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Case report

A fatal iatrogenic right vertebral injury after transoral odontoidectomy and posterior cervical stabilization for a type II odontoid fracture

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ABSTRACT

The authors present a singular case of an iatrogenic right vertebral artery injury, involving a 67 year-old man, who reported a type II odontoid fracture (Anderson and D'Alonzo Classification) and posterior atlantoaxial dislocation following a road traffic accident. A small injury involving the right vertebral artery occurred as a consequence of transoral odontoidectomy and posterior cervical stabilization. It was caused by bone spicules of spinal origin and their presence was confirmed by the histological section of the right vertebral artery at the level of C1–C2. The case confirms how iatrogenic vertebral artery injuries during cervical spine surgery may be potentially lethal, especially where complications arise some days after surgery.

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1. Introduction

Cervical spine injuries represent the most dangerous occurrence among all spinal injuries because of the high risk of possible harmful sequelae. It has been reported that the higher the level of the cervical spine injury, the higher the related morbidity and mortality will be. Cranio-cervical junction injuries are the ones that are most often fatal.[1]

In a retrospective study in which Malik et al. evaluated the morbidity, mortality and outcome of cervical spine injuries in 107 elderly patients, the cause of injury in 70% of cases was due to falling and in 30% to road traffic accidents.[2]

Odontoid fractures represent 9%–15% of all adult cervical spine fractures, the most common of which are upper cervical spine fractures in elderly people.[2,3] According to the anatomic location of the fracture, Anderson and D'Alonzo[4] made a classification that distinguishes:

Type I: oblique avulsion fractures of the upper part of the dens.
Type II: fractures at the junctions of the dens with the body of the axis.
Type III: fractures extend into the body of the axis.

Taking into account the type of odontoid fracture and its possible association to other cervical spine injuries different treatments can be adopted.[5]

Type II fractures, which are the most common, more than 60% of cases, can be treated conservatively or surgically. A conservative approach involves immobilization with a cervical collar or halo vest, whereas surgical treatment includes either anterior odontoid screw fixation or posterior C1–C2 instrumentation and fusion. Occiput to C2 fusion can be performed in those cases where the C1 arch is resected.[5–9]

The transoral approach to the craniovertebral junction is a valid surgical technique in treating ventral midline extradural compressive pathology. The target region is reached by the crossing of the oral cavity through the open mouth. Complications include: pneumonia, deep venous thrombosis, pulmonary emboli, myocardial

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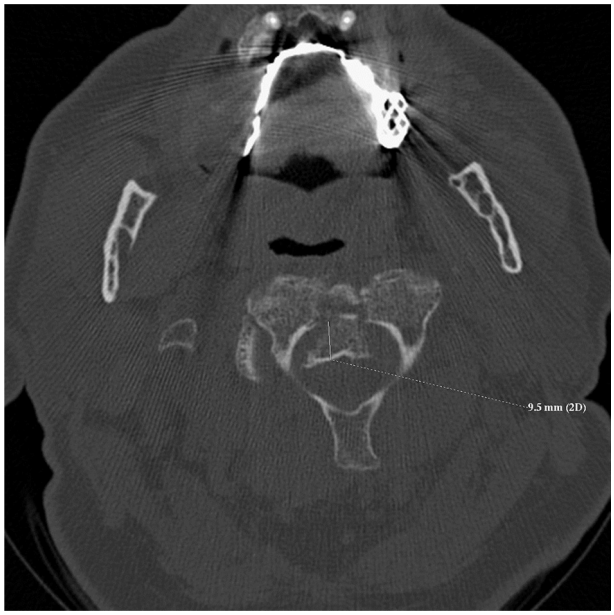

Fig. 1. Axial computed tomography scan shows fracture of the base of the odontoid with posterior displacement.

infarctions, cerebrospinal fluid leakage, wound infections, dehiscence, retropharyngeal abscess and vertebral artery injuries.[10]

Here is presented a singular case of iatrogenic right vertebral artery (RVA) injury, involving a 67 year-old man, who suffered a type II odontoid fracture (Anderson and D'Alonzo Classification[4]) and posterior atlantoaxial dislocation following a road traffic accident. The patient underwent a transoral odontoidectomy and posterior cervical stabilization but died 3 weeks after surgery due to the complication reported.

2. The case

A 67-year-old man after a car accident, reported a type II dens fracture (Anderson and D'Alonzo classification), as showed in cervical spine CT scan (Fig. 1). He was initially treated with halo-vest immobilization, but 11 days after the treatment no signs of reduction were observed, therefore the patient underwent transoral odontoidectomy and posterior cervical stabilization with iliac crest autograft. Complete atlantoaxial reduction and decompression of the spinal cord were achieved.

The patient, seven days after the surgery, showed a moderate bleeding from the mouth and for this reason, he was taken to the operating room for complete hemostasis and to investigate the cause of bleeding, a small injury of the RVA was found and tamponed with hemostatic agents. The following day the angiography revealed an occlusion of the RVA at C1 level and because of deteriorating general conditions, the patient underwent magnetic resonance neurography (MRN), showing severe hypoxic-ischemic brain damage and an absence of the right vertebral artery flow.

Two weeks after the first surgery with clinical conditions progressively worsening, despite the prompt therapeutic treatments, the subject died. The autopsy was performed about 24 h after death.

3. Postmortem findings

The external examination did not reveal the presence of traumatic injuries. The autopsy showed a mild to moderate pulmonary edema and no structural anomalies of the heart (weight 395 g). The neck examination, after in-situ dissection of both extracranial vertebral arteries, which allowed a complete removal of the vessels, showed a dissection of the vascular wall of the right vertebral artery in the tract along C1 and C2 and the lumen of the vessel was occupied by fibrin thrombi. No signs of aneurysms or other sources of bleeding were found.

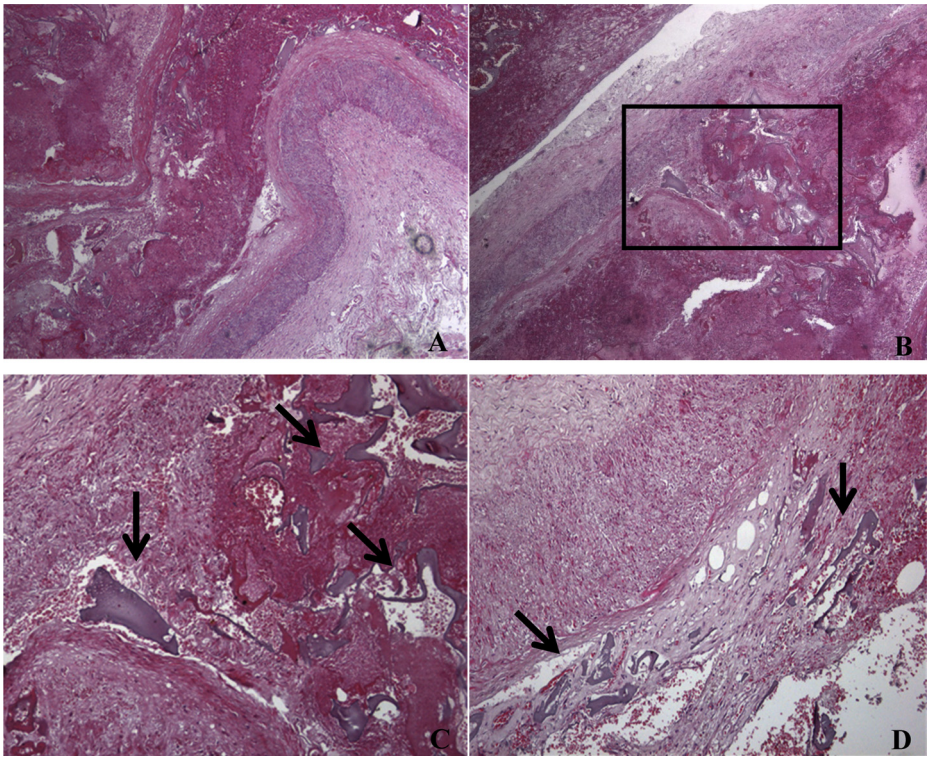

Fig. 2. A) Hemorrhagic dissection of RVA (H&E ×5). **B)** Perivascular and vascular wall hemorrhage with the presence of numerous of bone spicules (H&E ×5). **C)** Selected area of picture B, which highlights several bone fragments in aseptic necrosis (arrows) (H&E ×10). **D)** Reparative fibrosis of intimal injury of RVA and numerous bone fragments (arrows) (H&E ×10).

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