Hyrtl foramina

Hyrtl foramina (also known as Hyrtl's canals or Hyrtl's foramen) are anatomical variations that refer to small vascular foramina, or holes, in the cribriform plate of the ethmoid bone in the skull. These foramina provide pathways for blood vessels, particularly veins, that traverse the cribriform plate.

Anatomical Location and Significance

Cribriform Plate:

The cribriform plate is a horizontal, sieve-like structure located in the anterior cranial fossa, forming part of the ethmoid bone. It is situated between the two orbital plates of the frontal bone. The cribriform plate has multiple small foramina that allow the passage of the olfactory nerve fibers (cranial nerve I) from the nasal cavity to the olfactory bulbs, which are located on either side of the crista galli. Hyrtl Foramina:

Location: Hyrtl foramina are additional, small openings in the cribriform plate. While most foramina in the cribriform plate are intended for olfactory nerve fibers, Hyrtl foramina specifically provide a passage for small veins, such as emissary veins, that connect the nasal cavity's venous system with the venous sinuses within the cranial cavity, such as the superior sagittal sinus. Variability: The presence and number of Hyrtl foramina can vary significantly among individuals. Some people may have multiple Hyrtl foramina, while others may have few or none. Clinical Importance:

Emissary Veins: The veins passing through Hyrtl foramina are part of the emissary veins, which are veins that connect extracranial veins (outside the skull) with intracranial veins (inside the skull). These veins can be a pathway for infection spread from the nasal cavity to the cranial cavity, potentially leading to serious conditions such as meningitis or brain abscesses. Surgical Relevance: Awareness of Hyrtl foramina is important during surgical procedures involving the anterior cranial fossa and the nasal cavity, such as endoscopic sinus surgery, to avoid inadvertent damage to the vessels passing through these foramina and reduce the risk of bleeding or complications related to vascular injury. Historical Note:

The foramina are named after the 19th-century Austrian anatomist Josef Hyrtl (1810–1894), who is credited with their description. Hyrtl made significant contributions to anatomy, including detailed studies of the vascular and skeletal systems. In summary, Hyrtl foramina are small, variably present openings in the cribriform plate of the ethmoid bone, allowing the passage of veins that connect the nasal cavity with intracranial venous sinuses. While they are an anatomical variant, their recognition is important in understanding pathways for potential infection spread and during surgical procedures involving the nasal cavity and anterior cranial fossa.

Presence of bilateral cranio-orbital foramina, AKA Hyrtl foramina is rare yet existing. They carry the risks of retinal artery emboli due to reflux embolization for the neurovascular interventionalists, navigating complexities in olfactory groove meningioma management. A 59-year-old woman with progressive frontal lobe syndrome presented a large olfactory groove meningioma primarily supplied by bilateral sphenopalatine arteries together with bilateral anterior cerebral arteries, necessitating risky preoperative embolization and meticulous resection. This case underscores the intricate nature

of vascular supply in frontal skull base tumors, emphasizing the need for multidisciplinary approaches, thorough preoperative planning, and detective research to optimize treatment outcomes 1)

1)

Al-Barbarawi MK, Badary A, Moustafa W, Atallah O, Stock K, Czapiewski P, Renner HC. Bilateral cranioorbital foramina (Hyrtl foramina): crucial anatomical findings in the management of giant olfactory groove meningioma - a case report and literature review. J Surg Case Rep. 2024 Aug 24;2024(8):rjae476. doi: 10.1093/jscr/rjae476. PMID: 39183781; PMCID: PMC11344595.

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