SAS Journal of Medicine
Abbreviated Key Title: SAS J Med
ISSN 2454-5112
Journal homepage: https://saspublishers.com

OPEN ACCESS

Hepato-Gastro-Enterology

Endoscopic Ultrasound in the Management of Intraductal Papillary and Mucinous Pancreatic Tumors: What is the Specificity?

Z. Tammouch[1*], A. Mouffak[1], M. Salihoun[1], F. Bouhamou[1], I. Serraj[1], M. Acharki[1], N. Kabbaj[1]

[1]Hepato-Gastro-Enterology Department "EFD-HGE", Ibn Sina University Hospital, Mohamed V University, Rabat, Morocco

DOI: https://doi.org/10.36347/sasjm.2024.v10i08.009 | **Received:** 03.07.2024 | **Accepted:** 08.08.2024 | **Published:** 12.08.2024

***Corresponding author:** Z. Tammouch
Hepato-Gastro-Enterology Department "EFD-HGE", Ibn Sina University Hospital, Mohamed V University, Rabat, Morocco

Abstract **Original Research Article**

***Background*:** Pancreatic cysts, often symptomless, are more frequently detected with advanced imaging. Intraductal papillary mucinous neoplasms (IPMN) are the most common type, categorized into main-duct (MD-IPMN), branch-duct (BD-IPMN), and mixed forms, each with different risks of malignancy. Endoscopic ultrasound (EUS) aids precise diagnosis through detailed imaging and cyst fluid analysis, guiding personalized treatment and monitoring based on the patient's risk of malignancy. ***Method*:** This study was conducted at the EFD-HGE Unit of Ibn Sina Hospital in Rabat, from September 2015 to May 2024, were included all patients diagnosed with intraductal papillary mucinous neoplasms (IPMN) on imaging (MRI or CT scan). Epidemiological, clinical, biological and endoscopic ultrasound data were collected from EUS registries. ***Results*:** Out of 696 biliopancreatic EUS conducted, 44 patients were selected, representing a prevalence of 6.32%. The average age was 60.2 years (range 29-82 years), with a notable female predominance (M: 16, F: 28) (Sex Ratio = 0.57). The circumstances of discovery were incidental in 18 cases (40.9%), epigastric pain in 14 cases (31.8%), acute pancreatitis in 5 cases (11.4%), jaundice in 3 cases (6.8%), and abdominal pain in 4 cases (9.1%).biologically, cholestasis was observed in 10 cases (22.7%), elevated cytolytic enzymes in 5 cases (11.3%), and elevated Ca19-9 in 4 cases (9.1%).Endoscopic ultrasound provided details on tumor location, number, and size: predominantly in the pancreatic head in 21 cases (47.7%), body in 12 cases (27.2%), tail in 7 cases (15.9%), and multifocal in 4 cases (9.1%), with an average tumor size of 22.5 mm (range 19-57 mm). In 84.1% of cases (n = 37), there was communication solely with the main pancreatic duct (MPD), while in 15.9% (n = 7), there was communication with both the main pancreatic duct and secondary ducts, with Wirsung duct dilation in 15 cases (34%). Fine needle biopsy was performed in 23 cases (52%). Histopathological examination confirmed IPMN (Intraductal Papillary Mucinous Neoplasm) of the pancreas in 22 cases, while one case revealed a degenerated IPMN favoring pancreatic adenocarcinoma. ***Conclusion*:** Our study highlights the crucial importance of EUS in the diagnosis of intraductal papillary mucinous neoplasms (IPMN) of the pancreas. EUS has proven instrumental in delineating the tumor characteristics, including its location, size, and communication with pancreatic ducts. Additionally, it facilitated cytology sampling in 52% of cases, revealing adenocarcinoma in 2.27% of cases, underscoring its significant role in the diagnostic management of this complex pathology.

Keywords: Intraductal papillary mucinous neoplasms, Endoscopic Ultrasound.

INTRODUCTION

Pancreatic cystic lesions, frequently asymptomatic, are increasingly detected due to advancements in pancreatic imaging and improved understanding of their characteristics. Intraductal papillary mucinous neoplasms (IPMN) are the most common among these lesions, are considered premalignant and can be classified into main-duct IPMN (MD-IPMN), branch-duct IPMN (BD-IPMN), and mixed types, each carrying varying risks of dysplastic progression. Endoscopic ultrasound (EUS) provides detailed imaging for enhanced diagnostic accuracy and facilitates cyst fluid aspiration for thorough analysis. These assessments aid in determining appropriate treatment and follow-up strategies based on the patient's risk of malignancy and symptoms.

AIM

The objectives of our study are to evaluate the epidemiological and morphological characteristics of intraductal papillary mucinous neoplasms (IPMN); and

secondly, to assess the diagnostic yield of endoscopic ultrasound in their management.

MATERIALS AND METHODS

This is a single-center study conducted at the EFD-HGE unit of Ibn Sina Hospital in Rabat, from September 2015 to May 2024, including all patients with. Intraductal papillary mucinous neoplasms (IPMN). Epidemiological, clinical, biological, and endoscopic ultrasound data were collected from EUS registries.

All EUS were performed under Propofol sedation using radial and/or linear Pentax video echoendoscopes, with cytology obtained via needles of various calibers (19G-20G-22G) for biochemical analysis of cystic fluid and/or histopathological examination.

RESULTS

Out of 696 biliopancreatic EUS performed, 44 patients were included, representing a prevalence of 6.32% (Figure 1), and representing 77.1% of all pancreatic cystic tumors (57 cases). The mean age was 60.2 years (range 29-82 years) with a clear female predominance (M:16, F: 28) (Sex Ratio = 0.57).

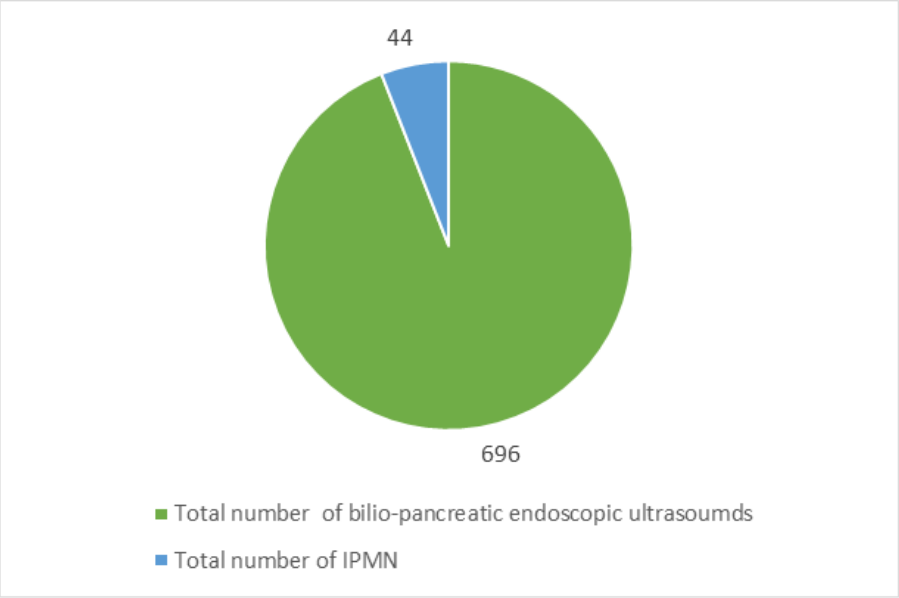

Figure 1: Prevalence of pancreatic Intraductal papillary mucinous neoplasms

Discovery circumstances were incidental in 18 cases (40.9%), epigastric pain in 14 cases (31.8%), acute pancreatitis in 5 cases (11.4%), jaundice in 3 cases (6.8 %), and abdominal pain in 4 cases (9.1%). (Figure 2).

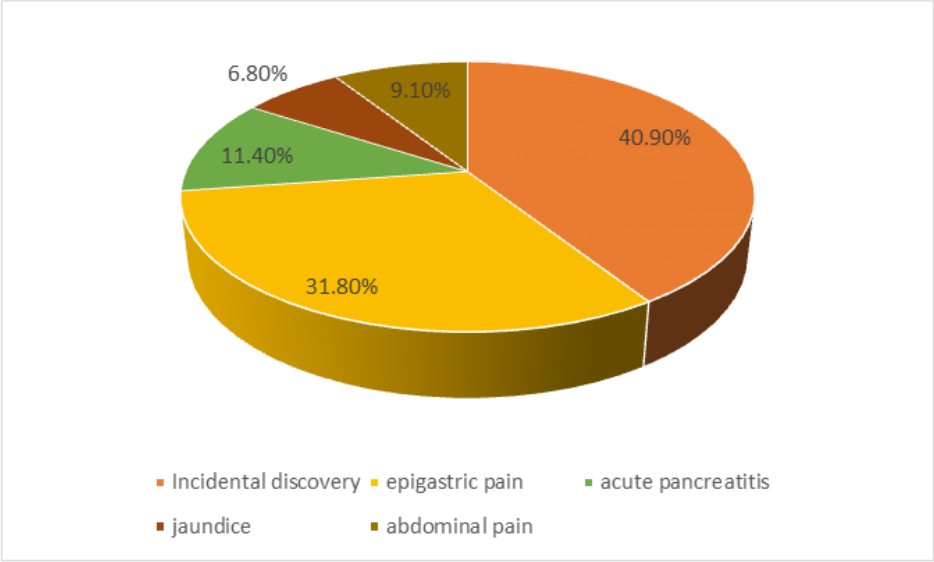

Figure 2: Discovery circumstances of patients with IPMN

Biologically, cholestasis was found in 10 cases (22.7%), cytolytic enzymes were elevated in 5 cases (11.3%), and elevated Ca19-9 in 4 cases (9.1%) (Figure 3).

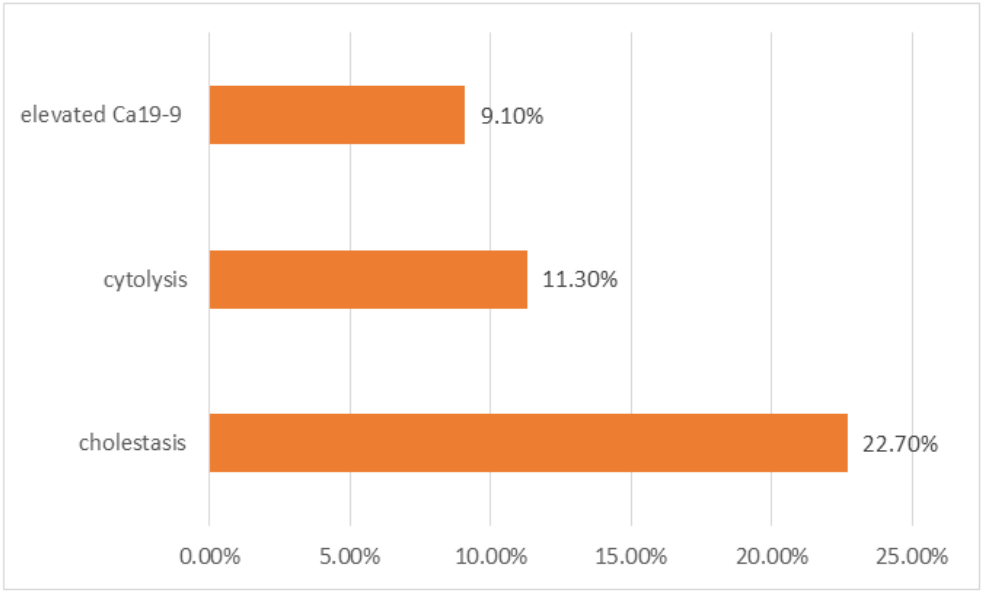

Figure 3: Biological assessment

Endoscopic ultrasound delineated tumor location, number, and size: predominantly in the pancreatic head in 21 cases (47.7%), body in 12 cases (27.2%), tail in 7 cases (15.9%), multifocal in 4 cases (9.1%), with an average tumor size of 22.5 mm (range 19-57 mm) (Figure 4).

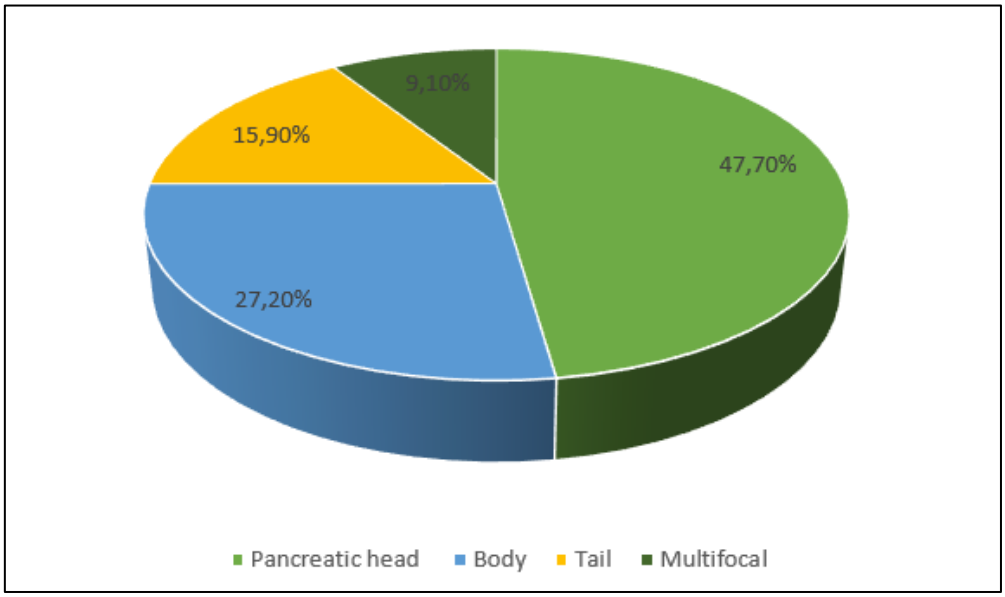

Figure 4: Distribution of patients according to the location of pancreatic IPMN

In 84.1% of cases (n = 37), there was communication with the main pancreatic duct (MPD) alone, while in 15.9% of cases (n = 7), there was communication with both the main pancreatic duct and secondary ducts, a Wirsung duct dilation in 15 cases (34%).

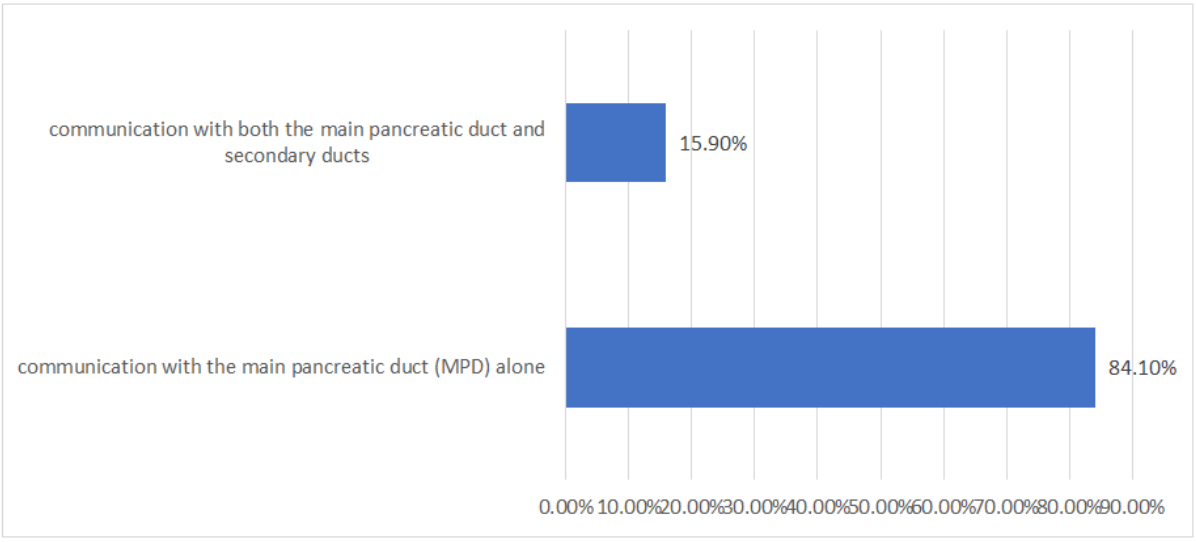

Figure 5: Communication with pancreatic ducts

Cytology was performed in 23 cases (52%). In 22cases, the histopathological study confirmed the diagnosis of IPMN of the pancreas, while in one case, it revealed pancreatic adenocarcinoma (2,27%)

Figure 6: Endoscopic ultrasound image of an IPMN

DISCUSSION

Intraductal papillary mucinous neoplasms (IPMN) are neoplasms derived from pancreatic ductal epithelium, ranging from benign to borderline, low-grade dysplasia, or invasive cancer. These are mucinous cystic lesions of the pancreas characterized by neoplastic proliferation of epithelial cells secreting mucin, forming papillary projections from the pancreatic ductal surface, extensively invading the main pancreatic duct and/or secondary pancreatic ducts, causing cystic dilation [1].

Four subtypes of IPMN have been characterized: gastric, intestinal, pancreatobiliary, and oncocytic. According to a recent report, these four subtypes of IPMN are associated with significant differences in survival. Patients with gastric-type IPMN have the best prognosis, while those with intestinal and pancreatobiliary types have a less favorable prognosis [2].

The actual incidence of IPMNs varies from one study to another. The frequency of this diagnosis within our series was 77.1%, aligning with various international studies where rates were reported as 65% in the study by William R *et al*., [2], 67% in the study by Laura D. Wood et al. [1], and up to 78.3% in the study by Tsuyoshi Hamada *et al*., [3].

There are no specific, precise signs that can point towards a diagnosis of Intraductal papillary mucinous neoplasms. Diagnosis can be incidental, especially following radiological or ultrasound examinations prompted by other pathologies. In our study, incidental discovery was noted in 40.9% of our patients. This finding is consistent with several studies, such as Carlos Fernández-del Castillo *et al*., [4], which reported incidental discovery in 32.7% of patients, as well as Mihai Rimbaș *et al*., [5], which found incidental findings in 8% of cases, and Feixiang Hu *et al*., [6],

where 49% of routine imaging exams accidentally detected pancreatic cystic lesions.

Pain is the most frequent and revealing clinical symptom of pancreatic IPMN. It manifests as epigastric pain or pancreatic-type pain occurring in 40 to 60% of cases according to Lévy P *et al*., [7].

During our study, abdominal pain was observed in 40.33% of cases, with epigastric pain in 31.8%. Acute pancreatitis was noted in 11.4% of our patients.

EUS (Endoscopic Ultrasound) is an essential tool in the evaluation of pancreatic cystic lesions. It provides high-resolution imaging. The diagnostic efficacy of EUS is comparable to that of MRI in characterizing lesions and demonstrating their communication with the main pancreatic duct. Moreover, EUS is superior in detecting multifocal, synchronous, or metachronous lesions and identifying intramural nodules considered to have a high risk of malignancy. In all cases, whenever technically feasible, tissue should be sampled for histopathological examination, as EUS imaging alone cannot confirm or exclude malignancy [11, 12].

These tumors are more common in the pancreatic head but can involve the entire pancreas and the ampulla of Vater [8].

They are typically located in the head of the pancreas as solitary cystic lesions, but in 20% to 30% of cases, they can be multifocal. IPMNs have become a significant clinical concern due to their increased identification in recent years. This could result from a true increase in incidence due to aging populations, better understanding of IPMNs, and/or increased use of conventional imaging in clinical practice [2].

In our study, endoscopic ultrasound allowed for determining the location of the tumor: predominantly in the pancreatic head in 21 cases (47.7%), in the body in 12 cases (27.2%), in the tail in 7 cases (15.9%), and multifocally in 4 cases (9.1%). These findings align closely with literature results where the rates of cephalic lesions were 36.8%, corporeal lesions 25.1%, caudal lesions 18.8%, and multifocal lesions 19.3% [9]. The study carried out by the Gaillard F *et al*., team showed that 51% of the localizations were on the head, 39% on the body, 7% on the tail and 4% multifocal [14].

In our study, endoscopic ultrasound allowed us to specify the average size of the tumors, which was 22.5 mm aligning with various studies in the literature. According to Kristine S *et al.*, the average size was 23.3 mm [10].

In our study, 84.1% of cases (n = 37), there was communication with the main pancreatic duct (MPD) alone, while in 15.9% of cases (n = 7), there was communication with both the main pancreatic duct and secondary ducts, this aligns with findings in the literature. According to Feixiang Hu *et al*., communication with the main pancreatic duct was observed in 65% of cases, with communication involving both the main pancreatic duct and secondary ducts in 15% of cases [6].

EUS-FNB (Endoscopic Ultrasound-guided Fine Needle Biopsy) has high diagnostic accuracy for pancreatic cystic tumors because it allows for tissue acquisition for histological analysis. A multicenter randomized controlled trial by van Riet *et al*., comparing EUS-FNA and EUS-FNB showed that EUS-FNB had a better histological yield (82% versus 72%) [13]. In our study, Endoscopic Ultrasound-guided Fine Needle Biopsy was performed in 23 cases (52%). Histopathological examination confirmed the diagnosis of IPMN (Intraductal Papillary Mucinous Neoplasm) of the pancreas in 22 cases (95%), while in one case, it revealed pancreatic adenocarcinoma (2.27%).

CONCLUSION

Our study highlights the crucial importance of endoscopic ultrasound (EUS) in the diagnosis of intraductal papillary mucinous neoplasms (IPMN) of the pancreas. EUS has proven instrumental in delineating the tumor characteristics, including its location, size, and communication with pancreatic ducts. Additionally, it facilitated cytology sampling in 52% of cases, revealing adenocarcinoma in 2.27% of cases, underscoring its significant role in the diagnostic management of this complex pathology.

REFERENCES

1. Wood, L. D., Adsay, N. V., Basturk, O., Brosens, L. A., Fukushima, N., Hong, S. M., ... & Furukawa, T. (2023). Systematic review of challenging issues in pathology of intraductal papillary mucinous neoplasms. *Pancreatology*, 23.
2. Brugge, W. R. (2015). Diagnosis and management of cystic lesions of the pancreas. *Journal of gastrointestinal oncology*, *6*(4), 375.
3. Hamada, T., Oyama, H., Nakai, Y., Tange, S., Arita, J., Hakuta, R., ... & Fujishiro, M. (2023). Clinical outcomes of intraductal papillary mucinous neoplasms with dilatation of the main pancreatic duct. *Clinical Gastroenterology and Hepatology*, *21*(7), 1792-1801.
4. Fernández-del Castillo, C., Targarona, J., Thayer, S. P., Rattner, D. W., Brugge, W. R., & Warshaw, A. L. (2003). Incidental pancreatic cysts: clinicopathologic characteristics and comparison with symptomatic patients. *Archives of surgery*, *138*(4), 427-434.
5. Rimbaș, M., Rizzatti, G., & Larghi, A. (2022). Diagnostic approach to incidentally detected pancreatic cystic lesions. *Current Treatment Options in Gastroenterology*, *20*(1), 20-33.

6. Hu, F., Hu, Y., Wang, D., Ma, X., Yue, Y., Tang, W., ... & Tong, T. (2022). Cystic neoplasms of the pancreas: differential diagnosis and radiology correlation. *Frontiers in Oncology*, *12*, 860740.
7. Lévy, P., Jouannaud, V., O'Toole, D., Couvelard, A., Vullierme, M. P., Palazzo, L., ... & Ruszniewski, P. (2006). Natural history of intraductal papillary mucinous tumors of the pancreas: actuarial risk of malignancy. *Clinical Gastroenterology and Hepatology*, *4*(4), 460-468.
8. Serinelli, S., & Khurana, K. K. (2024). Intraductal papillary mucinous neoplasms of the pancreas: Cytologic-histologic correlation study and evaluation of the cytologic accuracy in identifying high-grade dysplasia/invasive adenocarcinoma. *CytoJournal*, *21*.
9. Kim, H. S., Choi, Y. H., Jo, I. H., Paik, C. N., Lee, I. S., & Chang, J. H. (2024). Tracking incidentally discovered pancreatic cysts smaller than 30 mm: Natural course and predictors of malignancy. *Digestive and Liver Disease*, *56*(1), 137-143.
10. Spinelli, K. S., Fromwiller, T. E., Daniel, R. A., Kiely, J. M., Nakeeb, A., Komorowski, R. A., ... & Pitt, H. A. (2004). Cystic pancreatic neoplasms: observe or operate. *Annals of surgery*, *239*(5), 651-659.
11. Talar-Wojnarowska, R., Pazurek, M., Durko, L., Degowska, M., Rydzewska, G., Smigielski, J., ... & Malecka-Panas, E. (2013). Pancreatic cyst fluid analysis for differential diagnosis between benign and malignant lesions. *Oncology Letters*, *5*(2), 613-616.
12. Vege, S. S., Ziring, B., Jain, R., Moayyedi, P., Adams, M. A., Dorn, S. D., ... & Yang, Y. X. (2015). American gastroenterological association institute guideline on the diagnosis and management of asymptomatic neoplastic pancreatic cysts. *Gastroenterology*, *148*(4), 819-822.
13. van Riet, P. A., Larghi, A., Attili, F., Rindi, G., Nguyen, N. Q., Ruszkiewicz, A., ... & Bruno, M. J. (2019). A multicenter randomized trial comparing a 25-gauge EUS fine-needle aspiration device with a 20-gauge EUS fine-needle biopsy device. *Gastrointestinal Endoscopy*, *89*(2), 329-339.
14. Gaillard, F., & Yap, J., & Campos, A. (2024). Intraductal papillary mucinous neoplasm. Reference article, Radiopaedia.org 16 Jul 2024.