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Detection of Celiac Ganglia with Radial Scanning Endoscopic Ultrasonography

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Background/Aims : It has been recently reported that celiac ganglia can be identified by linear-array endoscopic ultrasonography (EUS). Still, there has been no report on the detection rate of celiac ganglia with radial scanning EUS. The aim of this study was to evaluate the detection rate of celiac ganglia by radial scanning echoendoscopy during a routine examination.

Methods : We prospectively enrolled 57 consecutive patients (23 men, 34 women; mean age 54 years, range 21-78 years) who were referred for EUS examination from September 2006 to December 2006. EUS was performed using a radial scanning echoendoscope. The size, location and EUS appearance of the celiac ganglia were recorded for each patient.

Results : Celiac ganglia were identified in 51 out of 57 patients (89.4%). They were identified at the left side of the celiac trunk and aorta and between the celiac artery and the left adrenal gland. They appeared as hypoechoic, oblong or lobulated structures, often with an irregular edge, and they often contained a hyperechoic focus or strand. The mean size was 18 mm by 4 mm. Structures corresponding to the visualized celiac ganglia were retrospectively identified on CT scans in 33 among the 37 patients (89.2%).

Conclusions : The results of this study showed that celiac ganglia could be identified, with radial scanning EUS, in the majority of subjects.

Key Words : Celiac ganglia; Endoscopic ultrasonography

INTRODUCTION

The major region of the sympathetic nervous system in the abdomen is the plexus of nerves extending along the front and sides of the entire length of the abdominal aorta. The celiac plexus is on the anterolateral side to the aorta at the T12-L1 level and contains 1-5 ganglia as well as a network of connecting neurons and neural rami[1, 2].

The celiac ganglia are composed of the postganglionic sympathetic nerve cell bodies within the celiac plexus[1, 3]. Recent studies have reported being able to identify the celiac ganglia with curved linear-array endoscopic ultrasonography (EUS) in the majority of patients[4, 5]. However, there are no reports on the detection rate of celiac ganglia with radial scanning EUS. The purpose of this study was to evaluate prospectively the detection rate of celiac ganglia using radial scanning echoendoscopy during routine examination. In addition, the EUS characteristics and the anatomical location of the celiac ganglia were evaluated.

MATERIALS AND METHODS

We enrolled 57 consecutive patients (23 men, 34 women;

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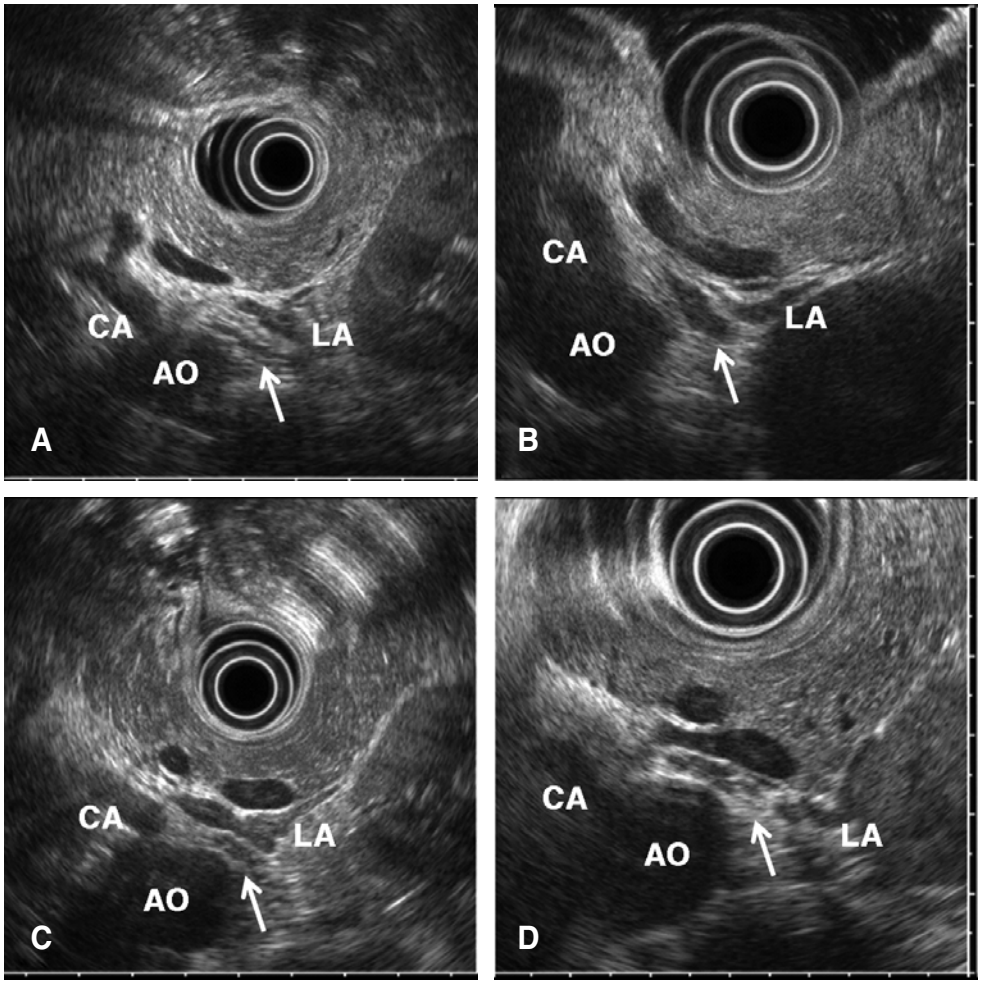

Figure 1. Radial scanning EUS images of celiac ganglia (arrows) from four patients (A to D). AO, aorta; CA, celiac artery; LA, left adrenal gland.

mean age 54 years, range 21-78 years) who were referred for EUS examination from September 2006 to December 2006. Each patient received both written and orally presented information about the study, and each consented in writing to participate. The indications for EUS included GI subepithelial lesion (25 patients), biliary diseases (16 patients), pancreatic diseases (6 patients), and cancer staging (10 patients).

The radial scanning echoendoscope used in this study was a GF-UM2000 echoendoscope (Olympus Co., Tokyo, Japan). EUS was performed by a single experienced operator (G.H. Kim) and the images were obtained at a frequency of 5 MHz. We excluded those patients in whom the echoendoscope could not traverse the gastroesophageal junction or those who had only an ultrasound probe used during the examination. The size, location and EUS appearance of the celiac ganglia were recorded for each patient.

Among all the patients in whom celiac ganglia were identified by EUS, contrast-enhanced CT scans were available for review in 37 patients. All the CT scans were retrospectively reviewed by one experienced CT radiologist (S. Kim).

RESULTS

EUS appearance of celiac ganglia

EUS structures consistent with the diagnosis of celiac ganglia were identified in 51 out of 57 patients (89.4%). The visualized celiac ganglia had a characteristic location and endosonographic appearance. All celiac ganglia were identified on the left side of the celiac trunk and aorta and between the celiac artery and the left adrenal gland (Figure 1A to 1B). They appeared as hypoechoic, oblong or lobulated structures, often with an irregular edge, and they often contained a hyperechoic focus or strand (Figure 1D). They ranged in size from 2 to 7 mm (mean, 4±1 mm) by 12 to 26 mm (mean, 18±8 mm). The distance from the celiac artery take-off was 4 to 18 mm (mean, 10±4 mm).

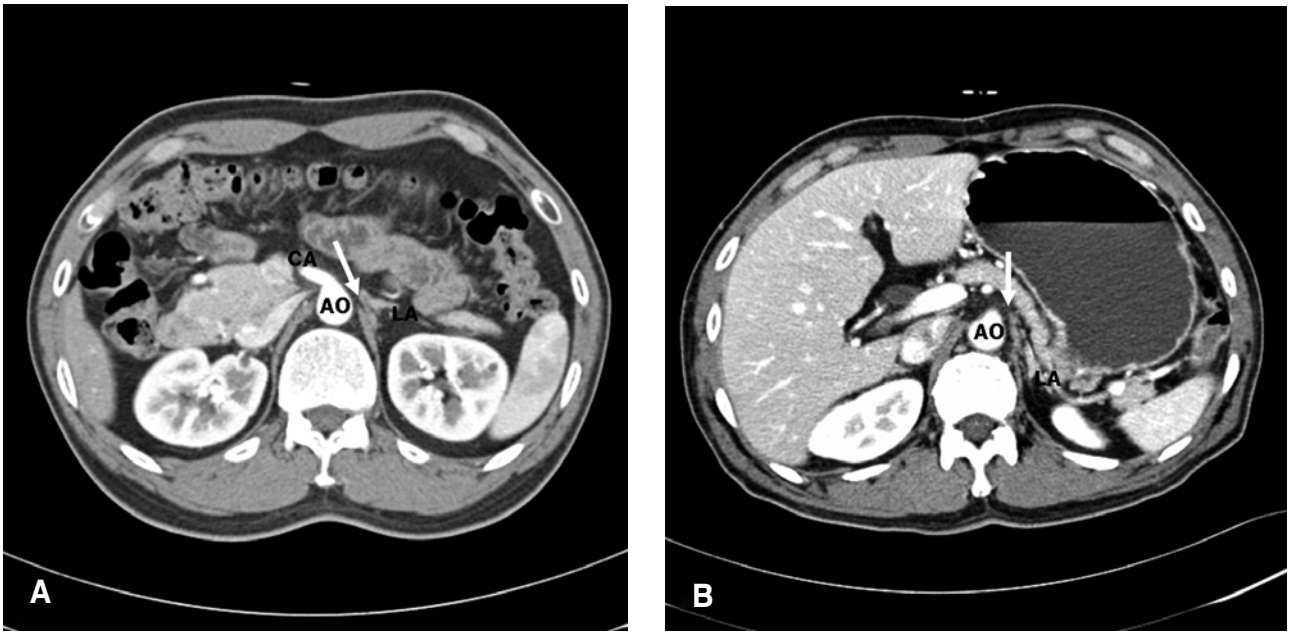

Figure 2. CT images demonstrating celiac ganglia (arrows) from two patients (A, B). AO, aorta; CA, celiac artery; LA, left adrenal gland.

CT appearance of celiac ganglia

Structures corresponding to the visualized celiac ganglia were retrospectively identified in 33 among 37 patients (89.2%). They typically appeared as oblong or lobulated structures between the celiac artery and the left adrenal gland (Figure 2).

DISCUSSION

The celiac plexus is composed of the right and left celiac ganglia; the number of ganglia varies from one to five[1]. The dominant ganglion are found on the right or left side, and their level, in relation to the celiac trunk, is variable. The size of celiac ganglia in the present study was 1.2 to 2.6 cm, which is in agreement with a previous report (0.5-4.5 cm)[1]. We did not visualize ganglia on the right side of the celiac artery, although previous anatomic studies have reported that the celiac ganglia are evenly distributed on the right and left sides[1]. Because the proximal stomach is located left of the midline, we assume that most of the ganglia identified by the EUS represented the left ganglion. For similar reasons, the right adrenal gland is typically not identified during EUS, although the left adrenal gland is usually seen.

On EUS, the celiac ganglia have a characteristic appearance and location[4, 5]. They are typically small and hypoechoic. They are multilobulated or are composed of confluent small spheres with hyperechoic bands. They are seen to the left side of the celiac trunk and aorta, between the celiac artery and the left adrenal gland. They often extend inferiorly on a chain, with hypoechoic thread-like strands connecting them. They may be confused with lymph nodes by those who are not familiar with these structures. In fact, the typical EUS findings of celiac ganglia were suggested after performing EUS-guided fine needle aspiration (EUS-FNA) to confirm lymph node metastasis during the process of cancer staging[4, 5].

Some reports have shown the identification of celiac ganglia on CT scanning in an effort to improve the success of CT-guided celiac plexus neurolysis or block, for the management of chronic abdominal pain in those patients with pancreatic cancer or chronic pancreatitis[6-8]. After identifying the characteristics of celiac ganglia, a retrospective review of the CT images, of all nine patients with visualized celiac ganglia, showed structures corresponding to the visualized ganglia[5]. Similarly, we could detect them in 89.2% (33/37) of the patients' CT images. Therefore, endosonographers or radiologists could identify celiac ganglia based on their endosonographic or radiologic appearance alone, because they have a characteristic location and appearance as described above.

In this study, we did not provide cytology confirmation of the celiac ganglia. However, our findings suggest that celiac ganglia can be accurately diagnosed by the characteristic sonomorphologic features. This is based on the findings of previous reports that showed that celiac ganglia could be reliably distinguished from lymph nodes by their typical morphology, which obviated the need for EUS-guided sampling[4, 5]. In fact, we found structures with the typical EUS findings of celiac ganglia during cancer staging in all 10 patients (6 patients with gastric cancer and 4 with esophageal cancer), and we easily

distinguished them from lymph nodes.

It has been suggested that the radial scanning EUS, traditionally used for initial diagnostic EUS assessment, might not allow for detailed imaging of the celiac ganglia, and that the linear-array EUS might enable more detailed assessment of the celiac area[4]. In a prospective study with linear-array EUS, the celiac ganglia were reported to be identified in 16 of 22 patients (73%). In the present study, we prospectively performed radial scanning EUS to identify the celiac ganglia and had an 89.4% detection rate. Although we did not simultaneously use a linear-array EUS to compare the efficacy for identifying the celiac ganglia in this study, we suggest that there might be no difference between radial scanning EUS and linear-array EUS in detecting celiac ganglia. Advances in EUS technology, including the recent development of electronic radial echoendoscopes with a doppler function, may improve the characterization of the celiac ganglia.

Direct visualization of the celiac ganglia may have diagnostic and therapeutic implications. First, we can distinguish celiac ganglia from lymph nodes during cancer staging. Second, EUS-FNA of celiac ganglia may help to evaluate neural pathology in patients with gastrointestinal disorders.

In summary, the results of this study showed that routine evaluation with the radial scanning echoendoscope identified the celiac ganglia and their specific characteristics. The EUS could be used to distinguish the celiac ganglia form lymph nodes.

Further study is warranted to assess the clinical utility of our findings.

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