Lip and oral commissure reconstruction with the radial forearm flap

Ramesh Sasidaran, Mohd Ali Mat Zain, Normala HJ Basiron

ABSTRACT

Introduction: The radial forearm free flap has been a workhorse flap for lip reconstruction due to its pliability, color match, and ability to incorporate the palmaris longus tendon for support. We report our experience with the use of the radial forearm free flap in three patients post-tumor resection. Materials and Methods: Between 2009 and 2010, three patients had undergone resection of squamous cell carcinoma of the oral region and simultaneous reconstruction with the radial forearm free flap. The average patient age was 51 years and the average defect size was $4 \times 3 \text{ cm}^2$. In two patients, anterograde radial forearm free flap was used with a fascia lata free tendon graft for support and in one patient, a retrograde radial forearm flap was used without the use of tendon as support. Results: All three patients were satisfied with the initial management of tumor clearance. All three surgical margins were clear. Out of three, two patients complained that the flap was unsightly and were dissatisfied with the appearance and bulk of the flap. Conclusion: Although the radial forearm flap is recognized as a gold standard for lip reconstruction, there always appears to be a need for secondary revision procedures to further improve both the functional as well as esthetic appearance of the lip reconstruction procedure. As a primary reconstructive procedure, the flap does not satisfy patient expectations. A comprehensive questionnaire as well as objective assessment follow-up study is warranted.

Key words: Radial forearm, lip reconstruction, commissure reconstruction

INTRODUCTION

Loss of the corner of the mouth in an adult is usually the result of either trauma or tumor excision. Surgical management of oral squamous cell carcinoma (SCC) typically involves resection of the carcinoma with a 1 cm margin of normal appearing tissue. A large surgical defect is often encountered. The goals of perioral reconstruction are esthetics and function, with oral competence and good lip control [Figures 1 and 2].

The use of the free radial forearm flap for reconstruction of lip defects have been extensively presented elsewhere. We present our early experience with the use of radial forearm flap for commissure reconstruction.

MATERIALS AND METHODS

From 2009 to 2010, our department had operated on three patients with cheek and oral commissure SCC. Patients’ age ranged from 59 to 64 years (average, 61 years). Out of the three patients, two were females and one was a male. All three patients were diagnosed by biopsy and histopathological examination of the lesion. The lesions had an average size of $4 \times 3 \text{ cm}^2$ with an involvement of the oral commissures. All the lesions were resected with a 1 cm clearance margin leaving an average defect of $5 \times 4 \text{ cm}^2$. The defect was reconstructed with a free radial forearm fasciocutaneous flap from the
contra lateral forearm. In two patients, an anterograde flow radial forearm was harvested and the free fascia lata graft was used to bridge the commissure defect. In the remaining patient, a reverse flow radial forearm flap was elevated and placed into the defect without a tendon graft [Figures 3–6].

**RESULTS**

In all three patients, there were no complications with the reconstruction procedure and all three surgical margins were clear of tumor cells. The second patient, however, had developed metastasis to the neck and is currently planned for a neck dissection and oncology consult. All the three patients were satisfied with the removal of the tumor; however, two of the three patients complained that the reconstructed flap was unsightly and one of the three patients avoided social events as the initial flap appearance was esthetically unpleasing [Table 1].

**DISCUSSION**

The aims of lip reconstruction should be to maintain oral competence, maximum oral aperture, mobility, and sensation and to maximize cosmesis. Vermilion reconstruction is considered successful only when both sphincter and sensory functions are established. Local

| Patient | Defect size (cm²) | Flow pattern | Dynamic reconstruction | Complications |
|---------|------------------|--------------|------------------------|---------------|
| 1       | 4 × 4            | Reverse flow | Nil                    | Drooling unesthetic |
| 2       | 3 × 3            | Antergrade flow | Fascia lata graft   | Unable to approximate lips due to flap bulkiness |
| 3       | 4 × 3            | Anter grade flow | Fascia lata graft   | Bulky         |

**Table 1: Defect size, radial forearm design and associated complications**

*Figure 1: SCC of the cheek involving the left commissure*

*Figure 2: Postresection of tumor with 1 cm margin*

*Figure 3: Postlip and commissure reconstruction 1 week*

*Figure 4: Postlip and commissure reconstruction 3 months*
flaps guarantee optimal functional and esthetic results in the presence of limited tissue losses; however, they do not allow obtaining adequate reconstructions for losses corresponding approximately to one-half of the superior and two-thirds of the inferior lip.

Moreover, especially in the oncology surgery, the involvement of the surrounding tissues with losses of substance extended not only to broad portions of the lips but also to the surrounding regions (skin and mucosa of the cheek, chin) is not infrequent. Historically, in such complex situations, the reconstruction was carried out with composite graft tissue of the chest region. However, these flaps did not always provide satisfactory results. In the last few years, the introduction of the reconstructive surgery of free flaps has deeply modified the therapeutic approach of lesions with wide losses of substance in the skull-craniofacial district.

The composite radial forearm flap with palmaris longus is thin enough that it can be folded on itself without significant increase in bulk. The flap is easy to dissect, the pedicle contains long vessels of large diameter, and the skin is a good color and texture match for the perioral region. Moreover, the vascularized tendon can be used for lower lip suspension. Because of its thickness, it is a better suited flap for commissure reconstruction than most distant flaps.

In our series, we encountered some problems with the radial forearm flap used for reconstruction. In our first patient, without the presence of the suspending palmaris longus, the floppy flap tends to fold on itself. This resulted in a poor esthetic appearance and subsequently led to drooling. In the second patient, due to the bulk of the flap, the goal to maintain competence was lost as there was failure of approximation of the lips. Even though the radial forearm free flap has been reported as the goal standard for lip reconstruction, it does not seem to be a problem free flap as patients usually require secondary touch-up procedures.

Jeng et al. reported on the use of an advancement flap with a free flap reconstruction for lip and cheek defects involving the commissure. In their series of 22 patients with lip and cheek reconstruction involving the commissure, three patients had defects involving the commissure. The maximum defect encountered was $12 \times 8 \text{ cm}^2$ for the facial skin and $12 \times 7 \text{ cm}^2$ of mucosal defect. In their series, lip reconstruction was accomplished with advancement of the remaining lips to reconstruct the lip sphincter function. The lip and cheek defect was thus converted into a cheek defect which was reconstructed with the free flap. In their opinion, from an esthetic standpoint, distant flaps used to reconstruct the lip defects normally yield poor results. With the use of the described technique, operative procedures requiring general anesthesia could naturally be minimized. A similar technique was also reported by Valentini et al.

Other flaps as alternatives for lip and commissure reconstruction have been explored by other authors as being superior to the radial forearm flap. In their papers, Yildirim et al. preferred the anterolateral thigh flap as there was no sacrifice of a major vessel as in the radial forearm flap. There was also the advantage of primary closure of the donor defect and a hidden donor scar. Koshima et al. preferred a combination flap comprising of the pedicled submental flap and the dorsalis pedis free flap for commissure reconstruction. They state that the radial forearm is a less than ideal flap for commissure reconstruction as it is bulky due to in folding, it does not grow hair unlike the submental flap, and has a poor scar. These arguments are of course
debatable in the sense that the anterolateral thigh flap is a bulky flap for lip reconstruction and the use of two flaps instead of one prolongs the operating time and exposes the surgeon and the patient to twice the risk of flap complications.

The importance of sling support for lip reconstruction with free flaps has been extensively reported. The use of a free flap without providing a sling support was experienced with the first patient. The radial forearm flap was seen to fold on itself looking unnatural and causing the patient to cover up the mouth area when attending social functions. The patient also had drooling as the folded flap formed a trough where saliva was seen to leak through. The secondary application of a sling may be a difficult undertaking in this case.

The bulkiness of the flap in the second patient could be subjected to flap thinning and application of vector sutures as previously described. The described procedures do decrease bulk of the flap, but then lend floppiness to the flap which requires tightening with vector sutures. All in all, the secondary procedures for improvement of the inherent problems of the radial forearm flap may not be as rewarding or as simple.

In conclusion, although the free radial forearm flap is widely applied flap for lip reconstruction, it is not without its inherent defects. Both our patients required secondary revision surgeries to improve both the esthetic and the functional defects seen.

**REFERENCES**

1. Jeng SF, Kuo YR, Wei FC, Su CY, Chien CY. Reconstruction of concomitant lip and cheek through-and-through defects with combined free flap and an advancement flap from the remaining lip. Plast Reconstr Surg 2004;113:491-8.
2. Valentini V, Saltarel A, Cassoni A, Battisti A, Egidi S. One-stage reconstruction of a defect of the oral commissure and of the cheek with a radial forearm free flap. J Craniofac Surg 2008;19:1508-11.
3. Yildirim S, Gideroglu K, Aydogdu E, Avci G, Akan M, Aköz T. Composite anterolateral thigh-fascia lata flap: A good alternative to radial forearm-palmaris longus flap for total lower lip reconstruction. Plast Reconstr Surg 2006;117:2033-41.
4. Koshima I, Inagawa K, Urushibara K, Moriguchi T. Combined submental flap with toe web for reconstruction of the lip with oral commissure. Br J Plast Surg 2000;53:316-9.
5. Furuta S, Sakaguchi Y, Iwasawa M, Kurita H, Minemura T. Reconstruction of lips, oral commissure and full thickness cheek with a composite radial forearm radial forearm palmaris longus flap. Ann Plast Surg 1994;33:544-7.
6. Chang KP, Lai CS, Lin SD. Recontouring commissuroplasty after reconstruction of large defects after resections for head and neck cancer with commissure involvement using an anterolateral thigh flap. Scand J Plast Reconstr Hand Surg 2009;43:256-9.

How to cite this article: Sasidaran R, Zain MM, Basiron NH. Lip and oral commissure reconstruction with the radial forearm flap. Natl J Maxillofac Surg 2012;3:21-4.

Source of Support: Nil. Conflict of Interest: None declared.