Journal of Cranio-Maxillo-Facial Surgery 42 (2014) 1861–1867

Contents lists available at ScienceDirect

Journal of Cranio-Maxillo-Facial Surgery

journal homepage: www.jcmfs.com

Submandibular artery: Bilobed platysma myocutaneous flap for total lower lip reconstruction☆

Ovunc Akdemir [a, *], William C. Lineaweaver [b], Servet Celik [c], Celal Cınar [d], Feng Zhang [e]

[a] Department of Plastic, Reconstructive and Aesthetic Surgery, Ege University, Izmir, Turkey
[b] Department of Plastic, Reconstructive and Aesthetic Surgery, Central Mississippi Medical Center, Jackson, MS, USA
[c] Department of Anatomy, Ege University, Izmir, Turkey
[d] Department of Radiology, Ege University, Izmir, Turkey
[e] Department of Plastic, Reconstructive and Aesthetic Surgery, University of Mississippi, Jackson, MS, USA

ARTICLE INFO

Article history:
Paper received 7 December 2013
Accepted 24 July 2014
Available online 14 August 2014

Keywords:
Myocutaneous
Bilobed
Flap
Submandibular artery
Lip
Reconstruction

ABSTRACT

Background: Lower lip reconstruction following cancer resection includes a variety of clinical and microsurgical options.
Objective: We have developed a myocutaneous flap for full thickness reconstruction with a functioning muscle.
Technique: In all patients, the submandibular artery was outlined using computerized tomographic angiography and Doppler. The flap was designed after resection. The first lobe was designed to fill the defect and was outlined 90° from the defect margin, with the submandibular artery in the center of the flap. A second lobe was then outlined 90° from the first lobe. The flap was raised along with the platysma muscle and artery, with the first lobe rotated to the lip and the second lobe inset into the first lobe site, permitting neck closure without skin redundancy.
Results: From January to May 2012, 17 patients were treated with this flap, and all flaps survived. All of the patients had oral continence at sixteen months, and electromyography documented platysma function.
Conclusion: The flap provides single-stage lower lip reconstruction with functional muscle.

1. Introduction

Oral reconstruction is still challenging for plastic surgeons. The main goal in a total lower lip reconstruction is to provide a functionally and cosmetically acceptable lower lip, with adequate oral sphincter function. Providing an adequate mouth opening for eating and talking is another critical requirement of a successful total lower lip reconstruction (Jeng et al., 2004; Gurlek et al., 2005; Ozdemir et al., 2003; Yıldırım et al., 2006; Lengele et al., 2004; Serletti et al., 1997). In principle, the lower lip can be reconstructed using 1) a local flap, cheek advancement flaps (Von Burow, 1855; Webster et al., 1960), or rotating the flap using the residual lip (Karapandzic, 1974; McGregor, 1983) or nasolabial tissue (Nakajima et al., 1984; Fujimori, 1980); 2) a regional pedicled flap (Baker et al., 1995; Converse and Converse, 1977; Bakamjian et al., 1971); or 3) free flaps (Kroll and Evans, 2000; Koshima et al., 2000; Wei et al., 2001). There is no definitive and widely accepted way to manage large lip defects (Sakai et al., 1989). The bilobed flap was first described by Esser in 1918 (Esser, 1918) for use in nasal tip defect reconstruction. Others, such as Zimany (Zimany, 1953) and McGregor and Soutar (McGregor and Soutar, 1981), expanded on its principles and described how it could be applied to one stage in many areas of reconstruction. The bilobed flap covers the primary defect by "spreading the load" of tissue loss over two adjacent skin flaps, and it enables the preservation of skin creases and skin folds (White et al., 2012).

Here, we present a new, nonmicrosurgical technique, the bilobed platysma myocutaneous flap, based on the submandibular artery, to achieve all of the aforementioned goals in the reconstruction of total lower lip defects.

☆ This study was presented in 56th Annual Meeting of the Southeastern Society of Plastic and Reconstructive Surgeons, Bonita Springs, FL, USA.

* Corresponding author. Department of Plastic, Reconstructive & Aesthetic Surgery, Ege University, Izmir 35040, Turkey. Tel.: +90 532 204 3139; fax: +90 232 342 1941.
E-mail address: ovuncakdemir@gmail.com (O. Akdemir).

http://dx.doi.org/10.1016/j.jcms.2014.07.004
1010-5182/

2. Surgical technique

The day before surgery, the submandibular artery is visualized by computerized tomographic angiography (CTA) scan (Fig. 1). The flap is designed after resection (Fig. 2). The submandibular artery, which is a branch of the facial artery, is located using Doppler ultrasonography. The rotation point is marked 3 cm distal to the submandibular artery. In the design of the bilobed flap, the submandibular artery is placed in the center of the first lobe. The defect size is measured with a paper ruler. The width of the first lobe of the bilobed flap is planned to equal the width of the defect. The lengths are measured from the rotation point to the top point of the lower lip mucosa and from the top point of the lower lip mucosa to the end of the intraoral defect mucosa. These lengths are equal to the length of the first lobe. The width and length of the second lobe are planned to equal to one-third of the width and length of the first lobe. The first lobe is designed to fill the defect and is outlined 90° from the defect margin, in the shape of a sandwich flap. The platysma muscle is sutured to the orbicularis oris muscle with 4/0 absorbable sutures (Fig. 3). The second lobe is rotated 90° to the location of the first lobe. The intraoral mucosa is sutured to the distal edge of the first lobe with 4/0 absorbable sutures, and the skin is closed with 5/0 non-absorbable sutures (Fig. 4). All of the patients were given an antiseptic mouthwash and 50 mg/kg of intravenous ceftazidime for three days postoperatively.

3. Material and methods

During the course of a year and a half, this new technique was used in 17 patients with total lower lip defects resulting from excision of extensive squamous cell carcinomas (SCCs). Patients requiring neck dissection were not included in this study. One day before surgery and at least six months postoperatively, orbicularis oris and platysma function were measured using electromyography (EMG). Operation times and tumor and flap diameters were measured. Weber's static two-point discrimination (s-TPD) and cold intolerance were assessed for determination of flap sensation at the first week, month, and year. In the first postoperative year, patients were asked to drink fruit juice with a pipette for assessment of flap leakage and motor function. In addition, a written survey was administered at the end of the first postoperative year

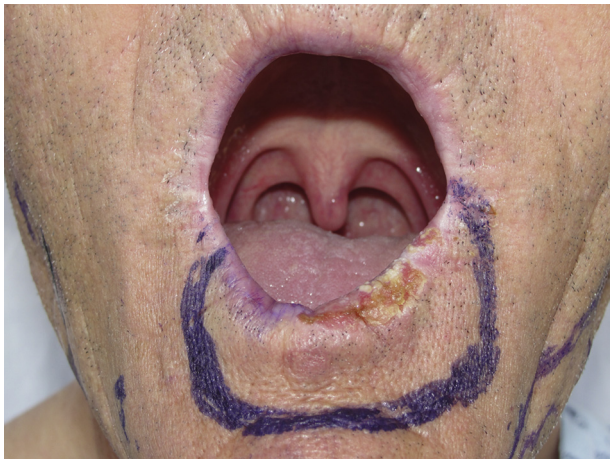

Fig. 2. 72-year-old male patient; appearance of tumor on lower lip, 4.4 × 2.3 cm.

to evaluate patient satisfaction, sagging neck skin, neck mobility, and eating quality. The all patients were followed up at least sixteen months.

4. Microstomy assessment

Two methods were used to assess microstomy: 1) paper ruler, 2) evaluation of preoperative and postoperative digital images using image analysis software (Image Pro Express version 4.5.1.3., 2002, Media Cybernetics Inc., U.S.A.). Photos were taken with a digital camera (Sony Cybershot DSC-T300) at 40 cm distance from the patients. The length between the two commissures was measured by these two methods when the mouth was opened and closed.

5. Electrophysiological recordings

For each patient, EMG recordings were made three times from the branch of the facial nerve, which innervates the platysma muscle. The platysma muscle was stimulated supra-maximally (intensity 10 V, duration 0.05 ms, frequency 1 Hz, range 0.5–5000 Hz, sampling rate 40 kHz/s) with a Biopac MP-30 stimulator (BIOPAC Systems, Inc.,

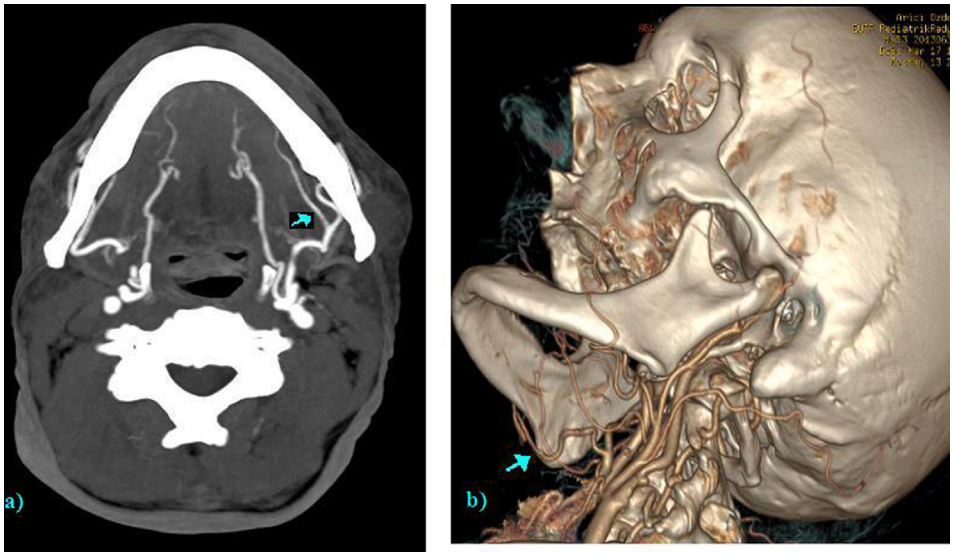

Fig. 1. a) Green arrow shows submental artery on tomography; b) Green arrow shows submental artery on 3D tomography.