



Asymptomatic dissection of craniocervical arteries in combination with severe cervical spine fractures

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Cervical spine fractures and traumatic dissection of craniocervical arteries are a common combination after severe trauma to the head and neck. Usually, severe symptoms lead the way to diagnosis. We report the case of a young woman involved in a high-velocity car accident without leading neurological symptoms but the threatening combination of dislocation fractures of the C6th/C7th/Th1th vertebrae and dissections of both carotid arteries and one vertebral artery. This case illustrates the need for quick and sufficient clinical diagnostic workup and evaluation and a well-scheduled treatment plan to combine the management of the spinal column fractures and the vascular injury. A review of the relevant literature and therapeutic approaches is presented.

Keywords: vascular injury ; cervical artery ; cervical spine fracture ; internal fixation.

INTRODUCTION

The combination of a vessel dissection with cervical spine injury is not rare after high-velocity accidents ; it is often fatal. Traumatic dissections of cervical arteries are primarily caused by rapid deceleration, followed by a hyperextension and rotation of the neck. The vertebrae serve as a fulcrum producing an intimal tear (5), allowing blood under arterial pressure to enter the wall of the vessel and dissect its layers. Increasing intramural haematoma may occlude the original vessel lumen and cause a stroke or emboli. Most patients demon-

strate severe neurological dysfunction and an immediate interventional therapy is often needed (3). The mandatory anticoagulation treatment often inhibits the direct surgical approach to stabilise the cervical fracture. We report a young patient with this injury pattern but without leading neurological symptoms. The diagnostic evaluation and the consecutive treatment modalities will be discussed.

CASE REPORT

A 30-year-old woman was admitted to our emergency room after being involved in a high-energy car accident in which the car rolled over at high speed. She was conscious in the pre-hospital phase and a stiff collar was put on by the paramedics. She showed only minor neurological symptoms with abnormal tickling sensations in the right foot ; muscular strength and reflexes in upper and lower extremities were bilaterally equal. Pain in the neck

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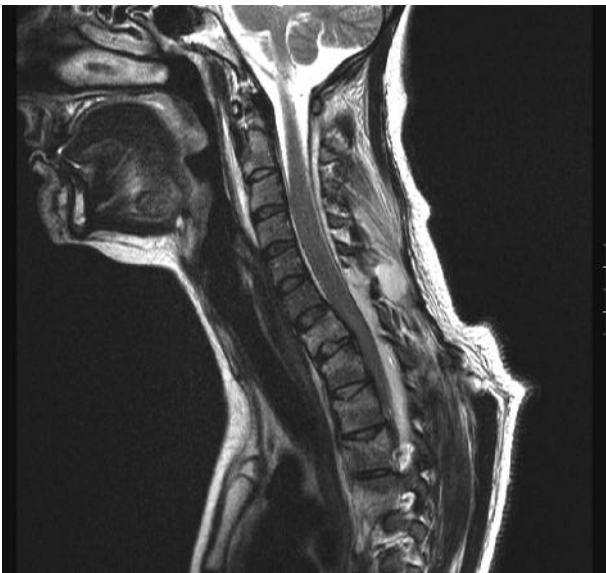


Fig. 1. — MRI of the injured region performed after the initial spiral CT scan.

was present. A body spiral-CT was performed after the first phase of shock room treatment as determined by our polytrauma algorithm. In addition to pulmonary contusions on both sides, there were fractures of vertebra C2, and dislocation fractures of the C6/C7 vertebrae and the C7/Th1 vertebrae were evident. Because of the combined cervical spine fractures, an MRI-Angiography was performed to exclude damage to the spinal cord (fig 1) and to assess the vessel damage. Bilateral dissection of the internal carotid arteries and dissection of the left vertebral artery were diagnosed. The patient was immobilised in a halo-vest brace in the emergency room (fig 2). An angiography was then performed, and a stent was implanted in the left internal carotid artery. Anticoagulant treatment was started with high-dose heparin (PTT 60-80 sec) and clopidrogel 75 mg/day. About 12 h after injury, the patient developed an incomplete paraplegia below the level of Th12 without motor reaction to pain stimuli in both legs. The upper extremities were neurologically not involved. A control CT scan showed an epidural haematoma at the level of C5-C6. The patient was directly transferred to the operating room. The right part of the C6 vertebral arch was mobilised and removed. The ligamentum



Fig. 2. — Lateral radiograph of the cervical spine after halo-vest brace and stent implantation in the left carotid artery.

flavum was found to be completely ruptured, and the medulla was covered by a haematoma, which was relieved. The fracture was stabilised using a dorsal internal fixation system (CerviFix Spinal System™, Synthes).

Postoperatively, the patient remained in the Intensive Care Unit for four days, following which she was extubated without problems and was transferred to the normal care station. The halo vest was worn for eight more weeks, while the patient was discharged to a specialised neurological rehabilitation centre. During the following six months, she made a good recovery without any residual neurological deficiency. Permanent anticoagulation treatment (clopidrogel 75 mg/day) was prescribed.

DISCUSSION

Combined lesions of bones, ligaments and blood vessels of the neck region are frequently seen fol-

lowing high-energy trauma. The patients usually present with severe neurological symptoms or often die (2). In milder forms, neck- or even occipital-based pain is present. With detailed diagnostic evaluation of the carotid artery, dissection of this vessel is found to be more common than previously thought (10). The incidence of isolated vertebral artery injury after blunt cervical trauma is reportedly below 1%, although the incidence of trauma-induced vertebral artery occlusion is described as being as high as 19% in patients with cervical spine fractures (11). Isolated lesions of this artery are often asymptomatic (15) even if the artery is not recanalised subsequently (11).

Complications of vertebral artery dissections may be recurrent brain embolism or cerebral ischaemia leading to a transient ischaemic attack (TIA) or a complete stroke (10). The differential diagnosis may be difficult in cases without these symptoms, and sometimes only a detailed radiological diagnostic workup will lead to the correct diagnosis in blunt artery trauma (6,9). Doppler investigation is sometimes used to clarify the diagnosis (14). As the diagnosis is easily overlooked, some authors recommend early angiography in this context (8). Especially in trauma patients, dissection of cranio-cervical arteries should be suspected when unremitting headache or neck ache is present in any young trauma patient. In patients with cervical spine fractures, even in the absence of neurological symptoms, arterial thrombosis should be suspected (16). The gold standard in diagnostic tools is a three-view trauma series as minimum to look for bone lesions (12), including a CT scan with a contrast agent and MR-angiography to locate the involved vessel section (13). The common treatment for isolated blunt carotid artery dissections is systemic anticoagulant treatment (4). Pre-emptive treatment with this medication is recommended. Cervical spine surgery may be delayed owing to this treatment, which may result in further harm to the patient (7). Recanalisation therapy might be considered in isolated carotid artery dissections, accepting the risk of an increasing intramural haematoma (1). Intraarterial stent implantation is needed if the blood supply of the intracranial structures is at stake, which is mostly seen in combination with

more than one damaged vessel. Only in these special cases does an endovascular or open surgical reconstruction seem to be suitable (4). Fractures might be stabilised through an external halo-vest brace without open reduction to avoid bleeding complications. While invasive treatment of asymptomatic patients with injuries to the brain-supplying vessel has been controversially discussed, we saw no other option in the case presented. After successful treatment, regular physical examinations and noninvasive imaging of the carotid arteries for at least a period of one year is mandatory (14).

In this case, a 30-year-old woman suffered the rare combination of severe neck fractures and extended cranial vessel damage with no leading neurological symptoms. Because appropriate radiological diagnostics were completed during the first clinical phase, the damage was diagnosed directly. However, the following treatment of these injuries with the need for opposite management approaches was a challenge for the involved medical staff and demanded an interaction between physicians of different specialisations and a well-scheduled treatment plan.

Our patient was informed, and she agreed that data concerning the case could be published.

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