Near Total/Total Lower Lip Reconstruction—Chin Rotation Advancement Flap

Amin Abu-Jabal, MD¹, Michael V. Joachim, DMD, MSc²,³, Nir Bitterman, MD⁴ and Imad Abu El Naaj, DMD²,³

Abstract
Summary: Total lower lip reconstruction is a challenging reconstruction procedure. Its main role is to restore lip function, maintain the proper relationship between the upper and lower lips and optimize cosmesis. Various techniques ranging from local flaps to free tissue transfer have been developed. For patients who are not candidates for microsurgical techniques or for those who do not want complex procedures, the local flap technique is a good solution. Most of the reported techniques, based on cheek advancement and nasolabial flaps, lead to scars located in the midface and therefore to unaesthetic results. We hereby present a novel technique for total lower lip reconstruction using a rotation advancement flap based on the excess tissue of the lower face. To our knowledge, this method has not been described previously in the literature.

Keywords
lip, rotation, surgical flaps, reconstructive surgical procedures

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Introduction
The lip is a complex laminar anatomical structure consisting of 3 layers: mucosa, muscle, and skin. This dynamic organ has an important functional role in speech articulation and oral competence maintenance.¹⁻³ Moreover, due to its central location, the lip has significant esthetic features of the lower face.¹ Throughout history, many solutions have been proposed to reconstruct different lip defects.¹⁻³ However, many of the current techniques work well for small to moderate lip defects. There is no ultimate reconstructive approach for total or near total lip defects. Most of the surgical techniques proposed (Bernard, Karapandzic, and Zisser) are based on local flap rearrangement or free tissue transfer.¹,²,⁴,⁵ Each method has its own advantages and limitations. The different local flaps described are based on cheek advancement and nasolabial flap techniques leading to scars located in the midface and therefore to unaesthetic results. According to the main authors’ experience, it is better to have a scar on the lower face, thus being less visible.

We hereby present a novel technique for total lower lip reconstruction using rotation advancement flaps based on the excess tissue of the lower face. To our knowledge, this method has not been described previously in the literature.

Case Presentation
An 87-year-old man presented with a 4-month history of an erosive lesion on the lower lip. The patient was healthy except for mild hyperlipidemia, and there was no smoking history.

¹Plastic Surgery Unit, Galilee Medical Center, Nahariya, Israel
²Oral and Maxillofacial Surgery Department, Baruch Padeh Medical Center, Poriya, Israel
³Azrieli Faculty of Medicine, Bar-Ilan University, Safed, Israel
⁴Plastic Surgery Unit, Bnai-Zion Medical Center, Haifa, Israel

Corresponding author:
Michael V. Joachim, Baruch Padeh Medical Center, MP Lower Galilee, Poriya 1520800, Israel.
Email: michael.joachim@biu.ac.il
history. The patient consented to publish his images. Physical examination revealed a 2X3 cm lesion in the middle of the lip extending to the labial mucosa (Figure 1a). The lesion did not cross the vermilion border. No palpable facial or cervical lymphadenopathy was observed. Incisional biopsy diagnosed poorly differentiated squamous cell carcinoma. The patient underwent contrast-enhanced CT of his head, neck and chest area. There was no evidence of locoregional or distant disease.

The patient underwent near total lip resection (Figure 2a). The commissures were preserved.

**Surgical Technique**

A rotation supraperiostal flap including the chin and upper central neck was marked. The marking was performed on the natural anatomic folds of the marionette line and upper neck folds. An additional lower cheek advancement flap

Figure 1. A. 87 y/o patient with a lesion in the middle of his lower lip, later diagnosed as squamous cell carcinoma on incisional biopsy, B. Patient at 6 months postop, C. Patient at 6 months postop—mouth opening, D. Patient at 6 months postop—vermillion and buccal mucosa.

Figure 2. A. Patient after tumor resection for a near total lower lip defect, with both commissures preserved. B. A rotation flap including the chin and upper central neck is marked. The lower cheek advancement flap based superiorly is marked adjacent to the edge of the rotation flap. C. The rotation flap is elevated and advanced into the lower lip defect. The cheek flap is advanced caudally to partially fill the rotation flap donor site, D. The patient at the end of the operation.
based superiorly was marked adjacent to the edge of the rotation flap (Figure 2b). The rotation flap was elevated and advanced into the lower lip defect and sutured from the inside-out. The cheek flap was advanced caudally to partially fill the rotation flap donor site (Figure 2c). Rotational buccal mucosal flaps were used for vermilion reconstruction.

Discussion

Total or near total lip defects mainly occur after malignant tumor resection. Various techniques have evolved to reconstruct the lower lip. However, none of the available surgical approaches can restore the complex 3-layer lip component precisely, thus leading to a poor esthetic outcome and functional compromise. Currently, it is popular to try to reconstruct the lower lip based on microsurgical techniques. This type of reconstruction allows for a single-stage procedure, minimizing the risk of microstomia and maintaining oral competence. Nevertheless, in many cases, older patients with major comorbidities prefer to avoid complex procedures, thus favoring lower lip reconstruction with local flaps. These procedures have, on the 1 hand, a potential esthetic advantage as they try to maintain the principle of replacing like with like. On the other hand, any of the flap designs are associated with suboptimal oral competence due to a lack of a functional orbicularis muscle. To overcome these problems, oral competence needs to rely on the development of a tight adynamic lower lip.

Dieffenbach (1845), Bernard (1853), von Burow (1855) and von Bruns (1857) all described techniques for cheek advancement. Bernard and von Burow described the excision of 4 triangular regions to reconstruct the upper lip and the lower lip. Webster suggested modifications of this technique that aligned the scars with the relaxed skin tension lines of the face. Since then, the Bernard–Webster flap with further technical modifications has been used for lower lip reconstruction worldwide. Nasolabial flaps also play a prominent role in total lip reconstruction. Various versions of this flap have developed over the years. The “gate flap” design by Fujimori, which rotates 2 nasolabial island flaps by 90°, is noteworthy. Reconstruction with any nasolabial flap design is associated with suboptimal oral competence and esthetics, as denervation of the flap is inevitable. Another option mentioned recently is the double overlying cervical flap described by Copelli et al.

Our proposed rotation advancement flap offers several advantages over the mentioned techniques:

1) This is a simple, large, reliable flap with a proper length to width ratio.

2) It does not cause microstomia because the flap is large and uses the excess tissue of the lower face.

3) The scars are located in natural folds and contour lines of the lower face and therefore are less visible than scars located in central positions.

4) Advancement flaps in the rotation donor site decrease the risk of lower lip retraction. As in the other techniques, oral competence is maintained by the development of a tight adynamic lower lip.

This technique shares similarities with rotation advancement submental island flap, although it shortens the rotation distance and angle compared to that flap.

Our technique is not free from complications. Its main drawback is violation of the chin esthetic unit. In addition, trapdoor deformities and lip retraction are potential complications. Also, there are 2 mandatory prerequisites for the use of this technique: first, the vertical height of the lower lip defect must not reach down to the level of the supramental fold or further caudally and second, no necessity for a combined uni/bilateral level I, IIa, IIb, and/or III neck dissection, since it might compromise the flap vascularity. Both conditions were met in this case.

In conclusion, the rotation advancement flap is a simple and reliable flap technique for total lower lip reconstruction. It can serve as an effective surgical alternative to microsurgical procedures. Nevertheless, further studies should be performed to assess its effectiveness.

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ORCID iD

Michael V. Joachim https://orcid.org/0000-0002-3577-276X

References

1. Ishii LE, Byrne PJ. Lip Reconstruction. Facial Plast Surg Clin North Am. 2009;17(3):445-453.

2. Closmann JJ, Pogrel MA, Schmidt BL. Reconstruction of perioral defects following resection for oral squamous cell carcinoma. J Oral Maxillofac Surg. 2006;64(3):367-374.

3. Boukovalas S, Boson AL, Hays JP, Malone CH, Cole EL, Wagner RF. A systematic review of lower lip anatomy,
mechanics of local flaps, and special considerations for lower lip reconstruction. *J Drugs Dermatology*. 2017;16(12):1254-1261.

4. Sun G, Lu M, Hu Q. Reconstruction of extensive lip and perioral defects after tumor excision. *J Craniofac Surg*. 2013;24(2):360-362.

5. Copelli C, Manfuso A, Pederneschi N, Hanna KT, Cassano L, Cocchi R. Reconstruction of full-thickness defects of the lower lip with a double overlying cervical flap. *J Craniofac Surg*. 2019;30(5):E428-E430.

6. Anvar B, Evans B, Evans G. Lip reconstruction. *Plast Reconstr Surg*. 2007;120:57e-64e.

7. Sarici M, Şirinoglu H, Yeşiloglu N, Temiz G. May local flaps be an alternative to free flaps in total lower lip and chin reconstruction in elderly patients. *J Craniofac Surg*. 2016;27(4):1112-1113.

8. Salgarelli AC, Bellini P, Magnoni C, Anesi A, Collini M. Synergistic use of local flaps for total lower lip reconstruction. *Dermatologic Surg*. 2011;37(11):1666-1670.

9. Denadai R, Raposo-Amaral CE, Buzzo CL, Raposo-Amaral CA. Functional lower lip reconstruction with the modified Bernard-Webster flap. *J Plast Reconstr Aesthetic Surg*. 2015;68(11):1522-1528.

10. Fujimori R. “Gate flap” for the total reconstruction of the lower lip. *Br J Plast Surg*. 1980;33(3):340-345.