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Case Report

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Sonographic Detection of Small Precursor Lesion of the Pancreas: A Case Report and Literature Review

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Abbreviations:

PC: Pancreatic Cancer; PanIN: Pancreatic Intraepithelial Neoplasia; CEUS: Contrast-Enhanced Sonography; US: Ultrasonography; CT: Computed Tomography; MRI: Magnetic Resonance Imaging; EUS: Endoscopic Ultrasonography; IPMN: Intraductal Papillary Mucinous Neoplasm; MCN: Mucinous Cystic Neoplasm

1. Abstract

Pancreatic Cancer (PC) remains consistently one of the leading causes of cancer-related death, with a poor 5-year survival rate of less than 10 %. However, if PC is detected in the early stage, a favorable outcome is expected. Accurate detection of small PCs or precursor lesions is clinically very important. Pancreatic Intraepithelial Neoplasia (PanIN) is a representative precursor of PC. We present a case in which focal pancreatic duct dilatation and focal chronic pancreatitis-like fibrosis, both are considered as histologic changes of PanIN, were clearly detected by Contrast-Enhanced Sonography (CEUS), suggesting that CEUS can detect PC in the early stage.

2. Introduction

Today, the number of patients with Pancreas Cancer (PC) is rapidly increasing worldwide [1], and ranks one of the top five among all human cancers. A survey by the Japanese Pancreas Society published in 2012 showed an overall 5-year survival for PC patients of less than 10 % [2,3]. However, when treated if the lesion size is less than 10mm, the 5-year survival increases to 80.4% [3]. Thus, the best way for curing this lethal neoplasm is currently believed to be early detection of small-sized cancer or precursor lesion and resection at an early time. Pancreatic Intraepithelial Neoplasia (Pan IN) is thought to be a precursor lesion of PC [4]. We present a case in which focal pancreatic duct dilatation and focal chronic pancreatitis-like fibrosis, both are considered as histologic changes of PanIN were clearly detected by Contrast-Enhanced Sonography (CEUS).

3. Case Report

A small hypoechoic area was detected by Ultrasonography (US) performed as part of regular health check in a 55-year-old woman, and the patient visited our hospital for a further examination of the lesion. She had no past history or family history. Furthermore, she was a non-smoker and non-drinker, with no history of medications, including supplements. The patient also had no history of blood transfusion or metabolic abnormalities. Her physical examination was normal, and blood test results were normal, including tumor markers (carbohydrate antigen19-9: 12.0U/ml, carcinoembryonic antigen: 1.0ng/ml). Abdominal US showed an 8 x 9 mm

ill-margined hypoechoic area (Figure 1A) in the pancreatic body. Additionally, the pancreas was minimally atrophied in this area. Otherwise, the abdomen was normal; there were no signs suggesting chronic pancreatitis, such as coarse echo parenchyma, small stones, or main pancreatic duct dilatation.

Detection of this small lesion was difficult by Computed Tomography (CT) or Magnetic Resonance Imaging (MRI). CEUS showed the area to be homogeneously is enhanced (compared with the surrounding pancreatic tissue) in arterial phase (Figure 1B) and slightly hypo enhanced in delayed phase (Figure 1C). Fine needle aspiration under Endoscopic Ultrasonography (EUS) showed no malignancy (class II). A summarized results led us to the conclusion that although PC was not confirmed, there remained a possibility of early PC or its precursor lesion. An intensive discussion about treatment option led us to exploratory surgery and a white small mass was resected. Histologically, the fibrosis extended into the adjacent periductal soft tissue, causing stenosis of the peripheral pancreatic duct, and the lesion was diagnosed as PanIN-2 (Figure 2). The postoperative course was uneventful.

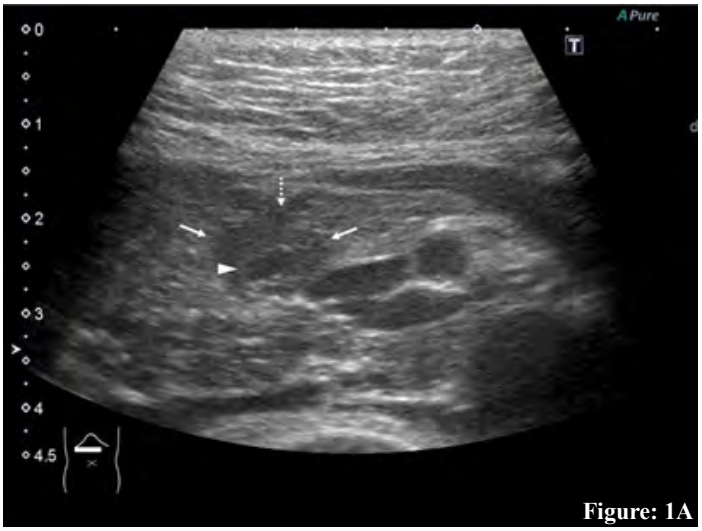

Figure: 1A

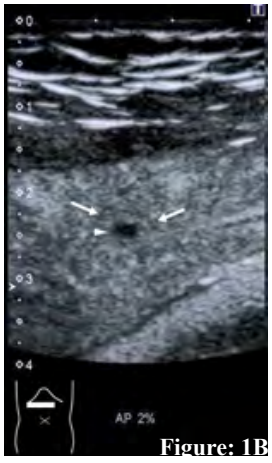

Figure: 1B

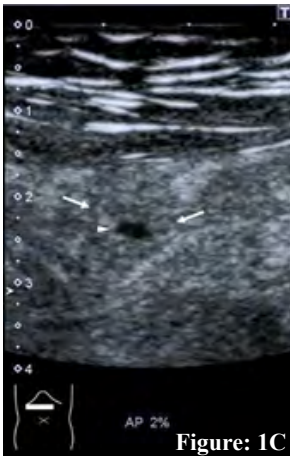

Figure: 1C

Figure 1: US images of the lesion

Figure 1A: Grayscale US shows an 8x9mm hypoechoic area (arrows) including a 4x3mm cyst in the pancreas body (arrow head). See pancreatic margin is slightly deformed (dotted arrow).

Figure 1B: CEUS shows the area (arrows) to be homogeneously enhanced in arterial phase. Segmentary dilatated peripheral branch of pancreatic duct (arrow heads).

Figure 1C: The area (arrows) is hypoenhanced in later phase. Segmentary dilatated peripheral branch of pancreatic duct (arrow heads).

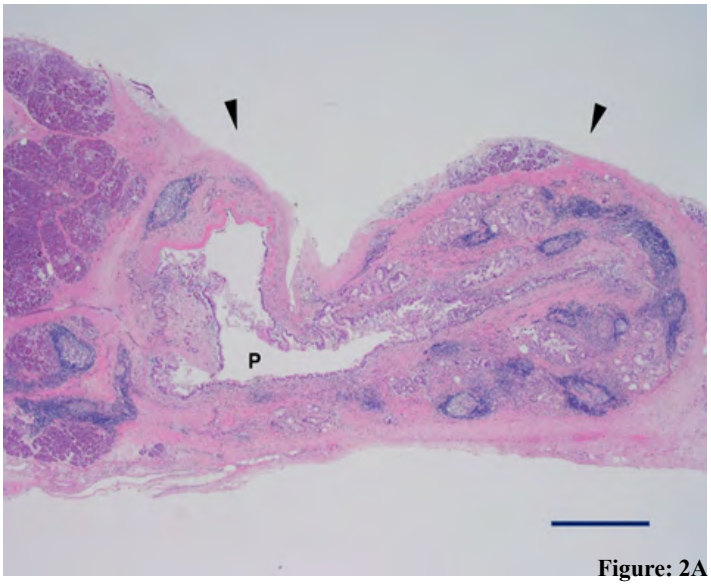

Figure: 2A

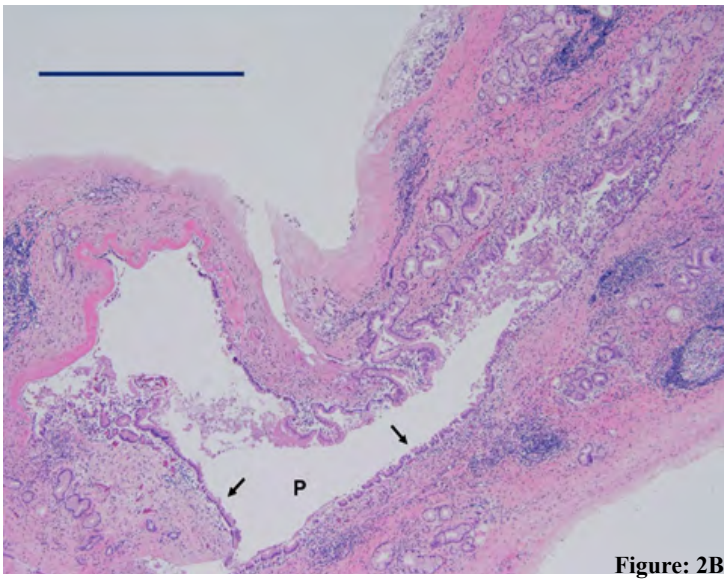

Figure: 2B

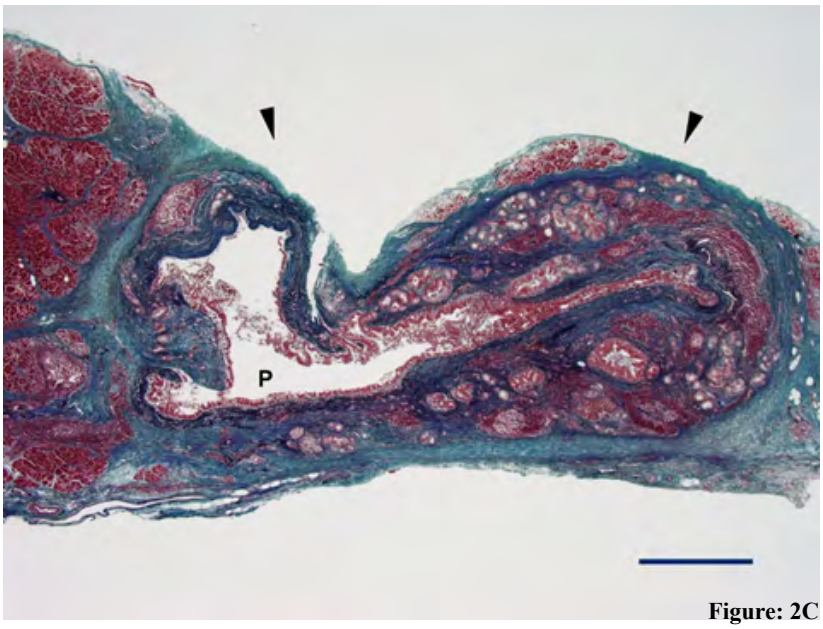

Figure: 2C

Figure 2: Histology of the lesion Peripheral pancreatic duct (P) is focally dilated by compression of chronic pancreatitis-like fibrosis (arrow heads). Mild nuclear atypia in the low papillary structures of the pancreatic ductal epithelium (arrows). The magnification bar: 1mm.

Figure 2A, B: Hematoxylin-eosin staining.

Figure 2C: Elastica-Masson staining.

4. Discussion

PC is an extremely lethal cancer, but a better prognosis has been reported for complete resection of early small localized lesions [5]. Roughly speaking, there are three recognized precursors of PC: Intraductal Papillary Mucinous Neoplasm (IPMN), Mucinous Cystic Neoplasm (MCN), and PanIN [6,7]. Compared with the former two pathologies, medical imaging findings of PanIN have been rarely reported [8]. PanINs are multistep and progressive and divided into three grades: PanIN-1 (minimal atypia); PanIN-2 (moderate atypia), and PanIN-3 (severe atypia), according to the degree of cytologic and architectural atypia [4,9]. Some detailed histology studies showed PanINs are frequently associated with lobular parenchymal atrophy and chronic pancreatitis-like changes [10], as was observed in the present case. Early detection and resection of high-grade precursor, including PanIN is expected to yield a favorable outcome [4]. Thus, the most useful strategy to ameliorate outcome lies in identifying precursor lesions through a routine clinical examination of asymptomatic individuals.

In clinical practice, CT is the mostly recommended diagnostic tool for PC. However, the problem is that the lesion is frequently in apparent at early stage, as was observed in this case [8]. Many institutions recommend EUS as the most suitable for diagnosing small pancreatic lesions [8,11]. However, this method is slightly invasive and not suitable for use in outpatient clinics. Currently

CEUS is not included in the recommended modality for diagnosis of pancreas lesions, probably it is not so widely used [12]. CEUS allows non-invasive assessment of normal and pathologic perfusion of the pancreas in real-time throughout the vascular phase,without use of irradiation and with a much higher temporal and spatial resolution than CT and MRI [13]. There is a marked paucity of CEUS findings of PanIN in the literature. In this case, the PanIN lesion was clearly imaged as a focal fibrotic area and associated peripheral cystic area (focal peripheral branch dilatation), corresponding to the histology. On US, the chronic pancreatitis-like fibrotic area showed similarities with that of reported chronic pancreatitis-associated pseudo-mass (hypoechogenecity in conventional US and is enhancement in CEUS arterial phase [14]. The present case suggests that as our knowledge of PanIN lesions grows, CEUS could become an effective diagnostic tool of PanINs.

5. Conclusion

Literature on pancreas histology tends to describe concept and characteristics of PanINs, with very limited information provided to guide clinicians and radiologists in deciding how these lesions are visualized on first-line imagings. The present case suggests PanIN may be associated with focal chronic pancreatitis-like fibrosis and stenosis of the peripheral pancreatic duct, and this minimal histological change can be detected by CEUS. The present case adds to supplement the limited literature data describing the use of CEUS for imaging PanINs.

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