Pancreatic cystic lesions: review of current literature including diagnostic modalities, management options and surgical procedures.

Poster No.: C-3173
Congress: ECR 2018
Type: Educational Exhibit
Authors: S. Picchia¹, E. Raimondi², M. G. Pezzullo³, M. Rengo¹, D.-M. Koh⁴, M. A. Bali⁴; ¹Latina/IT, ²Ferrara/IT, ³Brussels/BE, ⁴London/UK

Keywords: Cysts, Diagnostic procedure, Ultrasound, MR, CT, Pancreas, Oncology, Abdomen

DOI: 10.1594/ecr2018/C-3173

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is strictly prohibited.
You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.
www.myESR.org
Learning objectives

The aim of this poster is to review the current literature on most common pancreatic cystic lesions (PCL). The topics addressed are the classification, the diagnostic accuracy of the images modalities and the management algorithms.
Background

PCLs are increasing in frequency, mainly due to imaging technical improvements. The reported prevalence rates for PCLs using magnetic resonance (MR) varies from 2% to 38% and using computed tomography (CT) has been estimated up 3% [1]. Furthermore, a prevalence of 45% was reported using magnetic resonance cholangiopancreatography (MRCP) [2]. The prevalence increases with age, varying from 8% in patients below 70 years-old to 35% in patients above 90 years-old [3].

PCL form a variegated group of lesions classified according to the arising tissue (epithelial or mesenchymal) and to their neoplastic or non-neoplastic nature. The WHO classification includes more than 20 lesions [4]. Four neoplasms are the most common, accounting for about the 90% of all pancreatic cystic tumours, and they are all epithelial lesions [2]: the intraductal papillary mucinous neoplasm (IPMN), the mucinous cystic neoplasm (MCN), the serous cystic neoplasm (SCN) and the solid pseudopapillary neoplasm (SPN). The most frequent among the pancreatic cystic tumours is the SCN (32-39%), followed by MCN (10-45%), IPMN (21-33%) and SPN (1-2%) [5]. Therefore, both European and American guidelines focuse their analysis on these four types of lesions [2, 6].

Histologically, the IPMN is characterized by intraductal proliferation of neoplastic duct epithelium with associated mucin production [7]. It may arise from the main duct (main-duct type IPMN or MD-IPMN), its branch ducts (branch-duct-type IPMN or BD-IPMN) or both (mixed-type IPMN or MT-IPMN). It is most frequently unifocal, in 20-30% of cases multifocal and in 5-10% of cases it may entirely involve the pancreatic duct system [8]. The male-to-female ratio varies between 1 and 3 of main duct and from 0.66 and 1.8 for branch duct IPMN and the main age at diagnosis varies from 62 and 67 years.

The MCN is a mucin-producing epithelial tumour, with or without septations, with thick mural wall, most frequently solitary, without communication with the ducts. The typical histological feature is the presence of a unique ovarian-type stroma [9] not found in other pancreatic neoplasms. It is located in the body and the tail of pancreas in the 95%-98% of cases [10]. It shows an high female to male ratio (20:1) and the average age at presentation varies between 40 and 50 years [10].

The SCN is an epithelial tumour, with thin mural wall, without communication with the ducts which can present macroscopically with three morphologic patterns: polycystic, honeycomb and oligocystic. The polycystic pattern is the most common (70% of cases). [11]. The mean age at diagnosis reported is 61 years and almost 3/4 of the patients are women [12]. The location reported is head, neck or uncinate process in the 44%-45% of cases, while body or tail in the 54-56% of cases [12, 13].
The SPN is a rare epithelial tumor of the pancreas with uncertain pathogenesis, almost exclusively seen in females on the second or third decades of life [14]. The location reported is the head in 50% of the cases, the tail in 41.7% of cases and the body in 8.3% of cases [15]. The correct differential diagnosis between PCLs is mandatory because they have different risk of malignant transformation and therefore different management. Mucinous lesions are considered at high risk of malignancy.

As regards the IPMN, the rate of malignant transformation found varies between 6 and 46% in case of branch-ducts-type [2,9] and between 33 and 92% in case of main-duct-type [2,9].

A range between 12 and 20% of MCN are malignant [2], while malignant transformation of SCA is extremely rare, with approximately 30 reported cases in the literature [16].

The malignant potential of SPN is low, corresponding to 0.17 to 3% of all malignant pancreatic cancers [17].
Findings and procedure details

The modalities of choice in characterization of PCLs are MDCT and/or MR-MRCP. The diagnostic accuracy reported in literature is 56-85% and 73-91%, respectively [18]. When compared, despite it has been demonstrated the higher ability of MR-MRCP to detect mural nodules (which represent a sign of malignity), ductal communication and wall thickening [1], CT and MRI have not shown significant difference in terms of diagnostic accuracy [2,19] (Fig.1, Fig.2). It is recommended to perform multiplanar reconstructions and curved reformations both in MDCT and MR-MRCP [18]. A CT pancreas-specific protocol should be used, with thin-section, pre-contrast image, both arterial phase and portal venous phase images after IV contrast injection and typically with water as oral contrast to minimize artifacts arising from IV contrast media [20]. The MR pancreas-specific protocol includes T2-weighted sequence, diffusion weighted sequences, T1-weighted sequence and, in case of suspicion of malignancy, three coronal gadolinium-enhanced dynamic T1 sequences [21]. Concerning the MRCP, Yoon et al. found that 3D MRCP compared to the 2D MRCP provides better image quality and superior evaluation of the pancreatic duct and of the morphological details of IPMN [22]. The MRCP can also be performed after the IV injection of secretin which stimulates the pancreatic exocrine function and it improves the ability to detect of ductal communication (Fig.2), but its role in diagnosis is currently discussed [18].

The EUS also showed high accuracy (88%) [18] (Fig.3). A recent study demonstrated that EUS with or without FNA and cystic fluid analysis, improves the diagnostic accuracy over CT and MRI by 36 and 54% respectively [19]. Pancreatic cyst fluid CEA concentration of 192 ng/mL is the cutoff to differentiate mucinous from non-mucinous lesion and a fluid amylase level of <250 IU/L excludes the diagnosis of pseudocyst [23]. Despite the high accuracy, currently EUS with or without FNA is used mainly as additional modality when results in CT and MRI are uncertain, and there is no evidence to consider it as a comparable routine method in the staging of PCLs [2]. The first step in the diagnostic evaluation is to assess the connection with the ductal system, that allows to differentiate IPMN from the other lesions [2]. In case of communication, the location has to be established to differentiate between BD, MD and MT-IPMN. If communication is absent, we have to distinguish between MCN, SCN and SPN. The last one is quite rare and typical found in young women. The most common entities (MCN and SCN) can be differentiate on the basis of location, internal septation, macroscopic pattern and thickness of the mural wall (see above).

After lesion characterization, the risk of malignancy has to be established.

All guidelines established that symptomatic lesions should be resected (aga, EUROPEAN).

The management of asymptomatic patients has been showed below.
The European guidelines [2] say that in case of BD-IPMT, if patient presents with only one risk factor between mural nodules, dilatation of the main pancreatic duct > 6 mm, rapidly increasing in size and elevated serum levels of CA 19-9, surgery is recommended. If lesion has a diameter < 4 cm, he can be followed with non invasive management which consists preferably on non radiating imaging (MR or US) every 6 months for the first year, yearly between 2nd and 5th year and every 6 months after the 5th year because of the increasing risk of malignnancy correlated with the age of the lesion. In case of MD-IPMN or MT-IPMN, because of the high prevalence of malignancy, surgery is recommended.

If diagnosis of MCN is clear, surgery is recommended. SCN has to be considered a benign lesion and non invasive managment is recommended, except in case of large tumour size (>6 cm) and simultaneous location in the head of the pancreas where surgery is recommended. As regards SPN, all lesions should be resected. The follow-up after resection is recommended for IPMN (yearly, with MR or EUS), while is not recommended for SCN and MCN.

The American Guidelines [6] are mainly focused on the size and risk factors of all PCLs, rather than on the specific evaluation of each type. They recommend to adopt surveillance program in case of cyst, 3 cm without solid component or dilated pancreatic duct with the first MR in 1 year and then with MR every 2 years for a total of 5 years if it is unchanged. On the other hand, pancreatic cyst with size >/=3 cm or dilated main duct or presence of solid component at diagnosis or changes in the characteristics during the follow up, should be examined with EUS-FNA. Patients without concerning features on EUS-FNA results should undergo MR surveillance after 1 year and then every 2 years to ensure no changes. Patients with both solid and dilated pancreatic duct and/or concerning features on EUS/FNA should undergo surgery. The follow up after surgery suggested by the AGA guidelines is to undergo MR every 2 years in case if malignancy or high grade dysplasia on the resected specimen, while no surveillance is recommended in case of absence of them.
Fig. 1: MDCT on axial plane. The arrow shows a hypoattenuating lesion in pancreatic tail. The histology confirms the suspicion of a side-branch IPMN.

Fig. 3: The morphologic features on EUS imaging of different types of PCL. (a) EUS feature of SCN with honeycombing appearance in the neck of the pancreas. (b) EUS image of a MCN with presence of septations. (c) EUS image of an IPMN with the papillary form. (d) EUS appearance of the SPN with presence of calcifications in the head of the pancreas.

**Fig. 2:** Fig.2. MRCP. The arrows show connections between multiple cystic lesions and the main pancreatic duct in a patient with multifocal branch duct IPMN.

Conclusion

Current imaging modalities allow differential diagnosis between benign and potential malignant/malignant lesions with high accuracy.

It is already demonstrated in literature that in carefully selected patients imaging allows a non-operative management option [18] and therefore avoids the risk of morbidity and mortality associated with surgery, that are not negligible. Indeed, patients initially treated surgically the risk of morbidity reported in literature varies between 27.9% and 36% and the risk of mortality varies between 0 and 1% [24,25]. Gaujoux et al. highlighted also that the risk of malignancy in selected patients managed non-operatively proved to be equivalent to the risk of operative mortality in those who initially underwent resection [24].

Despite this, there are several limits on the current guidelines on the management of asymptomatic patients. In the European guidelines there is no an exact indication of follow-up timing in case of no surgically-treated SCN on the basis of the previous cited articles.

The American guidelines deal the asymptomatic cysts without regard to the cyst type considering as univocal entity both mucinous and non mucinous lesions, and it can be a problem because they show different risk of malignancy [26]. Moreover, the AGA guidelines don’t specify how manage patient with only one risk factor.

As regards the surgical technique, it is not mentioned in the AGA guidelines. The European guidelines said that the total pancreatectomy is unnecessarily aggressive, and the partial resection is recommended, based on the location, with additional routine intraoperative frozen section only in case of IPMN. In this consideration the multifocal or spreadily diffuse lesions on the ductal system were not mentioned.

Furthermore, there are no guidelines of management for symptomatic PCL with benign appearance, because the presence of symptoms was always considered enough to recommend surgery as first line treatment. There are also no guidelines of management of lesion with uncommon appearances: the European guidelines only said that in case of small uncertain lesions (4 cm), they can be managed as BD-IPMN.

Finally, we can conclude that currently the recommendations for lesion management need to be expanded, in particular as regards the management of symptomatic patients and lesion with uncommon appearance.
Personal information

Dr. Simona Picchia
Resident in Diagnostic Radiology
Department of Radiology University "La Sapienza"
Hospital I.C.O.T.
Address: Via Franco Faggiana, 1668
Post code: 04100
City: Latina, LT
Country: Italy

Mobil phone: 00393498329233
Email: simona.picchia87@gmail.com
References


