Odontoid Non Union with Myelopathy - “Joint Jamming Procedure” with Posterior C1-C2 Lateral Mass Fusion

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Abstract

The authors describe a case of a Odontoid non union in a 66 year old patient who presented with progressive weakness of all four limbs.

He was treated with C1- C2 fusion was done through a posterior approach by Goel technique. Six months post operatively, the patient has significant reduction in pain and there is an improvement in the neurological status. He is now fully ambulant without support.

Key words: Odontoid non union, joint jamming procedure, C1 - C2 lateral mass fusion

Introduction

Odontoid fractures are the most common cervical spine injuries (10 to 20%). Non union may result in compressive myelopathy along with pain and functional deficit from limited range of motion and muscle spasm; the treatments of these injuries are complex.

Case report

We report a 66 year old male patient, otherwise healthy, who sustained injury to the neck around 30 years back, which was managed by massage. He reported with severe neck pain of 1 year duration and progressive weakness of all four limbs for the past two months. On admission he had torticollis to right side with restriction of neck movements, motor power of 2/5 on right upper and lower limbs, 1/5 power on the left side with UMN signs. X-rays showed C1-C2 instability with odontoid nonunion, partially reduced in extension. MRI confirmed odontoid non union with significant compression of the spinal cord with myelomalacia changes at the craniovertebral region. CT scan was done to assess the bony anatomy and for planning the surgery.

C1- C2 fusion was done through a posterior approach by Goel technique. Patient was positioned in prone position over horse shoe ring with skull traction. After standard posterior exposure C1 & C2 posterior elements exposed. C2 ganglion excised bilaterally and C1-2 facet joint

Figure 1. Odontoid fracture with C1-2 instability.
opened out, distracted with varying sizes of osteotomies. Joint surfaces decorticated with high speed burr.

C1 lateral mass & C2 pedicle screw was put bilaterally by the standard method. Cortico cancellous graft of appropriate size was harvested and placed into the decorticated facet joint. C1-2 connecting rods were placed bilaterally. After the distraction and stabilisation procedure the spinal cord was seen free of compression and pulsating.

The posterior arches of C1 & C2 were decorticated and cancellous bone graft was placed to achieve fusion. Patient had an uneventful post operative period. He had significant improvement in the neurology and pain. Patient had grade 4/5 muscle power in all 4 limbs at the time of discharge and at 6 months of follow up C1-2 has fused well and patient is fully ambulant without any support.

Discussion

Type II dens fractures have a significant rate of nonunion (30-60%). Odontoid nonunion, whether stable or not, is a potential threat to the spinal cord due to instability at the atlantoaxial junction. Patients can develop neurological deficits months or years later. Paradis et al showed that 76% of odontoid nonunion patients without myelopathy, few years later had some form of neurology on presentation, mostly due to anterior cord damage. Neurological symptoms developed six months to sixty years after the injury. 90% of these patients showed improved neurologically following surgery. For this reason, many authors have supported operative stabilisation of mobile nonunions, regardless of the presence of myelopathy.

The role of conservative treatment in the management of odontoid nonunion is unknown. However it has a role in elderly disabled patients who are generally less active and may pose higher operative risks.
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Figure 6. C-arm picture showing C1-C2 facet joint distraction.

Figure 7. Intra-op. photograph showing the joint jamming procedure with bone graft.

Figure 8a and 8b. Intra operative photograph and C-arm picture showing the C1-C2 instrumentation.

Figure 9a and 9b. Post operative X-Rays: AP and lateral views.
Jörg Böhler et al emphasised that nonunion of the odontoid is an absolute indication for surgery. Robert Hart et al followed five elderly patients who had odontoid nonunion without myelopathy. There was progressive Atlanto-Axial subluxation at five years of follow up, but the space available for the cord was 14 mm. The actual risk for the development of myelopathy is unknown because the follow-up period was short.

Surgical approaches may be anterior, posterior or the combination of the two. The anterior odontoid screw fixation can be done for mobile odontoid nonunion, reducible nonunion, large odontoid, fracture gap less than 2mm. Soft tissue interposition at the nonunion site, is a contra indication.

If the Atlanto-Axial subluxation is reducible, posterior sub laminar wiring, Atlanto-Axial trans-articular screws or C1-2 lateral mass screw fixation can be done. Because of the partial reducibility, thin posterior arch of C1 and high riding vertebral artery precludes these procedures in our case. If there is irreducible Atlanto-Axial subluxation or dislocation, an attempt should always be made to reduce the subluxation or dislocation by skull traction. Failure of reduction is indication for transoral decompression with C1-C2 fusion, which is having high complication rate. Occipitocervical fusion abolishes all ranges of movements at CVJ. Hence we have done C1-2 lateral mass fixation with joint distraction and posterior elements fusion, which is even though technically challenging preserves the movements of all the joints other than C1 & C2 and gives solid fixation with high chances of C1-2 fusion.

The C1-2 distraction, jamming the joint with bone graft and C1 lateral mass and C2 pedicle screw fixation was described by Atul Goel and Vinod Laheri for Atlanto axial instability.

The distraction of C1-C2 joints by opening the capsule of the joint helps to reduce the C1-2 vertical & rotary subluxation. The joint surfaces and posterior arches of C1-2 are decorticated by curettage and burring which helps to achieve good intra articular and posterior element fusion. After distraction of the C1-2 facet joints with varying sizes of osteotomies, measured size of cortico cancellous bone graft taken from the posterior iliac crest placed in to the joint and joint is jack up. Reduction is maintained with lateral mass screws in to C1 vertebræ & pedicle screws into C2 vertebræ and connected with rods. The neurological recovery is related to initial impairment but can be satisfactory in >75% of patients.

Conclusion

Odontoid nonunion is a potentially serious complication and should be prevented. The onset of neurology can be delayed up to many years following an injury. The surgical treatment is challenging but neurological outcome is excellent after proper surgery.

References


