CONCLUSION

Abbe flaps are a dependable and safe technique for addressing secondary cleft lip deformities, offering an esthetic and functional outcome. Since its initial description by Robert Abbe[11] in the late 19th century, the technique has undergone various modifications and enhancements. The flap has been integrated with other procedures related to CLP repair and evaluated against other alternative reconstructive options. The Abbe flap remains a fundamental technique for the reconstruction of secondary cleft lip deformity.

REFERENCES

1. Koshy JC, Ellsworth WA, Sharabi SE, et al. Bilateral cleft lip revisions: the Abbe flap. *Plast Reconstr Surg* 2010;126:221–227
2. Mokal NJ, Juneja M. Secondary bilateral cleft lip-nose deformity correction by rhinoplasty with simultaneous Abbe flap. *Indian J Plast Surg* 2014;47:20–24
3. Cohn JE, Nyirjesy S, Davis WJ. Repair of a secondary cleft lip deformity with the abbé flap in a pediatric patient. *Ear Nose Throat J* 2019;98:265–267
4. Bagatin M, Most SP. The Abbe flap in secondary cleft lip repair. *Arch Facial Plast Surg* 2002;4:194–197
5. Steinberg JP, Brady CM, Burstein FD. Primary Abbe flap for median cleft lip deformity: new trends on an old concept. *J Craniofac Surg* 2016;27:480–483
6. Veeramani A, Wilson AT, Sawh-Martinez R, et al. Staged Abbe-Rhinoplasty technique to correct bilateral cleft deformity. *Plast Reconstr Surg* 2020;145:518–521
7. He J, Xu H, Wang T, et al. Simultaneous reconstruction of columella and philtrum using prolabial flap combined with Abbe flap in secondary bilateral cleft lip and nasal deformity. *J Cranio-Maxillofac Surg* 2018;46:1–5
8. Balaji SM. Cleft rhinoplasty columellar lengthening: comparison of techniques. *Indian J Dent Res* 2018;29:26–33
9. Susarla SM, Berli JU, Kumar A. Midfacial volumetric and upper lip soft tissue changes after Le Fort I advancement of the cleft maxilla. *J Oral Maxillofac Surg* 2015;73:708–718
10. Eski M, Aykan A, Alhan D, et al. Evaluation of the results of simultaneous open rhinoplasty and Abbe flap for the reconstruction of the secondary bilateral cleft and nasal deformity. *J Plast Reconstr Aesthetic Surg* 2015;68:751–757
11. Abbe R. A new plastic operation for the relief of deformity due to double harelip. *Plast Reconstr Surg* 1968;42:481–483

The Frequency of Presence of the Infraorbital Canal in the Maxillary Sinus and its Clinical Importance

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Objective: The infraorbital canal (IOC) houses critical structures like the infraorbital artery, vein, and nerve, and its atypical location within the maxillary sinus could pose risks during surgical procedures, making it crucial to understand its prevalence and distribution. The study aims to investigate the localization and frequency of the IOC within the maxillary sinus.

Methods: This retrospective study analyzed computed tomography (CT) images from 1000 randomly selected patients (500 males, 500 females) aged 18 to 65 years who underwent paranasal region imaging at Istanbul Medipol University Medipol Mega University Hospital between 2015 and 2020. Exclusion criteria included major pathologies, prior surgeries, and poor image quality. The study focused on evaluating the localization of the IOC and its presence within the maxillary sinus, using coronal CT sections.

Results: The IOC was found within the maxillary sinus in 8% of cases (44 males, 36 females). This variation was bilateral in 34 cases and unilateral in 46 cases, with no statistically significant relationship between sex and the occurrence or type of variation. The study's findings align with previous research, which reported similar prevalence rates for this anatomical variation.

Conclusion: The study confirms that the IOC is located within the maxillary sinus in a significant percentage of cases, emphasizing the importance of preoperative CT evaluation to prevent potential complications during maxillary sinus surgeries. These findings highlight the clinical relevance of considering individual anatomical differences in the localization of the IOC.

Key Words: Infraorbital canal, maxillary sinus, maxillary sinus surgeries

The infraorbital canal (IOC) is a continuation of the infraorbital groove posteriorly and an infraorbital foramen anteriorly. The IOC contains important structures such as the infraorbital artery, vein, and nerve.[1] In most basic sources, the IOC is considered to be located below the orbital cavity and above the maxillary sinus. The IOC is generally considered to be located below the orbital cavity and above the maxillary sinus.[2] For this reason, the IOC and vascular and nervous structures are often overlooked in interventional procedures performed from the anterior aspect of the maxillary sinus. However, some studies in the literature have reported that the IOC can sometimes be located within the maxillary sinus rather than on its roof.[1,3,4] In these cases, it has been reported that the IOC and, thus, the infraorbital vascular and nerve structures may be damaged in interventional procedures such as the Caldwell Luc operation performed through the anterior wall of the maxillary sinus.[1] Therefore, the location of the IOC within the maxillary sinus is clinically very important.

The aim of this study was to investigate the localization of the IOC and its frequency of presence in the maxillary sinus.

METHODS

In this study, we retrospectively evaluated the computed tomography (CT) images of individuals who applied to Istanbul Medipol University, Medipol Mega University Hospital, for any reason and underwent CT imaging of the paranasal region

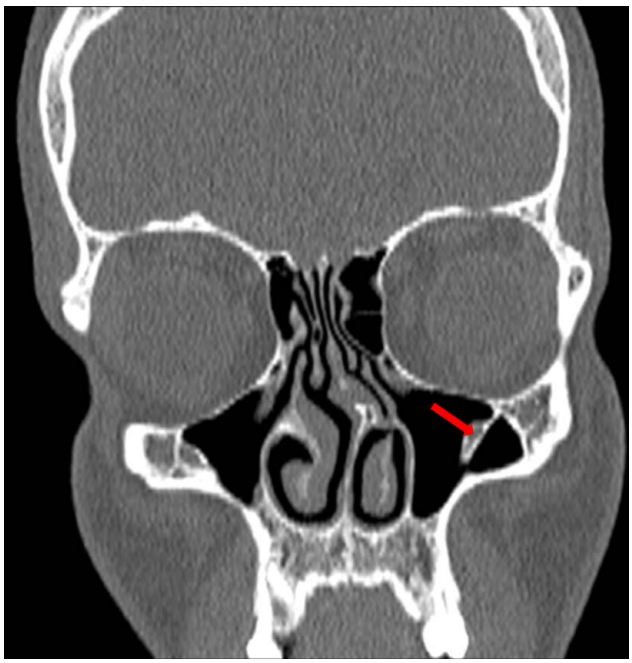

FIGURE 1. Coronal section CT image showing the IOC within the sinus maxillaries. CT indicates computed tomography; IOC, infraorbital canal.

between 2015 and 2020 through the hospital automation system. Local Ethics Committee approval was obtained before the study (February 4, 2021, and approve no: E-10840098-772.02-1171). Patients with major pathology of the paranasal region, patients who had previously undergone any surgical procedure in this region, and patients with poor image quality or artifactual images were excluded. After the exclusion criteria, CT images of 1000 randomly selected patients (500 males and 500 females with similar age distributions) aged 18 and 65 years were evaluated. On these CT images, the localization of the IOC and the frequency of its location in the maxillary sinus were evaluated in coronal sections.

Statistical Analyses

Statistical analyses were performed with the SPSS 25.0 package program, and a P value below 0.05 was considered statistically significant. Descriptive expressions and percentage values were used for prevalence. Student t test was used to compare normally distributed variables in 2 independent groups.

RESULTS

The mean age of the examined cases was 38.67 ± 13.67 years (38.59 ± 13.66 for males and 38.74 ± 13.69 for females; Fig. 1). There was no statistical difference between age and sex ($P = 0.859$). In 80 out of 1000 (8%) cases (n = 44, 8.8% for males and n = 36, 7.2% for females), the IOC was found to be within the maxillary sinus rather than on its roof. It was observed bilaterally in 34 of these cases and unilaterally in 46. It was determined that there was no statistical relationship between sex and the occurrence of this variation and whether this variation was bilateral or unilateral ($P > 0.05$ for both).

DISCUSSION

The infraorbital nerve and vessels are well protected and rarely injured in direct trauma,[5,6] but they can still be damaged by trauma. In addition to trauma, the infraorbital nerve can also be damaged by neoplasia, endoscopic interventions, or orbital decompression surgery.[7] In cases affecting the IOC and, thus, the infraorbital nerve, persistent paresthesia can be seen.[5,6] It has been reported that infraorbital nerve damage may result in dysesthesia.[8] In addition, it was reported that sensory deficits due to infraorbital nerve damage after orbitozygomatic complex trauma ranged from 24% to 50%.[9] Therefore, although the infraorbital nerve in the IOC is well protected, it can be damaged for various reasons. In these cases, problems that can seriously affect the quality of life may occur.

The IOC is generally considered to lie below the orbital cavity and above the maxillary sinus. However, some studies in the literature have reported that the IOC may be located within the maxillary sinus.[1,3,4] In these cases, the IOC and, thus, the infraorbital nerve may be damaged, especially in procedures performed through the antral wall of the maxillary sinus. In addition, preoperative CT sections can be examined, taking into account that there may be individual differences in the localization of the infraorbital nerve and canal. This may increase the success rate of surgical and anesthetic interventions.[1,6,10]

Therefore, the frequency of the location of the IOC in the maxillary sinus, which was analyzed in this study, is of clinical importance. Ference et al[11] found this variation as 12.5%, Lantos et al[12] 10.8%, Yenigun et al[6] 12.3%, and Bahşi et al[1] 7%. In this study, the prevalence of this variation was found to be 8%, which is very similar to the literature.

CONCLUSION

In this study, as in other studies in the literature, the frequency of the IOC in the maxillary sinus was found to be considerable. These findings once again emphasize the necessity of the evaluation of CT images before surgical procedures in the maxillary sinus region.

REFERENCES

1. Bahsi I, Orhan M, Kervancioglu P, et al. Morphometric evaluation and surgical implications of the infraorbital groove, canal and foramen on cone-beam computed tomography and a review of literature. *Folia Morphol* 2019;78:331–343
2. Standring S. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*, 41st ed. Elsevier Limited; 2016
3. Chandra RK, Kennedy DW. Surgical implications of an unusual anomaly of the infraorbital nerve. *Ear Nose Throat J* 2004;83: 766–767
4. Elnil H, Al-Tubaikh JA, El Beltagi AH. Into the septum I go, a case of bilateral ectopic infraorbital nerves: a not-to-miss preoperative sinonasal CT variant. *Neuroradiol J* 2014;27:146–149
5. Peltomaa J, Rihkanen H. Infraorbital nerve recovery after minimally dislocated facial fractures. *Eur Arch Otorhinolaryngol* 2000;257:449–452
6. Yenigun A, Gun C, Uysal II, et al. Radiological classification of the infraorbital canal and correlation with variants of neighboring structures. *Eur Arch Otorhinolaryngol* 2016;273:139–144
7. Sakavicius D, Kubilius R, Sabalys G. Post-traumatic infraorbital nerve neuropathy. *Medicina* 2002;38:47–51
8. Eppley BL. Re: cutaneous distribution of infraorbital nerve. *J Craniofac Surg* 2004;15:5
9. Vriens JP, van der Glas HW, Bosman F, et al. Information on infraorbital nerve damage from multitesting of sensory function. *Int J Oral Maxillofac Surg* 1998;27:20–26
10. Kazkayasi M, Ergin A, Ersoy M, et al. Certain anatomical relations and the precise morphometry of the infraorbital foramen—canal and groove: an anatomical and cephalometric study. *Laryngoscope* 2001;111:609–614
11. Ference EH, Smith SS, Conley D, et al. Surgical anatomy and variations of the infraorbital nerve. *Laryngoscope* 2015;125:1296–1300

12. Lantos JE, Pearlman AN, Gupta A, et al. Protrusion of the infraorbital nerve into the maxillary sinus on CT: prevalence, proposed grading method, and suggested clinical implications. *AJNR Am J Neuroradiol* 2016;37:349–353

Miniscrew-assisted Rapid Palatal Expansion Before Orthognathic Surgery for a Patient With Laterognathia

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Abstract: In this case report, a 19-year-old male patient with maxillary transverse deficiency, concave profile, and facial asymmetry is presented. In the case of transversal insufficiency, nonsurgical maxillary expansion was performed with the miniscrew-assisted rapid palatal expansion (MARPE) appliance to reduce the number of surgeries and provide both dentoalveolar and skeletal expansion. The periodontal soundness and short-term stability of the maxillary expansion were confirmed both clinically and radiologically. Mandibular prognathism was later corrected with orthognathic surgery. MARPE is an effective approach to the treatment of maxillary transverse deficiencies in adult patients.

Key Words: Facial asymmetry, laterognathia, MARPE, maxillary deficiency, orthognathic surgery

Transverse maxillary deficiency and antero-posterior disharmony are common clinical problems. It has been reported that ~30% of adult orthodontic patients have a maxillary transverse deficiency with a posterior crossbite.[1–3] Unilateral posterior crossbite is generally characterized by a narrow maxillary arch and a wide mandibular arch on the crossbite side.[1] Both unilateral and bilateral posterior crossbites are equally common in society.[4,5] These malocclusions are difficult problems faced by orthodontists due to their response to treatment and possible recurrence after treatment. However, with the development of social and esthetic awareness, the number of adult patients seeking treatment is increasing.

Segmental Le Fort I osteotomy is an old and widely used surgical method in cases of maxillary transverse deficiency up to 6 to 7 mm in adults.[6] However, as a result of the transverse expansion of the maxilla with segmental Le Fort I osteotomy, unstable (relapse) situations may often occur after surgery.[7,8] As a result of several studies conducted to evaluate transverse stability, it was revealed that a relapse rate of 30% was observed among premolars and 49% was observed in molars.[7,8]

Surgical-assisted maxillary expansion (SARME) is generally the preferred treatment method to solve the high resistance coming from the palatal bone and zygomatic buttress.[9,10] Although SARME is thought to provide better stability than segmental Le Fort I osteotomy, there are studies suggesting that there is no significant difference.[7] Although SARME has been shown to increase maxillary width both skeletally and dentally, postsurgical stability varies significantly between cases, and the number of studies on this subject is limited.[11,12] Individualization of the surgical technique according to the area affected by transverse insufficiency has rarely been described in the literature.[13]

In addition, a second surgical intervention is usually required in cases of transversal insufficiency and antero-posterior incompatibilities, and it is known that problems such as additional problems and increased costs may be encountered.[3] As many patients are reluctant to undergo multiple surgical procedures and recurrence is considered inevitable, the desire for nonsurgical treatment is increasing. Recently, Lee et al[14] reported successful results with 4 orthodontic titanium screws [miniscrew supported RPE (MARPE)] placed at the palatal level. When the appliance widens the maxillary arch, the pressure on the anchor teeth is reduced, and the side effects on these teeth are also reduced.[15] The appliance should be appropriately designed to maximize its skeletal impact. Recently, case reports showing different variations and expansion protocols of MARPE show that interest in the scientific literature in this field has increased.[16,17] Based on these, it can be argued that the use of MARPE in adult patients is a clinically effective and stable method for correcting transversal disharmony without surgery.[14]

In this case report, a miniscrew-assisted rapid palatal expander (MARPE) was used to widen the maxillary arch before orthognathic surgery. Thus, the treatment of an adult patient with asymmetric posterior crossbite is described, trying to prevent recurrence that may occur after SARME and segmental Le Fort I osteotomy.

DIAGNOSIS AND ETIOLOGY

The patient was a 19-year-old male who applied to Suleyman Demirel University, Faculty of Dentistry due to facial asymmetry. Clinically, he had a concave facial profile and a leftward deviation of the mandible (Fig. 1). Intraorally, there was no crowding in the lower dental arch and minimal crowding in the upper dental arch, and there was a unilateral posterior crossbite. No problem was found on panoramic radiographs (Fig. 2).

Cephalometric analysis shows a skeletal Class I malocclusion (ANB, 0.79°; Wits −2.42 mm) with maxilla and mandible in sagittally normal position (SNA, 84.62°; SNB, 83.83°) and hyperdivergent mandibular plane angle (FMA, 30.97°). Maxillary incisors were normal (U1 to SN, 103°) and mandibular incisors were retrusive (IMPA, 84.97°) to compensate for skeletal mal-

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