Neurological complications from brachial arteriovenous fistulae

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Introduction

We report two cases of disabling median nerve compression following haematoma and pseudoaneurysm formation of brachial arteriovenous fistulas (AVF). This is a rare but important complication of dialysis access that requires urgent intervention to prevent permanent disability.

Case 1

A 69-year-old male cardiac transplant recipient with end-stage renal disease secondary to cyclosporin toxicity, presented with a painful swollen right brachial AVF following difficult cannulations over several consecutive dialysis sessions. On inspection there was a tender soft tissue swelling overlying the fistula, but a thrill was still palpable. Neurological examination revealed weakness of the muscles supplied by the terminal motor branch of the median nerve, with loss of sensation over the distribution of the terminal sensory branch. A duplex Doppler study demonstrated a pseudoaneurysm of the brachial artery surrounded by haematoma. In view of ongoing pain and progressive neurological signs the patient underwent emergency exploration of the AVF under general anaesthesia. A large haematoma was identified deep to the fascia and evacuated. The AVF was tied off and the haematoma evacuated. The patient underwent an uncomplicated post-operative recovery, with partial recovery of median nerve sensory and motor function. Dialysis continued via a tunnelled percutaneous internal jugular vascular catheter.

Case 2

An 83-year-old woman with end-stage renal disease secondary to renovascular disease presented with a haematoma over her left brachial AVF. The patient had been anticoagulated with warfarin for paroxysmal atrial fibrillation. The haematoma developed following several difficult attempts to cannulate the AVF. On admission the fistula was functioning, and examination revealed a large haematoma with normal neurological examination. The International Normalized Ratio (INR) was sub-therapeutic at 1.7. A tunnelled long-term percutaneous vascular catheter was inserted for dialysis and the fistula was not used. The patient was then re-anticoagulated. She subsequently developed sudden onset of pain in the left forearm, with loss of sensation over the thenar aspect of the left hand, and weakness of opposition of thumb and forefinger. Assessment of wrist flexion and pronation were restricted by pain. She was noted to be over-anticoagulated with an INR of 4.5. As her symptoms and signs were classical of a median nerve lesion, and the timing of events pointed to the expansion of the fistula-related haematoma (confirmed on duplex Doppler ultrasound scan), she proceeded to urgent surgery, once her clotting was normalized, without any formal electrophysiological testing. At operation there was ongoing bleeding from the fistula into a haematoma. The AVF was tied off and the haematoma evacuated. She was subsequently discharged home with a slowly resolving median neuropraxia.

Discussion

Carpal tunnel syndrome and median nerve compression at the wrist is a well-recognized complication in haemodialysis patients, most cases being secondary to vascular steal syndrome, dialysis related amyloidosis or, less commonly, uraemic neuropathy [1,2]. Our two cases illustrate an uncommon cause of median nerve injury due to direct compression by haematoma and...
pseudoaneurysm in the cubital fossa. A literature search revealed that there is only one previously reported case of a brachial fistula pseudoaneurysm resulting in median nerve compression [3]. In this case the patient presented with an enlarging mass in the cubital fossa associated with forearm and hand pain, which at surgery was found to be due to a thrombosed venous pseudoaneurysm.

A similar phenomenon to median nerve entrapment at the wrist (carpal tunnel syndrome) has been labelled as the cubital tunnel syndrome [4], involving entrapment of the ulnar nerve in the cubital fossa. However, the median nerve is also vulnerable at this site. The median nerve, formed from the lateral root of the lateral cord and the medial root of the medial cord of the brachial plexus, does not give off any branches until it enters the forearm, where it lies medial to the brachial artery in the cubital fossa. This close relationship to this vessel places the median nerve under threat in the event of brachial artery (pseudo)aneurysm or surrounding bleeding. A median nerve lesion may result in weakness of important movements including wrist flexion, pronation and fine movements of the hand, which can impact greatly on the patient’s functional abilities. Sensory loss predisposes to injury.

Pseudoaneurysm formation of AVFs are usually due to repeated cannulation at the same site, and occur more frequently in prosthetic grafts rather than primary fistulae. One study comparing the effect on fistula function of daily, vs three times a week dialysis, found that rotating puncture sites rather than frequency of use of the fistula appears to be more important in avoiding the development of a false aneurysm [5]. The NKF-DOQI guidelines for vascular access [6] suggest that surgical repair of aneurysms in primary AVFs should only be undertaken if there is evidence of skin breakdown, risk of rupture or restricted access to suitable puncture sites. However the presence of nerve damage due to the fistula is another important indication, and should be regarded as a surgical emergency to avoid lasting neurological deficit.

Teaching points

Median nerve compression can occur from haematoma or pseudoaneurysm formation around a brachial AVF. Surgical exploration must be performed urgently to preserve neuronal function and avoid disabling neuropathy.

Conflict of interest statement. None declared.

References