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Revisiting the treatment algorithm for atlantoaxial dislocation after 10 years: A multi-center study with mid-to-long-term follow-up

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Background: Atlantoaxial dislocation (AAD) is the most prevalent disorder affecting the cranio-vertebral junction, often leading to myelopathy and impairment of cranial nerve function, which can result in significant morbidity or even mortality. Although the treatment algorithm we previously proposed for these diseases in 2013 has been widely adopted, its effectiveness and safety in multi-center settings have yet to be thoroughly evaluated.

Research question: To overcome the limitations of former strategy studies, an updated classification of AAD is proposed in this study.

Design: A large multi-center retrospective cohort study.

Methods: Patients with AAD who underwent surgical treatment were recruited from eight tertiary spine centers in eight provinces across China between January 2011 and December 2021. Patient's classification, surgical procedure, postoperative recovery progress, and occurrence of complications of the patients were collected and analyzed.

Results: 2354 patients were included. Type I and Type II constituted most patients (76.0%). For Type III AAD, our goal was conversion to Type II, first using posterior intra-articular release (212/523 patients, 40.5%), and if failed, trans-oral release (311/523 patients, 59.5%). For Type IV, we also attempted conversion to Type II, using posterior or trans-oral osteotomy (37/42 patients, 88.1%). Trans-oral and trans-nasal odontoidectomy was the last resort for decompression for patients whose AAD could not be reduced despite all efforts (5/42 patients, 11.9%). At an average follow-up of 5.3 years, 85.9% patients achieved complete anatomical AAD reduction, 98.8% demonstrated clinical or radiological signs of solid fusion.

Discussion: The classification system of AAD was updated. Advancements have been made in the management of irreducible and bony AAD, and the trans-oral release and odontoidectomy procedures were required by less AAD patients.