Anatomic Considerations in Indian Rhinoplasty: Review of Anthropometric Studies

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Abstract

Purpose: In recent years, facial plastic surgery has seen an increase in the number of Indian patients desiring rhinoplasty. It is crucial for the facial plastic surgeon to have a thorough understanding of this population's ethnic features. This article seeks to provide the reader with a cohesive overview of the anthropometric studies that have been conducted on the Indian nose, as well as a brief overview of surgical options.

Methods: Using PubMed and Google Literature search, key terms such as “rhinoplasty,” “Indian,” “anthropometric,” and “measurements” were used in various combinations. Articles over the past 15 years were considered, and then analyzed by both of the authors of this paper for relevance, content, and applicability. Pertinent information was included, as well as information based on clinical knowledge.

Results: Through anthropometric studies, the Indian nose has been described as being broader, shorter, and less rotated compared to Caucasian counterparts.

Conclusions: Aesthetic and functionally minded rhinoplasty, while keeping in the acceptable anatomic confines of this ethnic group, can lead to successful outcomes with high levels of patient satisfaction.

Keywords: Rhinoplasty; Anthropometric; India

Introduction

While the concept of beauty has a large subjective component, many have argued that an observer’s perception is largely based on the relationship and orientation of the facial structures. The balance and symmetry of individual facial structures creates a sense of harmony in the perceiver’s mind, translating to what is thought of as beautiful or attractive [1]. Occupying a central position on the face and outlines by the sharp contours of the forehead, cheeks, eyes, and jaw, the nose strongly influences one’s visual impression of the face [2].

Since the times of Sushruta, the Indian physician known to be the father of rhinoplasty owing to his work with nasal reconstruction, rhinoplasty has undergone significant advances [3-4]. The coarse technique that was once described in the Sushruta Samhita, the original treatise describing the surgical contributions of Sushruta, has now been described extensively in modern day literature with substantial refinements [5-6].

The goals of modern day rhinoplasty are both aesthetically and functionally minded. While some patients present for purely cosmetic reasons, some present for strictly functional issues. Despite the differences, the rhinoplasty surgeon must be skilled in achieving an acceptable cosmetic outcome without compromising functional status. Adding a degree of complexity to the operation is a thorough understanding of the patient’s ethnic background. It is well accepted that a certain composition of facial features, including minor variations, are characteristic to specific ethnicities. Through anthropometric studies, it has been found that variations in the nose have been helpful in classifying human beings by race and sex [7]. In the English literature, one can find studies specific to Caucasian, African-American, and Middle-Eastern noses with respect to considerations in rhinoplasty; however, not until recently did there exist similar studies for patients of Indian (from the Indian sub-continent) descent [7]. While anthropometric studies have been performed in the past five years regarding the Indian nose, literature specific to rhinoplasty is now gaining interest due to increasing popularity in cosmetic surgery among this ethnic group.

A global survey revealed that in 2009 alone, Indian surgeons performed 60,000 cosmetic rhinoplasty procedures throughout the year, and ranked in the top five nations for cosmetic plastic surgery [8]. In 2013, an international survey of aesthetic surgery showed that world-wide, India was ranked the fifth highest country for total number of plastic surgeons [9]. Indian culture has always valued inner development, placing an emphasis on education and family values. Although external beauty has also been held in high regard, inner beauty and self-acceptance have been placed at the forefront and purportedly could be the reason why rhinoplasty was not as common in this ethnicity till more recent years. With increasing immigration to the United States and Western influence in India, aesthetic surgery has gained much momentum and increasing numbers of Indian patients are seeking nasal refinement, among other procedures.

Rhinoplasty in the Indian patient shares the same aesthetic and functional goals as other patients, but with the understanding that ethnic identity must be maintained. In a survey of 15 Indian patients seeking rhinoplasty, all 15 patients stated that ethnic identity with regard to the facial features, was important to them while considering facial surgery [10]. In this paper, we seek to provide the reader with a review of anatomical considerations in the Indian rhinoplasty patient in hopes of increasing knowledge of this exceedingly important dimension in patient-specific surgery.

Methods

A PubMed search and browser search was conducted using query terms such as “rhinoplasty,” “Indian,” “anthropometric,” “nasal measurements,” and “nasal surgery”. The search terms were placed both singularly and in combination. Using both resources, over 25 articles were generated. For this study, articles over the past 15 years were considered and selected for the study. Both authors of the paper analyzed the articles for relevance to the subject matter, and 16 were selected to be included in the paper. Pertinent information regarding anthropometric measurements, ethnic nasal indices, and surgical options was gleaned from the article and utilized in the review. Articles not pertaining directly to
the subject matter or articles including ethnic groups those were not the focus of the study were excluded.

Results

Understanding the Indian Nose

The nose varies considerably amongst various ethnic groups. Analyzing characteristics of the nose are centered on the nasal height, nasal width, nasal index, nasolabial angle, and protrusion of the nose.

The measurement of the nasal index is crucial for anthropometric studies as it is vital in characterizing the individual by race and gender. The nasal index is defined as ratio of the nasal width to the nasal height. The nasal width is calculated by taking the lateral most point of the ala making a right angle with the face, to the corresponding point on the opposite side. The nasal height is measured by calculating the distance from the nasion to the subnasale. Some authors choose to measure this point at the nasal spine as an alternative to the subnasale [11]. According to Romo and Abraham, the nose is classified as leptorrhine, or fine, if the index is less than 69.9. If the index is 70-84.9, the nose is classified as mesorrhine, or medium sized. A broad, or platyrrhine, nose is one whose nasal index is greater than 85 [12].

In a 2014 study involving 250 patients from South India, it was found that the average nasal width in males was 49.28 mm and 38.02 mm in females, while the average nasal height was 58.04 mm in males and 56.12 mm in females. The nasal index was found to be 84.91 in males, mesorrhine, and 67.75 in females, leptorrhine. The differences in two sexes were noted to be statistically significant [11]. In a similar study of 600 North Indian patients, it was found that the average nasal height of the male nose was 51.32 mm while that of the female was 50.3 mm, and the average nasal width of the male nose was 39.48 mm and that of the female was 35.79 mm. Using their data, they calculated the nasal index in males to be 77.39 and 72.28 in females, both fitting the mesorrhine category [13]. Interestingly, the results of these two studies were similar to a study of the primitive Indo-aryan nose done by Risely in 1915, showing that the nasal index ranged from 66.9-79.6, spanning both the leptorrhine and mesorrhine categories [14]. In contrast, the Caucasian nose has an average nasal index of 65.8 for males and 61.4 for females; the difference between North Indian and Caucasian nasal index was found to be statistically significant. The mean width of the Caucasian male nose was 34.9 mm while that of the female was 31.44 mm, significantly smaller width than the North Indian nose [2]. These findings are also supported by the work of Patil et al. in 2011 [1].

The nasal protrusion, defined as the distance from the subnasale to the nasal tip, also referred to as the pronasale in some studies. In a study of 100 Indian females, Patil et al. found the mean nasal protrusion to be 16.3 ± 1.4 mm [1]. In Chabbhra and Bedi’s study, the mean nasal protrusion was found to be 16.12 mm in males and 15.8 mm in females [13]. According to Farkas et al., have reported the mean nasal protrusion as 19.5 mm in males and 19.7 mm in females, consistent with the reporting by Humphrey and Powell [2,15]. The protrusion of the Indian nose is significantly less than that of the Caucasian nose.

Another important parameter to measure is the nasolabial angle. The mean nasolabial angle of the Indian nose has been reported to be 96.75 ± 8.3 degrees, while that of the Caucasian nose is 104.2 ± 9.8 degrees. A statistically significant difference suggests that the Indian nasal tip has a greater degree of ptosis than the Caucasian nose [1,10].

It is important to note that the rule of facial fifths may not be applicable to Indian patients as they generally have a greater nasal width than intercanthal distance. One study measured the intercanthal distance of 100 patients to be mean 28.5 ± 1.8. Thus, in almost 100% of patients, it can be expected that the nasal width is greater than the intercanthal distance [1]. The more horizontal orientation of the Indian nostril can also lend to a flared appearance of the ala [1].

It can be summarized that the Indian nose is typically broader, shorter, and with a more acute nasolabial angle than the Caucasian nose, an important consideration when discussing surgical planning with the patient so as to improve aesthetic outcome while maintaining ethnic appearance.

Overview of Surgical Techniques

When planning rhinoplasty in a patient of Indian heritage, the same principles apply as with any patient. A thorough discussion of the patient’s goals and expectations must be had prior to the procedure. Appropriate pre-operative photography must be completed and examined with the patient. If simulation software is available, it may be helpful for the patient to understand what the effect of different maneuvers may be in the post-operative period. It is important for the surgeon to understand how important it is for the patient to maintain an ethnic appearance. If patient’s desire drastic changes, they should be cautioned that these may come at the expense of maintaining an ethnic nose. Functional, aesthetic, and culturally minded rhinoplasty may give the patient an improvement in nasal appearance while avoiding a surgically altered appearance that could have negative cultural ramifications. As the main purpose of this paper is to review anthropometric studies of the Indian nose, only a brief overview of surgical techniques is provided. For a more thorough discussion on rhinoplasty techniques and preparation, the reader is referred to the literature for a detailed description.

A primary consideration for the surgeon is whether endonasal (closed) approach is desired, or whether an open approach is more effective. Either approach may necessitate the use of several incisions, described below in figure 1. Advantages of a closed approach include shorter operative time, less dissection of the cartilage and soft tissue, and greater maintenance of nasal infrastructure. Proponents of an open approach may argue that improved visualization of structures makes this approach more
suitable in patients desiring more changes in the nose, namely in
tip definition. Regardless of approach, many of the same maneuvers
may be possible in either technique to achieve the patient’s goals.

Many patients may present with a dorsal hump, either
cartilaginous or bony. A dorsal hump reduction is best performed
after assessing the portion of the dorsum with excess. Raspers or an
osteotome can be used to remove a bony hump, while scissors can
used to remove a cartilaginous hump. It is important to keep in
mind that inadequately resecting the cartilaginous hump in the face
of a bony hump can result in a polybeak deformity which if present,
may require a second operation to correct. If the dorsum is over-
resected, the patient could be left with an open roof deformity;
therefore, following reduction of a bony hump, osteotomies should
be employed to close the open roof. Often times, grafts may also
be needed to prevent formation of an inverted-v deformity. Dorsal
hump reduction is displayed in figure 2.

As mentioned previously, patients of Indian origin tend to have
an under-rotated nasal tip. There are several options for increasing
tip rotation. The tongue-in-groove (TIG) technique described by
Rethi, involves the cephalic advancement of the medial crura onto
the caudal septum [16]. This technique allows for increased tip
support and should this be the only tip modifying maneuver needed,
can also be done endonasally. Moreover, the tongue-in-groove
technique when done without other tip modifying maneuvers can
provide a reliable long-term result immediately post-operatively.
Other options to increase tip rotation include the use of a columellar
strut graft or a tip graft, both of which are viable methods. When a
graft is considered, it is important for the surgeon to keep in mind
the quality of the harvest site. Also, patients should be cautioned
that although rarely, grafts may shift and lead to a visible cosmetic
deformity. Tip rotation can also be achieved through cephalic trim
of the lower lateral cartilages as depicted in figure 3 or in-folding the
lower lateral cartilages and securing them with a suture, as shown
in figure 4. When improving tip rotation in this population, it is
important to keep in mind that the Indian nose is slightly under-
rotated. An overly rotated or up-turned nose can be displeasing
to patients of Indian descent as it is a departure from their typical
ethnic appearance.

Although the Indian nose is not typically defined as having
a bulbous tip, patients may request tip refinement which can
be achieved with all of the conventional options. Dome binding
sutures, dome division, as well as graft use can all be employed
to improve the appearance of the nasal tip. Although many of the
above mentioned options can be used for tip modification, a full
discussion of tip modifying procedures is out of the scope of this
paper as it does not directly pertain to this population is not unique
to this ethnicity.

Lastly, a wide alar base is a frequently noted trend in the Indian
nose, and therefore, alar base reduction is commonly employed.
When performing alar base reduction, it is important to keep in
mind that the rule of facial fifths may not apply, as evidenced by
the work of Surendra et al [1]. The nose, if narrowed to fit the
intercanthal distance, may result in an unnatural look. Therefore,
some surgeons may advocate leaving the alar base slightly wider
than the intercanthal distance to preserve a natural, ethnic
appearance [1].

Conclusions

As the population of Indian Americans desiring rhinoplasty
continues to grow, it is important for the aesthetic surgeon to be
aware of the anatomic variations present in this population. The
Indian nose, through anthropometric studies, has shown to have
a wider alar base, shorter height, and more acute nasolabial angle
in comparison to the Caucasian nose. When planning rhinoplasty
in this population, it is important for the surgeon to approach
the operation with both medical and cultural perspective so as
to understand the psychosocial implications of this procedure in
this ethnic group. A thorough understanding of these principles
will allow the surgeon to provide aesthetic refinement while
maintaining an ethnic appearance that ultimately allows for
increased patient satisfaction.
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