Bony Dehiscence of the Anterior Ethmoidal Artery: A Proposed Classification System and the Impact on Endoscopic Transnasal Ligation

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Introduction

Introduction: Endoscopic transnasal ligation of the anterior ethmoidal artery (AEA) has become increasingly popular in both otorhinolaryngology and neurosurgery. Due to a normal anatomical variation, the AEA can be found within the anterior ethmoidal canal (AEC) or outside of the canal in a dehiscent state. The presence of a bony dehiscence can impact the ability for vessel ligation, and there is currently a lack of consensus regarding the prevalence of this variation1-3. We evaluate the variability of and classify bony dehiscence, assess its impact on endoscopic transnasal ligation, and attempt to identify its extent on corresponding computed tomography (CT) scans.

Methods

Methods: Using 20 preserved adult cadaveric heads (40 sides) injected with colored latex, endoscopy was used to identify both the surgical anatomy of the AEA, and the degree of bony dehiscence. The arteries were visualized via endoscope, their dehiscence was classified, and ligation was attempted. A novel classification system based on degree of bony dehiscence was applied, where the AEA was; completely within the skull base (grade I), protruding from the skull base (grade II), attached to the skull base by bony mesentery (grade III), and completely free of bony attachment (grade IV). We performed high-resolution CT scans in axial, coronal, and sagittal planes and identified the ethmoidal arteries. Using these scans, we determined if the extent of bony dehiscence was identifiable on the corresponding CT.

Conclusions

Conclusion: Bony dehiscence is a common anatomical variation of the AEA, the extent of which will have technical implications on surgical practice. The presence of a bony mesentery (type III) or complete dehiscence (type IV) will permit more effective ligation compared to type I and II AEA.

Learning Objectives

We evaluate the variability of and classify bony dehiscence, assess its impact on endoscopic transnasal ligation, and attempt to identify its extent on corresponding computed tomography (CT) scans.

Results

Results: The AEA was identified in all 40 sides. Ten percent were graded as type 1, 32.5% as type II, 52.5% as type III, and 5% as type IV. Ligation or cauterization was deemed feasible in all type III and IV AEAs, this equaled 57.5% of sides. CT was able to identify a bony mesentery in all grade III AEAs and the absence of a bony connection in the 1 grade IV head.

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