IMAGE IN CARDIOLOGY

Post-traumatic, intrapulmonary arteriovenous fistula: Diagnosis by trans-oesophageal echocardiography

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A 24-year-old male patient, admitted to the intensive care unit after a motor vehicle accident, was referred to cardiology with persistent hypoxia, despite optimal ventilation. The patient was intubated and ventilated for a decreased level of consciousness secondary to cerebral injury. On examination he was found to have marked clubbing and an old scar of a previous stab-wound to his right hemi-thorax. Cardiac examination was unremarkable. Blood-gas analysis revealed O_2 saturation of 85% on 100% oxygen and an Hb of 20mg/dl. Electrocardiography demonstrated sinus tachycardia with no evidence of chamber enlargement or axis deviation. Transthoracic echocardiography (TTE) windows were suboptimal, but no obvious chamber enlargement was noted and no pulmonary hypertension (PHT) was demonstrated.

The clinical picture was therefore that of chronic hypoxia. In the absence of demonstrable lung disease and without an identified aetiology of chronic shunting at cardiac level, the cause of chronic hypoxia was however unclear. In short, Eisenmenger's syndrome, congenital cyanotic heart disease and chronic lung disease were all unlikely in view of the normal cardio-respiratory examination and absence of evidence of structural heart disease or PHT on ECG and TTE. A trans-oesophageal echocardiogram (TOE) was subsequently performed. This demonstrated an anatomically normal heart, although the right upper pulmonary vein (RUPV) appeared dilated and blood flow from this vein was noted to be continuous during systole and diastole, as well as being vigorous. Agitated saline injected ("bubble contrast") into a left-sided, internal jugular vein-catheter opacified the right heart but did not cross the inter-atrial septum. After 5 beats, it emerged from the RUPV in a prominent stream. No bubbles entered the left atrium (LA) via any of the other 3 pulmonary veins. A diagnosis of a post-traumatic intrapulmonary arteriovenous fistula (PIPAF) related to the previous stab-wound was made, most likely situated in the right upper lobe.

We could find only 3 reports of an intrapulmonary arteriovenous fistula being diagnosed with TOE, but no clear aetiology was identified.[1-3] The rarity of PIPAF may be due to the fact that the pressure differential across the pulmonary capillary bed is relatively small compared to that of the systemic circulation, post-traumatic haematoma is therefore less likely to canalise and give rise to fistulas.[4]

TOE provides a convenient, low-risk modality with which to diagnose an intrapulmonary arteriovenous fistula. Agitated saline, which is injected intravenously, does not cross the inter-atrial septum directly and appears in the left atrium after 4 or more cardiac cycles.[5]

Whereas it can be safely assumed that the right and left upper lung lobes drain via their respective right and left upper pulmonary veins, and similarly for the lower lung lobes and their corresponding pulmonary veins (in cases where there are 2 pulmonary vein ostia), the right middle lobe may drain via the right upper or lower pulmonary veins.[6]

CONCLUSION

According to our knowledge, this is the first report of a PIPAF diagnosed with TOE. TOE is an excellent diagnostic test and can provide a reasonable estimate of the intrapulmonary location of the fistula.

Conflict of interest: none declared.

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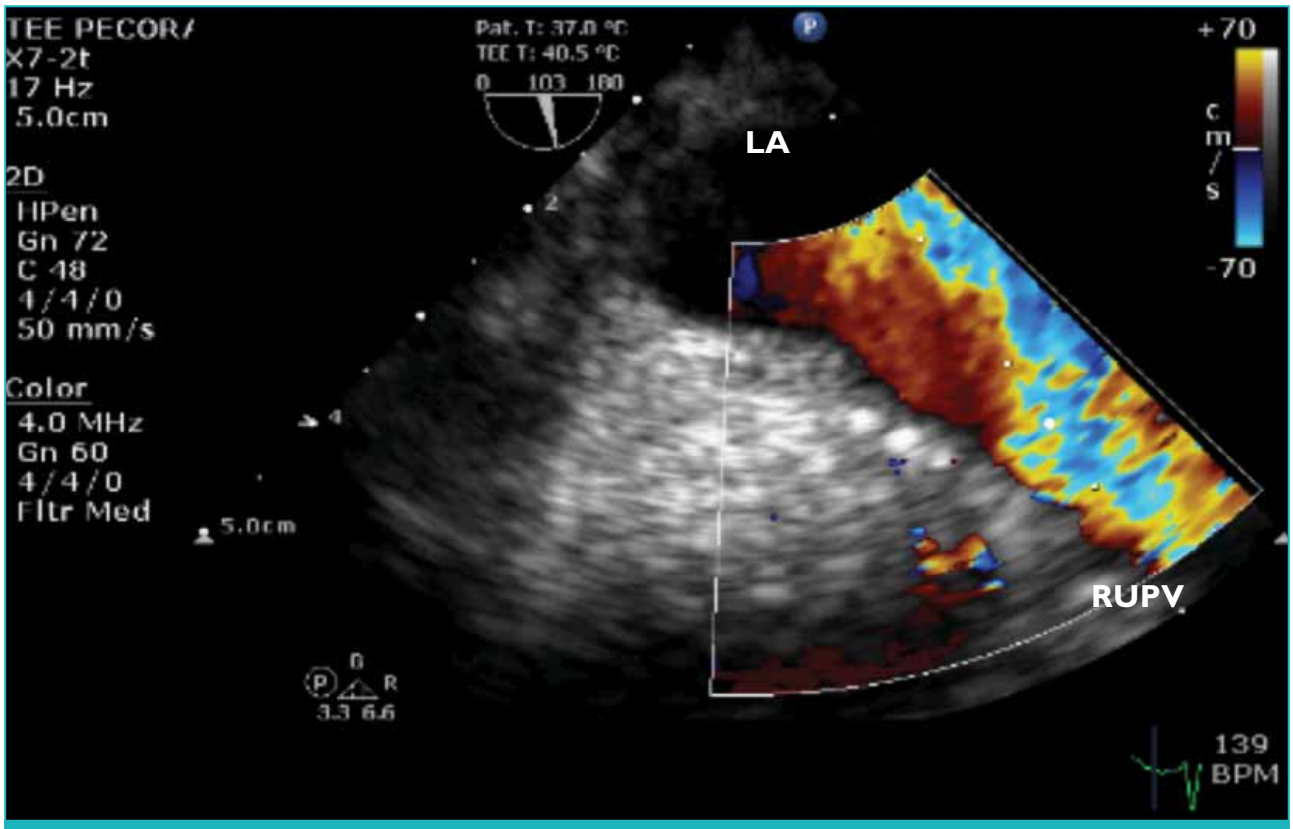

FIGURE 1: TOE (modified bicaval view) demonstrating vigorous flow (aliased flow at 70cm/s scale setting) from the RUPV into the LA.

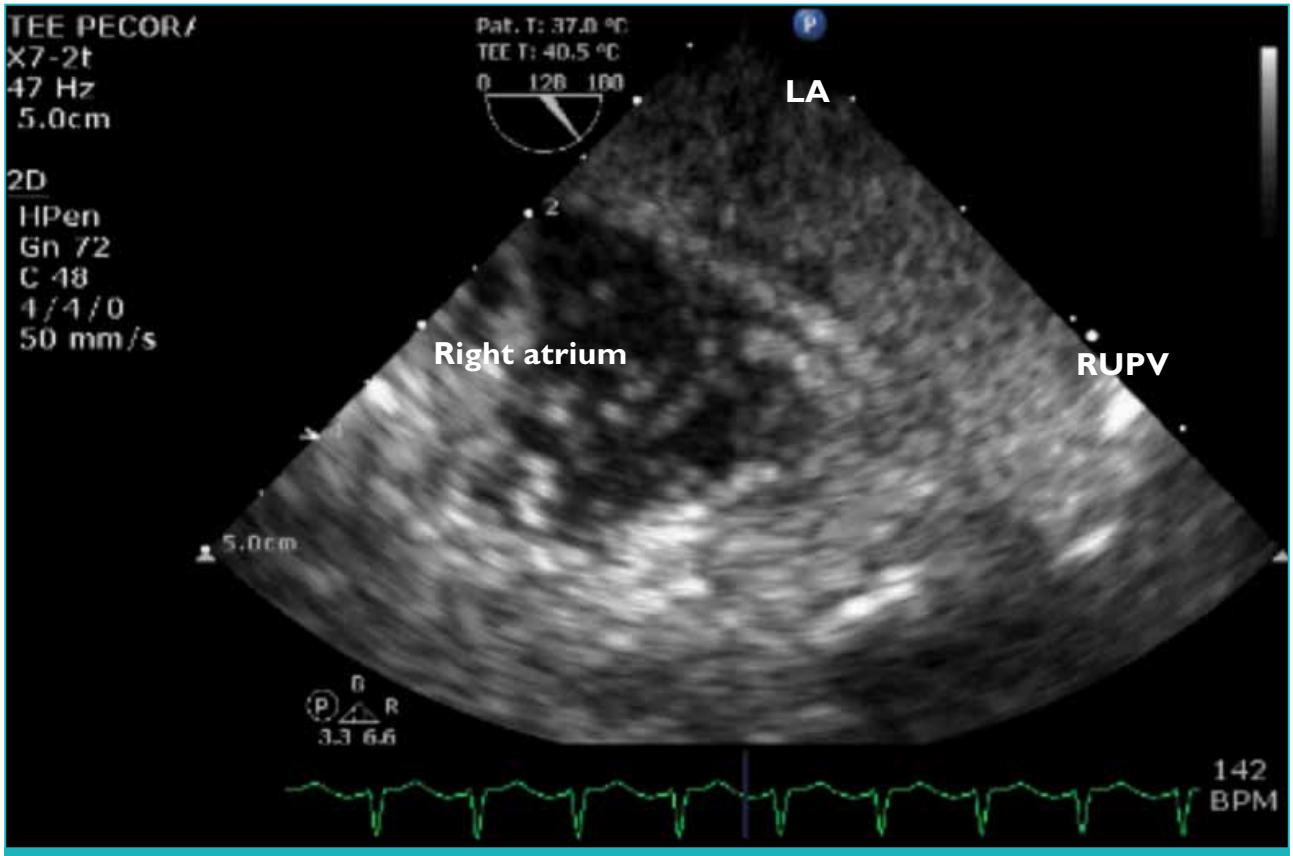

FIGURE 2: TOE (modified bicaval view) bubble-study demonstrating bubbles entering the LA via the RUPV.