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Case Report

Left Posterior Thoracic Acoustic Window: A Forgotten Approach for Aortic Stenosis Assessment

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ABSTRACT

Accurate diagnosis of severe aortic stenosis is important for timely valve replacement. Peak aortic velocity and gradient recordings require optimal aortic jet–ultrasound beam alignment, which may be challenging in patients with poor acoustic windows due to obesity, lung disease, chest deformities, skin lesions, or surgical scars. In these clinical settings, alternative acoustic windows, notably the posterior thoracic window, can be helpful. However, in order to use the posterior thoracic window, some degree of left pleural effusion must be present.

RÉSUMÉ

Le diagnostic précis de la sténose aortique sévère est important pour procéder au remplacement de la valve dans un délai approprié. Les enregistrements du gradient et de la vélocité aortique maximale exigent un alignement optimal entre le flux aortique et le faisceau d'ultrasons, mais il peut s'avérer difficile chez les patients dont les fenêtres acoustiques sont mauvaises en raison de l'obésité, d'une pneumopathie, de déformations thoraciques, de lésions cutanées ou de cicatrices chirurgicales. Dans ces contextes cliniques, d'autres fenêtres acoustiques, notamment la fenêtre thoracique postérieure, peuvent être utiles. Toutefois, pour utiliser la fenêtre thoracique postérieure, un certain degré d'épanchement pleural gauche doit être présent.

Case

A 54-year-old woman was admitted to our institution with severe abdominal pain and underwent urgent salpingectomy for bilateral tubo-ovarian abscesses. Soon after surgery, she developed shortness of breath and hypoxemia. Initial evaluation by chest X ray showed bilateral diffuse pulmonary infiltrates consistent with pulmonary edema. A computed tomography scan showed bilateral ground-glass opacifications, bilateral pleural effusions with bibasilar compression atelectasis, and no pulmonary embolism. Clinical examination revealed a 3/6 systolic ejection murmur radiating to both carotid arteries and bilateral lung crackles. Laboratory workup was notable for a N-terminal pro-brain natriuretic peptide (NT-proBNP) of 30.000 ng/L (normal range: < 300 ng/L) and a mild high-sensitive troponin T elevation of 90 ng/L (normal range: < 14 ng/L) with no increase on serial testing. The hemoglobin was mildly reduced at 110 g/L, and renal function was normal. A transthoracic echocardiogram was performed showing a nondilated left ventricle with normal ejection fraction and normal wall thickness and motion. The aortic valve was heavily calcified. Interrogation of apical and right parasternal windows with both imaging and nonimaging probes quantified the aortic stenosis as moderate (peak transaortic velocity: 3.6 m/sec; mean gradient: 31 mm Hg; aortic valve area: 1.1 cm2; Fig. 1, C and D). Suprasternal and subcostal acoustic windows were non-contributive. When the patient was positioned sitting upright, the left pleural effusion offered an additional acoustic window—the posterior thoracic window (PTW)—that allowed better alignment of the ultrasound beam with the aortic jet (Fig. 1, A, B and E; Fig. 2). Peak transaortic velocity was then recorded at 4.2 m/sec, and mean gradient at 42 mm Hg. Using the left ventricular outflow tract measurements of the parasternal long-axis view, the valve area was then calculated to be 0.9 cm2.

Discussion

Using the PTW in our case changed the final assessment of the aortic stenosis, which was initially underestimated as moderate, using the classical windows, but finally considered to be severe, using the PTW. Indeed, peak aortic velocity and gradient recordings require optimal jet–beam alignment, which may be challenging in patients with poor

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Novel Teaching Points

- Accurate diagnosis of severe aortic stenosis is important for timely valve replacement.
- Peak aortic velocity assessment requires optimal beam alignment.
- Many patients have poor acoustic windows due to obesity, lung disease, or chest deformities.
- Left pleural effusion, when present, offers a useful additional acoustic window.

acoustic windows due to obesity, lung disease, chest deformities, skin lesions, or surgical scars. In these clinical settings, alternative acoustic windows can be helpful, but in order to use the PTW, some degree of left pleural effusion must be present.

Parameswaran et al.[1] first described the PTW through a left pleural effusion to visualize heart structures with M-mode echocardiography more than 40 years ago. This window has since been used to visualize thoracic aortic dissections and aneurysms, assess left ventricular function, and diagnose constrictive pericarditis; it is particularly helpful for the distinction between pleural and pericardial effusion.[2-5]

Regarding aortic valve/prosthesis assessment, to the best of our knowledge only 2 case series with a total of 8 patients have been published using the left PTW. Naqvi & Huynh[3] reported accurate evaluations of 1 native and 3 prosthetic aortic valves using the left PTW in a series of 18 patients with left pleural effusion.[3] Similarly, Lee & Naqvi[6] described 4 cases of technically difficult and incomplete echograms of aortic valves

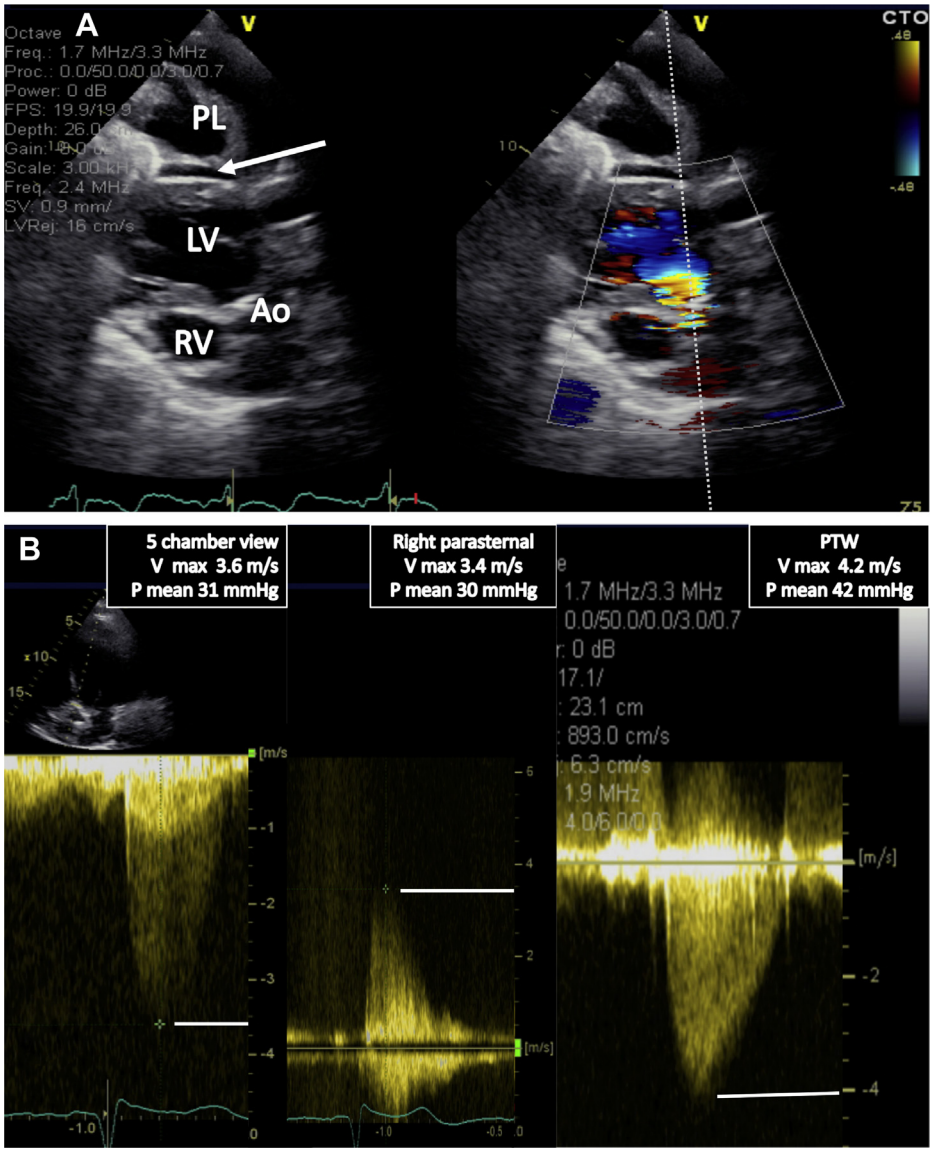

Figure 1. (**A**) Simultaneous 2-dimensional (left) and color Doppler (right) recording from the posterior thoracic acoustic window showing good beam–jet alignment. Arrow points to a small pericardial effusion. (**B**) Peak aortic velocity recordings are shown from the apical window (left) and the right parasternal window using a nonimaging pencil probe (middle). Peak velocity recoding from the left posterior thoracic window, taking advantage of a large pleural effusion (right). Ao, aorta; LV, left ventricle; PL, pleural effusion; PTW, posterior thoracic window; RV, right ventricle; V, velocity; P, pressure gradient.

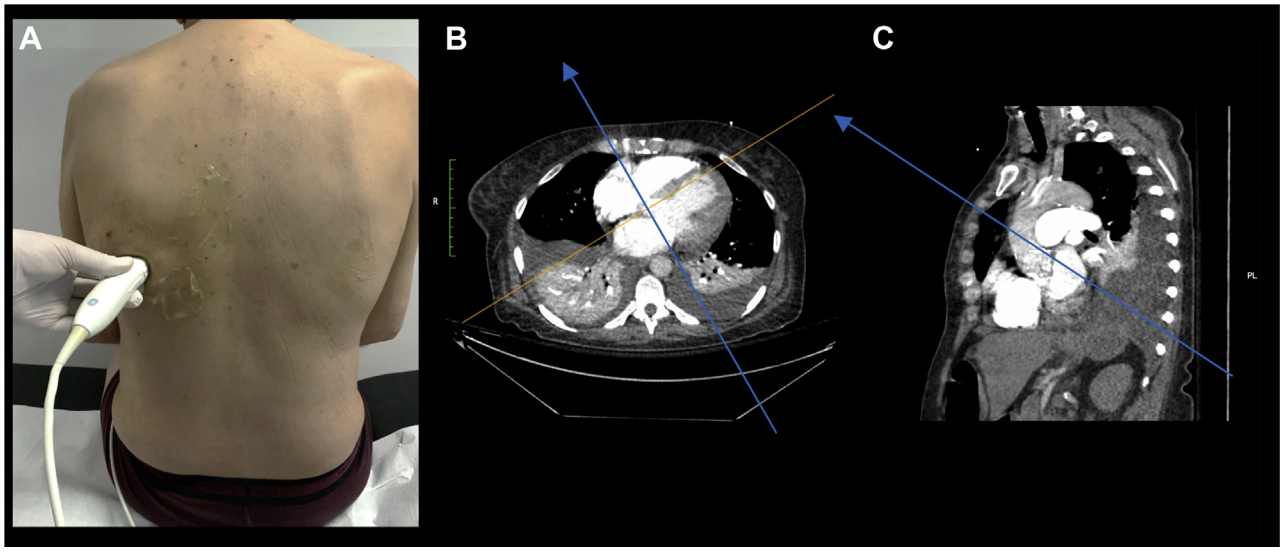

Figure 2. Posterior thoracic window image acquisition: (**A**) positioning of the transducer in the left subscapular region with the side marker pointing to the right shoulder; then the ultrasound beam is directed (**B**) medially (blue line) and (**C**) cranially as shown in the computed tomography scan images from the same patient.

and aortic prostheses in which the final diagnosis was established only after left PTW image acquisition.

In conclusion, in technically difficult echo exams, in the presence of a left pleural effusion, the PTW should be considered in the assessment of aortic stenosis as a potentially useful option to provide further diagnostic information.

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Disclosures

The authors have no conflicts of interest to disclose.

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