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Secondary cleft nose rhinoplasty: Subjective and objective outcome evaluation



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ABSTRACT

Introduction: Secondary rhinoplasty in cleft lip and palate (CLP) is commonly the last step in a set of surgical procedures that result in a variable but typically intensive change in facial appearance. However, there is evidence that the sentiment about the aesthetic and functional outcomes between patients and surgeons is different. The present study aimed to evaluate the subjective and objective outcomes of secondary rhinoplasty in patients with CLP.

Material and methods: Secondary rhinoplasty was performed in 10 patients with repaired unilateral CLP via a standardized open approach. For the subjective evaluation, the patients completed the rhinoplasty outcome evaluation (ROE) questionnaire. Pre- and postoperative photographic documentation served as the basis for the objective evaluation, which included the following: (1) assessment by five specialists at craniofacial malformation consultation appointments and by three doctors in continuing education using the Asher-McDade aesthetic index (AMAI) rating, and (2) metric facial analysis to determine the nasofrontal angle and the nasolabial angle.

Results: Patient satisfaction was high, based on the evaluation of the ROE questionnaire. The analysis of the AMAI rating questionnaire showed no significant differences between the positive ratings of the 'experienced' and 'inexperienced' doctors. In contrast, there was an obvious and significant difference between the 'preoperative' and 'postoperative' time points for questions 1–3. The metric analysis showed statistically significant improvements of the nasolabial angle and the nasofrontal angle. The subjective and objective outcome evaluations were descriptively congruent.

Conclusions: The data suggest that standardized secondary rhinoplasty in CLP leads to both a subjective and a statistically significant objective improvement of facial appearance and thus may support the psychosocial rehabilitation of affected patients. Furthermore, our results showed that the subjective and objective outcome evaluations of secondary rhinoplasty were largely compatible.

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1. Introduction

Cleft lip and palate (CLP) represents the most common malformation of the midfacial region worldwide (Dixon et al., 2011). The treatment concept for CLP requires multidisciplinary care and results in a more or less intensive disturbance of the facial appearance, which may lead to particular psychosocial stress in affected

individuals. Indeed, psychosocial stress is known as one of the most important risks of physical and mental health hazards in the 21st century (Gee and Payne-Sturges, 2004). The psychosocial functioning of children and young adults with orofacial clefts may be affected, resulting in behavioural problems, depression, and unhappiness with their facial appearance and speech (Hunt et al., 2006). More precisely, dissatisfaction with facial appearance can be localized to the upper lip, the nose and nasal breathing. In a recent comparison of visual face assessments between patients with CLP and a control group, it was found that for patients with CLP there were more initial fixations on the mouth and longer fixations on the mouth and nose regions; in addition, CLP faces

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were rated more negatively overall (Meyer-Marcotty et al., 2010). It is noteworthy, however, that further investigation into psychosocial adjustment difficulties in adolescents with orofacial clefts revealed greater self-satisfaction with several aspects of facial appearance (such as teeth, eyes, ears, hair, and chin) compared with adolescents without facial disfigurement. However, there was dissatisfaction with lip and nose appearance compared with the control group (Berger and Dalton, 2009). These findings illustrate the importance of facial aesthetics (that is the appearance of the nose and the lips) for the psychosocial status of patients with CLP.

The nose is located in the centre of the face and plays an essential role in the aesthetic assessment. Nasal deformities, and in particular a cleft nose deformity, not only lead to functional disturbances but also result in psychosocial adjustment difficulties. The unilateral cleft nose is mainly characterized by asymmetry of the nasal tip, deviation of the nasal dorsum, malposition of the lower lateral cartilage and hypoplasia on the cleft side, and septal deviation away from the cleft side. The correction of these complex anomalies by secondary rhinoplasty is one of the most challenging procedures in facial plastic surgery, and the surgeon has to achieve the best possible aesthetic and functional result for the patient. The disruption of the upper lip, the alveolar process of the maxilla, and the hard and soft palates cause deformation of the bony and cartilaginous structures during the period of growth. Because the soft tissue follows the underlying structures, the newly formed nasal structures must maintain tension within the tissue. Thus, the applied implants or transplants need to fulfil specific requirements. For example, columellar struts must offer high axial and transversal stability against the soft tissue tension towards the columella and the cleft side nasal base (Byrd et al., 2007). Furthermore, no resorption or rejection of the transplants must occur. The application of cartilaginous transplants from the rib is generally accepted in cleft nose surgery (Chummun et al., 2013; Hafezi et al., 2013; Cao et al., 2014).

Unfortunately, up to this point in time, the majority of publications concerning this issue describe the surgeon's point of view only. However, the surgeon's assessment of facial aesthetics after cleft surgery seems to be of minor relevance and thus emphasizes the role of the social support of affected individuals (Cochrane and Slade, 1999; Springer et al., 2008, 2009; Gkantidis et al., 2013; Reddy et al., 2013). Thus, the primary objective of secondary rhinoplasty should be the highest patient satisfaction. Therefore, the present study aimed to evaluate the objective and subjective assessments of treatment outcomes of standardized secondary cleft rhinoplasty.

Based on the above-mentioned findings, we hypothesize that:

1. Metric analysis of pre- and postoperative photographs will reveal improvements of the characteristic facial angles;
2. Patients with CLP will show a high degree of satisfaction with secondary rhinoplasty; and
3. The objective treatment outcome of secondary rhinoplasty assessed by interdisciplinary professionals will show an improvement of nasolabial appearance.

2. Material and methods

2.1. Study participants

Ten patients with a repaired complete, unilateral non-syndromic CLP (median age 21 years, interquartile range (IQR) 2.75) were recruited from craniofacial malformation consultation appointments with the Department of Cranio-Maxillofacial Surgery at the University Hospital of Schleswig-Holstein, Kiel Campus, Kiel,

Germany. The age range was 17–24 years, and six men and four women were included (see Table 1). Patients were informed about the course of the procedure and provided their written consent according to the Helsinki convention before examination began. The study design was approved by the local ethics board (AZ: D 500/14).

2.1.1. Preoperative management

Preoperative planning included a careful medical history with a particular focus on preliminary surgery, accidents, allergy, and nasal breathing disabilities. The clinical examination determined the extent of septal deviation and turbinate bone hyperplasia. During the exploration of the outer nose, a particular focus was placed on the nasal projection, the tip of the nose, discrepancies, the skin quality, and the position of the alar bases. The pre- and postoperative photographic documentation was used as the basis for the objective description of changes in the characteristic facial angles and for the objective assessment of nasolabial appearance by experienced colleagues of the interdisciplinary consultation team and inexperienced colleagues using the Asher-McDade aesthetic index (AMAI) rating. For each patient, four photographs were taken (full face frontal view, submental oblique view, right profile view, and left profile view) (Fig. 1). All pictures were taken with a Nikon D200 full-frame imaging sensor (Nikon, Chiyoda, Tokyo, Japan) and a Nikon portrait lens with a focal distance of 60 mm and a lens aperture f20 with manual focus. The exposure time with external lighting was 1/200 s. Each photograph was modified for further assessments (Figs. 2 and 3). Due to the complexity of the intranasal pathology in cases of cleft nose deformity, a computed tomography (CT) scan in axial and coronal stratification was performed for each patient.

2.2. Rhinoplasty

Secondary rhinoplasty was performed via an open, inverted V approach; osteotomies, septoplasty, domal repositioning, and columellar strut formation from rib cartilage were performed routinely. The operation procedure was divided into two steps. First, ventilation problems were corrected by nasal septum correction and turbino-plasty. Second, correction of the external nose was achieved by osteotomy of the nasal bone, positioning of the columellar strut, and repositioning of the lower lateral cartilages and nasal tip. At the end of the operation, the result was stabilized using septal splints, nasal tamponades, and a cast. Post-operatively, adequate pain medication (eg, ibuprofen 600 mg on demand), antibiotic prophylaxis (eg, Sultamicillin 375 mg tablets, 3 times a day for 1 week), and cooling (eg, Hilotherm, Argenbühl-Eisenharz, Germany) were considered. The nasal tamponades were typically removed 2 days after the operation, the nasal cast was removed after 1 week, and the septum splints were removed after 2 weeks. All procedures were performed by the first author only.

Table 1
Demographic characteristics of the cleft lip and palate (CLP) group ($n = 10$).

| | |
|-------------|---------|
| Age (years) | |
| Median | 21 |
| IQR | 2.75 |
| Range | 17–24 |
| Sex | |
| Female | 4 (40%) |
| Male | 6 (60%) |

IQR: interquartile range.

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