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Arterial bypass surgery and stenting to enable clot retrieval: A case of an acute ischaemic stroke in a patient with Takayasu's arteritis

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Abstract

Takayasu's arteritis is a rare progressive vasculitis which primarily affects the aorta and its branches. Its vascular complications are associated with considerable morbidity and premature mortality. We present a 26 year old female with a particularly aggressive and rapidly progressing form of Takayasu's arteritis manifesting as high grade bilateral common carotid and left subclavian artery stenoses. She suffered an acute ischaemic stroke requiring left subclavian artery angioplasty and stenting, followed by a hybrid revascularisation approach where a left subclavian artery to right distal common carotid artery bypass with a Dacron interposition graft and subsequent clot retrieval via cerebral angiography were successfully performed. She recovered well with minimal residual neurological deficits. Unfortunately, she developed re-stenosis of her bypass graft and stent despite appropriate medical management and required further endovascular interventions. Our case report illustrates the importance of employing a multidisciplinary approach to the management of Takayasu's arteritisto achieve a relatively good outcome for our patient. Ideally interventions should be performed in the inactive phase of the disease however this was not possible in our case as it was an emergency. Close surveillance is crucial to prevent serious end organ ischaemia.

Keywords

Takayasu's arteritis; vascular surgery; carotid; subclavian; bypass; stroke

Introduction

Takayasu's arteritis (TA) is a rare idiopathic granulomatous vasculitis involving large arteries. The most commonly affected arteries are the aorta, subclavian and common carotid arteries [1]. It typically presents in Asian females below 40 years of age and has an annual incidence of one to three cases per million population worldwide [2]. Intimal hyperplasia and fibrosis induced by vessel inflammation lead to arterial stenoses, occlusions and/or aneurysms [3]. Ischaemic strokes are a serious neurological complication of TA. We describe a case of a young patient with an acute ischaemic stroke on a background of TA who was successfully treated with a complex hybrid operative endovascular procedure involving Vascular Surgery, Interventional Radiology and Neurology specialists.

Case Report

A 26 year old Middle Eastern woman was diagnosed with Takayasu's arteritis in June 2015 after experiencing headaches, pre-syncopal episodes and intermittent vision loss. She had no other significant comorbidities. Medical management was initiated after arterial imaging revealed multiple large arterial stenoses. Her symptoms failed to improve despite steroids and immunosuppressive agents including azathioprine, mycophenolate, methotrexate and adalimumab. Six months following her diagnosis, she presented to our emergency department with dysphasia and a right hemiparesis of sudden onset.

Urgent cerebral computed tomographic (CT) angiography and perfusion scans confirmed an acute left middle cerebral artery (MCA) territory infarct. CT angiography also demonstrated bilateral common carotid artery and brachiocephalic artery occlusions, as well as stenosis of the left subclavian artery. The ischaemic stroke was likely a consequence of a thromboembolic event originating from the diseased left common carotid artery. Intravenous thrombolysis using alteplase (tissue plasminogen activator) was administered as per our hospital's stroke protocol and she underwent a cerebral and aortic arch digital subtraction angiogram (DSA). A thrombus in the M1 segment of the left MCA was visualised but was deemed inaccessible by endovascular means due to the bilateral carotid artery occlusions. At this stage, the left subclavian artery was angioplastied and stented to improve blood flow via the left vertebral artery. However, she continued to develop worsening neurological symptoms in the context of cerebral hypoperfusion despite blood pressure augmentation using inotropes, which was likely secondary to significant residual stenosis of the left subclavian artery.

A left subclavian artery to distal right common carotid artery bypass with a Dacron interposition graft in the retropharyngeal plane was performed, along with re-stenting of the left subclavian artery stenosis using a balloon-expandable 6mm V12 Maquet covered stent. The left common carotid artery was explored and the occlusion was stented at the common carotid bifurcation.

She was transferred to the angiography suite directly from the operating theatre where she underwent clot retrieval via the left neck wound. She developed a left femoral artery pseudoaneurysm as a result of the initial groin puncture for the cerebral angiography which was repaired intra-operatively, as well as a non-flow limiting left internal carotid artery dissection which was managed conservatively. She was commenced on dual anti-platelet therapy (prasugrel and aspirin) to prevent stent thrombosis. Prasugrel was chosen given she was a known non-responder to clopidogrel. There were no other significant complications and she recovered well with a very mild right sided upper and lower limb weakness and word finding difficulties. Post-operatively, she was commenced on tocilizumab in addition to prednisolone by the Rheumatology team. A follow up CT angiogram completed one month after the surgery demonstrated stable findings and her neurological symptoms had improved.

Discussion

The neurological manifestations of Takayasu's arteritis (TA) reflect end-organ ischaemia resulting from critical stenosis or occlusion of the arterial branches of the aortic arch which supply blood to the brain. Clinical features of neurological involvement in TA include headache, dizziness, vertigo, cranial nerve palsies, visual disturbance, seizure, transient ischaemic attack and ischaemic or haemorrhagic stroke. Stroke is the most significant neurological sequelae of TA and has been reported in

approximately 10 to 30% of cases [4]. It is an important contributor of morbidity and premature mortality in these patients, accounting for 9.5% of deaths in TA patients in a study by Mwipatayi et el [5].

The clinical course of TA is divided into two phases. The early pre-pulseless phase is characterised by non-specific constitutional symptoms such as fever, weight loss, malaise and arthralgia. The late pulseless phase presents with ischaemic symptoms and signs including limb claudication, bruits, renovascular hypertension and faint or absent peripheral pulses [6,7]. Endovascular intervention and bypass surgery are preferentially considered when there is no active inflammation to reduce the risk of restenosis and anastomotic dehiscence [8]. Saadoun et al showed that active inflammation at the time of revascularisation increased the likelihood of complications in patients with TA by seven fold. The complications were restenosis, bleeding, thrombosis and stroke [9].

This case was unusual in that surgical and endovascular revascularisation were necessary in the active phase of her disease to facilitate urgent clot retrieval. This was complicated by the fact that our patient had a rapidly progressing form of TA which was recalcitrant to multiple medical therapies. By taking a multidisciplinary approach to the management of her acute stroke, we were able to achieve a good outcome and prevent significant permanent neurological deficits in this young patient. Kim et al recommend that if emergency intervention is required in a patient with active TA, steroids should be administered prior and post the procedure and/or surgery.

Furthermore, regular follow up of patients with TA is crucial to enable prompt recognition of disease progression thereby allowing timely intervention to prevent or delay the complications of TA. Disease status can be determined based on patient symptoms, clinical examination findings as well as biochemical and radiological indicators of disease activity [10].

Figures

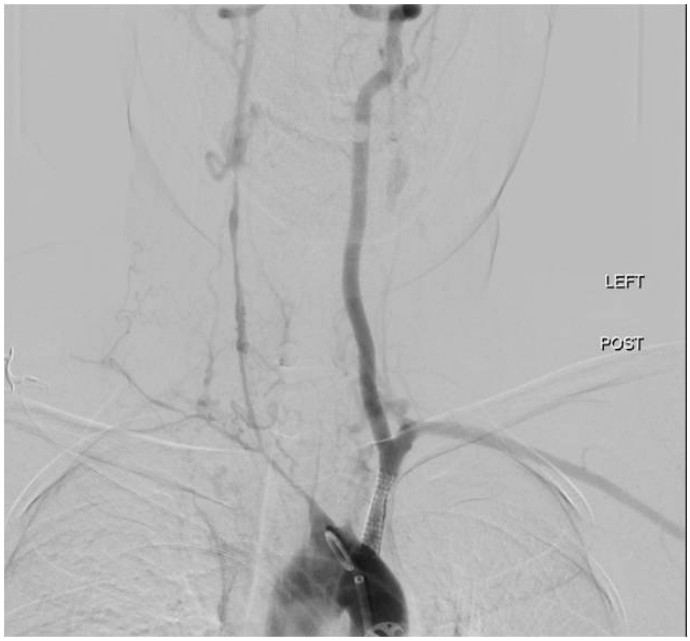

Figure 1: Aortic arch angiogram demonstrating left subclavian artery post angioplasty and stenting.

Figure 2: Cerebral angiogram revealing thrombus within the left M1 and A1 segments of the left MCA and ACA.

Figure 3: Completion run of cerebral angiogram following clot retrieval

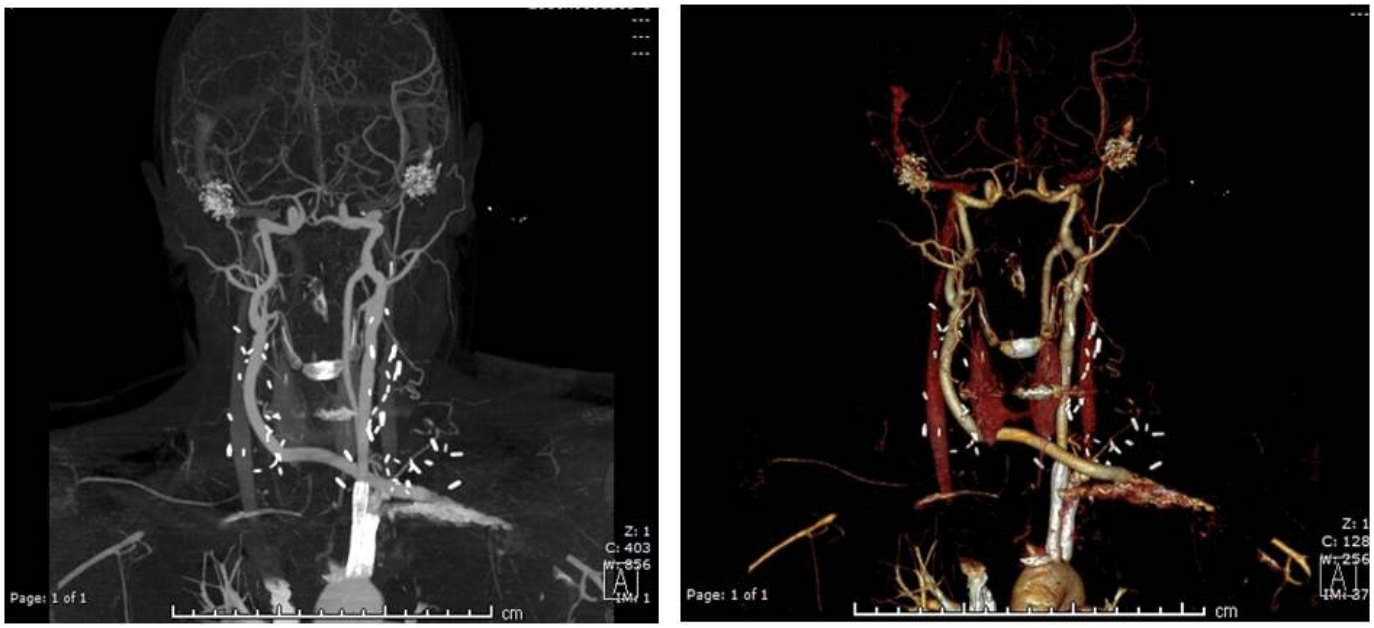

Figure 4: 3D reconstruction of the left subclavian to right common carotid artery bypass graft.

Figure 5: Left subclavian artery stent post angioplasty.

Conclusion

Maintaining arterial patency in Takayasu's arteritis is challenging and our case highlights the importance of employing a multidisciplinary approach in the management of this potentially deadly disease. Endovascular and surgical interventions are viable and relatively safe treatment options for the neurological complications of Takayasu's arteritis and should ideally be performed in the quiescent phase of the disease following optimal medical management.

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