

CASE REPORTS

Complex traumatic dissection of right vertebral and bilateral carotid arteries: a case report and literature review

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A 27-year-old female motorcycle passenger was admitted with bruises and concussion after a motor-vehicle accident. After a lucid interval of several hours she became stuporous and progressed to an acute comatose state. Computed tomography demonstrated extensive cerebral ischaemia in the territory of the right middle cerebral artery. Angiography after transfer to the authors' hospital revealed dissections of both carotid arteries and of the right vertebral artery. The patient underwent surgical reconstruction of the left internal carotid artery with saphenous vein. The management of this patient is discussed and the literature reviewed.

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Introduction

Traumatic dissection of the carotid artery has been discussed frequently with regard to clinical presentation, diagnosis and treatment [1–3]. Dissection of supra-aortic vessels after blunt trauma is rare and has been described to occur with an incidence of 0.8/1000 blunt trauma [4]. Vertebral artery dissection has been described even less frequently [5, 6]. The mortality of supra-aortic dissections is high (40%), particularly because most patients have a lucid interval of several hours after the initial trauma. When the patient becomes symptomatic however, cerebral ischaemia is usually present and worsens the patient's prognosis considerably. The appropriate treatment of carotid artery dissection remains a matter of discussion.

Case report

A 27-year-old female motorcycle passenger was injured in a motor vehicle accident. Upon admission

to a regional hospital she had light bruises and concussion only. She was kept under observation in the hospital despite normal neurological examination. Three hours later she developed respiratory insufficiency with loss of consciousness necessitating intubation and transfer to an intensive care unit. At that time no further neurological deficits were noted. Two hours later the patient was fully alert again and breathing spontaneously. She was extubated but became comatose after 30 minutes and was reintubated. In the meantime she had developed left-sided hemiplegia. A computed tomography scan of the brain showed extensive cerebral ischaemia in the territory of the right middle cerebral artery. The patient was transferred to the authors' hospital for further diagnostic measures and treatment.

An angiography was performed, which showed bilateral carotid artery dissection (*Figure 1, Figure 2*) plus right vertebral artery dissection (*Figure 3*). Based on these findings and the clinical picture with left-sided hemiplegia it was decided to reconstruct the left carotid artery. Intraoperatively, intimal haemorrhage was found distally from the carotid bifurcation. This haemorrhage was not confined to the extracranial parts of the internal carotid artery. After resecting approximately 4 cm of internal

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Figure 1 Angiography of the right carotid artery



Figure 3 Angiography of the right vertebral artery



Figure 2 Angiography of the left carotid artery

carotid artery, the intima of the distal part was readapted with a continuous suture. Vessel continuity was accomplished by interposition of a segment of saphenous vein. At the end of the procedure there was a good pulse on the vein segment. Further diagnostic work-up postoperatively showed a fracture of the right scapula and a stable fracture of the fourth thoracic vertebral body, both of which were managed conservatively.

Because of prolonged postoperative perturbation

and confusion excluding extubation the patient was sedated for 2 weeks, which necessitated long-term respirator therapy. After initial disorientation as to time and place, postoperative psychosis and lethargy her level of consciousness improved quickly after extubation. Three weeks later the patient was discharged to a neurological rehabilitation facility because of persistent left-sided hemiparesis. A postoperative angiography was not performed because it would not have had a surgical consequence. However, transcranial Doppler- and Duplex-ultrasound studies showed a patent reconstructed left internal carotid artery at the time of discharge.

Discussion and literature review

Verneuil was the first to describe traumatic dissection of the carotid artery in an autopsy case in 1872 [8]. It is reported to occur in 2–3% of all patients with severe craniocerebral trauma [7]. Yamada *et al.* [9] described 51 patients with traumatic dissection and Krajewski and Hertzler reported another series of 44 patients in 1979 [10]. The incidence of traumatic dissections of carotid arteries is increasing for several reasons. Firstly, physicians think of it more often when admitting trauma patients; secondly, better diagnostic tools are used to assess the patient's status accurately, thereby detecting dissections more frequently; and thirdly, an increasing number of

patients present following high-velocity decelerating accidents [11, 12].

The clinical course is characterized by a lucid interval lasting several hours [7, 11, 13]. In many patients, the initial trauma is considered minor, which leads to a delay in diagnosis. Usually, changes in the level of consciousness, aphasia, hemiparesis, or rare symptoms such as hemilingual paresis prompt further neurodiagnostic procedures [11, 14, 15].

Crissey *et al.* [16] described four different mechanisms for the development of traumatic carotid artery dissections in 1974: (i) direct trauma to the artery, (ii) lateral flexion of the head with overextension of supra-aortic vessels, (iii) blunt oral trauma and (iv) a skull-base fracture with intrapetrous thrombosis. Traumatic occlusion of supra-aortic vessels may be caused by contusion, spasm, thrombosis or intramural haematoma. However, the most frequent pathological finding is an intimal flap with consecutive vessel occlusion.

Angiography remains the 'gold standard' for establishing the diagnosis of traumatic carotid artery dissection. Doppler ultrasound is relevant for the diagnosis as a primary screening tool because of its rapid availability [17]. Magnetic resonance angiography can establish the diagnosis as well, but it is not available in all hospitals and makes the patient rather inaccessible during the examination, which puts him/her in unnecessary danger. Computerized tomography scans are mandatory for the diagnosis of cerebral perfusion deficits.

The treatment of carotid dissections remains controversial. Yamada *et al.* [9] demonstrated significantly better results with surgical intervention than with conservative therapy. Other studies have reported unsatisfactory results after operative treatment [18]. The need for anticoagulation among the proponents of conservative treatment also remains controversial. Panisset and Eidelmann [19] reported good clinical outcomes and complete resolution of radiographic signs in three patients without any anticoagulant therapy. The authors prefer a conservative approach in case of traumatic carotid artery dissection, including therapeutic anticoagulation with acetylsalicylic acid, and switch to operative intervention in only a very few selected patients. Criteria for operative intervention include no or only minor neurological deficits, focal vascular lesions and proof of orthograde blood flow on angiography. Where there are fluctuating neurological deficits, as in the

patient described, surgical intervention should occur within 4 to 6 hours after the onset of symptoms.

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