Unusual Variations of the Foramen Rotundum: Anatomical Findings and Clinical Significance

Piyakarn Boontem Matusiak[1], Anussara Kamnate[2,*]
[1]Division of Anatomy, School of Medical Sciences, University of Phayao, Thailand
[2]Department of Anatomy, Faculty of Medicine, Princess of Naradhiwas University, Narathiwat, Thailand

Corresponding Author Email: Anussara.k@pnu.ac.th

Abstract

The foramen rotundum (FR) is a paired aperture within the middle cranial fossa of the sphenoid bone, serving as a neurovascular conduit for the maxillary nerve (CN V2), the artery of the foramen rotundum, and emissary vein. Anatomical variations of the FR carry significant clinical implications, particularly in neurosurgical, maxillofacial, and skull base procedures. The present study investigated the anatomical variations of the FR in a macerated skull of a 64-year-old Thai male, aiming to provide population-specific reference data relevant to clinical and surgical practice. The FR was oval bilaterally. Duplication was identified on the left side, comprising one non-connecting and one connecting foramen, with lengths of 3.59 mm and 2.61 mm, and widths of 2.87 mm and 2.82 mm, respectively. The right FR exhibited triplication, comprising one non-connecting and two connecting foramina, with lengths of 3.55 mm, 4.02 mm, and 2.82 mm, and widths of 3.40 mm, 2.51 mm, and 2.94 mm, respectively. To the best of our knowledge, this represents the first reported case of co-existing duplication and triplication of the FR on opposite sides in a Thai individual. These findings underscore the considerable morphological variability in the number and dimensions of the FR, with potential implications for surgical and radiological interpretation of the middle cranial fossa. Furthermore, such variations may reflect aberrant ossification and fusion of the sphenoid bone during embryogenesis. This case report may serve as a foundation for future investigations aimed at elucidating the underlying etiology of such morphological variations.

Keyword: Foramen rotundum, middle cranial fossa, sphenoid bone, anatomical variation