

The Contribution of the Endoscopic Ultrasound (EUS) in Ampullary Tumors

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ABSTRACT

INTRODUCTION: The ampullary region is the region of the small intestine that presents the highest frequency of neoplastic transformation and malignancy. Endoscopic ultrasound is nowadays the best tool to examine the papilla and to perform the assessment of locoregional extension of ampullary and peri-ampullary tumors. It also makes it possible to establish the TNM classification with greater sensitivity than other imaging techniques. The aim of this work is to describe the interest of echo endoscopy in ampullary tumors.

METHODS DATA: A 15-month retrospective study (August 2019-November 2020) during which 10 patients were enrolled. We evaluated papilla appearance, tumor parietal staging, associated lesions and the histological results.

RESULTS: From August 2019 to November 2020, 10 patients with ampullary tumors were defined. 60% of an enlarged tumor papilla ($n = 6$), 20% an hypoechoic and homogenous thickening of the papilla, without invasion of the duodenal wall ($n = 2$), papilla was normal in 20% ($n = 2$). 3 patients (30%) had a dilated CBD (common bile duct) with a choledocolithiasis, 5 (50%) patients had a gallbladder stones. However, EUS revealed an isolated gallstone impaction at the ampulla of Vater in 2 patient (20%) without tumor. 8 patients (80%) underwent a 19G or 22G fine needle aspiration (FNA): Histopathological examination revealed 3 (37%) adenoma with low grade dysplasia, 3 (37%) invasive carcinoma and 2 papillitis (25%). By EUS, 3 (50%) ampullary lesions were staged as uT2, 2 (33%) as T1sm, and 1 (16%) as T3.

Conclusion: EUS-FNA for ampulla of Vater may be safely and accurately performed, and should be considered as a diagnostic modality before EST (endoscopic sphincterotomy). Exclusion of benign findings like choledocholithiasis or chronic pancreatitis is also important.

Key words: Ampulla of Vater; Endoscopic ultrasound; Fine needle aspiration; Staging

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INTRODUCTION

Tumors of the ampulla of Vater are uncommon. Ampullary tumors are a subset of periampullary lesions, which additionally comprise of distal cholangiocarcinoma, duodenal tumors and pancreatic head tumors. An ampullary lesion is identified by distinct invasion of the ampulla of Vater with distortion of the anatomy, based on the endoscopic appearance. They may be either malignant or benign lesions. Malignant tumors tend to be adenocarcinomas. Males are affected by this disease more often than females, in the ratio of 2: 1^[1,2].

Ampullary tumors may present with signs and symptoms of obstructive jaundice or pancreatitis. They may be incidentally found during routine upper gastrointestinal (GI) endoscopy in an asymptomatic patient as well. Ampullary tumors carry a good prognosis when they are localized. Transduodenal ampullectomy can be performed for an early T1 staged tumor^{3,4}.

Ampullary neoplasms that are localized to the ampulla, without submucosal or ductal invasion and are small, are amenable to endoscopic resection^{1,2,5,6}. This is because lymphatic involvement, lymph node metastasis and vascular invasion are absent in patients when the disease is limited to the duodenal mucosa⁷. Tumors which are unresectable endoscopically, such as those seen to have intraductal extension or invasion of the muscularis propria and beyond, can be treated by surgery. Hence, accurate staging is crucial to determine the type of resection and the resectability of the tumor.

Endoscopic ultrasound (EUS) provides relevant information when an ampullary or periampullary tumor is suspected. Early detection, T and N staging and Fine Needle Aspiration plus cytological confirmation, are some of the expected benefits. Exclusion of benign findings like choledocholithiasis or chronic pancreatitis is also important.

Radial and lineal EUS images are uniquely detailed and, at the moment, it seems to be the best way to exclude or confirm malignant or benign findings.

The aim of this study was to evaluate the contribution of the EUS in the ampullary tumors and to compare the performance characteristics of EUS in the local and regional staging of these tumors with the gold standard, HP staging.

MATERIELS AND METHODS

This is a retrospective study which 10 patients were included. These patients were identified from our EUS records.

The study period extended from August 2019 to november 2020 and during this period, Diagnosis was performed using linear and/or radial EUS after having undergone an upper GI endoscopy or with papillary biopsies and/or with the use of 19G or 22G fine needle aspiration (FNA).

The decision to use either the radial or curvi linear array EUS was made by the performing doctor.

We evaluated the appearance of the papilla, tumour parietal staging, associated lesions we founded, and the histological results.

EUS and histopathological staging

EUS staging was estimated as follows: uT1 = tumor without invasion of the muscularis propria (MP) of the duodenum; uT2 = invasion of the MP without invasion of the pancreas; uT3 = invasion of pancreas; uN- = no suspicious lymph nodes; uN+ suspicious lymph nodes. Finally, intraductal pancreatic and/or common bile duct (CBD) growths were estimated. Only uT1N- tumors without intraductal growth were included. Intraductal ultrasonography (IDUS) was optional. IDUS staging was considered as follows: uTm = tumor without invasion of the duodenal submucosae; uTsm = tumor with invasion of the duodenal submucosae.

RESULTS

Patient characteristics

The mean age of our patients was 59 (±10) years with 6 male (60%) and 4 female (40%).

The clinical signs was dominated by obstructive jaundice in 6 patients (60%), anicteric cholestasis in 3 patients (30%), 1 patient had

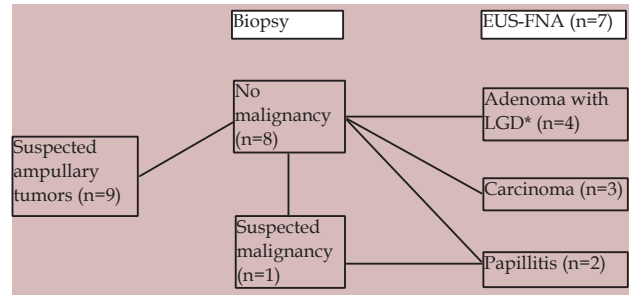


Figure 1 Shows results of diagnosis by biopsy and/or endoscopic ultrasound-guided fine needle aspiration following identification of suspected ampullary tumors. * Low grade Dysplasia.

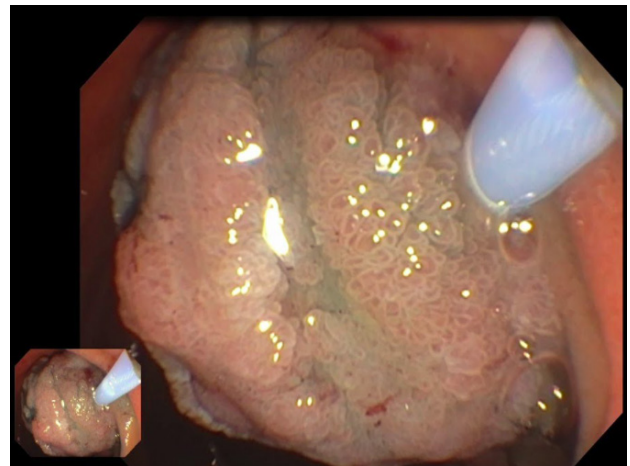


Figure 2 Geant ampullary adenoma endoscopic ampullectomy.



Figure 3 Ampullary tumor staged as uT2.

an acute pancreatitis (10%).

The EUS indications were suspicion of ampulloma on MRCP in 6 patients (60%), discovery of ampullary tumor of uncertain diagnosis while performing duodenoscopy before the ERCP in 3 patients (30%), and during staging of a certain ampullary tumour in 1 patient (10%).

EUS revealed 6 enlarged tumor papilla (60%), 2 hypoechoic and homogenous thickening of the papilla (20%) without invasion of the duodenal wall (n = 2), 2 papilla was normal (20%).

3 patients (30%) had a dilated CBD (common bile duct) with a choledocholithiasis, 5(50%) patients had a gallbladder stones. However, EUS revealed a gallstone impaction at the ampulla of Vater in 2 patient (20%) without any ampullary tumors.

8 patients (80%) underwent a 19G or 22G fine needle aspiration

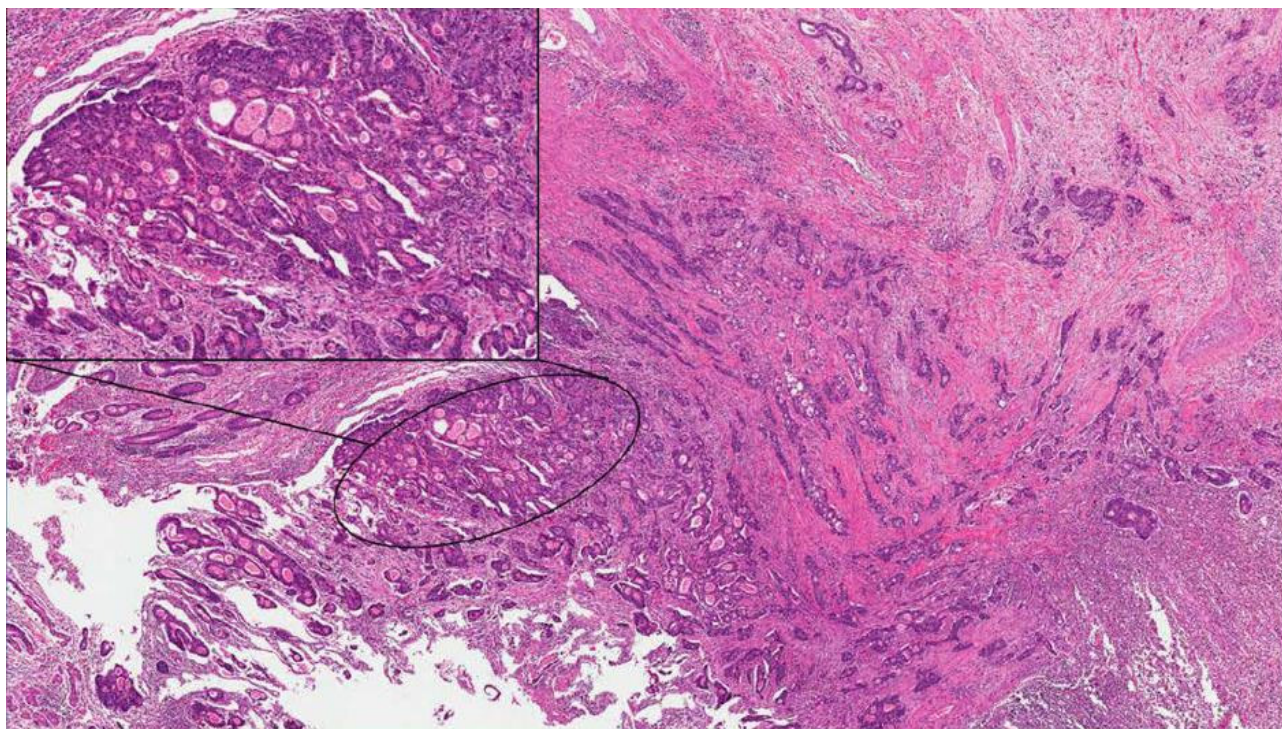


Figure 4 The anatomopathologic examination of EUS-FNA showing ampullary carcinoma.

(FNA): Histopathological examination revealed 3(37%) adenoma with low grade dysplasia, 3(37%) invasive carcinoma and 2 papillitis (25%).

By EUS, 3(50%) ampullary lesions were staged as uT2, 2(33%) as T1sm, and 1 (16%) as T3.

Results of diagnosis by biopsy and EUS-FNA (Figure 1)

Based on surface biopsy, only 1 patient was suspected to have malignancy; however, EUS-FNA found no malignancy in this patient, and the final diagnosis was papillitis. Among the remaining 8 patients diagnosed with no malignancies based on surface biopsy, 4 patients were diagnosed with adenoma with LGD by EUS-FNA. The remaining 3 patients, in whom malignancies could not be diagnosed based on surface biopsy, were finally diagnosed with adenocarcinoma by EUS-FNA followed by surgical resection (Figure 1).

Surface biopsies led to a false-positive result for 1 patient and false-negative results for 7 patients. On the other hand, results of EUS-FNA showed no false-positives or false negatives.

No complications were associated with EUS-FNA and intraampullary biopsy.

DISCUSSION

Ampullary tumors are unique from other periampullary tumors, such as distal cholangiocarcinoma and head of pancreatic cancers, because they may be endoscopically resectable. Hence, accurate staging of tumor and nodal status are vital in determining if patients are suitable for ampullectomy.

Early research indicated that T1 lesions and/or lesions extending beyond the mucosa require surgical intervention^[8].

More recent data have shown EA (endoscopic ampullectomy) to be an appropriate intervention when there is no infiltration further than 4 mm, or if the mass was less than 2.5 cm^[9,10]. Furthermore, the negative predictive value of EUS for muscularis invasion has

been shown to be 90%^[11]. EUS accurately identifies local staging of ampullary lesions and has been accepted as the best modality for evaluating ampullary lesions^[12]. However, EUS is unable to search for distant metastasis and distant lymph nodes due to the limited extent of examination^[13].

Thus, EUS is an effective tool in identifying ampullary lesions amenable to endoscopic intervention by virtue of its high sensitivity in identifying cases needing surgery.

Our study clarifies the benefits for patients who could not be diagnosed by endoscopic biopsy, and revealed the benefits of EUS-FNA for such lesions.

In the present study, adequate tissue samples were obtained by EUS-FNA for 8 patients with intraampullary lesions of the papilla of Vater. Furthermore, no complications were observed.

However, it has the possibility that carcinoma could be missed by both techniques. Although the gold standard treatment may be surgery, it is also an undeniable fact that this procedure is greatly invasive for patients. Therefore, if results of EUS-FNA or ampullary biopsy were not malignant, it may be an option to carefully perform clinical follow-up with repeated EUS-FNA and intraampullary biopsy.

Several limitations must be considered when the results of this investigation are interpreted. First, since the intraampullary carcinoma is a relatively rare tumor, the study included a small number of cases. Second, the design was retrospective with information only from a single tertiary center. A large-scale study is thus needed to confirm the clinical impact of EUS-FNA for lesions of the ampulla of Vater, particularly in terms of intra-ampullary lesions.

EUS in benign pathology

EUS provides endoscopic information, with the visualization of the papilla and its surroundings, and the eventual performance of a biopsy with forceps. A half-open pore can be indicative of the migration of a stone. The intradiverticular location of a papilla can be the only cause that explains a bile duct dilatation. The presence of lithiasis will guide

the procedure to ward a therapeutic ERCP. It is a simple diagnosis for EUS with a better outcome than MRI when the bile duct is not dilated, when the stones are smaller than 3 mm, or when the stones are impacted^[4]. We should bear in mind the association of lithiasis in obstructed bile ducts, which can be as high as 25%. EUS is of great value in differential diagnosis with other benign pathologies in addition to lithiasis, such as chronic pancreatitis, the presence of a periampullary diverticulum, choledochoceles or pancreas divisum. In our study, EUS revealed a gallstone impaction at the ampulla of Vater in 2 patients (20%) without any tumor.

CONCLUSION

Echo-endoscopy (EE) is the most effective examination for suggesting an ampullary tumour when endoscopy proves wrong. It's the best tool to examine the papilla and to perform the assessment of locoregional extension of ampullary and peri-ampullary tumors.

However, the limits are noticeable: an abnormality of the ampulla of Vater is not specific to a tumour and also, a Gall stone impaction of the common bile duct at the ampulla of Vater is not uncommon and can be confused with an ampullary tumour.

REFERENCES

- Norton ID, Gostout CJ, Baron TH, Geller A, Petersen BT, Wiersma MJ. Safety and outcome of endoscopic snare excision of the major duodenal papilla. *Gastrointest Endosc.* 2002; **56**: 239-43. [PMID: 12145603]; [DOI: 10.1016/S0016-5107(02)70184-3]
- Marc F Catalano I, Jeffrey D Linder, Amitabh Chak, Michael V Sivak Jr, Isaac Rajjman, Joseph E Geenen, Douglas A Howell. Endoscopic management of adenoma of the major duodenal papilla. *Gastrointest Endosc.* 2004; **59**: 225-32. [PMID: 14745396]; [DOI: 10.1016/S0016-5107(03)02366-6]
- Paramythiotis D, Kleeff J, Wirtz M, Friess H, Büchler MW. Still any role for transduodenal local excision in tumors of the papilla of Vater? *J Hepatobiliary Pancreat Surg.* 2004; **11**: 239-44. [DOI: 10.1007/S00534-004-0896-5]
- Tio TL, Mulder CJ, Eggink WF. Endosonography in staging early carcinoma of the ampulla of Vater. *Gastroenterology.* 1992; **102**: 1392-5. [PMID: 1551545]
- Jung S, Kim MH, Seo DW, Lee SK. Endoscopic snare papillectomy of adenocarcinoma of the major duodenal papilla. *Gastrointest Endosc.* 2001; **54**: 622. [PMID: 11677480]; [DOI: 10.1067/Mge.2001.117765]
- Binmoeller KF, Boaventura S, Ramsperger K, Soehendra N. Endoscopic snare excision of benign adenomas of the papilla of Vater. *Gastrointest Endosc.* 1993; **39**: 127-31. [PMID: 8495831]; [DOI: 10.1016/S0016-5107(93)70051-6]
- Ito K, Fujita N, Noda Y. Modes of spread in early ampullary cancer in terms of establishing proper indications for endoscopic papillectomy. *Dig Endosc.* 2004; **16**: 224-8. [DOI: 10.1111/j.1443-1661.2004.00353.x]
- Sun-Young Lee I, Kee-Taek Jang, Kyu Taek Lee, Jong Kyun Lee, Seong Ho Choi, Jin Seok Heo, Seung Woon Paik, Jong Chul Rhee. Can endoscopic resection be applied for early stage ampulla of Vater cancer? *Gastrointest Endosc.* 2006; **63**: 783-8. [PMID: 16650538]; [DOI: 10.1016/J.Gie.2005.09.015]
- G Petrone, R Ricci, P Familiari, F Inzani, M Matsuoka, M Mutignani, G Delle Fave, G Costamagna, G Rindi. Endoscopic snare papillectomy: A possible radical treatment for a subgroup of T1 ampullary adenocarcinomas. *Endoscopy* 2013; **45**: 401-4. [PMID: 23616129]; [DOI: 10.1055/S-0032-1326213]
- Roshan Patel I, Jonathan Davitte, Shyam Varadarajulu, C Mel Wilcox. Endoscopic resection of ampullary adenomas: Complications and outcomes. *Dig Dis Sci* 2011; **56**: 3235-40. [PMID: 21761167]; [DOI: 10.1007/S10620-011-1826-4]
- Lilian C Azih, Brett L Broussard, Milind A Phadnis, Martin J Heslin, Mohamad A Eloubeidi, Shayam Varadarajulu, and Juan Pablo Arnoletti. Endoscopic ultrasound evaluation in the surgical treatment of duodenal and peri-ampullary adenomas. *World J Gastroenterol* 2013; **19**: 511-5. [DOI: 10.3748/Wjg.V19.I4.511]; [PMCID: PMC3558574]; [PMID: 23382629]
- Wiriyaoporn Ridditid, Suzette E Schmidt, Mohammad A Al-Haddad, Julia LeBlanc, John M DeWitt, Lee McHenry, Evan L Fogel, James L Watkins, Glen A Lehman, Stuart Sherman, Gregory A Coté. Performance characteristics of EUS for locoregional evaluation of ampullary lesions. *Gastrointest Endosc* 2015; **81**: 380-8. [PMID: 25293823]; [PMCID: PMC4322681]; [DOI: 10.1016/J.Gie.2014.08.005]
- Mitake M, Nakazawa S, Tsukamoto Y, Naitoh Y, Kimoto E, Hayashi Y. Endoscopic ultrasonography in the diagnosis of depth invasion and lymph node metastasis of carcinoma of the papilla of Vater. *J Ultrasound Med.* 1990; **9**: 645-50. [DOI: 10.7863/Jum.1990.9.11.645]
- Kondo S, Isayama H, Akahane M, Toda N, Sasahira N, Nakai Y, Yamamoto N, Hirano K, Komatsu Y, Tada M, Yoshida H, Kawabe T, Ohtomo K, Omata M. Detection of common bile duct stones: comparison between endoscopic ultrasonography, magnetic resonance cholangiography, and helical-computed-tomographic cholangiography. *Eur J Radiol* 2005; **54**: 271-275. [PMID: 15837409]; [DOI: 10.1016/J.Ejrad.2004.07.007]