SHORT REPORT

Endovascular Stent Management of Acute Traumatic Subclavian Artery Occlusion by Intimal Flap

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Key Words: Subclavian artery injuries; Stent.

Introduction

Currently, acute arterial occlusion is most frequently associated with external blunt and penetrating trauma. Arterial injuries are usually caused by penetration but may also occur with multiple injuries.1 Surgical repair of blunt arterial injury is difficult and the risks are increased in the presence of multiple traumas. There is an increasing trend towards the use of endovascular stenting in the treatment of these injuries.2–4 We present a patient with multiple trauma and an acute left subclavian artery dissection and resultant occlusion treated with an endovascular stent.

Case

A 31-year-old male patient was brought to accident and emergency after a road traffic accident. His blood pressure was 90/65 mmHg and the pulse was 104/min in his right arm. There was no pulse in his left arm distal to the axillary artery. Femoral pulses were normal. The first and second ribs on the left were fractured and there was a left pneumothorax. A large hematoma and subcutaneous emphysema were present in the left chest wall. There was a non-displaced fracture of the proximal third of the right clavicle. An abdominal ultrasound was normal and no blood was detected on peritoneal lavage. A Trans-oesophageal echo confirmed that the aorta and heart were normal. His hemoglobin was 10 g/dl on admission.

Left upper extremity venography was normal. An arteriogram was carried out using the femoral approach with 6Fr pigtail catheter. Selective angiographic examination of both right and left subclavian arteries was performed; the right subclavian artery was normal but the left was occluded by a dissected flap just distal to the internal thoracic and vertebral artery origins (Fig. 1). The patient received aspirin (500 mg) and clopidogrel (300 mg) before the procedure. He also received a heparin bolus followed by an infusion to bring the activated clotting time up to 250 sec. The lesion was crossed using a 0.014 in. floppy guidewire 300 cm in length. A second 0.032 in. guide-wire was introduced to replace the 6Fr catheter with an 8Fr guiding catheter. The diagnostic catheter was then replaced with an 80 cm 8Fr guiding catheter. The 0.032 in. guide-wire was removed. A 4.5 cm x 30 mm balloon was inflated to 6 atm. for 15 sec at the site of the lesion. After deflation it was observed that distal flow had been restored and a dissection at the site of the lesion was observed (Fig. 2). The balloon was removed and 8–17 mm JoStent stent (JOMED-Germany) was deployed at 10 atm. It was confirmed that the dissection was completely covered by the stent and the patency of the vertebral and internal thoracic arteries was protected. A small stenosis was observed in the ostium of the left subscapular artery on completion angiography (Fig. 3). Clopidogrel 75 mg/day and aspirin 100 mg/day were continued for 4 weeks after stenting. The patient was discharged one...
week after the procedure. The subclavian artery was patent at 9th months on duplex ultrasound.

Discussion

Surgical repair of traumatic subclavian artery injuries is technically demanding because of the anatomical position of the vessel and the propensity for concomitant injuries. In stable patients, angiographic definition of the injury enables the surgeon to plan the approach. Standard surgical exposure techniques involve median sternotomy, posterolateral and anterolateral thoracotomy, often with extrathoracic
extensions and book incisions. However, proximal control, which is the prime consideration, may be difficult through this limited exposure. The subclavian artery is in close proximity to the brachial plexus and is also very friable, a fact not always appreciated by the inexperienced. These surgical interventions, however, may add to the overall morbidity and mortality of the patient by prolonging recovery time, injuring adjacent structures or leading to a higher risk of wound infection.

The use of endovascular intervention for the management of vascular injuries is an excellent alternative to surgical repair if the right conditions exist. These include a hemodynamically stable patient and experienced interventional radiology and vascular surgery teams. For lesions involving the proximal segments of the left subclavian, we always use a balloon-mounted stent. The chances of compression and deformation of the stent are low. Self-expandable stents are not chosen because of the inability to be exactly precise in a region where millimeters count. Furthermore, there is the possibility of stent migration with the self-expandable stents.

It is preferable to use self-expandable stents for lesions in the mid subclavian or near the region of the clavicle and first rib. The kind of balloon to use (which balloon-mounted stent) depends primarily upon the experience of the operator.

Although there are some reports about percutaneous approaches to the sequelae of penetrating injuries (pseudoaneurysms and arteriovenous fistulae), there is only one report about its application to acute blunt traumatic subclavian artery occlusion in literature. The occlusion is usually due to transection or dissection in traumatic cases. In our case, we decided that it was due to dissection and because of this we used an uncoated stent. Graft-stents are chosen for treatment of transection and aneurysms.

The advantages of this approach over surgery are that it is less invasive, shorter operation times are possible, general anesthesia may not be required and the patients mobilise early.

The endovascular approach is less time consuming, allows faster revascularization when performed successfully and may be performed during diagnostic angiography in traumatic subclavian artery injuries. Although the patency of the vessel after nine months in this case may demonstrate the effectiveness of the procedure, we think that there need to be more case reports and longer follow up periods to confirm its effectiveness.

References


Fig. 3. The dissection covered by the stent and minimal stenosis (arrow) at the origin of the subscapular artery.


Accepted 1 May 2003