Immediate postoperative regression of retroodontoid pannus after lateral mass reconstruction in a patient with rheumatoid disease of the craniovertebral junction

Case report

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The authors report the case of a 35-year-old man who had polyarthritic affliction with rheumatoid disease. He presented with complaints of quadriplegia that had progressed over the course of 2 years. Investigations revealed telltale evidence of rheumatoid disease of the craniovertebral junction with retroodontoid pannus, basilar invagination, and “fixed” atlantoaxial dislocation. The patient underwent lateral mass reconstruction with distraction of the facets and impaction of a spiked metal spacer and bone graft within the joint. Investigations done in the immediate postoperative phase showed complete disappearance of retroodontoid pannus in addition to reduction of basilar invagination and atlantoaxial dislocation. He had remarkable and sustained relief from symptoms. The authors also review the pathogenesis and treatment of retroodontoid pannus. (DOI: 10.3171/SPi/2008/9/9/273)

KEY WORDS • basilar invagination • craniovertebral junction • retroodontoid pannus • rheumatoid arthritis

We recently described an alternative treatment of performing lateral mass distraction in cases in which rheumatoid arthritis affects the CVJ. In this method metal spacers are placed to treat the vertical instability that causes basilar invagination and atlantoaxial dislocation. The metal spacer is impacted within the distracted atlantoaxial joints on both sides. Such treatment restores the lateral mass height and aids both in the reduction of the atlantoaxial dislocation and basilar invagination. We present a case wherein the retroodontoid pannus completely resolved immediately following lateral mass distraction surgery. Such an immediate reduction of pannus has not been reported in the literature. We present a case and discuss the possible effects of lateral mass distraction on the pannus.

Case Report

History and Examination. This 35-year-old man was seropositive for rheumatoid arthritis and had multiple joints involved with disease. He had undergone several surgical therapies for a number of joints and was on intermittent steroid drug treatment for ~ 5 years. For ~ 2 years, he was considerably disabled and had developed contractures in all 4 limbs. When admitted to the hospital, he had spastic Grade 3/4 quadriplegia and could walk with great difficulty with the aid of crutches. According to the Ranavat classification, his disability could be graded as Grade IIIA. The MR images and CT scans revealed retroodontoid pannus, “fixed” atlantoaxial dislocation, and basilar invagination and significant cord compression (Fig. 1).

Operation. The patient underwent surgery in the prone position with the aid of cervical traction according to the technical steps outlined in our previous works. The atlantoaxial joint was exposed after retracting the C-2 ganglion superiorly. The facets were distracted using an appropriate-sized osteotome. The articular surfaces were drilled to widely resect the articular cartilage. A 4-mm-thick spiked titanium spacer was impacted forcibly into the distracted joint (spacers varying from 1 to 6 mm in thickness are currently available). Multiple bone chips harvested from the iliac crest were inserted into the joint space along with the spacer.
**Postoperative Course.** The patient had clinically documented recovery immediately following surgery, and the spasticity had reduced considerably. As per the protocol, postoperative CT scanning and MR imaging were performed 1 day postsurgery (after ~20 hours). The investigations showed reduction in basilar invagination and atlantoaxial dislocation. The MR images showed complete regression of the retroodontoid pannus (Fig. 2). At the 6-month follow-up, the patient had satisfactory clinical recovery and could walk unaided (Ranavat Grade II).

**Discussion**

Rheumatoid disease involving the CVJ is frequently associated with retroodontoid pannus formation. The pannus formation has been uniformly attributed to inflammation of the synovial membrane that results in overgrowth of the hyaline cartilage and periarticular inflammation. Inflammation, ligamentous laxity, and bone erosion ultimately result in joint laxity and subluxation. Atlantoaxial dislocation and basilar invagination or rostral migration of the dens is associated in >20% of such cases.\(^1,10,11,13,14\)

The term basilar invagination has been used synonymously with the terms cranial settling and vertical odontoid migration in patients with rheumatoid arthritis.\(^1,7,8,11,12,16,17\) Basilar invagination is commonly associated with atlantoaxial dislocation, and the complex results in a significant degree of neck pain and myelopathy, adding considerably to the disability secondary to affecting other joints.

For basilar invagination and retroodontoid pannus, transoral decompression and subsequent posterior fixation has been the accepted treatment protocol. Many surgeons advise incorporation of the occipital bone and cervical vertebrae up to C-3 and C-4 in the occipitocervical fixation and believe that such a fixation is necessary to avoid cranial settling.\(^7,12,19\) Some authors have reported arrest of the vertical migration of the basilar invagination and regression of the size of the retroodontoid pannus after posterior fixation.\(^8,19\) Recent reports have indicated that atlantoaxial fixation is the treatment of choice even in the presence of retroodontoid process pannus.\(^2,18\) Menezes et al.\(^12\) observed that traction in cases of basilar invagination and atlantoaxial subluxation results in significant improvement in the craniovertebral alignments.

In our earlier reports, we discussed craniovertebral realignment and stabilization without any bone decompression as an alternative form of treatment in cases of basilar invagination in general and in those with rheumatoid disease in particular.\(^3-6\) Wide removal of atlantoaxial joint capsule and articular cartilage by drilling and subsequent distraction of the joint by manual manipulation provided a unique opportunity to obtain reduction of the basilar invagination and of atlantoaxial dislocation. Maintenance of the joint in a distracted and reduced position with the help of bone graft and metal spacers and subsequent fixation of the joint with the help of interarticular screws and a metal plate provided a biomechanically firm fixation and sustained distraction. Multiholed titanium spacers were chosen to allow bone incorporation and fusion across the distracted joint space. The biomechanical advantage afforded using our
method is suggested by successful fusion results in our earlier studies. In the present case, we used a joint-jamming or a joint-distraction technique, wherein spiked spacers were impacted within the distracted atlantoaxial joint. The stabilization achieved by the technique was firm, and no additional plates, screws, or wires were used. The method also avoids the need of insertion of screws within the relatively weak bones of the pedicles and pars of the region in cases with chronic disability. As the spacers cover a relatively wide area in the form of a plate, they can distract and support even weak or eroded facets as are often encountered in cases involving severe rheumatoid arthritis. However, the technique may not be feasible in cases in which the facets are markedly or entirely eroded. In our earlier reports, we demonstrated successful reduction of basilar invagination and atlantoaxial dislocation by using a lateral mass plate and screws. However, because stainless-steel plates and screws were used, actual alteration in the size of retroodontoid pannus could not be demonstrated, as in the presented case.

Rheumatoid arthritis is a disease of articular capsule and bones forming the joint. When the facets and joint capsule are affected, lateral mass collapse occurs, which is a precursor of basilar invagination and atlantoaxial dislocation. Other authors have also mentioned such lateral mass collapse. Reduction in the retroodontoid pannus during the immediate postoperative phase following distraction of the facets suggests that retroodontoid pannus could be a result of laxity of the ligaments in the region. Distraction results in restoration of the tautness of these ligaments and reduction or obliteration of the indentation caused by the retroodontoid pannus. Placement of spacers within the joint results in restoration of the height of the lateral mass and provides vertical stability to the atlantoaxial joint.

Based on our experience in the present case, we conclude that lateral mass distraction may be an ideal operation in patients in whom the CVJ is affected by rheumatoid disease.

Disclaimer

The authors do not report any conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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nation and atlantoaxial dislocation secondary to rheumatoid arthritis. *Neurol India* 52:338–341, 2004


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