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Upper cervical spine injuries in elderly patients

Background

Elderly patients may sustain upper cervical spine injury without neurological symptoms or radiographic evidence of fracture.

Objective

This review discusses the prevalence and presentations of upper cervical spine injury in the elderly, and the use of imaging in the evaluation of such injuries.

Discussion

Typically, upper cervical spine injuries are caused by hyperextension in patients with degenerative changes of the senescent spine. Multiplanar imaging of the cervical spine in elderly patients with persistent post-traumatic head and neck symptoms, even after seemingly minor trauma, is decisive.

■ **Cervical spine (C-spine) injuries are the most feared of all spinal injuries because of the potential for significant deleterious sequelae. In a 1995 study from Russia, 196 patients with spinal cord injury were admitted over 5 years in one centre. Injuries were: cervical, 49.0%; thoracic, 27.5%; and lumbar, 23.5%.¹ In the United States, 1.9–3.8% of adult emergency room presentations are for acute C-spine injury due to blunt trauma,² and as many as 10% of unconscious patients injured in motor vehicle accidents (MVAs) have C-spine injury.³ Motor vehicle accidents, falls and sport trauma are responsible for the majority of emergency department presentations of C-spine injuries.³**

Cervical spine injuries also present in the general practice setting. Around 1% of all visits to primary care physicians in the USA are due to neck pain.⁴ The three most common sources of neck pain encountered by primary care physicians are:

- axial neck pain (uncomplicated neck pain or cervical strain)
- whiplash associated disorder after a MVA, and
- neck pain with cervical radiculopathy.⁵

Prevalence

The incidence of cervical spine injury in the elderly has increased with the aging of the population.⁶ In the 'young elderly' (65–75 years of age), the main cause of cervical spine injuries are MVAs; in the 'old elderly' (>75 years of age), falls from standing or seated height predominate.⁷

It is important to remember that injury patterns in elderly patients may differ from those of younger patients because of differences in bone density, injury mechanism, and the presence of degenerative changes affecting biomechanics. 'Old elderly' patients and patients who fall from standing height are more prone to injuries of the upper cervical spine, commonly at the atlantoaxial complex and involving the dens of the axis (the odontoid process).⁷

Presentation of fractures

Cervical spine fractures in elderly patients can present with neck pain only, and without spinal cord injury.^{7–10} For example, Troyanovich¹¹ reported a patient, 67 years of age, who was discharged from a major metropolitan medical centre after head trauma from a MVA and presented to a chiropractic office with neck pain and stiffness; he had an undiagnosed C1 burst fracture (Jefferson fracture).

Cervical spine fractures may also present with pain in the jaw or head – referred pain. For example, Walid et al¹² reported a patient, 83 years of age, who fell in his front yard and waited 2 days before going to a hospital. He complained of severe jaw pain and had no neurological injury clinically. X-ray images showed no fracture, but computerised tomography (CT) of the cervical spine revealed an odontoid type III/base fracture. (Odontoid type III fractures account for 30% of odontoid fractures.)

Other C2 fractures may be missed on simple radiography. Jayakumar et al¹³ reported a man, 58 years of age, who presented with an undiagnosed Effendi type III classification fracture and spondylolysis of the axis with remarkably normal neurology. He was surgically treated 4 years after the initial injury.

Spontaneous fracture of the base of the odontoid process in patients with ankylosing spondylitis has been reported.^{14–17} Even minor trauma can cause fracture in an ankylosed spine and this may go undetected until the development of myelopathic symptoms, which may occur many months later.¹⁸ In older patients with rheumatoid arthritis, asymptomatic C-spine subluxations may predispose them to fatal injuries if they are involved in a MVA.¹⁹

Imaging

Upper cervical fractures and fractures of the occipital condyles can be easily missed on X-ray images of the C-spine.²⁰ The accuracy in diagnosing post-traumatic cervical spine abnormalities on cross table lateral view (CTLV) alone is 74.2% and 79.7% for the emergency physician and radiologist respectively,²¹ ie. a false negative rate of 20–26%. It is estimated that 35% of C1, 14.8% of C2, and 42.4% of C6 abnormalities are missed on CTLV by both the emergency physician and the radiologist.²¹

Shaffer and Doris²² conducted a 3 year retrospective study of 27 000 annual ER visits to a suburban community hospital in the USA to determine the incidence of false negative CTLV of the cervical spine. Of 35 patients with cervical spine fracture/dislocation, they found three cases difficult to diagnose, and six in which this initial view was interpreted as normal. The authors suggested that the addition of a standard anteroposterior view or standard open mouth view could have increased the diagnostic yield to 100%.

The false-negative rate is improved by the standard 3 view C-spine series traditionally used for radiological screening of C-spine injuries. It consists of anteroposterior, lateral and open mouth odontoid views. Computerised tomography is indispensable to exclude occult fractures and to evaluate regions not seen adequately on plain X-ray. With

multiplanar reformatting (CT and magnetic resonance imaging [MRI]) and attention to the suspected level of injury, CT can delineate bone details of the cervical spine and demonstrate fractures and the extent of bone injury.

Magnetic resonance imaging is used in the evaluation of trauma related spinal cord injury. It also facilitates the evaluation of extradural spaces and the integrity of the spinal ligaments. Increased intraspinal distance, divergence of the articular processes and widening of the posterior aspect of the disc space are signs indicative of cervical spine instability.

Presentations in clinical practice

Many cases of jaw aches, facial pain and headaches can be traced to the occiput, cervical articulations, cervical interspinous ligaments and the trapezius muscle.²³ Careful evaluation of these structures should be performed. Adequate radiological imaging must be performed to detect elusive injuries of the C-spine. Cross table lateral view alone is unreliable in diagnosing post-traumatic injuries of the cervical spine and potentially dangerous if the fracture is missed. When in doubt, especially with the elderly, referral to an orthopaedic or neurosurgeon skilled in the diagnosis and treatment of such injuries is indicated.

Conclusion

Elderly patients with degenerative changes may sustain upper cervical injury, even after seemingly minor trauma such as a fall from standing height, without neurological symptoms or radiographic evidence of fracture. Typically, such injuries occur due to hyperextension of the senescent spine. Initial plain X-rays including anteroposterior and open mouth views should be ordered in all cases of upper neck pain following minor trauma. If head/neck symptoms persist or neurological symptoms appear, then multiplanar imaging of the cervical spine is crucial.

Conflict of interest: none declared.

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