PITFALL IN THE ULTRASOUND SCANNING OF ABDOMINAL AORTA

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INTRODUCTION

One of the main emergency ultrasonography applications of the abdominal aorta is to diagnose abdominal aortic aneurysms (AAA) (Studer et al., 2014). Takayasu's arteritis, a rare form of vasculitis, surgical repair of the abdominal aorta, and atherosclerosis are all potential causes of abdominal aortic stenosis, which is typically linked to hypertension (Delvino et al., 2021).
Severe cardiovascular events including myocardial infarction and stroke eventually result from atherosclerotic development. As such, to reduce the healthcare burden, early diagnosis and intervention of atherosclerotic plaques will be crucial (Lu et al., 2013).
Typically, the aorta is well visualized as an anechoic, pulsating structure with easily discernible walls that extends from the upper midline to the bifurcation. The proximal and distal aorta, as well as the common iliac arteries and the major branches, are usually easy to identify. The elderly typically have mild tortuosity, and aortic atheroma, which is frequently calcified, and appears echogenic that it may shadow (England, 2004). Research reveals that evaluation of a significant portion of the abdominal aorta is limited by its inadequate visualization during the ultrasound (USS) scan. According to Studer et al. (2014), the aorta was not demonstrated in its whole in 17% of patients, and more than one-third of the aorta was not visualized in 8% of patients, in trying to rule out (AAA) with ultrasound scanning.

PATIENT BACKGROUND

A 49-year-old female presented with LIF pain radiating to the flanks and back. The patient was a smoker who took 20 packs per day. The patient had a raised WBC of 13.7and was hypertensive. In the previous USS scan in 2021 (as in Figure 1), the aorta was thought to be obscured by bowel gas, and the abdominal scan was deemed normal. However, due to frequent visits to the GP and recurrent symptoms, a CT scan was then ordered to rule out diverticulitis. The CT showed atherosclerosis with calcified plaques and stenosis of the infrarenal aorta (Figures 2 and 3). USS was then ordered for further evaluation of the abdominal aorta

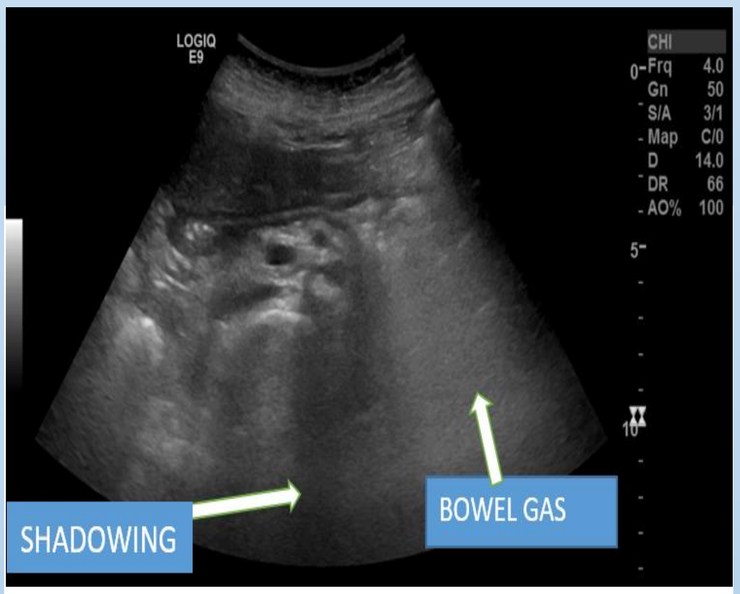

Figure 1: Previous USS imaging which stated that the abdominal aorta could not be visualized due to bowel gas. However, it can be noted there an area of shadowing distinctive from bowel gas.

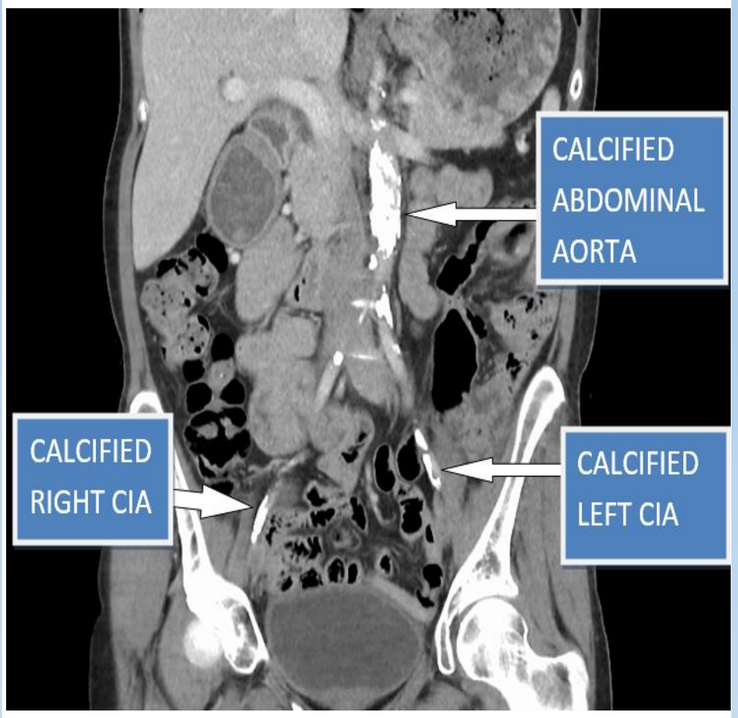

Figure 2: Coronal view showing calcified abdominal aorta and the common iliac arteries

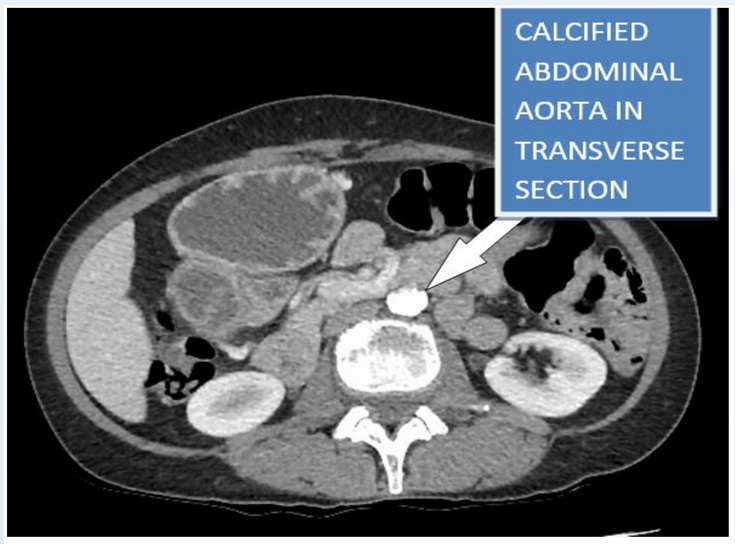

Figure 3: Transverse view of the calcified abdominal aorta showing small patent portion

ULTRASOUND EXAMINATION

A Logiq e10 GE scanner using a curvilinear transducer at a frequency of 4.5MHz was used. The patient fasted for 5 hours prior to the abdominal USS scan. The patient was scanned at hospital X as per departmental protocols following BMUS guidelines. The abdominal aorta was evaluated in transverse and sagittal sections and images were captured. Colour Doppler was applied, and spectral traces of the aorta were taken.

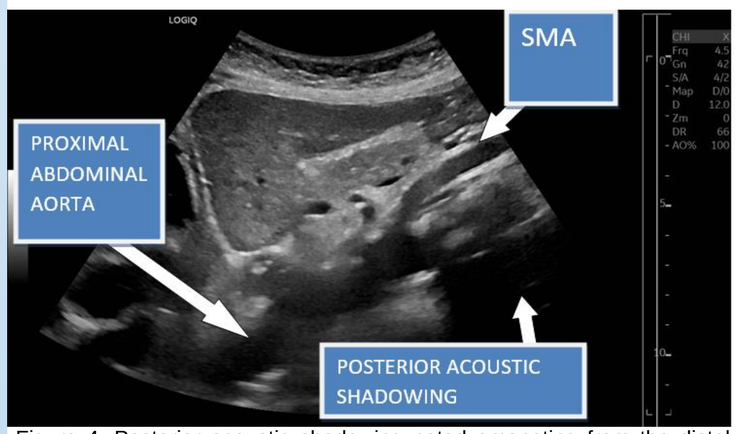

Figure 4: Posterior acoustic shadowing noted emanating from the distal portion of the abdominal aorta

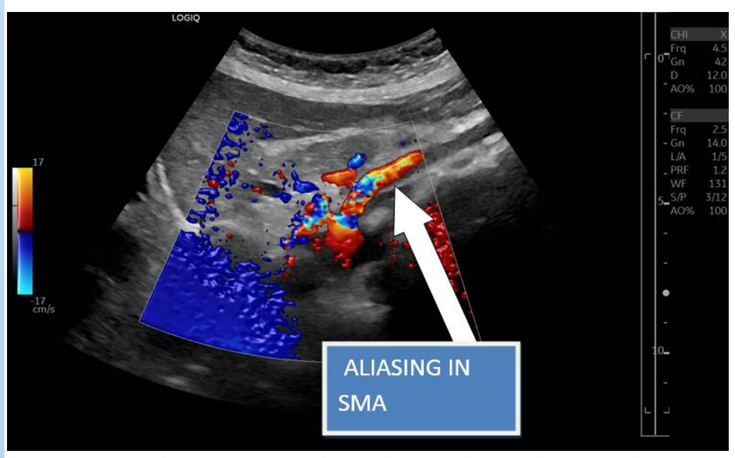

Figure 5: Patent superior mesenteric artery on Colour Doppler with aliasing indicating high flow

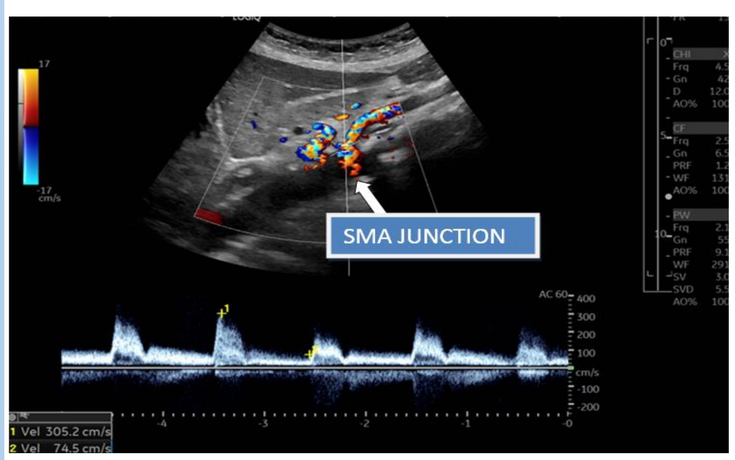

Figure 6: Spectral Doppler of the SMA indicating a peak systolic velocity of 305 cm/s.

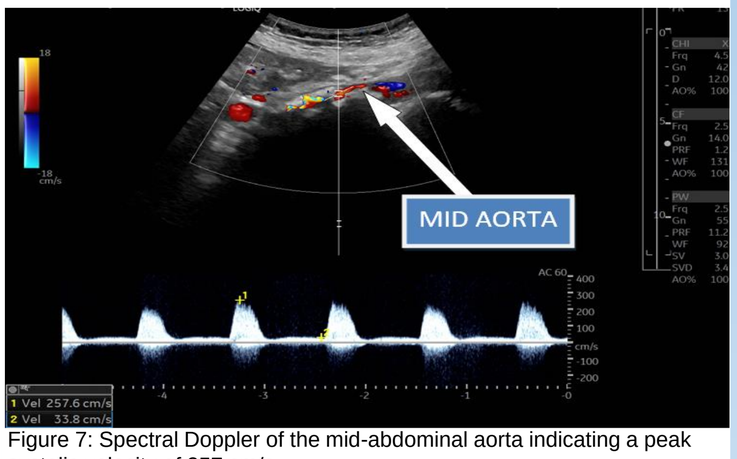

Figure 7: Spectral Doppler of the mid-abdominal aorta indicating a peak systolic velocity of 257 cm/s.

ULTRASOUND EXAMINATION

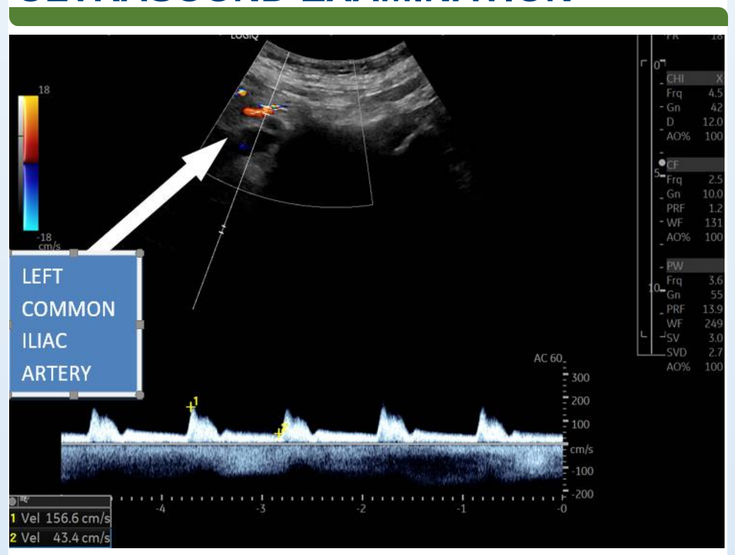

Figure 8: Spectral Doppler of the left common iliac artery indicating a peak systolic velocity of 157 cm/s.

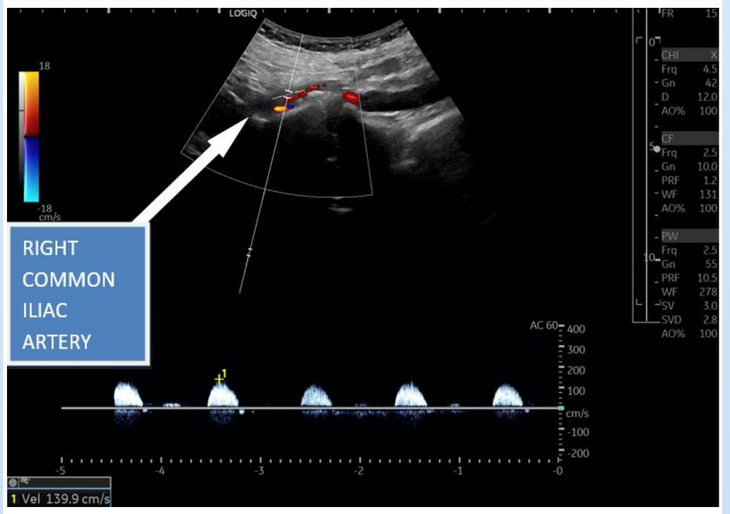

Figure 9: Spectral Doppler of the right common iliac artery indicating a peak systolic velocity of 140 cm/s.

DIAGNOSIS AND TREATMENT

Atheromatous and calcification were noted from the mid aorta/ superior mesenteric artery origin down to the distal abdominal aorta. High-grade stenosis greater than 90% with increased peak systolic velocity of 258 cm/s and 305 cm/s were observed in the mid-abdominal aorta and superior mesenteric junction respectively. The left and right common iliac arteries appear atheromatous with increased peak systolic velocities of 157 and 140 cm/s respectively. Referral to the vascular surgeon was organized

TREATMENT

Surgery to bypass the abdominal aorta was almost certainly necessary due to the substantial obstruction. During this procedure, a graft is used to make a new passageway for blood to travel around the blockage into the groin and leg arteries. The patient was prescribed aspirin and given the advice to stop smoking.

CONCLUSION

The calcified aortic atheroma has a strong echogenic appearance and may shadow, simulating the presence of bowel gas (England, 2004). Therefore, before concluding that the aorta cannot be demonstrated, it is crucial to distinguish between acoustic shadowing and bowel gas. Furthermore, Doppler ultrasound may assist to assess the vascular lumen and the presence of atherosclerotic plaques (calcified or soft) which may result in abdominal aortic stenosis hence evaluating the hemodynamic parameters (Małek et al., 2014).
According to Małek et al. (2014) Doppler ultrasound may help in the diagnosis of dissections, penetrating ulcers in the plaque, or diseases surrounding the aorta. With the advancements in contrast-enhanced sonography techniques, microbubbles can now clearly display the adventitia that feeds atherosclerotic arteries and intraplaque neovascularization (Lu et al., 2013).
If you cannot demonstrate the abdominal aorta,
THINK……IS IT BOWEL GAS OR POSTERIOR ACOUSTIC SHADOWING DUE TO CALCIFIED PLAQUE?

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