Use of the Abbé flap in revision of the bilateral cleft lip–nose deformity


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Use of the versatile Abbé flap for lip-nose revision of a representative adult with bilateral cleft lip and palate is reported. The deformity is discussed, and the surgical plans are developed and executed. Presented is a technique for reliably securing the lateral orbicularis oris muscle components to the philtrum, which ensures viability of the transposed flap and provides functional continuity across the midline while accentuating the philtral dimple.

It has been stated variously that “the bilateral cleft never looks good” in the final analysis. This, unfortunately, is often true. Contributing to this specter are both relative and absolute tissue deficiencies within the nasomaxillary complex. These deficits have their genesis in utero, where the affected embryologic processes that were to become nose, lip, philtrum, or premaxilla, for example, either fail to develop by focal agenesis or fail to fuse with their partners.¹ In the latter case the involved region then grows discordantly without the reciprocal trophic stimulus and regulation of anatomically and functionally related facial parts. An example is the protruding premaxilla of a bilateral complete cleft that may be reasonably related to the cranium above but extremely anteropositioned relative to the lagging lateral facial segments,² as if the innate facial growth had been expressed as anterior projection of the premaxilla, septum, and vomer, while overlooking the disjoined lateral maxillofacial components. Reciprocally, the prolabium is often quite small, rendered so through failure of functional and anatomic continuity with and subsequent trophic induction from the lateral lip segments. Some surgeons commit the patient to repair in early infancy in an attempt to correct these abnormal relationships and institute concordant development. The price the patient often pays is tissue growth restriction and collapse engendered by scar formation in the surgical beds, superimposed upon the primary facial tissue deficiencies.

In the bilateral complete cleft, the problems of inadequate tissue mass become manifest. These problems and their initial manipulation in the primary repair often dictate the requirements of secondary revision. For example, the prolabium may be a mere nubbin of tissue, part of which should have contributed to the development of both columella and philtrum. Such reparative designs as the LeMesurier-Hagedorn technique consign the prolabium to the columellar base and rely upon advancement of the lateral lip segments beneath it to complete the cupid's bow and tubercle.⁴

By comparison, the Millard repair shares the prolabium between the columella and nostril sill and the philtrum. Tissue salvaged from the prolabium is “banked” in the nostril sill for later release of a tethered nasal tip.⁵ Still other approaches, such as the later Veau designs, place the prolabium centrally in the lip, with straight-line closures then achieved between the “philtrum” and lateral lip segments.⁶, ⁷ Acceptable results may be seen with any of these approaches, granted the necessity for revisions such as lengthening of the columella and nasal tip by, for example, forked flaps from the philtrum, V-Y advancement, or transplantation of composite grafts from the auricle.⁸, ¹¹ Similarly, acceptable standards may have to include a longer lip, as in the LeMesurier repair, or a short, retracted philtrum, as in the Veau straight-line closure.¹² However, the extreme case will see the need for further addition of tissue to the lip, which replaces the existing philtrum and releases the columella superiorly while bringing suture lines into natural skin folds and restoring labial form. In this regard the Abbé flap from the lower lip has no peer.¹³

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The Abbé flap has long enjoyed wide application in secondary cleft lip and nose reconstruction.\textsuperscript{16-19} It not only represents the most readily harvested tissue mass that can reliably satisfy all of the basic demands placed upon it, but it provides added benefits as well. Not uncommonly the patient with a cleft exhibits a lower lip that is ptotic and anteriorly placed relative to the upper lip. All too often this represents a retruded maxilla, which must be corrected by advancement surgery as a first stage. An equally operative consideration, however, lies within the discrepancy of a tightly scarred upper lip relative to a hypotonic, flaccid lower lip. This situation may also have contribution from adaptations of the craniofacial musculature to chronic mouth breathing (as may be seen in cleft patients with and without pharyngeal flaps).\textsuperscript{20,21} In the latter case the interlabial relationship may be greatly improved by the transfer of tissue from inferior to superior. Skin, mucosa, and potentially dynamic muscle are transferred, the philtral dimple and column are restored, the mucocutaneous ridge is completed, a tubercle is fabricated, and equal bulk and tension between the lips are obtained. Further, simultaneous nasal tip release is achieved as the midline soft tissues are displaced superiorly and the flap is introduced.

The apparent panacea of the Abbé flap to bilateral cleft revision is not without problems. To ensure viability of the transferred segment, a supporting pedicle from the inferior labial vasculature must be maintained during revascularization of the host bed. With the lips held together by the pedicle, the airway may be compromised. Pediatric airways placed to either side of the vascular bridge may prevent this problem. Close postoperative observation must control the apprehensive patient, who may actually tear his flap down. As sufficient revascularization is obtained from the host bed, a releasing procedure divides and insets the bridge back into the lower lip while achieving the desired upper lip contours, which is a demanding tissue manipulation. At the time of release, a revision of the lower midline scar also is desirable. Later refinement of the vermilion border of the upper lip must also be performed to achieve tubercle definition.

The technique for harvesting a lower lip flap is standard, but the design must be varied according to the existing configuration of the upper lip to be revised, which invariably is unique. The revisional design of the bilateral cleft lip–nose deformity and a technique for secondary reconstruction are illustrated in the following case report.
CASE PRESENTATION

A 34-year-old man was referred by his prosthodontist. An existing overdenture was to be replaced to maintain the occlusion, although evaluation was sought regarding revision of residual bilateral cleft lip–nose deformity (Fig. 1).

The patient had undergone initial treatment at 3 months of age for complete bilateral cleft lip and palate by an apparent straight-line cheiloplasty facilitated by a premaxillary retropositional osteotomy. The latter procedure also ablated the alveolar clefts and oral-nasal communications anteriorly. When the patient was 9 months of age, a Van Langenbeck repair of the palate was performed, and he underwent lip and nose revisions in the teen-age years. Orthodontic treatment had been partially successful in correcting the dental arch discrepancy, while maxillomandibular balance had been aided by a downward growth pattern of the mandible as opposed to the usual more horizontal mandibular development. Speech therapy alone had achieved excellent results, no residua of cleft palate speech was apparent.

Examination revealed the stigmata of a bilateral cleft, which was tabulated for the labionasal region as follows (Fig. 2):

1. The nasal tip was depressed and deviated to the right with inferior rotation of the alar cartilages and retraction of the columella.
2. The left alar base was lateralized and depressed, accentuated by lateralization of the left nasolabial fold.
3. The philtrum was pallid, hairless, and short.
4. No mucocutaneous ridge (white roll) was apparent in the philtrum, the cupid’s bow was narrow, and the philtral ridges diverged superiorly.
5. Obvious vermilion notching was present, with no apparent tubercle (the “whistle-tip” deformity).
6. Bulging of the orbicularis muscle components on pursed lip posturing, along with the superiorly divergent philtral ridges, signified midline muscular union in the vermilion area only, with no attachments to the anterior nasal spine or septum.

The labial architecture, on composite, gave the impression of an upper lip that was superiorly retracted at the midline and laterally divergent at the nasolabial junction. The lower lip was notably ptotic. Left-sided nasal airway obstruction was also present, although this offered no
contribution to velopharyngeal competency as determined by cul-de-sac testing. The obstruction was attributed to a bony spur from the maxillary crest. A dentoskeletal open-bite was present anteriorly. This was in company clinically with mild midfacial hypoplasia, although a concordant maxillomandibular relationship was approximated. This was readily amenable to prosthetic rehabilitation, according to the patient's desires.

The reconstructive scheme is seen in Fig. 3. At surgery, an oral-endotracheal tube was secured by a wire bridle to the lower teeth to maintain its proper depth while allowing passive horizontal movement of the tube without distorting the lips. The left-sided nasal obstruction was approached initially. The maxillary crest was found to be hypertrophied and deviated into the left nasal passage. This was reduced, then freed for midline repositioning by a horizontal osteotomy at the base. A septal cartilaginous strut was harvested for lifting the nasal tip, and the septum was vertically scored. The strut was introduced through a vertical incision in the columella, which, combined with internal nasal rim incisions, also allowed access for dissection and advancement of the alar cartilages. The mobilized alar cartilages were secured to each other and to the strut graft with heavy nonresorbable suture.

The tissue transfer that allowed elevation of the tip was obtained by shifting the existing philtral tissue superiorly in the form of trailing forked flaps. These were marked and incised through and through as a preliminary step. At the columellar base area, the residual of these flaps was trimmed and diverted laterally to join the alar bases and complete the nostril sills. At this point a reasonable lengthening of the columella had been obtained, and a gentle lateral flare had been imparted to the columellar base. A triangular excision taken intranasally from the base of the left ala allowed medial rotation to correct its lateralized position. The lateral lip segments were then advanced and tacked at the point of convergence of the nostril sills, philtral ridges, and columellar bases. An increase in the length of the midportion of the lip resulted, and the final philtral length and width became readily apparent (Fig. 4).

A brief discussion of the philtral outline and its mated lateral lip segments is appropriate at this point. One must note the change in lip length when the midline superior retraction is released and the lateral lip segments are realigned; that measurement is transferred to the lower lip as the Abbé flap is outlined. This will provide not only grossly matching segment lengths but will also ensure such fine points as alignment of the mucocutaneous ridges and cupid's-bow peaks in the final result. In marking, it must be borne in mind that the normal philtrum is not in the
Fig. 6. Layered closure of the nasal and labial wounds completed. Shortened portex tubes and quarter-inch antibiotic gauze provide nasal airways and augment paraseptal splints. A pediatric airway is placed in the labial fissure opposite the pedicle.

shape of an abrupt triangle; it is more of a gradually diverging angle which takes origin from the columella (the philtral column), includes a prominent dimple (the mentolabial fold in the Abbe flap), and ends in the cupid's-bow peaks. Further, the effects of contracture in the maturing scar beds must be duly considered in designing the repair, for example, the prominent tendency for three-dimensional contracture along linear suture lines, which must be counteracted by eversion of the matched epithelial edges. Points of anatomic demarcation within the lip, such as the white roll, vermilion border, and wet line, should be overbulked and overeverted. The use of biconcave matching surfaces and the introduction of white-roll offset flaps will facilitate ridge formation in the fully matured scar not only by simple bulk increase but also by the Z-plasty effect that disorients and lessens the contracture otherwise expected along a linear scar.

The Abbe flap was measured and outlined slightly offset from the mid-line for ease of transfer and incised. The position of the inferior labial artery was noted on the transected margin, and the pedicle-side arterial pulsations were palpated to avoid injury to the vascular bundle as the through-and-through incision approached it superiorly.

It is not sufficient merely to inset the Abbe flap and proceed with closure. The lateral muscle bundles must be separated into components for example, the nasalis muscle, oblique orbicularis fibers and horizontal orbicularis fibers) and must be secured to the nasal septum and their fellows across the midline, respectively.22-24 Firm, interdependent anchorage is necessary not only as a foundation for normal lip architecture and function but also to preclude widening of the philtrum and of the scars from unantagonized lateral muscle pull. However, where the muscles are directly opposed through the midportion (the Abbe flap), loss of the philtral dimple and ridges may occur, resulting in a tight, flattened lip. As an alternative, we use a series of two to three sutures, which pass through the inner and outer fascial layers with the lateral muscle fibers, and transfix the coronal plane of the flap's muscular layer (Fig. 5). The net result is accentuation of the philtral dimple, functional continuity of the muscle at discrete levels, and forced eversion of the skin and mucosal edges. Further, vascular compromise of the flap is avoided, as might otherwise be expected by deep sutures that tend to strangulate the tissues they circumscribe.

As the foregoing steps were executed, layered closure was completed with simple chromic gut sutures subcutaneously and in the oral mucosa and fine cuticular sutures for skin. The suturing proceeded judiciously near the pedicle margins, often with simple epithelial closure in this area to maintain deep vascularity. Concluding the procedure, internal nasal splinting was obtained, consisting of heavy silicone rubber paraseptal sheets secured transseptally with mattress sutures; then portex tubes were trimmed and placed in each nasal passage. This was augmented with quarter-inch antibiotic-impregnated gauze packing. As the patient emerged from the general anesthesia, extubation was performed, and a pediatric oropharyngeal airway was placed to augment the nasal airways (Fig. 6).

On the fifth postoperative day the sutures were removed,
Fig. 8. (A) The lip after 6 months' maturation of the surgical wounds. (B) Scalloping vermilion excisions marked to sculpt the tubercle; the excision planes purposely converge from the margins to the depth of the wound. (C) Simple suturing without undermining ensures inversion of the suture lines, leaving the tubercle in gentle prominence.

along with the nasal tubes and gauze packing. The paraseptal splints were removed at 2 weeks, when the lips were divided in the outpatient clinic with the patient under intravenous sedation and local anesthesia.

The releasing incisions were carefully marked to provide sufficient bulk at all margins for adequate vermilion eversion (Fig. 7). Here, as in similar cases, a formal revision of the lower lip scar was performed, which firmly secured the orbicularis muscle bundles, provided a Z-plasty at the mucocutaneous ridge, and everted the mucosal margins. The upper lip was opened and undermined bilaterally in the vermilion area, and the lateral muscles again were functionally secured by means of transfixing sutures through the intervening central mass prior to final closure. Routine wound care followed; the cuticular sutures were removed at 5 days.

Six months postoperatively the patient underwent vermilion adjustment. This was designed to remove bulk optimally and impart subtle contour to the tubercle and lateral vermilion border. For this revision, intravenous sedation and regional block anesthesia were used. Infiltration of the surgical site, although desirable as a hemostatic agent, was avoided since hydraulic distortion locally would hinder symmetrical reduction. The excisions were performed in a scalloping pattern behind and on either side of the tubercle. As is done for reduction cheiloplasty, the incisions were begun at the periphery and beveled toward the central depth to form a wedge-shaped defect. Simple surface closure then followed without undermining to invert the scalloped surfaces. It is helpful here to perform the excision on one side initially and then tack it temporarily closed while the opposite side is symmetrically reduced (Fig. 8). The patient reported paresthesia in the philtrum at 6 months and full return of sensation at approximately 1 year.

Photographs taken 14 months postoperatively are shown in Figs. 9 and 10.

DISCUSSION

The case reported here represents one in a series of five Abbé flaps performed over a period of 18 months. Thorough tabulation of the deformity in every case has served to underscore the unique qualities of each and has allowed a customized treatment scheme for each. Highly acceptable results have been obtained with the Abbé flap, as evidenced by our own series and those cases treated elsewhere either with or without this versatile procedure. This transfer of supple new bulk from the lower lip to the
Fig. 9. Postoperative appearance at 14 months. On frontal view (A), the alar bases are seen to be symmetric, and the hair-bearing, similarly textured philtrum is well-balanced to the lateral lip segments, with tubercle definition. On lateral view (B), the lip-columella angle is gently notched, and upper and lower lips are proportioned, although some tip depression remains.

Fig. 10. Close view of the lip illustrates nicely defined philtral dimple, equal lengths of the lip segments, mucocutaneous ridge continuity, and well-defined tubercle.

The scarred central portion of the upper lip not only restores normal labial contours but also liberates the central tissues of the lip for reconstruction of the external nose. The lower lip suffers negligibly from having donated a part of itself; its frequent preoperative ptotic posture is actually improved. The fine midline scar at the donar site is hardly noticeable. At worst, the sometimes horrible disfigurement of cleft lip and palate is transformed into a merely traumatized or "busted" lip and, at best, the result is a finely balanced upper and lower lip that escape all but the closest scrutiny.

Further refinement in the use of the Abbé flap will likely be forthcoming in one-stage transfer by microsurgery. The need will still exist, however, for calm observation and periodic revision up to the end point, since it is clearly less difficult to remove tissue than to add it. Whatever the advancement in its applications, the Abbé flap will remain ideal in reconstruction of the tissue-deficient upper lip.

SUMMARY

Use of the Abbé flap is reported in secondary reconstruction of the lip and nose of a representative adult with bilateral cleft lip and palate. The approach to comprehensive management of this deformity is detailed, including the presurgical assessment, the individualized surgical plan, and the specifics of the surgical technique. Further, a variation is suggested for functional anchorage of the
lateral lip segments across the transferred flap, which maintains the philtral dimple and accentuates the philtral ridges while ensuring vascularity, and survival, of the flap.

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