt trauma, and hence diagnosis and treatment are often delayed. These injuries are potentially life threatening because D2 being a high output zone, managing these injuries are very difficult and more complex surgery are warranted. Here we discussed about the outcomes of D2 perforation in blunt trauma, pathological D2 perforation, iatrogenic while attempting ERCP and also based on the time of presentation to casualty from the time of perforation and also comparing the size of perforation in trauma, iatrogenic, pathologic injuries and also different types of procedures they underwent Based on the severity of injuries, we conclude that time of presentation is the foremost factor in deciding the outcome of the patient with D2 perforation which was often delayed due to its anatomic location being retroperitoneal organ and D2 being a high output zone, often makes the surgical procedures unsuccessful with high risk of postoperative leaks and makes duodenal injuries as life threatening injuries. Thus careful monitoring and computed tomography (CT) abdomen for all suspicious blunt trauma abdomen cases can help in early identification of D2 injuries and immediate surgical intervention procedures with T tube diversion, tube duodenostomy, pyloric exclusion to decompress the high output D2 based on the size, site, output and time of perforation will improve the overall outcome of the patient.

Keywords: D2 perforation, ERCP, Blunt trauma abdomen, Retroperitoneum, High output zone, Delayed diagnosis, High mortality

INTRODUCTION

Duodenal injuries are uncommon after Blunt and penetrating trauma to abdomen and are potentially life threatening. Incidence of duodenal injuries following blunt trauma is only 0.2 to 2.7%. Duodenal trauma can often pose diagnostic and therapeutic challenges due to its subtle clinical features as 2nd part of duodenum being a retroperitoneal organ and its rarity to get injured following blunt trauma, and hence diagnosis and treatment are often delayed.[1]

Iatrogenic injuries caused by interventional procedures like endoscopic retrograde cholangiopancreatography (ERCP) commonly occurs in D2. ERCP with sphincterotomy is commonly used in the treatment of common bile duct stones. It is widely regarded as a safe procedure, but the major complication rate approaches 10%. Common complications include pancreatitis,

bleeding, cholangitis, and perforation. Overall, the procedure carries a death rate of 1.0% to 1.5%. ERCP-related perforations occur in about 1% of patients, and the injury carries a death rate of 16% to 18%, ERCP related duodenal perforation are often identified earlier and managed well.[3-5]

CASE SERIES

Case 1

14/Mch presented to a private physician following a self-fall from a bicycle over the handle bar and sustained injury to upper abdomen. C/o mild upper abdominal pain, P/A soft BS+, no tenderness, no guarding, no external pattern abrasion or contusion. No other external injuries. Vitals were stable. Ultrasonography (USG) abdomen was normal no free fluid, no solid organ injury. X-ray abdomen, chest X-ray was normal. Patient was treated with analgesics and antacids patient was reassured and was discharged and sent home, after 48 hours, the boy presented to emergency casualty. C/o severe diffuse abdomen pain,4 episodes of non-bilious vomiting O/E tachycardia +P/A – diffuse tenderness+guarding+, rigidity, no chest/pelvic/long bone injury. CECT abdomen and pelvis revealed retroperitoneal air pockets surrounding the right kidney, retroperitoneal fluid collection.

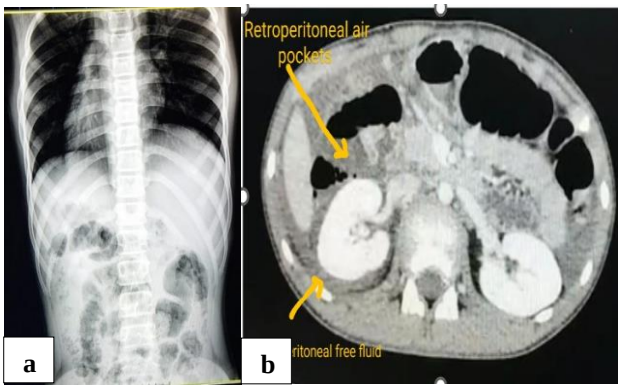

Figure 1: (a) Normal X-ray abdomen and (b) CT abdomen shows retroperitoneal air pockets.

Intraop findings

Bilious fluid of about 500 ml aspirated. Bilious saponification of omentum and mesentry noted at the site of duodenum, bilious collection noted in retroperitoneum, Morrisons pouch, Rt. paracolic gutter, on Cattell Braasch maneuver exposed 3rd and 4th part of duodenum were normal, on Kocher maneuver longitudinal perforation of 2 cm noted in the anterior and lateral wall of 2nd part of duodenum, rest medial aspect of 2nd part of duodenum with duodenal papilla and head of pancreas, mesentric vessels are found to be normal, CBD normal. Liver, spleen, GB – normal. Proceeded with duodenorraphy by single layer primary closure of the perfortion of anterior and lateral wall of 2nd part of duodenum, omental patch is placed over the closure site,nasogastric tube is advanced and kept at the duodenum 1st part and fixed to decompress the stomach and duodenum, Witzel feeding jejunostomy done. On POD 14 oral contrast done shows distal free flow, patient was discharged without any complications.

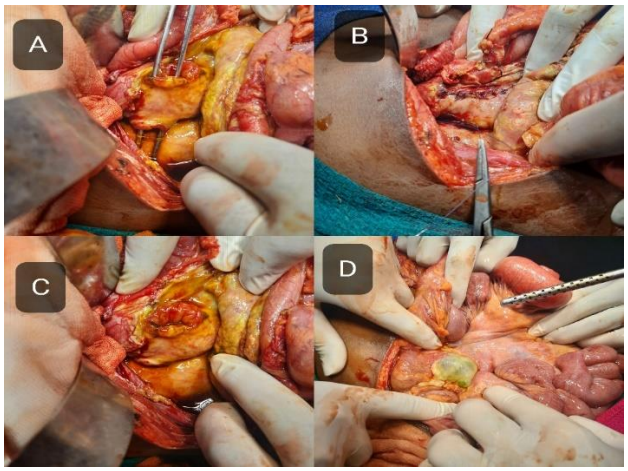

Figure 2: (A) Perforation at D2 anterior and lateral wall, (B) duodenorraphy of anterior and lateral wall of D2 perforation, (C) anterior wall of D2 perforation, and (D) bile stained mesentry.

Case 2

Mr. K 58/M, admitted with complaints of abdominal pain, distension, for 3 days, H/o multiple episodes of bilious vomiting, H/o laparotomy done 15 years back for which modified Graham omental patch closure done. No other previous surgery/co- morbid illness. O/E conscious, oriented, afebrile, dehydration+, vitals BP 110/70 mmHg, PR 120/min, SpO_2- 95% RA, RTA 500 ml (bilious), P/A-distension+, diffuse tenderness+, guarding+, BS+, TC 17000. CT abdomen-free air noted in peritoneum and retroperitoneum, moderate free fluids+S/o D2 perforation.

Intra op findings

200 ml bilious fluid drained out, perforation of size 1×1 cm with everted edge noted at junction of D2 lateral wall, retroperitoneum tissue sloughed out and bilious collection drained out extending over right side from D2 to pelvis, after giving thorough wash, perforation closed with modified Graham's omental patch closure, followed by feeding jejunostomy done. Postoperatively patient was in severe sepsis and on POD 2 there was Fournier's gangrene with gangrene of right testis due to tracking Bile causing thrombosis of right gonadal vessels,(8) proceeded with scrotal exploration and orchidectomy was done, postoperative patient was in severe sepsis and DT in hepatorenal pouch drained 1000 ml of bilious fluid and the patient was again taken up for laparotomy and pyloric exclusion, gastrojejunostomy, retrograde tube duodenostomy and T tube drainage of CBD was done, patient improved further from sepsis patient was started on FJ feeds and refeeding of bile from tube duodenostomy

and T tube was done, patient has electrolyte abnormalities and sepsis which was treated, but patient despite treatment died of sepsis.

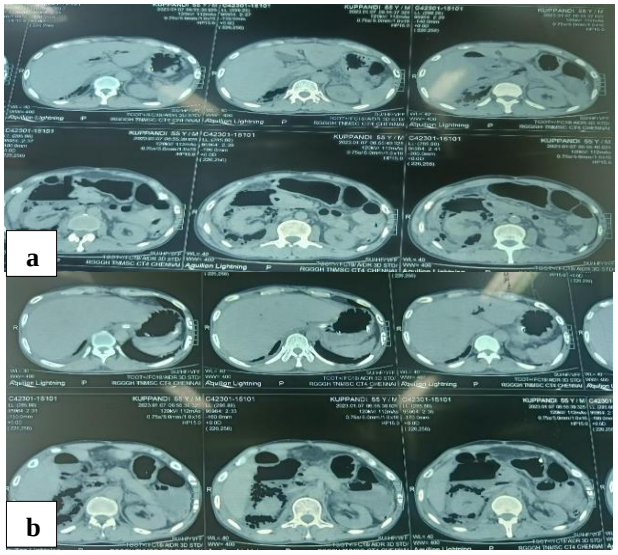

Figure 3: (a) and (b) Both representation massive air pockets in retroperitoneum and intraperitoneum and freefluid S/O D2 perforation.

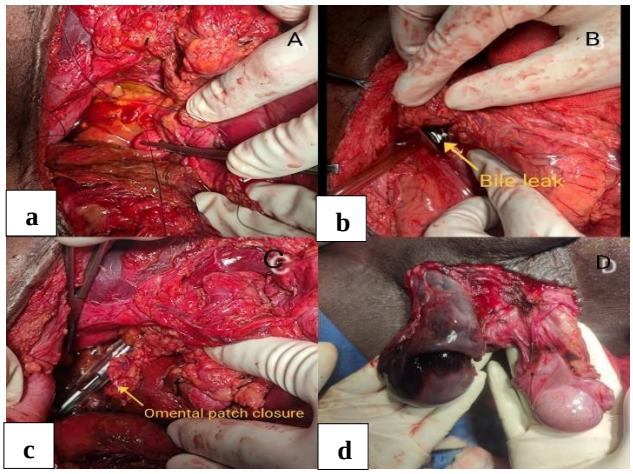

Figure 4: (a) Perforation at D2 lateral wall, (b) massive bile collection in the retroperitoneum, (c) omental patch closure done with DT placed at the closure site, and (d) gangrene of right testis noted on POD2 due bile in retroperitoneum causing thrombosis of right gonadal vessels -a rare entity.

Case 3

A 55/M k/c/o T2DM, came with complaints of abdominal pain for 15 days and yellowish discoloration of eye for 15 days, diagnosed as cholelithiasis with choledocholithiasis, previous H/o truncal vagotomy with gastrojejunostomy done for peptic ulcer. USG done revealed - dilated IHBR and CBD due to CBD calculus, MRCP-choledocholithiasis within the distal common hepatic duct and entire CBD, D1 pseudodiverticulum noted investigation-Tc 12.8, TB/Db 1.6/0.9, OT/PT 70/69, ALP 224, Na/k 132/4. During attempt of ERCP stenting for choledocholithiasis, suspected iatrogenic perforation of D2 - scope withdrawn immediately, CECT - pneumoperitoneum - hollow viscus perforation features suggestive of duodenal perforation. Patient was immediately taken up for surgery.

Intra op findings

1×1 cm perforation noted at D2, distended gall bladder, distended CBD approximately 2 cm, multiple stones in GB and CBD, previous gastrojejunostomy anastomosis+, proceeded with Grahams modified omental patch closure/ pylorus exclusion/ cholecystectomy/ CBD exploration and retrieval of stones/ T tube drainage/ feeding jejunostomy was done. On POD2 patient started on FJ feeds and bile refeeding and on POD 14 T tube cholangiogram done no stones detected and T tube was removed and patient was discharged without any significant complications.

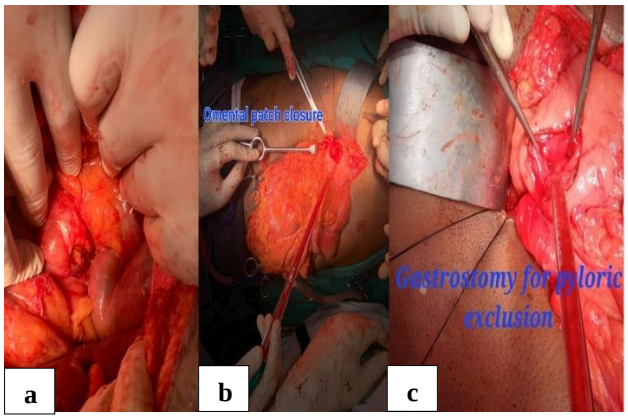

Figure 5: (a) Perforation 1×1 cm at lateral wall of D2, (b) omental patch closure of the D2 perforation was done, and (c) pyloric exclusion done by doing gastrostomy.

Case 4

A 55 years/female came to our hospital with c/o abdominal pain for 1 month in right hypochondrium, diagnosed to have cholelithiasis with choledocholithiasis 7 mm calculus in distal CBD with proximal CBD diameter 14 mm, TC 4520, plt 1.24 L, TB/DB 1.1/0.5, OT/PT/ALP19/14/100, OGD scope was normal study during attempt of ERCP stenting there was 2×2 cm perforation at D2, patient was immediately taken up for surgery.

Intraop findings

2×3 cm perforation noted in the lateral wall of D2, gall bladder distended, CBD dilated 1.2 cm with stones in distal CBD, proceeded with primary closure of D2 perforation with omental patch, cholecystectomy, CBD exploration after removing the stones in CBD saline wash given T tube drainage done, pyloric exclusion with gastrojejunostomy

done, retrograde tube duodenostomy done, feeding jejunostomy done, postoperative patient was treated with analgesics and IV antibiotics, on POD 3 FJ feeds started, bile refeeding from T tube and tube duodenostomy was done, postoperative USG abdomen shows no Intra-abdominal collection, gastrograffin study shows no leakage from GJ on POD 8 patient was started on oral feeds and tolerated well, T tube cholangiogram shows no residual stones in CBD and patient was discharged and asked to review after 14 days for T tube and tube duodenostomy and FJ removal, patient was discharged without any significant complications.

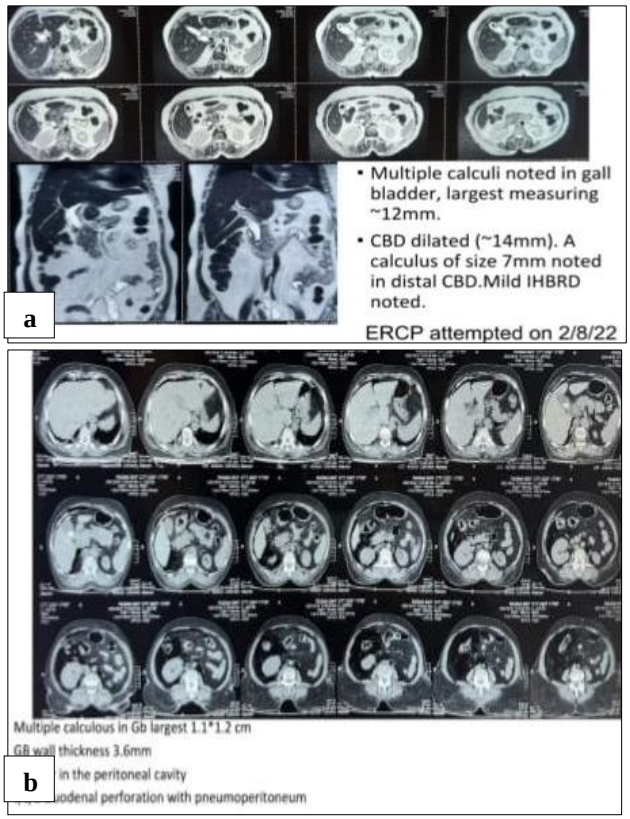

Figure 6: (a) Multiple gall stones largest 12 mm with dilated CBD with a calculus of 7 mm noted in distal CBD with IHBR dilatation, and (b) multiple gall stones, free air in peritoneum F/S/O D2 perforation with pneumoperitoneum.

Case 5

Mrs. A 50/F, c/o abdominal pain and fever. Patient was referred to RGGGH from a private hospital as a case of retroperitoneal abscess s/p laparotomy and lavage with bilious discharge from DT. Patient was apparently normal before 10 days after which she had abdominal pain and vomiting. USG scan was done which revealed an appendicular abscess. Diagnostic laparoscopy converted laparotomy revealed retroperitoneal abscess of 500 ml Frank pus, lavage and drainage done. Patient developed bilious discharge from DT and was referred to our hospital. O/E conscious, oriented, febrile, hydration poor, vitals: BP 100/70 mmhg, PR 92/min, output 700 ml, DT 100 ml (feculent), RTA 100 ml (bilious), P/A- abdomen distended, mild diffuse tenderness noted, BS+, inv on admission Tc 16.2, Hb 8.8, Plt 2.65, Pt/INR 26/1.68, U/Cr 110/3.6, Na/k 140/3.7. CT abdomen and pelvis- k/c/o retroperitoneal abscess with very minimal collection in subhepatic space and pelvis, in view of persistent high output in DT, patient taken up for emergency laparotomy pre op diagnosis was enterocutaneous fistula/ S/P emergency laparotomy and retroperitoneal abscess drainage.

Intraop findings

500 ml toxic bile stained fluid aspirated, collection noted medial to hepatic flexure and behind caecum and ascending colon, sloughed out caecum and perforation of size 2×2 cm noted at the DT site kept in the previous procedure was found impinging the 2nd part of duodenum (overlying peritoneal lining strictures opened in the previous procedure) noted along with bile stained collection in the retroperitoneal cavity near it.

Proceeded with right hemicolectomy with end ileostomy and transverse colon mucous fistula. Gastrojejunostomy with pylori exclusion with tube duodenostomy and jejunojejunostomy. T tube drainage of CBD. Feeding jejunostomy, primary closure of duodenal perforation. Patient has severe sepsis and acute kidney injury and could not be revived, and died of sepsis.

Figure 7: (a) 2×3 cm perforation at lateral wall of D2, (b) primary closure of perforation at D2, (c) CBD exploration with T tube drainage, and (d) pyloric exclusion with gastrojejunostomy.

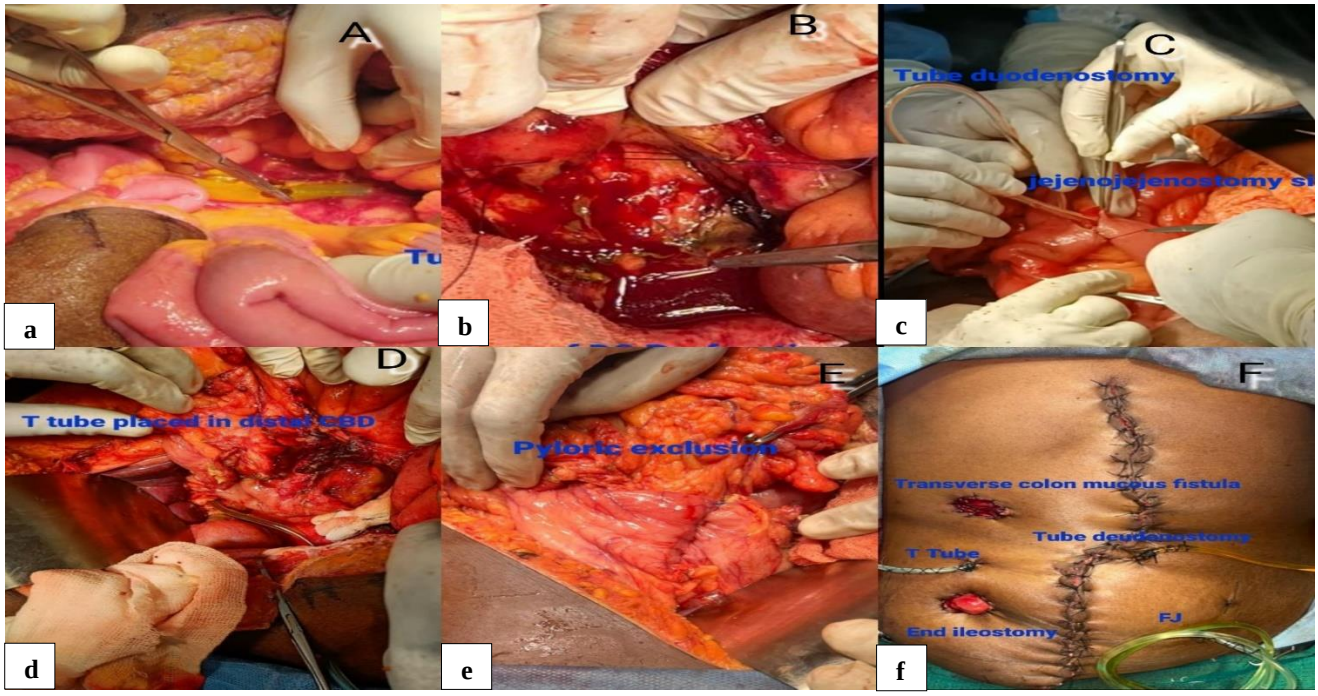

Figure 8: (a) DT tube impinging on D2 lateral wall with bilious collection (iatrogenic injury), (b) perforation at D2 lateral wall omental patch closure bites taken, (c) retrograde tube duodenostomy through jejunojejunostomy site, (d) T tube placed in distal CBD and brought through the anterior abdominal wall, (e) pyloric exclusion was done, and (f) postoperative picture showing T tube, tube duodenostomy, FJ tube with transverse colostomy and end ileostomy.

DISCUSSION

Diagnosis was often delayed due to a failure to recognize the significant, but subtle, physical and roentgenographic findings of retro-peritoneal injury. Morbidity and mortality were related to a delay in operative intervention, the severity of duodenal injury, the presence and degree of associated pancreatic injury, and the choice of operative therapy.[1] Patients with intramural hematoma or complete duodenal perforation without pancreatic injury did well with simple closure or evacuation of the hematoma. AAST grade 1: hematoma involving single portion of duodenum, laceration of partial thickness, no perforation. Grade 2: hematoma involving more than one portion of duodenum, disruption less than 50% of circumference, 75% to 85% of duodenal injuries comes under grade 1 and 2 and grade 1 and 2 are managed by duodenorraphy–primary closure with omental patch, jejunal patch closure. Grade 3: laceration, disruption of 50 to 75% of circumference of D2, disruption of 50 to 100% of circumference of D1, D3, D4. Grade 4: disruption more than 75% of circumference of D2, involving a papilla or distal CBD. Grade 3 and 4 are managed by primary repair with tube duodenostomy, resection and anastomosis, Roux en y duodenojejunostomy, duodenal diverticulization. Grade 5: massive disruption of duodenopancreatic complex, devascularisation of duodenum which is managed by major Whipples procedure.[9]

Patients with duodenal perforation and minor pancreatic injury did best after primary closure and pancreatic drainage if operation was performed within 24 hours; delay beyond 24 hours resulted in a high incidence of duodenal fistula after simple closure, and therefore is an indication for a bypass procedure, such as a distal gastrectomy, vagotomy, tube duodenostomy, and gastrojejunostomy.[1] A high degree of suspicion is necessary for early diagnosis of blunt duodenal trauma and CT scan should be performed in case of all significant epigastric trauma. In most cases primary direct repair of duodenal wounds can be safely achieved and duodenal decompression via triple or quadriple tube technique is required to decrease the risk of duodenal fistula.[10] Pyloric exclusions has been used in the management of complicated injuries to temporarily protect the duodenal repair and prevent septic abdominal complications.[2,6,7] Mortality is 40% in the patients who diagnosed over 24hrs while 11% in the patients who underwent surgery within 24 hour.[1]

CONCLUSION

In the above patients with D2 injury those with blunt trauma and other pathological causes were diagnosed late as they have no acute signs as D2 being retroperitoneal organ presenting as asymptomatic initially most D2 traumatic injuries often associated with pancreatic injuries and often diagnosed late and hence mortality increased in such patients in case of iatrogenic injury by ERCP procedures often diagnosed early and treated early hence those patients survived without much complications, while those D2 perforations diagnosed late presenting with

severe sepsis and high output bile collection in the retroperitoneum due to trauma or other pathological events has high mortality.

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