

### **Images in Spine Surgery: Rheumatoid Arthritis in Cervical Spine**

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A 70 years old female, a known case of rheumatoid arthritis for the last 40 years, presented with increased clumsiness of her upper and lower extremities for the last 6 months. Her hand dexterity was remarkably reduced. She had ongoing sub-occipital neck pain for a long time. On flexion and extension of her neck she had experienced a current like sensation in her upper limbs for the last 6 months. She had significant involvement of most of her upper and lower extremity joints due to rheumatoid arthritis (RA). Her gait could not be reliably checked for being spastic because of her extensive lower extremity joints involvement. Examination showed that her muscle tone was increased in

all extremities and her hand grip was slightly weak, otherwise her motor strength was normal. She had marked hyper reflexia in both upper and lower limbs. Audible crepitus was present on neck flexion and extension, with tenderness over the C1-C2 joint posteriorly. Flexion-extension X-rays of her cervical spine showed marked instability at C1-2 joint with an exaggerated Atlanto-Dens Interval (ADI) and a hint of basilar invagination. Subluxation with a kyphotic deformity of the subaxial spine at C5-6 level was also noted. Her MRI showed an increased atlantodens interval (ADI) with hypertrophic pannus in front of the dens, in addition a mild basilar invagination was noted along with the subaxial spine

(C5-6) deformity. The dens was noted to be impinging on the medulla oblongata leading to narrowing of the foramen magnum. No signal change was though noted at craniocervical junction or distally. She was admitted and placed into a halo traction starting with 5 lbs and sequentially increasing up to 15 lbs.

The increase in traction weights was MRI monitored. Significant reduction of ADI along with decrease in the basilar invagination was achieved. The impingement on the spinal cord was also relieved. The patient was maintained in traction for few days followed by a posterior occipitocervical fusion in the reduced position. The patient has been doing fine in the follow up evaluation with improvement in the preoperative symptoms.

### Commentary

The cervical spine is the second most commonly involved site in rheumatoid arthritis (RA). It usually becomes involved early in the course of the disease, leading to three different patterns of instability: atlantoaxial subluxation, basilar invagination (atlantoaxial impaction) and subaxial subluxation.<sup>1</sup> Chronic synovial inflammation leads to progressive destruction of the joints, ligaments, and bone, particularly in the atlantoaxial region. Eventually, this process leads to clinical manifestations of pain, deformity, instability, and neurologic deficits. Patients can present with occipital headaches, ear pain, facial pain or neck pain. Symptoms of vertebrobasilar insufficiency like equilibrium, visual problems and transient ischaemic attacks can also lead to presentation. Signs of myelopathy may be difficult

to elicit in rheumatoid patients due to extensive musculoskeletal involvement by RA. Patients with RA undergoing endotracheal intubation should undergo static and dynamic (Flexion- Extension) cervical spine radiographs to rule out instability before endotracheal intubation. Treatment strategies for the rheumatoid cervical spine include patient education and lifestyle modification, periodic assessment for radiographic signs of increased risk of neurologic injury, and early surgical intervention to prevent permanent neurologic injury. Surgery<sup>2</sup> should be considered promptly for any of the following: progressive neurologic deficit, chronic neck pain in the setting of radiographic instability that does not respond to non-narcotic pain medication, any degree of atlantoaxial impaction or cord stenosis, a posterior atlantodental interval =14 mm, atlantoaxial impaction represented by odontoid migration =5 mm rostral to McGregor's line, sagittal canal diameter <14 mm, or a cervicomedullary angle <135°. Reducible atlantoaxial subluxations can be treated with posterior C1-C2 instrumentation and fusion. Irreducible subluxations may require C1 laminectomy in case of posterior compression or a transoral odontoid resection in case of anterior compression. Any atlantoaxial impaction or basilar invagination once identified should be reduced by halo traction and after reduction an occipitocervical instrumentation and fusion be performed. In irreducible deformities a transoral odontoid resection or a C1 laminectomy may be required in addition. Subaxial cervical spine subluxations with neurologic deficits or decreased canal diameter (<14mm) should undergo decompression and instrumented fusion. Instrumentation

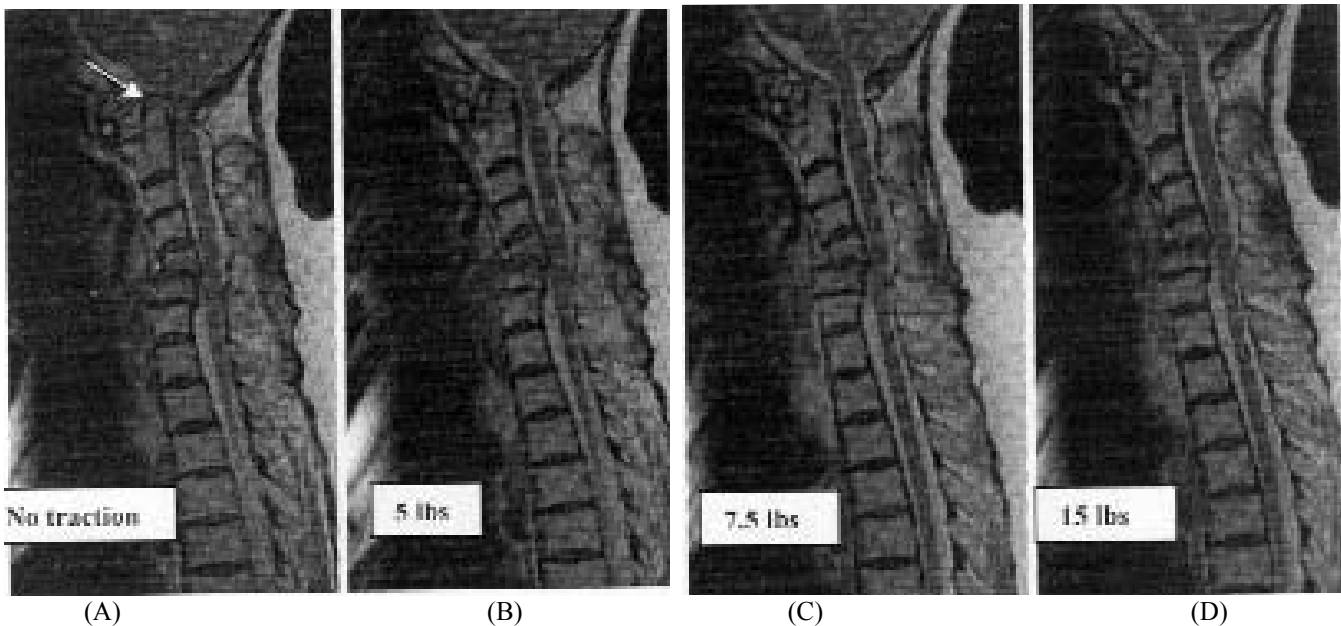


Figure 1. (A) T2 weighted MRI, Sagittal section without traction. Note the Increased atlantoaxial Interval (ADI) with rheumatoid pannus in front of the Dens, the Basilar Invagination (Atlantoaxial impaction) by the protruding dens (arrow) into the medulla and subaxial cervical spine subluxation at C5-6. (B) T2 weighted MRI, Sagittal image with 5 lbs traction. Some reduction in the compression at craniocervical junction can be noted, in comparison with figure I. Decreasing ADI and inferior migration of the dens can also be seen. (C) T2 weighted MRI; sagittal section with 7.5 lbs traction, further improvement in ADI and decreased compression at the cervicomedullary junction is noted (D) T2 weighted MRI, Sagittal section with 15 lbs traction. Note there is no stenosis at C5-6 Level.

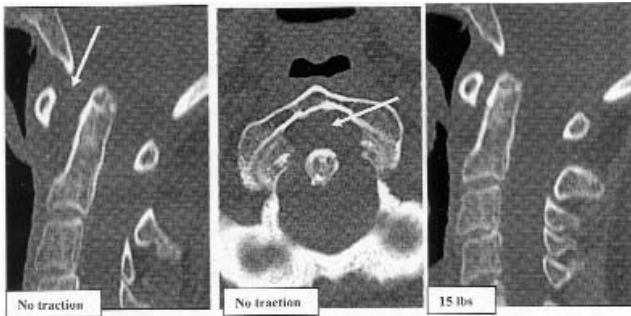


Figure 2. (A) Sagittal and coronal plane CT scan, showing the increased ADI (see arrows) and (B) the posterior displacement of dens into the spinal canal (C) Reduced position of the Dens after Halo traction of 15 lbs was placed.

and instrumented fusion. Instrumentation and fusion should extend to the lowest involved level in case concurrent occipitocervical instrumentation is performed proximally. The high complication rates in these procedures on RA patients are due to high infection rate, osteopenia, adjacent segment disease and high perioperative mortality rate.

### References and suggested readings

1. Dreyer SJ, Boden SD. Natural history of rheumatoid arthritis of the cervical spine. *Clin Orthop Relat Res.* 1999;366: 98-106.
2. Kim DH, Hilibrand AS. Rheumatoid arthritis in the cervical spine. *J Am Acad Orthop Surg.* 2005; 13:463-74.



Figure 3. Occipitocervical instrumentation and fusion, note the reduced position of the Dens, decreased ADI and the tip of Dens lies at the level of the McGregor line.