

Case Report

Fenestration of the Main Pancreatic Duct. The First Description

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1. Abstract

1.1. Aim: To show the unique aberrant anatomy - fenestration of the main pancreatic duct, identified by additional radiological study of the pancreas.

1.2. Method: Retrospective analysis of the case of bifurcation of the main pancreatic duct with the help of by multi-planar and 3-D reconstructions of the abdominal CT scans.

1.3. Results: The first case of fenestration of the main pancreatic duct was described.

1.4. Conclusion: Detection of MPD fenestration can be more frequent if preoperative multi-planar and 3D- reconstruction of the whole pancreas is systematic in cases of MPD bifurcation.

2. Abbreviations: CT: Computed tomography; MPD: Main pancreatic duct; MRCP: Magnetic resonance cholangio pancreatography

3. Keywords: Main pancreatic duct; Pancreatic imaging; Pancreatic duct bifurcation; Pancreatic duct fenestration; pancreatic CT

4. Case Report

A 56-year-old woman was admitted to oncology department for treatment of pancreatic cancer. In addition to resectable pancreatic head tumor spreading to the pancreatic neck preoperative CT revealed the bifurcation of the Main Pancreatic Duct (MPD) at the level of body and tail (Figure 1). Whipple procedure with the pancreatic body excision (Figure 2) was performed and operative exploration of the cut surface of the pancreatic remnant identified two ducts orifices 2 and 1 mm in diameter (Figure 2, 3). Both ducts were stented before invagination anastomosis, the procedure and postoperative period were uneventful. Histopathological examination of the resected specimen confirmed as the ductal adenocarcinoma of the pancreatic head and neck, so as two ducts orifices at the cut surface on the background of chronic pancreatitis of the tail.

Taking into consideration this extremely rare pancreatic duct aberration, preoperative CT scans were reevaluated with the help of multi-planar and 3-D reconstructions. The retrospective analysis of CT revealed duct aberration which was never described before – so called “fenestration” of the MPD, i.e. its bifurcation at the body-tail level with the consequent fusion in one duct at the tail level with formation of the “window” between the branches of split duct (Figure 4, 5).

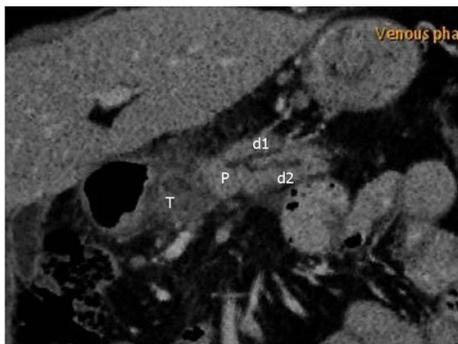


Figure 1:MDCT, venous phase, coronal view. Bifurcation of the MPD at the level of pancreatic tail-body. T-tumor, P-pancreas, d1 и d2 – branches of the MPD for all pictures.

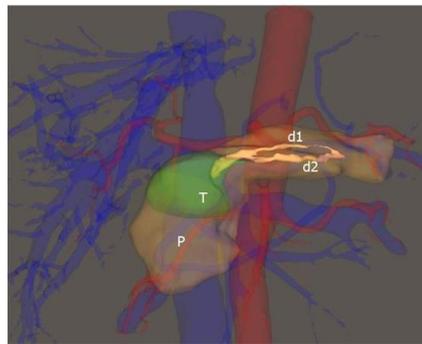


Figure 5: Colored MDCT-based 3-D. Reconstruction of the pancreas, MPD, fenestration of the main pancreatic duct made with the Auto plan@software.



Figure 2: Picture of the operating field after Whipple procedure with the removal of the pancreatic body. There are two ducts orifices 2 and 1 mm in diameter at the cut surface of the pancreatic remnant.

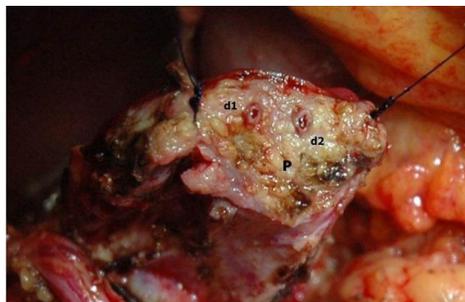


Figure 3: Magnified (X 2) picture of the operating field after Whipple procedure with the removal of the pancreatic body. There are two ducts orifices 2 and 1 mm in diameter at the cut surface of the pancreatic remnant.

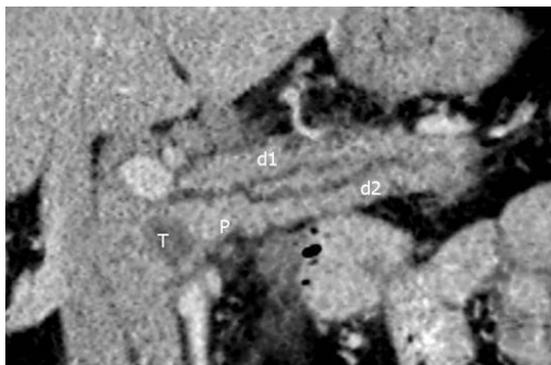


Figure 4: MDCT, delayed phase. Multi-planar curved reconstruction. Fenestration of the MPD at the level of the pancreatic tail and body.

5. Discussion

The different types of pancreatic duct abnormalities develop because of specialties of its embryogenesis. At the 4th week of gestation the dorsal and ventral portions of the pancreas form from the dorsal and the ventral outpouchings of the foregut. During foregut elongation the pancreatic portion of the ventral outpouching is displaced to the right, and the dorsal outpouching is displaced to the left. The pancreatic portion of the ventral outpouching rotates dorsally. During the 8th week of gestation the ventral pancreas and common bile duct come to lie caudad to the dorsal pancreas. After that, the dorsal and ventral portions of the pancreas fuse along with its ducts. The most common variant is the pancreas draining through the fused dorsal and ventral pancreatic ducts through the major papilla [1]. Such a complicated way of pancreas forming is a reason of large number of duct aberrations.

In that case we consider that “fenestration” is the most appropriate term for aberration depiction. The term “fenestration” is commonly used for description in vascular and nerve anatomy [2, 3]. Fenestration is the division of the vessel or nerve into two separate and parallel branches which rejoin distally. In this way, bifurcation of pancreatic duct at the body-tail level with the consequent fusion in one duct at the tail level could be named “pancreatic duct fenestration”. At the same time, bifurcation of MPD (the division into two branches) in the tail and body is a very rare event (appr.0, 9-1, 4% of ERCP for symptomatic patients) [4-9] and in contrast to duct aberration of the pancreatic head [10] has no reliable statistics, classification [11] and developmental explanations [12,13]. Therefore, clinical significance of this anatomical variant is unclear. Nevertheless, the information about the possibility of MPD fenestration at the body-tail level will be useful as for surgeon, when planning any kind of proximal or distal pancreatic resection (including enucleation), so as for gastroenterologist, when planning MPD draining or stenting. Possibly, detection of MPD fenestration can be more frequent if preoperative multi-planar and 3D- reconstruction or MRCP [14] of the whole pancreas is systematic in cases of MPD bifurcation.

6. Conclusion

Fenestration of the main pancreatic duct is a rare pancreatic duct aberration and may represent a potential pitfall in preoperative characterization of individual anatomy of the pancreas, which can be important in planning the volume and type of surgery.

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