Oral cancers occasionally involve the lip and corners of the mouth, requiring aggressive resection. In such situations, it is imperative to reconstruct the intraoral defect, lips, and corners of the mouth simultaneously in a single stage. For coverage of partial lower lip defects, reconstructive options based on the upper lip like the Abbe and Estlander flaps are routinely used. However, local flaps of the lips are usually insufficient for reconstruction of the oral cavity. Therefore, in cases requiring both oral and lip reconstruction, a combination of local skin flaps for lip reconstruction and free flaps for oral and external skin coverage may be necessary. In this report, we describe a case of oral carcinoma requiring resection of the buccal mucosa, buccal skin, and corner of the mouth caused by wide excision of invasive cancer.

**CASE REPORT**

A 70-year-old man presented with a persistent oral mucosal ulcer. His medical history was positive for hypertension, smoking, and alcohol consumption. On examination, a 4-cm × 3-cm bleeding ulcer with raised contour was identified, which was diagnosed as a squamous cell carcinoma after incisional biopsy. Tumor resection included combined resection of the corners of the mouth, lips, and cheek skin, and neck dissection. The patient underwent reconstructive surgery using an extended upper lip flap combined with an Estlander flap and a free anterolateral thigh flap. Two months after surgery, the patient was able to consume regular food. At 24 months of follow-up, the patient was able to speak normally without any restrictive symptoms such as fluid leakage from the corner of the mouth. Lip sensation restoration was optimal. This method using the combination of an anterolateral thigh flap and extended Estlander flap is a markedly useful option for reconstructive surgery of defects around the corner of the mouth caused by wide excision of invasive cancer.
defect, and resection of one-third of the upper lip and one-half of the lower lip. A 15 × 6-cm ALT flap, which included a total of five perforators, was harvested with some of the muscle attached to the proximal end of the pedicle. The ALT fascia was sutured to the masseter muscle in the oral cavity with 4-0 polydioxanone sutures, and then the ALT skin islands were sutured to the oral mucosa with 4-0 polydioxanone mattress sutures. Next, a Doppler blood flowmeter was used to confirm the presence of the facial artery and superior labial artery on the unaffected side. A traditional Estlander flap was designed in the proximity of the defect.

For the entire upper lip advancement flap, the incision line was designed along the columnellar base and the base of the nasal wing toward the contralateral nasolabial fold. The full thickness of the upper lip was elevated as the local flap. The vermilion border, including the superior labial artery, was preserved, and the Estlander flap was elevated. The orbicularis oris muscle was sewn to the anterior nasal spine. The superior thyroid artery and the internal and external jugular vein were used as recipient vessels.

After confirming the position of the mouth angle on the affected side created by the Estlander flap, a small part of the ALT skin was de-epithelialized and the Estlander flap was then sutured over the de-epithelialized ALT flap. (See figure 1, Supplemental Digital Content 1, which demonstrates intraoperative findings. http://links.lww.com/PRSGO/C168.) The Estlander flap and ALT were sutured for the buccal skin defect with Gambee suture to hermetically seal the oral cavity (Fig. 1). The fascia of the ALT flap was sutured to the zygomatic bone periosteum, so the flap could pull the neo-commissure laterally, preventing further stricture of the oral sphincter (See figure 1, Supplemental Digital Content 1, http://links.lww.com/PRSGO/C168).

The immediate postoperative period was uneventful. Two months after the surgery, the patient was able to consume regular food. The patient was able to speak normally without leakage from the mouth corner. The patient reported normal speech and deglutition 23 months after surgery with almost normal lip sensation. (See figure 2, Supplemental Digital Content 2, which demonstrates dynamic range for oral aperture. http://links.lww.com/PRSGO/C169.)

**DISCUSSION**

Although local flaps can provide up to 80% functional muscle and soft tissue coverage of lip defects, a free or pedicled flap may perform better to avoid lip deformity. Nowadays, the forearm free flap is considered gold standard in reconstruction of large lip defects. However, when malignant tumors that originate in the oral cavity invade the lips and corner of the mouth, such as oral mucosal or inferior gingival carcinoma, reconstruction of both the oral cavity and lips is required. In these cases, the volume of the forearm flap may be insufficient, making the reconstruction more difficult.

In our case, we chose ALT free-flap-based reconstruction to provide sufficient volume coverage of the extensive defect involving the buccal mucosa, defect of the mouth corner and lip, and defect of the buccal skin. The combined ALT-Estlander approach, along with innervation from the healthy side, ensured that the continuity of the orbicularis oris muscle was not disrupted, achieving optimal lip function during follow-up without any reported problems associated with lip movement during conversation and feeding.

In cases where volume coverage of the defect is the priority in primary surgery and 6 months follow-up reveals discrepancy in mouth movement, our team usually considers a revision procedure in the form of facial nerve reconstruction. Functional muscle flaps have been used as an alternative method, particularly using the gracilis muscle flap. The gracilis flap allows for symmetrical lower lip movement and maintains the contour of the oral commissure. Among other methods, muscle bow traction can also be implemented, which is a concept of transverse suspension for facial palsy. In this method, a sling around the masseter is used to pull the oral commissure laterally and backward by the restoring force of the muscle when the jaws are clenched. Sasaki et al used this method in combination with a free flap to reconstruct the lips and reported good functional reconstruction. In our case, we partially sutured the fascia of the ALT flap to the masseter muscle and then sutured the de-epithelialized ALT skin paddle under the corner of the mouth following reconstruction with the Estlander flap. As a result, the fully reconstructed oral commissure moved slightly laterally and backward.

**CONCLUSIONS**

In this case, we were able to reconstruct the buccal skin, including the corners of the mouth and the oral mucosa, with a combination of ALT and Estlander flaps. Good
speaking and eating functions were retained. We believe that this technique will be an effective option for similar cases.

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PATIENT CONSENT
The patient was properly informed and gave written consent for the study and use of photographs.

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