Secondary cleft rhinoplasty rejuvenates the nose: a suggestion from a panel survey

Niels Christian Pausch, MD, DMD, PhD, a Poramate Pitak-Arnnop, DDS, MSc, b,c Philipp Yorck Herzberg, PhD, d Kittipong Dhanuthai, DDS, MSc, e and Alexander Hemprich, MD, DMD, PhD, f Leipzig, Germany; and Bangkok, Thailand UNIVERSITY HOSPITAL OF LEIPZIG AND CHULALONGKORN UNIVERSITY

Background. Cleft-lip nasal deformity (CLND) affects the overall facial appearance and attractiveness. The CLND nose shares some features in part with the aging nose.

Objectives. This questionnaire survey examined: 1) the panel perceptions of the role of secondary cleft rhinoplasty in nasal rejuvenation; and 2) the influence of a medical background in cleft care, age and gender of the panel members on the estimated age of the CLND nose.

Study design. Using a cross-sectional study design, we enrolled a random sample of adult laypersons and health care providers. The predictor variables were secondary cleft rhinoplasty (before/after) and a medical background in cleft care (yes/no). The outcome variable was the estimated age of nose in photographs derived from 8 German nonsyndromic CLND patients. Other study variables included age, gender, and career of the assessors. Appropriate descriptive and univariate statistics were computed, and a P value of <.05 was considered to be statistically significant.

Results. The sample consisted of 507 lay volunteers and 51 medical experts (407 [72.9%] were female; mean age ± SD = 24.9 ± 8.2 y). The estimated age of the CLND noses was higher than their real age. The rhinoplasty decreased the estimated age to a statistically significant degree (P < .0001). A medical background, age, and gender of the participants were not individually associated with their votes (P > .05).

Conclusions. The results of this study suggest that CLND noses lack youthful appearance. Secondary cleft rhinoplasty rejuvenates the nose and makes it come close to the actual age of the patients. (Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;111:174-180)
“scroll” region makes the nasal tip droopy and elongated. Instability of the nasal-tip support contributes to alar collapse and nasal bulbosity, as well as nasal airflow changes. Pyriform remodeling and maxillary bone resorption narrow the nasolabial angle, shorten the columella, and accentuate a ptotic tip. The nose becomes more convex with advancing age because of downward rotation of the lobule and relative columellar retraction.1-8

Cleft-lip nose deformity (CLND) is composed of multiple features, including thin and philtral dimple of the upper lip, retracted columella, deformed nasal cartilaginous framework, a hanging nasal tip, and a convex nasal profile. The dorsal hump results from loss of nasal-tip projection and/or soft tissue retraction after the initial lip-nose repair.9-11 These characteristics are shared in part with those of the aging nose.

Nasolabial appearance is one of the most important measures of the successful outcomes for cleft treatments.12 Unlike Aristotle’s quotation above, the CLND characteristics are unique. It is not a variation, but can be a grotesque blemish. CLND is difficult to camouflage, and affects overall facial appearance and attractiveness. With visible facial impairment and low self-esteem, cleft patients may develop psychosocial maladjustment, speech difficulties, unrealistic perceptions of facial appearance, and physiognomic rejection.13-18

As a central and prominent landmark of the face, the nose is the focal point of the attention during social interaction, thus affecting the overall facial appearance.15,18-21 Extensive publications have concerned specific age-related changes to the nose and surgical refinements of aging-nose rhinoplasty.2-8 However, our literature search failed to identify any study addressing the role of secondary cleft rhinoplasty in nasal rejuvenation. We surveyed panel perceptions, because subjective patient reporting and evaluation by treating cleft specialists on treatment outcomes seem to be biased.13,14,18,22,25

The purpose of the present study was to answer the research question: “Did secondary cleft rhinoplasty rejuvenate the CLND noses?” We hypothesized that definitive cleft rhinoplasty that produces an esthetically pleasing appearance would rejuvenate the cleft nose in the eyes of panel members. The secondary aim was to determine the influence of a medical background in cleft care, age and gender of the observers on the estimated age of the CLND nose.

MATERIALS AND METHODS

Study design/sample

The study was designed as a cross-sectional study. We enrolled a random sample derived from the general public and health care providers in Leipzig and Dresden, Germany; all were German. The Institutional Ethics Committee approved the project (approval registration no. 221-2006). We surveyed the samples with the questionnaire and the CLND patients’ photographs administered in a randomized manner. The participants who were unknown to the data evaluators (P.P. and K.D.) did not know the patients and the treatments given. The primary author (N.C.P.) screened the subjects for study eligibility and initiated the consent process, including a review of the study rationale and protocol. We obtained informed consent from all of the participants and from all of the patients to use their photographs in this study. The recommendations of the Helsinki Declaration were thoroughly maintained during the study.

To be included in the sample, the subject was not involved in the treatments for the patients we used in this study. We enrolled a diverse heterogeneous study sample, so that the study results might be more generally applicable.26 There was no exclusion criterion for the study.

Variables and data collection

The same experienced assessment instructor chaired every rating procedure, which was not time limited. All instructions were standardized and read from a paper to ensure that similar information was given to the voters. The primary predictor variable was secondary cleft rhinoplasty. It was a binary variable: before/after. Photographs of 8 German patients were randomly selected from a pool of our nonsyndromic CLND patients for the study. Four were female, 3 of which had unilateral cleft and 1 bilateral clefts; and 4 were male, 2 of which had unilateral cleft and 2 bilateral clefts. The age of all patients ranged from 16 to 20 years, except 1 patient who was 48 years old (mean age ± SD = 21.5 ± 10.1 years).

All of the patients elected to undergo secondary cleft rhinoplasty via an open approach by the first author (N.C.P.) at the Department of Oral, Craniomaxillofacial, and Facial Plastic Surgery, University Hospital of Leipzig, from January 2002 to December 2007. They received the sequential treatments according to our functionally based Leipzig protocol for cleft patients, as described previously by Hemprich et al.27 To correct a retracted columella and an acute nasolabial angle, and improve tip projection, we used an L-shaped caudal septal extension graft of the nasal septal cartilage, as demonstrated by Toriumi2,28 and Byrd et al.29 coupled with the “lateral crural steal” technique: the lateral crura were advanced toward the medial crura and the columnellar graft.2,28,30

We used a sample of the patients’ photographs, because there is no difference between judgments on facial appearance made from live subjects (adult cleft patients) and those made from photographs.31,32
an audit of our cleft clinic, we took good-quality standardized photographs of 6 patients (3 males and 3 females) before surgery, and those of the other 2 patients (1 male and 1 female) before surgery and 6 months after secondary cleft surgery. All photographs were black and white and displayed only frontal and lateral views of the nasolabial area to minimize the influence of the surrounding facial features, lighting, color, and contrast on the assessment. In total, we used 20 photographs of 8 patients in this study (Figs. 1 and 2). To prepare the photographs, we followed the method recommended by Galdino et al. The secondary predictor variable was a medical background in cleft care. It was recorded as a binary variable: yes/no. The photographs were judged separately by the laypersons and health care professionals. The former were persons without a cleft care background and who had no previous experience or exposure to cleft patients. The latter included maxillofacial surgeons, oral surgeons, otolaryngologists, and orthodontists; all confirmed that they had regular contact with cleft patients.

The outcome variable was the estimated age of the nose in the patients’ photographs, as evaluated by the laypersons and health care providers. The independent assessors were asked to judge only the nose appearance and to ignore the surrounding facial features. The estimated age of each nose was stratified into 4 groups: 1) ≤20 years; 2) 21-30 years; 3) 31-40 years; and 4) >40 years old. The observers were also asked to vote for the most attractive female and male noses. The estimated age judged by the panel was compared with the actual age of the patients.

Other study variables were demographic variables: age, gender, and career of the panel members.

**Data analyses**

Data analyses were conducted using SPSS version 10.0 (SPSS, Chicago, IL). Spearman rank correlation tests were performed to determine interexaminer reliability. Descriptive and univariate statistics were computed as indicated. A P value of <.05 was considered to be statistically significant.

**RESULTS**

We enrolled 558 subjects, 407 of which were female (72.9%). They consisted of 507 laypersons (90.9%) and 51 medical experts (9.1%) with a mean age of 24.9 ± 8.2 years. The laypersons included 5 athletes (1.0%), 15 businessmen (3.0%), 9 cooks (1.8%), 18 craftsmen (3.6%), 4 engineers (0.8%), 132 ergonomists (26.0%), 64 hairdressers (12.6%), 5 painters (1.0%), 31 nurses (6.1%), 44 speech therapists (8.7%), 64 other paramedics (12.6%), 69 students (13.6%), 7 teachers (1.4%), 10 unemployed (2%), and 30 others (5.9%). The medical personnel were 15 maxillofacial surgeons (29.4%), 12 oral surgeons (23.5%), 16 otolaryngologists (31.4%), and 8 orthodontists (15.7%). Table I summarizes sample characteristics.
Comparison of rating age of the noses among different raters revealed a high degree of interobserver agreement both within and between the 2 groups of participants ($P < .0001$). Although the medical professionals gave slightly more accurate estimated age than the lay volunteers, there was no statistically significant difference on the votes between the 2 groups ($P > .05$). Age and gender of the raters did not individually affect the estimated age to a statistically significant degree ($P > .05$).

The ratings of average age of preoperative female noses were higher than the actual age, except photograph A whose patient was older than the other patients (Fig. 1). Photograph D is the postrhinoplasty image of photograph C. The estimated age of photograph D was 10 years lower than that of photograph C ($P < .0001$; Fig. 3). Most of the raters (82.6%) voted photograph D as the most attractive female nose.

In the male group also, the preoperative noses were judged to be the aging nose. Photograph B is the postrhinoplasty image of photograph C (Fig. 2). The estimated age of photograph B was 10 years lower than that of photograph C ($P < .0001$; Fig. 4). Photograph B was voted as the most attractive male nose by 68.3% of the evaluators.

Complete data are not shown and are available upon request.

**DISCUSSION**

The primary purpose of this study was to determine public perceptions of nasal rejuvenation after secondary cleft rhinoplasty. Our hypothesis was that definitive cleft rhinoplasty would rejuvenate the cleft nose in the panel eyes. To test the hypothesis, the investigators surveyed 507 nonmedical laypersons and 51 health care providers with observer-based scales using the photographs of 8 nonsyndromic CLND patients. We also analyzed the relationship between the estimated age of the cleft nose and 3 variables of the assessors: a background in cleft care, age, and gender.

The results of this study suggest that CLND makes the patient’s nose look older than its actual age. A secondary cleft rhinoplasty rejuvenates the cleft nose ($P < .0001$). A medical background, age, and gender were not individually associated with perceptions of the independent observers ($P > .05$).

In the realm of cleft patient care, nasal esthetics has been of interest and the focus of considerable research. However, esthetic outcomes after secondary cleft rhinoplasty remain understudied. Rhinoplasties of the late CLND nose and the aging nose share several common goals: 1) to perform tip derotation and refinement; 2) to

---

**Table 1. Sample characteristics**

<table>
<thead>
<tr>
<th>Study variables</th>
<th>Laypersons</th>
<th>Medical professionals</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>307</td>
<td>51</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Age (y, mean ± SD)</td>
<td>23.9 ± 7.6</td>
<td>34.9 ± 7.2</td>
<td>&lt;.0001*</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>124 (24.5%)</td>
<td>27 (52.9%)</td>
<td>&lt;.0001*</td>
</tr>
</tbody>
</table>

*a*Analysis of variance.

*b*Chi-squared test.
increase tip projection and columellar lengthening; 3) to decrease the overall nasal length and dorsal hump; 
4) to stabilize and support the internal nasal valves; and 
5) to correct septal deviation and inferior turbinate hypertrophy if present. Although many authors have 
demonstrated the specific age-related changes to the nose and the aging-nose rhinoplasty, little work has 
been done toward bridging nasal rejuvenation after aging and cleft rhinoplasties. Most publications are 
technical notes and/or narrative reviews, and no outcome research has been available up to now.

In the lateral view, there are some differences of the esthetically pleasing features of the nose between 
genders. In men, the desirable relationship between the nasal tip and the dorsal nasal line arises from the 
projection of the rhinion or “keystone” area: the junction of the nasal bones and the upper lateral cartilages, 
above the dorsal line as the same level as the nasal tip. Conversely, the supratip and radix are below this dorsal 
line in both genders. Special attention should be paid to 3 measurements of the nasal rotation: 1) the tip angle 
between the vertical facial plane and the tip-defining point (about 100° in men, and 105° in women); 2) the 
nasolabial angle that is formed by the columella and the upper lip (90°-95° in men; 95°-110° in women); and 
3) the columella-tip angle or the columellar-lobular angle (about 37° in men, and 47° in women). An 
investigation on anthropometric changes after secondary cleft rhinoplasty is under way in our institution.

As mentioned earlier, cleft patients with visible facial impairment and low self-esteem are prone to problems 
with body image and social adjustment. One
goal of cleft surgeries is to eliminate all visible defects of the face and thereby prevent psychosocial problems. Surprisingly, a recent survey in France revealed that cleft patients, albeit completely treated, had a delay in education and marriage. They also received lower income, had a lower chance of employment, and became more dependent on their families compared with non-cleft individuals. This lower socioeconomic status in oral cleft patients is in agreement with the findings of other studies. For details about psychologic aspects of oral clefting, please refer to Turner et al. It remains unknown whether and how nasal esthetics affects the overall quality of life (QoL) of the cleft patients. This is an essential issue for future research using validated QoL instruments, which can be either condition specific or more global.

A standardized method of assessment for the cleft deformity and the treatment outcomes is important. However, much controversy remains regarding systematic, valid, and reliable methods for evaluating the outcomes after facial cosmetic procedures including rhinoplasty. Subjective patient reporting and objective evaluation by the treating cleft specialists of treatment outcomes seem to be unreliable. Kosowski et al. suggest that a well developed patient-reported outcome measure would be helpful in valid assessment of an individual patient for the entire treatment, surgeon-patient communication, comparison of surgical techniques, qualification of positive results, and identification of an appropriate candidate for the surgery. Moreover, a valid patient-reported outcome measure would provide research data, a follow-up standard, and a reference point for clinical research, regulatory efforts (such as those of health care authorities), and effective studies.

Rhee and McMullin recommend that, if possible, investigators first use existing instruments before creating a new measure, which is a laborious task and often takes time to develop. However, to the best of our knowledge, there has been no study addressing nasal rejuvenation after secondary cleft rhinoplasty until now. Therefore, we had to use the novel measure, although it is a traditionally simplistic ad hoc questionnaire. Notably, the selection of the appropriate instrument depends on the research question to be answered.

It is generally accepted that clinicians who are familiar with cleft care will better discriminate the degree of CLND impairment, resulting in possible bias in an outcome assessment. However, we did not find a difference between the familiar and nonfamiliar judgments. This finding is in agreement with other authors. A possible explanation for this is that in the photographs, we depicted the nasolabial area only, so the ratings were not influenced by the surrounding facial features. However, cropping only the midface makes the presenting features differ greatly from the whole face in real life and social interaction.

There are several limitations of this study. First, the statistically significant differences in the sample characteristics (age and gender) may skew our results, reflecting only a catchment area of the subjects. There are different judgments on nasal esthetics between genders and between different sexual orientations. It is also difficult to compare the current panel outcomes with previously published data because of the different panel compositions and the methods used. However, a large number of samples seem to have increased external validity of this study compared with other studies, which usually included <20 assessors. Second, it is not known whether the patients’ photographs we used are representative of the cleft patient population. The generalizability of our findings requires further investigations. Third, the 2-dimensional static imaging technique that we used, though simple, cheap, valid, reproducible, and noninvasive, has a major drawback: distortion error due to the translation of an object from 3 into 2 dimensions. Lighting, head orientation and subject-camera distance can affect the measurements.

To cope with these known shortcomings, we used the standardized photographing method, as described by Galdino et al. The interviewer’s experience and enthusiasm may also affect the responses. Finally, because we used the only-time response, this precludes the test-retest analysis of the questionnaire.

CONCLUSION

Although it is not the main purpose of secondary cleft rhinoplasty, the present findings suggest that this intervention rejuvenates the CLND nose, which usually loses a youthful appearance. Future studies are required to investigate patient self-reporting, public perceptions of nasal esthetics, and anthropometric changes after the definitive rhinoplasty. Long-term QoL of the postrhinoplasty cleft patients also deserves further investigations.

The authors thank Ms. Evelyn Kuhnt, Coordination Center for Clinical Trials, Faculty of Medicine, University Hospital of Leipzig, for her help with statistic analyses.

The authors indicate full freedom of investigation and no potential conflicts of interest. There was no grant support for this study.

REFERENCES

45. Pausch et al. February 2011
46. Reprint requests: Dr. Poramut Pitak-Arnnop Klinik und Poliklinik für Mund-, Kiefer- und Plastische Gesichtschirurgie Universitätsklinikum Leipzig AoR Nürnberger Str. 57 04103 Leipzig Germany poramut.pitakarnnop@gmail.com