

Isolated internal carotid artery dissection after a motorcycle accident: A case report

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ABSTRACT

Extra cranial carotid artery dissection is one of the most important complications associated with blunt head and neck trauma. It is a major cause of ischemic stroke in young adults. We report a case of internal carotid artery dissection which caused transient hemiparesis, horizontal gaze to right and anisocoria in a 19-year-old male motorcyclist involved in a collision. Unenhanced brain computed tomography scan showed well defined infarction in the right frontotemporoparietal area. Digital subtraction angiography showed complete occlusion of the proximal cervical right internal carotid artery. Moreover, intimal dissection was observed in distal cervical left internal carotid artery which did not limit blood flow to the brain. A stent was placed at the site of dissection in the left internal carotid artery. Intravenous heparin was commenced to avoid further thrombosis. He was discharged home 40 days after the accident with oral anticoagulation. Extra cranial carotid artery dissection is a rare condition which may happen after a non-significant neck trauma. Accordingly, the diagnosis of a cervical vascular dissection requires strong clinical suspicion.

Keywords: Case report, Carotid artery, Traumatic dissection, Cerebral infarction, Traffic injuries

1. INTRODUCTION

Extra cranial carotid artery dissection is one of the most important complications associated with blunt head and neck trauma [1]. However, this event is not common and is frequently associated with non-life threatening injuries; which can be missed on initial examination in the emergency room [2]. Compression against the spine in case of cervical rotation and extension may cause carotid dissections [3]. It is a major cause of ischemic stroke in young adults [1,3].

Motor vehicle accident is the most significant risk factor for carotid artery dissection in previously healthy patients. Inconveniently, most patients remain asymptomatic until the occurrence of cerebral ischemia and define focal neurological deficits usually for longer than 24 hours [4].

Here, we report a case of traumatic carotid dissection; the aim is to attract suspicion regarding this entity as a potentially under-recognized condition behind minor traumatic medical complaints.

2. CASE REPORT

We report the case of a 19-year-old male motorcyclist involved in a collision. He was brought to the emergency room by ambulance. At arrival he was agitated and uncooperative. Following administration of 2 mg midazolam intravenously he became slightly sedated and the initial examinations were done. His vital signs were as follows: blood pressure, 115/80 mm Hg; pulse rate, 85 beats/min; respiratory rate, 12 breaths/min and SpO₂, 96%. The initial physical examination revealed multiple abrasions in the upper and lower limbs as well as his right shoulder and an abrasion on the penis, without other significant findings. He underwent extended focused assessment with sonography in trauma (eFAST) and computed tomography (CT) scan of the brain, neck, chest and abdomen which appeared normal. The patient's medical history was procured from his father, who subsequently arrived at the emergency department. The patient had no notable past medical history and was not on any specific medications. Furthermore, there was no record of familial diseases. However, the patient has a history of alcohol intake. Another examination was performed 6 hours after admission. He was

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alert and conscious and complained of pain in the neck and right pelvic bone. However, his neck, chest, abdominal, pelvic and back examinations were unremarkable. The patient was discharged and advised to visit a neurosurgery clinic for further evaluation with cervical spine magnetic resonance imaging (MRI).

Two days after discharge, he was transported to our emergency department for weakness, lethargy and dizziness. He also complained of transient hemiparesis, however there were no obvious neurological deficits on examination. His pupils were midsized and reactive to light bilaterally. A brain CT scan was performed, which did not have any specific point. He was transferred to the general ward for further management. The next day, his family announced that he had taken some opium the night before due to pain and insomnia. Therefore, a toxicology consultation was requested. The patient had acceptable vital signs including blood pressure, 95/60 mm Hg; pulse rate, 53 beats/min; respiratory rate, 13 breaths/min and SpO₂, 98%. A horizontal gaze to right and anisocoria with right side pupil 4 mm and left side pupil 2 mm in the ambient light were observed. He also had left hemiparesis. The blood glucose level was 185 mg/dl and he had a normal venous blood gas analysis (pH, HCO₃⁻, and PCO₂ were 7.43, 23.4 mmol/L and 35.3 mmHg, respectively). These findings were more compatible with a structural problem of brain rather than opium poisoning. Unenhanced brain CT scan showed well defined infarction in the right frontotemporoparietal area as well as right to left midline shift (Figure 1). The patient underwent decompressive craniotomy and admitted postoperatively to the intensive care unit to provide integrated clinical treatment. Transthoracic echocardiography was performed the next day to exclude cerebral embolic event associated vegetations or mitral valve disease. There was normal sinus rhythm, ejection fraction was 60, and there was no structural abnormality in cardiac chambers.



Figure 1. Unenhanced brain CT scan. Note the ischemic area in the right frontotemporoparietal region as well as right to left midline shift.

Computed tomography angiography (CTA) of extracranial carotid arteries demonstrated normal internal, external and common carotid artery of both sides, without any signs of stenosis or filling defect. Both vertebral arteries were normal as well. Nevertheless, digital subtraction angiography (DSA) showed complete occlusion of the proximal cervical right internal carotid artery (Figure 2).

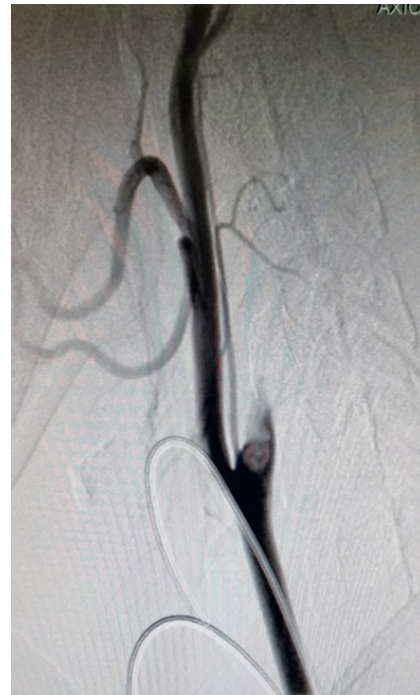


Figure 2. Digital subtraction angiography. Note the occlusion of the right internal carotid artery, distal to the carotid bifurcation

The stopped blood flow was consistent with the massive right ischemic stroke. Moreover, intimal dissection was observed in distal cervical left internal carotid artery which did not limit blood flow to the brain. A stent was placed at the site of dissection in the left internal carotid artery. Intravenous heparin was commenced to avoid further thrombosis. He was discharged home 40 days after the accident with oral anticoagulation with aspirin and clopidogrel for 3 months.

He was last visited 4 months after the accident, at which time he was alert and oriented. His cranial nerve examination revealed a visual acuity of hand motion in right eye and left-sided seventh nerve palsy. He had left hemiparesis which was more severe at the lower limb. He was referred to a rehabilitation facility for prolonged neuromotor rehabilitation. Timeline of symptoms, diagnosis, and treatment of the patient are given in Table I.

Table I. Timeline of the patient's examination and therapy

Hour/Day	Event	Investigation/ Treatment
Hour 0/Day 0	Collision involving a motorcyclist. agitation, uncooperation. acceptable vital signs, abrasions in the upper and lower limbs and penis.	Bedside eFAST scan – normal. CT scan of the brain, neck, chest and abdomen – normal
Hour 6/Day 0	Haemodynamically stable, conscious, complain of pain in the neck and right pelvic bone.	Neck, chest, abdominal, pelvic and back examinations – unremarkable. Discharged and advised to visit a neurosurgery clinic for further evaluation with cervical spine MRI in 7 days
Day 2	Readmission due to weakness, lethargy, dizziness and transient hemiparesis.	Neurological examination – normal. Brain CT scan – unremarkable. Admission in general ward for observation
Day 2	Family's account of him consuming opium the previous night due to pain and insomnia.	Toxicology consultation.
Day 3	Visit on ward by toxicologist. Acceptable vital signs, including respiratory rate, 13 breaths/min and SpO ₂ , 98%. Horizontal gaze to right, anisocoria, left hemiparesis.	Blood glucose, 185. Normal venous blood gas analysis. Brain CT scan – infarction in the right frontotemporoparietal area as well as right to left midline shift. Decision for decompressive craniotomy. Admission in ICU
Day 4	Ongoing review.	Transthoracic echocardiography – ejection fraction 60, no structural abnormality in cardiac chambers. CT angiography – without any signs of stenosis or filling defect in internal, external and common carotid arteries.
Day 12	Ongoing review.	Digital subtraction angiography – complete occlusion of the proximal cervical right internal carotid artery and intimal dissection in distal cervical left internal carotid artery without limitation of blood flow to the brain.
Day 14		Stent placement at the site of dissection in the left internal carotid artery. Intravenous heparin to avoid further thrombosis.
Day 40	Ongoing review. Approved for discharge by neurosurgery team.	Refer to a rehabilitation clinic. Reviewed in clinic in about 80 days.
Day 120	Reviewed in neurosurgery clinic.	Scheduled for cranioplasty. Refer to a rehabilitation clinic.

3. DISCUSSION

Dissection of the cervical carotid artery in the context of blunt head or neck trauma is a potentially devastating injury due to the considerable huge ischemic stroke in young adults. On average, symptoms of ischemic stroke appear in 2 days; however, this can be delayed up to about 4 months [5]. It is a rare condition that makes up approximately 0.08 to 0.4% of all traumatic injuries [6]. The main mechanisms of the injury include rotation and extension of the neck. Unexpectedly, even a non-significant neck trauma may cause cervical carotid artery dissection [1,7].

During the acute phase, the clinical presentation may remain subtle, unless the dissection is complicated with thrombus formation and subsequent infarction of the underlying brain [4]. Unfortunately, it is impossible to identify a damage mechanism based on the history taken from the patient, especially after traffic accidents. Accordingly, the diagnosis of a cervical vascular dissection requires strong clinical suspicion. On physical examination, the neck should be evaluated for petechiae or bruising, and auscultation for neck bruits should be performed. Bedside ultrasound imaging can help in assessment

of cervical artery dissection, nevertheless it is not a sensitive test for small intimal tears [1,8,9]. Unfortunately these were not done in our case.

Digital subtraction angiography is the gold standard protocol for the diagnosis of cervical artery dissection; hence, CTA has a sensitivity of 66-98% in comparison with DSA [10]. CTA could not find culprit lesion in our case, but the DSA showed complete occlusion of the proximal cervical right internal carotid artery. The stopped blood flow was consistent with the massive right ischemic stroke. Of course, this delayed diagnosis did not help to change the prognosis of our patient.

The best action should be taken in the shortest possible time, in managing the emergency patient. Therefore, cervical CTA can be helpful in high-speed accidents, where the vascular damage is considered [11]. Doppler sonography is also useful in the diagnosis of changes in the flow profile with a sensitivity of 79% and a specificity of 94% in comparison with CTA [12]. If the findings were positive, the best possible therapy for the patient may be implemented after consultation with a vascular neurologist.

Fully alert and well-oriented patients benefit from antiplatelet drug therapy. In contrast, patients suffering from progressive

neurological symptoms may benefit more from surgical treatment. However, due to its perioperative morbidity and mortality, open surgery is currently advocated for potentially life-threatening conditions. Minimally invasive stenting has become an extremely effective and safe method for vascular repair, instead [1]. However, our patient was conscious at the time of discharge after the initial visit; it seems that he was not well informed about neurological red flags at that time, as his neurological exam was initially unremarkable.

He was returned to the hospital with weakness, lethargy and dizziness; but a complete neurological exam was not performed due to the history of opium consumption. While, there were obvious neurological deficits, including hemiparesis, anisocoria and horizontal gaze, brain CT scan showed massive infarction in the right frontotemporoparietal area and midline shift. Therefore, he had lost the golden time for the diagnosis and treatment due to delayed referral. However, according to the DSA, intimal dissection in the distal cervical left internal carotid artery was diagnosed and treated using stent placement and anticoagulant therapy.

In conclusion, we consider that without proper diagnosis and treatment, this lesion could cause a similar stroke on the left side in the future. ICA dissection is a differential diagnosis to consider in trauma patients presenting with hemiparesis. Numerous case studies of traumatic ICA dissection can be found in the existing medical literature [1-3,6,7,11]. The patient in our case study was brought to our emergency department two days after his accident, presenting symptoms of weakness, lethargy, and dizziness. He also reported experiencing transient hemiparesis. Despite the patient's initial CT scan presenting as normal, medical professionals should have considered the potential for an ICA dissection given the patient's complaints. It would have been prudent to conduct an angiography prior to the onset of a massive CVA.

Compliance with Ethical Standards

Ethical standards: This work was conducted ethically by following per under Helsinki World Medical Association Declaration.

Patient consent: The patient gave his consent for clinical information and images relating to his case to be reported in a medical publication.

Conflict of interest: The authors declare that they have no conflict of interest.

Authors' contributions: MA, SMM and MT: Design, FF, SMM and BM: Supervision, MT, MA and SMM: Resources-Materials, FF, SMM, BM, MT and MA: Data collection and and/or processing, FF, SMM, HO, MT, MA and BM: Analysis and/or interpretation, MA, SMM and MT: Literature search, HO and SMM: Writing the manuscript, MA, SMM and MT: Critical review. All authors approved the final manuscript to be submitted.

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