

Original Research Paper

Knowledge, attitude, and the practices in prevention of post endoscopic retrograde cholangiopancreatography pancreatitis (PEP) among advanced endoscopists.

Authors:

Chintan Tailor¹, Shamshersingh Chauhan², Vikas Pandey³, Kiran B⁴, Vikramaditya Rawat⁵, Meghraj Ingle⁶

^{1,4,5}Senior Resident, Medical Gastroenterology, Lokmanya Tilak Municipal Medical College, Mumbai

² Assistant Professor, Medical Gastroenterology, Lokmanya Tilak Municipal Medical College, Mumbai

³Associate Professor, Medical Gastroenterology, Lokmanya Tilak Municipal Medical College, Mumbai

⁶Professor and Head, Medical Gastroenterology, Lokmanya Tilak Municipal Medical College, Mumbai

Corresponding Author: Dr. Meghraj Ingle, Professor and Head Medical Gastroenterology Lokmanya Tilak Municipal Medical College, Sion, Mumbai

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ABSTRACT

Background and Aims: PEP is the most dreaded complication of endoscopic retrograde cholangiopancreatography (ERCP). We sought to capture the various practise methods amongst advanced endoscopists regarding measures taken for prevention of PEP. **Methods:** An anonymous online 31-item survey was sent to advanced endoscopists by social media platforms like WhatsApp, Twitter and E-mail. The responses were collected over a period of 2 weeks. **Results:** Of the 600 endoscopists who were invited to participate, 123 responded. Eighty-seven percentage of endoscopists believe their PEP rate was around 0 to 5 %. Thirty seven percent use intravenous hydration (IV) only in patients deemed as high risk for PEP. Majority (91.8%) use Ringer's lactate solution for the prevention of PEP. Standard hydration was the norm in using IV fluids in prevention of PEP amongst most endoscopists (67.5%). Forty percentage endoscopists put pancreatic ductal (PD) stent after more than two inadvertent PD cannulation. About 11% endoscopists felt that there was no therapeutic benefit of PD stenting after inadvertent cannulation. About 97 % endoscopists would use rectal nonsteroidal anti-inflammatory drugs (NSAIDs) if there are no contraindication to use. Sixty-nine percentage endoscopists use rectal NSAIDs in high-risk patients only. About 60 % endoscopists use rectal NSAIDs after ERCP. Eighty-nine percentage of endoscopists use combined therapy for PEP. The most commonly used combination is rectal NSAID with standard hydration. If pancreatic ductal stenting is done due to inadvertent cannulation, 72 % endoscopists would still use intravenous hydration with rectal NSAID as additional mode of prophylaxis. **Conclusions:** As per our survey, Rectal NSAID is most preferred method for PEP prophylaxis. Rectal NSAID with standard hydration is more commonly used. Most endoscopist prefer to use pancreatic stent in high-risk situation.

Keywords: Post ERCP Pancreatitis, Rectal NSAIDS, Pancreatic duct stenting, Hydration Therapy

INTRODUCTION:

Post endoscopic retrograde cholangiopancreatography pancreatitis (PEP) is the most dreaded complication of endoscopic retrograde cholangiopancreatography (ERCP) with the overall incidence of PEP is estimated to be 3% to 10% in systematic reviews¹. A recent meta-analysis of 108 randomized controlled trials (RCTs) involving 13,296 patients, reported a 9.7% overall incidence of PEP, the majority of PEP cases were mild, with a mortality rate of 0.7%². In high-risk patients, incidence of PEP is upto 14 %. PEP can progress to moderate or severe pancreatitis in 4.7% of patients and is associated with an overall mortality rate

of 0.7%³. Appropriate patient selection is very paramount in reducing the incidence of PEP. Strategies to prevent PEP are hydration, rectal non-steroidal anti-inflammatory drugs (NSAIDs) and pancreatic stent. Intravenous (IV) hydration is a fundamental therapy for treatment of acute pancreatitis. IV hydration is thought to prevent further injury to the pancreas from microvascular hypoperfusion⁴. Many agents have been studied for pharmacologic prophylaxis of PEP, each directed toward interruption or amelioration of an aspect of the inflammatory cascade that accompanies and potentiates acute pancreatitis. Rectal administration of nonsteroidal anti-inflammatory drugs

(NSAIDs) has the most robust data for significantly reducing the incidence and severity of PEP^{5 6}. Several RCT and meta-analyses have proven a significant reduction in incidence and severity of PEP with prophylactic pancreatic duct stenting in high-risk group^{7 8}. A recent survey of advanced endoscopy physicians in United States showed involving 62 endoscopists, all reported using pancreatic stents for PEP prevention. About 98 % physician used rectal NSAIDs for PEP prevention. About 83.0% (n=49) of respondents reported using rapid intravenous fluids to prevent PEP⁹. Recent guidelines suggest aggressive intravenous hydration for prevention of PEP^{10 11}. However, combining aggressive hydration with rectal NSAIDs did not reduce the incidence of post-ERCP pancreatitis in patients with moderate to high risk as per the recently published FLUYT trial. Therefore, the burden of laborious and time-consuming aggressive periprocedural hydration to further reduce the risk of post-ERCP pancreatitis is may not hold true in all settings especially in high volume centres¹². So, we conducted survey for methods practised by advanced endoscopist worldwide to reduce PEP to get a real-world knowledge in practising methods for prevention of post ERCP pancreatitis.

METHODS

Design of survey.

Survey was conducted after institutional ethical committee approval. A 31-point questionnaire was designed using the Google forms in June 2021, to assess knowledge, attitude and practices regarding PEP. It was circulated to gastroenterologists, surgeons and physicians doing therapeutic ERCPs using social media platforms like Twitter, email and WhatsApp. The high-risk patients were defined according to criteria mentioned in Table 1. Standard hydration was defined as intravenous lactated Ringer's solution at a rate of 1.5 mL/kg/h during ERCP and the following 8 hours¹². Aggressive hydration was defined as intravenous lactated Ringer's solution ,bolus of 20 mL/kg right after ERCP and 3 mL/kg/h of lactated Ringer's solution for 8 hours¹². Participation was voluntary.

Statistical analysis

The Google forms was used for the generation of descriptive statistics. Results are expressed as mean ± standard deviation or as a percentage. A small number of surveys were only partially completed; each response was included in the analysis, and therefore percentage calculations have a variable denominator based on the total number of responses to each question.

Table 1: High Risk Patients ²

Patient-related	Young age Female gender Suspected SOD History of recurrent Pancreatitis History of post-ERCP pancreatitis Normal serum Bilirubin level
Procedure-related	Pancreatic duct injection Difficult cannulation Pancreatic sphincterotomy Precut access Balloon dilation

Operator or technique-related	Trainee (fellow) participation Non-use of a guidewire for cannulation Failure to use a pancreatic duct stent in a high-risk procedure
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RESULTS:

We circulated our survey to 600 endoscopists who practise ERCP. One hundred and twenty-eight responses were recorded with response rate 21%. Mean age of endoscopist was 40 years \pm 8 years (n=128). Demographic characteristics is given in Table 2. More than 90% [93.7 %] endoscopist (n=127) performed ERCP. Half of endoscopist (52.8 %, n=65) endoscopist performs less than 10 ERCPs per month. About 60.5% endoscopist (n=75) endoscopist are performing ERCPs less than 5 years. About 40.6% (n=52) endoscopists work in tertiary care centre while 33.6 % (n=43) work in private practice and rest 25.8 % (n=33) work in teaching hospitals. About half of the endoscopist (53.8%, n=69) work with trainees during ERCP. About 87.5% (n=112) endoscopists surveyed believed, their PEP rate is between 0-5%. About two third of endoscopists (62.7%, n=79) take maximum 5 attempts for common bile duct (CBD) cannulation before attempting pre-cut sphincterotomy. About 41.5% (n=51) endoscopist put pancreatic duct (PD) stent after more than 2 inadvertent PD cannulation. About 11.9% (n= 15) endoscopist do not believe in therapeutic benefit of prophylactic PD stenting when inadvertent cannulation occurs. About 57.6% (n= 68) endoscopists use X-ray abdomen before removing the PD stent. Half the endoscopists (52.1%, n= 62) remove PD stent withing 2 weeks. About 92.4% (n= 110) endoscopists uses 5F PD stent for prophylactic PD stenting. Three fourth endoscopists (76.5%, n= 91) use

5 cm long PD stent before prophylactic PD stenting. Straight PD stent was used by 51.3% (n=61) endoscopist. Rectal NSAIDs as PEP prophylaxis was used by about 78.9% (n= 101) endoscopist. About two third endoscopists (67.5%, n= 85) use rectal NSAID in high-risk group only. About 58.7% (n= 74) endoscopists use rectal NSAID after ERCP. Diclofenac 100 mg is the most common rectal NSAID used. If there are no contraindication to use, 96.8% (n= 91) endoscopists use rectal NSAID. About 88.3% (n= 113) endoscopists use intravenous hydration for PEP in all patients undergoing ERCP. 62.3% (n= 76) endoscopists use intravenous hydration routinely for all patients undergoing for ERCP. 90.2 % (n= 112) endoscopists use ringer's lactate for PEP. Most 67.5% (n= 83) uses standard hydration while 30.1% (n= 37) endoscopists practice aggressive hydration. 89.8 % (n= 114) endoscopists use combined therapy for PEP. Most common combination is rectal NSAID with standard hydration. If pancreatic ductal stenting done due to inadvertent cannulation, 71.8% (n= 89) endoscopists use intravenous hydration with rectal NSAID as additional mode of prophylaxis. 85.2% (n= 109) endoscopists believe, 1-5 % patients develop PEP even after using appropriate prophylactic measures. In other pharmacological methods, about 4.8 % (n=6) endoscopists use octreotide, 3.2 % (n=4) uses antibiotics, 1.6 % (n=2) use ulinastatin and 2.4% (n=3) use adrenaline spray on papilla.

Table-2: Demographic characteristics of endoscopists

Characteristics	Percentage (n=numbers)
Age (Years)	40 \pm 9
Sex	Male 90 % (n=115), Female 10% (n=13)
ERCP performed	

Yes	94 % (n=119)
No	6 % (n=8)
No of ERCPs performed every month	
0-10	52.8 % (65)
10-30	32.5 % (40)
>30	14.6 % (18)
Experience [in years] of performing ERCP	
0-5 years	60.5 % (75)
6-10 years	20.2 % (25)
11 or more years	19.4 % (24)
Clinical setting of practice	
Tertiary care centre	40.6 % (52)
Private practice	33.6 % (43)
Teaching hospital	25.8% (33)
Trainees' involvement	
Yes	54.3 % (69)
No	45.7 % (58)
Percentage of ERCPs involving fellows	
0-25 %	51.2 % (43)
26-50 %	15.5 % (13)
51- 75 %	14.3 % (12)

76-100 %	19 % (16)
The incidence of PEP	
0-5 %	87.5 % (112)
6-10 %	12.5 % (16)
11 or more %	0

Table -3: Pancreatic stent practice

Characteristics	Percentage (n=numbers)
Number of inadvertent PD cannulations, after which the pancreatic stent placed	
1	10.3 % (13)
2	37.3 % (47)
>2	40.5 % (51)
I do not use	11.9 % (15)
Investigation done before removing the PD stent	
X-ray abdomen	57.6 % (68)
Ultrasound abdomen	4.2 % (5)
Directly remove with duodenoscope	38.1 % (45)
Timing of PD stent removal	
2 weeks	52.1 % (62)
4 weeks	16 % (19)
At time of removal of CBD stent	28.6 % (34)

Never	3.4% (4)
Size of the pancreatic stent used	
3Fr	92.4 % (110)
5 Fr	5% (6)
7 Fr	1.7 % (2)
4 Fr	0.8 % (1)
Length of the pancreatic stent used	
3 cm	10.9 % (13)
5 cm	76.5 % (91)
7 cm	11.8 % (14)
11 cm	0.8 % (1)
Type of pancreatic stent used	
Straight	51.3 % (61)
Single pigtail	48.7 % (58)

Table-4: Pharmacological management

Characteristics	Percentage (n=numbers)
Preference of Non-endoscopic method of post ERCP pancreatitis prophylaxis	
Aggressive hydration	13.3 % (17)
Standard hydration	7.8 % (10)
Rectal NSAIDs	78.9 % (101)

Populations of patients for which rectal NSAIDs used	
High risk patients	32.5 % (41)
All patients	67.5 % (85)
Timing of insertion of rectal NSAID	
Before ERCP	58.7% (74)
After ERCP	40.5 % (51)
Do not use rectal NSAID	0.8 % (1)
Rectal NSAID and dose	
Indomethacin 50 mg	9.4 % (12)
Indomethacin 100 mg	30.5 % (39)
Diclofenac 50 mg	17.2 % (22)
Diclofenac 100 mg	41.4 % (53)
Do not use rectal NSAID	1.6 % (2)
Intravenous hydration for post ERCP pancreatitis prophylaxis	
Yes	88.3 % (113)
No	11.7 % (15)
Setting, in which intravenous hydration used for PEP prophylaxis	
High risk	62.3 % (76)

All	36.9 % (45)
Fluid used for post ERCP pancreatitis prophylaxis	
Ringer's lactate	90.2 % (111)
Normal saline	9.8 % (12)
Amount of fluid used per 24 hour	
Aggressive hydration	30.1 % (37)
Standard hydration	67.5 % (83)
Only 1 L of RL	0.8 % (1L)
Only 500 ml of RL	0.8 % (1L)
Amount not clearly defined	0.8 % (1L)
Combination therapy for post ERCP Pancreatitis	
Yes	89.8 % (114)
No	10.2 % (13)
Most common combination	
Rectal NSAID+ Standard hydration	63.8 % (74)
Rectal NSAID+ Aggressive hydration	36.2 % (42)
Post ERCP Pancreatitis rate	
None	10.2 % (13)
1-5 %	85.2 % (109)

6-10%	3.9 % (5)
>10 %	0.8 % (1)

DISCUSSION:

This is first survey to date regarding hydration practices for prevention of PEP. We conducted our survey in era of social media. Our response rate was about 20 % (123/600). In study by Domonceu et al, completed surveys were collected from 149 (31.9%) of 467 medical doctors attending the course¹³. 222 of the 373 endoscopists completed the survey (59.5%) in UK survey¹⁴. In study by Lopez et al, completed surveys were collected from 28 of them (response rate 87.5%)¹⁵. In USA survey, questionnaires were distributed to 233 endoscopists, and 62 were completed (26.7% response rate)⁹. In our survey, though percentage wise response rate was low, absolute was highest. Our response rate could have been higher if we had done after national/ international conference along with social media channel. The American Society for Gastrointestinal Endoscopy (ASGE) and the European Society for Gastrointestinal Endoscopy (ESGE) guidelines both recommends hydration for prevention of PEP^{10 11}. ESGE guidelines recommends aggressive hydration only if rectal NSAIDs contraindicated and no pancreatic stent deployed. But as per recently conducted FLUYT trial, aggressive periprocedural hydration did not reduce the incidence of post-ERCP pancreatitis in patients with moderate to high risk of developing this complication who routinely received prophylactic rectal NSAIDs. Therefore, the burden of laborious and time-consuming aggressive periprocedural hydration to further reduce the risk of post-ERCP pancreatitis is not justified¹². To best of our knowledge, this is probably first survey to include hydration practices in PEP prevention. In our survey, 88% used some form of hydration. Most (67%) uses standard hydration while 30 % endoscopists practice aggressive hydration. Recent ESGE guidelines suggest routine administration of rectal NSAID before procedure in all patients undergoing ERCP¹¹. In study by Hanna et al, done in UK in 2013, rectal NSAID was used only in 34%¹⁴. In study by Avila et al done in USA in 2019, Rectal NSAID being used in 41% in average risk patients⁹. While in our study, it is being used in 68%. This change reflects growing awareness and implementation of ESGE guidelines. Indomethacin 100 mg was reported as the NSAID of choice in study by Avila et al⁹. No respondents reported using diclofenac. While in our survey, Diclofenac is the most

commonly use NSAID. Avila et al had noted the major reason cited for not routinely using pancreatic stents was concern about increased risk of PEP with failed pancreatic duct insertion⁹. In our survey, most common reason for not using pancreatic stents (10.6%) was not convinced of its protective benefits. Limitation of our study is response rate is low. It can be potentially plagued by responder bias and recall bias. What this study adds to our knowledge is most of advanced endoscopist prefers to follow most recent guidelines.

CONCLUSION:

Rectal NSAID is most preferred method for PEP prophylaxis. Rectal NSAID with standard hydration is more commonly used. Most endoscopist prefer to use pancreatic stent in high-risk situation.

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Supplementary Material

Table 5: Questionnaire list

1	Your age
2	Sex • Male • Female
3	Do you perform ERCP? • Yes • No

4	<p>If yes, how many ERCPs do you perform every month?</p> <ul style="list-style-type: none"> • 0-10 • 10-30 • >30
5	<p>What is your experience [in years] of performing ERCPs?</p> <ul style="list-style-type: none"> • 0-5 years • 6-10 years • 11 or more years
6	<p>Of the following, select the choice that best describes the clinical setting of your practice.</p> <ul style="list-style-type: none"> • Tertiary referral center • Private practice • Teaching hospital
7	<p>Do you work with gastroenterology trainees?</p> <ul style="list-style-type: none"> • Yes • No
8	<p>If you work with gastroenterology trainees, what percentage of ERCPs you perform involve fellows?</p> <ul style="list-style-type: none"> • 0-25% • 26-50 % • 51-75 % • 76-100 %
9	<p>What is the incidence of post ERCP pancreatitis in your practice?</p> <ul style="list-style-type: none"> • 0-5% • 6-10% • More than 11%

10	<p>What is the number of attempts, you would take at CBD cannulation before attempting precut sphincterotomy?</p> <ul style="list-style-type: none"> • 1-5 • >5 • Direct Precut Sphincterotomy
11	<p>What is the number of inadvertent PD cannulations, after which you would place the pancreatic stent?</p> <ul style="list-style-type: none"> • 1 • 2 • >2 • I don't use PD stent
12	<p>If you do not place the pancreatic duct stent, then please state the reason/s that influence your decision - select all the options that apply</p> <ul style="list-style-type: none"> • Insufficient experience about placing the pancreatic duct stents • There is concern about the increased risk of post-ERCP pancreatitis with failed pancreatic ductal stenting • Not convinced of its protective benefits • Difficulties in following-up of patients to plan removal of PD stent • Equipment not available • Equipment is expensive • Do not believe that stents provide additional benefit beyond pharmacologic prophylaxis • I use Pancreatic ductal stent
13	<p>Before removing the PD stent, what do you do ?</p> <ul style="list-style-type: none"> • Xray ABD • Ultrasound Abdomen

	<ul style="list-style-type: none"> • Directly put in the duodenoscope to remove it
14	<p>After placing the pancreatic stent, when do you remove the stent?</p> <ul style="list-style-type: none"> • 2 weeks • 4 weeks • At the time of removal of the CBD stent if needed • Never
15	<p>What size of the pancreatic stent do you use?</p> <ul style="list-style-type: none"> • 3 F • 5 F • 7 F • Others
16	<p>What length of the pancreatic stent, do you commonly use?</p> <ul style="list-style-type: none"> • 3 cm • 5 cm • 7 cm • Others
17	<p>Of the following, select the choice that best describes the clinical setting of your practice.</p> <ul style="list-style-type: none"> • Single pigtail • Straight
18	<p>Which is the non-endoscopic method of post ERCP pancreatitis prophylaxis do you prefer?</p> <ul style="list-style-type: none"> • Aggressive Hydration • Standard Hydration • Rectal NSAIDs
19	<p>For which populations of patients, do you use rectal NSAIDs?</p>

	<ul style="list-style-type: none"> • High-risk patients • All patients
20	<p>What is the timing of insertion of rectal NSAID?</p> <ul style="list-style-type: none"> • Before ERCP • After ERCP • I don't use rectal NSAIDs
21	<p>If you use rectal NSAIDs, which rectal NSAID do you use and at what dose ?</p> <ul style="list-style-type: none"> • Indomethacin 50 mg • Indomethacin 100 mg • Diclofenac 50 mg • Diclofenac 100 mg • I don't use rectal NSAIDs
22	<p>If there is no contraindication to rectal NSAIDs and still you do you not use rectal NSAIDs, please state the reason or reason/s that influence your decision - select all the options that apply</p> <ul style="list-style-type: none"> • Insufficient experience using rectal NSAIDs • There is concern about increased risk of bleeding or other complications • Not convinced of its protective benefits • Rectal NSAIDs not easily available • Expense of medication • Do not believe that rectal NSAIDs provide additional benefit beyond prophylactic • Pancreatic duct stenting • I use rectal NSAIDs
23	<p>Do you use intravenous hydration for post ERCP pancreatitis prophylaxis?</p> <ul style="list-style-type: none"> • Yes • No

24	<p>In which setting, do you use intravenous hydration for post ERCP pancreatitis prophylaxis?</p> <ul style="list-style-type: none"> • High risk patients • All patients
25	<p>Which kind of fluid, do you use for post ERCP pancreatitis prophylaxis?</p> <ul style="list-style-type: none"> • Normal saline • Ringer lactate • Dextrose normal saline
26	<p>What is amount of fluid used per 24 hour?</p> <ul style="list-style-type: none"> • Aggressive hydration • Standard hydration
27	<p>Do you use combination therapy for post ERCP Pancreatitis?</p> <ul style="list-style-type: none"> • Yes • No
28	<p>If yes, what is most common combination?</p> <ul style="list-style-type: none"> • Rectal NSAID+ Standard Hydration • Rectal NSAID+ Aggressive hydration
29	<p>If pancreatic ductal stenting done due to inadvertent cannulation, then do you use additional modes of post ERCP pancreatitis prophylaxis?</p> <ul style="list-style-type: none"> • None • Only Rectal NSAIDs • Only IV hydration – standard • Only IV hydration – aggressive • IV hydration + Rectal NSAIDs
30	<p>Do you use any other pharmacologic methods for post-ERCP pancreatitis prophylaxis?</p>

	<ul style="list-style-type: none"> • Octreotide • Antibiotics • Sublingual glycerile nitrate • Ulinastatin • Adrenaline spray on papilla • None
31	<p>In your experience, what is the approximate number of patients developing post ERCP pancreatitis after use of any prophylactic measure?</p> <ul style="list-style-type: none"> • None • 0-5 % • 5-10% • >10%