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Clinical Image

Transpleural Systemic Artery to Pulmonary Artery Fistulas: Doppler Ultrasound Findings

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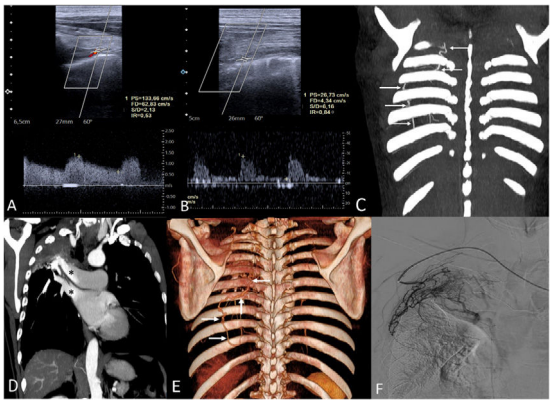

Fig. 1. (A) Doppler ultrasound of the right thoracic wall identifies prominent right-sided intercostal arteries showing spectral broadening (increased peak systolic velocity [134 cm/s] and decreased resistance index [0.53]), suggesting an arterial fistula with an increased and turbulent blood flow. (B) Doppler ultrasound of the left thoracic wall shows a normal doppler waveform of the intercostal arteries (low peak systolic velocity [27 cm/s] and high resistance index [0.84]). (C) Coronal thoracic maximum intensity projection (MIP) CT image shows hypertrophy of the right superior intercostal arteries (arrows) compared to the left hemithorax. (D) Coronal thoracic MIP CT image shows an unexpected early and prominent contrast enhancement of the right upper lobe vessels (asterisks) due to retrograde filling through the hypertrophied intercostal arteries. (E) Volumetric reconstruction CT image shows the hypertrophy of the posterior right intercostal arteries. (F) Digital subtraction angiogram shows the right intercostal arteries embolization procedure using polyvinyl alcohol particles (300–500 μm in size).

We present the case of a 69-year-old lung cancer survivor (the patient was treated 6 years earlier with chemoradiation therapy) who presented to our hospital with hemoptysis. Chest radiograph showed a right upper lobe atelectasis. A thoracic ultrasound was first performed and identified right-sided prominent intercostal arteries with a low resistance spectral waveform on Doppler interrogation (Fig. 1A,B), suggesting the presence of transpleural systemic artery to pulmonary artery fistulas (TPSAPAFs). These TPSAPAFs were later confirmed on CT as the cause for the hemoptysis (Fig. 1C–E), and the patient underwent a successful embolization of several non-bronchial systemic arteries (Fig. 1F).

TPSAPAFs are abnormal anastomoses between systemic arteries and peripheral pulmonary arteries and can be congenital or, more frequently, acquired. Acquired TPSAPAFs may occur due to long-standing inflammation/infection, trauma, surgery, and cancer. In these conditions, TPSAPAFs mostly occur between systemic non-bronchial arteries (intercostal, internal mammary, costocervical trunk, and inferior phrenic arteries) and peripheral branches of the pulmonary artery.[1,2] In our patient, chronic radiation changes in the lung most likely facilitated the hypertrophy and recruitment of systemic nonbronchial arteries. To our knowledge, Doppler ultrasound findings of TPSAPAFs have not been previously described. Understanding the pathophysiology, complex anatomy, and treatment for these rare vascular anastomoses is crucial prior to angiographic intervention in order to improve outcomes, avoid misdiagnosis, and prevent inappropriate intervention.

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Conflict of interests

The authors state that they have no conflict of interests.

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