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CASE REPORT

Superior Mesenteric Artery-Related Aortic Pseudomass as a Form of Reverberation Artifact in a 10-Year-Old Boy

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ABSTRACT

Artifacts are encountered routinely in clinical ultrasonography practice. The ability to recognize and eliminate potentially correctable ultrasound artifacts is of great importance to image quality improvement and optimal patient care. We describe an example of a superior mesenteric artery-related pseudomass as a form of reverberation artifact that could lead to misinterpretation of sonographic findings. We present the ultrasonographic and computed tomography angiography findings and give an explanation for the appearance of the artifact.

Key words: Aortic pseudomass, computed tomography angiography, sonographic artifact, superior mesenteric artery, ultrasound

INTRODUCTION

In radiologic imaging, the term artifact describes any part of an image that does not accurately represent the anatomic structures of the subject being evaluated.[1,2] In ultrasonography (US), artifacts may result in the appearance of structures in an image that are not present anatomically. Alternatively, a structure that is present anatomically may be missing from an image. US is prone to numerous imaging artifacts that are commonly encountered in clinical practice.[1] The majority of these can be interpreted as "by-products" of the physical process of ultrasound image generation. Most of them can be explained at a basic level by an understanding of the form of the focused sound beam, the interaction of sound with tissue, and assumptions made about the spatial assignment of reflected echoes.[3] Beam width, side lobe, reverberation, comet tail, ring-down, mirror-image, speed displacement, refraction, attenuation, shadowing, and increased through-transmission artifacts are encountered routinely in clinical practice. If misinterpreted, ultrasound artifacts can lead to serious misdiagnosis. To avoid confusion, radiologists should be able to recognize artifacts when they occur.

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CASE REPORT

We describe a case of a 10-year-old boy with acute abdominal pain, an unremarkable physical examination, and normal blood test. Abdominal sonography was performed using a 4–6 MHz curvilinear probe and a 7–11 MHz linear

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probe. US showed a hyperechoic well-defined ovoid nonocclusive intraluminal mass in the abdominal aorta between the origin of the superior mesenteric artery (SMA) and the ostia of the renal arteries, closely related to the origin of the SMA [Figure 1a]. Color Doppler examination revealed a normal color flow pattern with no definite mass lesion or intimal dissection flap [Figure 1b]. A computed tomography angiography (CTA) effectively ruled out an aortic intraluminal filling defect [Figure 1c]. Due to mismatched findings of US versus CTA, the appearance of an aortic mass eventually proved to be an artifact, probably due to acoustic reverberation, not a thrombus.

DISCUSSION

The incidence of an aortic thrombus or intravascular mass in children is extremely rare.[4] The former can be seen as a complication of intra-arterial catheter placement in a neonate and is occasionally seen in a young patient with structural aortic anomalies, cyanotic heart disease, or a prothrombotic state, or secondary to trauma, dehydration, or sepsis.[5] Our patient had none of the above.

Abdominal sonography identified a hyperechoic nonocclusive intraluminal mass in the abdominal aorta between the origin of the SMA and the ostia of the renal arteries, closely related to the origin of the SMA, without Color Doppler abnormalities. Reimaging the patient's aorta in the supine position in multiple planes, without including the SMA, could not reproduce the filling defect [Figure 1d]. The lesion was considered an SMA-related reflection pseudomass (or mirror-image artifact). This is a form of reverberation artifact that is related to the presence or absence of the SMA between the aorta and transducer. Such an artifact can occur from reverberations between a mass and an adjacent highly reflective surface in B-Mode imaging. The insonating beam is partially mirrored on the posterior wall of the SMA in the passage from low-impedance blood to high-impedance fat between the SMA and the aorta. Thus, the fat anterior to the SMA is reflected into the aortic lumen, resulting in an intraluminal echogenic artifact.[4] The artifact could be operator dependent and is generated when the transducer, SMA, and aorta are in alignment. When scanning the aorta by the same radiologist or another independent operator outside this plane, no such artifact can be identified.

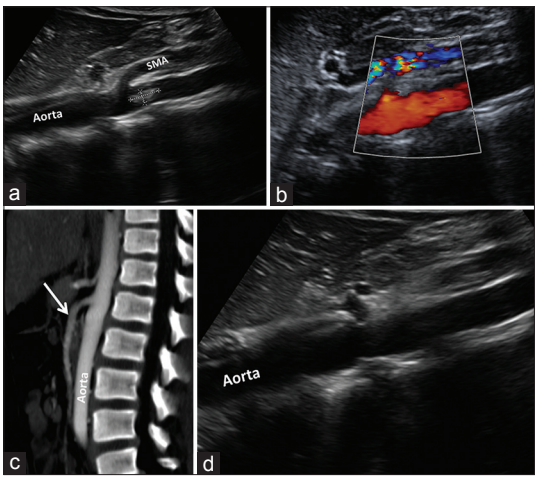

Figure 1: 10-year-old boy with acute abdominal pain. (a) Sagittal grayscale sonographic image of the aorta shows an echogenic intraluminal filling defect (arrow) at the origin of the superior mesenteric artery (SMA). (b) Color Doppler image shows the normal flow pattern in the SMA with no definite mass lesion or intraluminal dissection flap. (c) Sagittal CT angiography reformatted image shows normal abdominal aorta and SMA (arrow) with no evidence of filling defect or dissection. (d) Sagittal sonographic image of the abdominal aorta without the SMA in the scan plane confirms no intraluminal or mural aortic abnormality.

CONCLUSION

In this report, we have presented the detection of a hyperechoic nonocclusive intraluminal mass in the abdominal aorta between the origin of the SMA and the ostia of the renal arteries. To avoid erroneous conclusions and unnecessary tests and procedures, the aorta should be scanned in multiple planes, both with and without the SMA, to confirm whether the lesion disappears and should be interpreted as a reverberation artifact from the SMA. This report highlights the importance of considering the possibility of an artifact when the findings of radiologic imaging are improbable or inconsistent with the clinical findings. When diagnostic uncertainty persists, alternate noninvasive forms of vascular imaging, such as contrast-enhanced CT or magnetic resonance angiography, should be performed.

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