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Iatrogenic Duodenal Injury in Laparoscopic Cholecystectomy: A Fatal Complication

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Abstract

Introduction: Duodenal injury during laparoscopic cholecystectomy is rare but associated with significant morbidity and mortality. *Methods:* This study is a retrospective review of prospectively collected database of patients with postcholecystectomy complications. The study analysed 5 cases of duodenal injury secondary to laparoscopic cholecystectomy and managed by surgical team of our unit. *Results:* Mean age of these 5 patients was 54.6 (45-65yrs) out of which 3 were males and 2 females. One case was dealt by immediate intraoperative duodenal repair on recognition of the injury. In other 4 cases, mean interval to re-surgery was 4.8 days. These 4 patients presented with septicaemia with peritonitis. Duodenorapphy with omental patch was done in 3 cases. Tube duodenostomy with feeding jejunostomy was done in one case. 4 out of 5 cases died due persistent sepsis and multiorgan failure. One patient survived with uneventful outcome. *Conclusion:* Though rare, duodenal injury secondary to laparoscopic cholecystectomy is potentially a fatal complication. Early diagnosis and prompt management may minimize morbidity and mortality.

Keywords: Complications; Cholecystectomy; Duodenal Injury; Duodenorapphy; Laparoscopic.

Introduction

Laparoscopic cholecystectomy has become the gold standard treatment in the management of symptomatic gall stone disease. However in 0.3 to 7% cases it is associated with potentially life threatening complications like bile duct, vascular and bowel injuries [1,2]. Duodenal injury is a rare complication associated with significant morbidity and potential mortality. This study is an analysis of duodenal injury cases secondary to laparoscopic cholecystectomy managed by us and highlights the fact that despite its rarity it is a complication with high mortality.

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Materials and Methods

This study is a retrospective analysis of prospectively collected database of patients with postcholecystectomy complications managed in a single unit of department of surgery. Our team also acted as support surgeons to other hospitals when called upon in the operation theatre for intraoperative consults.

There were only 3 indigenous cases of bile duct injury out of a total of 2688 laparoscopic cholecystectomies performed in our unit in the reference period between June 2010 to August 2017. However, in the same duration of period 45cases of post cholecystectomy complications were managed. Out of these 45 cases, 37 patients were of biliary tract injury, 5 cases of duodenal injuries, 2 patients of transverse colon injury and 1 patient with ileal injury were identified.

Complete records of these 5 cases of iatrogenic duodenal injuries secondary to laparoscopic cholecystectomy were reviewed. Following points were taken note of: type of surgery; laparoscopic or open, difficulties encountered during surgery, conversion to laparotomy (done or not), timing of detection of injury, mode of presentation, evaluation, management and outcome.

Results

Out of 45 cases of post cholecystectomy complications managed from June 2010 to August 2017, 5 cases of iatrogenic duodenal injuries were identified (Table 1.). Mean age of the patients was 54.6 (Range 45-65yrs). 3 were male and 2 were female.

Case1

Forty five years old male with no comorbidities, was undergoing a laparoscopic cholecystectomy. Duodenal injury was detected intraoperatively by operating surgeon at a city hospital and one of the surgeons from our team was called for an intraoperative consult.

As per the primary surgeon version infundibulum of the gall bladder was adherent to first part of duodenum. Perforation occurred while attempting adhesiolysis with scissors. Conversion was done on recognition of injury; duodenorapphy with omental patch was done. He had an uneventful postoperative outcome.

Case 2

A 48 year old male, underwent a laparoscopic cholecystectomy for acute cholecystitis in a peripheral hospital. As per the operative notes it was a difficult laparoscopic cholecystectomy due to dense adhesions in Calot's triangle. Postoperatively patient had bile leak in the drain. Duodenal injury was identified by the operating surgeon on postoperative day 5, when he re-explored the patient for a high output biliary fistula. Direct suture repair of the perforation in the first part of duodenum was done by the primary surgeon. However, duodenal fistula persisted in the postoperative period. The case was referred to our unit on postoperative day 10.

This patient had septicaemia with septicemic shock and duodenal fistula with peritonitis at the time of referral. Ultrasound scan of the abdomen showed fluid collection in all the abdominal quadrants. Immediate laparotomy after resuscitation revealed dehiscence of the sutured perforation. The perforation was in the first part of duodenum, 2.0x2.0 cm in size with oedematous friable margins. Tube duodenostomy, feeding jejunostomy with drainage of peritoneal cavity was done. In the postoperative period the patient had persistent high output duodenal fistula, deep wound dehiscence with fistulous discharge from the main wound. He succumbed to sepsis and multiorgan failure on tenth day of resurgery.

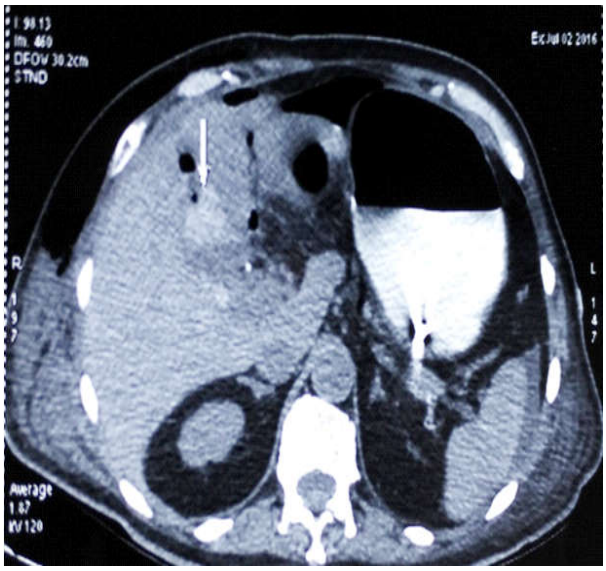

Fig. 1: CECT scan showing contrast extravasation from duodenal perforation

Table 1: Details of the Iatrogenic duodenal injury patients

Case no	Age & Sex	Presumed mechanism of injury	Presentation	Interval surgery	Type of surgery	Outcome
1	45 Male	Dissection and adhesiolysis	Immediate	On table	Duodenorapphy with omental patch	Survived
2	48 Male	Electrocautery	Septicaemia peritonitis, duodenal fistula	10 days	Tube duodenostomy Feeding jejunostomy	Death POD10
3	58 Female	Electrocautery	Septic shock, peritonitis, bilious fistula	3 days	Duodenorapphy with omental patch	Death POD4
4	65 Male	Electrocautery	Septicaemia, Peritonitis	7 days	Duodenorapphy with omental patch	Death POD4
5	57 Female	Dissection and adhesiolysis	Septic shock, bilious fistula	4 days	Duodenorapphy with omental patch Feeding jejunostomy	Death POD1

*POD- Postoperative day

Case 3

A 58 years old diabetic lady, presented with a long standing history of cholelithiasis. Ultrasound of the abdomen showed a contracted gall bladder with a solitary calculus (22mm) in size. At laparoscopy, gall bladder was not visualised due to dense adhesion of the hepatic flexure of colon to the subhepatic space. Laparoscopic surgery was converted to an open laparotomy, and adhesiolysis of the colon was performed. Duodenum was densely adherent to the gall bladder. In view of the obliterated Calot's triangle, a subtotal cholecystectomy was performed after separating the duodenum from the gall bladder. On postoperative day 3, the patient developed abdominal pain, fever with low volume bile stained fluid from the drain. Ultrasound showed ascites. Immediate reexploration after resuscitation revealed a 0.5x0.5 cm perforation in the first part of duodenum most likely secondary to thermal damage by electrocautery. Repair of the perforation with omental patch was done. Her sepsis continued unabated, finally leading to multiorgan failure and death on day 4.

Case 4

Sixty five years old male patient with one month history of acute cholecystitis complicated by localised perforation which was managed by percutaneous drainage. He had chronic obstructive pulmonary disease, diabetes mellitus and coronary artery disease as co-morbidities. The patient underwent laparoscopic cholecystectomy in a city hospital. He was referred to our unit on postoperative day 7 with features of peritonitis, septicaemia and bilious output from drain. Communication with operating surgeon revealed that it was difficult laparoscopic cholecystectomy due to extensive pericholecystic adhesions. Ultrasound scan showed subhepatic fluid collection with minimal inter-loop fluid. Further evaluation with CT scan abdomen revealed contrast extravasation from the duodenum (Figure 1). On urgent laparotomy 0.5x 1.0 cm perforation was identified in duodenal first part. Duodenorapphy with omental patch was done. In the postoperative period he had pneumonia, multiorgan failure leading to death on day 4 post reexploration.

Case 5

A 57 year old lady, underwent a laparoscopic cholecystectomy. At surgery, duodenum was adherent to the gallbladder neck; during adhesiolysis duodenal injury was identified and was managed by intracorporeal suturing. She was referred to our institution on postoperative day 3 with bile draining through the drain, and features of septic shock and severe respiratory distress. The patient required massive intravenous fluid administration, pressor drugs and ventilator support during resuscitation. However despite adequate resuscitative measures her condition failed to improve significantly. In view of history of intraoperative duodenal injury and bilious discharge from the drain it was decided to explore immediately for source control of sepsis. Peroperative findings showed dehiscence of sutured duodenal perforation measuring 1.0x1.0 cm. Duodenorapphy with omental patch and feeding jejunostomy was done. Her septic shock persisted and she died of multiorgan failure on the first postoperative day.

Discussion

Duodenal injury is a rare complication of laparoscopic cholecystectomy with a potential mortality unless recognized and managed in time. The estimated incidence of injury to duodenum has been reported to be 0.04% (0.01%- 0.04%) [3]. Most of the injuries to duodenum are caused during dissection of the gallbladder near the infundibulum due to extensive adhesions between the gallbladder and the duodenum. Thermal injury by use of electrocautery is another important cause of duodenal injury [4, 5, 6, and 7].

The sharp edge of suction device used for traction has also been reported as a cause of duodenal injury [5]. In our series of 5 cases 2 patients had dense adhesions in Calot's triangle (case 2,4). Two patients [1,5] duodenum was adherent to infundibulum. In case 3 gall bladder was contracted with obliteration of Calot's triangle. There were dense adhesions of hepatic flexure of colon and duodenum to the contracted gall bladder.

Timing of duodenal injury recognition has been variably reported in the literature, ranging from on table detection to 5th postoperative day [3]. A systematic review [8] on duodenal injury in laparoscopic cholecystectomy reported that the injury was diagnosed at an average of 1.7 days with only 46% cases being detected during surgery. In our series two patients were identified intraoperatively by the operating surgeon (case 1,5). In the other 3 cases there was delayed recognition (3 to 5 days).

Timing of duodenal injury detection is related to the mortality. Machado etal [8] observed significant difference in mortality between patients in whom injury was detected within a day to those with delayed recognition after 24 hrs. Delayed recognition leads to

an increase in mortality in the majority of reports in literature. We had similar experience, though in two patients there was immediate recognition of injury, conversion to laparotomy for repair was done in only one case. Only this patient had uneventful outcome. All the other 3 cases with delayed recognition and one patient dealt by immediate laparoscopic intracorporeal suturing had mortality. We recommend that in case of duodenal injury detected during the course of laparoscopic cholecystectomy conversion to open should be done for a proper assessment and repair of injury.

In the literature, though there have been case reports of diagnosing electrocautery induced duodenal injuries during laparoscopic cholecystectomy but these are usually few [9,10]. In general thermal injuries are unrecognized and present late once the duodenal perforation develops as a result of coagulative necrosis (postoperative 1-16 days) [11,12]. In view of rarity of duodenal injury in laparoscopic cholecystectomy, its diagnosis is difficult in postoperative period and demands high degree of clinical suspicion [3,12,13].

Patients having unexplained fever, nausea, vomiting and unusual abdominal pain in the postoperative period, especially after a difficult laparoscopic cholecystectomy, with extensive adhesiolysis should have a high index of suspicion for a duodenal injury.

Three patients in the series developed abdominal pain, peritonitis and features of septicaemia on postoperative day 3, 3 and 5 respectively with low output bile stained discharge from the drain. In case 2 operating surgeon detected duodenal injury on postoperative day 5, when a laparotomy was performed for a high output bile leak.

Croce et al [5] has stated that estimation of drain fluid amylase helps in early diagnosis of duodenal injury. Further leak can be confirmed by demonstration of gastrograffin extravasation on oral contrast study [14]. In case of posterior perforation of duodenum other helpful signs are obliteration of right psoas muscle by retroperitoneal gas, forward displacement of duodenum by posterior collection [15,16].

Apart from duration of injury, the site of injury is another important factor [13,17]. Injury occurring just above or below the level of ampulla of vater will be more complicated because of leakage of both biliary and pancreatic fluid. In contrast injury sustained in first part of duodenum or at the level of superior flexure is relatively less complicated. All of our patients had injury in the first part of duodenum.

The management of duodenal injury usually requires surgical intervention [3,4,12]. There have been occasional case reports of successful conservative management in the literature [14,18]. But majority of the authors agree on urgent surgical intervention [3,4,6,12,13]. Type of surgical intervention required depends upon timing of detection and site of injury. Various approaches have been described in literature ranging from duodenorapphy, tube duodenostomy, serosal or mucosal patch to even pancreaticoduodenctomy [3,19,20]. One patient in our series in whom intervention was done on 10th postoperative day underwent tube duodenostomy and feeding jejunostomy. His perforation size was 2.0x2.0 cm with oedematous friable edges. All the other 4 patients underwent duodenorapphy with omental patch technique.

Duodenal injury during cholecystectomy is uncommon complication with high mortality unless promptly diagnosed and managed. A review of literature on iatrogenic duodenal injury has quoted mortality rate of 17% [9]. El Banna et al [2] reported mortality in 3 of the 4duodenal injury patients (75%). Dezeil et al [12] in an analysis of 77604 laparoscopic cholecystectomy cases detected mortality of 8.3% in 12 patients of duodenal injury. Huang et al [6] noted mortality of 21.03% in 19 of patients with duodenal injury in analysis of 39238 cases of laparoscopic cholecystectomy. In our experience duodenal injury in laparoscopic cholecystectomy is extremely fatal 4 out of 5 patients (80%) did not survive. We attribute high mortality to delayed recognition resulting in septicaemia which persisted despite definitive surgery ultimately leading to multiorgan failure and death.

All precautions should be taken to prevent duodenal injury in laparoscopic cholecystectomy. Careful dissection, low threshold to conversion in case of difficult dissection in Calot's triangle not only helps in avoiding bile duct injuries but also useful in preventing duodenal injury. Thermal injury can be prevented by avoiding use of electrocautery in close proximity to bowel, use of low power current and maintaining proper insulation of the instruments.

Conclusion

In conclusion laparoscopic surgeon should be aware of the possibility of duodenal injury in difficult laparoscopic cholecystectomy. High index of suspicion should be maintained in case of uneventful recovery. Delay in diagnosis and intervention results in high mortality.

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