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Real-Time Ultrasound-Guided Deep Acupuncture at Zhongwan With Gastric Antral Wall Localization: A Case Report

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Statistical Analysis C
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Patient: Female, 35-year-old
Final Diagnosis: Dyspepsia (suspected functional dyspepsia)
Symptoms: Epigastric pressure • belching • postprandial fullness
Clinical Procedure: —
Specialty: Gastroenterology and Hepatology • Traditional Medicine

Objective: Unusual setting of medical care

Background: Long-needle acupuncture at Zhongwan (CV12) has been studied in patients with dyspeptic symptoms, but the upper abdominal anatomy beneath this point varies among individuals. We describe a case in which real-time ultrasound was used to map surrounding organs, select a needle trajectory, and monitor needle advancement during deep CV12 acupuncture.

Case Report: A 35-year-old woman with long-standing dyspeptic symptoms underwent 10 sessions of ultrasound-guided deep acupuncture at CV12 over approximately 5 weeks. Preprocedural ultrasound identified the abdominal wall, left hepatic lobe, gastric antrum, and abdominal aorta, allowing adjustment of the needle trajectory to avoid hepatic tissue. During all 10 sessions, the needle tip was advanced to the superficial portion of the sonographically identified gastric antral muscular layer, where brief mechanical stimulation was applied by gently tapping the needle handle. The practitioner monitored the needle tip under ultrasound guidance and stopped advancement at the intended sonographic endpoint (ie, intentional partial-thickness gastric wall entry). No full-thickness gastric wall penetration or intraluminal entry was observed. Dietary and lifestyle counseling was provided concurrently. The Nepean Dyspepsia Index-Korean version symptom score decreased from 70 at baseline to 37 at the fifth treatment assessment and 22 after the tenth treatment. No immediate procedure-related adverse events were documented, and no delayed procedure-related adverse events were reported during treatment.

Conclusions: Real-time ultrasound was used to map nearby abdominal organs and monitor needle advancement during deep CV12 acupuncture. The present report describes ultrasound-guided localization of an intentionally selected gastric antral wall endpoint but cannot establish the efficacy or comparative safety of this approach.

Keywords: Acupuncture Points • Acupuncture Therapy • Dyspepsia • Safety • Ultrasonography

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/955058

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Introduction

Dyspepsia commonly presents with postprandial fullness, early satiation, epigastric pain, or burning; it can interfere with daily life [1]. Zhongwan (CV12), located on the upper abdominal midline, has been studied as an acupuncture point for functional dyspepsia [2]. Elongated-needle acupuncture involving CV12 has also been investigated in patients with dyspeptic symptoms [3-6].

The deeper anatomy at CV12 cannot be reliably inferred from its surface location alone. Ultrasound has previously been used to examine structures beneath CV12 and other acupuncture points [7,8]. In 1 study, hepatic tissue was observed beneath CV12 in 62.7% of evaluable adults [9]. Computed tomography has also documented deep CV12 needle trajectories involving the stomach and other intra-abdominal organs [10], and unintended gastric penetration after acupuncture has been reported [11]. These findings underscore the need to identify the liver, stomach, and adjacent vessels before deep needling.

Here, we describe a case in which real-time ultrasound was used to examine the upper abdominal anatomy, select a trajectory toward the gastric antral wall, and monitor needle advancement. The practitioner intentionally selected the superficial portion of the sonographically identified antral muscular layer for brief mechanical stimulation and stopped advancement at that point. We report the technique, observations during treatment, and short-term clinical course.

Case Report

Patient Information and Diagnostic Assessment

A 35-year-old Korean woman presented to our clinic with severe postprandial fullness, a sensation of epigastric obstruction or pressure, frequent belching, intermittent nausea, and occasional epigastric burning while fasting. Her height was 160 cm, weight was 49 kg, and body mass index was 19.1 kg/m^2. She had experienced recurrent indigestion since adolescence, and symptom worsening began 4 months before presentation to our clinic. She had no known coexisting diseases, did not smoke, and reported no recreational drug use or other substance misuse. She consumed alcohol approximately twice weekly.

Before presentation, she self-administered approximately 2 tablets of Bearse Tab. (Daewoong Pharmaceutical, Republic of Korea) orally each day. Each tablet contained diastase, protease, and cellulase (50 mg combined); lipase (15 mg); pancellase (30 mg); panprosin (20 mg); enteric-coated pancreatin granules (78.6 mg); simethicone (40 mg); and ursodeoxycholic acid (10 mg).

The patient reported that upper gastrointestinal endoscopy performed 4 months before presentation to our clinic had shown no clinically significant abnormalities. She also reported having undergone blood tests that showed no serious abnormalities. The original endoscopy and laboratory reports could not be retrieved for independent verification. At the initial assessment, the clinical history revealed no unintentional weight loss, vomiting, dysphagia, known anemia, or relevant family history. The absence of anemia could not be objectively confirmed because laboratory results were unavailable. Functional dyspepsia was clinically suspected based on the persistent meal-related symptoms and patient-reported findings from previous examinations, but fulfillment of formal diagnostic criteria could not be independently verified from the available records.

At baseline, the symptom component of the Nepean Dyspepsia Index-Korean version (NDI-K) was 70. Tenderness elicited by palpation at CV12 was rated 7 on an 11-point numerical rating scale (NRS), where 0 indicated no tenderness and 10 indicated the worst imaginable tenderness. The patient usually ate 1 or 2 irregular meals daily, frequently substituted bread or snacks for meals, and drank coffee approximately 3 times daily.

The clinical course and treatment schedule are summarized in **Table 1**.

Therapeutic Intervention

The patient received 10 sessions of ultrasound-guided deep acupuncture at CV12 over a 5-week period, generally twice weekly. Herbal medicine was recommended but was not administered because the patient declined it. No acupuncture at other points, pharmacopuncture, electroacupuncture, moxibustion, or manual therapy was performed during the treatment period. Counseling regarding regular meals and reduced coffee and snack intake was provided concurrently.

CV12 was selected based on previous clinical investigations of acupuncture for dyspeptic symptoms [2], and the deep-needling approach was informed by studies involving elongated-needle acupuncture at CV12 [3-6]. In the present case, the practitioner sought to provide localized mechanical stimulation of the gastric antral wall and selected the superficial portion of the sonographically identified muscular layer as the intended endpoint. This choice reflected the practitioner's procedural judgment, rather than an established gastric wall-targeting protocol. Real-time ultrasound was used to identify adjacent structures, monitor needle advancement, and stop insertion at the intended sonographic endpoint.

All procedures were performed with the patient in the supine position under aseptic conditions. The simulated out-of-plane approach is shown using a model in **Figure 1**. A GE LOGIQ P9

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Table 1. Patient timeline.

Time	Clinical course
Adolescence onward	Recurrent indigestion
4 months before presentation to our clinic	Worsening postprandial fullness, epigastric pressure, belching, and intermittent nausea; upper gastrointestinal endoscopy reportedly showed no clinically significant abnormalities
Before presentation to our clinic	Approximately 2 tablets/day of Bearse Tab.
Initial presentation	Baseline NDI-K score of 70 and CV12 tenderness NRS score of 7; first ultrasound-guided deep acupuncture session
Fifth treatment	NDI-K score of 37 and CV12 tenderness NRS score of 3; decreased Bearse Tab. use
Approximately 5 weeks after presentation	Tenth and final treatment; NDI-K score of 22, CV12 tenderness NRS score of 1, and rare Bearse Tab. use

Abbreviations: NDI-K, Nepean Dyspepsia Index-Korean version; NRS, numerical rating scale.



Figure 1. Simulated out-of-plane ultrasound-guided approach at Zhongwan (CV12) using a model. A capped instrument indicates the intended needle trajectory without needle insertion.

ultrasound system equipped with a 1 to 6 MHz convex transducer was used. The operator wore sterile gloves, and the transducer was enclosed in a sterile cover with sterile ultrasound gel. The skin was disinfected with a chlorhexidine-based antiseptic solution and allowed to dry before needle insertion.

CV12 was identified on the anterior midline, 4 body-cun superior to the center of the umbilicus [12]. The convex transducer was placed longitudinally over the epigastric region, and CV12 was positioned at the center of the transducer footprint. Real-time B-mode imaging was then used to identify the abdominal wall, peritoneal interface, left hepatic lobe, gastric antrum, and abdominal aorta posterior to the stomach. Preprocedural scanning revealed the left hepatic lobe within the CV12 sonographic field, indicating that correct surface localization alone did not define the underlying anatomical relationships. Thus, the transducer position and intended needle trajectory were adjusted to avoid the hepatic parenchyma and keep the abdominal aorta outside the projected needle path. In the available sonographic measurements, the distance from the skin surface to the superficial gastric antral wall ranged from approximately 1.40 to 1.66 cm; a representative preprocedural measurement was 1.58 cm (**Figure 2**).

A sterile, disposable acupuncture needle measuring 0.40 mm in diameter and 60 mm in length (DongBang, Republic of Korea) was inserted using an out-of-plane approach. Needle advancement was guided by real-time ultrasound visualization of the intended anatomical endpoint. The skin-to-gastric-wall measurements represented anatomical distances rather than the exact inserted needle length, which was not separately recorded. During advancement, the practitioner tracked the needle tip as a moving echogenic focus, adjusting the transducer and making small needle movements to keep the tip in view (**Figure 3, Video 1**).

Under continuous real-time ultrasound visualization, the needle was advanced through the abdominal wall and parietal peritoneum toward the gastric antral wall. In all 10 treatment sessions, the needle tip reached the superficial portion of the gastric antral muscular layer, as interpreted on real-time ultrasound. The operator intended to engage this superficial muscular region without advancing further through the deeper gastric wall layers or into the gastric lumen. At this endpoint, brief localized mechanical stimulation was applied by gently tapping the needle handle several times. The needle was not retained and was immediately withdrawn. Full-thickness gastric wall penetration or intraluminal needle entry was neither intended nor observed sonographically. Anatomical layer identification was based on sonographic interpretation, rather than histological confirmation.

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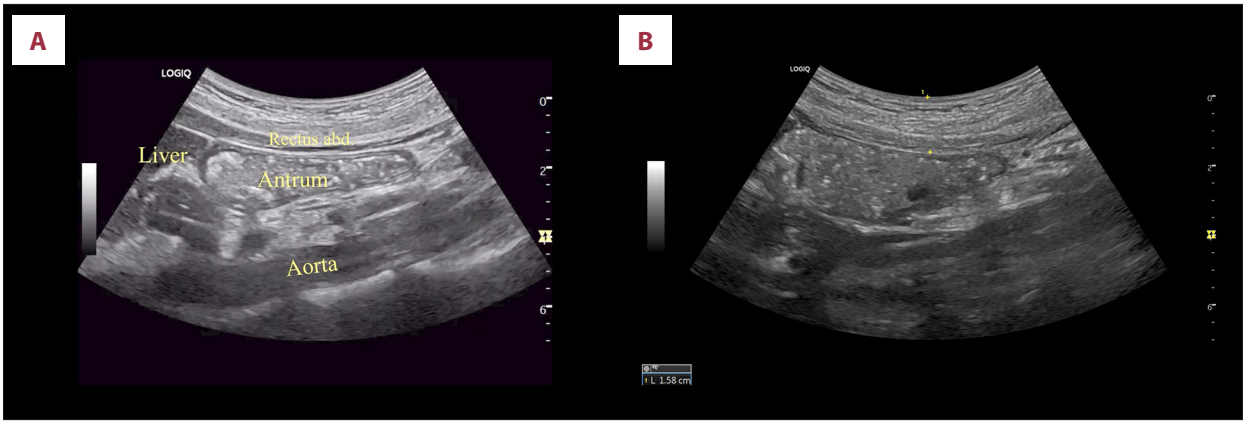


Figure 2. Patient-specific preprocedural sonographic mapping of the CV12 region. (**A**) Representative longitudinal B-mode image showing the rectus abdominis, left hepatic lobe, gastric antrum, and abdominal aorta. (**B**) Caliper measurement showing a distance of 1.58 cm from the skin to the superficial gastric antral wall.

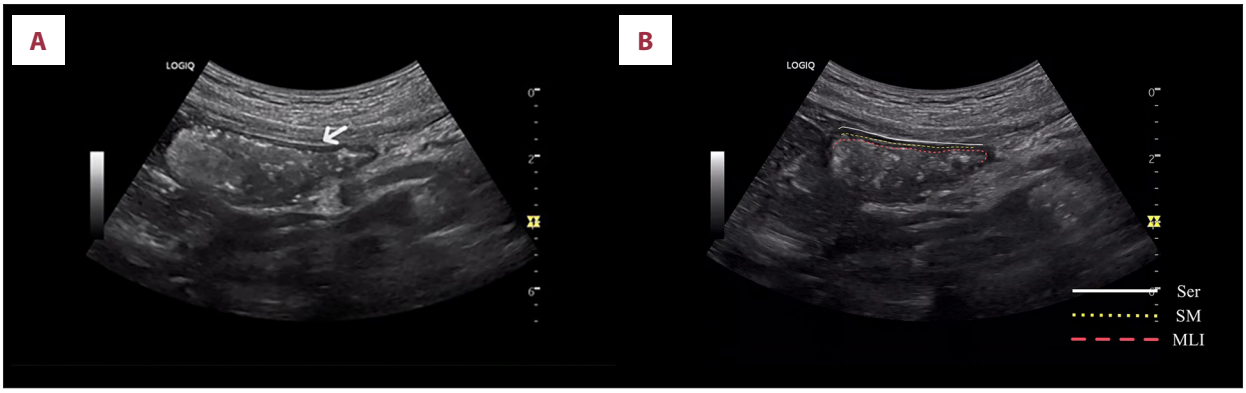
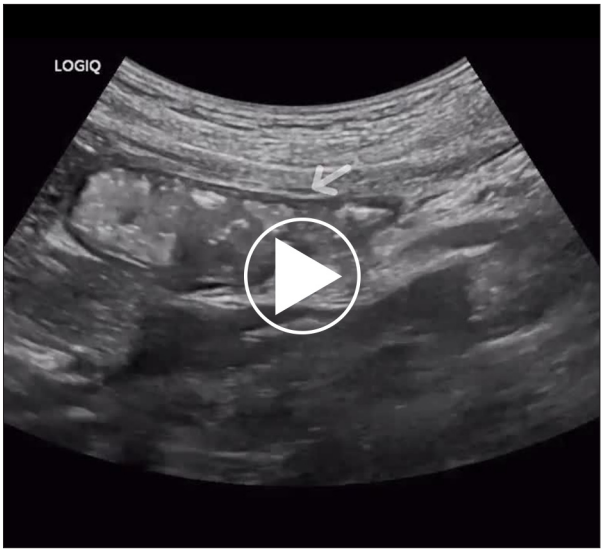


Figure 3. Intraprocedural ultrasound images obtained during real-time ultrasound-guided deep acupuncture at Zhongwan (CV12). (**A**) B-mode image showing an echogenic focus interpreted as the needle tip (white arrow); its movement during needling is shown in Video 1. (**B**) Annotated sonographic image illustrating the gastric antral wall layers. Solid white line indicates the serosa (Ser), dotted yellow line indicates the submucosa (SM), and dashed red line indicates the mucosal-luminal interface (MLI). The region between the serosa and submucosa was sonographically interpreted as the muscularis propria (MP). Tissue-layer identification was based on sonographic interpretation, rather than histological confirmation.



Video 1. Continuous real-time ultrasonographic tracking of the needle tip during the out-of-plane approach at Zhongwan (CV12). The practitioner tracked the moving echogenic needle-tip focus during controlled needle manipulation and transducer adjustment.

After needle withdrawal, the puncture site was examined for bleeding or hematoma, and the patient was observed for immediate symptoms. At each subsequent visit, the patient was specifically asked about delayed procedure-related symptoms that occurred after the preceding session. Adverse events were assessed clinically throughout the treatment period, although a standardized adverse-event questionnaire was not used. This case was reported with reference to the CARE guidelines [13], and the acupuncture intervention was summarized according to the STRICTA recommendations [14] (**Table 2**).

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Table 2. Acupuncture intervention details adapted from the STRICTA recommendations.

Item	Details
Acupuncture rationale	CV12 was selected based on a previous clinical study of functional dyspepsia [2]. Earlier elongated-needle studies involving CV12 provided a clinical precedent for a deep-needling approach [3-6]. The superficial portion of the sonographically identified gastric antral muscular layer was deliberately selected for brief localized mechanical stimulation. Ultrasound was used to map organs, select the needle trajectory, dynamically monitor the needle tip, and stop advancement at the intended anatomical endpoint to avoid full-thickness gastric wall penetration
Needle insertions	One needle insertion per session at CV12
Needle type	Sterile, disposable acupuncture needle, 0.40 × 60 mm (DongBang, Republic of Korea)
Imaging and approach	GE LOGIQ P9; 1-6 MHz convex transducer; real-time B-mode imaging; out-of-plane needle approach
Depth and endpoint	Needle advancement was guided by real-time visualization of the sonographic endpoint. The measured distance from the skin to the superficial gastric wall was approximately 1.40-1.66 cm (representative value, 1.58 cm). This was an anatomical distance, rather than a separately measured needle insertion length. The needle reached the superficial portion of the sonographically identified gastric antral muscular layer in all 10 sessions
Needle-tip visualization	The practitioner tracked the moving echogenic needle-tip focus during controlled needle manipulation and transducer adjustment
Stimulation and retention	At the sonographically identified superficial muscular layer endpoint, brief mechanical stimulation was applied by gently tapping the needle handle several times, followed by immediate withdrawal without needle retention
Treatment regimen	10 sessions over a 5-week period, generally twice weekly
Co-interventions	Counseling regarding regular meals and reduced coffee and snack intake; no acupuncture at other points, herbal medicine, pharmacopuncture, electroacupuncture, moxibustion, or manual therapy
Practitioner background	Licensed Korean medicine doctor with 10 years of clinical practice and 7 years of experience in ultrasound-guided procedures

Abbreviations: STRICTA, Standards for Reporting Interventions in Clinical Trials of Acupuncture.

Table 3. Changes in clinical outcomes during treatment.

Outcome	Baseline	Fifth treatment assessment	Final assessment after tenth treatment
NDI-K symptom score	70	37	22
CV12 tenderness, NRS	7	3	1
Bearse Tab. use	Approximately 2 tablets/day	Decreased	Rare use
Postprandial fullness	Severe	Improved	Greatly improved
Belching and epigastric obstruction	Frequent	Improved	Improvement maintained
Procedure-related adverse events	Not applicable	None reported	None reported

Abbreviations: NDI-K, Nepean Dyspepsia Index-Korean version; NRS, numerical rating scale.
Note: Qualitative symptom changes and Bearse Tab. use were based on patient reports.

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Clinical Outcomes

Dyspeptic symptoms were assessed using the symptom component of the NDI-K, with a possible score range of 0 to 195; higher scores indicated a greater symptom burden [15,16]. Tenderness at CV12 was assessed using an 11-point NRS that ranged from 0 (no tenderness) to 10 (worst imaginable tenderness). Self-reported use of Bearse Tab. and procedure-related adverse events were also recorded.

The NDI-K symptom score decreased from 70 at baseline to 37 at the fifth treatment assessment and 22 at the final assessment after the tenth treatment. CV12 tenderness decreased from an NRS score of 7 at baseline to 3 and 1 at the corresponding assessments. The patient also reported reductions in postprandial fullness, belching, and the sensation of epigastric obstruction. Self-administered oral Bearse Tab. use decreased from approximately 2 tablets daily at baseline to rare use by the end of treatment (**Table 3**).

Adverse Events

No immediate procedure-related adverse events were observed or documented after any of the 10 sessions. At each subsequent visit, the patient was asked about delayed symptoms that occurred after the preceding session; she reported no new or worsening abdominal pain, persistent nausea or vomiting, rebound tenderness, abdominal guarding, dizziness, sweating, presyncope, bleeding, hematoma, or fever. No suspected infection, emergency evaluation, additional testing, treatment modification, or treatment discontinuation was reported or required during the approximately 5-week treatment period. A standardized adverse-event assessment instrument was not used, and follow-up beyond treatment completion was unavailable.

Discussion

Deep needling at CV12 has previously been investigated in patients with dyspeptic symptoms [3-6]. This report describes an additional technical element: real-time ultrasound was used to map nearby abdominal organs and track the advancing needle toward an intentionally selected gastric antral wall endpoint.

Previous ultrasound and computed tomography investigations have shown that hepatic tissue and other abdominal organs may lie along deep needle trajectories at CV12 [9,10]. In our patient, ultrasound revealed the left hepatic lobe within the CV12 field and the abdominal aorta posterior to the stomach. The practitioner adjusted the intended trajectory to avoid the liver and keep the aorta outside the needle path. **Figure 4** provides a separate example of hepatic tissue beneath CV12. The needle also passed through the parietal peritoneum, placing this procedure within the scope of intraperitoneal acupuncture described in the literature [17].

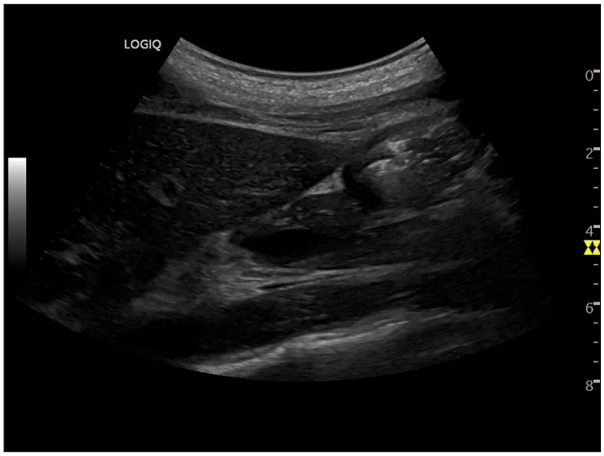


Figure 4. Illustrative sonographic image showing hepatic tissue beneath Zhongwan (CV12), obtained from an author of this report. This image is not from the patient involved in the present case.

During the out-of-plane approach, the practitioner tracked the advancing needle tip as a moving echogenic focus while adjusting the transducer as needed. In all 10 sessions, the needle reached the superficial portion of the gastric antral muscular layer, as interpreted on ultrasound. Brief mechanical stimulation was applied by gently tapping the needle handle several times, followed by immediate withdrawal without needle retention. Full-thickness gastric wall penetration or intraluminal entry was not observed.

No immediate procedure-related adverse events were documented, and no delayed symptoms were reported at subsequent visits. This observation is limited to 1 patient and approximately 5 weeks of treatment; it cannot establish procedural safety. Previous reports of unintended gastric penetration illustrate the potential for injury during deep abdominal needling [11]. Future studies should include standardized adverse-event assessments and longer follow-up.

Dyspepsia scores, CV12 tenderness, and self-reported use of Bearse Tab. decreased during treatment. However, dietary and lifestyle counseling was provided concurrently, no comparison group was available, and natural symptom fluctuations or expectation effects may have contributed. The original endoscopy and laboratory reports could not be reviewed, so functional dyspepsia remained a clinically suspected—rather than independently confirmed—diagnosis. Objective gastric motility testing was not performed, and medication use was self-reported. Therefore, the clinical improvements cannot be attributed to acupuncture alone.

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Conclusions

In this patient, real-time ultrasound was used to map the left hepatic lobe, gastric antrum, and abdominal aorta and monitor needle advancement during deep CV12 acupuncture. The practitioner deliberately advanced the needle to the superficial portion of the sonographically identified gastric antral muscular layer during all 10 sessions, applied brief mechanical stimulation, and stopped without observed full-thickness gastric wall penetration or intraluminal entry. Dyspeptic symptoms improved during treatment, and no procedure-related adverse events were documented or reported during that period. As a single case with concurrent dietary counseling and limited follow-up, the present report cannot establish the efficacy of the selected anatomical endpoint or the comparative safety of this technique.

Department and Institution Where Work Was Done

Bona Korean Medicine Clinic, Seoul, South Korea.

Patient Consent

Written informed consent was obtained from the patient for publication of their clinical information, ultrasound still images, and procedure video.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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