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Reconstruction of a Subtotal Lower Lip Defect Following Squamous Cell Carcinoma Resection Using a Modified Bernard-Webster Flap: A Case Report

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Abstract

Extensive lower lip defects following oncologic resection present significant reconstructive challenges due to the anatomical and functional complexity of the perioral region. Restoration of oral competence, adequate mucosal lining, and acceptable aesthetic appearance are essential objectives, particularly when the oral commissure is involved. We report the case of a 73-year-old man with a moderately differentiated squamous cell carcinoma of the lower lip measuring 5 × 2.5 × 2 cm. Oncologic resection, including the involved orbicularis oris muscle, resulted in a subtotal full-thickness lower lip defect involving more than 80% of the lower lip and the left oral commissure, with approximately 1 cm of lower lip tissue preserved adjacent to the right commissure. Reconstruction was performed using a modified Bernard-Webster technique with bilateral cheek advancement flaps facilitated by crescent-shaped cutaneous releasing excisions. The vermilion and mucosal lining were reconstructed through advancement of the remaining labial mucosa. The immediate postoperative appearance demonstrated restoration of lower lip continuity and reconstruction of the affected commissural region. Partial oral incompetence was initially observed; however, at the two-month follow-up, the patient was able to speak, eat, and chew without significant difficulty. Complete restoration of oral sphincter function could not be objectively established. This case suggests that modified Bernard-Webster reconstruction combined with local mucosal advancement may represent a useful option for selected extensive lower lip defects involving the oral commissure. Longer-term follow-up and objective functional assessments are needed to evaluate reconstructive outcomes.

Categories: Plastic Surgery, General Surgery, Oncology
Keywords: bernard-webster flap, cheek advancement flap, lower lip reconstruction, oral commissure, oral competence, squamous cell carcinoma

Introduction

Squamous cell carcinoma (SCC) is a common malignancy of the lip, with approximately 88% of cases involving the lower lip, according to a population-based study [1]. Although surgical excision provides oncologic treatment, extensive resections may produce complex defects that compromise oral competence, speech, mastication, and facial appearance. Reconstruction must therefore restore the cutaneous, vermilion, and mucosal components while maintaining an adequate oral aperture and functional perioral structures [2,3].

The lower lip plays a central role in oral sphincter function, primarily through the coordinated activity of the orbicularis oris muscle and adjacent perioral musculature. This mechanism contributes to lip closure, saliva retention, speech articulation, and food containment during mastication. Extensive full-thickness defects may disrupt muscular continuity and compromise oral competence, particularly when the oral commissure is involved. Reconstruction must therefore address both tissue replacement and the functional consequences of muscular and commissural loss [2].

Reconstructive options depend on defect size, depth, commissural involvement, and the availability of residual lip tissue. Small defects may be managed through primary closure, whereas extensive full-thickness defects generally require local or free flaps [3-5]. The Bernard-Webster technique uses adjacent cheek tissues to reconstruct large lower lip defects, with releasing incisions facilitating tissue advancement. Several modifications have been described to improve tissue mobility, reduce closure tension, and optimize functional and aesthetic outcomes [6,7].

In the present case, oncologic resection of a tumor infiltrating the orbicularis oris muscle resulted in a subtotal full-thickness lower lip defect involving the left oral commissure, with only a small segment of the lower lip preserved adjacent to the right commissure. Given the extent of muscular and commissural tissue

loss, a modified Bernard-Webster approach was selected. Bilateral cheek advancement was facilitated by crescent-shaped cutaneous releasing excisions, while the remaining labial mucosa was advanced to reconstruct the vermilion and mucosal lining. Rather than introducing an entirely novel technique, this case demonstrates the application of established Bernard-Webster principles to a complex defect involving substantial muscular loss and unilateral commissural resection.

Case Presentation

A 73-year-old male patient presented with a progressively enlarging lesion involving the lower lip. The lesion initially appeared as an asymptomatic nodule approximately 18 months before presentation and gradually increased in size. Over time, the patient developed mild localized pain and occasional minor bleeding. The tumor measured 5 × 2.5 × 2 cm and exhibited an extensive ulcerated and exophytic appearance (Figure *1A*).

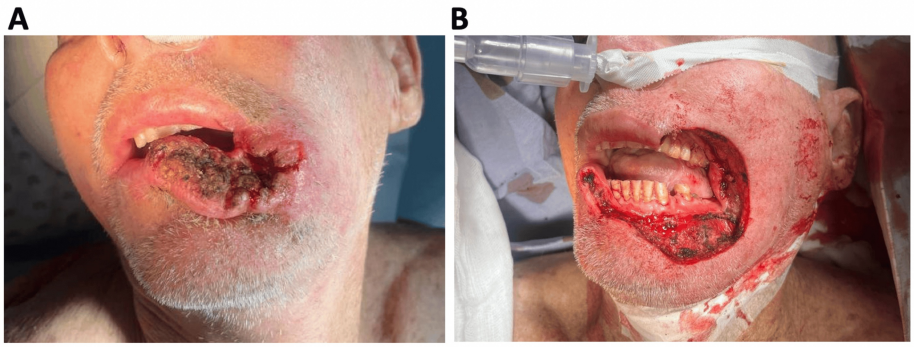


FIGURE 1: Preoperative tumor appearance and post-resection lower lip defect

(A) Preoperative clinical photograph showing an extensive ulcerated and exophytic lesion involving the lower lip. (B) Intraoperative photograph demonstrating a subtotal lower lip defect following oncologic resection, with involvement of the left oral commissure and preservation of a small segment of the lower lip adjacent to the right oral commissure.

Histopathological examination revealed a moderately differentiated SCC of the lower lip. Intraoperative assessment revealed tumor infiltration of the orbicularis oris muscle, requiring its resection as part of the oncologic procedure. Following oncologic resection, a subtotal full-thickness lower lip defect involving more than 80% of the lower lip and extending to the left oral commissure was identified. Approximately 1 cm of the lower lip was preserved adjacent to the right oral commissure, which remained intact (Figure *1B*). Final histopathological examination confirmed negative surgical margins.

Reconstruction was performed using a modified Bernard-Webster technique involving bilateral cheek advancement flaps. Crescent-shaped cutaneous releasing excisions were used to facilitate mobilization of the adjacent cheek tissues toward the defect (Figure *2A*). Bilateral advancement of the mobilized tissues allowed reconstruction of the lower lip and the affected left oral commissure, restoring continuity of the perioral structures (Figure *2B*). The remaining lower lip mucosa was advanced to reconstruct the vermilion and mucosal lining. The deeper tissue layers and mucosa were approximated using 3-0 Vicryl sutures, while skin closure was performed using 4-0 nylon sutures.

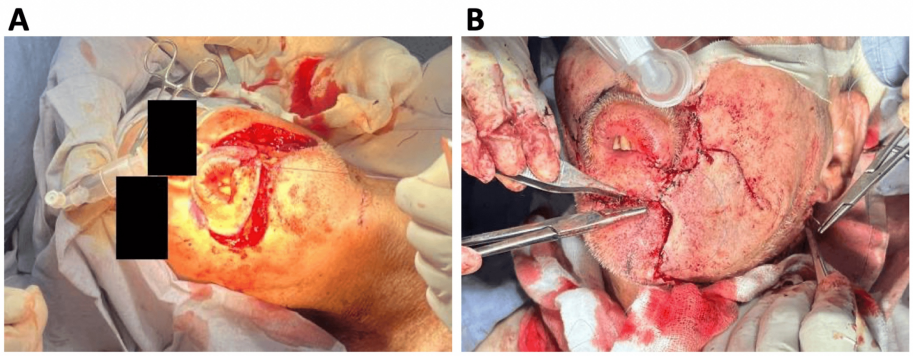


FIGURE 2: Modified Bernard-Webster flap design and reconstruction

(A) Surgical design showing bilateral cheek advancement flaps and crescent-shaped cutaneous releasing excisions. (B) Intraoperative reconstruction of the lower lip and affected commissural region using bilateral cheek advancement and the remaining labial mucosa.

The immediate postoperative appearance demonstrated restoration of lower lip continuity following reconstruction (Figure *3*). A schematic illustration of the modified Bernard-Webster technique, highlighting the post-resection defect, bilateral crescent-shaped releasing incisions, advancement of the remaining labial mucosa, and final reconstruction, is provided in Figure *4*. The patient experienced satisfactory postoperative recovery. Partial oral incompetence was initially observed, with progressive improvement during subsequent follow-up. At the two-month follow-up, the patient was able to speak, eat, and chew without significant difficulty.



FIGURE 3: Immediate postoperative appearance

Immediate postoperative appearance following modified Bernard-Webster reconstruction, demonstrating restoration of lower lip continuity and reconstruction of the left oral commissure.

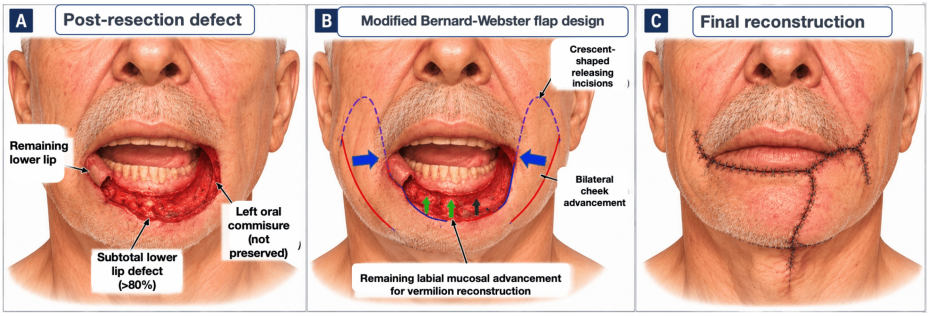


FIGURE 4: Schematic illustration of the modified Bernard-Webster technique for subtotal lower lip reconstruction

(A) Subtotal full-thickness lower lip defect involving more than 80% of the lower lip, with loss of the left oral commissure and preservation of a small segment of the lower lip adjacent to the right commissure. (B) Modified Bernard-Webster flap design showing bilateral crescent-shaped releasing incisions, cheek advancement, and advancement of the remaining labial mucosa for vermilion and mucosal reconstruction. (C) Schematic representation of the final reconstruction following bilateral cheek advancement and restoration of lower lip continuity.

The illustration is schematic and is intended to demonstrate the principal steps of the reconstructive technique rather than reproduce the exact intraoperative anatomy.

Figure Credit: The authors used ChatGPT (OpenAI, San Francisco, CA, USA) to enhance intraoperative photographs from the reported surgical case. The content and scientific accuracy of the figure were reviewed and verified by Dr. Regina Gallardo Santiago.

Discussion

Reconstruction of extensive lower lip defects requires a balance between adequate tissue replacement, oral competence, preservation of the oral aperture, and aesthetic symmetry. These objectives are particularly challenging when most of the lower lip and an oral commissure are involved [2,5]. In the present case, resection of a moderately differentiated SCC measuring 5 × 2.5 × 2 cm resulted in a subtotal full-thickness defect involving the left commissure, with approximately 1 cm of lower lip tissue preserved adjacent to the right commissure. Tumor infiltration of the orbicularis oris muscle required muscular resection, further increasing the functional complexity of reconstruction.

Reconstructive planning should consider not only defect dimensions but also commissural involvement, residual lip tissue, patient age, and available adjacent tissues. Park et al. proposed an algorithm using a 50% defect threshold to guide reconstructive selection [3]. Russo et al. further emphasized individualized approaches in elderly patients, considering surgical complexity and functional requirements [4]. In this patient, the extensive tissue loss, orbicularis oris involvement, and unilateral commissural resection supported the selection of a technique capable of recruiting substantial adjacent tissue.

The Bernard-Webster technique is an established option for extensive lower lip reconstruction. Bilateral cheek advancement provides local tissue for closure, while releasing incisions facilitate mobilization and reduce tension. Seo et al. reported successful reconstruction using Webster modifications of the Bernard operation, although postoperative drooling, paresthesia, and secondary commissuroplasty were necessary in some patients [6]. These findings highlight the distinction between anatomical restoration and complete functional recovery.

Modifications of the Bernard-Webster technique aim to improve tissue distribution and preserve perioral function. Brougham and Adams described the incorporation of tissue from traditional Burow triangles into V-Y advancement flaps to reduce cheek shortening [7]. More recently, Li et al. reported a modiolus-preserving modification in 16 patients, with successful reconstruction and favorable functional outcomes [8]. Although these studies support the versatility of the technique, their results cannot be directly generalized to reconstructions involving different patterns of commissural or muscular resection.

In the present case, bilateral cheek advancement was facilitated by crescent-shaped cutaneous releasing excisions. Similar to the releasing excisions used in conventional Bernard-Webster reconstruction, these incisions allowed mobilization of the adjacent cheek tissues toward the defect. Their crescent-shaped configuration represented an adaptation of established tissue advancement principles rather than a fundamentally different surgical approach. The advanced tissues restored lower lip continuity and reconstructed the affected commissural region. The vermilion and mucosal lining were reconstructed through advancement of the remaining labial mucosa. This combination provided cutaneous and mucosal coverage using adjacent tissues, an important consideration in full-thickness lip reconstruction [2,6].

However, the extent of muscular and neurovascular preservation could not be determined from the available operative information.

Alternative options include Karapandzic, Abbe, Estlander, nasolabial, and free flaps. The Karapandzic technique preserves innervated musculocutaneous tissue and may maintain oral sphincter function. Patel and Cook reported reconstruction of defects involving 20%-95% of the lower lip, with preserved oral competence in their series [9]. Nevertheless, potential limitations include reduced oral aperture and commissural distortion. The selection between Karapandzic and Bernard-Webster reconstruction should therefore be based on individual defect characteristics rather than size alone.

Commissural involvement adds functional and aesthetic complexity. Bansal et al. described bilateral nasolabial flaps for subtotal lower lip defects involving the commissure [10]. Furthermore, Hassan et al. identified commissural resection as a factor associated with postoperative oral incompetence in a retrospective analysis of lip reconstruction following cancer resection [11]. These observations are particularly relevant to the present patient, whose left commissure was included in the oncologic defect.

Free tissue transfer, including radial forearm and anterolateral thigh flaps, may be necessary when local tissues are insufficient. Although these techniques provide substantial tissue coverage, restoration of dynamic oral sphincter function remains challenging [5]. In selected patients, local cheek advancement offers an alternative without the additional complexity of microsurgical reconstruction.

Functional outcomes remain central to evaluating reconstructive success. Potential complications include microstomia, sialorrhea, sensory disturbances, wound dehiscence, and flap-related complications. Kumar et al., in a systematic review, reported a mean complication rate of approximately 8% following local-flap lip reconstruction, while emphasizing variability in outcome reporting [12]. In the present case, partial oral incompetence was initially observed, followed by clinical improvement during subsequent follow-up. At the two-month follow-up, the patient was able to speak, eat, and chew without significant difficulty, indicating favorable early functional recovery. However, the degree of residual oral incompetence was not formally assessed, and standardized measurements of oral sphincter function were not available. Therefore, complete restoration of oral competence could not be objectively established.

The main limitations of this report include the lack of objective measurements of oral aperture and sphincter function, the relatively short follow-up period, and the absence of postoperative photographic documentation beyond the immediate period. Nevertheless, this case illustrates the applicability of bilateral cheek advancement in a modified Bernard-Webster configuration, complemented by labial mucosal advancement, for reconstruction of a subtotal full-thickness lower lip defect with unilateral commissural involvement.

Conclusions

Reconstruction of subtotal full-thickness lower lip defects with oral commissure involvement remains a significant surgical challenge. The modified Bernard-Webster technique, combined with advancement of the remaining labial mucosa, may represent a useful reconstructive option for restoring lower lip continuity, vermilion, and mucosal lining using adjacent tissues. In the present case, this approach achieved anatomical reconstruction of an extensive oncologic defect involving orbicularis oris resection. Although partial oral incompetence was initially observed, the patient demonstrated clinical improvement and was able to speak, eat, and chew without significant difficulty at the two-month follow-up. However, complete restoration of oral sphincter function could not be objectively established. This case highlights the potential applicability of individualized local cheek advancement in selected patients. Longer-term follow-up, objective functional assessments, and evaluation in additional patients are needed to better determine functional and aesthetic outcomes.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Acquisition, analysis, or interpretation of data: Sergio Morales Acosta

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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