Arteriovenous Fistula of Internal Thoracic Vessels

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Abstract

Arteriovenous fistula of internal thoracic vessels is rare. We report a case of a 77-year-old woman with a fistula between the left internal thoracic artery and vein after a mediastinal needle biopsy through the anterior chest wall. The incidence of internal thoracic arteriovenous fistulas seems to be increasing because the number of cardiac and thoracic surgical procedures is increasing. It is important to consider an internal thoracic arteriovenous fistula as part of the differential diagnosis in patients with continuous murmur in the parasternal area.

(Key words: arteriovenous fistula, internal thoracic artery, biopsy, continuous murmur)

Introduction

Arteriovenous fistulas involving the systemic, coronary, or pulmonary vessels represent the most common causes of continuous heart murmurs. However, fistulas of the internal thoracic vessels are extremely rare (1). These fistulas can usually be classified as either congenital, inflammatory, traumatic, neoplastic, or iatrogenic in origin (1, 2). We present a patient with an internal thoracic arteriovenous fistula that developed as a complication of a mediastinal needle biopsy through the anterior chest wall.

Case Report

A 77-year-old woman was admitted to our ward for the assessment of a heart murmur in September 2002. She had undergone a mediastinal needle biopsy via the left anterior chest wall at the second intercostal space because of a suspected mediastinal tumor in September 2001 (Fig. 1). The biopsy was performed without complications, such as bleeding or pneumothorax. A heart murmur had never been detected in this patient prior to the biopsy. No family history of congenital malformations was present. She had no symptoms of heart failure. Her blood pressure was 118/64 mmHg, and her pulse rate was 72 beats/min. A grade 3/6 continuous machinery murmur was heard over the left second intercostal space along the left sternal border. The results of a chest X-ray and electrocardiogram were within the normal limits. An echocardiogram revealed a normal cavity size and LV wall motion, mild aortic stenosis and no abnormal intracardiac left-right communication. Cardiac catheterization revealed normal pressures in the right atrium, right ventricle, pulmonary artery, pulmonary capillary wedge pressure, left ventricle and aorta without evidence of intracardiac shunting. A left ventriculogram, and right and left coronary arteriograms were normal. A computed tomography (CT) examination using contrast medium showed a dilated left internal thoracic artery and veins, compared with the results of a similar examination performed about one year earlier (Fig. 2). Magnetic resonance imaging (MRI) and MR angiography also revealed the dilatation of the left internal thoracic artery and veins (Fig. 3). Selective angiography of the left internal thoracic artery revealed a communication between the left internal thoracic artery and veins (Fig. 4), with the left internal thoracic veins draining into the superior vena cava. Ultrasonography and echo-Doppler studies showed an enlarged left interthoracic vein and shunt flow from the left interthoracic artery (Fig. 5). We decided to observe the present patient because the fistula in the internal thoracic vessels was small and the patient did not have any complications associated with the fistula or symptoms or signs of heart failure.

Discussion

Only 14 cases of iatrogenic arteriovenous fistulas of the internal thoracic vessels have been reported (3–14). Among these cases, 12 were caused by a parasternal wire after a

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sternotomy (3–13), 1 was caused by pericardiocentesis after the insertion of a catheter into the pericardial cavity using the subxiphoid approach in a patient with uremic pericarditis (14), and 1 was caused by the insertion of a chest tube into the right parasternal region through the third intercostal space (13). The present case is the first report of the formation of a fistula caused by a needle biopsy through the anterior chest wall in the parasternal region. In the previous two cases caused by the chest tube or catheter insertion, the arteriovenous fistulas that formed in the internal thoracic vessels were located at the site of insertion. The internal thoracic artery and veins are located in the parasternal and subxiphoid regions. Thus, the needle puncture in the present case and the tube and catheter insertion in the previously reported cases are the most likely causes of fistula formation. Therefore, transthoracic maneuvers, including the insertion of tubes or needles in the parasternal region, must be carefully performed to prevent the formation of arteriovenous fistulas in the internal thoracic vessels.

Diagnosing an arteriovenous fistula in an internal thoracic vessel is difficult because of the relative scarcity of this condition and its variable and often subclinical presentation. The presence of an internal thoracic fistula should be considered if a characteristic continuous, machinery murmur is present in the parasternal area. Although CT and MRI examinations usually provide useful information for the diagnosis of an internal thoracic fistula, the gold standard is a selective angiography. Fistula was also detected by ultrasonography in the present case. Ultrasonography and echo-Doppler studies seem to be useful for the observation of fistulas in internal thoracic vessels.

Internal thoracic arteriovenous fistulas can be associated with complications like congestive heart failure, bacterial endocarditis, rupture, and proximal arterial degeneration, aneurysm, and compression of adjacent tissues (1, 13, 15–19). However, the spontaneous closure of small fistulas may also occur (4). Management of this condition may include surgical closure, transcatheter embolization, or observation (20–22). Congestive heart failure as a result of an internal tho-
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Figure 3. Magnetic resonance imaging (A) and angiography (B) show the enlarged left internal thoracic artery and veins (arrow).

Figure 4. Selective angiography shows a communication between the enlarged left internal thoracic artery (arrow) and veins (arrowheads). The left internal thoracic artery is in the center and internal thoracic veins are on the sides of the artery.

Figure 5. Ultrasonography shows the enlarged left internal thoracic vein and shunt flow from the left internal thoracic artery (arrow).
Arteriovenous fistula seems to be related to the duration and size of the fistula.

Although arteriovenous fistulas of the internal thoracic vessels are rare, their incidence is likely to increase because of the increasing number of cardiac and thoracic surgical procedures. The possibility of an internal thoracic fistula should be considered as part of a differential diagnosis in patients with a continuous murmur in the parasternal area and who have previously undergone a surgical procedure or puncture of the anterior chest wall.

References