

## Pancreas Divisum and Acute or Chronic Pancreatitis

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The role of pancreas divisum as a pancreatic ductal anomaly able to induce acute or chronic pancreatitis is still under debate; some authors consider the pancreas as a variant of the pancreatic ductal system able to induce acute or chronic pancreatitis as a result of relative outflow obstruction [1, 2, 3], whereas others consider this finding a simple morphological anomaly of the pancreatic ductal system without any clinical consequence [4, 5, 6].

Based on the results of a multicenter prospective study carried out in Italy which enrolled 1,173 patients with acute pancreatitis, it was found that only 2 patients had pancreas divisum diagnosed on the basis of endoscopic retrograde cholangiopancreatography (ERCP) findings [7]. In Italian chronic pancreatitis patients, pancreatic ductal abnormalities were detected in 6% of the patients (49 out of 865 patients: complete pancreas divisum in 41 patients, incomplete in 6, and annular pancreas in the remaining 2) [8]. The two problems of pancreas divisum remain: what is the best imaging technique for diagnosing it and then to assess whether or not it is caused by acute or chronic pancreatitis?

For many years ERCP has been considered the only technique able to diagnose pancreas divisum and recently, Asayama *et al.* have confirmed that ERCP is superior to multi-detector row computed tomography (MDCT) in assessing the presence of a ductal anomaly compatible with pancreas divisum [9]. They retrospectively assessed the diagnostic performance of MDCT in an evaluation of pancreas divisum using ERCP as the reference standard, and analyzed 41 consecutive patients (14 cases having pancreas divisum and 27 cases having standard anatomy) who had undergone both MDCT and ERCP for the evaluation of

clinically diagnosed acute pancreatitis. Ductal anatomy was correctly diagnosed by MDCT in 23 of the 41 cases (56.1%). Eight of the 14 cases (57.1%) were correctly diagnosed by MDCT as pancreas divisum. Standard anatomy was identified in 15 of the 27 cases (55.6%). The inter-observer agreement was substantial. According to the Balthazar criteria, pancreatitis of grade B or higher and the presence of pancreatic necrosis significantly influenced the evaluation of ductal anatomy, and pancreas divisum was correctly diagnosed in the case of Balthazar grade A acute pancreatitis.

Regarding the possibility of pancreas divisum as an etiological factor of acute or chronic pancreatitis, French authors [10] evaluated the frequency of pancreas divisum diagnosed using magnetic resonance cholangiopancreatography (MRCP) in patients with recurrent acute or chronic pancreatitis of unknown origin after exclusion of all known causes and they also tested the hypothesis of an interaction between anatomical and functional genetic anomalies (SPINK1, PRSS1, or CFTR gene mutations or polymorphisms). Patients with alcohol-induced pancreatitis and subjects who underwent MRCP for a non-pancreatic disease were used as controls. The frequency of pancreas divisum was 7% in subjects without pancreatic disease, 7% in patients with alcohol-induced pancreatitis, and 5%, 16%, 16%, and 47% in those with idiopathic, and PRSS1-, SPINK1-, and CFTR-associated pancreatitis, respectively. The frequency of pancreas divisum was higher in patients with CFTR gene-associated pancreatitis as compared to those with idiopathic and alcoholic pancreatitis and with those with SPINK1 and PRSS1 gene-associated pancreatitis. These findings seem to demonstrate that pancreas divisum by itself is not a cause of pancreatitis and other factors are required, such as genetic factors, to induce acute or chronic pancreatic diseases.

In conclusion, the answers to the previously posed questions are that the best imaging techniques to diagnose pancreas divisum are ERCP or MRCP, and that this pancreatic ductal anomaly does not cause acute or chronic pancreatitis.

**Key words** Cholangiopancreatography, Endoscopic Retrograde; Cholangiopancreatography, Magnetic Resonance; Multidetector Computed Tomography; Pancreas /abnormalities; Pancreatitis, Acute Necrotizing; Pancreatitis, Chronic

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**Conflict of interest** None

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