Navigation-Assisted Posterior Open Reduction and Internal Fixation in a C-CLAMP Fashion for an Isolated C1 Fracture

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Abstract

C1 fractures with an intact transverse ligament are usually treated conservatively. Patients who present with a progressive diastasis of bone fragments and a progressive articular subluxation mainly attributed to progressive lengthening of the transverse ligament (TAL) fibers can be treated with a C1 "C-clamp" fusion.

A 75-year-old male who sustained a motor vehicle accident was neurologically intact. A computed tomography (CT) imaging demonstrated a Jefferson’s type-C1 fracture with a slight lateral displacement of the C1 left lateral mass (LM) and a rotatory subluxation on the right. MRI showed an intact TAL and demonstrated an isolated rupture of the left alar ligament. Conservative treatment was chosen. Radiographic follow-up showed, at 3 months, progressive lateral mass displacement, most likely due to elongation of the TAL fibers; this was also associated with a persistent mechanical neck pain. For this reason, we performed a posterior reduction and internal fixation in a C-clamp fashion by placement of C1 lateral mass screws and posterior compression sparing the C1–2 joint. Using navigation, a 3.5-mm screw was inserted into the LM bilaterally. The screw heads were then connected with a rod and compression was applied before tightening. Postoperative CT scan demonstrated a satisfying reduction and further imaging will be made during the follow-up. The patient had a considerable relief of neck pain. Simple lateral mass fixation with C-clamp technique is a reasonable option in case of isolated C1 fractures in patients who have failed conservative management while preserving the range of motion (ROM) at the atlanto-axial joint.

The link to the video can be found at: https://youtu.be/x8bsVwzCt_M.

Keywords

► atlas fracture
► Jefferson fracture
► transverse ligament
► open reduction and internal fixation


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**Fig. 1** C1 ORIF in a C-clamp fashion. Pre- and postoperative image and representative model. CT, computed tomography; ORIF, open reduction and internal fixation.

**Conflict of Interest**
None declared.