Cleft Septorhinoplasty
Form and Function

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KEYWORDS

• Cleft lip nasal deformity • Cleft lip rhinoplasty • Presurgical infant orthopedics
• Nasoalveolar molding • Primary cleft lip rhinoplasty • Secondary revision rhinoplasty

KEY POINTS

- Considered by many rhinoplasty surgeons to be the most difficult to master, cleft lip septorhinoplasty is a challenge requiring understanding of the primary deformity and lip/nose repairs in infancy.
- Surgical planning to address the typical characteristics incorporate the typical grafting and suture techniques used in noncleft rhinoplasty, but adept use of cleft-specific techniques is required (alar hooding, alar base asymmetry, columellar shortening, deficiency in the piriform/premaxilla, and nostril shape).
- Skeletal disproportion from the cleft deformity plays a major role in the nasal deformity. Ideally the bony deficit is treated with appropriately timed alveolar cleft and premaxillary bone grafting.
- Septal or rib cartilage grafts should be used to create a stable caudal septal projection. The lower lateral cartilages are then set into position to the rotation and projection of choice using a tongue-in-groove technique.
- Thick-skinned nasal tips require conservative soft tissue debulking or soft tissue envelope thinning to improve tip contour and definition.

INTRODUCTION

Cleft lip and/or palate formation is the most common congenital craniofacial abnormality, constituting 1 in 500 to 1000 live births.[1] Some variability in ethnicity has been noted, with higher incidence in Native Americans and Asian populations,[2] and lower incidence in African Americans and Africans.[3] Orofacial clefting seems to be multifactorial, associated with genetics and environmental factors.[4]

The nasal deformity associated with typical cleft lip can result in significant aesthetic and functional issues that can be difficult to address. The nasal deformity has classic descriptions for the unilateral (**Box 1**) and bilateral (**Box 2**) cleft lip, but the nasal findings occur with significant variability along a spectrum of severity. The nose's central position has an important role in facial aesthetics and the perception of normal facial features.[5] In cleft nasal deformity the distortion of the nose can range from minimal to severe,[6] emphasizing the importance of a patient-centered approach to repair. In order to maximize function and appearance through cleft septorhinoplasty, it is crucial to understand the embryologic origin of clefting and the anatomic structure in nasal cleft deformity.

This article reviews cleft lip nasal deformity, presurgical care, primary cleft rhinoplasty, and

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Box 1
Characteristics of unilateral cleft lip nasal deformity

- Grossly asymmetric
- Nose has longer appearance on cleft side
- Retrodisplaced cleft-side dome
- Base of columella deviated toward noncleft side
- Nostril is wider and retrodisplaced on cleft side
- Nostril margin on cleft side buckles inward because of bowing by internal vestibular web
- Deficient maxilla on cleft side (often absent nasal floor affecting piriform aperture)
- Posterolaterally displaced alar base and piriform margin on cleft side
- Anterolaterally displaced anterior nasal spine
- Deviated premaxilla, columella, and caudal septum toward noncleft side
- Posterolaterally displaced cleft-side dome of lower lateral cartilage (LLC)
- Increased angle between medial and lateral crura on cleft side
- Short medial crus on cleft side
- Long lateral crus on cleft side
- Upper lateral cartilage and LLC on cleft side are side by side rather than normal overlap

Adapted from Cuzalina A, Jung C. Rhinoplasty for the cleft lip and palate patient. Oral Maxillofac Surg Clin North Am 2016;28(2):189–202.

Box 2
Characteristics of bilateral cleft lip nasal deformity

- Grossly symmetric
- Wide nose with broad and depressed tip
- Short columella
- Wide nostrils with inward collapsing margins
- Flared alae with bilateral vestibular webbing
- Posterolaterally displaced alar domes
- Increased angles of divergence between the medial and lateral crura
- Shortened medial crura
- Longer lateral crura
- Protrusive premaxilla
- Hypoplastic maxilla bilaterally
- Anterior nasal spine and caudal septum are inferiorly displaced relative to the alar bases
- Deficient or absent bony nasal floor

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definitive cleft septorhinoplasty, with a focus on restoring symmetry and contour to the shape, and maintaining or improving function.

EMBRYOLOGY

During embryologic development, the upper lip formation begins at approximately 4 weeks of gestation with completion at 3 to 4 months of gestation.[7] Most facial skeleton and connective tissue is developed from a pluripotent population of cells and cranial neural crest (CNC) cells that show remarkable migratory abilities as well as ability for development into diverse cell types.[8] Migration of the CNC cells into the frontonasal prominence facilitates the formation of the forehead, nasal dorsum, median and lateral nasal prominences, premaxilla, and the philtrum.[9] This highly regulated process starts with paired bilateral maxillary prominences, derived from the first branchial arches, merging toward the midline to form the lateral aspect of the upper lip. Later in the development, as the CNC continues to migrate into the maxillary prominences, the medial and lateral nasal prominence join the premaxillary segment to form the nares, nasal tip, and philtral column (**Fig. 1**).

This coordinated process involves a multitude of transcription factors, and regulation of growth signals. Disruption of the transcriptional or growth factor signals in development results in malformations of the upper lip, central alveolus, and/or the primary palate,[8] including clefting of the lip and palate. Extent of cleft nasal deformity is associated with extent of interruption of the normal development, with a spectrum of varying severity of lip and associated nasal deformities. However, even when subtle, nasal deformities are always associated with cleft lips.[10]

ANATOMIC DEFORMITY

Nasal deformity associated with unilateral and bilateral cleft have been well documented. Understanding the consistent skeletal and muscular dysmorphism and asymmetry is essential in providing the most cosmetic and functional repair.

Unilateral Cleft Lip Nasal Deformity and Dysfunction

In unilateral cleft lip nasal deformity, there are several well-described characteristics (see

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