

# Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall - Endoscopist Greatest Agony

Kapil Sharma<sup>1\*</sup>, Mamta Sharma<sup>2</sup>, Ansul Gupta<sup>3</sup>

<sup>1</sup>\*Department of Gastroenterology, Nayati Medicity, Mathura (UP), India.

<sup>2</sup>Department of Biostatistics, Nayati Medicity, Mathura (UP), India.

<sup>3</sup>Department of Gastroenterology Nayati Medicity Mathura (UP), India.

drkapilsharma83@gmail.com

*\*Corresponding Author: Kapil Sharma, Department of Gastroenterology, Nayati Medicity, Mathura (UP), India.*

## Abstract

Endoscopic retrograde cholangiopancreatography (ERCP) is one of the therapeutic modality for various pancreatic and biliary problems. Endoscopic sphincterotomy (ES) usually done for removal stones and facilitate the entry of stent in bile duct. ES related perforation are not uncommon which are usually retroperitoneal and usually located in the perivaterian region. Perivaterian perforation could generally be managed by conservative management and non surgical interventions as they tend to be smaller in size and are usually well contained. These nonsurgical management includes endoscopic intervention like placement of endoscopic nasobiliary drainage catheter (ENBD), multiple plastic stents, endoclips, fibrin glue and placement of fully covered self-expandable metallic stents (FCSEMS) and radiologic interventions using percutaneous transhepatic biliary drainage (PTBD). The mechanism, site and extent of injury, suggested by clinical and radiographic findings, should guide towards operative or non-operative management. In type I perforations early surgical repair is indicated, unless endoscopic closure can be achieved. Patients with type II perforations should be treated initially non-operatively. Non-operative treatment was successful in 2/3 of patients with perivaterian perforation with little mortality. We are sharing our experience of managing different type of duodenal perforation during ERCP.

## INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) initially popularized as diagnostic as well as therapeutic tool for treatment in pancreatico-biliary pathology. It was first introduced in 1968 as first pancreaticogram [1]

In a last decade, applications of ERCP limited to therapeutic sense for removal of CBD stones, cholangitis, biliary stricture, bile leak and biliary stenting for optimization of bilirubin levels to start chemotherapy for pancreatico-biliary malignancy. ERCP looks simple in hands of experts because of high level of technical skills and experience but can be challenging for novice and also carries more risk of complications, such as bleeding, perforation, pancreatitis, and cholangitis. Amongst these

complications, perforation is a potentially fatal complication which occurs at rate of 0.3%-1.0% in different studies [2,3,4] and the rate of mortality in perforated patients is high (8%-23%)[2,3,4]

In ERCP scope induced perforation are although rare, usually immediately visualized on endoscopic vision during ERCP. [5] It is intraperitoneal (typically in the lateral wall) and often need surgical intervention till recent past. Now it can be managed by endoscopic clipping in hands of experts. We also sharing our experience of managing one case of duodenoscope induced lateral duodenal wall perforation by surgery. For surgical intervention, the interval between the perforation and operation is of much significance as mortality increases dramatically in the event of

## Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall- Endoscopist Greatest Agony

---

delay. If perforation detected during or immediately after ERCP, it can be managed by primary repair without diversion with good outcome. However who diagnosed late prognosis remains dismal even after primary repair and duodenal diversion.

Perivaterian perforations are usually recognized on fluoroscopy but sometime can be detected on endoscopic vision similar to our case. [6]

Conservative management intravenous antibiotics, hydration, pain control, and nil-by-mouth appears to be inadequate. Indeed, it should be combine with any methods for biliary drainage to prevent bile spillage in retroperitoneum. Biliary drainage can be done by ENBD, use of plastic or metallic stents and PTBD with or without duodenal drainage via a nasoduodenal tube. If conservative management failed which indicated by fever, tachycardia, guarding on examination and leukocytosis, then often these patients needs a delayed surgery, although even after that subsequent clinical course was found to be poor in some studies [7,8].

Immediate indication for surgery in perivaterian perforation includes major contrast leak, presence of peritonitis or retroperitoneal fluid collections not amenable to percutaneous drainage and unsolved problems like stones or retained hardware (baskets) (7,9,10,11)

If any suspicion regarding perforation irrespective of its location and types, effective nasobiliary and gastrointestinal drainage should be placed to decrease the leak of digestive juice and bile that would otherwise gradually accumulate in the retroperitoneal space.

Biliary FCSEMS has advantage of preventing bile flow to perforation site completely and sealing of perforation over the ENBD especially for a major leakage and large perforation.

We here also share our experience of managing perivaterian perforation by Biliary FCSEMS and multiple plastic stents.

Diminutive duodenal perforation is not a true perforation; generally, it can be treated sufficiently with conservative management alone. We have also encountered such case after ERCP.

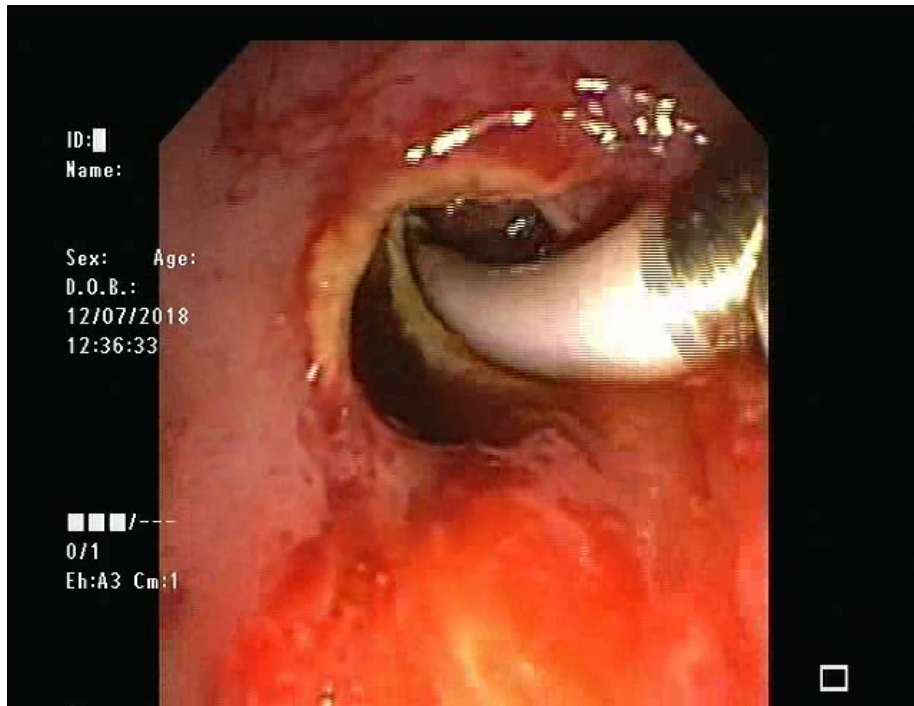
Liver parenchyma or intrahepatic biliary tree perforation are very rare and can be manage by only conservative management. We are also sharing experience of managing similar case.

### CASE 1

57 year old female with history of biliary colic who had cholelithiasis with choledocholithiasis referred to us for ERCP with CBD stone removal. She was taken for ERCP after informed consent with conscious sedation under monitored anaesthesia. Side view scope (Olympus TJF 150) negotiated till second part of duodenum and papilla enfaced. Papilla was tiny and had small hood for adequate sphincterotomy. CBD selectively cannulated and cholangiogram done which revealed dilated CBD ~ 9 mm with rectangular ~ 8 mm filling defect in mid part just below scope. Endoscopic sphincterotomy done with VIO 300 D ERBE cautery followed balloon sphincteroplasty with CRE balloon from boston scientific till 9 mm. Balloon sweeping was done with stone retrieval balloon from boston scientific. Balloon got stucked at lower end. After little deflation balloon came out in duodenum with stone. Simultaneously lower end of bile duct appeared lacerated with gaping between CBD mucosa and duodenal mucosa (Figure 1). Doubtful shadow of subhepatic air noted under fluoroscopy. Immediate suspicion of perivaterian perforation suspected. 7 Fr Naso biliary drain and 7 fr x 7 cm DPT plastic stent placed. Simultaneous nasoduodenal ryle's tube placed under fluoroscopic guidance. Xray KUB confirmed perinephric air (Figure 2). Patient managed conservatively. Next day she developed right neck subcutaneous emphysema and NBD cholangiogram showed leak from distal CBD. Hence decision regarding placement of biliary fully covered Self expandable Metal Stent (FCSEMS) made. 6 cm x 10 mm Honto biliary FCSEMS with distal anchor from Mitra placed under fluoroscopic and endoscopic guidance (Figure 4). USG Abdomen showed no evidence of intra or retroperitoneal collection. Patient discharge on day 5 after ERCP.

**Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall-  
Endoscopist Greatest Agony**

---

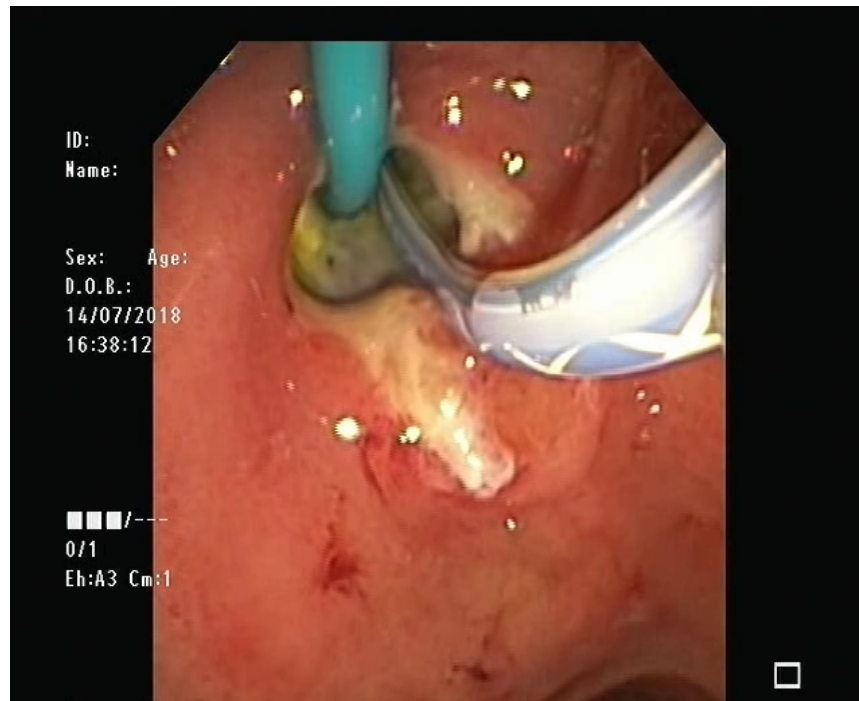


**Fig 1.** *Sphincterotomy site perforation which is evident just below lower end of bile duct*

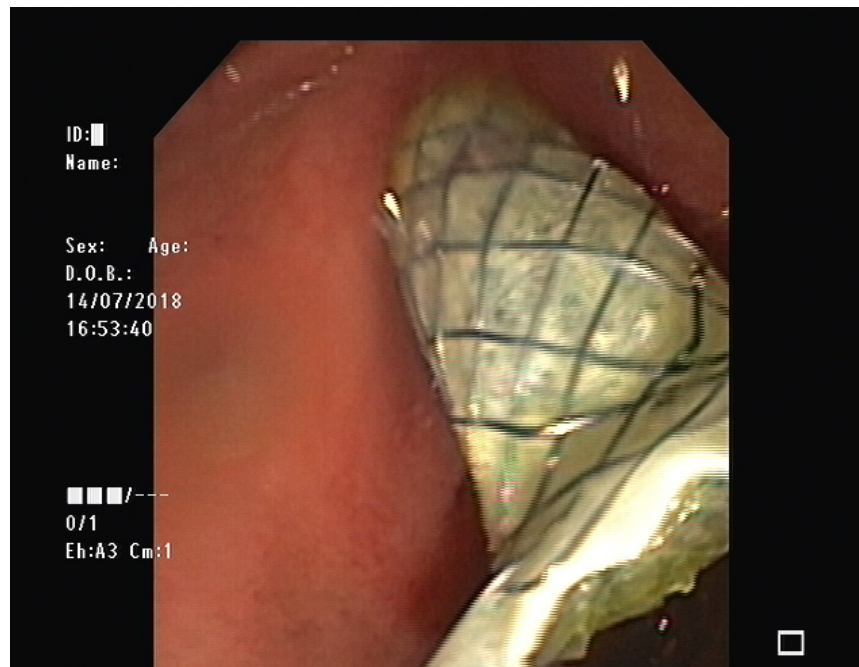


**Fig 2.** *X ray film showing perinephric air after sphincterotomy site perforation*

## Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall-Endoscopist Greatest Agony



**Fig 3.** Cannulation of bile duct with naso biliary drain insitu



**Fig 4.** Selfexpandable metal stent covering Sphincterotomy site perforation

### CASE 2

45 years old female with choledocholithiasis with cholelithiasis referred to us for ERCP. She was taken for ERCP after informed consent with conscious sedation under monitored anaesthesia. Side view scope (Olympus TJF 150) negotiated till second part

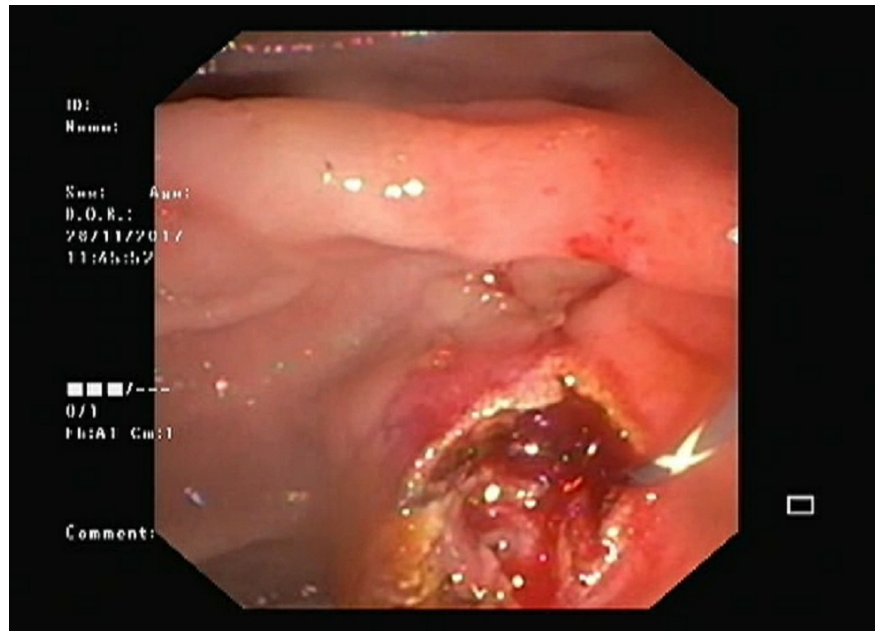
of duodenum and papilla enfaced. Papilla was up and over. Cannulation was difficult and required needle knife papillotomy (NKP). Mild bleeding occurred during NKP which was controlled with adrenaline spray and coagulation current. Stone removed by balloon sweeping. Patient discharge after 24 hrs. She



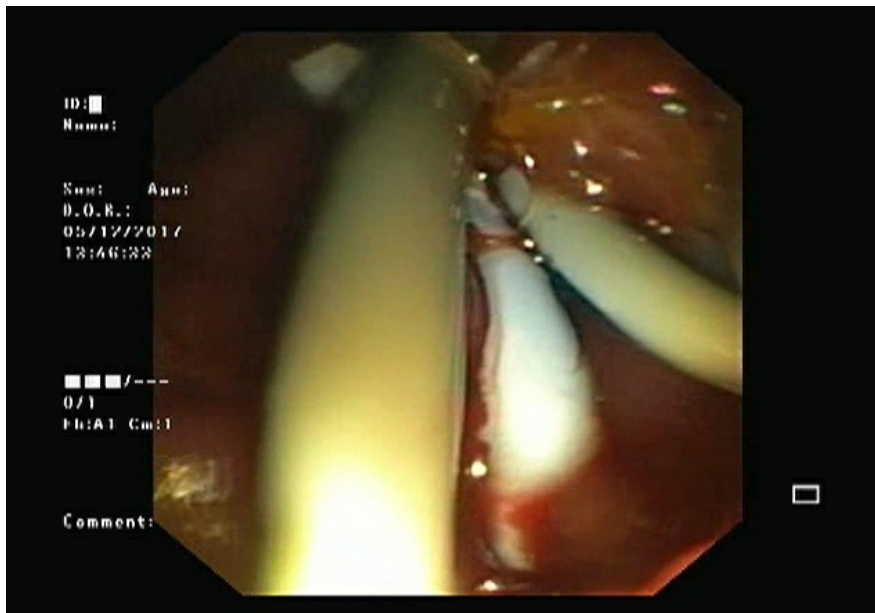
## Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall-Endoscopist Greatest Agony

developed abdominal pain after resuming soft diet at home. For that she was hospitalized. USG abdomen done which showed 476 ml collection in pelvic cavity and 176 ml septate collection in sub hepatic region. She was taken for surgery. Two drain placed one in subhepatic region and another in pelvic cavity. Subsequently she improved clinically. Drain output decreased particularly in subhepatic drain. Although pelvic drain showed persistent discharge. Hence Contrast CT abdomen with oral contrast was done which showed Cholelithiasis with cholecystitis

with slight leak of contrast from second part of duodenum with mild ascites with pelvic drain in situ. Again referred to us for duodenal leak. We placed multiple plastic straight stents in CBD due to financial constraint (Figure 6). 16 Fr Naso duodenal Ryle's tube under fluroscopic guidance. She was managed conservatively by nil per mouth, IV fluids , parental nutrition, IV albumin and IV antibiotics. After long period she recovered from this complication and consequences.



**Fig 5. Lacerated sphincterotomy site**



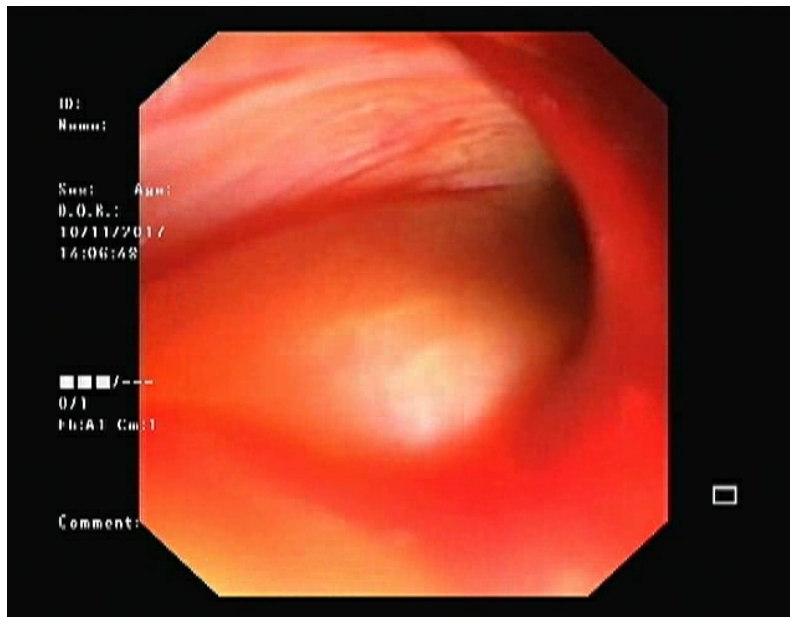
**Fig 6. Multiple plastic stents covering sphincterotomy site**

## Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall-Endoscopist Greatest Agony

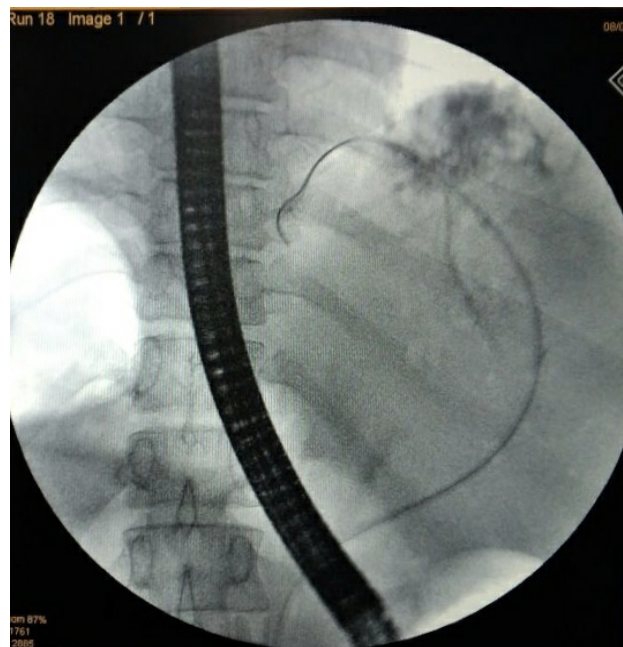
### CASE 3

70 Years old female had choledocholithiasis which was diagnosed during evaluation of her abdominal pain. She was taken for ERCP after informed consent with conscious sedation under monitored anaesthesia. Side view scope (Olympus TJF 150) negotiated till second part of duodenum and papilla en faced. CBD cannulated and cholangiogram done which showed dilated CBD with multiple filling defects. Wide

sphincterotomy done. Balloon sweeping done which removed few stone. Final Balloon sweeping done without wire in CBD. During this sweeping balloon suddenly popped out into duodenum which caused strike of duodenoscope to lateral duodenal wall. Suddenly complete loss of vision with visualization of peritoneum with duodenal injury with inactive ooz. (Figure 7) On table surgical consultation done. Patient taken for surgery immediately after consent. Primary repair of lateral duodenal wall perforation done.



**Fig 7.** Duodenoscope related posterior duodenal wall perforation



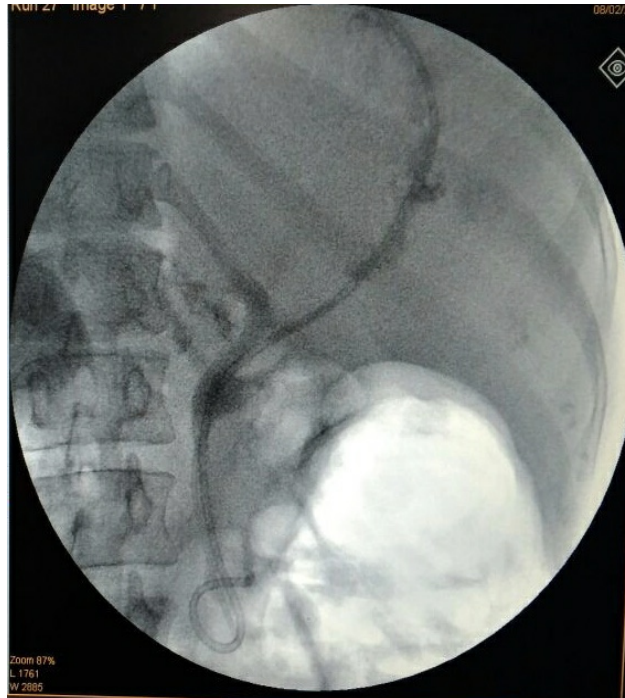
**Fig 8.** Wire guide intrahepatic biliary tree perforation

## Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall-Endoscopist Greatest Agony

### CASE 4

36 year old female with post cholecystectomy type 2 biliary stricture (bismuth) taken for after informed consent with conscious sedation under monitored anaesthesia. Side view scope (Olympus TJF 150) negotiated till second part of duodenum and papilla

enfaced. Selective CBD Cannulation done stricture negotiated with difficulty. Wire placed deep into intra hepatic biliary tree. Cholangiogram done which showed leakage from intra hepatic biliary tree (Figure 8) that was managed by placement of long 7 Fr x 10 cm double pig tail plastic stent placed which sealed the leak (Figure 9).



**Fig 9.** Sealing of intrahepatic biliary tree perforation by long plastic stent

### DISCUSSION

Stapfer et al [12] classified duodenal perforations into four types according to anatomical location and severity. Type 1 are lateral duodenal wall perforation by the endoscope itself. Type II are perivaterian or periampullary perforations, and most occur during endoscopic sphincterotomies. Type III are perforations of the distal bile duct, typically due to wire or basket instrumentation. Type IV are diminutive retroperitoneal perforations due to excessive use of compressed air to retain a patent bowel lumen. [12]

Risk factors type 1 perforation are related to patients due to abnormal anatomy where difficult to intubate duodenum such as post billroth II and whipple surgery status and situs inversus [13,14,15]. Risk factors for other type perforation mostly operator dependent due to technical issues for performing cannulation, sphincterotomy and precut fissulotomy. Patients related risk factors includes sphincter of oddi dysfunction and a dilated common bile duct [16].

No standard recommendations exists regarding its management due to its rarity and variable clinical consequences. If patient is well clinically despite the presence of extensive retroperitoneal air, conservative and nonsurgical approach followed. If the patient develops abdominal pain, fever and appears toxic clinically, surgical exploration should be considered[17]. Delayed diagnosis can lead to severe morbidity and even mortality [16]

Vezakis et al [18] reported a case of a persistent high-volume duodenal stula, caused during an endoscopic sphincterotomy, that was treated successfully using a partially covered SEMS.

Park et al [19] also considered biliary FCSEMS for duodenal perforation after endoscopic sphincterotomy, similar to the above study.

Thus, optimal conservative management using a fully covered SEMS may be a good treatment option for type 2 or 3 Staffer perforation.

## Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall-Endoscopist Greatest Agony

Patient with Stoffer type 1 should be managed with immediate surgery and endoscopic closure by over the scope clip or multiple clips through the scope.

However, the optimal duration of stenting has not been established. Several studies have reported stenting durations in peri-ampullary perforations ranging from 10 to 30 days [18-21].

Moreover, because the treatment outcome did not seem to depend on the duration of stenting, and a stent should be removed when the patient shows improved perforation-related symptoms, signs, and imaging results.

### CONCLUSIONS

In conclusion, ERCP - related perforation is an uncommon complication, but one that can cause extremely serious conditions. Early diagnosis and prompt management are important to decrease morbidity and mortality. Patients with ERCP-related perforations should be closely monitored by gastroenterologist and surgeon; this team should decide whether to proceed with surgery or to continue conservative cum endoscopic management. The most appropriate treatment course should be decided on case-by-case basis.

Although immediate surgical closure has been standard treatment for ERCP-related Stoffer type 1 perforation of duodenal wall, currently, endoscopic interventions using clips, endoloops, glue injection, and newly developed devices can be used in selected patients. Type II, III & IV perforations can be managed conservatively with keeping NBM, IV fluids diversion of bile in form of NBD and naso-duodenal tube placement with close monitoring and FCSEMS placement, later on if no improvement then surgery.

For early detection and prompt management we recommend 5Rs. 1) Recognise 2) React 3) Reach out 4) Revisit 5) Repent.

We should identify perforation earliest either on fluoroscopy or endoscopy followed by immediate reaction to tackle it such as surgery or endoscopic clipping for Stoffer Type 1 and biliary diversion for rest of other perforation. Even after this, these patient should be strictly followed up for recovery or deterioration. Next plan of action should be ready if any treatment modality fail. If finally everything went good and patient discharge after good recovery then you can cherish.

It may also be concluded that endoscopic treatment has developed a lot and will further develop so that there will be minimal use of surgery in the near future for these perforations.

### REFERENCES

- [1] McCune WS, Shorb PE, Moscovitz H. Endoscopic cannulation of the ampulla of Vater: a preliminary report. *Ann Surg* 1968; 167: 752-756
- [2] Christensen M, Matzen P, Schulze S, Rosenberg J. Complications of ERCP: a prospective study. *Gastrointest Endosc* 2004; 60: 721-731
- [3] Enns R, Eloubeidi MA, Mergener K, Jowell PS, Branch MS, Pappas TM, Baillie J. ERCP-related perforations: risk factors and management. *Endoscopy* 2002; 34: 293-298
- [4] Pungpapong S, Kongkam P, Rerknimitr R, Kullavanijaya P. Experience on endoscopic retrograde cholangiopancreatography at tertiary referral center in Thailand: risks and complications. *J Med Assoc Thai* 2005; 88: 238-246
- [5] Vezakis A, Fragulidis G, Polydorou A. Endoscopic retrograde cholangiopancreatography - related perforations: diagnosis and management. *World J Gastrointest Endosc* 2015;7:1135-1141
- [6] Motomura Y, Akahoshi K, Gibo J, et al. Immediate detection of endoscopic retrograde cholangiopancreatography - related periampullary perforation: fluoroscopy or endoscopy? *World J Gastroenterol* 2014; 20: 15797-15804
- [7] Alfieri S, Rosa F, Cina C, Tortorelli AP, Tringali A, Perri V, Bellantone C, Costamagna G, Doglietto GB. Management of duodeno-pancreato-biliary perforations after ERCP: outcomes from an Italian tertiary referral center. *Surg Endosc* 2013; 27: 2005-12
- [8] Wu HM, Dixon E, May GR, Sutherland FR. Management of perforation after endoscopic retrograde cholangiopancreatography (ERCP): a population-based review. *HPB (Oxford)* 2006; 8: 393-399
- [9] Preetha M, Chung YF, Chan WH, Ong HS, Chow PK, Wong WK, Ooi LL, Soo KC. Surgical



## Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall- Endoscopist Greatest Agony

- management of endoscopic retrograde cholangio pancreatography-related perforations. ANZ J Surg 2003; 73: 1011-1014
- [10] Machado NO. Management of duodenal perforation postendoscopic retrograde cholangio pancreatography. When and whom to operate and what factors determine the outcome? A review article. JOP 2012; 13: 18-25
- [11] Chung RS, Sivak MV, Ferguson DR. Surgical decisions in the management of duodenal perforation complicating endoscopic sphincterotomy. Am J Surg 1993; 165: 700-70
- [12] Stapfer M, Selby RR, Stain SC, Katkhouda N, Parekh D, Jabbour N, Garry D. Management of duodenal perforation after endoscopic retrograde cholangiopancreatography and sphincterotomy. Ann Surg 2000; 232: 191-198 [PMID: 10903596]
- [13] Morgan KA, Fontenot BB, Ruddy JM, Mickey S, Adams DB. Endoscopic retrograde cholangio pancreatography gut perforations: when to wait! When to operate! Am Surg 2009; 75: 477-483; discussion 483-484
- [14] Faylona JM, Qadir A, Chan AC, Lau JY, Chung SC. Smallbowel perforations related to endoscopic retrograde cholangiopancreatography (ERCP) in patients with Billroth II gastrectomy. Endoscopy 1999; 31: 546-549 [PMID: 10533739 DOI: 10.1055/s-1999-61]
- [15] Lin LF, Siau CP, Ho KS, Tung JC. ERCP in post-Billroth II gastrectomy patients: emphasis on technique. Am J Gastroenterol 1999; 94: 144-148
- [16] Avgerinos DV, Llaguna OH, Lo AY, Voli J, Leitman IM. Management of endoscopic retrograde cholangiopancreatography: related duodenal perforations. Surg Endosc 2009; 23: 833-838
- [17] Knudson K, Raeburn CD, McIntyre RC, Shah RJ, Chen YK, Brown WR, Stiegmann G. Management of duodenal and pancreaticobiliary perforations associated with periampullary endoscopic procedures. Am J Surg 2008; 196: 975-981
- [18] Vezakis A, Fragulidis G, Nastos C, Yiallourou A, Polydorou A, Voros D. Closure of a persistent sphincterotomy-related duodenal perforation by placement of a covered self-expandable metallic biliary stent. World J Gastroenterol 2011; 17: 4539-4541 [PMID: 22110286 DOI: 10.3748/wjg.v17.i40.4539]
- [19] Park WY, Cho KB, Kim ES, Park KS. A case of ampullary perforation treated with a temporally covered metal stent. Clin Endosc 2012; 45: 177-180 [PMID: 22866262 DOI: 10.5946/ce.2012.45.2.177]
- [20] Canena J, Liberato M, Horta D, Romão C, Coutinho A. Shortterm stenting using fully covered self-expandable metal stents for treatment of refractory biliary leaks, postsphincterotomy bleeding, and perforations. Surg Endosc 2013; 27: 313-324 [PMID: 22806507 DOI: 10.1007/s00464-012-2368-3]
- [21] Jeon HJ, Han JH, Park S, Youn S, Chae H, Yoon S. Endoscopic sphincterotomy-related perforation in the common bile duct successfully treated by placement of a covered metal stent. Endoscopy 2011; 43 Suppl 2 UCTN: E295-E296 [PMID: 21915834 DOI: 10.1055/s-0030-1256464]

**Citation:** Kapil Sharma, Mamta Sharma, Ansul Gupta. Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Perforation Going through the Wall - Endoscopist Greatest Agony. Archives of Gastroenterology and Hepatology. 2019; 2(2): 01-09.

**Copyright:** © 2019 Kapil Sharma, Mamta Sharma, Ansul Gupta. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.