INTRODUCTION

Subclavian artery (SCA) occlusion is not so rare. Although SCA occlusion results in insufficient blood flow, it is mostly observed without any symptoms. The therapeutic treatments include angioplasty and stent insertion into the SCA to treat stenosis and occlusion. However, if these interventions are not feasible, surgical options must be considered. We performed femoro-axillary (fem-ax) artery bypass using an autologous saphenous vein graft. However, 10 months later, she experienced coldness in the left forearm. Angiography revealed chronic total occlusion of the venous bypass. Despite emergent thrombectomy, redo fem-ax artery bypass operation was performed using a prosthetic graft. Upper limb salvage can be achieved by fem-ax artery retrograde bypass. 

Key Words: Subclavian artery occlusion, Artery bypass, Upper limb salvage

CASE

A 61-year-old woman with dialysis-dependent renal failure experienced coldness in her left upper extremity with left finger pain. Two years earlier, she underwent aortic valve reconstruction and coronary artery bypass graft (CABG) with a right great saphenous vein (GSV) graft. Native vascular access (arteriovenous fistula) had been constructed on the left forearm. Angiography revealed total left SCA occlusion and more than 75% stenosis of the left common iliac artery (CIA) (Fig. 1). Ankle brachial index (ABI) was 0.86 on the right and 0.68 on the left. Doppler ultrasound of the carotid artery showed severe calcification and increased intromedial thickness in the bulb region. She was diagnosed as having left SCA occlusion and arteriosclerosis obliterans.

First endovascular treatment was utilized to revascularize the left upper extremity. Endovascular methods to target the lesion of the left SCA were attempted, but the catheter and guide wire could not pass through the orifice of the SCA occlusive lesion (30 mm length of SCA). Unfortunately 1 month later, septic shock caused by Methicillin-resistant Staphylococcus aureus infection of the GSV necessitated amputation of the right leg, above the right knee, to remove the necrotic tissue and source of infection. Following amputation, angiography showed 75% stenosis...
DISCUSSION

SCA occlusion causes insufficient blood flow with various symptoms such as vertigo, arm weakness or numbness. We often encounter non-cardiac symptoms prior to other systematic problems such as the blood pressure differences of more than 20 mmHg between each arm. Endovascular treatment is the first therapeutic option for SCA occlusive lesions, and generally provides positive results [1-3]. For patients requiring revascularization for left upper limb ischemia, intervention with contemporary endovascular devices for SCA occlusion is used. In this case, many underlying diseases prevented surgical reconstruction. However this treatment strategy should be
tailored based on the patient by considering several factors including but not limited to age, daily activity and primary illness. This is important as recent reports have described that 6% to 12% of cases develop restenosis after SCA percutaneous angioplasty and stenting [1-4]. Although long-term consequences are unknown, recent studies have described stent grafts with the development of higher quality stents and enhanced operator techniques.

Curative measures often require surgical interventions; aorto-axillary, carotid-axillary, and bilateral SCA or bilateral axillary crossover arterial bypass. Axillary-femoral artery bypass has been usually selected in the treatment of high-risk patients with abdominal and iliac artery obstruction since it was first reported by Blaisdell and Hall in 1963 [5]. Extra-anatomical bypass is essential for various patients with infectious aorta, prosthetic arterial graft, and dissection or aorto-enteric fistulae. However, satisfactory peripheral perfusion and freedom from restenosis/occlusion are difficult to achieve after bypass. We chose an extra-anatomical bypass, despite the risk of a calcified carotid artery lesion, with expectations of a good long-term bypass graft patency. The patient also had the possibility of a secondary vascular access reconstruction in the contralateral upper limb because of regular hemodialysis dysfunction, and we also considered the risk of coronary steal syndrome post CABG [6,7]. The surgical procedure and approach should depend on the primary illness and anatomical location of the occlusion. Considering post-operative bypass patency, we first selected an autologous reverse GSV bypass graft, tapered with a PTFE graft. However, the small vessel size of the GSV could not allow sufficient blood flow for upper limb salvage, thus, we performed surgical revascularization with a prosthetic graft.

Fem-ax retrograde arterial bypass may be a valuable to salvage left finger necrosis when endovascular treatment is not available. Additionally, for successful arterial bypass reconstruction, it is essential to consider both bypass route and graft type.

REFERENCES

1) Tsuura M, Terada T, Tanaka Y, Yoshi-mura R, Okada H, Nanto M, et al. Endovascular reconstruction for stenotic or occlusive lesions of subclavian and vertebral artery. J Jpn Coll Angiol 2010;50:737-743.
2) Sixt S, Rastan A, Schwarzwälder U, Bürgelin K, Noory E, Schwarz T, et al. Results after balloon angioplasty or stenting of atherosclerotic subclavian artery obstruction. Catheter Cardiovasc Interv 2009;73:395-403.
3) Sadato A, Satow T, Ishii A, Ohta T, Hashimoto N. Endovascular recanalization of subclavian artery occlusions. Neurol Med Chir (Tokyo) 2004;44:447-453, discussion 454-455.
4) Schillinger M, Haumer M, Schillinger S, Ahmadi R, Minar E. Risk stratification for subclavian artery angioplasty: is there an increased rate of restenosis after stent implantation? J Endovasc Ther 2001;8:550-557.
5) Blaisdell FW, Hall AD. Axillary-femoral artery bypass for lower extremity ischemia. Surgery 1963;54:563-568.
6) Sadek MM, Ravindran A, Marcuzzi DW, Chisholm RJ. Complete occlusion of the proximal subclavian artery post-CABG: presentation and treatment. Can J Cardiol 2008;24:591-592.
7) Rogers JH, Calhoun RF 2nd. Diagnosis and management of subclavian artery stenosis prior to coronary artery bypass grafting in the current era. J Card Surg 2007;22:20-25.