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Pseudotumor of the distal common bile duct at endoscopic retrograde cholangiopancreatography

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Abstract

Background—Prior studies have described a pseudocalculus appearance in the distal common bile duct as a normal variant at cholangiography. The objective of this study is to describe the occurrence of pseudotumor in the distal common bile duct at endoscopic retrograde cholangiopancreatography (ERCP).

Methods—Nine patients who underwent ERCP between May 2004 and July 2008 were identified as having a transient eccentric mural-based filling defect in the distal common bile duct. A single reader systematically reviewed all studies and recorded the imaging findings.

Results—The mean diameter of the filling defect was 9 mm (range, 5 to 11). Eight patients had resolution of the filling defect during the same ERCP or on a subsequent ERCP, and in 2 of these patients the inferior border of the filling defect was not well visualized. The other patient underwent surgical resection of a presumed tumor with no evidence of malignancy on surgical pathology.

Conclusion—An eccentric mural-based filling defect in the distal common bile duct can be artifactual in nature and may reflect transient contraction of the sphincter of Oddi. Recognition of this pseudotumor may help avoid unnecessary surgery.

Keywords

Endoscopic retrograde cholangiopancreatography (ERCP); Common bile duct; Pseudotumor; Sphincter of Oddi

Introduction

Tumor is the primary consideration when an eccentric mural-based filling defect is seen at endoscopic retrograde cholangiopancreatography (ERCP), and this finding typically precipitates further intervention or surgery. We have encountered cases where such an appearance has been transient or otherwise documented to be non-pathological in nature. Therefore, we undertook this study to describe the occurrence of pseudotumor in the distal common bile duct at endoscopic retrograde cholangiopancreatography.

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Materials and methods

This was a retrospective study approved by our Committee on Human Research (approval number H11982-32617-01), with waiver of the requirement for informed consent. Between May 2004 and July 2008, the senior author identified 9 patients in whom ERCP images showed an eccentric mural-based filling defect in the distal common bile duct that was transient and not present on subsequent imaging ($n = 8$) or surgically proven to be non-pathological in nature ($n = 1$). Clinical and imaging findings were recorded by review of all available medical and radiological records. In particular, a history of hepatobiliary disease, prior bile duct intervention such as sphincterotomy, and the presence of stones in the common duct were recorded. The maximum diameter of the finding, the number of images that showed the finding, the number of images on which the distal common bile duct was opacified, and the total number of images were determined by the senior author (FVC) and the principal investigator (JHT) by review of all images on a picture archiving and communication system workstation (Impax; Agfa, Mortsels, Belgium).

Results

The clinical and imaging characteristics of the 9 patients in the study are summarized in Table 1. In all patients, an eccentric mural-based filling defect in the distal common bile duct was visualized on at least one ERCP image, which was not present on subsequent imaging ($n = 8$; Figs 1–3) or was proven to be non-pathological in nature at surgery ($n = 1$; Fig 4). Patients 1 and 4 showed a filling defect without clear visualization of the inferior border (Fig 2). The remaining 7 patients showed a discrete filling defect with at least partial outlining of the inferior border. None of the patients demonstrated significant bile duct dilatation proximal to the radiographic finding.

Discussion

The findings in these 9 patients suggest that an eccentric mural-based filling defect in the distal common bile duct can be artifactual in nature, as documented by the transience on imaging or absence of pathology at the time of surgery. This highlights the need to interpret abnormalities of the distal common bile duct seen on static ERCP images with caution, particularly if only a limited number of images are available. If the etiology of a distal common bile duct finding is uncertain, close inspection of remaining images, repeat ERCP, or correlation with cross-sectional imaging such as CT MRI, or endoscopic ultrasound may be helpful in making this determination [1].

Given that only one of the nine patients went to surgery (and no pathological abnormality was found), the anatomic basis of the pseudotumor appearance in this series is largely speculative. That said, we believe the transient nature of the finding in the 8 non-surgical patients suggests that the etiology may be related to contraction of the sphincter of Oddi. Additionally, the lack of bile duct dilatation proximal to the lesion suggests that the finding does not represent a true obstruction. We observed that many of our patients had prior hepatobiliary pathology or intervention; the extent to which this may have altered motility or contraction dynamics in the distal common duct is unknown. Another possible explanation is that patients had an adherent stone in the duct which passed in the interval between images, although the lack of stones in five patients and the mural-based nature of the imaging finding in all patients would argue against this explanation. There are also a variety of technical factors which may mimic lesions in the bile duct on ERCP including introduction of air bubbles [2] or physical impaction of the scope into the ampulla. When the bile duct is cannulated, it is possible that the force of the cannula pushes the ampulla into the lumen of the duct and causes the bile duct to deform and buckle creating a filling defect.

This filling defect may resolve with movement or removal of the scope. Communication between the radiologist and endoscopist may help clarify the nature of such artifacts.

Our study provides a contemporary update to earlier studies describing the so-called “pseudocalculus sign” in the distal common duct on endoscopic, percutaneous, intra-operative, and MR cholangiopancreatography [3–6]. The “pseudocalculus sign” is a smooth or irregular convex upward termination of the distal bile duct (compared to the eccentric focal narrowing seen in the pseudotumor in our case series) that mimics a distal bile duct calculus at cholangiography. One study attributed the findings to motion artifact caused by pulsation of the inferior vena cava [7]. Previous studies also believe that the finding is due to transient physiologic contraction of the sphincter of Oddi. Wertheimer et al. described the finding and how it could be distinguished from a true calculus on dynamic ERCP [8]. More recently, dynamic MR cholangiopancreatography has been used to visualize real time common duct contractile activity [9]. When reviewing static images, if the stricture resolves on later imaging, or if the inferior border cannot be visualized [4], then the finding is more likely due to contraction of the bile duct rather than stone or stricture. We observed the latter in only two of our cases. Other causes of an artifactual filling defect or “pseudocalculus” at cholangiography include insertion of the cystic duct or posterior compression from the right hepatic artery [10–12], though these etiologies will usually result in a pseudocalculus in a more proximal segment of the common duct rather than in the distal common duct.

Our report has several limitations. First, it is a retrospective review of cases collected by a single radiologist at one center. The images reviewed were static and therefore we could not evaluate any dynamic changes in the pseudotumor that might have been evident at fluoroscopy. Our study only included 9 cases. The patients were not selected systematically and we do not know how often this pseudotumor is seen on ERCP. Further research would be required to address these deficiencies.

In conclusion, an eccentric mural-based filling defect in the distal common bile duct can be artifactual in nature and may reflect transient contraction of the sphincter of Oddi.

Acknowledgments

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Figure 1.

Fig. 1A- ERCP image from a 60 year woman with abdominal pain (patient #8, Table 1) showing eccentric narrowing (arrow) of the distal common bile duct.

Fig. 1B- Subsequent image during the same study shows resolution of the finding. Patient later underwent a laparoscopic cholecystectomy for acute cholecystitis, with a normal intraoperative cholangiogram.

Figure 2.

Fig. 2A- ERCP image in a 59 year man (patient #4, Table 1) with a history of liver transplantation. A filling defect of the distal common bile duct (arrow) is seen without visualization of the inferior border.

Fig. 2B- Subsequent image during the same study shows resolution of the finding.

Figure 3.

Fig. 3A- ERCP image in a 66 year old woman (patient #6, Table 1) with abdominal pain and a history of cholecystectomy and sphincterotomy. A filling defect of the distal common bile duct (arrow) is seen.

Fig. 3B- Subsequent image during the same study shows resolution of the finding.

Figure 4. Photomontage of three successive images from an ERCP in a 66 year old man with abdominal pain and jaundice (patient #9, Table 1). An apparent eccentric filling defect (arrow) is seen in the distal common duct on the final image. Pancreatoduodenectomy was performed for suspected intraductal cholangiocarcinoma. No tumor was found in the specimen.

Table 1

#	Age	Other biliary disease or intervention	# ERCP Images		Maximum dimension of pseudotumor (mm)	Resolution of pseudotumor
			Pseudo tumor visible	Distal common bile duct opacified		
1	51	Pancreas divisum, sphincterotomy	1	5	10	Resolved on the same ERCP
2	73	Proximal common bile duct stone	2	4	9	Resolved on the same ERCP and had subsequent normal intra-operative cholangiogram
3	39	Chronic pancreatitis	4	4	7	Not seen on subsequent ERCP
4	59	Liver transplant	2	3	9	Resolved on the same ERCP
5	57	Biliary stents, sphincterotomy	1	1	10	Not seen on subsequent ERCP
6	31	Gallstone pancreatitis, sphincterotomy, gravel/debris removed by ERCP	2	4	11	Resolved on the same ERCP
7	66	Sphincterotomy, removal of stone fragments on ERCP	1	4	5	Resolved on the same ERCP
8	60	Sphincterotomy	1	7	7	Resolved on the same ERCP and had subsequent normal intra-operative cholangiogram
9	66	None	4	4	10	Normal surgical pathology