

POSSIBILITY OF USING SUBMENTAL FLAP FOR LOWER LIP RECONSTRUCTION

Danishchuk OI^{1,3}, Nazarian DN^{2,3}, Karpova EI^{1,3}, Khachatryan AA^{2,3} ✉, Razmadze SS^{2,3}

¹ Federal Clinical Center for High Medical Technologies of the Federal Medical Biological Agency, Moscow, Russia

² National Medical Research Center for Otorlaryngology of the Federal Medical Biological Agency, Moscow, Russia

³ Academy of Postgraduate Education, Federal Scientific and Clinical Centre for Specialized Types of Medical Care and Medical Technologies of the Federal Medical Biological Agency, Moscow, Russia

Head and neck reconstruction surgery is a challenging area of surgery that requires the surgeon to be familiar with various reconstructive options. Achieving both functionality and aesthetic harmony of facial proportions constitutes one of the most important aspects of the head and neck defect elimination. For that various methods are used involving application of local, regional and free flaps on vascular pedicles. The reconstructive method is selected based on the defect size, location, composition, as well as on the age, comorbidity, surgeon's and patient's preferences. Submental flap is a regional flap that has proven to be a reliable fasciocutaneous flap, the tissues of which are identical to that of the lower face in width, texture, and color. Long vascular pedicle ensures wide flap rotation arc, thereby allowing one to use the flap for elimination of defects of the upper and lower lips, mental region, tongue, floor of the mouth, and preauricular area. Damage to the donor site is minimal, it is cosmetically invisible due to the scar hidden in the mental region. The paper presents the results of surgical treatment of the 38-year-old female patient with the soft tissue defect of the lower third of the face and the lip resulting from trauma. The wound did not heal for more than six months, no improvement was observed. It was decided to eliminate the defect using a rotation submental flap. The patient was followed up for a year after surgery. We managed to achieve complete aesthetic and functional rehabilitation of the patient.

Keywords: submental flap, lip defect, regional flap, maxillofacial defects, reconstructive surgery, microsurgery, plastic surgery

Author contribution: Danishchuk OI, Nazarian DN — surgical procedure, manuscript writing and editing; Karpova EI — surgical procedure; Khachatryan AA — manuscript writing; Razmadze SS — patient management, manuscript writing.

Compliance with ethical standards: the informed consent to case study publication was submitted by the patient.

✉ **Correspondence should be addressed:** Arbak A. Khachatryan
Volokolamskoe shosse, 30, bld. 2, Moscow, 123182, Russia; drarbak@yandex.ru

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ВОЗМОЖНОСТИ ПРИМЕНЕНИЯ ПОДПОДБОРОДОЧНОГО ЛОСКУТА ДЛЯ РЕКОНСТРУКЦИИ НИЖНЕЙ ГУБЫ

О. И. Данишчук^{1,3}, Д. Н. Назарян^{2,3}, Е. И. Карпова^{1,3}, А. А. Хачатрян^{2,3} ✉, С. С. Размадзе^{2,3}

¹ Федеральный клинический центр высоких медицинских технологий Федерального медико-биологического агентства, Москва, Россия

² Национальный медицинский исследовательский центр оториноларингологии Федерального медико-биологического агентства, Москва, Россия

³ Академия постдипломного образования Федерального научно-клинического центра специализированных видов медицинской помощи и медицинских технологий Федерального медико-биологического агентства, Москва, Россия

Реконструктивная хирургия головы и шеи — сложная область хирургии, требующая от хирурга владения различными реконструктивными опциями. Одним из важных аспектов устранения дефектов головы и шеи является достижение не только функциональности, но и эстетической гармонии пропорций лица. Для этого применяют различные методы, включающие использование местных, регионарных и свободных лоскутов на сосудистой ножке. Выбор реконструктивного метода зависит от размера, локализации, состава дефекта, возраста, сопутствующей патологии, предпочтений хирурга и пациента. Субментальный лоскут — это регионарный лоскут, который зарекомендовал себя как надежный кожно-фасциальный лоскут, ткани которого идентичны таковым нижней зоны лица по толщине, консистенции и цвету. Длинная сосудистая ножка обеспечивает широкую степень ротации лоскута, что позволяет применить его для устранения дефектов верхней и нижней губы, подбородочной области, языка, дна полости рта и преддушной области. Ущерб донорской области минимален и косметически незаметен за счет скрытого в подбородочной области рубца. В статье представлен результат хирургического лечения 38-летней пациентки с дефектом мягких тканей нижней трети лица и губы, который был получен в результате травмы. Рана не заживала больше шести месяцев, положительная динамика отсутствовала. Было принято решение устранить дефект ротационным субментальным лоскутом. Послеоперационный период наблюдения за пациентом составил год. Нам удалось добиться полной эстетической и функциональной реабилитации пациента.

Ключевые слова: субментальный лоскут, дефект губы, регионарный лоскут, дефекты челюстно-лицевой области, реконструктивная хирургия, микрохирургия, пластическая хирургия

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Соблюдение этических стандартов: от пациента было получено добровольное информированное согласие на публикацию клинического случая.

✉ **Для корреспонденции:** Арбак Арманович Хачатрян
Волоколамское шоссе, д. 30, корп. 2, г. Москва, 123182, Россия; drarbak@yandex.ru

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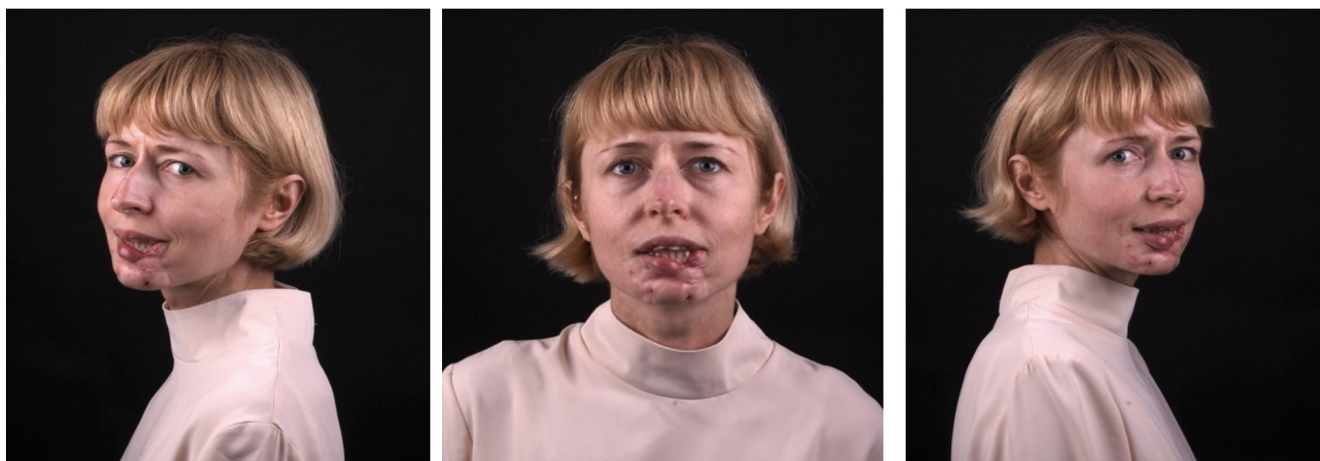


Fig. 1. Anthropometry on the day of treatment

Maxillofacial defects have a significant effect on the patients' health and quality of life. Defects of this region result primarily from injuries of different etiology, tissue resection following surgical procedures on resection of masses of different origin, blast injuries, congenital anomalies, and iatrogenic injuries.

High aesthetic value of facial zone, structural features of maxillofacial region represented by the compactly located vital structures, and functional value of this zone determine the difficulty of conducting surgical procedures involving selection of individual plan in each particular case.

Today, selection of surgical treatment for patients with facial defects implies an integrated multidisciplinary approach involving maxillofacial and plastic surgeons, thereby ensuring optimal morphofunctional and aesthetic rehabilitation of patients.

Here we provide a clinical case of complex multistage surgical treatment of the female patient with soft tissue defect in the lower third of the face (jaw and lower lip) involving the use of submental flap and subsequent local tissue correction.

Submental flap proposed by D. Martin in 1993 was selected due to its popularity among oncologists and maxillofacial surgeons commonly operating head and neck for elimination of defects of the neck, esophagus, tongue, floor of the mouth, upper and lower lips [1–3].

The flap is supplied by the submental artery, after which it was named. The submental artery being a branch of the facial artery is a reliable and consistent blood supply source. The average artery diameter is 1.7 mm. On its way the artery produces 1–4 perforator branches to the skin area of the flap, thereby enabling harvesting the flap with a skin paddle sized 18 cm (length) and 7 cm (width). Venous drainage is provided by the eponymous vein that runs into the facial vein. The average vein diameter is 2.2 mm. The vascular pedicle can be 8 cm long, which enables flap rotation up to the zygomatic arch, thereby covering most possible zones in the middle and lower face [4–5].

The advantages of the flap include reliable blood supply, invisible scar hidden in the neck area, large skin paddle and long vascular pedicle, enabling a wide arc of flap rotation [6].

Meta-analysis involving comparison of using submental flaps and free tissue transfer for elimination of oral defects showed that the use of rotation submental flap was associated with less operative time, shorter hospitalization, fewer perioperative complications [7].

There are multiple case studies, in which the rotation submental flap was used to eliminate various maxillofacial defects. In particular, such flap was used to eliminate the upper lip defect with a very good aesthetic outcome [8]. The flap was applied to eliminate

the lower lip defect preserving the oral cavity airtightness [9]. A case study was provided, in which two submental flaps were used for total reconstruction of the lower lip defect resulting from the malignant neoplasm resection [10].

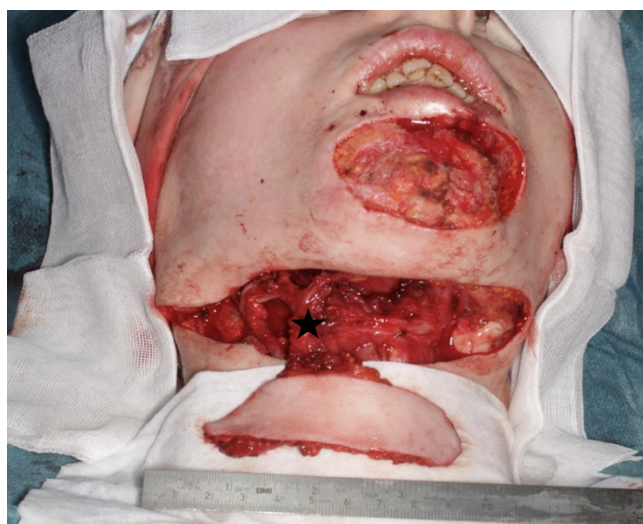


Fig. 2. View of the defect and the harvested submental flap with vascular pedicle (marked with asterisk)



Fig. 3. View of the wound after flap fixation in the defect area and the donor bed suturing

Thus, submental flap is an ideal flap for elimination of facial defects due to texture that is similar to that of facial skin and color match. This can be an excellent alternative to free flaps when used in the head and neck reconstructive surgery [11, 12].

Clinical case

Female patient S., 38 years old, contacted the Department of Maxillofacial Surgery at the National Medical Research Center for Otorlaryngology of FMBA of Russia due to lower lip defect resulting from trauma, non-healing wounds in the chin region (Fig. 1). Histological examination of wound tissues performed in the Center confirmed tissue necrosis and chronic inflammation.

The first stage of surgical treatment involved dissection of necrotic tissue in the mental region and lower lip. To close the resulting defect sized 7×3 cm, a submental fasciocutaneous flap sized 8.5×2 cm was harvested on the right submental artery and vein (Fig. 2) with subsequent flap rotation through the skin tunnel and fixation in the mental region. The Minidop 8 portable Doppler (Bioss; Russia) was used to identify perforators supplying skin (Fig. 3). The donor region was closed by placing a layer-by-layer suture to form a linear scar that was hardly visible in the submental region.

Venous stasis in the flap formed was observed during the first day. Hirudotherapy was performed for five days in order to improve circulation and reduce venous stasis (Fig. 4). Beneficial effect was reported, the patient was discharged on day 7 in satisfactory condition (Fig. 5).



Fig. 4. View of the flap on day three; hirudotherapy is applied

Seven months after the defect closure a residual deformity in the form of cicatricial lower lip shortening and vermilion defect on the left was observed. The second stage of reconstruction involved restoration of the lower lip length/height on the left and elimination of vermilion defect using local tissues. To eliminate the lower lip mucosal defect, we cut a rotation flap via a “rabble” incision along the transitory fold, which was moved into the



Fig. 5. Anthropometry: view of the wound on day 7



Fig. 6. Anthropometry four months after surgery

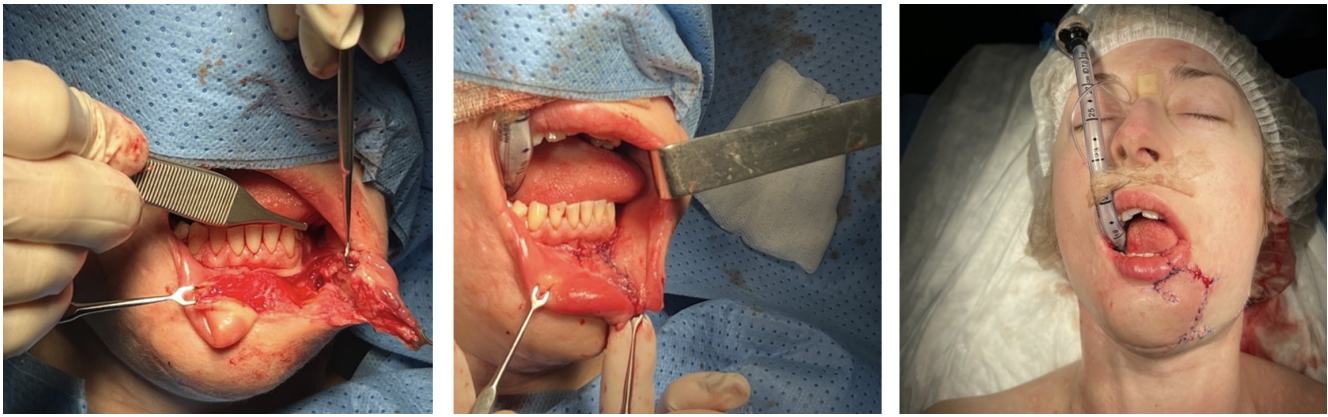


Fig. 7. Second-stage surgery: reconstruction of the lower lip and mental region tissues seven months after the main stage

resulting defect after dissection of mucosal scars. After scar tissue dissection we cut multiple transposable triangular flaps (Z-plasty) from the skin of the lip and chin on the left, which enabled increasing the lower lip length on the left. The vermillion defect was eliminated using the method by Mirault involving cutting a triangular (tongue-shaped) flap from the vermillion border of the lateral lip fragment and a bed for the flap in the medial lower lip fragment. To restore the lower lip function, the

remaining orbicularis oris muscle fragments were identified that were sutured by plication (superimposition of fragments). After that sutures were placed layer-by-layer. Stitches were removed on day 10. Wound healing by primary intention took place; no signs of inflammation were observed (Fig. 6, 7).

The patient was followed up for a year after surgery, good aesthetic and functional results were yielded with minimal donor region deformity. The patient could close her lips completely,



Fig. 8. Anthropophotometry 11 months after surgery

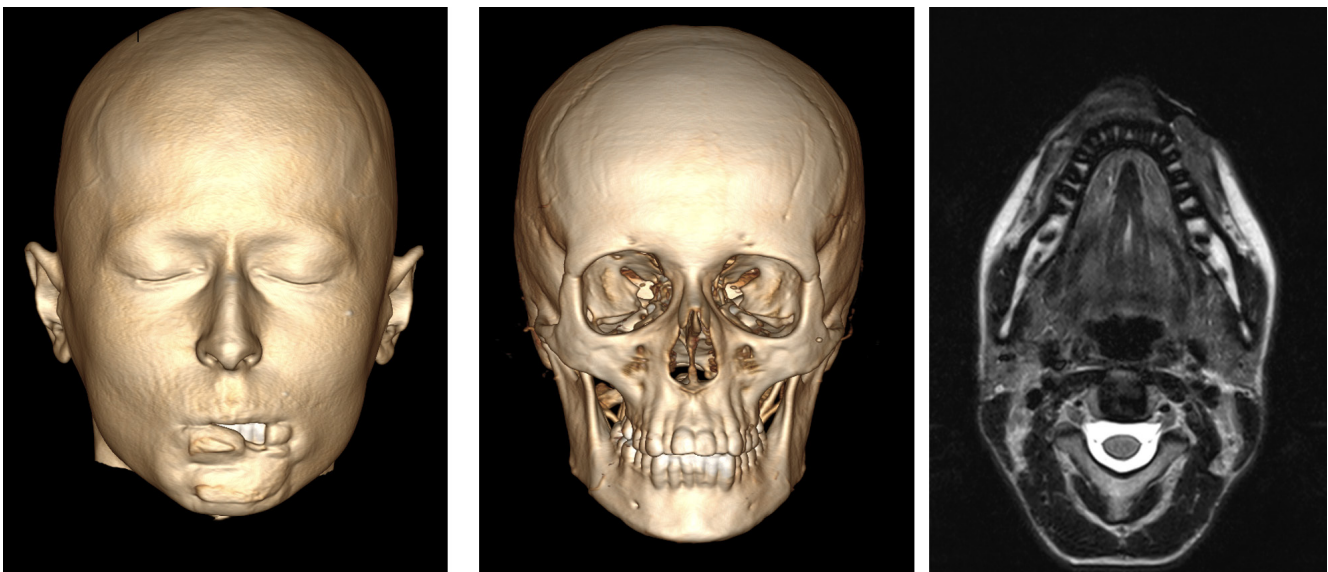


Fig. 9. Contrast-enhanced MSCT and maxillofacial MRI before surgery: no foreign objects are visible in the defect area



Fig. 10. Contrast-enhanced MSCT after surgery: submental artery is marked with arrow

she had no difficulty consuming fluids and foods of any texture (Fig. 8–10).

Clinical case discussion

Various methods for reconstruction of surgical defects of the lower third of the face have been reported. Reconstructive options vary between primary closure and the use of free flaps, depending on the defect size and type [9].

However, for optimal outcome to be achieved, the donor and recipient sites should have similar characteristics in terms of skin quality, thickness, color and texture match. Thus, selection of local regional flap near the facial soft tissue defect is a perfect option [8, 13].

Closure of mental and buccal defects using free flaps and microsurgical technique does not allow one to obtain identical skin color and texture in Caucasian patients when using flaps harvested from the thoracocortical, radial, femoral or shoulder areas.

To eliminate residual deformity after the defect closure, supplementary surgical reconstruction with local tissues is required for the patient's appearance improvement.

Advances in microsurgery led to a better understanding of the fasciocutaneous perforator flaps anatomical features, thereby allowing reconstructive surgeons to gain new capabilities of eliminating complex maxillofacial defects [14].

CONCLUSION

Regional flaps are a good alternative to free flaps with vascular pedicles due to less operative time, lower requirements for the patient's somatic status, surgeon's skills, and operating room equipment [7]. This allows one to use flaps of this type in field surgery for immediate elimination of blast and gunshot defects in the lower third of the face.

Long vascular pedicle ensures wide flap rotation arc and the possibility of using the flap for elimination of almost any soft tissue defect of the lower third of the face, while skin characteristics identical to those in the buccal and mental areas make it possible to achieve good aesthetic outcome.

The clinical case reported represents an example of complex approach to surgical treatment of patients with maxillofacial defects involving the use of rotation submental flaps.

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