Otolaryngological complications of occipitocervical injury

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ABSTRACT

Occipitocervical injuries are rare, accounting for 15% of all fatal spinal trauma. In patients who survive the initial incident, early detection and appropriate management is vital to avoid significant neurological disability and mortality. We present the case of a patient with neck trauma who was initially cleared of spinal injuries in the emergency department but who later developed acute hearing loss. We describe how the investigation of the hearing loss led to the detection of this devastating injury and report its successful management. Patients with persistent neck pain following trauma, particularly in the presence of degenerative spinal disease, should have cervical spine computed tomography to exclude occipitocervical injuries and other occult injuries.

KEYWORDS

Spinal injury – Otolaryngology – Conductive hearing loss – Spinal fracture

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Occipitocervical injury (OCI) (equivalent to occipitocervical dislocation) is an uncommon but devastating injury,¹ occurring most commonly in children owing to an anatomical predisposition^{2,3} (greater ligament laxity, flat articulation of occiput and atlas, and larger head in proportion to body size). In trauma, OCI is rare and, if associated with craniocervical dissociation, usually fatal as a result of the skull separating from the spinal column; it happens in hyperextension injuries or blunt trauma to the occipital region and accounts for 15% of fatal spinal trauma.^{5,4} If an individual is fortunate enough to survive this injury, early detection is crucial in avoiding significant morbidity and mortality. We present the case of a patient with OCI diagnosed following the development of acute hearing loss.

Case History

An 85-year-old man was brought to the emergency department by ambulance in a hard collar with posterior neck pain after he slipped and fell down three steps. Despite sustaining a head injury, there was no loss of consciousness. He was able to recall the events and the history confirmed a mechanical fall. Past medical history included ischaemic heart disease and hypertension. He took antihypertensive medications, lived with his wife, was an ex-smoker and usually mobilised with a stick.

A primary and secondary survey was unremarkable. A cervical spine x-ray showed degenerative changes with no fracture (Fig 1). In the absence of midline tenderness, the hard collar was removed and cervical spine cleared. The patient

was admitted to the medical assessment unit for analgesia, mobilisation, postural blood pressure measurements and occupational therapy assessment. The clinical impression was of a soft tissue neck injury following a mechanical fall.

The next morning while in the medical assessment unit, the patient was noted by the medical consultant to have an acute hearing impairment and an otolaryngology opinion was sought. An ear, nose and throat assessment found bilateral middle ear effusions with conductive hearing loss confirmed using tuning fork tests. Given the patient's age and smoking history, a flexible nasoendoscopy was performed to assess the postnasal space (PNS). This revealed a smooth, large, erythematous bulging mass emerging from the posterior nasopharyngeal wall occluding both Eustachian tubes. The suspicion of malignancy was raised, and urgent magnetic resonance imaging (MRI) of the head and neck was arranged.

The MRI showed a fracture of the anterior and posterior arches of the C1 vertebra and the odontoid process, which was displaced ventrally, leaving the occipitocervical junction in place. These changes had resulted in a 'pseudomass' of the PNS (Fig 2). The diagnosis was confirmed with computed tomography (CT) as OCI (Fig 3). Given the unstable pattern of the fracture, orthopaedic spinal surgeons were contacted. The patient was taken to theatre and an awake local anaesthetic reduction was performed using an external fixation device under radiological guidance followed by operative fixation under general anaesthesia (Fig 4). Postoperative MRI revealed an appropriate reduction (Fig 5).

Figure 1 Lateral cervical neck plain x-ray

Figure 2 Sagittal magnetic resonance imaging of postnasal space (PNS) and neck: The spinal column (SC) is displaced anteriorly as it transverse the foramen magnum and the odontoid process (OP) is displaced anteriorly to the clivus, resulting in obliteration of the PNS.

The patient made an uneventful postoperative recovery and was discharged into the community for rehabilitation. Outpatient follow-up visits at two and six months revealed no neurological deficits or postoperative complications, and he maintained his ability to walk with a stick.

Discussion

Hearing loss is an unreported symptom of patients with OCI. To our knowledge, it has never been the primary indicator leading to this diagnosis. It may be that hearing loss is common with OCI but underreported owing to the

Figure 3 Sagittal and axial computed tomography of the postnasal space, neck and C1 vertebra, the occipitocervical injury (OCI) and fracture of the anterior (ANT#) and posterior (POST#) arches of C1

Figure 4 Intraoperative imaging demonstrating reduction of the fracture

Figure 5 Postoperative magnetic resonance imaging demonstrating reduction of occipitocervical injury, re-establishment of postnasal space (PNS) and realignment of spinal column (SC)

presence of other distracting injuries and the critical state in which these patients typically present. Acute conductive hearing loss in OCI can be explained by the anatomical relationship of the spinal column to the PNS. Anterior displacement of the odontoid process into the PNS during OCI

can obstruct the Eustachian tubes. In the absence of a drainage pathway from the middle ear, an effusion can develop, resulting in hearing loss.

As with the first reported case of a patient surviving OCI with craniocervical dissociation in 1966,⁵ our patient too had no evidence of serious spinal injury or neurological deficit on initial clinical examination. This was supported by negative radiological examination. (These images were suboptimal because of degenerative spinal disease.) In fact, failing to diagnose OCI with initial imaging is not uncommon. Reis *et al* reported only 84% of patients with OCI were diagnosed on initial imaging; the remainder required MRI.² Clinicians must therefore maintain a high level of suspicion for OCI to avoid delaying the recognition of this potentially fatal injury.

With the invention of computed tomography and international guidelines for the management of neck trauma, a greater proportion of patients with OCI are being recognised early enough to survive with satisfactory functional outcomes.^{1,2} Signs of the injury can be subtle and easily missed if the diagnosis is not considered. A systematic approach to examination and investigation must therefore be utilised.

Clinicians should have a low threshold for performing CT of the cervical spine including the occipitocervical and cervicothoracic junction in patients with degenerative spinal disease when pain is persistent following trauma. MRI should be performed in the presence of suspected cord or ligamentous injury.

Conclusions

The reported case is the first to demonstrate acute hearing loss as the primary symptom resulting in the diagnosis of OCI. It highlights the importance of remembering the differential diagnosis of OCI in patients with neck trauma. OCI can be a difficult diagnosis to make clinically when patients present without cardiorespiratory or neurological compromise. With a rising incidence of patients reaching the emergency department with OCI given improvements in prehospital care, emergency teams need to familiarise themselves with the condition to promote early diagnosis and appropriate management.^{2,5} It is our opinion that patients with persistent neck pain following trauma, particularly in the presence of degenerative spinal disease, should have CT of the cervical spine to exclude OCI and other occult fractures.

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