

Abstract #919.docx

Anterior cervical corpectomy and reconstruction: Biomechanical evaluation of anterior-only and circumferential instrumentation of the cervical spine

Summary of Background Data

Cervical multilevel corpectomy is a widespread procedure, but recommendations when to perform a supplemental dorsal fixation are lacking. This study evaluates ex vivo the range of motion (ROM) to characterize the stability and the need of an additive dorsal fixation after cervical mono-, bi- or multilevel corpectomies (CE) for elucidating biomechanical differences between anterior-only and additive dorsal instrumentation.

Methods

12 human cervical cadaveric spines were loaded in a spine tester with pure moments of 1.5Nm in lateral bending (LB), flexion/extension (FE) and axial rotation (AR) followed by two cyclic loading periods. After each cyclic loading session flexibility tests were performed for the anterior-only (group_1, 6 specimens) and the circumferential (group_2, 6 specimens) instrumentation. States of instrumentation: intact, 1-, 2- and 3-level corpectomies with and without dorsal fixations; cyclic loading of group_1; cyclic loading of group_2.

Results

In the flexibility tests all 360° instrumentations showed a significant decrease in ROM compared to the intact state and the anterior-only instrumentations regardless of the number of resected levels and the direction of movement. Compared to intact, a supplemental dorsal instrumentation after 3-level CE decreased the ROM to 12% ($\pm 10\%$), 9% ($\pm 12\%$) and 22% ($\pm 18\%$) in LB, FE and AR, respectively.

Whereas the anterior-only construct outperformed the intact state only in FE with a significant ROM reduction of 57% ($\pm 35\%$), 60% ($\pm 27\%$) and 62% ($\pm 35\%$) for 1-, 2- and 3- level CE, respectively. In LB and AR the 3-level CE with anterior-only instrumentation had the same stabilization potential as the intact state. In conclusion there is a statistical increased ROM between the 1- and the 3- level corpectomy for the anterior- only and the 360° instrumentation.

Conclusion

A 3-level corpectomy with an anterior-only construct shows an increased instability which may lead to a high failure rate. A supplemental dorsal instrumentation stabilizes the corpectomies but necessitates a second approach. From a biomechanical point of view in selected patients a 2-level corpectomy with a dorsal instrumentation already seems to be useful to decrease the complication rate. To our knowledge, these patients have not been identified so far.