


A radio-paleontological evaluation and comparison of Anatolian rhinoplasty patients and the literature.

Who are we “engaged” to operate?

Anadolu'daki rinoplasti adaylarının radyo-paleontolojik değerlendirilmesi ve karşılaştırılması.

Kimi ameliyat ediyoruz?

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Abstract

Aim: Nasal bone anatomy is a frequent target of rhinoplasty procedures. This study aims to examine the nasal bony anatomy of rhinoplasty-seeking patients, and compare it with the recent literature.

Materials and Methods: 138 patients seeking rhinoplasty were examined with CT scans. Nasal bone length, width, osteotomy line bone thicknesses on three separate levels, aperture width and lengths were measured. 87 female and 51 male patients, aged between 16 to 58 years, were included in this study.

Results: Nasal bone lengths were measured as 2.47 ± 0.42 cm, widths were measured as 1.06 ± 0.19 cm on right and 1.06 ± 0.21 cm on left, aperture widths were measured as 2.31 ± 0.2 cm and heights as 3.16 ± 0.43 cm, osteotomy thicknesses were measured as 1.61 ± 0.33 mm, 1.79 ± 0.37 mm, 2.05 ± 0.45 mm on inferior, medial and superior parts, respectively.

Conclusion: Measurements of nasal skeletal properties showed unsimilar results with studies from adjacent areas. Therefore, it may be wise to say that surgeons should not approach every patient as a standard patient with similar anatomical structures.

Keywords: Nasal bone, rhinoplasty, radiological anatomy.

Öz

Amaç: Nazal kemik anatomisi, rinoplasti ameliyatlarının temel hedeflerinden biridir. Bu çalışma, rinoplasti olmak isteyen hastaların nazal kemik anatomisinin incelenmesini ve literatürle karşılaştırılmasını amaçlamaktadır.

Gereç ve Yöntem: 138 rinoplasti isteği ile başvuran hastanın Bilgisayarlı Tomografi (BT) taramaları incelenmiştir. Kemik uzunluğu, genişliği, üç ayrı seviyede osteotomi kalınlıkları, apertura piriformis genişlik ve yükseklikleri ölçülmüştür. Yaşları 16 ile 58 arasında değişen 87 bayan ve 51 erkek hasta çalışma popülasyonuna dâhil edilmiştir.

Bulgular: Nazal kemik uzunlukları $2,47\pm 0,42$ cm, genişlikleri sağda $1,06\pm 0,19$ cm, solda $1,06\pm 0,21$ cm; apertura piriformis genişlikleri $2,31\pm 0,2$ cm, yükseklikleri $3,16\pm 0,43$ cm; osteotomi kalınlıkları, alt orta ve üst seviyelerde sırasıyla $1,61\pm 0,33$ mm, $1,79\pm 0,37$ mm ve $2,05\pm 0,45$ mm olarak ölçülmüştür.

Sonuç: Bu ölçümler, komşu coğrafi bölgelerde yapılan çalışmalardan farklılık göstermektedir. Bu nedenle cerrahların her hastaya aynı anatomik özelliklere yönelik standart bir yaklaşım göstermemelidir.

Anahtar Sözcükler: Nazal kemik, rinoplasti, radyolojik anatomi.

Introduction

As an every-day-practice for most of the plastic surgeons, rhinoplasty has a unique perspective when compared to other operations. Many textbook chapters discussing rhinoplasty techniques begin with mentioning the philosophy concept: Every rhinoplasty operation has similar steps but are totally different from each other. The most important difference begins with the anatomy of the patient.

Anatomy differs between individuals, as it causes the difference of different rhinoplasty techniques. A skeleton, made of osteo-cartilaginous framework, is the basis of this anatomy. Most of the rhinoplasty techniques depend on understanding and fully cooperating with these structures' reactions and has a learning curve (1).

Nasal bones, which articulates with maxilla on lateral sides and frontal bone on superior, are broad, quadrangular bones with thicker bony matter on superolateral sides. Additionally, medial borders articulate with lamina perpendiculars of the ethmoid bone, giving the structure a tripod shape. Thinner distal parts of the nasal bones articulate with upper lateral cartilages. Within these "specific" borders, bone shapes and thicknesses differ a lot. Even classification systems have been suggested (2). In this study, we present nasal bone's skeletal anatomical properties of Anatolian population that seek for rhinoplasty operation.

Materials and Methods

This study was held with approval of the local ethical committee of Ministry of Health, and the study was performed in accordance with the Declaration of Helsinki. Information of 237 patients who admitted to the first author's outpatient clinic for a rhinoplasty procedure in a level-3 state hospital were obtained and evaluated. Patients with maxillofacial trauma or surgical history were excluded from the study. Subsequently, maxillofacial CT scans of 138

patients were evaluated. CT scans were taken by Philips Ingenuity CT Core 128 machine with 257 mA. Age, sex, nasal bone lengths and widths, aperture widths and heights, body thicknesses on osteotomy line's inferior, intermediate and superior parts were measured using RadiAnt DICOM Viewer 5.0.1. (Figure-1).

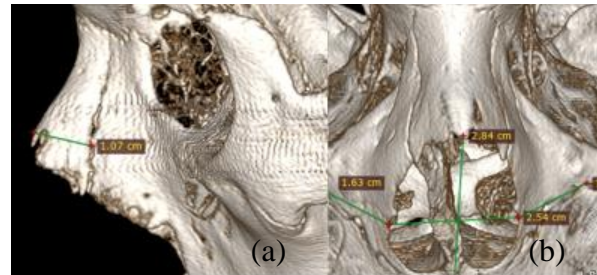


Figure-1. Measurements of (a) nasal bone width and (b) piriform aperture.

Results

Of the 138 patients, 51 were male and 87 were female patients. Age range was 16 to 58 with a median of 22.0 years. Nasal bone length means were measured as 2.50 ± 0.4 mm (1.61-3.62) in males and 2.4 ± 0.4 (1.39-3.47) in females, and width of right nasal bones' means were measured as 1.1 ± 0.2 cm (0.68-1.66) in males and 1.0 ± 0.2 cm (0.57-1.66) in females, and width of left nasal bones' means were measured as 1.2 ± 0.2 cm (0.74-1.47) in males and 1.0 ± 0.2 cm (0.51-1.98) in females. Aperture width means were 2.4 ± 0.2 cm (1.78-2.79) in males and 2.3 ± 0.2 cm (1.89-2.96) in females. Aperture heights were measured as 3.5 ± 0.4 cm (2.51-4.41) in males and 3.0 ± 0.3 (2.11-3.85) in females. Bone thicknesses of inferior, middle and superior osteotomy lines were measured as 1.7 ± 0.3 (1.2-2.7), 1.8 ± 0.4 (1.2-2.8), 2.2 ± 0.5 (1.3-3.1) mm in males and 1.5 ± 0.3 (0.2-2.3), 1.8 ± 0.4 (1.2-3.1), 2 ± 0.4 (1-3.1) mm in females, respectively (Table-1).

Table-1. Descriptive of the measurements (cm).

	Median	SD*	Mean	Min.	Max.
Age	24.48	7.64	22.00	16.00	58.00
Nasal Bone Length	2.47	0.42	2.41	1.39	3.62
Nasal Bone Width (R)	1.06	0.19	1.05	0.57	1.66
Nasal Bone Width (L)	1.06	0.21	1.03	0.51	1.98
Ostetotomy Inf	1.61	0.33	1.57	0.15	2.74
Osteotomy Mid	1.79	0.37	1.76	1.15	3.10
Osteotomy Sup	2.05	0.45	2.01	1.02	3.13
Aperture Width	2.31	0.20	2.29	1.78	2.96
Aperture Height	3.16	0.43	3.12	2.11	4.41

* SD: Standard deviation.

Discussion

This study was aimed to examine and classify radiological characteristics of a Middle Eastern population which seek for a rhinoplasty.

The surgeons who do rhinoplasty operations have been trying to reach to the perfect shape of the nose for years. As many years and rhinoplasty operations pass, we know a lot more, but not learned the whole concept yet. Racial differences and inter individual differences change our procedures. This study doesn't intend to standardize any approaching techniques, but it aims to estimate the situation when we are engaged with the patient.

Nasal bone dimensions of different ethnic groups have been identified in different studies. German nasal bones were 2.49 ± 0.32 cm in length (3). Nasal bone lengths were compared between Austrian, Ashanti tribe, American Indian and Black American skulls, and reported to be 2.18, 3.02, 3.0 and 2.79 cm, respectively (4). In Korean CT scan evaluations, nasal bone lengths were given as 20.95 ± 5.99 (2). In another study, Korean nasal bone length was given 2.59 ± 0.38 cm in males, 2.45 ± 0.37 cm in females (5). In a Saudi population, Alharethy et al. measured nasal bone lengths on CT scans. They showed 1.96 ± 0.29 cm in males and 1.82 ± 0.34 cm in females (6). Another Middle Eastern study from Iran showed nasal bone lengths of 2.57 ± 0.296 cm in males and 2.35 ± 0.334 cm in females (7). A study from Turkey showed nasal bone lengths of 2.074 ± 0.528 cm in males and 1.964 ± 0.452 mm in females (8). Our study revealed nasal bone lengths as 2.50 ± 0.4 cm in males and 2.4 ± 0.4 in females, and this is not consistent with the other Kaplanoglu et al.'s study. The closest values were measured in the Korean study of Hwang et al and the Iranian study of Naser & Borouieni (5, 7).

A study in USA revealed aperture widths of Ashanti tribe, American Indian and Black American skulls as 2.16, 2.52 and 2.36, respectively (4). In Korean CT scan evaluations, aperture widths were given as 2.401 ± 0.234 cm (2). Another study with Korean CT scans reported aperture widths as 2.57 ± 0.17 cm in males and 2.54 ± 0.21 cm in females (5). German aperture widths were reported as 2.36 ± 0.18 cm in general population (3). Another study from Iran gave the aperture width values of 2.567 ± 0.179

cm in males and 2.377 ± 0.28 cm in females (7). Turkish aperture widths were given as 2.354 ± 0.296 cm in males and 2.324 ± 0.229 cm in females (8). The last two studies mentioned are from neighbor geography. However, their values show differences. As our study is from Eastern Turkey, we expected similar values with Kaplanoglu et al.'s study (8). However, our data showed aperture width means as 2.4 ± 0.2 cm in males and 2.3 ± 0.2 cm in females. It is more similar to German and Black American widths mentioned in Ofodile's study (4), more than the other Turkish study and less than Iranian study.

Aperture height values were given as 3.745 ± 0.725 cm for males, 3.592 ± 0.674 in females. (8) Korean aperture height was reported as 3.017 ± 0.26 cm in males and 2.807 ± 0.28 cm in females (5). Ofodile's study comparing Ashanti tribe, American Indian and Black American skulls revealed 3.14, 3.14 and 2.82 cm, respectively (4). Our study revealed aperture heights of 3.5 ± 0.4 cm in males and 3.0 ± 0.3 cm in females. Controversially to expected results due to geographical proximity, Kaplanoglu et al.'s study showed higher values (8). On the other hand, this study has the most similar results of ours.

Nasal osteotomy lines were measured at three different levels. Inferior, middle and superior portions were measured for inter individual differences and compared between individuals. In the literature, mean values were given in some studies, involving different races. Citardi et al. reported bone thicknesses as 2.39 ± 0.68 mm (1.5–3.7), 1.18 ± 0.3 mm (0.5–1) for the most lateral (inferior) and intermediate (middle) levels, respectively (2). Karadag et al. measured these levels as 1.85 ± 0.32 mm in males and 1.91 ± 0.46 mm in females, and 2.08 ± 0.17 mm in males and 2.04 ± 0.17 mm in females, respectively (9). In our study, we revealed bone thicknesses of same levels of 1.7 ± 0.3 and 1.8 ± 0.4 mm in males, and 1.5 ± 0.3 , 1.8 ± 0.4 mm in females, respectively. According to these results, we found that our population has thinner bone thicknesses from both studies.

Conclusion

In this study, we compared our population with the reported outcomes of previous studies. It is an interesting outcome to have different results than a similar study that was held in the same country. However, a limiting factor of our study is

the small-sized population. Also, a more-randomized population studies may show different results. Additionally, radiologic evaluation can hinder the precision of such measurements. In future studies, precise

information can be gathered from skull measurements from different races.

Conflict of interest: The authors have not declared any conflict of interest in this study.

References

1. Gruber RP, Garza RM, Cho GJ. Nasal Bone Osteotomies with Nonpowered Tools. *Clin Plast Surg.* 2016; 43 (1): 73-83.
2. Lee SH, Yang TY, Han GS, Kim YH, Jang TY. Analysis of the nasal bone and nasal pyramid by three-dimensional computed tomography. *Eur Arch Oto-Rhino-Laryngology.* 2008; 265 (4): 421-4.
3. Lang J, Baumeister R. [Postnatal growth of the nasal cavity]. *Gegenbaurs Morphol Jahrb.* 1982; 128 (3): 354-93.
4. Ofodile FA. Nasal bones and pyriform apertures in blacks. *Ann Plast Surg.* 1994; 32 (1): 21-6.
5. Hwang TS, Song J, Yoon H, Cho BP, Kang HS. Morphometry of the nasal bones and pyriform apertures in Koreans. *Ann Anat.* 2005; 187 (4): 411-4.
6. Alharethy S, Aldaghri F, Mesallam TA, Farahat M, Bukhari MA. Nasal bone length in Saudi rhinoplasty: A clinical-radiological study. *Ann Saudi Med.* 2014; 34 (1): 65-7.
7. Zamani Naser A, Panahi Boroujeni M. CBCT Evaluation of Bony Nasal Pyramid Dimensions in Iranian Population: A Comparative Study with Ethnic Groups. *Int Sch Res Not.* 2014; 2014: 1-5.
8. Kaplanoglu H, Coskun H, Toprak U. Computed Tomography Evaluation of Nasal Bone and Nasal Pyramid in the Turkish Population. *J Craniofac Surg.* 2017; 28 (4): 1063-7.
9. Karadag D, Ozdol NC, Beriat K, Akinci T. CT evaluation of the bony nasal pyramid dimensions in Anatolian people. *Dentomaxillofacial Radiol.* 2011; 40 (3): 160-4.