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SPECIAL FEATURE: EDITORIAL

Ultrasonographic diagnosis of pancreatic diseases: this is all you need

Yoshiki Hirooka[1] · Senju Hashimoto[1] · Ryoji Miyahara[1]

Introduction

Pancreatic tumors, especially pancreatic cancer, are recognized as being representative of tumors with a poor prognosis. According to Projection of Cancer Mortality and Incidence in 2019 based on the latest statistics (CANCER STATISTICS IN JAPAN-2019) from the Foundation for Promotion of Cancer Research [1], the number of deaths due to pancreatic cancer ranks 4th (4th for men, 3rd for women) among all cancers. Excluding lung cancer, it ranks 3rd (3rd for men, 2nd for women). In the United States, the number of deaths due to pancreatic cancer is predicted to rank 2nd after lung cancer within the next 10 years if the current situation continues. According to the Clinical Practice Guidelines for Pancreatic Cancer 2019 [2] published by the Japan Pancreas Society in 2019, the first step for diagnosis of pancreatic cancer is transabdominal ultrasonography (TUS), while the second step is endoscopic ultrasonography (EUS).

Diagnosis of pancreatic cancer includes diagnosis of the presence of a lesion and the differential diagnosis. Ultrasound diagnosis primarily includes two modalities: TUS and EUS.

In this feature, we roughly divided pancreatic tumors into solid tumors and cystic tumors, and we had specialists of each type to describe the role of TUS and EUS in the diagnosis of each type. We also had the specialists touch on ultrasound elastography, which has received attention in recent years for its usefulness in diagnosing pancreatic lesions.

Pancreatic solid tumors

We had Sofuni et al. [3] and Yamashita et al. [4] discuss pancreatic solid tumors.

Sofuni et al. [3] have provided a detailed description of diagnosis of pancreatic solid tumors using TUS. First, they describe how to depict a solid tumor from the standpoint of the anatomy of the pancreas using TUS. Next, they explain how to interpret B-mode images, which are fundamental to ultrasound diagnosis, from three points of view: (1) shape of the contour, (2) nature of the internal echo, and (3) change in images of the pancreatic duct. They then provide a detailed description of B-mode images of pancreatic cancer (PC), mass-forming pancreatitis (MFP), autoimmune pancreatitis (AIP), pancreatic endocrine tumors (PNET), and solid pseudopapillary neoplasms (SPN) with example images. In the second half of the article, they touch on diagnosis of the above lesions using contrast-enhanced ultrasonography (CEUS).

Yamashita et al. [4] have provided a detailed description of diagnosis of pancreatic solid lesions using EUS. EUS allows observation of the lesion from up close with its high frequency as compared with TUS. It is more invasive than TUS, but it provides more detailed images. Like TUS, they also describe the usefulness of contrast-enhanced harmonic EUS. One could argue that diagnosis that takes into account hemodynamics is indispensable for diagnosis of pancreatic lesions. They also provide a detailed description of methodologies and applications of EUS-guided fine needle aspiration (EUS-FNA), a modality for puncturing a target lesion under EUS guidance and collecting a histopathological sample. They touch on the utility of diagnosis with a combination of EUS-FNA and contrast-enhanced harmonic EUS, as well.

The article by Sofuni et al. [3] and that by Yamashita et al. [4] cover almost everything related to diagnosis of pancreatic solid tumors. We are sure that they will be useful in your research and when writing conference presentations and papers for publication going forward.

✉ Yoshiki Hirooka
yoshiki.hirooka@fujita-hu.ac.jp

[1] Department of Gastroenterology and Gastroenterological Oncology, Fujita Health University, 1-98 Dengakugakubo, Kutsutake-cho, Toyoake, Aichi 470-1192, Japan

Pancreatic cystic lesions

Hashimoto et al. [5] and Ohno et al. [6] have provided detailed descriptions of TUS and EUS, respectively, for pancreatic cystic lesions.

Hashimoto et al. [5] first point out the importance of risk factors for pancreatic cancer, stating that the presence of a pancreatic cyst is a clear risk factor for onset of pancreatic cancer, and that the differential diagnosis of pancreatic cystic lesions is, therefore, important. In the case of TUS, they mention the usefulness of tissue harmonic imaging (THI), in which the contour of the target becomes clear and artifacts disappear. They mention the advantage of the cyst portion, in particular, becoming clear by using THI.

They emphasize that CEUS is useful for diagnosing pancreatic cystic lesions, as well. They emphasize that a more accurate diagnosis can be made by combining B-mode images including THI with CEUS. Hashimoto et al. [5] have provided a detailed description of diagnosis of intraductal papillary mucinous neoplasms (IPMN), mucinous cystic neoplasms (MCN), serous neoplasms (SN) (also called serous cystic neoplasms (SCN)), pseudocysts, and other lesions. They also touch on lesions with cystic degeneration of a solid tumor. In a clinical setting, attention is required as it is sometimes difficult to differentiate between a cystic tumor and cystic degeneration of a solid tumor.

Ohno et al. [6] have provided a detailed description of diagnosis of pancreatic cystic lesions using EUS. The flowgram in Fig. 1 in their article is very easy to understand and will likely serve as a useful reference. The real-world examples of follow-up observation of each type of lesion are also presented in an easy-to-understand manner. The lesions covered in the article are the same as those described by Hashimoto et al. [5], but the article contains many useful findings that can only be obtained by a modality capable of depicting the detailed structure of a lesion. The importance of the combination of B-mode images and contrast-enhanced images is touched on in their article, as well. They also mention diagnosis using EUS-FNA and its associated techniques. They also discuss analysis of intracystic fluid collected by EUS-FNA and the latest techniques such as EUS fine needle-based cystoscopy and EUS fine needle-based confocal laser endomicroscopy.

Present status of ultrasound elastography

Kuwahara et al. [7] have provided a detailed description of the present status of elastography for the diagnosis of pancreatic tumors based on their own cases and a review of the literature. Ultrasound elastography is roughly divided into a technique that measures strain and a technique that determines shear wave velocity. There have been many articles written to date about both techniques, and they have concluded that they are useful for the diagnosis of pancreatic tumors. However, we cannot ignore the fact that reproducibility is an issue associated with both strain and shear wave elastography. We look forward to development of a technique with stable reproducibility in the future.

Conclusion

We have experts who provide detailed explanations of the present status of TUS and EUS for the diagnosis of pancreatic lesions (solid tumors and cystic tumors). This feature is both educational and may serve as a useful reference in the future when you prepare presentations and write papers about your research.

Added

Different papers may have different names for the same disease. In this special feature, I left the original text as it is to respect the originality of each person. This does not reduce the academic value of each article or the value of this special issue.

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