

Jefferson Fracture

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Abstract

Atlas fractures (Jefferson fractures) occur when axial forces are transmitted through the occipital-cervical junction, compressing the atlas between the angled articular surface of the shaft and the occipital condyles. The resulting four-part atlas fracture, two in the posterior arch and two in the anterior arch, is commonly referred to as a Jefferson fracture. Most cases are relatively stable without neurological deficits, and satisfactory results can be achieved through external fixation. An unstable Jefferson fracture represents a more severe atlas injury and occurs when the transverse ligament is also torn due to expansion of the C1 arch. These fractures are more difficult to treat because of the instability of the atlantoaxial spine. Many surgeons recommend surgical fixation for these unstable Jefferson fractures.

Keywords: Atlas; Jefferson fracture; CT; Cervico; Occipital junction

Case History

A 38-year-old men patient without any significant medical history was admitted to the emergency room after having fallen. He described an axial impact on her head, without loss of consciousness, and complained about acute neck pain. He was hemodynamically stable, and her neurological status was unremarkable.

A computed tomography (CT) examination of the head and the cervical spine was then performed (Figure 1 and 2), showing fracture lines in the anterior and posterior arch of the Atlas. No skull fracture or intracranial bleed was present.



Figure 1: CT axial section through a bone window showing fracture lines (white arrows) in the anterior and posterior arch of the Atlas, defining a Jefferson fracture.

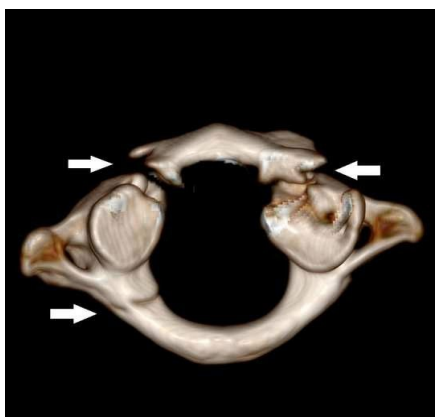


Figure 2: VRT reconstruction of the Atlas showing fracture lines (white arrows) involving the anterior and posterior arch.

Discussion

The Jefferson or Burst fracture of the atlas first described in 1800 and then detailed by Sir Geoffrey Jefferson, after whom it is named. It accounts for 25% of all cervical trauma and 1.3% of spinal fractures. Defined as 4 fracture lines involving the anterior and posterior arches, but may also be limited to 2 or 3 fracture lines.

Patients with atlas fractures typically present with high spinal pain, contracture and spasm. Contractures and muscle spasms, and pain on neck anteflexion, especially on rotation. Torticollis or cock-robin deformities are rare. Neurological deficit is uncommon, but may occur in cases of spinal cord compression. It is associated with symptoms linked to such as nausea, vomiting, tinnitus, blurred vision and syncope. Vision problems and syncope are possible due to vertebral artery dissection or post-traumatic thrombosis.

The special orientation of the upper and lower articular facets of the atlas enables it to support the axial loads of the spine. support the axial loads of the occiput and their distribution to the lateral laminae. If the forces exceed the strength of the bony or ligamentous structures a fracture of the ring and rupture of the transverse atlas ligament (TAL). The predominant locations of these fractures are the points of weakness corresponding to the points of attachment of the of the anterior arch, posterior arch or TAL to the lateral masses. The typical mechanism is to plunge head first into shallow water. Axial loading along the axis of the cervical spine results in the occipital condyles exerting a mass effect and depressing the masses of C1, thus breaking the anterior and posterior arches. It is usually associated with other, more common spinal lesions, most commonly a fracture of the axis, cerebral damage and sometimes damage to the vertebral artery.

Vertebral artery or cranial nerve involvement [1]. An open-mouth radiograph of the front spine reveals asymmetric spacing between the

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Received: 03-Jun-2023, Manuscript No. roa-23-103509; **Editor assigned:** 05-Jun-2023, PreQC No. roa-23-103509(PQ); **Reviewed:** 19-Jun-2023, QC No. roa-23-103509; **Revised:** 22-Jun-2023, Manuscript No. roa-23-103509 (R); **Published:** 29-Jun-2023, DOI: 10.4172/2167-7964.1000457

Citation: Rostoum S, Zhim M, Naggar A, Chorfa SH, Touarsa F, et al. (2023) Jefferson Fracture. OMICS J Radiol 12: 457.

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odontoid and lateral masses, and protrusion of the lateral edges of the axis. the odontoid and lateral masses, and a protrusion of the lateral edges of the axis. A more specific CT scan more specific than standard radiography, enables a definitive diagnosis to be made, as it shows fracture lines the anterior and posterior arches, it can also classify fractures and give an idea of their stability. stability by looking for bony avulsion of the transverse ligament, which must be analysed be analyzed in axial section and by measuring the atlanto-axial distance: normal being less than 5mm and 3mm in the paediatric population. In doubtful cases, MRI can be used to better study the the TAL. The main differential diagnosis is pseudo Jefferson fracture, which refers to the normal the normal overhang of the lateral edges of the lateral laminae of C1 on the lateral laminae of the body of C2. hypoplasia of the anterior or posterior arch, bipartite atlas or post-traumatic

Post-traumatic disunion [1,2]. Treatment remains conservative if the transverse ligament is considered intact. fracture is considered unstable, and surgical treatment by osteo-synthesis and orthopedic orthopedic immobilization.

Conflict of Interest

The authors have no competing interest to declare.

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