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Functional lower lip reconstruction with the modified Bernard–Webster flap



Rafael Denadai, Cassio Eduardo Raposo-Amaral,
Celso Luiz Buzzo, Cesar Augusto Raposo-Amaral*

Institute of Plastic and Craniofacial Surgery, SOBRAPAR Hospital, Campinas, São Paulo, Brazil

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KEYWORDS

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Summary *Background:* Lower lip defects after squamous cell carcinoma (SCC) excisions have been repaired by several surgical techniques. However, the functional reconstruction of full-thickness defects of the lower lip remains a therapeutic challenge. We therefore evaluated functional results of the modified Bernard–Webster flap for the reconstruction of full-thickness lower lip defects after SCC excisions.

Methods: A prospective study was performed on all patients with lower lip full-thickness defects after SCC excisions greater than 1/3 of the lip, reconstructed with the modified Bernard–Webster flap in 2011–2013. Functional (sphincter, motor, and sensory functions) postoperative results were evaluated according to criteria previously adopted.

Results: Twelve lower lip defects were reconstructed without complications, except for two (16.7%) wound dehiscence successfully managed. Ten (83.3%) patients presented transient and permanent functional abnormalities in the recent and late postoperative assessments. Ten (83.3%) patients classified the late functional results as satisfactory.

Conclusions: The modified Bernard–Webster flap proved to be an excellent alternative to repair full-thickness lower lip defects with more than 1/3 of the lower lip length, as it allowed the use of similar neighboring tissues, could be performed in one stage, and was functionally effective.

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* Corresponding author. Institute of Plastic and Craniofacial Surgery, SOBRAPAR Hospital, Av. Adolpho Lutz, 100, Caixa Postal: 6028, Campinas, São Paulo CEP: 13084-880, Brazil.

E-mail address: cesaragustoraposo@hotmail.com (C.A. Raposo-Amaral).

Introduction

Squamous cell carcinoma (SCC) is the most common malignancy of the lower lip, and depending on its size, can be infiltrative and destructive.¹ Surgical excision with tumor-free margins may cause a major defect that requires complex surgical reconstruction.^{1–3} Therefore, appropriate preoperative planning and choosing a meticulous surgical technique are essential to recreate an aesthetically pleasing and functional lower lip.^{1–3} Considering a wide variation of soft-tissue tumor compromise, each surgical approach should be selected according to the extent, location, and thickness of the lower lip defect.^{2,3}

Full-thickness defects larger than 1/3 of the lower lip length require complex reconstructive procedures such as described by several authors.^{4–10} In 1845, Dieffenbach⁴ was the first to suggest the reconstruction of lower lip defects using the medial advancement of bilateral cheek flaps. Bernard,⁶ in 1853, described a bilateral Burow's triangle full-thickness resection in the nasolabial fold, allowing the medial advancement of cheek flaps. In 1960, Bernard's surgical approach⁶ was modified by Webster⁹; the triangular resection became of partial thickness, and the mucosal flaps were applied to either reconstruct the lip vermilion or to advance the paranasal skin region, using principles previously described by Schuchardt.¹¹ Since then, the Bernard–Webster flap⁹ with further technical modifications has been used in lower lip reconstructions worldwide.^{2,6,12–21}

Interestingly, divergent functional outcomes have been described after modified^{16,18–21} Bernard–Webster's⁹ techniques, namely Fries'¹⁵ modification (a curved incision in the labiomental fold and an excision of Burow's triangles in the submental region) and Wechselberger's¹⁶ modification (preservation of the innervated muscle fibers of the oral orbicularis muscle by dissection and careful tissue handling, without complete muscle transection at the level of the commissures). As the modifications proposed by Fries¹⁵ were not directly focused on the sensory and muscle components of lower lip function, we hypothesized that the technical refinements described by Wechselberger et al.,¹⁶ could determine satisfactory functional results in the postoperative assessments.

The purpose of the study was to evaluate the functional results after lower lip reconstruction using the modified¹⁶ Bernard–Webster flap.⁹

Methods

A prospective study of consecutive patients with full-thickness lower lip defects with more than 1/3 of lower lip length after SCC excision, and who underwent lower lip reconstruction with the modified¹⁶ Bernard–Webster flap,⁹ was conducted at a single plastic and craniofacial surgery unit between 2011 and 2013. Demographic, clinical, and surgical data were collected via medical records, clinical photographs, and interviews with all patients. All patients with the following criteria were excluded from the study: partial-thickness lower lip defects, lower lip defects with less than 1/3 of the lower lip length, and/or incomplete medical records/follow-up. Patients with a medical history

that could interfere with the sensitivity of the perioral region (diabetes mellitus, previous facial trauma, prior perioral surgical intervention, and established neurosensory disorders) were also excluded.

All subjects were enrolled upon a signed consent form, in accordance with the Helsinki Declaration of 1975, as amended in 1983. A local institutional research ethics board approval was obtained for this study.

Surgical approach

In our center, all full-thickness lower lip defects with more than 1/3 of the lower lip length after SCC excisions and with no oral commissure involvement have been reconstructed with the modified¹⁶ Bernard–Webster flap.⁹ Besides the traditional Bernard–Webster principles,⁹ the preservation of the muscles constituting the modiolus was the modification¹⁶ adopted in all patients. In summary, spreading of orbicularis oris muscles and surrounding muscles with delicate scissors along their fibers allowed perioral soft tissue advancement with preservation of muscle innervations.¹⁶ Unilateral or bilateral flaps have been adopted based on the location of the lower lip defects (predominantly lateral defects or predominantly central defects, respectively), and all lower lip defects have been stratified according to the quantification method described by Jeng et al.²²

Functional assessments

Functional results were investigated during each post-surgery visit (7, 14, 21, 30, and 60 days postoperatively and then every three months). The standardized clinical examination consisted of an evaluation of the orbicular ring function including: opening the mouth, pouting the lips, lip at rest for lip continence, speech, and neurosensitivity according to similar previous investigations.^{8,20,21,23} Oral continence (incompetence, sialorrhoea at rest, sialorrhoea formed with fluid intake, and complete competence) and lip mobility (symmetric/asymmetric by observing pouting and mouth-opening movements) were verified according to a previous study.²¹ The speech was evaluated during conversations with all patients, and all patients were questioned about their difficulties with oral communication after lower lip surgery.²³ Self-assessment of altered sensation was classified as hypoesthesia present or hypoesthesia absent.²¹ The objective neurosensory evaluations of the cheek, nasolabial folds, upper and lower lips, and chin regions were tested by determination of the light touch threshold detection with *Semmes–Weinstein* monofilaments (North Coast Medical, Inc., San Jose, CA, USA), according to the previously described standard method.^{24,25} Both sides of the face were tested separately, and the *Semmes–Weinstein* monofilament 3.22 was adopted as the upper limit of normality for the threshold detection of the anatomical sites investigated.^{24,25} All patients were tested pre- and postoperatively. The neurosensory impairment was defined as “abnormal test” in the postoperative period. The permanent neurosensory deficit was defined as “abnormal clinical test” with at least 12 months postoperatively.^{24,25} All patients were questioned

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