Study on Dimensions of Nasal Columella to Aid Aesthetic Rhinoplasty

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Abstract

Aims: Thorough knowledge of an Indian nose is vital for performing aesthetic Rhinoplasty. Hence the present study was taken up with the aim to determine dimensions of nasal columella and columellar index of Tamil ethnic group; and also to statistically analyse gender wise difference in findings

Settings and Design: The present cross-sectional study, approved by the Institutional Ethics Committee, was done on Tamil speaking medical students of Velammal Medical College, Madurai, Tamil Nadu.

Methods & Material: Of total 142 medical student population, 106 Tamil speaking medical students participated. Consenting Tamil speaking students were included. Individuals with noticeable facial disfigurement and with history of previous facial surgery were excluded.

Statistical Analysis used: Unpaired t test

Results: The present study reports mean values for nasal columella width, length and index as 6.63mm, 13.8mm, and 48.6 for males; 5.61mm, 13.53mm and 41.9 for females; and 6.84mm, 13.65mm and 45 for the whole group.

Conclusion: The present study infers that nasal columella width greater than 5.9 mm belongs to male, and lesser than 5.9 mm belongs to a female; and nasal columella index is greater than 48 in males, and lesser than 45 in females. Nasal columella length findings were inconclusive.

Keywords: Otolaryngology; Columellar Length; Columellar Width; Columellar Index; Aesthetic Rhinoplasty.

Introduction

For aesthetic rhinoplasty, nasal columella is a major component. The columella has anterior lobular portion, the intermediate (or narrower) portion, and the basal (or wider) portion. The columella, ala, and lobule have now been included as an aesthetic complex for evaluation; and their interrelation may affect any nasal tip surgery, a fact that should be considered while planning surgery in that region. Thorough knowledge of an Indian nose is vital for performing aesthetic Rhinoplasty. Hence the present study was taken up with the aim to determine dimensions of nasal columella and columellar index of Tamil ethnic group; and also to statistically analyse gender wise difference in findings.

Columella is oriented vertically and is primarily responsible for nostril length and nasal tip projection and determines nasal tip size, shape, and nostril configuration. Hence, it is important to understand that individual, racial and ethnic variations within the structural compo-nents of the nasal tip are bound to exist. In general, the nose can be described as being platyrrhine (African), mesorrhine (Asian), or leptorrhine (Caucasian). The African and Asian noses do share many common features and can be described as less projected with a shorter colu-mella. A common finding with bilat-eral cleft lip nose is underprojection and a short columella, wherein,

V-Y advancement technique incision allows the surgeon to ex-pose and augment the nasal tip structures by lengthening the columella [1,2].

Material & Method

The present cross-sectional study was conducted during the months of January to April 2017. The study was approved by Institutional Ethics Committee and was ethically conducted in accordance with Declaration of Helsinki. Written informed consent was taken from the participants before data collection. 106 (49 males and 57 females) Tamil speaking medical students, 19-21years of age, participated in the study. Consenting Tamil speaking students were included. Individuals with noticeable facial disfigurement and with history of previous facial surgery were excluded. Sample size was calculated using Sample Size Calculator presented as a public service of Creative Research Systems: Survey software, 'The Survey System'. Sample size was 106 (Confidence Level at 95%, and Confidence Interval of 5) of total 142 students (population).

Participants were positioned as described by Farkas *et al. [3]*. Columellar measurements were taken manually using *Sliding Vernier calliper*. The

Parameters assessed were, Columellar width (CW), Columellar length (CL), and Columellar index (CI). Columella Width was measured at the narrowest point at subnasale and Columellar Length was measured from sub nasale to nasal tip [4]. Columellar index (CI) was calculated using formula CI= CW / CL x 100. Statistical evaluation was done using *unpaired t test*. Statistical significance was determined at $p<0.05$.

Results

Columellar findings were tabulated in a Master-Chart. Statistical values namely, Mean, Standard Deviation (SD), Standard Error of Mean (SEM), and 95% Confidence interval ($CI._{95}$) of the difference in mean of male (m) and female (f) participants were estimated using unpaired t test. Intermediate values in calculation were t value, degrees of freedom (df), and standard error of difference (SED). Gender wise differences were significant at $p<0.05$ (*with unpaired t test*) in all measured parameters. Table1 indicates Statistical findings for columellar measurements in males, females and total participants and Table 2 indicates Statistical findings (*with unpaired t test*) on gender wise differences in analysed parameters.

Table 1: Statistical findings for columellar measurements

N=106		CW	CL	CI
Male Participants (n = 49)	Mean	6.63 mm	13.8 mm	48.6
	SD	0.73	1.79	6.23
	SEM	0.1	0.26	0.89
Female Participants (n = 57)	Mean	5.61 mm	13.53 mm	41.9
	SD	1.45	3.12	8.18
	SEM	0.19	0.41	1.08
All Participants (n = 106)	Mean	6.84 mm	13.65 mm	45
	SD	1.27	2.59	8.04
	SEM	0.12	0.25	0.78

CW-Columellar width, CL- Columellar length,
CI- Columellar index, SD-Standard Deviation,
SEM-Standard Error of Mean

Table 2: Statistical findings on gender wise differences in analysed parameters

	$CI._{95}$	t value	DF	SED	p value	Statistical Inference
CW	0.57 to 1.47	4.4607	104	0.228	Less than 0.0001	extremely significant
CL	0.73 to 1.27	0.5334	104	0.505	0.5949	Not Significant
CI	3.8 to 9.5	4.6729	104	1.431	Less than 0.0001	extremely significant

CW-Columellar width, CL- Columellar length, CI- Columellar index, M – Mean, SD - Standard Deviation, SEM - Standard Error of Mean, $CI._{95}$- 95% Confidence interval of the difference in mean of male (m) and female (f) participants, SED - Standard Error of Difference

Discussion

There haven't been studies of similar kind previously. Cho *et al.* reported columellar findings in infants which cannot be compared with the present study [5]. Farkas *et al.* and HeZ *et al.* reported smaller columella in Asians to that off Caucasians [6,7]. Poor development of medial and lateral crura could be the reason for short and narrow columella in Asian populations. Columella strut being one of the commonly performed procedures in Asian rhinoplasty justifies the aforementioned hypothesis [4].

Columellar morphology and orientation must be considered when deciding appropriate surgical pro-cedure for tip refinement and nostril shape augmentation. In rhino-plasty operation, aesthetics and function are objectives; and anatomy determines the op-erative technique. Changes in col-umella are performed to increase or decrease nasal tip projection. Col-umella can be viewed as the center pole of a tent, wherein, height alterations of the center pole results in an increase or decrease in nasal tip projection. Changes in projection, in turn affects nostril shape and ori-entation [8,9]. Nasal tip and the nostril shape are complex anatomical structures consisting of cartilaginous framework, skin and soft tissue. When preparing for rhinoplasty operations, it is important to con-sider ethnic and individual variations in the nasal tip, nostril shape, and internal structure. By categorizing nasal tip into its respec-tive subunits, the rhinoplasty surgeon can then formulate a systematic and pragmatic ap-proach to the nasal base, lateral wall, and colu-mella. Altering or augmenting one or all of these is bound to affect nasal tip, shape and orientation of the nostril [1,2].

In Rhinoplasty, post-operative complications result from nasal healing that causes changes in nasal morphology and function [9,10]. The surgeon should anticipate these healing forces and take into account support mechanisms of the nasal tip when planning an optimal approach for the surgery [11].

Conclusion

The present study infers that nasal columella width greater than 5.9 mm belongs to male, and lesser than 5.9 mm belongs to a female; and nasal columella index is greater than 48 in males, and lesser than 45 in females. Nasal columella length findings were inconclusive. The present study results will help surgeons avoid complications by anticipating healing forces and take into account support

mechanisms of the nasal tip when planning an optimal approach for aesthetic nasal surgeries. The authors of the present study believe that knowledge of columellar morphology of a particular gender, geographical area and ethnic group is important for the surgeon to plan an approach for aesthetic nasal surgeries.

Key message

Knowledge of Nasal Columellar morphology of a particular gender, geographical area and ethnic group is important for the surgeon to plan an approach for aesthetic nasal surgeries.

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