

Spine

Long-term incidence of subaxial cervical spine instability following cervical arthrodesis surgery in patients with rheumatoid arthritis

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Abstract

Objective: Cervical spine deformities are well-known complications of RA. A 5- to 20-year follow-up of 51 consecutive rheumatoid patients who underwent posterior cervical arthrodesis is presented to evaluate the recurrence of instability and need for further surgery.

Methods: We conducted a retrospective review of the clinical features of 11 men and 40 women with an established diagnosis of RA and associated cervical deformities who underwent cervical spine surgery at the Mayo Clinic (Rochester, MN) between 1979 and 1990. Their mean age was 61 ± 10 years (SD), and their duration of RA averaged 21 ± 8.9 years (SD). There were 22 patients who presented with myelopathy, 7 with radiculopathy, and 22 with instability/neck pain. There were 33 patients with AAS, 2 with SMO process into the foramen magnum, 8 with SAS, and 8 with combinations of these. Preoperative reduction was followed by decompression and fusion using wiring techniques and autologous bone graft. Postoperative halo orthosis was provided for at least 3 months. The mean follow-up was 8.3 ± 6 years (SD).

Results: There were 31 patients (61%) who underwent atlantoaxial arthrodesis, 17 patients (33%) who underwent subaxial, and 3 patients (6%) who underwent occipitocervical arthrodesis. During follow-up, 39% (13/33) of patients with AAS developed nonsymptomatic (6) or symptomatic/unstable (7) SASs subsequent to C1-C2 fusion. The latter 7 patients (21%) subsequently required extension of their arthrodesis. Adjacent segment disease was most common at the C3-C4 interspace after atlantoaxial fusion in 62% (8/13). Among the 8 patients who underwent isolated cervical fusion for SAS, 1 patient (1/8, 12%) developed adjacent instability after a fall and required extension of the previous fusion. No secondary procedure was required for the 6 patients initially stabilized by C1-(C6-T1) fusions for combinations of AAS + SAS. None of the patients initially treated by C1-C2 arthrodesis for AAS progressed to SMO.

Conclusions: The incidence of subaxial instability in patients with rheumatoid disease who underwent cervical arthrodesis may be higher than previously reported, indicating the need for continued follow-up in these patients. Adjacent segment disease may be most common at the C3-C4 level following atlantoaxial fusion. Early stabilization of the C1-C2 complex in the patients with AAS may potentially prevent progression of SMO.

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Keywords:

Rheumatoid arthritis; Cervical spine; Surgical treatment; Posterior arthrodesis; Adjacent segment disease

Abbreviations: AAS, atlantoaxial subluxation; C, cervical level; IRB, Institutional Review Board; RA, rheumatoid arthritis; SAS, subaxial subluxation; SMO, superior migration of the odontoid.

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1. Introduction

Cervical instability due to rheumatoid synovitis follows 3 main patterns: AAS is the most common manifestation, followed by SAS and SMO into the foramen magnum.

Patients with RA may be especially at risk for further cervical instability following initial fusion surgery because of cervical spine laxity caused by rheumatoid erosive facet synovitis. Very few studies [1,23] have evaluated the long-term incidence of SAS and the need for further surgery after cervical fusion among the RA patients. This information may be valuable in determining the extent of fusion during initial surgery and the need for clinical and radiographic surveillance postoperatively.

2. Material and methods

With the approval of an IRB, records of 51 patients undergoing surgery between 1979 and 1990 were retrospectively reviewed. Patients averaging 61 ± 10 years (SD) and having RA for an average of 21 ± 8.9 years (SD) presented with myeloradiculopathy or instability. Cord and/or root compression and instability (>3.5 mm of translation) were confirmed on preoperative dynamic x-rays and magnetic resonance studies. There were 33 patients with AAS, 2 with SMO process into the foramen magnum, 8 with SAS of the cervical vertebral bodies (SAS), and 8 with combinations of these.

Following complete medical evaluation, patients underwent skeletal traction, and most underwent an attempt at closed anatomical reduction 1 to 3 days before surgery. Patients were typically intubated awake, and neurophysiological monitoring was used in most cases. Overall, 4 different arthrodesis techniques with or without posterior decompression were used to stabilize the occipitocervical spine in this series: (1) atlantoaxial fusion using a modified Brooks-Jenkins [4] procedure for reducible AAS; (2) occipital atlantoaxial fusion for irreducible AAS; (3) subaxial posterior fusion for SAS, using spinal processes/facets wiring and corticocancellous grafting [5]; and (4) occiput to cervical or T1 fusion for combined occipital atlantoaxial and SASs. Based on this paradigm, 31 patients (61%) had atlantoaxial, 17 patients (33%) had subaxial, and



Fig. 2. One-year follow-up lateral C-spine x-ray reveals reasonable spinal alignment and C1-C2 fusion. Please note some evidence for C2-C3 autofusion.

3 patients (6%) had occipitocervical arthrodesis. Patients, immobilized in Halo orthosis, were evaluated postoperatively using plain and dynamic x-rays at 6 weeks, 3 months, 6 months, 12 months, and annually thereafter.

The mean follow-up period was 8.3 ± 6 years (SD), including telephone interview questionnaire. Follow-up radiographs were reviewed for each patient. There were 6 patients (12%) who had evidence of pseudoarthrosis on postoperative x-rays, 4 of whom underwent additional surgery. Adjacent segment disease was defined as an evidence of new subluxation/instability within the 2 spinal segments adjacent to fused segments. Kaplan-Meier event

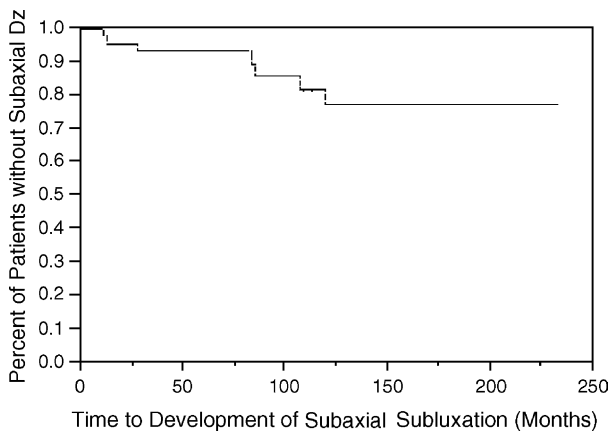


Fig. 1. Kaplan-Meier event estimates for radiographic evidence of SAS subsequent to the initial arthrodesis procedure.



Fig. 3. Lateral C-spine x-ray reveals C3-C4 anterior subluxation that incompletely reduced with neck extension.

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