Brachiocephalic vein compression caused by a mediastinal cystic tumor presenting with rapidly progressive upper limb swelling and pain in a patient on hemodialysis with a newly created arteriovenous graft

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Abstract

A 61-year-old man was hospitalized for creating vascular access for maintenance hemodialysis. Chronic interstitial nephritis was the cause of his end-stage kidney disease. An arteriovenous graft (AVG) was selected because superficial veins in his bilateral upper limbs were not suitable for arteriovenous fistula (AVF). Venography did not show any stenotic lesions in the drainage veins bilaterally. Soon after creation of the AVG, his left arm began to swell. Obstruction of the drainage vessels downstream of the AVG was highly suspected. Magnetic resonance imaging disclosed that the left brachiocephalic vein was compressed at the junction of the superior vena cava by a mediastinal cystic tumor. This tumor was 15 mm in diameter and was tentatively diagnosed as a bronchogenic cyst. While initiating hemodialysis using the AVG, the patient's body weight was decreased by the extracorporeal ultrafiltration method, followed by amelioration of swelling in the left arm. Because the swelling and pain of his left upper limb gradually subsided, we finally decided not to close the AVG and continued hemodialysis using the left AVG. He is currently on maintenance hemodialysis for 3 months with a slightly swollen left upper limb. Central venous obstruction or compression is one of the major causes of ipsilateral limb swelling in patients on hemodialysis. Central venous stenosis caused by previous central catheter insertion is often involved. Our case emphasizes the importance of searching for potential anatomical obstruction of drainage vessels by mediastinal tumors as a potential cause of venous hypertension in hemodialysis patients.

To the Editor,

A 61-year-old man was hospitalized for creating vascular access for maintenance hemodialysis. Chronic interstitial nephritis was the cause of his end-stage kidney disease. An arteriovenous graft (AVG) was selected because superficial veins in his bilateral upper limbs were not suitable for arteriovenous fistula (AVF). Venography did not show any stenotic lesions in the drainage veins bilaterally, including the left subclavian vein. A graft made of expanded polytetrafluoroethylene was chosen for his AVG. Soon after creation of the AVG, his left arm began to swell. A photograph of his left upper limb taken at 2 days after creating the AVG

is shown in Fig. 1a. Obstruction of the drainage vessels downstream of the AVG was highly suspected. Contrast-enhanced computed tomography, which was performed on the 44th day after creating the AVG, showed that the left brachiocephalic vein was compressed at the junction of the superior vena cava by a mediastinal cystic tumor (Fig. 1b, c). This tumor was 15 mm in diameter and was tentatively diagnosed as a bronchogenic cyst by magnetic resonance imaging (MRI), which was obtained on the 54th day after creating the AVG (Fig. 1d, e). The results of MRI performed 10 years previously showed that the tumor was already present. Additionally, the size had remained unchanged over the last 10 years, which suggested that the tumor could be benign. At that point, there were three therapeutic options as follows: (1) expect development of collateral veins, which may finally lead to a better blood flow and amelioration of limb swelling, (2) surgically remove the tumor, and (3) close the AVG and place a permanent central venous catheter in the jugular or subclavian vein. While initiating hemodialysis

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Fig. 1 Photograph of the patient's left swollen arm and imaging of the chest. Photograph of the left upper arm taken on the 2nd day after arteriovenous graft surgery (**a**). **b** Contrast-enhanced computed tomography shows that a round mass (white arrow) is present in the anterior mediastinum. The left brachiocephalic vein is compressed by the mass at the entry of the junction of the superior vena cava (red arrow). **c** Serial images of the contrast-enhanced computed tomog-

raphy of the round mass and compressed brachiocephalic vein. MRI also shows that the mass indicated by enhanced computed tomography is slightly intensified in a T1-weighted image (**d**, white arrow) and highly intensified in a T2-weighted image (**e**, white arrow). This suggests the presence of a cystic tumor, including a bronchogenic cyst. Histological diagnosis was not confirmed. AA ascending aorta, DA descending aorta

using the AVG, the patient's body weight was decreased by the extracorporeal ultrafiltration method, followed by amelioration of swelling in the left arm. Because the swelling and pain of his left upper limb gradually subsided, we finally decided not to close the AVG and continued hemodialysis using the left AVG. He is currently on maintenance hemodialysis for 3 months with a slightly swollen left upper limb.

Central venous obstruction or compression is one of the major causes of ipsilateral limb swelling in patients on hemodialysis with vascular access in the upper limb [1]. Central venous stenosis caused by previous central catheter insertion is often involved. However, obstruction or drainage of the central vein in the thorax has occasionally been reported [2, 3]. Our case emphasizes the significance of the search for potential anatomical obstruction of the central drainage vessels by such intrathoracic tumors as mediastinal tumors when we encounter patients with venous hypertension who does not have any apparent stenotic lesions in the drainage vessels in the ipsilateral side of the vascular access.

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Compliance with ethical standards

Conflict of interest The authors have declared that no conflict of interest exists.

Human and animal rights All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional review board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Written informed consent for submitting this case report was obtained by the patient.

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