The Journal of Emergency Medicine, Vol. 38, No. 5, pp. 593–596, 2010

0736-4679/$–see front matter

doi:10.1016/j.jemermed.2007.08.059

Clinical Communications: Adults

A PITFALL IN NECK PAIN: OCCULT ODONTOID FRACTURE

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□ **Abstract—Type III odontoid fractures of the axis are the second most common injuries of the cervical spine. Most of these result from motor vehicle accidents and falls. Occult odontoid fractures without preceding trauma are rarely reported in the literature and may be difficult to diagnose. We report the case of a healthy patient who had no history of trauma, but sustained sudden pain in the neck and guarding during head movement after sleep. Initial radiographs of the cervical spine including open-mouth, anterior-posterior, and lateral views did not reveal any obvious fractures. Type III odontoid fracture was uneventfully diagnosed via high-quality three-dimensional reconstruction of computed tomography. The possible mechanism was hyperextension of the neck during the change from the supine to the sitting position. Type III odontoid fractures can occur in the absence of major trauma. The usefulness of computed tomography is emphasized and the literature is also reviewed.**

□ **Keywords—cervical spine; occult; odontoid fracture**

INTRODUCTION

Odontoid fractures of the axis are not infrequent, and comprise a significant proportion of acute cervical spinal injuries (1). Type III fractures of the odontoid process of the axis, classified by Anderson and D'Alonzo, are the second most common injury of the odontoid process, most resulting from traumatic events (2). A type III fracture extends deep into the body of C2 at the base of the dens. Occult odontoid fracture without a traumatic event in healthy patients rarely has been reported in the literature and remains a challenge for emergency physicians (3). The purpose in presenting this case is to raise awareness among emergency physicians of occult odontoid fractures in the absence of trauma and to emphasize the usefulness of images from three-dimensional reconstructions of computed tomography (CT).

CASE REPORT

A 49-year-old man experienced sudden pain and soreness in his neck when he awoke from a midday nap. He reported no major traumatic event just before the onset of his symptoms or in the past. On arrival at the Emergency Department, he complained of severe neck pain and numbness in his left hand but no muscle weakness. His vital signs demonstrated a normal temperature of 36.9°C, respiratory rate 18 breaths/min, heart rate 87 beats/min, and blood pressure 149/78 mm Hg. On physical examination, he was alert and oriented but agitated, and resisted moving his neck due to severe pain. In addition, the patient also experienced hypoesthesia in the entire left hand. Motor strength in all four limbs, deep tendon reflexes, Hoffmann's sign, and Babinski's sign were normal. A series of laboratory tests revealed no remarkable findings. Radiographs of the cervical spine, includ-

RECEIVED: 7 June 2006; FINAL SUBMISSION RECEIVED: 5 May 2007;
ACCEPTED: 1 August 2007

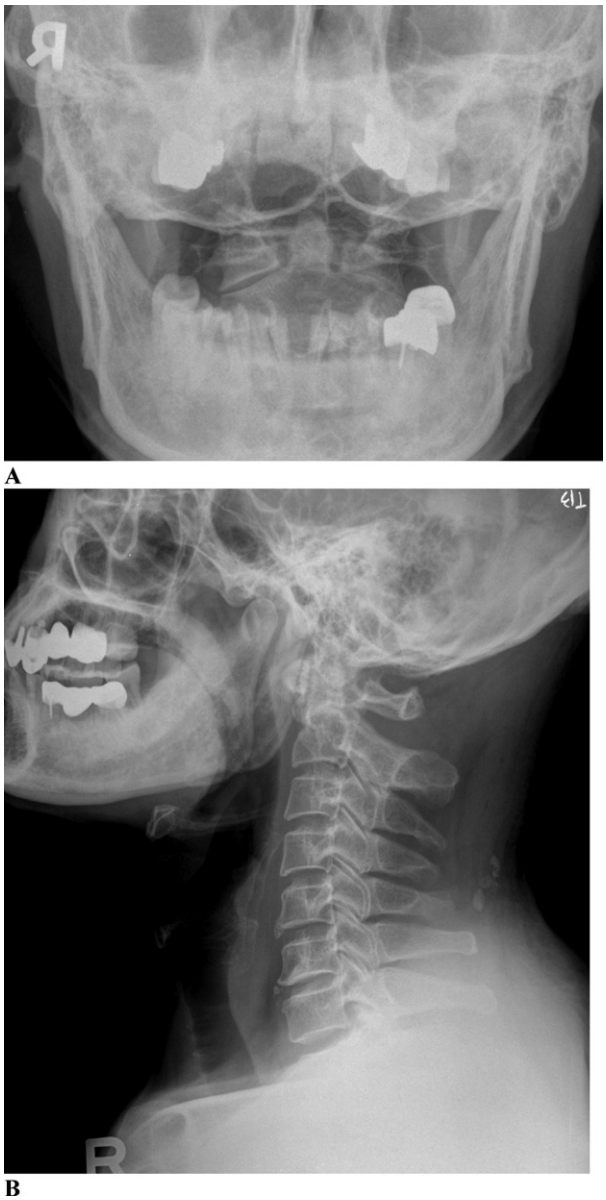

Figure 1. (A) Radiograph of open-mouth view of cervical spine that did not reveal fracture of the axis. (B) Radiography of lateral view of cervical spine did not reveal the widening of atlantal-dense distance.

ing open-mouth, anterior-posterior, and lateral views, showed cervical spondylolysis with marginal osteophytes, normal curvature, and no obvious fractures (Figure 1). Due to the severity of his symptoms and signs, CT scan of the cervical spine was performed 1 h later. CT scan reconstructions revealed a fracture of the axis from the base of the odontoid process to the vertebral body without significant displacement of the fragment, and a bulging disc at C6/7 (Figure 2). Magnetic resonance imaging demonstrated increased signal on T2-weighted images over the fracture sites and high signal foci over the cervical cord. A type III odontoid fracture was diagnosed. After explanation was given to the patient, conservative treatment with a rigid neck collar was recommended. The patient did well and his symptoms had resolved 1 month later.

DISCUSSION

Fractures of the odontoid process of the second cervical vertebra are not an uncommon injury, and account for 7–20% of all fractures of the cervical spine (4–7). According to the nomenclature by Anderson and D'Alonzo, three types of odontoid fractures are classified (2). Type I fractures are oblique fractures through the upper portion of the odontoid process. Type II fractures cross the base of the odontoid process at the junction with the axis body. Type III fractures are fractures through the cancellous portion of the body of axis. Type III fractures of the odontoid process comprise 18–23% of odontoid fractures (6–8). The most common causes of injuries are motor-vehicle accidents (65–71%), followed by falls (14–15%) and diving injuries (4–6%) (7,8). Unlike the elder population, in whom odontoid fractures are caused by low-energy trauma like falls, in the younger population they are frequently caused by high-energy injuries (9). However, except for pathological or osteoporotic causes, odontoid fractures in patients without any traumatic events, such as in our case, are rarely described in the literature.

Fractures of the odontoid process are mostly induced from non-physiological force, producing flexion, extension, or rotation of the upper cervical spine, but the exact mechanism is controversial. In the examination of postmortem radiographs of 312 victims of fatal motor vehicle accidents, Alker et al. hypothesized that odontoid fractures were probably due to hyperextension because of the posterior displacement of the fracture fragments (10). In a laboratory biomechanical study using cadaver preparations, Mouradian et al. demonstrated that hyperextension was found to be the main mechanism of injury for type III odontoid fractures (11). However, a three-dimensional, non-linear finite element model of the occipito-atlantoaxial complex, reported by Puttlitz et al., revealed hyperextension coupled with lateral shear or compression leads to Type I fracture, axial rotation and lateral shear can produce type II fracture, and the causal mechanisms for Type III fractures are unpredictable (12). In our case, the posture with hyperextension of the neck was highly suggestive as the causal mechanisms when the patient moved from the supine to the sitting position.

Clinical presentations in patients with axis fracture vary depending on the impact of force and the pathophysiological mechanism, and range from symptoms of