PEDIATRIC STEREOTACTIC IMAGE-GUIDED C1-2 TRANSARTICULAR SCREW PLACEMENT: A TECHNICAL NOTE

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Background: Atlantoaxial instability is a common pediatric pathology which often requires neurosurgical intervention. C1-2 transarticular screw placement has been shown to be a safe and effective option for treatment of instability in this population. Upper cervical spine anatomy is unique, and requires careful technique to avoid neurologic or vascular injury during screw placement. One technique which can aid in screw placement, but is not commonly utilized in children, is the use of stereotactic image guidance. We examined our series of pediatric patients with spinal instability treated with stereotactic image-guided C1-2 transarticular screws.

Materials/Methods: A single-center, retrospective study was conducted at our institution examining pediatric patients from 2020-2021, undergoing C1-2 transarticular screw placement. All screws were placed using stereotactic image guidance based on intraoperative 360 degree fluoroscopy. Demographic, clinical, radiographic, and outcome data were examined. Primary outcomes included radiographic signs of fusion and resolution of cervical instability.

Results: Six patients were identified who underwent C1-2 transarticular screw placement with stereotactic image-guidance. Three patients (50%) were male and three were female. The median age was 10 years (SD=4.31 range=2-15). Three patients (50%) had instability related to congenital anomalies, two (33%) related to trauma, and one related to tumor (17%). All patients underwent surgery for C1-2 transarticular screw placement. Ten total screws were placed. Two trajectories were avoided due to concern for aberrant vertebral artery anatomy. No patients experienced postoperative complications. On postoperative imaging all screws were placed in satisfactory positions, and no patient had evidence of spinal instability.

Conclusions: We present our series of children who underwent C1-2 transarticular screw placement with stereotactic image-guidance. All patients had favorable clinical and radiographic outcomes without complications. We use this series to highlight the role of stereotactic image-guidance to augment understanding of variant anatomy and detail the technique for C1-2 transarticular screw placement in pediatric patients.

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