

CASE REPORT

Recurrent Coronary-subclavian Steal Syndrome Treated by Left Subclavian Artery Stenting

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Introduction

The left internal mammary artery (LIMA) has better long-term patency rates than long saphenous vein grafts when used for coronary artery bypass surgery.¹ However, blood flow through it can be compromised by proximal disease in the left subclavian artery, resulting in recurrence of the symptoms of myocardial ischaemia. This has been termed the coronary-subclavian steal syndrome, and retrograde flow through the LIMA graft can be shown on coronary angiography. Various treatments have been used to correct this, including carotid-subclavian bypass, percutaneous transluminal angioplasty (PTA) and most recently, primary stenting. We describe a case initially treated with angioplasty, which recurred and eventually required percutaneous stenting with complete resolution of symptoms.

Case Report

A 72-year-old man presented with exertional angina and dyspnoea, despite medical treatment with nitrates and a calcium channel blocker. He had suffered a myocardial infarction aged 63 and had undergone coronary artery bypass surgery aged 68. At surgery his triple vessel disease had been bypassed using saphenous vein grafts to the right coronary artery and

obtuse marginal artery, and a LIMA graft to the left anterior descending artery. Following this he was asymptomatic for 4 years. He then developed recurrent angina and underwent coronary angiography, which showed that both vein grafts were working well, but an aortic arch injection showed that there was a severe left subclavian artery stenosis, extending almost to the origin of the vertebral artery, proximal to the origin of the LIMA graft (Fig. 1). A thallium exercise scan confirmed reversible ischaemia in the territory supplied by the left anterior descending artery. Left subclavian artery PTA was performed via the left common femoral artery using an 8 mm balloon. Post-angioplasty the appearance was improved, but a shelf-like protrusion into the lumen persisted (Fig. 2). His symptoms resolved, but gradually recurred after 4 weeks. On review, although his blood pressure was equal in both arms, duplex scanning showed abnormally elevated velocities in both subclavian arteries, on the left side proximal to the origin of the vertebral artery and on the right side distal to the origin of the vertebral artery. The right internal carotid artery was noted to be occluded and the left internal carotid artery to have a localised stenotic plaque causing a 50-79% stenosis. The left vertebral artery had a proximal stenosis. Repeat left subclavian artery angioplasty was performed using a larger 9 mm balloon. Post-procedure duplex scanning confirmed a good haemodynamic result, but again his symptoms recurred after 4 weeks. The stenotic area was then stented using a 10 mm × 4 cm Memotherm™ stent inserted via the left common femoral artery (Fig. 3). He has remained symptom-free for the last 17 months.

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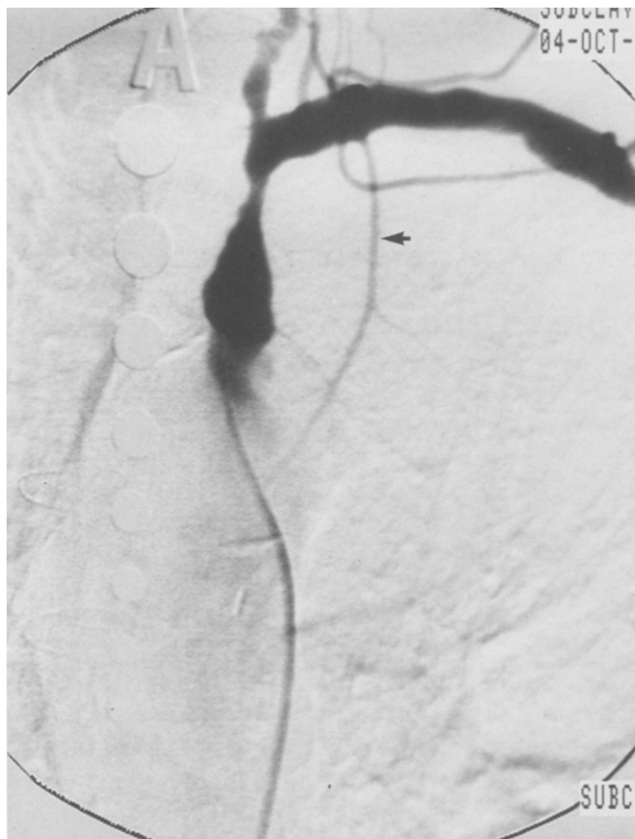


Fig. 1. Left subclavian angiogram showing stenosis in left subclavian artery just proximal to the origin of the left vertebral artery. The left internal mammary artery is arrowed.

Discussion

The coronary-subclavian steal syndrome was first described in 1974 by Hargola and Valle, who stressed the importance of subclavian angiography prior to coronary artery bypass surgery.² The incidence has been estimated at up to 1%.³ Clinical signs commonly reported include unequal blood pressure in the arms and diminished pulses on the left side. However, as this case shows, in the presence of bilateral subclavian disease these physical signs may not be present. As the left hand is the non-dominant side in the majority of people, a history of arm claudication may not be elicited despite a significant subclavian stenosis. Routine subclavian injection has been advocated in patients undergoing coronary angiography who are likely to proceed to bypass surgery,⁴ but the angiographic appearance may be misleading. The only way of being certain that a lesion is haemodynamically significant at angiography is to demonstrate a pressure drop across the stenosis. Duplex imaging of the subclavian artery is simple, non-invasive and provides accurate haemodynamic information about the flow in the artery.⁵



Fig. 2. Post-angioplasty appearance of the left subclavian artery showing some improvement in appearance.

Subclavian artery angioplasty is successful in up to 94%^{6,7} of cases, although a restenosis rate of up to 20% has been reported,⁸ and Mathias has reported an 83% success rate in reopening occluded subclavian arteries with PTA with encouraging medium-term patency rates.⁹ If restenosis occurs then the options are to stent the lesion or to perform surgery. The most commonly reported surgical procedure is carotid-subclavian bypass, which has a reported 5-year patency of 95%,¹⁰ but in this case the risk of stroke would have been increased because of the presence of an occluded contralateral internal carotid artery and a compromised left vertebral artery. Axillo-axillary bypass has a lower patency rate¹¹ and would have been a poor choice in this patient, as the inflow would have

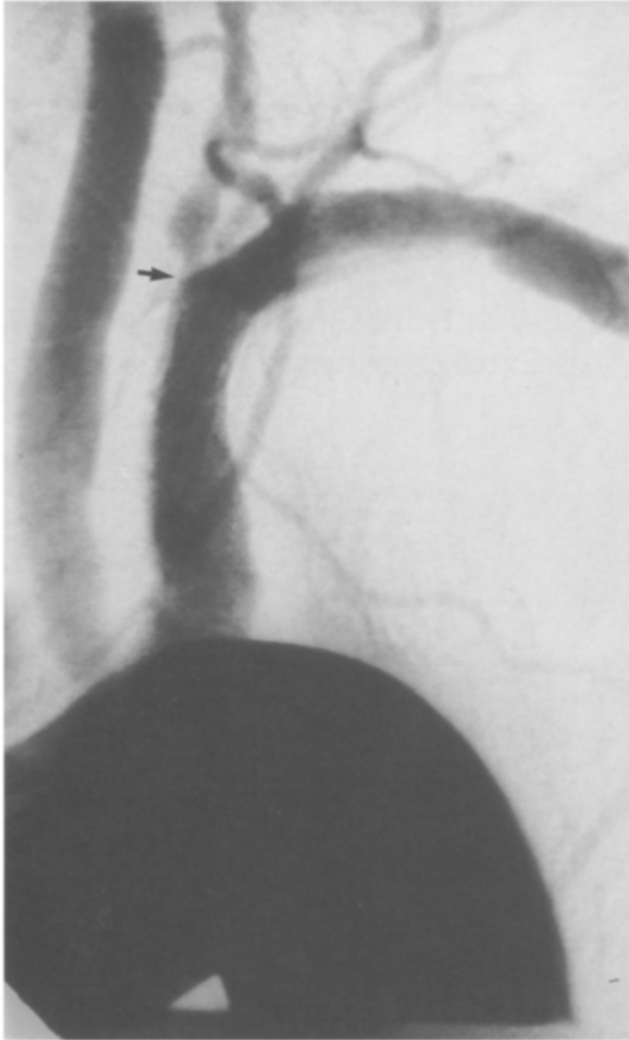


Fig. 3. Arch aortogram following deployment of stent into the left subclavian artery. The upper end of the stent (arrow) is just proximal to the origin of the left vertebral artery.

been compromised by the contralateral subclavian stenosis. Subclavian artery stenting for this problem has been described in a small number of cases as a primary procedure.^{12,13} Stenting as a secondary procedure for restenosis after PTA of the subclavian artery has only been described once.¹⁴ Correct positioning of the stent is important, avoiding encroachment on the origins of the vertebral and internal mammary arteries. This may be difficult if the lesion is long or close to the origins of these vessels, and concern about covering the origin of the left vertebral artery was the main deterrent in stenting this patient after his first restenosis. Slight protrusion of the stent proximally into the aorta a small amount is probably not significant. Very little follow-up data is available on the results of subclavian stenting, but an initial report is encouraging.¹⁵

In summary, patients who have undergone coronary artery bypass surgery using a LIMA graft and who subsequently develop angina should initially undergo duplex scanning of their left subclavian artery to exclude a significant proximal subclavian artery stenosis. If a stenosis is detected and thallium scanning confirms reversible ischaemia in the territory supplied by the graft, then subclavian artery angioplasty should be performed. Recurrent stenosis may be detected by duplex scan and treated by stenting.

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