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Morphometric analysis of the immature human infra-orbital canal

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ABSTRACT

The infra-orbital neurovascular supply, plays a vital role in the development and growth of the immature maxilla and the associated midfacial region. While the infra-orbital canal serves as a conduit for the nerves innervating these midfacial structures, the development and growth of the canal itself is not well understood. A comprehensive understanding of changes in the morphometry of the infra-orbital canal, particularly during the late prenatal and early postnatal periods of growth, may facilitate the early detection of potential aberrant growth patterns and dental abnormalities occurring during these stages of life. The aim of this study was thus to describe changes in the morphology, dimensions and branching pattern of the infra-orbital canal during early stages of development and growth. The sample included 50 fetal and neonatal maxillae (18 skeletonized crania and 32 cadavers). The skeletonized individuals were sourced from the Raymond A. Dart Collection of Human Skeletons, while the paediatric remains were obtained from the Paediatric Collection of the School of Anatomical Sciences, University of the Witwatersrand. The sample was subdivided into a late prenatal (30 gestational weeks to birth) and a postnatal (birth to 1 year) age group. Maxillae were scanned using a Nikon XTH 225 L micro-CT unit and analysis conducted using VG studiomax v3.2. Measurements included the maximum width, height and surface area of the two foramina associated with the infra-orbital canal and the total length of the canal. The boundaries of the canal walls and the branching pattern of the infra-orbital canal were also described. All the measurements and dimensions of the infra-orbital canal were larger in the late prenatal group when compared with the early postnatal group, while the walls of the canal were more defined in the postnatal group. The branching pattern of the infra-orbital canal reflected the developmental stage of the associated surrounding structures. Precise knowledge of the changes in the infra-orbital canal morphometry during periods of development and growth is imperative for understanding the distribution patterns of the infra-orbital neurovascular supply to the immature midfacial region and in predicting aberrant craniofacial and dental growth patterns.