INTRODUCTION
Relief of internal carotid artery stenosis by percutaneous transluminal angioplasty (PTA) entails the risk of cerebral embolism.1 This risk increases further if for some reason, a distal protection device cannot be deployed in the appropriate location to the respective carotid artery, such as innominate artery stenosis.

We report the case of a patient who developed in-stent re-stenosis (ISR) in an innominate artery stent and was also found to have new right internal carotid artery stenosis.

CASE REPORT
A 55-year-old female reported to this hospital on 1st January 2008 with history of right arm pain and claudication. The patient was a diagnosed case of aortitis syndrome for the last 10 years and had been on medical treatment. During her stay in UK 4 years ago she had similar symptoms and had a stent deployed in the innominate artery. During that stenting the patient had suffered from a transient ischemic attack (TIA). She now presented with 10 days history of pain in her right upper limb, especially on lifting heavy objects and performing overhead tasks; the pain was relieved on resting the upper limb. In addition the patient had also noticed a temperature difference between the upper limbs; the right being slightly cooler. There was no neurological deficit. The patient was already taking clopidogrel (75 mg daily) and aspirin (300 mg daily), along with amlodipine (5 mg daily). There were no drug allergies of note. Clinical examination revealed weak pulses of the right upper limb, and delayed capillary refill in the finger nails. The severity of signs and symptoms was not suggestive of acute limb ischemia. Her neurological examination was unremarkable for any deficit. No carotid bruit was audible. The possibility of in-stent restenosis of the innominate artery stent was discussed with the patient and the need for angiography of the related vessels was explained.

After informed consent, angiography was performed which revealed an almost 90% stenosis of the stent in the proximal innominate artery; additionally there was a 90-95% stenosis of the bifurcation of common carotid artery and extending into the right internal carotid artery (Figure 1). The therapeutic options were explained to the patient which were either surgical correction of the ISR in the innominate artery and carotid endarterectomy or a therapeutic percutaneous interventional procedure. First a temporary pace maker lead was guided into the right ventricle through the right femoral vein approach using a 6F sheath. Then the innominate and right common carotid arteries were approached via the right femoral artery. Under systemic heparinization (100 U/kg unfractionated heparin), an 8F multipurpose catheter (Guidant) was maneuvered over a wire across the occluded stent and into the right internal carotid artery. A distal protection device (Acunet 6.5 mm by Guidant) was deployed over the wire distal to the stenosis in the internal carotid artery. The lesion was pre-dilated and then stented with a self expanding ACCU/LINK carotid stent (Guidant- length 40 mm; diameter 7-10 mm). The stent was post-dilated with a 20 mm ViaTrac Plus balloon (Guidant 5 mm dia). The stent overlapped the...
origin of the external carotid artery however, there was no flow limitation within the artery. Keeping the access across the ISR was of utmost importance. The distal protection device was now removed, leaving the retrieval sheath in place. The retrieval sheath was withdrawn over a heavy duty exchange wire. A Power Flex Plus balloon (Guidant) 10 mm in diameter and 40 mm length was placed across the ISR in the innominate artery, over the heavy duty exchange wire. The balloon was inflated twice to optimal pressure within the ISR (Figure 2).

Final angiography demonstrated no residual stenosis and antegrade flow across the common carotid and internal carotid arteries was smooth (Figure 3). The attempted relief of the ISR left a residual stenosis of only 30% (Figure 4). No complications occurred immediately during or after the procedure. After the procedure the patient was prescribed clopidogrel 75 mg twice daily for 4 weeks (followed by 75 mg once daily) and aspirin 300 m once daily.

**DISCUSSION**

The technical challenge in this particular case was to deploy a distal protection device into the internal carotid artery after crossing an ISR in the innominate artery stent. The deployment of the distal protection device in the internal carotid artery presented considerable difficulty and skill maneuvering of the chosen equipment was employed to overcome the problem.

The other important aspect of this case was whether to advise percutaneous intervention for the two procedures or advise surgery. Since intervention in both the vessels was far from perfect, the stroke hazard and the possibility of a repeat procedure was discussed with the patient. Accepting the stroke risk the patient declined surgery and opted for percutaneous procedure.

Symptomatic lesions of innominate arteries are infrequent as compared to arteries elsewhere in the body. They usually present with upper limb or neurological symptoms. The purpose of PTA is symptomatic relief. According to the guidelines of the Society of Interventional Radiology Standards of Practice Committee (SIR SOP) lesions of the subclavian and innominate arteries are classified into 4 categories.2 Category 1 is stenotic lesions that are isolated, 3 cm or less in length, and with plaque that does not involve the right carotid artery, or either vertebral artery orifice; (b) stenosis dilated to provide inflow to surgical grafts and (c) bypass grafts anastomotic stenoses in cases in which the risk of cerebral embolization is low. Category 3 includes short-segment occlusions (less than 5 cm) that often involve the origin of the subclavian and brachiocephalic arteries. Category 4 encompasses stenoses that involve the origin of the carotid and vertebral arteries or long-segment occlusions (greater than 5 cm).

In patients with cerebral symptoms PTA of the supra-aortic vessels is a safe and effective procedure1 and may be considered the primary therapeutic option for treatment of atherosclerotic lesions;3,4 it results in immediate resolution of patients’ symptoms with few complications.5,6 Innominate artery PTA can achieve excellent immediate and long-term results in proximal stenosis.6-8 Subclavian occlusions do not respond as well to PTA, with a high re-stenosis rate (50%); retreatment with metallic stents however, is safe, and they seem to limit the long-term re-stenosis rate.8,9

Its large diameter and short length, with early bifurcation into the common carotid and subclavian arteries makes intervention in the innominate artery the most challenging. The difficulty extends to the right subclavian artery in comparison to its left counterpart, which is related to fluoroscopic visualization and the tendency for stenoses to develop in the very short segment between its origin and the take-off of the right vertebral artery.10

The debate of carotid artery stenting (CAS) versus carotid endarterectomy (CEA) for carotid artery stenosis continues, yet the trend for carotid stenting is catching up. In ACAS (Asymptomatic Carotid Atherosclerosis Study), the researchers concluded that compared to aggressive medical treatment, elective surgical revascularization will reduce the 5-year risk of ipsilateral stroke, (In asymptomatic carotid stenosis more than 60%) if performed at a center associated with a perioperative morbidity rate of less than 3%. In CAVATAS (Carotid and Vertebral Artery Transluminal Angioplasty Study) the 30-day rates of stroke and death were similar in 504 patients who were randomly assigned to undergo either angioplasty, with or without
stenting, or surgery. The primary endpoints in the SAPPHIRE study (Stenting and Angioplasty with Protection in Patients at High Risk for Endarterectomy) strongly favored stenting over surgery in 334 patients, who had symptomatic stenosis of more than 50% or asymptomatic stenosis of more than 80% and who were high risk surgical candidates to undergo either stenting or surgery.

REFERENCES


