Original Article

Radix's Importance for Plastic Surgeons: A Descriptive Cross-Sectional Study

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ABSTRACT

Background: Considering the importance of the nose in the beauty of the face, accurate and systematic three-dimensional nasal analysis of the nose before the procedure is essential. The radix, and so the nasofrontal and nasofacial angles, play an essential role in forming an aesthetically pleasing nose because they influence the length and projection of the nose. We aimed to measure information about the pre-operative radix position in our region.
Method: Pre-operative images were taken from our cases in the profile view. A checklist including radix location and projection, nasofrontal angle, and nasofacial angle were extracted from these images.
Results: Overall, 200 (100 males and 100 females) cases were enrolled. Thirty-two male cases and 48 females had abnormal radix position. Radix projection were normal in only 36 male cases and 18 females. The mean nasofrontal angle in the male and female groups was 119.2 and 128.2 respectively. The mean nasofacial angle was 29.8 in the female groups and 32.6 in the male group.
Conclusion: The reality of the current society of Iranian patients can be very different from the predictions of surgeons and can be far away from the statistics mentioned in western books. We tried to notify surgeons to thoroughly examine the patients prior to surgical operation by measuring parameters such as projection and position of the radix and nasofrontal and nasofacial angles.

KEYWORDS
Augmentation; Nasofrontal angle; Radix; Rhinoplasty; Nasofacial angle

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INTRODUCTION

Over the past years, rhinoplasty has been one of the most popular cosmetic surgical procedures performed using different methods for aesthetic or constructional purposes in plastic surgery [1-3]. Considering the importance of the nose in the beauty of the face and the enormous challenges of rhinoplasty for inexperienced surgeons, accurate and systematic three-dimensional nasal analysis of the nose before the procedure is essential so that the surgery must meet the minimum expectations of the patient and the surgeon's goals [4].
As rhinoplasty was the most popular cosmetic surgery in the United States in 2020, the post-operative dissatisfaction rate is relatively

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high compared to other aesthetic procedures [5, 6]. Several reasons are involved in this dissatisfaction, including the possible unrealistic expectation of the patient, the inexperience of the surgeon, and surgical challenges during operation [5, 7]. Therefore, an adequate preoperative explanation to the patient of what rhinoplasty can and cannot do is imperative based on the anatomy and function of the patient's nose [8].

The radix area, the most cephalic indentation of the nasal dorsum, lies between the superior lash line and the supratarsal crease and consists of skin, subcutaneous fat tissue, and muscle [9, 10]. The radix, and so the nasofrontal and nasofacial angles, play an essential role in forming an aesthetically pleasing nose because they influence the length and projection of the nose [9, 11]. Neglecting and underestimating the radix area before the operation by many surgeons can be one of the crucial causes of post-operative dissatisfaction of the patients, which should be paid attention to.

Although rhinoplasty is one of the most common cosmetic procedures in Iran, little statistical information has been published compared to other ethnics, which forces surgeons to use the results of other researches on different races and ethics, so it can finally affect post operative dissatisfaction rate.

We aimed to measure local information about pre-operative parameters and the average of these parameters in the community and by comparing it with other ethnicities, which can help surgeons perform better procedures and reduce postoperative dissatisfaction rate.

METHODS

This descriptive cross-sectional study was conducted among patients' candidates for rhinoplasty at the Mother and Child Hospital of Shiraz University of Medical Science, Shiraz, Iran in 2020-2022. Patients were included if they have the age between 20-40 years. Exclusion criteria were a history of trauma, congenital deformities, and any obvious nose deformity. Informed consent forms were filled out by all the patients who participated in our study.

This study has been reviewed and approved by the Medical Ethics Committee of Shiraz University of Medical Sciences.

Proper pre-operative, profile view images were taken from the patients and the checklist was filled according to these images. Images were in the real size. The checklist includes the following items.

1. Radix location: high, normal, low.
2- Radix projection (in millimeters) compared to the corneal plan.
3- Nasofrontal angle in degrees.
4- Nasofacial angle in degrees.

Statistical analysis:

All analyses were performed using IBM SPSS 24 software (IBM Corp., Armonk, NY, USA). *P*-values less than 0.05 was considered as statistically significant. Kolmogorov- Smirnov test was used to determine if the data are normally distributed. Normally distributed data were reported as mean ± standard deviation, and not normal distributed data were reported as median (IQR).

RESULTS

We enrolled 200 cases including 100 female and 100 male patients with a mean age of 32 ± 2. The mean nasofrontal angle in the male and female groups was 119.2 and 128.2, respectively. The mean nasofacial angle was 29.8 in the female groups and 32.6 in the male group.

Radix position and projection are summarized in Table 1. Radixes located in the distance between the eyelash line and 4 mm above it were considered normal. The normal projection of the radix in the profile view compared to the cornea is about 15 mm.

Table 1: Radix position and projection distribution in male and female gender

Variables		Male N	Female N
Radix position	High	5	3
	Normal	68	52
	Low	27	45
Radix projection	Need reduction	47	34
	Normal	36	18
	Need augmentation	17	48

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Table 2: Nasofrontal and nasofascial angle distribution in male and female gender

Variable		Male N	Female N
Nasofrontal angle	Higher than the normal range	36	18
	Normal	40	57
	Lower than the normal range	24	25
Nasofascial angle	Higher than the normal range	14	10
	Normal	62	31
	Lower than the normal range	24	59

Nasofrontal and nasofacial angles are summarized in Table 2. Normal nasofrontal angle in the female gender was considered 140 ± 5 and in the male gender 130 ± 5 degrees. Normal nasofacial angle in the female gender was considered 35 ± 2 and in the male gender 35-40 degrees.

DISCUSSION

One of the necessary factors to have a successful rhinoplasty is measurement and analysis before the operation. Therefore, the existence of more accurate factors for better analysis of anthropometric characteristics can help surgeons in reducing the dissatisfaction rate. In the results obtained from this research, a significant number of people had a low radix position, while the number of high radix positions was insignificant. In addition, in this study, a large number of people need to correct radix projection, among which most women need radix augmentation by common technique like Skoog, crushed septal cartilage, temporalis facia, while men need radix reduction more than radix augmentation. Creating a proper position in the radix helps to maintain the symmetry, balance and harmony of the nose, for example, underprojected radix makes the nose dorsum look longer and the high projected radix makes the nose dorsum look shorter.

In almost half of the patients participating in this study, the nasofrontal angle was out of the ideal range, which proportion was more in men than in women. The average nasofrontal angle in these patients was 10 degrees lower in both sexes compared to the western race. In almost more than half of the women patients, the nasofacial angle was lower than the standard and need to be augmented, but this was not true for men, most men had an angle within the normal range and the tip-dorsum projection is normal. It can be said which does not need to be manipulated. In both groups, the need to decrease this angle was less than to increase it. The average nasofacial angle in Iranian patients was 3 to 5 degrees lower than the western race in both sexes. Contrary to the results obtained in our research, in a study conducted in another city of Iran, Tehran, more than half of the men have a low radix position and a quarter have a high radix position, additionally, in women the percentage of people with a high radix position is higher than low radix position. though it is difficult to sort out these inconsistent results, the difference in average parameters in both groups may in part be clarified by considering different in ethnic population or number of patients that participate in the study. In similar study, Koreans had lower radix height than Caucasians, Because of that; radix augmentation is increasingly popular among Asians[12]. According to Mowlavi et al, women prefer the middle positions of the radix rather than the upper and lower positions, and men also prefer the middle and upper positions rather than the lower position. In addition, the optimal projection for men and women is about 10mm[13].

Aging process cause the soft tissue and nasal bone undergo changes that can be seen as an increase in the thickness of the skin enveloped radix area and nasofrontal angle, whereas a decrease is seen in the length and thickness of the bony part[14]. Looking at East Asia, the average nasofacial angle in Korea was 32.3° and in Nigeria, it was 36.3° [15, 16]. In a study on a group of Turkish people, the average nasofrontal angle was 123° in men and 133° in women[17], and this number was 136° in the group of Korean women. In similar research conducted in the Vietnamese community, the nasofrontal angle in women is noticeably higher than men, but this difference is not noticeable in the nasofacial angle, however comparing this research with the results obtained in

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our research, the nasofrontal angle is higher about 10 degrees in women and 14 degrees in men[18]. This difference can be due to the difference in race and measurement methods of these two groups. Based on the results of a research on South Indian women, despite the geographical proximity of Iran and India, the nasofacial angle of our research group is equal to that of North American white women and differs by about seven degrees from the Indian group [19].

It is suggested to determine the amount of radix deformity in secondary rhinoplasty candida patients, it is expected that due to the high rate of this deformity in primary rhinoplasty cases, this amount will be very high.

Other indices of nose such as skin thickness, average distance of LLC cartilage from nasal rim, width of Alar base, width of columellar base, width of nose, prevalence of deviation from the midline in each of the nasal triangles, width of bony pyramid in the apex areas and base etc. to be examined.

The results of this study show that the reality of the current society of Iranian patients can be very different from the predictions of surgeons and can be far away from the statistics mentioned in western books. Therefore, it is recommended that the surgeon's judgment during the preoperative analysis is basically based on the anthropometric indicators of each patient and less based on the general taste and insistence of the patients.

Another problem that exists is the lack of extensive research to determine the local aesthetic parameters in Iran, which causes surgeons to use patterns that are not related to their general practice. This research helps to increase postoperative satisfaction by using local patterns.

CONCLUSION

The definition of the beauty and desirability of the face depends on many factors according to the ethnicity, since the position and projection of the radix has a significant effect on the visual aesthetics of the nose, and it has an effect on the appearance of other parameters of the nose, such as the dorsum and tip, determining these parameters in each geographical area helps surgeons to know more and perform better cosmetic procedures. Therefore, in this study, we tried to notify surgeons to thoroughly examine the patients prior to surgical operation by measuring parameters such as projection and position of the radix and nasofrontal and nasofacial angles.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interests.

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