ISSN: 0975-3583,0976-2833 VOL 15, ISSUE 08, 2024

ORIGINAL RESEARCH

Pre operative evaluation of keros classification in endoscopic sinus surgery

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Received: 24 June, 2024 Accepted: 28 July, 2024

Introduction

Disruption of mucociliary clearance, often caused by anatomic variations and mucosal disease, is the primary pathogenic factor contributing to the persistence of symptoms and the chronic nature of the disease[1]. The boundaries of the olfactory fossa are defined as follows: medial – crista galli, inferior – cribriform plate of the ethmoid, and lateral – lateral lamella of the ethmoid[2]. Additionally, there exists an asymmetry between the olfactory fossa on the left and right sides. It is crucial to conduct a preoperative assessment using the Keros classification to prevent inadvertent procedures at the skull base level, as the depth of the olfactory fossa may differ between the two sides[3-5].Chronic sinonasal diseases are prevalent conditions necessitating surgical intervention in the field of otolaryngology. While some diseases can be managed with medications, surgical treatment is often required. Endoscopic sinus surgery (ESS) is the predominant approach employed for treatment currently[6-8].

The Keros classification is a widely utilized method for assessing the depth of the nasal roof preoperatively to mitigate potential life-threatening complications. The uncinate process and attachment of the middle turbinate can be linked to various anatomical regions, occasionally attaching directly to the nasal roof[9,10]. Disruption of this anatomical site can lead to severe clinical complications such as cerebrospinal rhinorrhea and meningitis. High-resolution computed tomography (HRCT) serves as the gold standard for diagnosing paranasal sinus conditions and adjacent structures, playing a crucial role in preoperative assessment to prevent associated medical complications[11-13]. The objective is to determine the incidence of keros classification in ethmoid sinus.

Methods

Source of data: Patients with chronic rhinosinusitis attending the outpatient department of otorhinolaryngology, head and neck surgery (ENT-HNS) at a teritiary care medical college in south india for a period of 12 months from December 2022 to November 2023.Method of collection of data: 100 consecutive patients with history of CRS subjected for CT-PNS. CT paranasal sinuses was performed with 16 slice CT machine Seimens Somatom by direct axial and coronal sections. The images were reformated for sagittal section to evaluate entire anatomy. Data was entered in proforma after taking informed written consent.Sample size is 100. Sampling is Cross sectional study.Inclusion criteria were all the patients with clinically

ISSN: 0975-3583,0976-2833 VOL 15, ISSUE 08, 2024

proven chronic sinusitis; patients above fifteen years age.Exclusion criteria were patients with history of previous nasal surgery or trauma; pregnant patients; patient with sinus malignancies.

Results

TABLE NO: 1

KEROS CLASSIFICATION	INCIDENCE (%)
TYPE 1	11.5
TYPE 2	85
TYPE 3	3.5

FIGURE 1

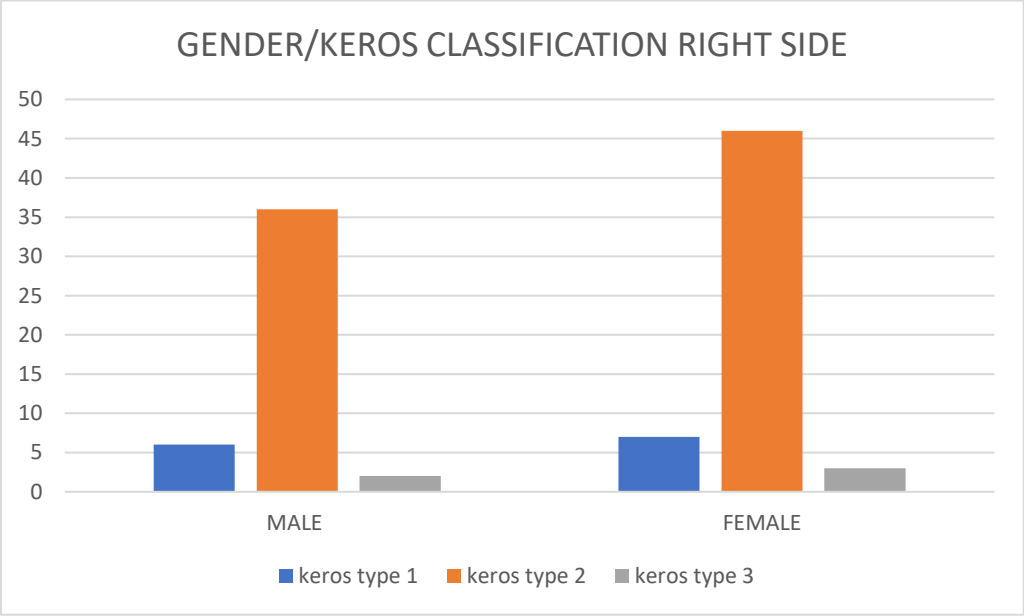
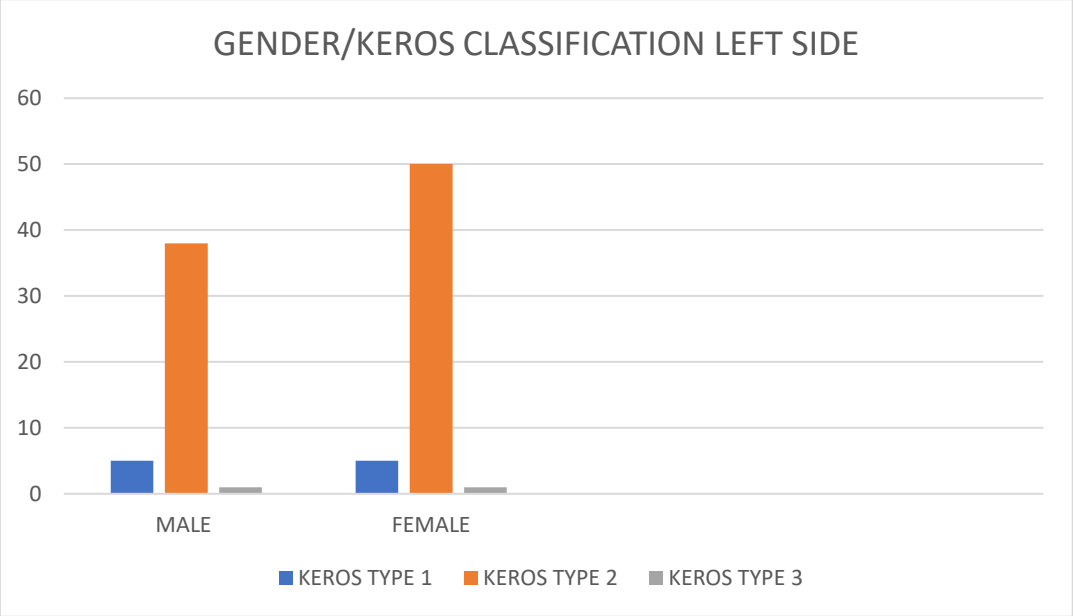


FIGURE 2



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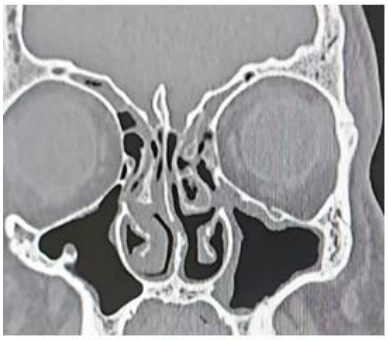
A total of 100 patients were included in the study.According to the Keros classification (TABLE 1) , Type 1 was found 11.5% , Type 2 85% and Type 3 3.5% , consequently majority of cases were Type 2. Also, we found that Type 2 was the most common on both sides in males and females. (FIGURE 1&2). In males – Right keros type II (36) and left keros type II(38) is the most common type. In females keros type II (46) is the most common in right side and left (50) keros type is the most common. In males right (2) and left (1) type III is the least common. In females right (3) and left (1) in the type III is the least common. Keros type II is most common in left side (88) than the right side (82). Type III is most commonly seen in right (5) than on the left side (2)



KEROS TYPE 1.

KEROS TYPE 2.

KEROS TYPE 3.

Discussion

Our data analysis revealed that Keros type 2 was the most frequently observed type in medical conditions. However, variations in these anatomical structures were not uncommon. Of particular concern was Keros type 3, which featured skull base attachment and posed a potential risk in clinical settings[14-16].Type II was the most common on both sides in males and females. When clinical suspicion arises, diseases or variations can be further assessed using high-resolution computed tomography (HRCT) evaluation[16]. This imaging technique provides detailed information on anatomical structures, variations, and pathologies, aiding in the prevention of complications during endoscopic sinus surgery (ESS). While anatomical knowledge and experience can reduce the likelihood of complications, ESS has been associated with both minor and major complications. These range from minor issues like bleeding and infection to more severe complications such as extraocular muscle damage and cerebrospinal fluid leaks[17-20]. Understanding the thickness of the lateral lamella is crucial, as it can impact the degree of Keros classification and the risk of complications. Pre-operative assessment, particularly in cases of Keros type 3, is essential to mitigate the risk of cerebrospinal fluid leaks and other serious complications[21-23]. Gender was not found to be a significant factor influencing anatomical variations, emphasizing the importance of individualized patient assessment before ESS to minimize risks[24-26]. In conclusion, a thorough evaluation using HRCT imaging is essential to identify potential danger areas in the sinonasal tract and ensure the safety and success of endoscopic sinus surgeries.

Conclusion

Anatomical variations in the sinonasal region can indeed contribute to the development of sinonasal diseases. The use of CT imaging in the paranasal sinuses can effectively identify these variations, serving as a valuable tool for surgeons during Functional Endoscopic Sinus Surgeries. Your study highlights the importance of determining the depth of the ethmoid roof to prevent damage to the bony lamella and minimize the risk of complications post-surgery. This approach can significantly enhance patient outcomes and reduce the likelihood of adverse events.

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ISSN: 0975-3583,0976-2833 VOL 15, ISSUE 08, 2024

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