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Papillary Morphology and periampullary diverticulum as a Predictor of difficult biliary Cannulation and Post-ERCP Adverse Outcomes

Mithu Bhowmick, Roshan Agarwala, Mukesh Agarwala, Kamal Chetri, Arvind Kelkar, Tanvee Yusuf, Swapnalika Bhuyan, Swarup Kar, Bijay Agarwala, Satakshi Purkayastha, Arjun
Institutions (All)-Apollo Hospitals, Guwahati, India

Apollo HOSPITALS GUWAHATI

Introduction

Papillary morphology and periampullary diverticulum(PAD) are increasingly recognized as important anatomical factors influencing the technical success and safety of Endoscopic Retrograde Cholangiopancreatography (ERCP).

Aim

To evaluate the association between papillary morphology and PAD with biliary cannulation success and the incidence of post-ERCP adverse outcomes.

Methods

- Retrospectively analysed ERCP data of consecutive patients who underwent ERCP for biliary pathologies between October 2022 to October 2025 at the ERCP unit of Apollo Hospitals Guwahati, in Northeastern India.
- Papillary morphological types were classified as type 1(regular), type 2 (small flat), type 3 (protruding or pendulous) or type 4 (creased or ridged).[1]
- PAD was classified as type 1(with the papilla located inside PAD), type II (papilla at the margin of PAD) and type III (papilla outside the PAD).
- Difficult biliary cannulation and post ERCP pancreatitis (PEP) was defined as per the European Society of Gastrointestinal Endoscopy (ESGE) Guideline.[2]
- In the settings of difficult cannulation, rescue cannulation techniques were used such as needle knife papillotomy (NKP), needle knife fistulotomy (NKF) or transpancreatic sphincterotomy(TPS) for achieving biliary access.
- We performed multivariate regression analysis to identify risk factors for difficult biliary cannulation and PEP.

Results

- 708 patients were included, mean age was 51.74 ±16.35 years, 56%(397) were males.
- 39.2%(40) patients with PAD had difficult biliary cannulation,.
- Post procedure complications were noted in 8.1% (57) patients, 7.06% (50) had PEP, post sphincterotomy bleed in 0.71%(5) and duodenal perforation in 0.29%(2) patients.

Results (Continued)

- Multivariate regression model identified difficult biliary cannulation{Adjusted odds ratio(AOR) 2.29; 95% CI 1.22–4.30}as independent risk factor of PEP, other factors including papillary morphology, PAD and indication related factors had no contribution. For difficult biliary cannulation, both type 2 papilla (AOR 3.96; 95% CI 2.16–7.25) and type 3 papilla (AOR 4.02; 95% CI 2.70–5.99) were associated while ERCP indication and presence of PAD were not.

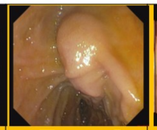
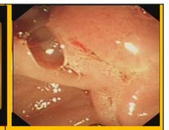
Types of papilla	 Type 1	 Type 2	 Type 3	 Type 4
Prevalence	71.3%(504)	7.1%(50)	20.3%(144)	1.4%(10)
Difficult biliary cannulation	26.4%(133)	60%(30)	61.8%(89)	10%(1)
Rescue techniques successful	91%	90%	87.6%	100%
PEP	7.5%(38/504)	6%(3/50)	5.5%(8/144)	10%(1/10)

Table 1- Papillary morphology types and associated difficulty

Conclusion

Type 2 and 3 papillary morphologies were an independent predictor of difficult biliary cannulation and difficult cannulation independently predicted post-ERCP pancreatitis. In contrast, the presence of a periampullary diverticulum did not confer an increased risk of cannulation difficulty, procedural failure, or adverse outcomes.

References

1. Haraldsson E, Kylänpää L, Grönroos J, et al. Macroscopic appearance of the major duodenal papilla influences bile duct cannulation: a prospective multicenter study by the Scandinavian Association for Digestive Endoscopy Study Group for ERCP. Gastrointest Endosc. 2019 Dec;90(6):957-963.

2. Testoni PA, Mariani A, Aabakken L, et al. Papillary cannulation and sphincterotomy techniques at ERCP: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. Endoscopy. 2016 Jul;48(7):657-83

Variables	Values
Indications	
1. Choledocholithiasis	79.4%(562)
2. Malignancy	14.8%(105)
3. Common bile duct stricture(benign)	4.6%(33)
4. Others (Bile leak, worms)	1.1%(8)
Periampullary diverticulum(PAD)	14.41%(102)
1. Type I	8.8%(9)
2. Type II	60.78%(62)
3. Type III	30.3%(31)
Biliary cannulation	
1. Easy biliary cannulation	64.27%(455)
2. Difficult biliary cannulation	34.6% (244)
3. Could not be cannulated	1.27%(9)
Difficult biliary cannulation	
1. >5 minutes	65.2%(165)
2. >1 PD cannulation	29.25%(74)
3. >5 contacts with papilla	5.9%(15)
Rescue techniques used in difficult cannulation	98.4%(249/253)
1. NKP	81.8%(207)
2. NKF	13.8%(35)
3. TPS	2.7%(7)
Success in biliary cannulation	
• **Rescue techniques successful**	91.1%(227/249)
• **Overall success in biliary cannulation**	96.3%(682/708)
Difficult biliary cannulation having pancreatitis	9.88%(25/253)

Table 2- Characteristics of patients who underwent ERCP

Contact information

Dr Mithu Bhowmick, MD, DM
Consultant gastroenterologist
Apollo Hospitals, Guwahati, India
Email- bhowmickmithu@gmail.com

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Department of Gastroenterology,
Apollo Hospitals, Guwahati, India