

## Case Report/Case Series

# Bilateral Transposition Lip Flaps

## A Novel Single-Stage Reconstruction of Central Upper Lip Defects Involving Cupid's Bow

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**IMPORTANCE** Defects of the central upper lip present a challenge. A variety of techniques have been described, but most tend to efface the natural contours present in the philtrum and the cutaneous-mucosal vermilion border (Cupid's bow). Furthermore, the techniques typically require a second-stage procedure to improve the upper lip aesthetic. We discuss a novel technique using bilateral transposition flaps to reconstruct central defects of the upper lip that violate Cupid's bow while maintaining normal aesthetic landmarks in a single stage. The mean angle of the transposition flaps was calculated.

**OBSERVATIONS** A retrospective review of 7 patients was performed to identify those who underwent reconstruction of central upper lip defects at a Mohs reconstruction referral practice. Medical records from January 2009 to December 2013 were evaluated. The mean diameter of the final defect was 1.4 cm (range, 1.2-2.1 cm). The mean angle of the transposition flaps used was 50°. All defects were closed in a single stage with no secondary defect remaining. There was no need for a second-stage procedure.

**CONCLUSIONS AND RELEVANCE** The use of bilateral transposition flaps is a viable and preferred method for a single-stage reconstruction of the Cupid's bow and philtrum in central defects of the upper lip.

*JAMA Facial Plast Surg.* doi:10.1001/jamafacial.2015.18  
Published online March 12, 2015.

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Facial defects can have a significant effect on a patient's quality of life. Deformities become even more pronounced in the central face, where the focus of facial expression and most facial recognition take place. Beyond attracting notice owing to irregularity, the distortion of facial features can negatively affect the overall perception of a person. Such defects may lead to questioning of a person's honesty, employability, trustworthiness, and overall capability.<sup>1</sup> Furthermore, deformities of the central face appear to be more noticeable and bothersome to look at than are more peripheral deformities.<sup>1-3</sup>

The choices for reconstruction of the upper lip are innumerable and are largely dependent on the diameter, depth, and location of the remaining defect. Among other options, methods that have been used with some success include primary closure, advancement flaps, transposition flaps, pedicle flaps, cross-lip or switch flaps, nasolabial flaps, oral circumference advancement flaps, alar crescent flaps, and other types of full-thickness skin grafting. The issue typically encountered with these options is that they may necessitate a second-stage or revision operation to try to restore a more natural contour. When the 3-dimensional characteristics of the central lip are not restored properly, the end result will typically be blunting of the philtral ridges and a unilip deformity.

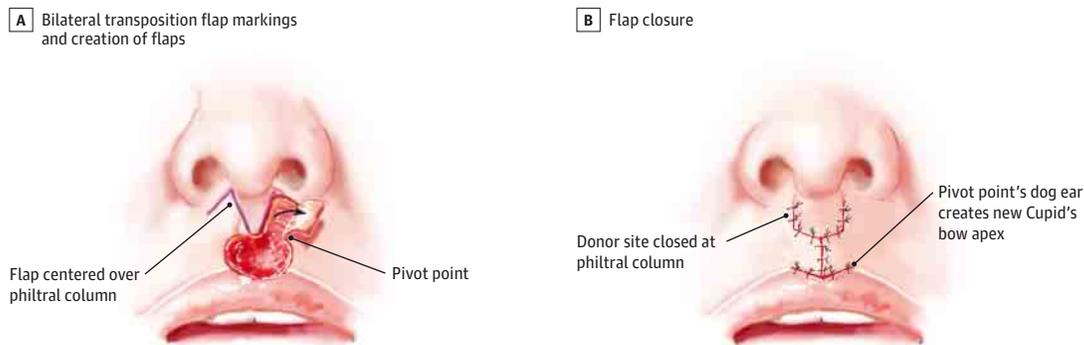
The disadvantages of performing a second procedure are debatable. There are many techniques available for restoration of a more normal contour to the philtrum and cutaneous-mucosal vermilion border (Cupid's bow) following primary closure. However, we believe most of these methods to be limited in achieving the intended goal. Corrective procedures of secondary deformities have been outlined by Thomson and Hart,<sup>4</sup> Onizuka,<sup>5</sup> Spira and Stal,<sup>6</sup> Choi et al,<sup>7</sup> Takeshita et al,<sup>8</sup> and Limberg.<sup>9</sup> Although some corrective procedures produce acceptable cosmetic results, we are still confronted with the drawback of exposing the patient to multiple surgical procedures.

We describe our experience with a single-stage procedure for correction of central lip defects that uses a bilateral transposition flap centered over the residual philtral columns to reconstruct Cupid's bow. We believe that this method addresses the restoration of contour, length, volume, and overall 3-dimensional appearance.

### Methods

A retrospective review of Mohs micrographic surgical repairs of the lip was performed using our electronic medical record

Figure 1. Bilateral Transposition Flap for Central Lip Defect Markings



A, The medial incisions are marked from the most superior of the philtral column down toward the midline until the defect is reached. From the same superior point, the lateral incisions are marked obliquely in a rhombic fashion to ensure an adequate pedicle for the flap. B, The donor area of the transposition flaps closes

along the philtral columns with 6-0 nylon vertical mattress sutures to accentuate them. Bilateral flaps are then transposed inferomedially upon closure of the secondary philtral defects. The pivot point of the transposition flaps creates a standing cutaneous deformity that recreates the apex of Cupid's bow.

system from January 2009 to December 2013. Operative records were reviewed as well as photographs using Mirror Suite imaging software (Canfield Scientific). All cases were performed by one of us (A.A.J.) at a private practice ambulatory surgical center. Procedures were conducted using local anesthesia and were planned as a single stage.

Candidacy for the procedure was based on upper lip length because the vertical height of the skin above the defect is necessary to form the transposition flaps. Bilateral transposition flaps are used to maintain the philtral ridge bilaterally at the site of the secondary defect while pushing downward centrally to maintain or restore the trough and peaks of Cupid's bow. For males, the additional benefit is maintenance of hair-bearing skin, although there is potential of reorienting hair follicles with flap rotation. The positioning of the incisions ensures adequate tissue perfusion and restoration of normal sensation. Length of the upper lip is preserved, as is volume.

The incisions are fashioned in a manner similar to that of bilateral rhombic flaps (Figure 1). Reference markings are made along the philtral ridges, vertically down the center of the philtrum, and along the vermilion border. The medial incisions are marked from the most superior of the philtral column down toward the midline until the defect is reached. From the same superior point, the lateral incisions are marked obliquely in a rhombic fashion. An adequate pedicle for the flap is maintained between the lateral incision and the defect.

The Mirror Suite imaging software was used to calculate the mean angle joining the medial and lateral incisions. Following infiltration of the site with local anesthesia, incisions are made using a No. 15 scalpel. The cut is made in a plane perpendicular to the skin and then extended down until it reaches the orbicularis muscle. The flaps are elevated with some of the superficial aspect of the orbicularis oris muscle to maintain adequate thickness of the flaps and improve flap survivability. Adjacent tissue is undermined slightly for improved flap mobility. The donor area of the transposition flaps closes along the philtral columns with 6-0 nylon vertical mattress sutures to accentuate them. Bilateral flaps are then transposed inferomedially on closure of the sec-

ondary philtral defects. The pivot point of the transposition flaps creates a standing cutaneous deformity that recreates the apex of the Cupid's bow. Deep sutures are placed with a 4-0 polyglactin 910 suture followed by vertical mattress sutures with a 6-0 nylon suture to ensure adequate eversion of the ridges. The medial edges of the transposition flaps are turned inferiorly to push into the philtral dimple and trough of the Cupid's bow.

## Results

A total of 7 patients underwent bilateral transposition flap repair of central cutaneous defects of the upper lip involving the Cupid's bow during the study period. The mean age of these patients was 67 years (range, 51-76 years), all were white, and 6 were women. The mean defect diameter was 1.4 cm (range, 1.2-2.1 cm). All defects were partial thickness and did not involve the full thickness of the lip (ie, skin, orbicularis muscle, and lip mucosa). Two defects in the 7 patients crossed the vermilion cutaneous border and involved the red lip. The mean follow-up time was 8 months. The maximum defect size noted was 2.1 × 1.3 cm. There were no secondary defects remaining in our patient series, and all closures were tension free with no tissue necrosis or epidermolysis. The mean angle joining the medial and lateral incisions of each transposition flap (14 flaps or 2 flaps per patient) was 50°.

All reconstructions were performed as a single stage with no need for any revisions. There were no tumor recurrences, unilip deformity, oral incompetence, or speech complications. All patients were satisfied with their outcomes and had restoration of contour, length, volume, and overall 3-dimensional appearance of the central upper lip.

## Report of Cases

### Case 1

A 67-year-old woman had a 1.2 × 1.5-cm (area, 1.8 cm<sup>2</sup>) central lip defect resulting from Mohs resection of a basal cell car-

**Figure 2. Representative Cases of Bilateral Transposition Flap Repair of Central Cutaneous Defects of the Upper Lip Following Mohs Resection of Basal Cell Carcinoma**

**A** 67-Year-old woman with a 1.2 x 1.5-cm central lip defect



**B** 62-Year-old woman with a 2.1 x 1.3-cm central lip defect



**C** 67-Year-old woman with a 1.2 x 1.2-cm central lip defect



**D** 61-Year-old woman with a 1.4 x 1.0-cm central lip defect



In all cases, good aesthetic reconstruction of Cupid's bow was noted at the postoperative visit.

cinoma lesion (Figure 2A). Bilateral lip transposition flaps were used to close the deficit. An immediate postoperative photograph showed suture lines superiorly along the philtral ridges and accentuation of the Cupid's bow apices at the transposition flap pivot point. Good aesthetic reconstruction of the Cupid's bow was observed at the 6-month postoperative visit. The open-mouth view is also shown.

### Case 2

A 62-year-old woman had a 2.1 x 1.3-cm (area, 2.44 cm<sup>2</sup>) central lip defect resulting from Mohs resection of a basal cell carcinoma lesion (Figure 2B). This was the largest defect of the

present series. Bilateral transposition flaps were raised and sutured to re-create Cupid's bow. A small portion of the defect extending into the red lip was reconstructed by performing a simultaneous mucosal advancement flap. An adequate Cupid's bow, eliminating the need for second-stage surgery, was demonstrated at the 9-month follow-up visit. The open-mouth view is also shown.

### Case 3

A 67-year-old woman had a 1.2 x 1.2-cm (area, 1.44 cm<sup>2</sup>) circular defect of the central lip after Mohs resection of a basal cell carcinoma lesion (Figure 2C). Bilateral transposition flaps

were raised, and the defect was closed without any residual deficit. Re-creation of the Cupid's bow and philtral ridges without loss of upper lid height was noted at the 7-month postoperative visit. The open-mouth view is also shown.

#### Case 4

A 61-year-old woman had a 1.4 × 1.0 cm (1.44 cm<sup>2</sup>) circular defect of the central lip after Mohs resection of a basal cell carcinoma lesion (Figure 2D). Bilateral transposition flaps were raised, and the defect was closed without any residual deficit. Re-creation of the Cupid's bow and philtral ridges without loss of upper lid height was noted at the 7-month postoperative visit. The open-mouth view is also shown.

## Discussion

The challenges associated with central upper lip reconstruction result from the complexity of the subanatomic zones that lie within the upper lip. The upper lip can be divided into 2 lateral compartments separated centrally by the philtrum,<sup>10</sup> which terminates inferiorly at Cupid's bow. The vertical columns of the philtrum extend from the columellar base to the peaks of the bow, enclosing the dimple and allowing the nose to harmonize with the upper lip; the proportions have been emphasized in anthropometric studies.<sup>11,12</sup> The philtrum functions as a reservoir of skin that is stretched when smiling and moving the upper lip.<sup>13</sup>

The closure of central defects of the upper lip may present a unique challenge to the reconstructive surgeon. This obstacle is multiplied in difficulty when Cupid's bow is violated significantly within the defect. Persistent deformity in this region has proved to be concerning, if not debilitating, to patients undergoing surgical correction. Aside from central defects of the face being more noticeable than those located laterally, this area is of special concern since it has significant implications in perception of the patient. Beyond serving as a region of attraction and sensuality, any violation of the upper lip, including the Cupid's bow and philtrum, may predispose the patient to unwarranted judgment by others.

Given the potential debilitation caused by these defects, it is of utmost importance to restore all preexisting characteristics associated with proper aesthetic appearance. It would be advantageous to perform this procedure in a single stage void of any need for revision. With the methods described above, there is significant risk of resultant skin color mismatch with skin grafts, asymmetric lip contour, absence of philtral ridges, malformed Cupid's bow, poor wound healing, loss of subunits, loss of hair-bearing skin, contour depression, and, most commonly, a unilip deformity that typically dictates the need for a second-stage repair.

Given the advanced age of many patients presenting with defects resulting from the removal of head and neck neoplasms, a single-stage procedure is unarguably a preferred choice. As demonstrated, the use of bilateral transposition flaps is a viable option for the reconstruction of central upper lip defects when reconstitution of the delicate anatomy associated with Cupid's bow is required.

The bilateral transposition flap allows for a single-stage reconstruction of the philtral columns, Cupid's bow, and philtral dimple owing to its design. The donor area of the transposition flaps is centered on the philtral columns to camouflage the donor area. The pivot point of the transposition flaps creates a standing cutaneous deformity that re-creates the apices of Cupid's bow. The medial edges of the transposition flaps turn to push into the philtral dimple and trough of Cupid's bow. Because the transposition flaps are created from the reservoir of hair-bearing skin in the philtrum above a central lip defect, this reconstruction allows for hair growth in the area of the repair in men and the possibility to grow a moustache.

The technique presented here, like all others, has specific limitations. There must be adequate height of the cutaneous skin above the central lip defect to construct the transposition flaps. Because these transposition flaps are designed in a manner similar to that of rhombic flaps, the requisite philtral skin above the defect should be approximately the same height as the defect. A central lip defect that extends from the defect to the base of the nasal columella would have no reserve skin for flap reconstruction. In older patients, the upper white lip tends to be longer, so there often is sufficient skin. Younger patients with a short philtral length may not have sufficient skin. Furthermore, the technique described here is limited in its ability to repair cutaneous defects—not full-thickness defects involving the skin, orbicularis muscle, and mucosa. As shown in case 2 (Figure 2B), involvement of the mucosal lip may require a mucosal advancement flap to reconstruct loss of the red lip while the bilateral transposition flap re-creates the white lip and curvature of Cupid's bow.

## Conclusions

The bilateral transposition flap allows for a single-stage reconstruction of central lip defects, including the philtral columns, Cupid's bow, and philtrum, in patients with a sufficient reservoir of skin superior to their cutaneous lip defect. The donor area of the transposition flaps is centered on the philtral columns to camouflage the donor area, while the pivot point of the transposition flaps creates a standing cutaneous deformity that recreates the apices of the Cupid's bow. This technique avoids the 2-stage approach of more traditional techniques while ensuring good aesthetic outcomes.

#### ARTICLE INFORMATION

**Accepted for Publication:** December 21, 2014.

**Published Online:** March 12, 2015.  
doi:10.1001/jamafacial.2015.18.

**Author Contributions:** Dr Jacono had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.  
*Study concept and design:* Jacono, Talei.

*Acquisition, analysis, or interpretation of data:* Bassiri, Talei.

*Drafting of the manuscript:* All authors.

*Critical revision of the manuscript for important intellectual content:* Jacono, Talei.

*Statistical analysis:* Jacono, Talei.

*Obtained funding:* Jacono.

*Administrative, technical, or material support:* Jacono.

*Study supervision:* Jacono.

**Conflict of Interest Disclosures:** None reported.

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