Neurologic outcome of surgical and conservative treatment of rheumatoid cervical spine subluxation: a systematic review

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CRD summary
Surgical neurological outcomes were better than conservative treatment in rheumatoid cervical spine subluxation patients. In patients with no neurological involvement, outcomes were similar between treatments, but the evidence was weak. Survival could not be compared due to scarcity of data. Given the low quality of available studies and uncertainty regarding the analyses, the authors' conclusions should be treated with caution.

Authors' objectives
To compare the impact of cervical spine surgery with conservative treatment on neurological outcome and survival in asymptomatic and chronic patients with rheumatoid arthritis.

Searching
PubMed and EMBASE were searched. Search terms were reported. The authors' own files were also searched. The references of retrieved articles and relevant reviews were handsearched. The search strategy was available on request.

Study selection
Studies that assessed any type of surgical fixation technique or conservative treatment (physical therapy, cervical collars, active physical treatment or rheumatic drugs) for upper cervical spine involvement in patients with rheumatoid arthritis were eligible for inclusion. Outcomes included for review were all-cause mortality and neurological outcome reported according to Ranawat classification or with a clear description of neurologic status at baseline and follow-up. Included studies should report the follow-up period.

Included studies evaluated different fixation or decompression procedures (anterior/posterior). The mean age of included patients ranged from 52 to 75 years and the majority were female. Patients treated surgically were evenly spread across the Ranawat classifications, including those with neurological impairments (Ranawat IIIA and IIIB). The majority of patients treated conservatively had no neurological deficits (Ranawat classification I).

Two reviewers independently selected the studies for review, with disagreements resolved by consensus.

Assessment of study quality
The methodological quality of the included studies was assessed using the Dutch Cochrane Centre checklists for cohort and case-control studies. This assessed definition of patients and intervention, absence of selection bias, use of appropriate outcome measurements, blinded outcomes, adequate follow-up, no selective loss to follow-up, and comparability of groups. Each criterion was awarded a score of 1, giving a maximum score of 8.

The authors did not state how many reviewers performed the validity assessment.

Data extraction
The Ranawat classification at baseline and follow-up, and the follow-up time, were extracted for each patient. Survival and mortality data were also extracted for each study.

Two reviewers independently extracted the data for review.

Methods of synthesis
The outcomes were pooled separately for patients with surgical and conservative treatment. The pooled number and percentage of patients improving, showing no change or declining in their Ranawat classification at follow up compared
to baseline levels were calculated for each Ranawat classification group. Kaplan-Meier survival analyses were calculated for each Ranawat subgroup.

Results of the review
Twenty five different observational studies were included in the review (n=1,086 patients); one prospective study (n=141), 23 retrospective studies and one retrospective case-control study (n=19). One study appears to have been reported in two different articles. Some studies had both surgical treatment and conservative treatment arms. On the validity assessment, one study scored 7 out of 8 points, two studies scored 6 points, and twenty two studies scored 5 or 4 points. The length of follow-up ranged from one to 288 months.

Surgical Treatment (21 studies)
Neurological outcomes: The majority of patients with Ranawat classification II or IIIA improved at least one classification following surgical treatment (Ranawat II 53% of patients; Ranawat IIIA 56% of patients). Only a very small percentage of patients with Ranawat I (4%), II (7%) or IIIA (9%) deteriorated following surgical treatment. Of the patients with Ranawat IIIB, surgical fixation improved neurological outcomes by one class in 38% of patients, and by two or more classes in 21% of patients.

Mortality: Following surgery, 43% of patients with Ranawat IIIB died compared with 13%, 20% and 26% of patients in other Ranawat classifications (α<0.0001). Mortality rates for patients with Ranawat IIIA (26%) were significantly worse than patients with Ranawat I (13%; α<0.02). Mortality rates for patients with Ranawat I or II did not significantly differ from one another.

Conservative Treatment (seven studies)
Neurological outcomes: Eighty-nine percent of patients with Ranawat I did not deteriorate with conservative treatment. Two thirds (67%) of patients with Ranawat II classification deteriorated following conservative treatment. Almost all patients with Ranawat IIIA deteriorated to IIIB with conservative treatment (97%).

Mortality: Mortality could not be determined by Ranawat classification. Thirty seven percent of patients died at 60 months and 58% at 120 months.

Authors’ conclusions
Surgical neurological outcomes were better than for conservative treatment in all patients with cervical spine involvement. In patients with no neurological involvement, outcomes were similar between the groups, but the evidence was weak. It was not possible to compare survival time between surgical and conservative treatment groups because of the scarcity of data.

CRD commentary
The review addressed a clear question. Inclusion criteria were well-defined though broad for study design. There was no information provided on the types of conservative treatment or surgical fixation technique, which made it difficult to determine homogeneity of included studies and the implications of the review. Only two relevant data bases were searched, so important data may have been omitted. Also, it was not clear whether appropriate steps were taken to minimise the risk of publication and language bias. Suitable steps were taken to minimise the risk of reviewer error and bias in the study selection and data extraction stages, but it was unclear whether similar steps were taken in the validity assessment stages. Therefore, reviewer error and bias could not be definitively ruled out.

An appropriate validity assessment was carried out. However, the majority of included studies were methodologically weak. The authors acknowledged the high risk of selection bias and confounding with observational studies, the poor quality of included studies, the limitations with small sample sizes, and the lack of controls. Statistical heterogeneity was not assessed and there was insufficient information provided on the included studies to determine whether statistical pooling of results was appropriate. Furthermore, comparisons between surgical and conservative treatment were indirect. Given the very small numbers of patients with Ranawat II or above treated conservatively, comparisons between the treatments were difficult to make.
In light of the unclear quality of the available studies and uncertainty regarding the suitability of analyses, the authors’ conclusions should be treated with caution.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that prospective randomised controlled trials are needed comparing patients with atlantoaxial subluxation neurological impairments (Ranawat I and II) treated surgically and conservatively on neurological and survival outcomes.

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