Brachial aneurysm following arterovenous fistula ligation

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Section: Cardiovascular
Area of Interest: Vascular
Procedure: Diagnostic procedure
Imaging Technique: CT
Imaging Technique: CT-Angiography
Imaging Technique: Ultrasound
Imaging Technique: Ultrasound-Colour Doppler
Special Focus: Aneurysms Embolism / Thrombosis
Case Type: Clinical Cases
Patient: 57 years, male

Clinical History:

An immunocompromised 56-year-old man presented to our department with fever of unknown origin, history of fatigue, and weight loss. He had undergone renal transplantation 10 years before due to multicystic kidney disease.

Imaging Findings:

Chest CT of the lung was unremarkable. However, a 50x40mm mass was found incidentally in the region of the left shoulder, anterior to the subscapularis muscle (Fig. 1). Doppler ultrasonography was then performed, revealing a large dilation of the brachial artery (50x50mm maximum size) with a tortuous course and a partially perfused thrombus inside it. A further mild dilation of the vessel was found proximal to the elbow (Fig. 2).

Finally, a CT angiography examination was carried out, that confirmed the presence of an aneurysm of the brachial artery, extending for 14cm with a maximum size of 57x55mm (APxLL). The presence of partially reperfused aneurysmal thrombosis was also confirmed. The radial artery was obstructed after its origin (Fig. 3-5).

Discussion:

An aneurysm is defined as focally increased diameter of a vessel by at least 50% of the normal size. It is called a true aneurysm when all the three layers of the sac are involved; otherwise it is called a pseudoaneurysm.

Most aneurysms are central, mainly involving the aorta and carotid arteries. Peripheral aneurysms are less frequent and are most frequently pseudoaneurysms, which usually involve femoral, popliteal or brachial arteries [1]. True aneurysms of the brachial artery are rare and are usually caused by infection, congenital defects, and iatrogenic injuries (e.g. as a complication of arterial catheterisation). In fact, most arterial dilations occur following traumatic arteriovenous fistulas, and aneurysmal progression even after ligation of the fistula has been reported. Possible explanations for these findings are increased blood flow and endothelium-derived factors [2].

The normal diameter of the brachial artery is 4.1-4.8mm in men and slightly less in women [3].

On physical examination a pulsatile, painless mass can be found, but frequently this condition is asymptomatic and can be diagnosed only incidentally [1]. Symptoms become apparent when complications such as aneurysm rupture, thrombosis, or distant embolisation happen, and include pain, missing pulse distal to aneurysm, and sensitive and/or motor signs [4].

The gold standard for diagnosis is ultrasonography, which can show the severity and extent of vascular dilation, as
well as the presence of endoluminal thrombosis. Doppler ultrasound can be used in combination to find blood flow inside the aneurysm and in distal vessels. CT angiography is the recommended second-level examination to confirm diagnosis and for surgical or endovascular treatment planning, as it allows to accurately depict the morphology and size of the aneurysm and to evaluate its run-in and run-off vessels.

Treatment includes observation and follow-up in uncomplicated cases, whereas percutaneous embolisation or surgery is reserved to high-risk cases. The choice depends on aneurysm features and embolisation risk. Our patient underwent surgery, consisting of isolation of the aneurysm by ligation of the initial and distal tract and interposition of a prosthetic graft. This was a very risky intervention concerning aseptic humeral head necrosis, neurological damages of the arm, and infective or embolic complications. Indeed, our patient reported a motor deficit in his left hand after surgery.

**Differential Diagnosis List:** Left axillary and brachial artery aneurysm, Haematoma, Abscess, Pulsating tumour, Lymphoadenopathy, Arteriovenous malformation

**Final Diagnosis:** Left axillary and brachial artery aneurysm

**References:**


Description: Axial chest CT Image shows a round mass with parenchymal density anterior to the left subscapularis muscle. Multiple parietal calcification can be seen. Origin: Diagnostic and Interventional Radiology, University of Pisa, Italy
**Figure 2**

**Description:** US reveals a large brachial aneurysm (50x50mm AP-LL diameter). **Origin:** Diagnostic and Interventional Radiology, University of Pisa, Italy
**Description:** Doppler examination shows turbulent flow inside the aneurysm. **Origin:** Diagnostic and Interventional Radiology, University of Pisa, Italy

**Description:** 35-mm-large, inhomogeneously echogenic intravascular mass consistent with aneurysmal thrombosis. **Origin:** Diagnostic and Interventional Radiology, University of Pisa, Italy
**Description:** Large brachial artery aneurysm with large thrombosis and narrowed patent lumen. **Origin:** Diagnostic and Interventional Radiology, University of Pisa, Italy
Description: Multiplanar reformatted image shows global extent of the aneurysm from the left axillary artery to the mid-distal third of the brachial artery. Origin: Diagnostic and Interventional Radiology, University of Pisa, Italy
Description: CPR views allow to "unroll" the vessel, enabling measurement of its real diameters at different levels. Origin: Diagnostic and Interventional Radiology, University of Pisa, Italy
Description: MIP image shows the tortuous course of the artery and parietal calcifications. Origin: Diagnostic and Interventional Radiology, University of Pisa, Italy
Description: VR reformatted image reveals the tortuous course of the artery. Origin: Diagnostic and Interventional Radiology, University of Pisa, Italy
**Description:** Whole-volume MIP image with bone subtraction. Another vessel dilation is present next to the elbow. The upper pole of the transplanted kidney can be seen in the left iliac fossa. **Origin:** Diagnostic and Interventional Radiology, University of Pisa, Italy.
**Description:** Whole-volume VR image. Relationship of the aneurysmal formation with the surrounding structures. **Origin:** Diagnostic and Interventional Radiology, University of Pisa, Italy