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Periampullary Diverticula Misdiagnosed as Cystic Pancreatic Lesions: A Review of 3 Cases

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Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Case series

Patient: Female, 67 • Male, 69 • Female, 65
Final Diagnosis: Periampullary diverticulum
Symptoms: —
Medication: —
Clinical Procedure: Magnetic Resonance Imaging
Specialty: Radiology

Objective: Diagnostic/therapeutic accidents

Background: Cystic lesions on the pancreatic head can mimic fluid-filled duodenal or periampullary diverticula. We reviewed a series of cases in which periampullary diverticula were misdiagnosed as cystic pancreatic lesions.

Case Report: Case 1. A Chinese woman presented to the surgical outpatient clinic for intermittent upper abdominal discomfort. Contrast-enhanced MRI of the abdomen revealed a cystic-appearing lesion in the region of the pancreatic head, which was reported as a cystic pancreatic lesion. A follow-up scan showed this lesion to be filled with fluid, gas, and debris, suggestive of a periampullary diverticulum. Review of a prior CT scan confirmed a periampullary diverticulum. Case 2. A Chinese man with a history of chronic hepatitis B infection underwent an MRI of the liver, which revealed a cystic-appearing lesion in the region of the pancreatic head, reported as a cystadenoma or pseudocyst. The patient underwent an endoscopic ultrasound. A large periampullary diverticulum was discovered but there was no pancreatic head lesion. Case 3. A Chinese woman with a history total hysterectomy and bilateral salpingo-oophorectomy for ovarian malignancy underwent an MRI of the abdomen and pelvis. A cystic-appearing lesion was found in the region of the pancreatic head, which was reported as a cystadenoma or intraductal papillary mucinous neoplasm. Follow-up magnetic resonance cholangiopancreatography showed a signal void within, suggestive of gas within a periampullary diverticulum. Review of a prior CT scan showed a periampullary diverticulum.

Conclusions: Periampullary diverticula, when fluid-filled, can be confused with cystic lesions in the pancreatic head. Radiologists should be aware of this potential pitfall.

MeSH Keywords: Diagnostic Errors • Diverticulum • Duodenum • Pancreatic Cyst

Full-text PDF: <http://www.amjcaserep.com/abstract/index/idArt/896944>



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Background

Cystic pancreatic lesions are increasingly diagnosed with increasing use of computed tomography (CT) and magnetic resonance imaging (MRI) in clinical practice. These lesions are often incidentally detected and common entities include intraductal papillary mucinous neoplasms, cystadenomas, and pseudocysts. Periampullary diverticula are outpouchings of the duodenal wall occurring about 2–3 cm from of the ampulla of Vater, and typically lie along the medial wall of the duodenum. Cystic lesions on the pancreatic head can be confused with fluid-filled duodenal or periampullary diverticula due to location and potentially similar imaging features. We review a series of cases in which periampullary diverticula were misdiagnosed as cystic lesions in the pancreatic head on MRI, and discuss how to avoid such misdiagnosis.



Figure 1. T2-weighted fat-saturated sequence showing a fairly homogeneous hyperintense lesion in the region of the pancreatic head (arrow).

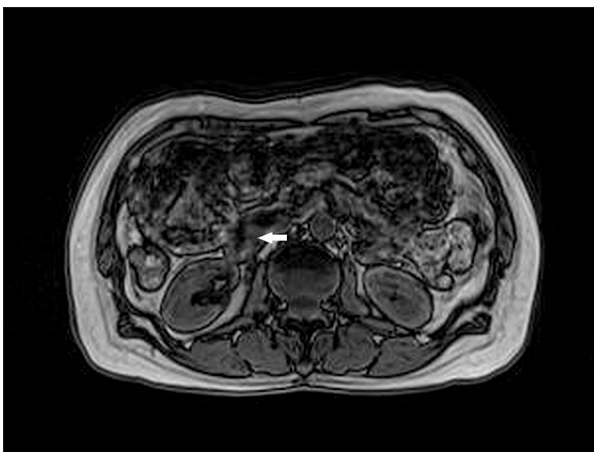


Figure 2. T1-weighted (dual-echo out-of-phase) sequence showing the lesion to be hypointense (arrow).

Case Report

Case1

A 67-year-old Chinese woman presented to the surgical outpatient clinic due to intermittent upper abdominal discomfort of a few weeks duration. She had a history of colonic polyps. An abdominal ultrasound scan was unremarkable. Contrast-enhanced MRI of the abdomen was then performed. There was a lesion in the region of the pancreatic head. It was very hyperintense on T2-weighted sequence, similar to fluid intensity, measuring about 1.2×0.7 cm (Figure 1). It was hypointense on T1-weighted sequence (Figure 2). There was no restricted diffusion, with “T2 shine-through” on ADC map (Figure 3). After administration of intravenous contrast, there was no enhancement (Figure 4). No other significant finding was noted in the MRI scan. The lesion was reported as a cystic lesion in the pancreatic head, possibly an intraductal papillary mucinous neoplasm.



Figure 3. On ADC map, the lesion demonstrates “T2 shine-through” with hyperintense signal, indicating absence of restricted diffusion (arrow).

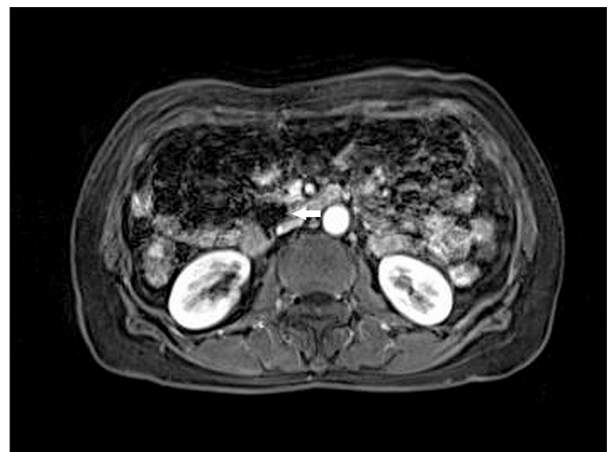


Figure 4. Post-contrast T1-weighted fat-saturated sequence did not show enhancement of the lesion (arrow).

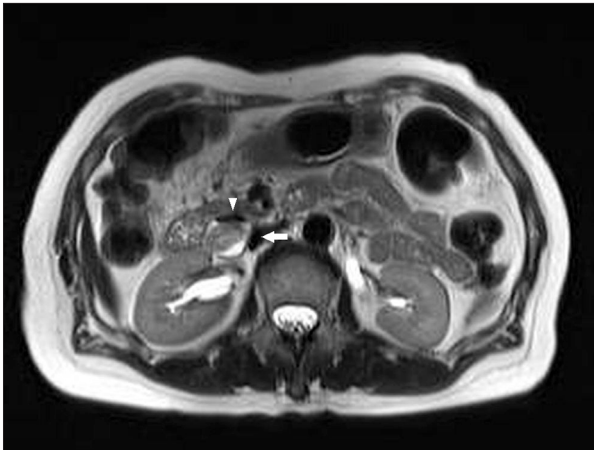


Figure 5. Follow-up MRI, T2-weighted sequence showed the lesion to contain fluid and hypointense contents (arrow), as well as non-dependent crescent of signal void, suggestive of gas (arrowhead) and suggesting the possibility of a periampullary diverticulum.



Figure 6. Prior CT scan confirmed the presence of a periampullary diverticulum containing gas (arrow).

A follow-up scan 3 months later showed this lesion to be filled with fluid, gas, and debris, communicating with the medial aspect of the second part of the duodenum (Figure 5). This suggested a periampullary diverticulum. A review of the patient's CT scan performed a few years before confirmed the presence of a periampullary diverticulum (Figure 6).

Case 2

A 69-year-old Chinese man with a history of chronic hepatitis B infection underwent an MRI of the liver to evaluate a hepatic lesion detected on screening ultrasound. MRI confirmed findings of a hepatocellular carcinoma. A lesion was also detected in the region of the pancreatic head, measuring 3.8×2.6 cm. It was slightly hyperintense on T2-weighted sequence with internal hypointense areas (Figure 7). It was hypointense on



Figure 7. T2-weighted sequence shows a predominantly hyperintense lesion in the region of the pancreatic head, with internal hypointense foci suggestive of internal debris (arrow).

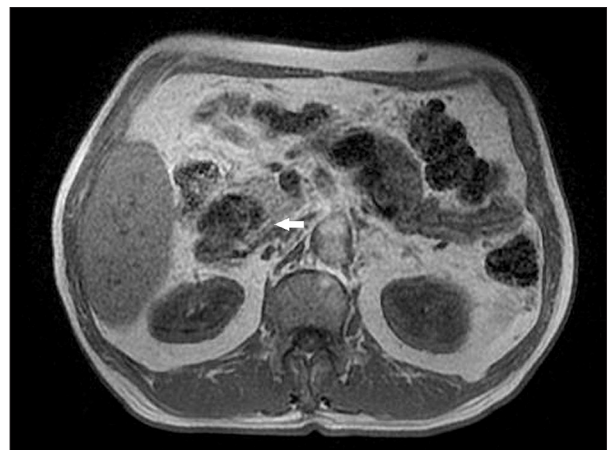


Figure 8. T1-weighted (dual-echo in-phase) sequence showing the lesion to be hypointense (arrow).

T1-weighted sequence (Figure 8). After intravenous administration of contrast, there was no enhancement, but internal debris was demonstrated (Figure 9). The lesion was reported as a cystic pancreatic head lesion with debris within, probably a cystadenoma or pseudocyst.

The patient underwent an endoscopic ultrasound for further characterization of the lesion. A large periampullary diverticulum was discovered, but there was no pancreatic head lesion (Figure 10).



Figure 9. Post-contrast T1-weighted fat-saturated sequence did not show significant enhancement of the lesion (arrow), although internal debris was again noted.



Figure 11. T2-weighted fat-saturated sequence showing a hyperintense lesion in the region of the pancreatic head with internal hypointense foci, suggestive of debris (arrow).



Figure 10. Endoscopic ultrasound found a large periampullary diverticulum. Distal common bile duct was identified (arrow) and no cystic lesion was noted in the region of the pancreatic head.

Case 3

A 65-year-old Chinese woman with a history of total hysterectomy and bilateral salpingo-oophorectomy for ovarian malignancy underwent an MRI of the abdomen and pelvis for staging. There was no evidence of nodal or distant metastases, but there was a cystic lesion in the region of the pancreatic head with internal debris on T2-weighted sequence, measuring about 2.5×2 cm (Figure 11). After intravenous administration of contrast, no enhancement was noted (Figure 12). This lesion was reported as a cystic pancreatic head lesion, possibly a cystadenoma or intraductal papillary mucinous neoplasm.

Magnetic resonance cholangiopancreatography (MRCP) was performed 1 week later to evaluate for communication with the pancreatic duct. The cystic structure appeared smaller,

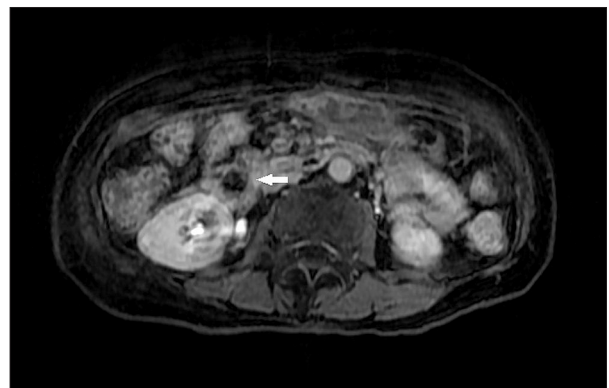


Figure 12. Post-contrast T1-weighted fat-saturated sequence did not show enhancement of the lesion (arrow).

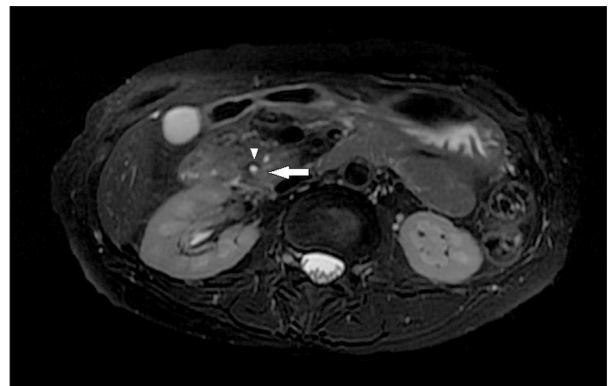


Figure 13. Subsequent MRCP, T2-weighted fat-saturated sequence showing the lesion to have slightly decreased in size (arrow) and a crescent of non-dependent signal void was noted (arrowhead), suggesting the possibility of a periampullary diverticulum.

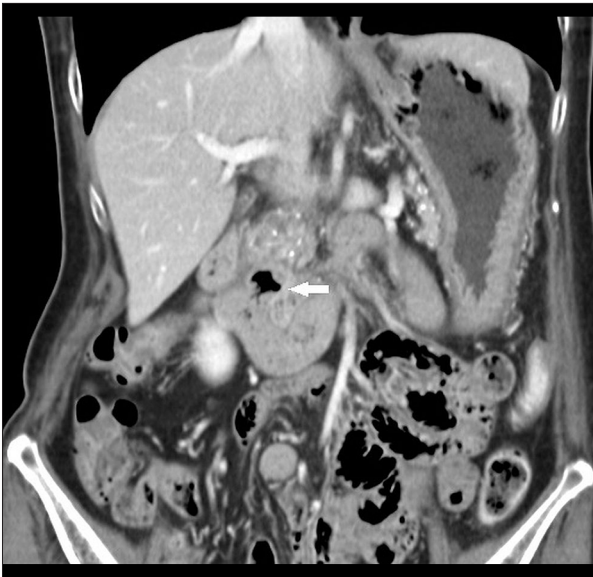


Figure 14. Prior CT scan confirmed the presence of a periapillary diverticulum containing gas (arrow).

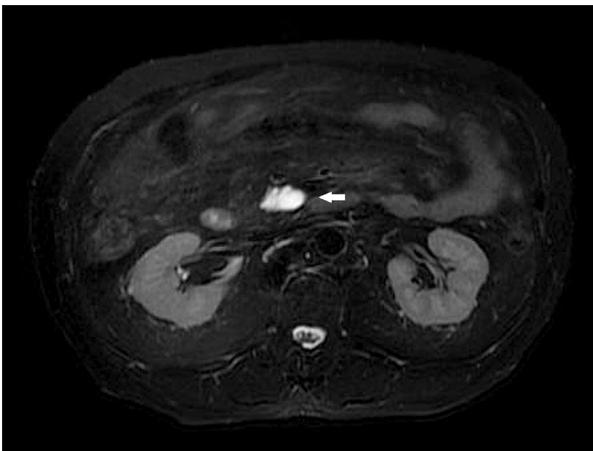


Figure 15. T2-weighted fat-saturated sequence showing a fairly homogeneous hyperintense lesion in the region of the pancreatic head (arrow).

with a void within, suggestive of gas within a periapillary diverticulum (Figure 13). A review of a CT abdomen study performed a few years before showed a gas-filled periapillary diverticulum (Figure 14).

Discussion

Cystic pancreatic lesions, such as intraductal papillary mucinous neoplasms (IPMN), cystadenomas, and pseudocysts, are increasingly diagnosed with the increasing use of CT and MR in clinical practice, and are often incidental [1]. On MRI, such lesions show high T2-signal, sometimes with internal septations or locules, and, in cases of IPMN, there is communication



Figure 16. T1-weighted (dual-echo out-of-phase) sequence showing the lesions to be hypointense (arrow).

with the pancreatic duct [2]. On imaging, periapillary diverticula are typically seen in the second part of the duodenum along the medial wall, and, when large, they can bulge into the region of the pancreatic head or uncinete process. When completely filled with fluid, they can appear as cystic structures on MRI and can be confused with cystic lesions in the pancreatic head.

There are various reports of fluid-filled periapillary diverticula mimicking cystic lesions in the pancreatic head [3–5]. In our case series, all 3 periapillary diverticula were misdiagnosed as cystic pancreatic neoplasms on MRI. This reflects the challenge in actual practice in differentiating a fluid-filled periapillary diverticulum from cystic pancreatic neoplasm on MRI compared to CT, possibly because communication of the diverticulum with the adjacent duodenum and small amounts of intradiverticular gas can be more difficult to appreciate on MRI compared to CT. Moreover, cysts and intradiverticular fluid often show similar signal intensities on MRI and can be difficult to distinguish. For comparison, we show an example of another patient with a known intraductal papillary neoplasm in the pancreatic head. In this case, the lesion was also hyperintense on T2-weighted sequence (Figure 15), hypointense on T1-weighted sequence (Figure 16), and did not show enhancement after administration of intravenous contrast (Figure 17). These MRI features, together with location medial to the duodenum, are similar to the periapillary diverticula illustrated in our series. However, a 3-dimensional heavy-T2-weighted MRCP sequence showed communication with the main pancreatic duct (Figure 18), indicating an intraductal papillary mucinous neoplasm.

There are certain clues that may help to distinguish periapillary diverticulum from cystic neoplasms in the pancreatic head on MRI. The presence of intradiverticular gas with air-fluid level is one of the most important and easily recognized

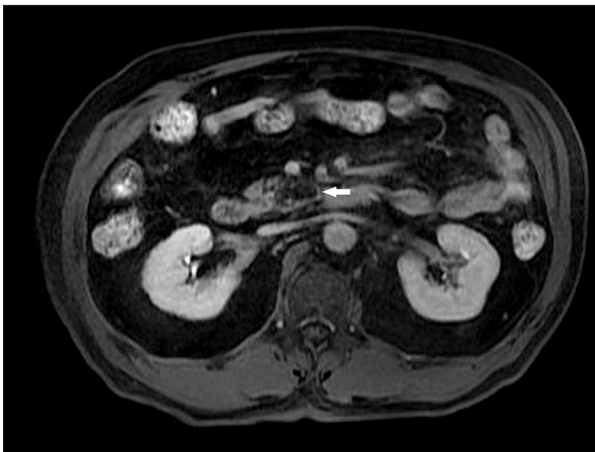


Figure 17. Post-contrast T1-weighted fat-saturated sequence did not show enhancement of the lesion (arrow).

features [6]. This is best seen on axial T2-weighted sequences, where there is stark contrast between the hyperintense fluid and the signal void of non-dependent gas. A tiny amount of gas may appear as a crescent of signal void, and careful evaluation is required. The presence of dependent debris within also suggests a diverticulum (containing bowel material) rather than a cystic pancreatic neoplasm. This appears as hypointense areas or dependent layering; however, this is also seen in pancreatic pseudocysts [7]. Occasionally, periampullary diverticula can be seen to change morphology between MRI sequences or they may become gas-filled, making the diagnosis obvious. Alternatively, oral administration of water or shifting the patient's position can alter its morphology to increase diagnostic confidence [5]. In retrospect, 2 of the present cases (case 1 and 3) had prior CT scans that confirmed presence of a periampullary diverticulum, while in 1 case (case 2), a communication with the duodenum was suggested on careful review of the images. In 2 cases (case 2 and 3), hypointense foci were noted within the lesions, which could have suggested intradiverticular debris rather than a true cystic pancreatic lesion. From our case series it is also clear that review of prior cross-sectional imaging is helpful in the diagnosis.

When a periampullary diverticulum is suspected, further investigation can be done to confirm it. A barium follow-through study will show barium filling the diverticulum and this is usually diagnostic [4]. Pineapple juice has also been studied as a negative oral contrast agent in MRI and can help in diagnosis of periampullary diverticula. Its superparamagnetic component results in shortening of T2-relaxation time and suppression of fluid signal from the diverticulum on MRI, distinguishing it from a cystic pancreatic lesion [8].

Solitary periampullary diverticula generally do not require active management because most are asymptomatic. Indications for

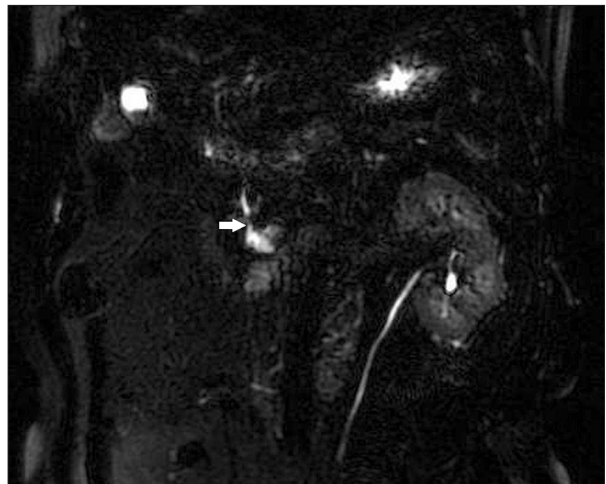


Figure 18. 3-D heavy-T2-weighted MRCP shows a communication of this cystic lesion with the main pancreatic duct (arrow), confirming an intraductal papillary mucinous neoplasm in the pancreatic head.

surgical resection include recurrent abdominal pain, cholangitis, pancreatitis, large diverticula causing mass effect (e.g., biliary or duodenal obstruction), or complications such as bleeding, perforation, or diverticulitis [9]. Management of symptoms and complications is either medical or surgical. Medical management includes analgesia for abdominal pain and antibiotics for diverticulitis, as well as bed-rest and fluids. Surgical management includes diverticulectomy, embolization of bleed via endovascular techniques, or endoscopic hemostasis [10].

Conclusions

Periampullary diverticula, when fluid-filled, can be confused with cystic lesions in the pancreatic head. Radiologists should be aware of this potential pitfall. However, there are clues that are useful in avoiding misdiagnosis and further unnecessary investigation or intervention. Although the cases presented here were initially misdiagnosed as cystic pancreatic lesions, careful scrutiny of images, as well as review of prior studies, could have finalized the diagnosis.

Statements

1. The authors declare no potential conflicts of interest. No external funding was involved in our study.
2. The authors declare no involvement of human participants or animals.
3. Institutional review board approval was not required as our study did not involve direct patient care or interaction, and only required review of imaging studies that were already performed, and all patient identifiers were removed.

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