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Case Report & Case Series

Acute internal carotid artery occlusion after carotid endarterectomy

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ABSTRACT

We report two cases of acute carotid artery (CA) occlusion following carotid endarterectomy (CEA). Case 1: a 58-year-old man was admitted with transient right-sided hemiparesis. Magnetic resonance imaging (MRI) and MR angiography (MRA) revealed cerebral infarction in the left cerebral hemisphere and left CA stenosis. Ten days after admission, he underwent CEA. 24 h after surgery, he developed right hemiplegia. MRI and MRA demonstrated a slightly enlarged infarction and left internal carotid artery (ICA) occlusion. Emergency reoperation was performed and complete recanalization achieved. The patient made a clinically significant recovery. Case 2: a 65 year-old man underwent a right-sided CEA for an asymptomatic 80% CA stenosis. 48 h after surgery, his family noticed he was slightly disorientated. MRI and MRA revealed multiple infarctions and right ICA occlusion. He was treated with antiplatelet therapy without reoperation because sufficient cross-flow from the left ICA through the anterior communicating artery was demonstrated by angiography, and his neurological symptoms were mild. His symptoms gradually alleviated and he was discharged 14 days after surgery. With ICA occlusion after CEA, immediate re-operation is mandatory with severe neurological symptoms, whereas individualized judgement is needed when the symptoms are mild.

1. Introduction

Carotid endarterectomy (CEA) is safe and effective in reducing the risk of stroke in symptomatic and asymptomatic patients with severe carotid artery stenosis [3,7]. However, perioperative neurological events are reported in 1.5–9% of CEA cases [11]. Particularly, postoperative occlusion of endarterectomized carotid arteries occurs in 0.5% of cases soon after surgery [4]. Management of these complications is an area of controversy. Here, we report two cases of acute internal carotid artery (ICA) occlusion following CEA. The first case was treated operatively and the second case non-operatively, with the relevant literature reviewed.

2. Case report

2.1. Case 1

A 58-year-old man consulted our hospital because he experienced transient right-sided hemiparesis. Magnetic resonance imaging (MRI) revealed cerebral infarction in the left cerebral hemisphere (Fig. 1A). Additionally, magnetic resonance angiography (MRA) and left carotid angiography demonstrated left carotid artery (CA) stenosis (Fig. 1B, C). The degree of CA stenosis was 80% by North American Symptomatic Carotid Endarterectomy Trial (NASCET) criteria [7]. He was admitted and underwent antiplatelet therapy. Recurrence of paralysis was not seen. Ten days after admission, CEA was performed under general anaesthesia by longitudinal arteriotomy to expose the intraluminal atheroma. A Pruitt-Inahara shunt (P-I shunt) was used to maintain cerebral perfusion during the arteriotomy. Complete resection of the plaque with a smooth distal edge was obtained. After endarterectomy, the arteriotomy was closed primarily with 5–0 propylene sutures and the shunt removed before completion of the sutures. His postoperative course was uneventful until 20 h after surgery when he developed right hemiplegia and disorientation. MRI and MRA were performed, with a slightly expanded infarction and left ICA occlusion detected (Fig. 1D, E, F). Emergency re-exploration was performed under general anaesthesia with rapid reheparinization. A reddish-black thrombus was identified at the endarterectomy site. Removal of the thrombus resulted in brisk retrograde bleeding. A Fogarty catheter was inserted through the ICA. Clotting of the distal ICA was prevented by aspiration through the Fogarty catheter. Complete recanalization was confirmed by intraoperative angiography, and a P-I shunt inserted to maintain cerebral perfusion. A smooth intima edge was confirmed from the operative findings. The cause of thrombus formation was unknown, however the ICA shape at the endarterectomy site appeared slightly kinked. The arteriotomy was again closed primarily with 5–0 propylene sutures, with no kink detected at the endarterectomy site. The patient made a clinically significant recovery. Fourteen days after reoperation, the patient was transferred to a rehabilitation hospital with mild right hemiparesis. Before discharge from our hospital, he was able to walk with assistance. At his 1-year follow-up evaluation, the patient had a

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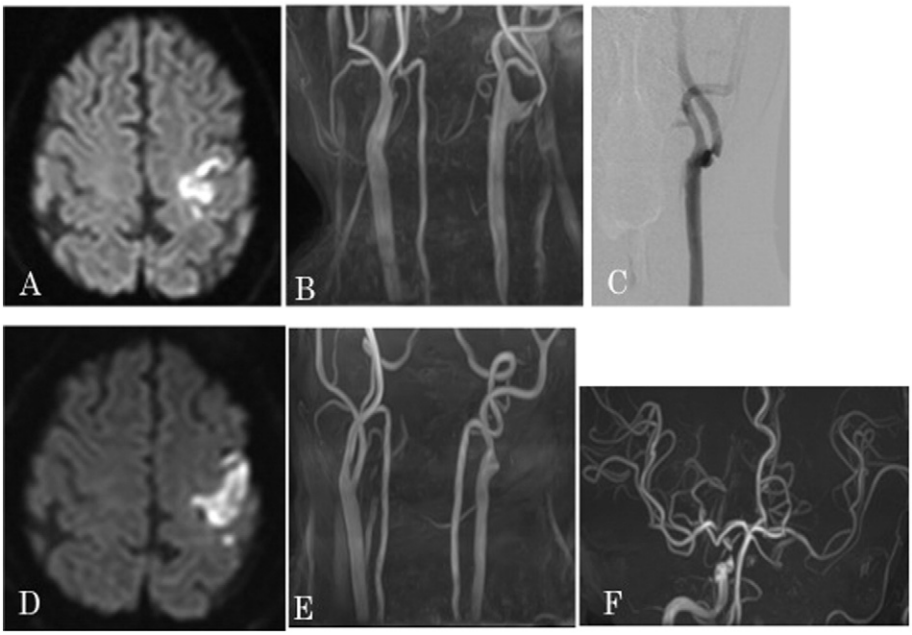

Fig. 1. Radiographic findings for Case 1. A: on admission, diffusion-weighted MRI detected a cerebral infarction in the left cerebral hemisphere. B: MRA demonstrated left cervical ICA stenosis. C: left carotid angiography demonstrated cervical CA stenosis. D: 20 h after CEA, diffusion-weighted imaging showed slight expansion of the cerebral infarction from the time of admission. E,F: cervical and cranial MRA revealed right ICA occlusion and cross-flow from the left ICA through the anterior communicating artery.

modified Rankin Scale (mRS) score of 3 and a patent left CA on MRA (Fig. 2A, B).

2.2. Case 2

A 65-year-old man was admitted with a moderate-size haemorrhage in the putamen and treated conservatively. He was discharged from hospital after 18 days with mild left hemiparesis. During admission, an asymptomatic CA stenosis was detected by MRA (Fig. 3A). The degree of CA stenosis was 75% by NASCET criteria. The patient was readmitted 6 months later and CEA performed under general anaesthesia by longitudinal arteriotomy. During the arteriotomy, a P-I shunt was used to maintain cerebral perfusion. The ICA size was comparatively small, and it was nearly impossible to insert a distal P-I shunt tube. The intraluminal atheroma was exposed and complete resection of the plaque with a smooth distal edge was obtained. After endarterectomy, the arteriotomy was closed primarily with 5–0 propylene sutures, and the shunt removed before completion of the sutures. His postoperative course was uneventful until 48 h after surgery when slight disorientation was noted. MRI and MRA were performed, with multiple infarctions in the right cerebral hemisphere and ICA occlusion detected (Fig. 3B, C). Emergency re-exploration was considered, but sufficient cross-flow from the left ICA through the anterior communicating artery was observed by angiography (Fig. 3D). Moreover, his neurological symptoms were mild, therefore he was treated with antiplatelet therapy. His left hemiparesis did not worsen and his symptoms gradually alleviated. He was discharged 14 days after surgery and lived without worsened symptoms. At her 2-year follow-up evaluation, she had a modified Rankin Scale (mRS) score of 2.

3. Discussion

Several reports have documented that acute thrombus at the endarterectomy site is a common cause of ICA occlusion after CEA [4,11,12]. Complete surgical excision of the carotid plaque during CEA is essential to prevent postoperative thrombus generation [8,10,12]. In Case 1, a smooth intima edge was confirmed during re-exploration, but with a slight arterial kink detected at the endarterectomy site. Correction of kinks in the ICA and common carotid artery (CCA) can help prevent post-CEA thrombosis [9]. Surgeons performing CEA should pay

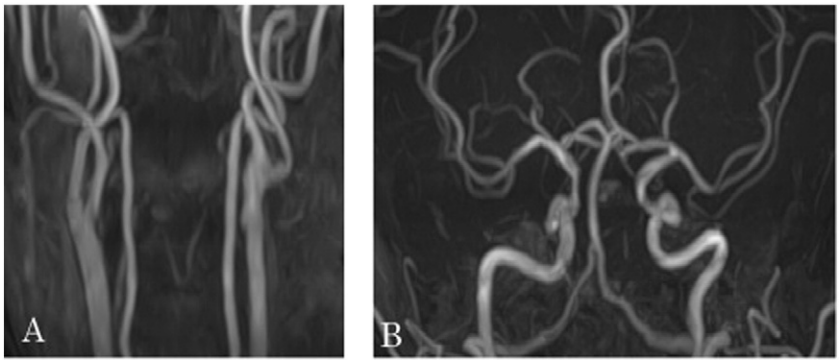

Fig. 2. Radiographic findings for Case 1 one year after surgery. A,B: a patent left CA was confirmed on cervical and cranial MRA.