Anatomical Considerations for the Endoscopic Endonasal Approach to the Orbit and Optic Nerve in the Pediatric Population

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ABSTRACT

Educational objective: By the end of this presentation, audience members will be familiar with anatomic measurements and relationships of critically important neurovascular structures encountered during the endoscopic endonasal approach to the orbit in the pediatric population.

Objectives: Endoscopic endonasal approaches (EEA) to the pediatric orbit are challenging secondary to highly variable sinus pneumatization patterns, volumes, and proximity to critical neurovascular structures. We therefore defined a step-wise progression of critical anatomic measurements necessary for safe dissection to the orbital apex and optic nerve (ON), with stratification by age.

Study design: Radio-anatomic cross-sectional study.

METHODS AND MATERIALS

- Radio-anatomic cross-sectional study.
- CT scans were examined in patients <18 years of age and stratified into eight age groups. Differences in horizontal strut distance to the 1) infraorbital nerve, 2) anterior ethmoidal artery and 3) posterior ethmoidal artery were recorded. Pneumatization surrounding the ON and orbital apex, lamina papyracea area, and volumes of sinuses were measured. Results were stratified into eight age groups and compared to an adult control population.

RESULTS

- Eighty-eight pediatric patients were included. Adult horizontal strut distances to the infraorbital nerve were greater than patients aged 2-4 (p = 0.049). Adult horizontal strut distances to the anterior and posterior ethmoidal arteries were greater than patients aged 4-7 (p=0.019, p = 0.011). Adult degree of pneumatization surrounding the orbital apex is greater than patients aged 2-4 (26.2% vs 18.3%, p = 0.0006), while pneumatization surrounding the ON and orbital apex, lamina papyracea area, and volumes of sinuses were measured. Results were stratified into eight age groups and compared to an adult control population.

Conclusions: Pediatric sinonasal anatomical relationships are significantly different in pediatric populations, although sinus pneumatization surrounding the orbital apex approaches adult patterns by age seven. Thorough knowledge of critical structure relationships is invaluable for safe dissection.

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REFERENCES