Diverging Artifact in a Subcutaneous Abscess Derived from Spatial Compound Imaging

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Section 2 – Answer

Case

A 60-year-old male had one painful, erythematous mass of the inferior abdominal wall for 3 months. He received a hernia repair surgery 1 year ago. Wound infection developed after the surgery, and an abscess was formed nearby. He received debridement, but there was only partial improvement. Under the impression of a residual abscess, ultrasound was arranged, revealing a hypoechoic lesion [Figure 1a] with peripheral hyperemia [Figure 1b]. A subcutaneous abscess with active inflammation was diagnosed. Furthermore, a hyperechoic structure was found in its center with diverging acoustic shadows [Figure 1c]. What is your impression about these findings in the Figure 1c?

Interpretation

Figure 1a shows a hypoechoic mass in the subcutaneous layer. There is focal fluid accumulation with posterior enhancement. The image is compatible with a subcutaneous abscess considering his medical history. The hyperechoic lesion in Figure 1c is a stitch left in the skin proven after the further debridement. The diverging acoustic shadow below the hyperechoic lesion resulted from the ultrasound beams of multiple directions while the spatial compound imaging (SCI) was turned on. When turning off the SCI [Figure 2a], only one acoustic shadowing below the hyperechoic lesion can be found. The phenomenon can be simulated by applying some jelly on the center of the transducer [Figure 2b].

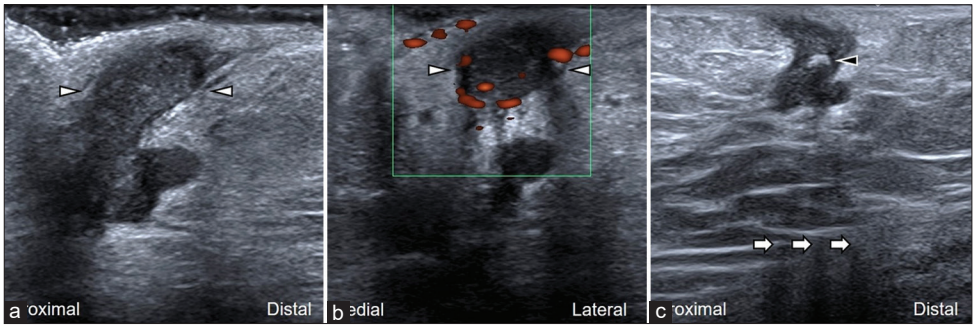

Figure 1: (a) The image was obtained by placing the transducer in the sagittal plane over the mass (arrowheads). (b) The image was obtained in the power Doppler mode showing hyperemia surrounding the mass. (c) The diverging artifacts (white arrows) behind the hyperechoic structure (black arrowhead) were observed

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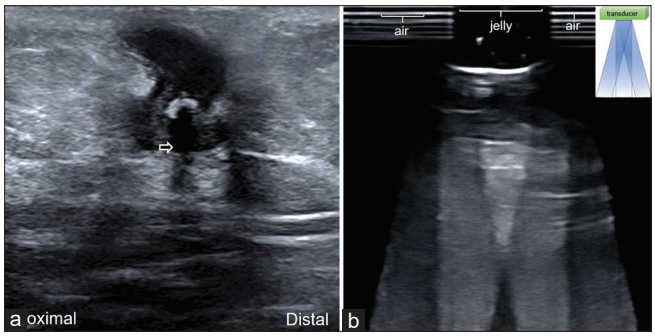

Figure 2: (a) When turning off the spatial compound imaging, only one acoustic shadowing (black arrow) can be observed. (b) The phenomenon can be simulated by placing some jelly on the central of the transducer

Discussion

Owing to the development of the machine, some novel techniques have be applied for image optimization, including SCI.[1] It uses electronic beam steering to generate several overlapping images of a single object from different angles of insonation.[1] These scans are combined and averaged to obtain a multi-angle compound image. SCI reduces artifacts made by lateral dispersion of residual off-axis beams, reverberations, and reflections which are commonly seem in the conventional ultrasound images.[2] The higher number of overlapping images, the better resolution and contrast.[3] However, the frame rate will be decreased accordingly, which causes lag in outputting imaging.[2]

In this case, the clean acoustic shadow is formed when the ultrasound beam hits the high-attenuating structure.[4] When turning on the SCI, the acoustic shadow will be casted to multiple directions, like what we observe in Figure 1c. Because the ultrasound beams are projected in a fan manner, the acoustic shadow becomes wider in the far zone. However, the anechoic area deeper to a hyper-reflective structure will be more echogenic, which allows the investigator to explore the region behind the acoustic shadow.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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Conflicts of interest

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