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RESEARCH PAPER

Management of endoscopic retrograde cholangiopancreatography (ERCP)-related perforations in a tertiary care centre in North-East India

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***Background and aims**: Endoscopic retrograde cholangiopancreatography (ERCP) related perforations are rare complications but are associated with significant morbidity and mortality. The purpose of this retrospective study was to evaluate the management and outcomes of these perforations. **Methods**: The study was conducted from January 2016 to January 2020 at a tertiary care centre in Northeast India. We reviewed the medical records and collected data on patients with ERCP induced perforations. We analysed the type of injury, management and outcomes. **Results**: A total of 450 ERCPs were performed at our centre during the study period. Eleven patients (2.4%) developed ERCP related perforations. Two patients had type I injury, identified during ERCP and managed by urgent surgery. Three patients with type II injury were managed conservatively. One patient with type III injury was detected intra-operatively on laparoscopy for planned laparoscopic cholecystectomy, which was organised by placing subhepatic and pelvic drains. Five patients with type IV injury were also managed conservatively. **Conclusion**: Type I injuries require immediate surgical or endoscopic closure whenever possible. An initial conservative approach to small perforation for type II injury may be appropriate, but surgical consultation and careful observation is mandatory. Type III and IV injuries almost always improve after conservative treatment.*

***Keywords**: Endoscopy; perforation; emergency surgery; hepato-pancreaticobiliary diseases.*

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INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is a widely used diagnostic and therapeutic tool in hepatopancreaticobiliary diseases. Though considered safe, it is associated with certain significant complications like pancreatitis, cholangitis, perforation and bleeding. ERCP-related perforations are a rare but severe complication of ERCP with high morbidity and mortality rates. The incidence of ERCP-related perforation ranges from 0.3% to 1.3%.[1-7] The mortality rate in perforated patients has been reported to be as high as 25%.[8]

It is generally agreed that some ERCP-related perforations can be successfully managed without surgery;[6,9] however, it is difficult to define these patients. Further, once a plan of non-operative management is made, these patients should be under constant surveillance by a surgical team so that the patient may be immediately operated on if deterioration occurs. Data on the management of these ERCP related perforations in resource-constrained settings like ours is sparse. We, therefore, decided to review our experience with the management of ERCP related perforations.

Patients and methods: This was a retrospective study. We reviewed the records from January 2016 to January 2020 of our endoscopy department to assess the number of ERCPs performed. From these records, patients admitted with ERCP related perforations were identified. The patients' medical records with ERCP related perforations were reviewed retrospectively, and data was collected regarding their presentation, management, and outcomes. ERCP-related perforations were classified according to Howard and Stapfer's classification (**Table 1**).[10-11]

Table 1 Classification systems of endoscopic retrograde cholangiopancreatography-related perforations

Type of injury	Stapfer et al.[11]	Howard et al.[10]
Type I	Lateral or medial wall perforation	Guidewire perforation
Type II	Peri-Vaterian injury	Periampullary retroperitoneal perforation
Type III	Distal bile duct injury related to wire/ basket instrumentation	Guidewire perforation
Type IV	Retroperitoneal air alone	None

RESULTS

450 ERCPs were done at our tertiary referral centre in Guwahati, Assam, India, between January 2016 and January 2020, and we identified and managed 11 (2.4%) perforations. Two of these patients with ERCP-related injury were referred to our hospital for management. These two patients were also included in this study. Eight were female among these 11 patients, and three were male with a median age of 52 years (31-72 years). Fluoroscopy during ERCP, abdomen and chest X-rays and Contrast-Enhanced Computed Tomography (CECT) abdomen were used to diagnose the underlying conditions. All these patients indicated common bile duct stone, with or without biliary stricture and associated cholangitis. The most typical type of injury was a type IV injury in 45.45% of patients. Most patients were managed conservatively (82.82%). Details of individual patients are presented below according to Stapfer's type of perforation (**Table 2**).

Table 2 Patients' details

Patient characteristics		Observations
Age	Range (Median)	31-72 years (52 Years)
Sex	Male:Female	3:8
Stapfer's type of injury	Type I	2 (18.18%)
	Type II	3 (27.27%)
	Type III	1 (0.91%)
	Type IV	5 (45.45%)
Management	Surgery	2 (18.18%)
	Conservative	9 (81.82%)
Post ERCP stay	Type I	9 days
	Type II	9 Days
	Type III	5 Days
	Type IV	7 Days

Type I injury

Two patients had type I injury. The indication for ERCP in both these patients was multiple CBD calculi. Both these cases were identified during the procedure of ERCP itself and were managed by urgent surgery in the same sitting. Both patients had a lateral wall injury in the second part of the duodenum, and they were managed by primary repair. After Kocherisation of the duodenum to obtain control, the perforation was closed transversely in two layers with interrupted sutures with inner 4-o polydioxanone and outer 3-o silk.

Additionally, retro colic -isoperistaltic gastrojejunostomy was added to divert the gastric juice. Cholecystectomy and CBD exploration were also done to remove the calculi, and the CBD was closed over a T-tube to divert the bile. The nasogastric tube was removed on a post-operative day (POD)3, a liquid diet was started, and a T-tube was clamped on POD4. The subhepatic drain was removed on POD8, and patients were discharged the next day with clamped T-tube in-situ, which was subsequently removed on POD21 after a good T-tube cholangiogram.

Type II injury

Three patients had type III perforation. These were not picked up intra-procedure but diagnosed later when they complained of abdominal pain and discomfort post-procedure. These patients were kept under observation. The patients failed to improve over the next 24 hours and developed tachycardia and mild abdominal distention, tenderness and absent bowel sounds. Urgent CECT was done, revealing minimal retro-duodenal and right perinephric collections in

all patients. Because of the absence of free air and apparent peritonitis, they were planned for conservative management with nil orally, intravenous fluids, indwelling nasogastric tube and injectable antibiotics and analgesics. Patients improved clinically on medical management. Repeat CECT was done on day 3 of the procedure and revealed a significant decrease in the size of the collections. Hence, conservative treatment was continued. Two of the patients improved with this management and were started on orals on day 8. However, one patient developed pain abdomen and underwent repeat CECT on day 6, which did not show any collection and conservative treatment was continued. On day 8, the nasogastric tube was removed, and a liquid diet was started. Patients were discharged on the following day after they tolerated a regular diet.

Type III injury

One patient had a type III injury. This was diagnosed intra-operatively during laparoscopy for planned cholecystectomy on post-procedure day 1. On laparoscopy, bile was detected in subhepatic and pelvic regions. Since the patient was asymptomatic, it was decided to manage him conservatively by placing right subhepatic and pelvic drains. CECT was done but did not reveal any leak. Drain output was 30 ml in subhepatic and 40 ml in the pelvic drain in the first 24 hours, bile stained serous fluid. The output was gradually reduced, turned to severe, and drains removed on the 5th day of the procedure. The patient was discharged with the plan for laparoscopic cholecystectomy and CBD stent removal after four weeks. He underwent a successful cholecystectomy later on.

Type IV injury

Five patients had type IV injuries and were also managed conservatively. All these patients underwent successful CBD clearance and stent placement. However, patients developed abdominal pain post-procedure, and mild enlargement and tenderness were detected on examination. Urgent CECT was done, which revealed retroduodenal air in all these patients. In addition, three patients had associated right perinephric air, two patients had associated pneumomediastinum, and one patient had associated subcutaneous emphysema in the right upper trunk. All patients improved with medical treatment and were discharged within seven days.

DISCUSSION

ERCP-related bowel perforations are infrequent but potentially lethal complications, with an unpredictable outcome. Predisposing factors that increase the risk of ERCP-related perforation include sphincter of Oddi dysfunction, older age, undilated bile duct, sphincterotomy, and longer procedure duration.[2] Other reported risk factors are abnormal duodenal anatomy and peripapillary duodenal diverticulum.[7]

Though the appropriate management of ERCP-related perforations has been controversial, increasing experience with evidence suggests that most ERCP-related perforations can be managed without surgery.[6,9] Stapfer's classification helps classify the perforations following the mechanism and location. Exceptions include typing I injuries, which are scope induced and require urgent intervention, either with endoscopic clipping, suturing, or surgical repair. Type II injuries can often be managed conservatively but may require exploration on failure to improve. It is also important to note that these perforations may be associated with pancreatitis, which increases the risk of mortality and morbidity. If identified during the procedure, stenting may be performed. They require close observation and early intervention. Type III and Type IV are usually managed conservatively and often missed as most patients may be asymptomatic.[12]

Our data shows that nearly 80% of ERCP related perforations can be managed conservatively. This is in concordance with what other authors have reported as well.[13] However, it is essential to involve a surgical team from the beginning to allow a surgical intervention to be performed at the earliest sign of deterioration.

The main drawback of our study is that it is a tiny sample, and ERCP-related perforation is a rare complication by itself. Further, this study details the management of these patients at a tertiary care centre from North East India.

CONCLUSION

All type I injury require immediate surgical or endoscopic closure whenever possible. Though a conservative approach can manage type II injury, surgical consultation and careful observation are mandatory. Type III and IV injuries almost always improve with conservative treatment.

Data availability: The data used to support the findings of this study are included in the article.

Conflicts of interest: None declared.

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