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REVIEW

Infraorbital canal variants and its clinical and surgical implications. A systematic review

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Abstract

Background Recent literature highlights anomalous cranial nerves in the sinonasal region, notably in the sphenoid and maxillary sinuses, linked to anatomical factors. However, data on the suspended infraorbital canal (IOC) variant is scarce in cross-sectional imaging. Anatomical variations in the sphenoid sinuses, including optic, maxillary, and vidian nerves, raise interest among specialists involved in advanced sinonasal procedures. The infraorbital nerve's (ION) course along the orbital floor and its abnormal positioning within the orbital and maxillary sinus region pose risks of iatrogenic complications. A comprehensive radiological assessment is crucial before sinonasal surgeries. Cone-beam computed tomography (CBCT) is preferred for its spatial resolution and reduced radiation exposure.

Objective The aim of this study was to describe the prevalence of anatomical variants of the infraorbital canal (IOC) and report its association with clinical condition or surgical implication.

Methods We searched Medline, Scopus, Web of Science, Google Scholar, CINAHL, and LILACS databases from their inception up to June 2023. Two authors independently performed the search, study selection, data extraction, and assessed the methodological quality with assurance tool for anatomical studies (AQUA). Finally, the pooled prevalence was estimated using a random effects model.

Results Preliminary results show that three types are prevalent, type 1: the IOC does not bulge into the maxillary sinus (MS); therefore, the infraorbital foramen through the anterior wall of MS could be used for identification of the ION. Type 2: the IOC divided the orbital floor into medial and lateral aspects. Type 3: the IOC hangs in the MS and the entire orbital floor lying above the IOC. From which the clinical implications where mainly surgical, in type 1 the infraorbital foramen through the anterior wall of MS could be used for identification of the ION, while in type 2, since the lateral orbital floor could not be directly accessed an inferiorly transposition of ION is helpful to expose the lateral orbital wall directly with a 0 scope; or using angled endoscopes and instruments, however, the authors opinion is that direct exposure potentially facilitates the visualization and management in complex situations such as residual or recurrent mass, foreign body, and fracture located at the lateral aspect of the canal. Lastly, in type 3, the ION it's easily exposed with a 0° scope.

Conclusions This systematic review identified four IOC variants: Type 1, within or below the MS roof; Type 2, partially protruding into the sinus; Type 3, fully protruding into the sinus or suspended from the roof; and Type 4, in the orbital floor. Clinical recommendations aim to prevent nerve injuries and enhance preoperative assessments. However, the lack of consistent statistical methods limits robust associations between IOC variants and clinical outcomes. Data heterogeneity and the absence of standardized reporting impede meta-analysis. Future research should prioritize detailed reporting, objective measurements, and statistical approaches for a comprehensive understanding of IOC variants and their clinical implications. Open Science Framework (OSF): https://doi.org/10.17605/OSF.IO/UGYFZ.

Keywords Infraorbital canal · Infraorbital groove · Infraorbitalis canal · Orbital floor · MS roof · Infraorbital nerve · Infraorbital artery · Infraorbital neurovascular bundle

Extended author information available on the last page of the article

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