On-line Case Report

Late presentation of a type III axis fracture with spondyloptosis

PRAKASH JAYAKUMAR, DAVID CHOI, ADRIAN CASEY

Victor Horsley Department of Neurosurgery, The National Hospital for Neurology and Neurosurgery, London, UK

ABSTRACT

A 58-year-old man presented with an undiagnosed Effendi type III classification fracture and spondyloptosis of the axis with remarkably normal neurology. We discuss his surgery 4 years since the initial injury, and the presentation, features and management of fractures of the axis.

Keywords: Hangman's fracture – Axis-C2 – Spondyloptosis – Cervical – Trauma

Case report

A 58-year-old retired chauffeur presented with a long-standing history of neck pain and progressive cervical deformity since he was assaulted 4 years previously. The roadside fracas involved four female assailants and our patient who was ethanolic at the scene. The resultant blunt trauma to the patient's head and neck, mainly from impact via the assailants' handbags, caused him to fall to the ground! The mechanism of cervical injury was not determined and he did not seek medical attention at the time

Previous medical history

He had a known history of alcohol dependence, smoking, multiple falls, treated pulmonary tuberculosis, chronic obstructive pulmonary disease and degenerative polyarthralgia. Since the assault, he complained of progressively increasing neck pain but had no significant neurological symptoms. He also noticed that he was always looking at the ground and had a progressively worsening posture.

Examination

He had a kyphotic deformity of the cervical spine, mild cervical tenderness and a significantly reduced range of movement, especially in extension. Surprisingly, there were no referred symptoms and no significant motor or sensory deficits in the arms or legs.

Radiology

Plain cervical spine radiographs demonstrated a cervical spine with multilevel degenerative disease and reversal

Figure 1 Lateral cervical X-rays (flexion–extension) showing dramatic C2–C3 spondyloptosis.

Correspondence to: Prakash Jayakumar, Victor Horsley Department of Neurosurgery, 6th Floor, Queen Mary's Wing, The National Hospital for Neurology and Neurosurgery, Queens Square, London WC1N 3BG, UK
M: +44 (0)7866 424589; E: pj_007@hotmail.co.uk

Figure 2 Axial CT scan of C2 showing bilateral fractures through the pars interarticularis.

of normal lordosis. An old fracture of the pars interarticularis of C2 was identified with spondyloptosis of C2 on C3 but, remarkably, no instability on flexion and extension views. The body of C2 was dramatically displaced and perched on C3 (Fig. 1). These findings were confirmed by CT scanning (Fig. 2), clearly demonstrating bilateral fractures of the pars interarticularis of C2 and 60% central canal narrowing at the C2/C3 level.

Management

Four years after the initial injury, the patient was managed with a week of cervical traction loaded to 10 kg but without significant reduction. Subsequently, occipitocervical fusion was performed using lateral mass screws, rods and an occipital plate (Fig. 3). Somatosensory evoked potentials were used throughout the operation. He made a good postoperative recovery with complete resolution of his neck pain and presented no neurological deficit (Fig. 4). There were no clinical concerns at follow-up 18 months postoperative intervention.

Discussion

The hangman's fracture was first described in 1965 and is defined as a traumatic fracture of the pars interarticularis (isthmus) of the axis, often associated with spondylolisthesis of C2 on C3.¹ Acute fractures of C2 represent around 17% of cervical spine fractures and more commonly involve the odontoid peg.² The classification system for traumatic spondylolisthesis of C2 was proposed by Effendi *et al.*³ and recently modified by Levine and Edwards.⁴ Type III axis fractures (9%) are classified as those of the isthmus with greater than 3 mm translation and 10° angulation. This unstable fracture is associated with facet dislocation and disruption of the disc, facet capsules, posterior and anterior longitudinal ligaments at the C2–C3 level.^{3,4} Although neurological deficits are demonstrated in only 5% of all hangman's

Figure 3 Postoperative X-ray showing occipitocervical fixation.

A

B

Figure 4 Pre-operative and postoperative lateral views of patient in neutral position.

fractures, type III injuries are rare and more likely to be associated with clinical and neurological morbidity and mortality.⁵ The common mechanism of this type of cervical injury is by flexion with concomitant axial compression, such as that following road traffic or diving accidents rather than the hyperextension and distraction forces involved in judicial hanging. The indications for surgical management include irreducible fractures, failure of external immobilisation, traumatic C2–C3 disc herniation and spinal cord compromise, and established non-union.

In our case, the primary indication for operative intervention was pain and 60% canal compromise. Although gross instability was not demonstrated on flexion–extension radiographs, essentially simple static tests, the fracture was treated as unstable given the injury classification. Clear indication of the level of neck pain was impossible; however, this was more likely to be at the C1–C2 level rather than C0–C1 given the abnormal loads transmitted through this region and the increasing likelihood of micro-instability at this level. Failure of adequate reduction and positional improvement via

external immobilisation further indicated surgical intervention. Single posterior fixation *in situ* was executed to avoid the greater relative risk associated with a combined anterior and posterior procedure and due to the intact neurology. Although the stabilisation procedure could not reduce the deformity or decompress the spinal canal, the goal at the outset to achieve pain control and prevention of further canal compromise was essentially achieved.

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