Internal Mammary Arteriovenous Fistula Treated with Transcatheter Embolization

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Abstract

We report an adult case of internal mammary arteriovenous fistula which was found to have a continuous murmur. The fistula was clearly demonstrated by multi-detector row computed tomography and selective digital subtraction angiography, and was successfully occluded by transcatheter embolization.

Key words: arteriovenous fistula, MDCT, transcatheter embolization

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Introduction

Most fistulas that develop between adjacent vessels are caused by surgery, trauma, history, neoplasms, or are iatrogenic (1, 2). Internal mammary arteriovenous fistulas are extremely rare. We present an adult patient with an internal mammary arteriovenous fistula without a definite etiology.

Case Report

A 69-year-old woman was referred to our hospital for the assessment of a continuous murmur. She had no associated cardiac symptoms or any history of surgery or trauma. There was also no history of any congenital disorders in her family.

A grade 3/6 continuous murmur was heard in the left fourth intercostal space. An echocardiogram showed a normal global function, normal cavity size for the 4 chambers, normal valve function, and no evidence of an intracardiac shunt. We detected the abnormal blood flow close to the body surface, where the murmur could be most easily heard (Fig. 1), but we could not identify the origin of this abnormality. Images obtained using multi-detector row computed tomography (MDCT, Aquilion64, TOSHIBA, Tokyo, Japan) with a workstation (ZIO STATION, AMIN, Tokyo, Japan) for detecting the abnormal blood flow showed an arteriovenous fistula of the internal mammary vessels (Fig. 2). The left internal mammary artery appeared to be extremely tortuous and distended with an aneurysmal formation, and an anomalous blood vessel connected to the superior vena cava (SVC). Selective digital subtraction angiography subsequently confirmed the MDCT findings (Fig. 3), and a hemodynamic study revealed increased oxygen saturation at the SVC (shunt ratio: 38.5%, Qp/Qs: 1.3). We treated the patient with transcatheter embolization using a coil and liquid material (n-butyl-cyanoacrylate: NBCA) for preventing the rupture of the mammary aneurysm. We considered it too difficult to treat by coil embolization alone because the anomalous vessel appeared to be extremely tortuous with large aneurysms. We implanted the coils via the left internal mammary artery and the SVC in order to reduce the blood flow prior to the injection of NBCA. The MDCT images after the procedure confirmed the closure of the internal mammary arteriovenous fistula (Fig. 4), and the continuous murmur had also vanished.

Discussion

Internal mammary arteriovenous fistulas are extremely rare, and most of these fistulas are reported to be associated with various types of iatrogenic trauma, such as the use of a parasternal wire after sternotomy (3, 4), pericardiocentesis (5), the insertion of a chest tube (4), or needle biopsy (6). Although cases presenting with congenital arte-
riovenous fistulas are very rare, Song et al. (7) reported an adult case of internal mammary arteriovenous fistula without a definite etiology which was similar to our case. Physicians should therefore consider the possible existence of an internal mammary arteriovenous fistula if a continuous murmur is heard in the parasternal area, even in patients without a history of trauma or surgery.

MDCT is now being increasingly widely applied for the diagnosis of coronary artery disease, and it can also be utilized to detect anomalies of the cardiovascular structures, cardiac chamber and lungs (8). In fact, the number of incidentally detected coronary artery fistulas on MDCT has been increasing (9). In the present case, MDCT was a very effective diagnostic tool for identifying both the origin of the murmur and the abnormal blood flow detected on the echocardiogram. The 3-D reconstruction view made it possible to identify the precise anatomical formation and to also accurately assess the degree of aneurysmal change.

This is still no consensus regarding the optimal management of fistulas in asymptomatic patients. In asymptomatic adult cases with coronary-pulmonary artery fistulas, a conservative clinical follow-up is recommended because of the low incidence of adverse events (10). On the other hand, the closure of the fistula is also sometimes recommended due to the potential risk of congestive heart failure, infection or aneurysmal dilation (11). The indications for the surgical or transcatheter closure in asymptomatic patients with an arteriovenous fistula are still being debated. In the present case, we performed transcatheter embolization due to the presence of an aneurysmal formation (>15 mm) which had a potential

Figure 1. Transthoracic echocardiography showed the presence of a dilated vessel with an abnormal continuous blood flow in the left fourth intercostal space.

Figure 2. Multi-detector row computed tomography (MDCT) showed the existence of an internal mammary arteriovenous fistula. The left internal mammary artery appeared to be extremely tortuous and distended with an aneurysmal formation, and an anomalous blood vessel was observed to connect to the superior vena cava (SVC). The right internal mammary artery was intact.

Figure 3. Selective digital subtraction angiography showed the presence of an arteriovenous fistula which was consistent with the MDCT findings. The shunt ratio was 38.5%, and the Qp/Qs was 1.3.
We performed transcatheter embolization with a coil and liquid material (n-butyl-cyanoacrylate: NBCA) via the left mammary artery and the right mammary vein. At 3 months after the procedure, we confirmed the closure of the arteriovenous fistula by MDCT (arrow: coil).

risk of rupturing.

In summary, we experienced a rare case of internal mammary arteriovenous fistula without a definite etiology that was successfully treated by transcatheter embolization. Non-invasive angiography using MDCT is therefore considered to be valuable for assessing the anatomical relationship, particularly in complex vascular malformations, and it can also be helpful for planning and selecting the most appropriate invasive procedures.

The authors state that they have no Conflict of Interest (COI).

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References

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