# Cleft Lip and Palate Surgery: An Update of Clinical Outcomes for Primary Repair

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• Cleft lip • Cleft palate • Nasal repair • Palatoplasty

The comprehensive management of cleft lip and palate has received significant attention in the surgical literature over the last half century. It is the most common congenital facial malformation in the United States and has a significant developmental, physical, and psychological impact on those with the deformity and their families. In the United States, current estimates place the prevalence of cleft lip and palate or isolated cleft lip at 16.86 per 10,000 live births (approximately 1 in 600).[1] There is significant phenotypic variation in the specific presentation of facial clefts. Care of children and adolescents with orofacial clefts needs an organized team approach to provide optimal results.[2–4] Specialists from multiple areas are needed for successful management from infancy through adolescence. These include oral and maxillofacial surgery, otolaryngology, plastic surgery, genetics and dysmorphology, speech-language pathology, social work, psychology, orthodontics, pediatric dentistry, prosthodontics, audiology, and nursing.[4] The specific goals of surgical care for children born with cleft lip and palate include:

- Normalized esthetic appearance of the lip and nose
- Intact primary and secondary palate
- Normalized speech, language, and hearing
- Nasal airway patency
- Class I occlusion with normal masticatory function
- Good dental and periodontal health
- Normal psychosocial development

These goals are best achieved when surgeons with extensive training and experience in all phases of care are actively involved in the planning and treatment.[5–7] Surgical treatment must be based on the best available clinical research to avoid unfruitful, biased treatment schemes and optimize outcomes. Ideally, randomized prospective controlled trials with comparative data and appropriate outcome measures would guide one's decisions. Outcome studies pertaining to the multiple outcome measures, such as facial appearance, facial growth, occlusion, patient satisfaction, and psychosocial development, are essential. Unfortunately, this level of published

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evidence is lacking for this patient population.[8] The cleft population as a whole is heterogeneous, making it difficult to standardize groups of patients and to provide valid comparison and outcome data. Individual clefts of the lip or palate are as unique, as are the patients with the deformity. Patients have complete or incomplete clefts that may be isolated to the lip or palate only, can be unilateral or bilateral, wide or narrow, and found in syndromic or nonsyndromic individuals, to mention the most obvious variations. Infants with clefting can present with cardiac, neurologic, renal, and other developmental deficits that can delay treatment and affect outcome, further complicating this patient population. The heterogeneity of the population, the difficulty in coordinating and compiling multi-center data, and the final results of surgical intervention not being seen for approximately 2 decades make high-level outcome research with long-term, reliable results difficult. Few studies currently stand up to the rigorous criteria of level I evidence. The vast majority of publications deal with single-surgeon experience, retrospective cohort studies, and case series. A lack of comparison or control groups in these studies provides little for evidence-based decision making. However, considerable experience can be used to guide some of one's decisions. Thus, dogmatic claims about the best therapies across large populations of patients are often inappropriate, given the lack of valid data. This article provides an update on current primary cleft lip and palate outcome data and its implications in our treatment decisions.

## CLEFT LIP REPAIR

Cleft lip and palate is a complicated and 3-dimensional malformation. Distortion of the skin, musculature, mucous membranes, underlying skeletal structures (bones and cartilage), and dentition occurs with varying severity. The goals of unilateral cleft lip repair include the creation of an intact upper lip with appropriate vertical length and symmetry, repair of the underlying muscular structures producing normal function, and primary treatment of the associated nasal deformity (**Fig. 1**). Original lip reconstruction techniques consisted of simple straight-line closures. In the mid-1800s, the first reports of lip repair that diverged from previous simple closures were published by Malgaine[9] and Mirault.[10] The Tennison[11] technique with use of a triangular flap to vertically reposition cupids bow was presented in 1952. Millard[12] changed cleft lip surgery when he published the rotation-advancement flap technique in 1957. In short order, the technique became popular and remains the most common technique used today.[12,13] Numerous modifications to Millard's original description have been published since then. Prominent surgeons around the world modified their own and others' distinctive repairs, including Asensio,[14] Delaire and colleagues,[15,16] and Nakajima and Yoshimura,[20] lending to the diversity that is cleft lip and nose repair.

Recent surveys of active North American cleft surgeons indicate that the Millard rotation advancement or a modification of the technique is used by 84% of respondents; triangular flaps are used by 9%; and Delaire functional cheilorhinoplasty, by 2%.[13] A detailed description of each repair is presented elsewhere and the reader is referred to a prior publication for detailed discussions.[17] Studies providing comparison data for results of the various repairs are lacking. The few available randomized comparison studies investigated nasal and labial esthetics of patients treated with the rotation advancement technique versus a triangular flap technique.[18,19] Overall, these studies found no significant differences in esthetic outcomes and ultimately advocated either technique. The variations in technique for repairing cleft lip and nasal deformities and the uniqueness of each cleft make comparison studies difficult. Surgical results are also influenced by other variables, such as the use of presurgical orthodontic/orthopedic treatment, simultaneous gingivoperiosteoplasty (GPP), and specific timing of surgery—the particular procedure perhaps being only one of many important factors.[20] The surgical repair of the cleft lip, more than any other area of cleft care, remains an art with little compelling evidence to promote one technique over the other. There currently are no adequate controlled studies published that compare different primary techniques of lip repair and their long-term outcomes.

### *Primary Nasal Reconstruction*

The reconstruction of a cleft lip defect also involves correction of the associated nasal deformity. Thompson and Reinders[21] found that residual nasal deformity required approximately twice as many revisions as the lip. In the past 2 decades, much attention has been given to performing cleft nasal reconstruction in a primary fashion, but controversy still exists. In 2008 Sitzman[13] found that 52% of active cleft surgeons in North America performed primary nasal reconstruction routinely, and 22% never used the technique. The typical nasal deformity is characterized by a cleft-side dome depression, splaying of the ala, and eversion of the alar rim exposing the nasal mucosa. The septum is directed to the noncleft