

MRI and MRCP features of chronic pancreatitis associated with pancreas divisum abnormality: a correlation with patient age

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Aims and objectives

Pancreas divisum (PD) is the most common congenital anomaly of the pancreatic ductal system (1).

It results from a failure of the two pancreatic buds, the ventral and the dorsal buds, to fuse during the seventh week of gestation (2).

The clinical significance of pancreas divisum is still controversial.

It occurs in 4-10% of the general population.

Most people with pancreas divisum are asymptomatic (3) and PD is detected incidentally on imaging.

Several studies, however, have shown a higher frequency of chronic abdominal pain, recurrent acute pancreatitis or chronic pancreatitis in patients with pancreas divisum (4,5).

Our hypothesis was that patients with pancreas divisum abnormality would develop chronic pancreatitis (CP) in the dorsal pancreas earlier than in the ventral pancreas. The aim of our study was to describe the MRI and MRCP features of chronic pancreatitis (CP) in patients with pancreas divisum (PD) and their relationship with patient age.

Methods and materials

This is an IRB-approved retrospective study.

We reviewed 86 patients (41 male and 45 female, aged 16-85 years; mean age 53 years) with PD and symptomatic chronic pancreatitis who underwent MRI and MRCP at our institution between January 2013 and December 2016.

Patients were stratified by age in three groups: <40 years (26 patients; M:16, F:10), 41-60 years (27 patients; M:11, F:16), >60 years (33 patients; M:14, F:19).

Two readers in consensus evaluated the following parenchymal features: thickness of the organ, regularity of the margins, signal intensity on T1-FS images, and enhancement.

The readers also assessed ductal changes: irregularity of the main pancreatic duct (MPD), dilation/stricture of the MPD, branch-ducts dilation and filling defects.

All MRI features were compared across age groups by using Chi-square test.

Results

74 patients were affected by complete PD and 12 by incomplete PD.

Hypointensity in T1 sequences and irregularity of the main pancreatic duct were significantly more often limited to dorsal pancreas in patients aged <40 ($p=0.03$; $p=0.02$) while the entire pancreas was significantly involved in patients aged >60 (Fig.1;Fig.2). Isolated dorsal T1-hypointensity was observed in 86% of the patients aged <40 while involvement of the entire pancreas was observed in 50% of the patients aged >60 (Tab.1).

Increasing age was significantly associated with reduction in parenchymal thickness ($p=0.0082$), irregularity of parenchymal margins and branch-ducts dilatation ($p=0.0002$), but not with parenchymal hypointensity in T1 sequences ($p=ns$) (Fig.3).

When the reduction in parenchymal thickness was mild, there were no significant differences in distribution in the organ between the age groups ($p=ns$). When the reduction was more severe, the entire pancreas was involved in the older patients compared to a more limited involvement in younger patients ($p<0,001$).

Dorsal involvement of the MPD was observed in 89% of patients aged <40 (Tab.2).

Branch-duct dilatation was significantly associated with increasing age ($p=0.0001$), while no difference was observed in the site of dilatation.

Images for this section:

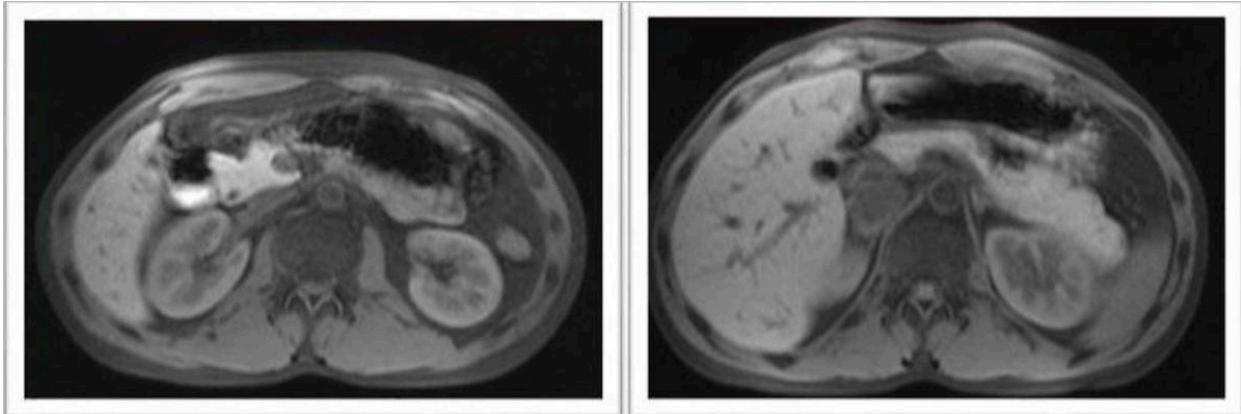


Fig. 1: 23-year-old man with PD abnormality and history of acute recurrent pancreatitis. Axial Fat-sat T1WI: the pancreas is normal in size, but signal intensity is slightly reduced in the body/tail compared to the head.

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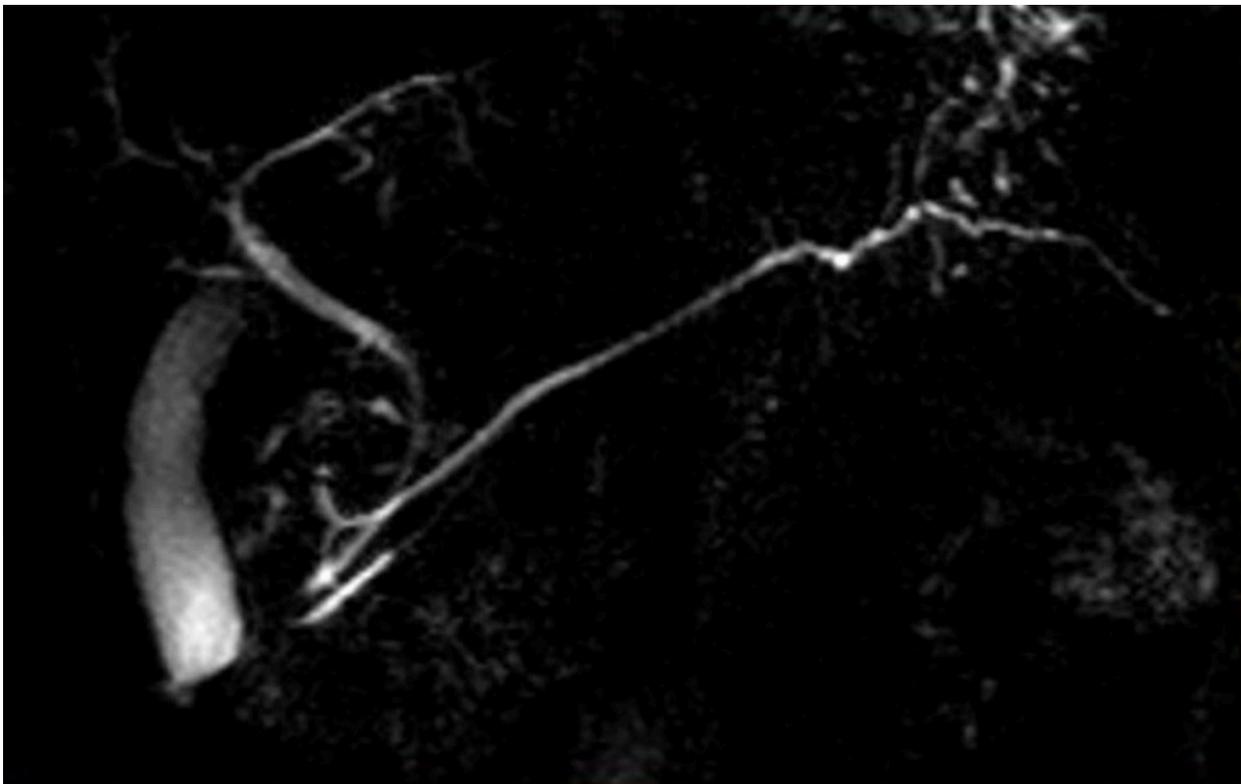


Fig. 2: 27-year-old woman with PD abnormality and history of acute recurrent pancreatitis. MRCP: The main pancreatic duct is slightly irregular in the tail; branch-ducts dilation is also noted.

	DORSAL INVOLVEMENT	VENTRAL INVOLVEMENT	GLOBAL INVOLVEMENT
<40 years	89%	0%	11%
40-60 years	89%	5%	5%
>60 years	64%	0%	36%

Table 1: Frequency of irregularity of the main pancreatic duct based on site of pancreas involvement.

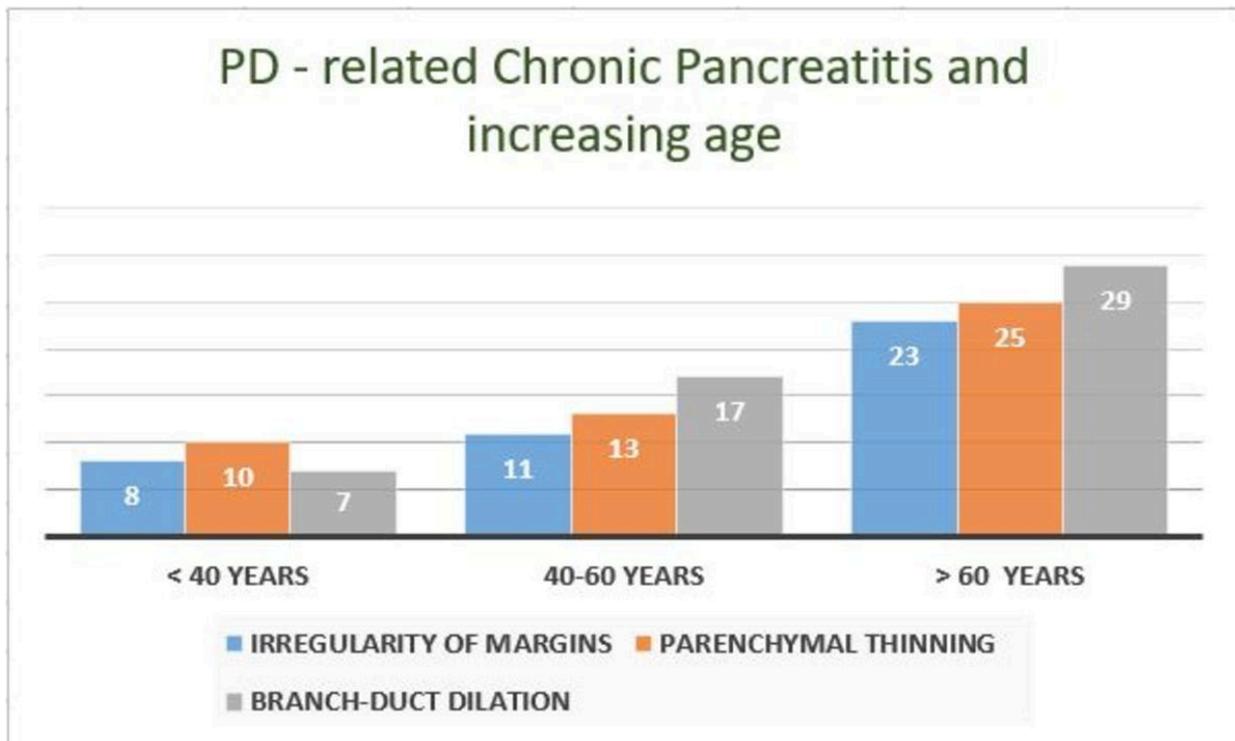


Fig. 3: PD-related Chronic Pancreatitis and increasing age

	DORSAL INVOLVEMENT	VENTRAL INVOLVEMENT	GLOBAL INVOLVEMENT
<40 years	86%	0%	14%
40-60 years	89%	0%	11%
>60 years	43%	7%	50%

Table 2: Frequency of hypointensity on T1-weighted sequences based on site of pancreas involvement.

Conclusion

Patients with PD develop chronic pancreatitis in the dorsal pancreas earlier than in the ventral pancreas, and morphological alterations are significantly associated with increasing patient age.

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