

Subaxial Kyphosis and Significance of O-C1 Angle After Posterior C1-C2 Fusion for Atlantoaxial Dislocation

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ABSTRACT

Background

Posterior C1-C2 fusion is the most popular treatment for atlantoaxial dislocation (AAD), but some patients experience postoperative subaxial kyphosis. The objective of this study is to evaluate the change of correlation of cervical radiologic parameters after posterior C1-C2 fusion and the incidence of postoperative subaxial kyphosis.

Methods

Medical records and radiologic data were retrospectively reviewed on patients that had undergone posterior atlantoaxial fusion for AAD at a single center from January 2014 to December 2017. Previous cervical surgery history, concomitant with basilar invagination, additional fusion extending to occipital or subaxial spine were excluded. 38 patients were included. O-C1, O-C1 range of motion (ROM), C1-C2, O-C2, C2-C7, T1 slope, C2-C7 sagittal vertical axis were measured at preoperative and postoperative one year. Postoperative subaxial kyphosis was defined as the postoperative change of $\geq 10^\circ$ at C2–C7 CA. Correlation test and multiple logistic regression were used to evaluate the relationship with each parameter.

Results

Mean age was 54.4 years, and 24 of 38 patients were women. Mean O-C1 ROM and CA was $8.7 \pm 8.7^\circ$ and $-6.7 \pm 8.9^\circ$ preoperatively, and $9.6 \pm 5.3^\circ$ and $-6.6 \pm 6.4^\circ$ postoperatively. Mean C1-C2 CA was changed from $18 \pm 11.2^\circ$ to $19.5 \pm 6.2^\circ$. Mean O-C2 CA was increased from $11.3 \pm 8.6^\circ$ to $12.8 \pm 6.9^\circ$. Mean C2-C7 CA was decreased from $16.9 \pm 10.3^\circ$ to $14.0 \pm 10.2^\circ$, Mean C2-C7 SVA was increased from $11.8 \pm 12.1^\circ$ to $14.4 \pm 10.6^\circ$. Patients presenting decreased O-C1 ROM was 12. The incidence of postoperative subaxial kyphosis was 23.7%. Preoperative cervical radiologic parameters showed the sequential linkage of significant correlation from T1 slope to O-C1 angle. However, this sequential linkage was changed like

that O-C1 angle showed significant relationship with C1-C2 and C2-C7 angle after surgery. Decreased O-C1 ROM was significantly associated with postoperative subaxial kyphosis.

Conclusions

Preoperative cervical radiologic parameters showed the sequential linkage of significant correlation from T1 slope to O-C1 angle. However, this sequential linkage was broken up after surgery. O-C1 angle became a key parameter associated with C1-C2 and C2-C7 angle. Furthermore, decreased O-C1 ROM was significantly associated with postoperative subaxial kyphosis.