Intraductal papillary mucinous neoplasms of the pancreas: Differentiation of malignant and benign tumors using MR imaging and MR cholangiopancreatography

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Purpose

Intraductal papillary mucinous tumors (IPMT) of the pancreas is the term to describe a spectrum of proliferation of the pancreatic ductal epithelium with production of excessive amounts of mucin and progressive dilatation of the main pancreatic duct (diffuse or segmental), of cyst dilatation of the branch ducts, or of both, depending on the site and extent involvement.

IPMT still represent a more critical field, potentially bearing adenoma, in situ carcinoma or invasive carcinoma.

The IPMN therapeutic strategy mainly depends on the suspicion of malignancy emerging from the preoperative workup.

MR imaging and MR Cholangiopancreatography MRCP is regarded as the most efficient imaging modality for the detection and preoperative staging of IPMT of the pancreas. In addition, endoscopic ultrasound (EUS) and positron emission tomography (18FDG-PET) in pancreatic malignancy have developed considerably as complimentary diagnostic. But EUS guided aspiration and biopsy is useful in cases that are indeterminate at cross-sectional imaging or require observation. Positron emission tomography scan offers, by analysing metabolic activity within the wall of a cystic lesion, the possibility of investigating the nature of small mural nodules, morphologically demonstrated by MR, by functional data.

To assess whether MR imaging and MR Cholangiopancreatography can predict malignancy in patients with intraductal papillary mucinous neoplasms (IPMNs) of the pancreas.
Methods and Materials

A series of 23 patients with diagnosis of pancreatic IPMNs (3 main duct, 5 combined, and 15 branch duct type) were retrospectively included in our study group. All patients underwent MR imaging and MRCP at 1.5T-device. The phased-array coil was used for both excitation and signal reception. Ten minutes before MR examination, 300 ml of water were used as an oral contrast agent in an attempt to improve the visualization of the duodenum. Scopolamine methyl-bromide (Buscopan® 20 mg/ml; Boehringer Ingelheim) was intramuscularly administered immediately before starting the examination in order to avoid peristaltic artefacts. The imaging protocol began with axial T2-weighted, respiratory-triggered, fat-suppressed, fast spin-echo sequence and/or single-shot T2-weighted fast spin-echo sequence. MR cholangiopancreatography (MRCP) was performed by means of coronal breath-hold, thin and thick-slab, single-shot T2-weighted fast spin-echo sequences (effective echo time, 1052 msec; thickness, 2, 10 and 50 mm; field of view, 35-45 cm; matrix size, 256x256 pixels; 0.5 signal averaged; acquisition time, 1-2 seconds for every image). A 3D fat-suppressed breath-hold T1w LAVA sequence (TR/TE,3.6ms/1.6ms; 2.4mmthk/-1.8mmsp; matrix,224x192; one NEX) was performed before and after intravenous administration of gadobenate-dimeglumine (Gd-BOPTA; MultiHance, Bracco).

Histological diagnosis of IPMT after surgery: malignant n=17 (carcinoma n= 9, borderline n= 8) and benign n=6 (hyperplasia/adenoma).

The maximum diameter of cystic lesion (diameter of the lesions ≥ 30 mm, according to the international association of pancreatology guidelines recommended surgery in absence of mural nodules), the presence of main pancreatic duct dilatation and mural nodules/mural enhancement were evaluated by two radiologists; on the basis of consensus readings final diagnoses of pancreatic lesions were categorized as probably malignant and as probably benign.
Results

Reviewers correctly classified as probably malignant 15/17 of the malignant IPMTs: 8 carcinoma (Fig. 1a,b,c,d on page ) and 7 borderline (Fig.2a,b,c,d on page ) and as probably benign 5/6 of the benign IPMTs (hyperplasia/adenoma; Fig. 3a,b on page ). One false positive (Fig. 4a,b on page ) and 2 false negative: 1 carcinoma and 1 borderline (Fig. 5a,b on page ) were resulted. The sensitivity, specificity, PPV, and NPV of the reviewers for the differentiation between benign and malignant IPMTs were 94%, 71%, 88% and 83%, respectively.
Conclusion

A recent description classified IPMT as a subgroup of pancreatic tumors premalignant and malignant. It is fundamental to detection the conventional predictive early malignant signs to correctly identify patients candidate for surgery. Although some radiological features have been described that many indicate a definite risk—all main duct tumours, branch duct tumours larger than 30 mm and malignant component presence in cyst walls.

The accuracy CT scan is vary low in this field, while MRI/MRCP accurately depict the morphologic features of the cyst and the relationship of the cyst to the pancreatic duct system and is considered the modality of choice for demonstrating the presence of septa, of parietal nodules/mural nodules enhancement or intraluminal filling defects.

MRI and MRCP with highly T2w sequences, in different plain with no respiratory artefacts and good planar resolution has vary high sensitivity for detecting cystic lesions, an indisputable advantage in the study of ductal structures, in their possible communication with the cystic and in the detecting intraluminal defects of lesions. The use of contrast shows a minimal enhancement of tumour septa or of mural nodules. Administration of secretin increases the visibility of the pancreatic duct system.

MRI and MRCP can represent a reliable method for predicting malignancy in patients with pancreatic IPMT.
References


