Introduction

The length of the nasal bones is an important consideration during rhinoplasty as patients with shorter nasal bones are more prone to collapse of the middle vault and inverted V deformity after osteotomies, especially if lateral osteotomies are being performed. Osteotomy of nasal bones also leads to narrowing of the pyriform aperture and consequently a decrease in the cross sectional area of the internal nasal valve area. Patients with narrower pyriform apertures are more prone to this consequence of rhinoplasty.

Since the dimensions of nasal pyramid are likely to be different in patients from different ethnic groups the surgeon may need to consider the patient’s ethnicity to factor in the impact of osteotomies on the form and function of nose during rhinoplasty.

Methods and Materials

The aim of this study was to determine whether the length of nasal bones and the width of the pyriform aperture differ between different ethnic groups in Singapore. Our null hypothesis was that there is no difference in these parameters between different ethnicities.

A total of 311 randomly selected patients (235 Chinese-86 female, 146 male; 32 Malay-16 female, 16 male; and 44 Indian-11 female, 33 male) with a mean age of 48.5 years were evaluated using computed tomography (CT). Measurements were made on sagittal cuts of the nasal bone and coronal cuts of the pyriform aperture.

Results

The average nasal bone length was 25.97 +/- 2.88 mm for Chinese, 24.53 +/- 1.81 mm for Malays and 23.43 +/- 3.27 mm for Indians. The average pyriform aperture width was 24.56 +/- 2.14 mm for Chinese, 24.05 +/- 2.17 mm for Malays and 22.67 +/- 2.17 mm for Indians. There was a statistically significant difference in nasal bone length (p<0.05, df = 2, Power = 0.80) and pyriform aperture width (p<0.05, df = 2, Power = 0.80) amongst the races, particularly between the Chinese and the Indians (2 way ANOVA test - nasal bone length: mean difference of 2.54, compared to 1.44 between Chinese and Malays and 1.11 between Malays and Indians; for pyriform aperture width: mean difference of 1.89, compared to 0.51 and 1.37 respectively).

There was a statistically significant difference (p < 0.05, 95% CI = -1.02 to -2.34, Power = 0.80) in nasal bone length between males (n = 196, mean = 26.09 +/- 2.93) and females (n = 115, mean = 24.4 +/- 2.81).

There was a statistically significant difference (p = 0.02, 95% CI = -1.13 to -0.98, Power = 0.80) in pyriform aperture width between males (n = 196, mean = 24.48 +/- 2.23) and females (n = 115, mean = 23.86 +/- 2.23).

Table 1. Nasal Pyramid Dimensions by Ethnicity and Gender.

<table>
<thead>
<tr>
<th></th>
<th>Chinese</th>
<th>Malay</th>
<th>Indian</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal bone length (mm)</td>
<td>25.97</td>
<td>24.53</td>
<td>23.43</td>
<td>26.09</td>
<td>24.40</td>
</tr>
<tr>
<td>Std deviation</td>
<td>+/- 2.88</td>
<td>+/- 1.81</td>
<td>+/- 3.27</td>
<td>+/- 2.93</td>
<td>+/- 2.81</td>
</tr>
<tr>
<td>Pyriform Aperture Width (mm)</td>
<td>24.56</td>
<td>24.05</td>
<td>22.67</td>
<td>24.48</td>
<td>23.86</td>
</tr>
<tr>
<td>Std Deviation</td>
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<td>+/- 2.23</td>
<td>+/- 2.23</td>
</tr>
</tbody>
</table>

Discussion

As Singapore is a multiracial society, successful rhinoplasty would require knowledge of the variations in anatomy amongst the different races. Compared to other populations, the Chinese (25.97mm), Malay (24.53mm) and Indian (23.43mm) populations in Singapore have longer nasal bones than the Koreans (20.95mm) and Africans (21.8mm) and shorter nasal bones than the Anatolian (29.81mm) and Austrian populations (30.2mm). The Anatolian (18.1mm), Austrian (22.6mm) and Indian (22.67mm) populations have narrower pyriform apertures compared to the Chinese (24.56mm), Malay (24.05mm) and Korean (24.01mm) populations, while the African (26.5mm) population has the widest pyriform aperture. Hwang et al proposed that this effect was due to the need for climate regulation.

In addition, the significantly increased nasal bone length and width and pyriform aperture width in males compared to females were similar to studies in other populations and should be taken into consideration during surgery.

Nasal bone thickness varies in the different regions of the nose and increases caudal-cranially and from lateral to medial. Osteotome selection should also take into account whether a lateral, medial or intermediate osteotomy is being performed, with the nasal bone being thickest along the lateral osteotomy track and thinnest along the intermediate osteotomy track.

Conclusions

In conclusion, ethnic and gender differences in nasal bone structure, in addition to differing nasal bone thickness along the various osteotomy tracks, should be considered during rhinoplasty. Pre-operative CT imaging can be considered for rhinoplasty and reconstructive surgeries.

References


Contact

Dr Charmain Zhao
Khoo Teck Puat Hospital, Singapore
charmain.zhao@mohh.com.sg