



# Unilateral cleft lip repair



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## KEYWORDS

Cleft lip;  
 Unilateral;  
 Congenital;  
 Repair

In the United States, cleft lip occurs in approximately 1 child of every 1,000 live births. Cleft lip can be complete or incomplete. Complete cleft lip involves the entire vertical length of the lip and incomplete cleft lip can be any fraction of the length. Classification of cleft lip also entails defining unilateral or bilateral involvement. Repair is directed based on the type of lip deformity. The focus of this article is on the repair of unilateral cleft lip repair.

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## Background

Cleft lip is a congenital deformity caused by failure of fusion of embryologic structures and can occur in conjunction with cleft palate or in isolation. Most commonly, cleft lip is associated with cleft palate.<sup>1</sup> There have been many potential etiologic factors identified for cleft lip. This deformity can occur as part of a sequence or be a result of a genetic abnormality associated with a syndrome. More than 200 syndromes have been identified to have cleft lip as a component.<sup>2</sup> Additionally, environmental factors can play a role in the development of cleft lip. Maternal smoking has been linked with many congenital anomalies including cleft lip.<sup>3</sup> Prenatal nutrition also plays a role in many congenital birth defects, and nutritional supplementation is important in prevention of cleft lip.<sup>4</sup> In the United States, the prevalence of cleft lip is approximately 1 in 1,000 live births. Overall, the prevalence is higher in boys. Native Americans and Asians are most commonly afflicted, and it occurs with least frequently in blacks.<sup>1,2</sup>

## Anatomy and embryology

At the fourth week of gestation, the orofacial region of a developing embryo becomes recognizable. There are 5 facial prominences that develop from neural crest cells around the primitive mouth, the paired maxillary and mandibular prominences and a median frontonasal prominence. The nasal placodes develop lateral to the frontonasal placodes and develop ridges that become the medial and lateral nasal prominences. The medial nasal prominences develop into the nasal tip, nasal septum, central portion of the upper lip, and the primary palate. Fusion of the medial nasal prominences with the maxillary prominences in the fifth to seventh weeks of development completes the upper lip. The lateral nasal prominences fuse to form the lateral nasal walls.<sup>5,6</sup> Unilateral cleft lip is a result of failure of fusion of the medial nasal prominence to the maxillary prominence of the same side. Bilateral cleft lip results from failure of fusion on both sides of the medial nasal prominence to the maxillary prominence<sup>7</sup> (Figure 1).

An understanding of normal lip anatomy is essential to institute an esthetically appropriate repair. The normal lip contour is defined by a central dimple known as the philtrum; 2 philtral columns that flank the philtrum and a cutaneous white roll at the cutaneous-vermillion junction that runs from commissure to commissure (Figure 2). The underlying

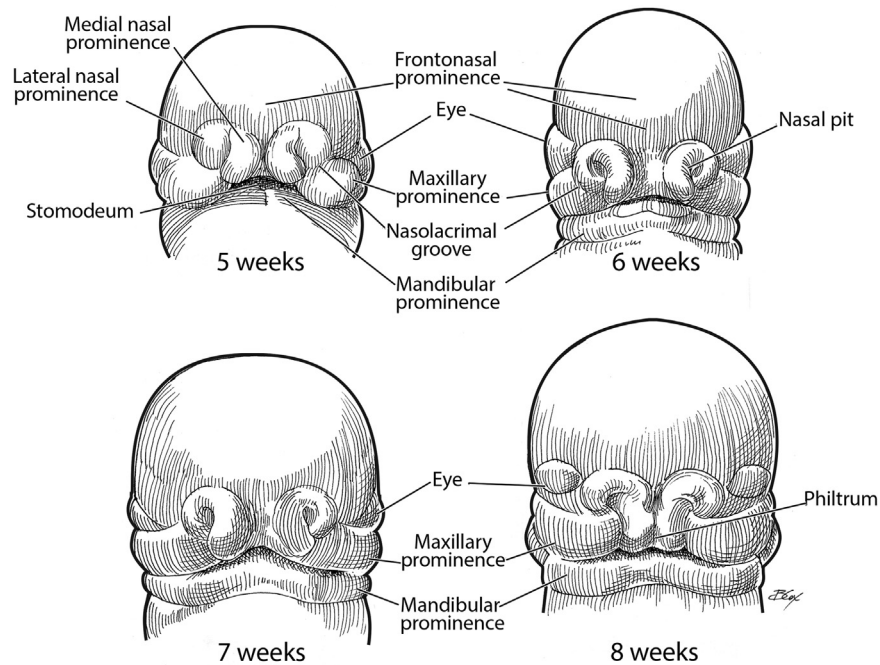
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<http://dx.doi.org/10.1016/j.otot.2015.06.003>

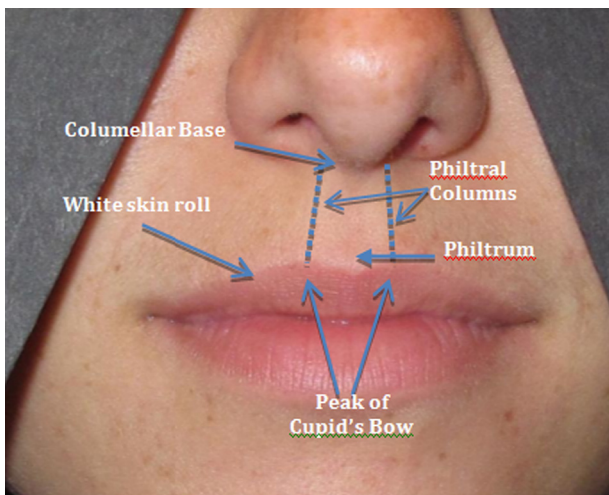
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**Figure 1** Schematic representation of the fusion of the medial nasal prominences with the maxillary prominences to develop a complete lip.

orbicularis oris, consisting of a pars superficialis and pars marginalis, is responsible for creating the normal lip contour.

In patients with a unilateral cleft lip, the orientation of the pars superficialis, which inserts into the skin to form the philtral column, is disrupted on the cleft side. The muscle in the lateral lip element is vertically oriented and attaches to the periosteum of the maxilla along the pyriform aperture as well as the base of the nasal ala. On the noncleft side, the muscle is not disoriented, but its unopposed action may contribute to nasal deformity.<sup>6</sup> Additionally, the pars marginalis is hypoplastic along the cutaneous vermilion junction, resulting in a deficient white skin roll along the cleft. The vermilion of the medial side of the cleft lip often has a decreased volume.<sup>8</sup>



**Figure 2** A photograph of a normal upper lip and key anatomical structures. (Color version of figure is available online.)

Because normal development of the upper lip happens in conjunction with nasal development, nasal deformities are associated with unilateral cleft lip. In a normal nose, the septum and columella lay midline with balanced ala and adequate nasal passages. In a unilateral cleft lip, the nasal ala is laterally displaced and flattened and the lower lateral cartilage is deformed relative to the normal side. Additionally, there is deviation of the caudal septum and columella to the noncleft side. The posterior septum tends to be deviated to the cleft side.<sup>9</sup>

## Goals of repair

The primary goal of cleft lip surgery is to create a lip with form and function as near normal as possible. This means providing oral competence and establishing normal lip contour and balance as well as nasal appearance. An esthetically repaired lip establishes a Cupid's bow contour to the upper lip with well-disguised scars. Additionally, growth-related changes are kept in mind, preventing a long overhanging lip.<sup>10</sup>

## Surgical options for unilateral cleft lip repair

There are various accepted methods of cleft lip repair. The techniques used vary widely based on surgeon preference and training. The rotation-advancement technique popularized by Millard remains one of the most commonly used surgical repairs today. This method involves rotating the medial cleft lip margin inferiorly to reestablish the Cupid's bow contour. The resulting defect is triangular at the upper

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