COMMENTARY
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Convex versus Radial Echoendoscopes - Comparison of Capability for Evaluating the Pancreatobiliary Junction

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See "Capability of Radial- and Convex-Arrayed Echoendoscopes for Visualization of the Pancreatobiliary Junction" by Yoshihide Kanno, Kei Ito, Shinsuke Koshita, et al., on page 274-278.

The echoendoscope (ES), which was developed in the 1980s, is used for the diagnosis and treatment of pancreatobiliary (PB) disease.[1-3] Endoscopic ultrasonography (EUS) is useful as a surveillance test in asymptomatic patients with high risk for PB malignancies.[4,5] The failure rate of EUS in diagnosing a PB lesion is known to be about 7%,[6] which is lower than the 20% failure rate for the diagnosis of colonic polyps. However, with a better understanding of the features of this novel equipment, a more accurate method is necessary to reduce the failure rates. Currently, there are two types of ES available, which have slightly different uses depending on their features. The radial ES can visualize structures in the vertical direction with a 360-degree viewing angle, while a convex ES can visualize structures in the parallel direction with a 180-degree viewing angle. Due to this difference, the position of both scopes would be different, when viewing the same structure. It is still debatable as to which scope is better for the diagnosis and treatment of pancreatic malignancies. When convex ES was first introduced, many endosonographers found it difficult to manage this type of scope because of its narrow field of view. However, with more experience, they are now more comfortable in interpreting the image. Convex ES are now thought to provide a better visualization of the head-body transition region of the pancreas and its vasculature, while radial ES is considered more suitable for the evaluation of ampullary lesions and the gallbladder.[6,7] However, there are very few published papers, directly comparing radial and convex ES in diagnosing PB malignancies, because of limited available centers and endosonographers skilled in both types of ES.

Kanno and colleagues[8] studied the comparison of radial and convex ES images at the PB junction, as a retrospective study. In all, 3,644 patients were enrolled in the study, including 1,660 cases with radial ES and 1,984 cases with convex ES. The rate of clear visualization of the PB junction was significantly higher with convex ES than that with radial ES (89.5% vs. 80%, $p<0.0001$). Cases in which PB junction was not visualized was 8.4% and 2.5% with radial and convex ES, respectively. These results suggested that visualization of the PB junction using a convex ES was more suitable than with a radial ES. This study showed that the rate of clear visualization would not be similar in evaluating diseases around the ampulla. However, the PB junction is the most important structure of the ampulla, and if the PB junction was well visualized, the detection rate of ampullary diseases might increase.

Regarding T staging in PB malignancies, there were several studies which reported similar results between radial and convex ES in the 1990s.[9,10] Gress and colleagues reported 94% and 88% accuracy in T staging with radial and convex ES,

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respectively.[9] In a meta-analysis, there was no difference in the accuracy of T staging between radial and convex ES.[10] In contrast, Jamil and colleagues[11] reported a significant discrepancy of 38% in T staging for pancreatic tumors between radial and convex ES, even in a small sample size (*n*=13). Recently, Kaneko and colleagues[7] compared radial and convex ES in PB lesions, including the surrounding vessels. Convex ES had better results in visualizing the vascular structure and upper bile duct, and radial ES had better results in visualizing the gallbladder and ampulla lesion. At another site outside the PB lesion, convex ES and radial ES showed similar results; however, convex ES had a longer procedure time (31 min vs. 28 min) than radial ES. Shin and colleagues[6] also compared radial and convex ES in pancreatic lesions. In this study, the failure rate was 9% for radial ES and 4% for convex ES during pancreatic cancer screening. Based on recent prospective randomized studies and this study, it was suggested that convex ES is better, compared to radial ES in the evaluation of pancreatic and biliary lesions, except those of the ampulla. However, a large-scale randomized controlled study is necessary to confirm this recommendation.

The present study had some limitations. It was a retrospective study and the period of enrolment was different between two groups. Moreover, different ultrasound processors were used between the groups. EU-ME2 (Olympus Co., Tokyo, Japan) was used in the convex group, and EU-ME1 (Olympus Co.) was used in the radial group. Additionally, the proportion of cases that were performed by trainees was slightly higher in the convex group than in the radial group (735/1,984 [37%] vs. 537/1,660 [32%]).

Nevertheless, convex ES might be used as a primary scope for evaluating the PB junction because it might be superior to radial ES for the diagnosis and surveillance in PB lesions and could be used for the management of PB diseases.

Conflicts of Interest

The authors have no financial conflicts of interest.

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