Original Article* / *Çalışma - Araştırma

Fujimori gate flap: an old flap for reconstruction of lower lip defects due to lower lip carcinoma resection

Fujimori gate flep: Alt dudak karsinomunun rezeksiyonu nedeniyle oluşan alt dudak defektlerinin rekonstrüksiyonunda eski bir flep

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Objectives: This study aims to present our clinic experiences on the Fujimori gate flap used for reconstruction of lower lip defect due to lower lip carcinoma.

Patients and Methods: This retrospective study included 19 patients (7 females, 12 males; mean age 60.3 years; range 41 to 79 years) who underwent reconstruction with the Fujimori-gate flap between January 2006 and March 2011. Demographic features of all patients and postoperative long-term functional and aesthetic results were reviewed.

Results: The mean size of the defects was 34.2 mm (range, 10 to 60 mm). Totally 27 flaps were elevated. No complication was observed after surgical procedure. In the long-term, nine patients underwent minor revisions. None of the patients showed local recurrence.

Conclusion: Fujimori gate flap may be used for the reconstruction of the soft tissue loss after tumor surgery at lower lip.

Key Words: Gate flap; lip reconstruction; lower lip cancer.

Amaç: Bu çalışmada alt dudak karsinomuna bağlı alt dudak defektlerinin rekonstrüksiyonunda kullanılan Fujimori gate flebi ile ilgili klinik deneyimlerimiz sunuldu.

Hastalar ve Yöntemler: Ocak 2006 - Mart 2011 tarihleri arasında Fujimori gate flep ile rekonstrükte edilmiş 19 hasta (7 kadın, 12 erkek; ort. yaş 60.3 yıl; dağılım 41-79 yıl) bu retrospektif çalışmaya alındı. Tüm hastaların demografik özellikleri ve ameliyat sonrası uzun dönem fonksiyonel ve estetik sonuçları incelendi.

Bulgular: Ortalama defekt boyutu 34.2 mm (dağılım, 10-60 mm) idi. Toplam 27 flep eleve edildi. Ameliyattan sonra hiçbir komplikasyon izlenmedi. Dokuz hastaya uzun dönemde minör revizyon uygulandı. Hiçbir hastada lokal nüks meydana gelmedi.

Sonuç: Fujimori gate flep alt dudak tümörlerinin cerrahisi sonrası gelişen doku kayıplarının rekonstrüksiyonunda kullanılabilir.

Anahtar Sözcükler: Gate flep; dudak rekonstrüksiyonu; alt dudak kanseri.

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Lip cancer is one of the primary disorders that requires total lower lip reconstruction by plastic surgeons. Lip cancer is one of the most common cancers of the head and neck region and it accounts for about 25-30% of all oral cavity cancers.[1] The most important risk factors in its pathogenesis are solar radiation, smoking, and viral agents such as human papillomavirus.[2,3] After resection of the tumor, the closure should be done with ideal tissue which contains the same features as the mouth. A broad spectrum of methods, including primary repair, grafting, and the use of local, regional, or distant flaps have been reported about lower lip defect reconstruction.[4] Of these choices, the Fujimori gate flap has been confirmed as an effective and functional flap for closure of lower lip defects of all sizes from small to large. This retrospective study investigated 19 patients who had undergone reconstruction with the Fujimori gate flap between January 2006 and March 2011.

PATIENTS AND METHODS

Between January 2006 and March 2011, 19 patients (7 females, 12 males; mean age 60.3 years; range 41 to 79 years) presented at our clinic with lower lip squamous cell cancer (SCC). Patient complaints included non-healing wounds, size and contour changes, and pigmentation differences at the lesion (Figure 1). Incisional biopsies and physical examination were performed and led to the diagnosis of SCC. All patients underwent operations under general anesthesia. Routine blood counts, biochemistry, bleeding parameters, hepatitis tests, electrocardiograms, and chest

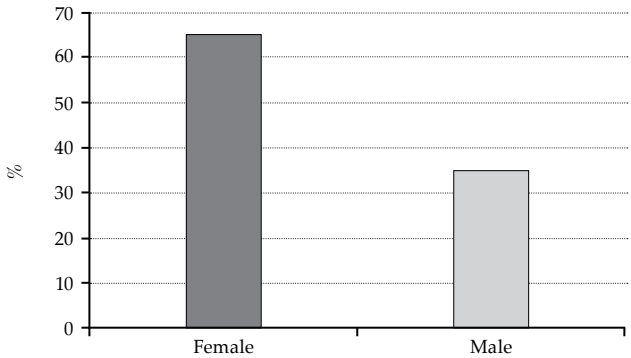

Figure 1. *The graphic distribution of patients according to the sex.*

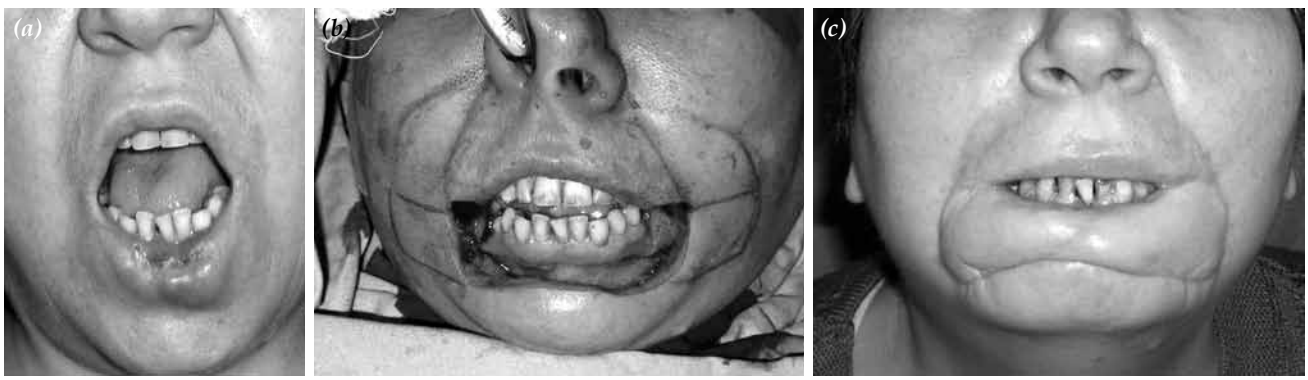

Figure 2. *Reconstruction of total lower lip defect with bilateral Fujimori gate flap;* ***(a)*** *Preoperative view of the lesion.* ***(b)*** *The design of the bilateral flaps.* ***(c)*** *The view of the flaps at postoperative 12th months (Patient 2).*

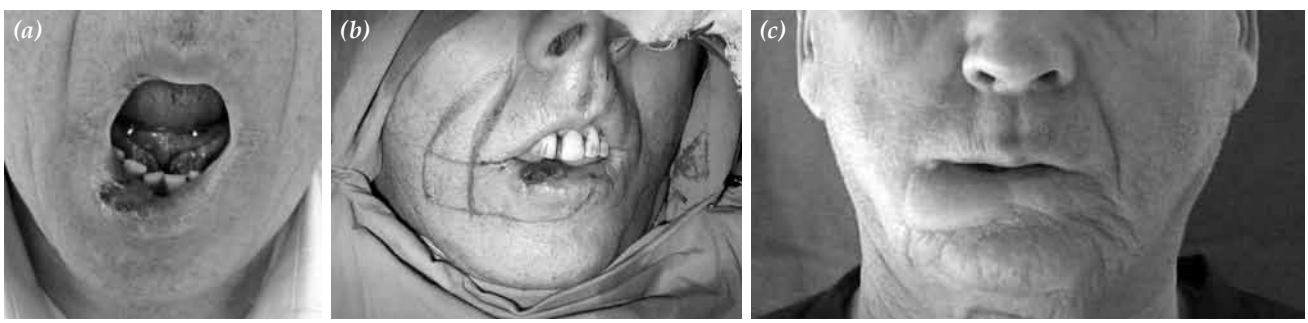

Figure 3. *Reconstruction the lower lip defect with right angular artery based Fujimori gate flap;* ***(a)*** *Preoperative view of the lesion.* ***(b)*** *Intraoperative view of the flap.* ***(c)*** *Reconstruction the lower lip defect with right Fujimori gate flap; the view of the flaps at postoperative 12th months (Patient 9).*

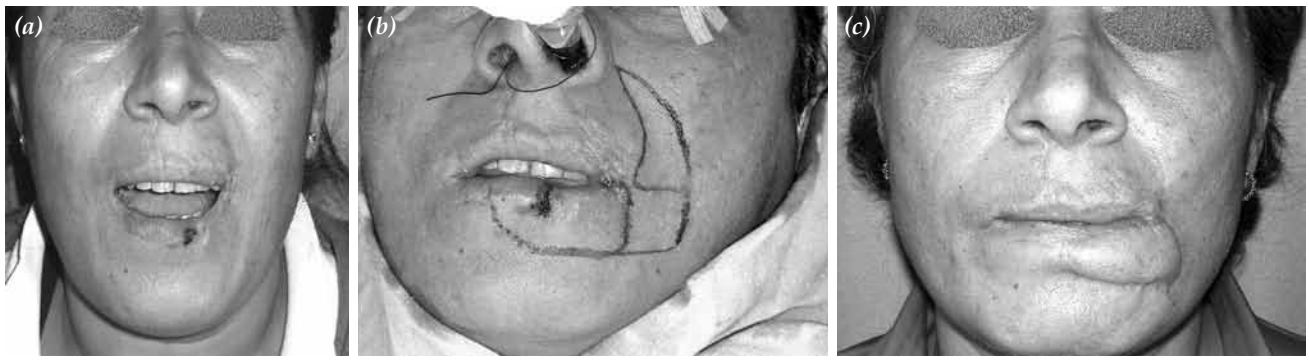

Figure 4. *Left angular artery based Fujimori gate flap;* ***(a)*** *Preoperative view of the lesion.* ***(b)*** *Intraoperative design of the resection and the flap.* ***(c)*** *The view of the flaps at postoperative sixth months (Patient 16).*

X-rays were performed before surgery. All neck ultrasounds were reported as reactive, except in one patient. Patients with normal preoperative tests were placed under general anesthesia, with 20 mg/ml, 0.0125% lidocaine + epinephrine solution used as a local anesthetic. A 1 cm safety margin was also removed during the excision of the lesions. Resection was performed according to the gate flap procedure. A bilateral or unilateral flap was planned according to the size of the defect (Figure 2-5). The triangle flap was designed at the nasolabial sulcus. It was composed of mucosa-muscle-skin. The flap was elevated carefully to avoid damage

Figure 5. ***(a)*** *Bilateral Fujimori gate flap; preoperative view of the lesion.* ***(b, c)*** *Bilateral Fujimori gate flap; intraoperative view of the flaps.* ***(d)*** *Bilateral Fujimori gate flap; the view of the flaps at postoperative 12^{ih} months (Patient 5).*

Table 1. The table of demographic distributions of the patients

Patient number	Age/ gender	Country	Smoking history	Bad oral hygiene	Diameters of lesion (mm)	Lymphadenopathy	Follow-up time (months)	Design of the flap	Revision	Tumor differantiation
1	59/M	Ankara	Yes	Yes	40	Yes	54	Right unilateral	Yes	Good
2	54/F	Eskişehir	No	Yes	60	No	54	Bilateral	Yes	Good
3	57/F	Ankara	Yes	Yes	30	Yes	36	Left unilateral	No	Good
4	60/M	Aksaray	Yes	Yes	Unknown	No	48	Bilateral	Yes	Good
5	68/M	Ankara	Yes	Yes	60	No	48	Bilateral	No	Moderate
6	64/M	Çankırı	Yes	Yes	35	No	48	Left unilateral	Yes	Good
7	61/F	Ankara	No	Yes	60	Yes	36	Bilateral	No	Good
8	43/F	Ankara	No	Yes	15	No	24	Right unilateral	Yes	Moderate
9	53/M	Zonguldak	Yes	Yes	15	No	24	Right unilateral	No	Good
10	68/M	Çorum	Yes	Yes	40	Yes	24	Bilateral	No	Moderate
11	79/M	Ankara	Yes	Yes	40	No	12	Bilateral	Yes	Moderate
12	51/M	Ankara	Yes	Yes	15	Yes	12	Right unilateral	No	Good
13	66/M	Ankara	No	No	15	Yes	16	Left unilateral	Yes	Good
14	72/F	Ankara	No	No	15	No	12	Right unilateral	No	Good
15	73/M	Ankara	Yes	Yes	10	No	24	Left unilateral	No	Moderate
16	43/F	Ankara	No	No	10	Yes	48	Left unilateral	Yes	Good
17	70/F	Ankara	No	No	60	No	24	Bilateral	No	Good
18	45/M	Ankara	Yes	Yes	40	No	54	Left unilateral	Yes	Good
19	41/M	Ankara	Yes	Yes	30	No	24	Bilateral	No	Good

to Stenon's canal, and it was rotated into the defect area. The suturing was performed in three layers (mucosa-muscle-skin). After placing point sutures, the tumor tissue was sent to the pathology department. All surgical specimens were reported to have clean edges. Because of detection of a pathological lymph node on ultrasonography in one patient, neck dissection was added to the tumor surgery.

Control processes in all postoperative patients were planned at one week, one month, three months, six months, and one year.

RESULTS

Defects were between 10-60 mm in diameter, with an average size of 34.2 mm. The actual size of the lesion for one case was not known as the patient had undergone his first operation at another center. Lymphadenopathy was determined in seven patients. All of the pathologic materials were reported as SCC. The differentiations of the lesions were reported as good (n=14) and moderate (n=5) (Table 1). Localization of the lip defects was in the middle in eight patients (45%), right lateral in five patients (25%), and left lateral in six patients (30%) (Figure 6).

None of the patients showed local recurrence. During the postoperative follow-up period, nine patients underwent a minor revision. Five of these patients (55.5%) had leakage of liquid foods. Revision of these patients was performed with Z-plasty and W-plasty. An additional four patients (35.5%) had aesthetic anxiety because of a bulky flap. Defatting was performed in these patients. None of the patients had microstomia, speech disorder, difficulty with intake of solid foods, or mouth leakage while drinking (Figure 7).

DISCUSSION

Although lower lip defects can be caused by benign occurrences such as trauma, infection, vasculitis, congenital nevus, and hemangioma, most of them are caused by lower lip cancer.[5] Lip cancer is one of the most common cancers of the head and neck region and constitutes approximately 25-30% of all cancers of the oral cavity.[6] Although it is more often encountered on the lower lip (88-98%), it can occasionally be found on the upper lip (2-7%) and the commissure (2%).[7] This disease occurs primarily in older men (95%) and the incidence increases with age.[7] In our study, patients were usually in this age group and the mean age was 60.3 years. Despite this Hosal et al.[8] reported 129 patients in their study, with an average age of 46 years.

For reconstruction of a lip tissue defect, the tissue must be selected primarily from an area neighboring the defect.[9,10] Surrounding soft tissues must be used in the absence of adequate

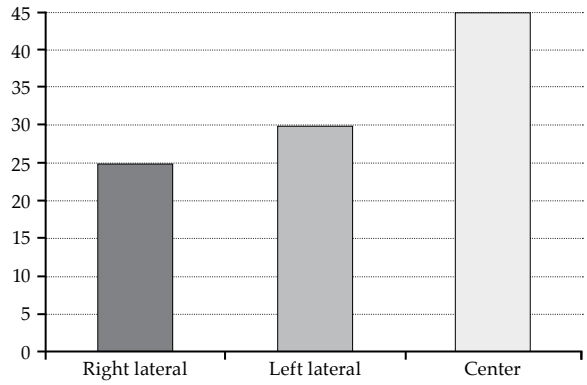

Figure 6. *The graphic distribution of the lesions according to their localizations.*

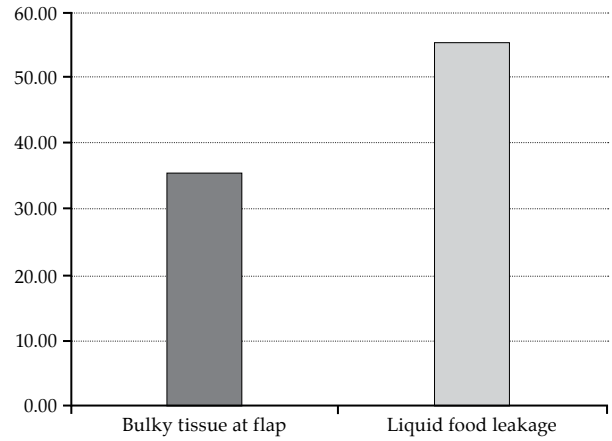

Figure 7. *The graphic distribution of postoperative causes of revisions.*

lip tissue.[9,10] Tellioğlu et al.[11] reported operating on patients with an innervated depressor anguli oris flap, with good results. Roldán et al.[12] compared lip reconstruction techniques in 63 patients with defects that covered up to one third of the lip, and found that a step technique provides better aesthetic results than wedge excision. For lip lesions covering more than two-thirds of the lip, an Abbe flap combined with the step technique gives better results. Turgut et al.[13] studied 18 patients with defects of the lower lip and applied a neuromusculocutaneous local advancement flap to close the patients' lip defects. Lip sensation and the orbicularis muscle function were preserved in these patients and satisfying aesthetic results were obtained. Yıldırım et al.[5] presented two patients who were reconstructed with a bipedicular fasciocutaneous flap that was elevated from the neck to cover the defects caused by lower lip cancer. This method is especially effective in elderly patients and patients who are undergoing neck dissection. Matteini et al.[14] designed an M-shaped flap for the reconstruction of lower lip defects. Mutaf et al.[15] restored lower lip defects in eight patients with a procedure involving a bilateral musculocutaneous unequal Z flap.

Gate flap and its modifications have been used for both upper and lower lip reconstruction. Aytekin et al.[16] used a gate flap for reconstruction of upper lip defects and their results were quite functional. Ay et al.[17] resolved the mucosal need by using the Fujimori gate flap with a mucosal mesh method in 11 patients. They reported that the mucosa healed in one week in these patients. We did not need mucosal mesh at our patients because we cut the mucosa larger than the skin during flap elevation. And no mucosal contracture occurred at long-term follow-up period.

For reconstruction of the near-total or total defects of the lower lip, different flap designs have been described in the literature. Keskin et al.[18] used a distant tissue transfer involving a radial forearm flap with a tongue flap in five patients. In 2006, Ueda et al.[19] used a free gracilis flap with a radial forearm flap for reconstruction of the lower lip defect in one patient. In the same year, Yıldırım et al.[20] performed an anterolateral thigh composite flap for the repair of defects of the lower lip in 11 patients. But all of these flap choices need preparing an extra surgical area, and they do not supply similar tissue for lip defects.

For lower lip cancer management, surgical treatment is the first-line step in many centers. The pathologic material must contain at least an 8-10 mm safety margin.[7] In addition, higher rates of local recurrence can occur after simple wedge excisions.[21,22] Local recurrence rates range from 12-15% in lesions smaller than 2 cm, but it may increase with the size of the first lesion.[23] In our clinical experience, there was no local recurrence during the mean 32.7 months follow-up period.

In our study, we used the Fujimori gate flap because it can be elevated 3 cm wider than the classic nasolabial flap, it can be rotated without dog-ear formation, it contains innervated muscle, and it is a one-stage procedure.[24] Because it is angular artery based, it is a well-vascularized flap. Therefore it can be easily performed even

in heavy smokers. Recovery time is short, and edema resolves by six months. Its color and aesthetic harmony is excellent with the face.[16] It also presents no microstomia disadvantage that restricts food intake.

In conclusion, the Fujimori gate flap is an ideal flap for lower lip reconstruction as it contains local tissues and has good aesthetic and functional results.

Declaration of conflicting interests

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