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Case report

# Minor oral surgery in a patient with a combined fracture and congenital malformation of the first cervical vertebra.

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Abstract

Here we present a case study of a patient who presented with both a congenital failure of fusion of the posterior arch of the atlas and a concomitant Jefferson fracture of the anterior arch following trauma. This patient required minor oral surgery prior to open reduction and internal fixation of the fracture and the considerations are discussed.

*Keywords: Oral surgery, atlas, fracture.*

Clinical Relevance

Some referrals may give the oral surgeon pause. Presented here is an example of one such referral which was dealt with by some extra planning and a short literature search.

Case report

JL is a 23 year old previously fit and well man who was admitted to A+E following an assault during which he was repeatedly kick on the vertex of his head whilst lying prone on the ground. On examination he was found to be haemodynamically stable, had a GCS of 15/15, was complaining of pain at the back his of neck. No neurological deficit was present. He was fitted with a cervical immobilisation collar. On CT he was shown to have an anterior Jefferson fracture of the C1 atlas vertebra. Also revealed, was a concomitant absence of the posterior arch of the atlas, resulting in two independently moving portions and an unstable fracture. There was however good integrity of the posterior ligament. The injury was treated initially with immobilisation in a halo device and a check radiograph demonstrated no anterior slippage of the odontoid peg. Three months later however at subsequent follow-up including repeat imaging, computer

tomography failed to show union of the fracture. At this stage it was decided he would benefit from an open surgical fixation.

However, on admission he was complaining of dental pain in both his right and left upper quadrants and on examination he was found to have a grossly carious 27 tooth (FDI notation) which was demonstrated to be tender to percussion. Further radiological investigation showed secondary caries under restorations in both the 16 and 17 teeth and a periapical radiolucency around the roots of the 16. It was felt by the consultant spinal surgeon that removal of any focus of dental sepsis would be beneficial before open reduction and internal fixation of the atlas fracture with metal plates. This was to minimise the potential of post operative infection possibly compromising the implanted metal fixation plates. The University of Liverpool Dental Hospital was contacted and the patient seen by a consultant oral surgeon.

Due to the fracture it was necessary to carefully consider the force that would be transmitted to the neck if conventional extractions were undertaken. It was decided that these teeth would be best removed surgically with the resultant reduction in force applied during the procedure. The patient was advised to take some pain relief (2 x Co-Codamol 30/500mg) 20 minutes prior to the procedure. Intravenous sedation was not considered due to potential problems securing the airway in the event of a medical emergency or over sedation. Although the halo device is fixed directly to the skull with rigid screws it relies on a back and chest extension to prevent neck movement. This is attached to the headpiece via a rigid metal skeleton consisting of four vertical bars. One bar at a time

could be removed safely to allow for access while still retaining three points of support. This is demonstrated figure 2.

All teeth were successfully removed with surgical bone removal and separation of roots resulting in minimal force application. The patient reported no neck pain during the procedure.

## Discussion

Jefferson fractures of the atlas are fractures where an axial force is transmitted between the occipital condyles and the surface of the axis vertebra causing the atlas to be compressed between them resulting in a burst fracture to either the anterior or posterior arch and separation of the lateral masses. This type of fracture was first described by Geoffrey Jefferson in 1920[1].

They account for up to 30% of all fractures to the atlas[2] and as many as 3% of all cervical spinal injuries[3,4]. Complications from manipulation of atlas fractures include luxation of vertebrae, airway compromise and even death[5].

Congenital malformations of the atlas have been discussed in the literature and posterior arch defects have an estimated incidence of 4% of these defects[6]. Potential neurological complications from congenital arch defects include weakness and sensory symptoms such as paraesthesia in all four limbs[7,8,9].

Although the halo vest has been shown to be effective in reducing forces across the neck[10], surgical removal was considered necessary to reduce these forces and potential for serious adverse complications.

Figure legends

Figure 1. Clinical photograph showing halo immobilisation device in situ.

Figure 2. Periapical radiographs, 1a) showing secondary caries on 16 and 17 molars and periapical lesions on 16 (arrowed) and1b) showing grossly carious 27 molar (arrowed).

Figure 3. Clinical photograph showing minor oral surgery procedure with access to surgical site via removal of one arm of halo device.

Figure 4. Computer tomographic (CT) imaging of the first cervical vertebra showing congenital failure of fusion of posterior arch and midline fracture of anterior arch. a) Transverse CT image. b) 3D reformatted CT image.

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Figure 1
86x115mm (72 x 72 DPI)

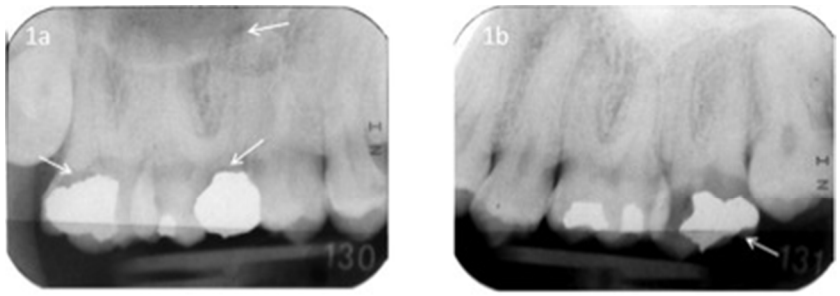
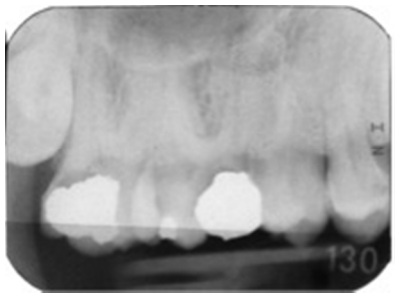



Figure 2
146x50mm (72 x 72 DPI)

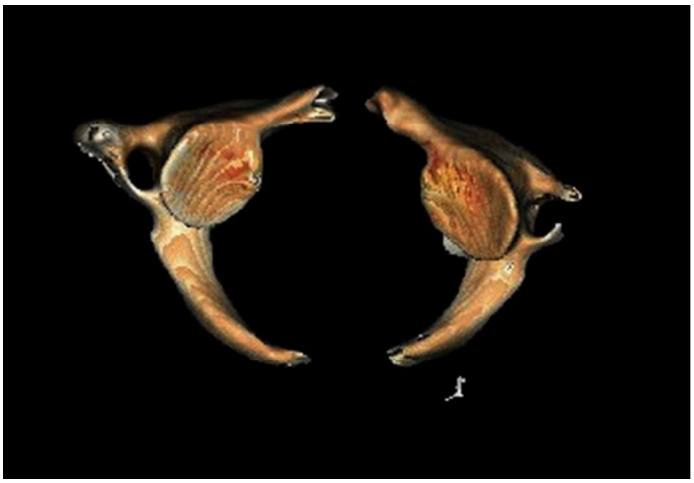
115x77mm (72 x 72 DPI)




Alternative figure 2 1a without annotations
68x50mm (72 x 72 DPI)

Alternative figure 2 1b without annotations
67x50mm (72 x 72 DPI)

103x103mm (72 x 72 DPI)



121x83mm (72 x 72 DPI)