

## Ethmoidal arteries variability: an anatomical and radiological study

Davide Lancini<sup>1</sup>, Francesco Belotti<sup>1</sup>, Marco Bottazzoli<sup>2</sup>, Elena Mercandelli<sup>1</sup>, Enrico Moretti<sup>1</sup>, Roberto Maroldi<sup>3</sup>, Luigi F. Rodella<sup>1</sup>

<sup>1</sup> Section of Anatomy and Physiopathology, Department of Clinical and Experimental Sciences, University of Brescia, Brescia, Italy - <sup>2</sup> Head and Neck Surgery, Department of Otorhinolaryngology, University of Brescia, Brescia, Italy - <sup>3</sup> Department of Radiology, University of Brescia, Brescia, Italy

Understanding the location of ethmoidal arteries (EAs) is crucial during endoscopic sinus surgery or skull base surgery. The aim of this study was to evaluate the anatomical variability of EAs, considering their presence and position within the ethmoid bone and their position in relation to the skull base (SB) and the frontal sinus (FS). Fourteen human heads underwent a cone-beam CT scan and an endoscopic dissection was carried out to evaluate the anatomy of the EAs. Several features were assessed both radiologically and in the lab setting: presence; position according to the "5 doors theory" (1); position respect to the SB; distance from the SB; relation with the FS (2); dehiscence of the bony canal. Anterior EA and posterior EA were present in all cases, whereas the prevalence of the middle EA was  $28.57 \pm 16.73\%$ . Anterior EA was most frequently found ( $64.29\%$ ) in the basal lamella of the middle turbinate; it originated from the SB in  $60.71\%$  of cases and it was separated from the FS by a single bony lamella in  $46.43\%$ . Its canal was dehiscent in  $46.43 \pm 18.47\%$ . Posterior EA was almost equally found posterior to the basal lamella of the middle turbinate, in the basal lamella of the superior turbinate and posterior to it. It was found in the SB in  $82.14\%$  of the cases and its canal was dehiscent in the  $28.57 \pm 16.73\%$ . Middle EA was found posterior to the basal lamella of the middle turbinate in  $62.50\%$  of cases and it was found in the SB in  $75.00\%$  of the cases. These data demonstrate that, despite their constant presence, anterior and posterior EAs showed a variable position and relationship with the SB; in addition, the data showed a non-negligible number of cases in which the middle MEA was present. Therefore, because of these several anatomical variability in EAs, a high-spatial-resolution CT should be provided for the preoperative anatomical assessment.

### References

- [1] Stammberger et al. (1990) Functional endoscopic sinus surgery. Concept, indications and results of the Messerklinger technique. *Eur Arch Otorhinolaryngol* 247: 63.
- [2] Hemmaoui et al. (2008) Anatomical relationship between the frontal sinus ostium and the anterior ethmoidal artery. *Ann Otolaryngol Chir Cervicofac* 125: 174. doi: 10.1016/j.aorl.2008.07.002.

### Keywords

Ethmoidal arteries; cadaver dissection; CBCT; endoscopy; skull base.