A novel technique of reconstruction of vermilion by pedicled myomucosal labial vestibular flap in traumatic defect of lower lip

ABSTRACT
We present a new technique of reconstruction of a partial defect of vermilion in a case of post traumatic defect of lower lip. The vermilion defect was reconstructed by the myomucosal flap taken from the labial side of lip posterior and below the anterior lip defect. The lower rounded part of this 3 cm × 2 cm rectangular flap was brought on the outer anterior lip defect through a hole made by splitting the orbicularis oris muscle below the vermilion and its lower end was rotated upward to reconstruct the defect in the anterior and inferior part of vermilion. The secondary defect on the inner lip was closed by mobilization of mucosa. The triangular-shaped skin loss of anterior lower lip and its underlying muscle was closed in anatomic layers meticulously after mobilization of muscle and skin on both sides. The orocutaneous communication created was closed after 3 weeks by a minor operation under local anesthesia. The mouth opening remained normal between the period of lip repair and closure of iatrogenic orocutaneous communication. Good shape with normal color of vermilion and length having proper lip fullness was achieved without any microstomia. The surface of vermilion was smooth without any irregularity. The single scar of lower lip was supple and mobile over the underlying muscle. There was no deglutition, chewing, labial phonation, or any drooling saliva problems. The procedure provided functionally and esthetically satisfying result. We authors have not found a similar technique of lip reconstruction in the literature.

Keywords: Defect of lower lip, myomucosal labial vestibular flap, orocutaneous fistula

INTRODUCTION
Functional and esthetic restoration is a challenge to a plastic surgeon in traumatic defects of lip. Small-to-medium lip defects are closed directly or after converting it into a full-thickness defect. Isolated vermilion defects can be repaired by vermilion advancement, while large defects need local flaps for their closure. After malignancy, trauma is the second most common cause of lower lip defects. It is more commonly seen in young adults due to roadside accidents, burn injuries, animal bite, human bite, cracker blast injuries, arteriovenous (A-V) malformations, and cancrum oris. We present a case report of one patient of traumatic defect of lower lip involving vermilion and lip.

CASE REPORT
A 17-year-old male sustained roadside facial injury in which his lower lip got injured and resulted in the partial defect of

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vermilion and lower lip [Figure 1]. In the vermilion defect, the mucosa was absent on its anterior side. The partially damaged orbicularis oris was seen on the posterior side of vermilion with an intact mucosa posteriorly. The inferior labial artery was patent in the upper uninjured mucosa of vermilion which was confirmed by pencil Doppler. The lower lip defect was triangular in shape and was in continuity with the vermilion defect above and below the wound extended up to 1 cm of the lower border of mandible. After tetanus prophylaxis, antibiotic coverage, and necessary blood investigations, he was operated for the repair of lip defect under nasal endotracheal general anesthesia. The vermilion defect was repaired with the pedicle vestibular myomucosal flap and the muscle and skin defect by local closure. A small orocutaneous communication resulted in the process of reconstruction of vermilion by the inner vestibular flap which was closed after 3 weeks by a minor procedure under local anesthesia. Antibiotics were given parenterally for 2 days and then orally for another 5 days. Oral hygiene was maintained with Listerine mouthwash, and the patient was kept on liquid diet for 72 hours and then after on semisolid diet for 2 weeks. The fistulous track which was formed along the path of myomucosal flap below the vermilion was excised after 3 weeks under local anesthesia. Photographic documentation was done pre-, per-, and postoperatively.

Technique

It is our novel technique of vermilion reconstruction [Figure 2]. An inferior labial vessel-based rectangular myomucosal vertical flap of 3 cm by 2 cm was elevated on the oral mucosa of lower lip extending from the vermilion above to the labial sulcus below, just posterior to the lower lip defect [Figure 3]. The lower round end of the labial flap was brought out anteriorly through the passage (hole/orocutaneous communication) made in the middle part of wound by splitting the orbicularis oris with an artery forceps. The lower end of the flap was turned upward and sutured with the margins of vermilion defect [Figure 3]. The blood supply of this flap was based on the vascular plexus formed by the small branches of the inferior labial artery in the submucous plane and in through the portion of orbicularis oris included in the flap. A layer of orbicularis oris was dissected below the hole [Figure 4], as a small flap, and this flap was brought upward over the hole to cover it anteriorly and was stitched with the orbicularis oris of either side of the remaining vermilion. Next, the orbicularis oris and depressor labii inferioris were dissected on either side of the lower lip defect and mobilized and sutured together. After muscle repair, the skin of the lower lip was mobilized from the mucocutaneous junction upward to the lower border of mandible below and the incisions were given along the mucocutaneous junction on either side of the defect up to the corners of lips. The skin flaps were dissected above the muscle plane, brought together, and sutured vertically. A small transverse slit-like orocutaneous communication was left between the lower lip skin and the undersurface of labial flap [Figure 5]. This slit-like fistula was closed after 3 weeks under local anesthesia. Broad-spectrum antibiotics were given for 2 days parenterally and then after orally for another...
5 days. The patient was kept on liquid diet for 1 week and then after on normal diet.

The result of the reconstructed lower lip by labial myomucosal flap was good. The vermilion shape, texture, and color were normal and could not be differentiated from the remaining vermilion. There was no notching or irregularity in vermilion. The scar on skin was acceptable, supple, and smooth. There was no contracture or fibrosis on the labial surface of lip.

The sphincteric action of lip was adequate, and the speech, mastication, and facial expressions were normal. Drooling of saliva was not present. It was functionally and esthetically a good repair, and the patient remained satisfied with the outcome of the surgery even after 3 years of follow-up [Figures 6 and 7].

DISCUSSION

We present a case of lower lip defect where the partial loss of vermilion was repaired by the myomucosal flap from the labial mucosa and the skin by approximation of wound edges. A rectangular 3 cm by 2 cm superiorly based myomucosal flap was elevated on the labial mucosa with inferior labial artery running transversally along its pedicle and supplying it through the plexus of minute branches in the submucous and muscle layer of the flap. This vermilion defect was repaired by this flap as described in the operative technique. The skin defect in lower lip was closed by mobilizing skin flaps on both sides of the defect and suturing them together. The main goal in the lip reconstruction is to have normal looking lip with good sphincteric competence and normal function. Lip malignancy and roadmap accidents are the common causes of lower lip defects, while other less common causes are burn injuries, animal and human bite, fire and cracker blast injuries, A-V malformations and cancrum oris. Vermilion and lip defects are repaired by many techniques described in the literature.

Vermilion may be partially or totally damaged in less severe lip injuries. When it is partially damaged, it can be repaired by a free skin or mucosa grafts. The skin graft is commonly taken from the postauricular skin, while free mucosal graft is taken from cheek mucosa and lip vestibular mucosa. The genital labia minora graft has also been reported. The final outcome of the results of free grafts as far as color, texture, and shape is not good esthetically as compared to the mucosal flaps. The graft uptake is poor, and sometimes, it is rejected also. The cause is the dynamic nature of lips which prevents the immobilization required for the take-up of graft on lip surface. The shearing strain inhibits the plasmatic circulation between the donor and recipient bed, and there is a breakdown of minute blood vessels preventing neovascularization and take-up of the graft. For these reasons, mucosal flaps are the better choice for reconstruction of vermilion defects. The mucosal flaps can be taken from the upper lip, cheek, or tongue of which the lip mucosal flaps are commonly practiced. Reconstruction of vermilion by mucosal flaps may be done in a single stage or in two stages depending on the size of the defect and the presence of healthy mucosa around it. The single-stage reconstruction by mucosal flaps is convenient to the patient as the mouth is not immobilized in postoperative period and the perioral area is not disturbed. Single-stage repair is done by V-Y advancement of vermilion from the remaining lip vermilion. The flap can be advanced from one side of the remaining lip or from the both. Arterialized myomucosal flaps from the remaining lip are used to reconstruct the vermilion.
Defect up to half of lip. Stretchability and elasticity of vermilion and inclusion of the inferior labial artery in the flaps makes it a reliable flap for coverage of vermilion up to half of the lip defects. Myomucosal flap from one lip can be planned to repair the defect on the other lip. Flap of 0.8 cm wide and 3.5 cm long can be raised on the inferior labial artery. Arterialized V-Y advancement or myomucosal flap advancement, though repairs the vermilion defect in one stage, alters the shape of vermilion, and it usually appears thin and stretched both in the reconstructed part and in the donor part. If V-Y advancement flaps are sutured under tension, then it results in notching of the upper border or whistling deformity of lip and drooling of saliva and speech defect, especially for labial words. Other local flaps are rotation flaps and V-Y advancement of the labial vestibular mucosa from the inner side of lip. The V-Y advancement of labial vestibular mucosa is good for small vermilion defects and is practiced to correct the labial contracture, labial fibrosis, and inversion lip deformities. Local flaps from the adjacent lower lip skin are used to reconstruct the defect involving skin, mucocutaneous junction, and mucosa of vermilion. The flap taken from the lower lip is advanced proximally to cover the defect in the first stage, and later, the upper part is de-epithelialized and is replaced with the free mucosal graft. Vermilion reconstruction with free labia minora graft has been reported with good results. Pedicle cheek mucosal flap, mucosal flap from upper lip, or pedicle vestibular labial mucosal flaps and facial artery myomucosal flap from cheek mucosa are also reported for the coverage of vermilion defects. All these procedures are commonly used for the reconstruction of isolated mucosal defects in partial vermilion defects, but these flaps can also be used in combination with other local skin flaps for reconstruction of larger lip defects involving mucosa and skin both. A case was reported where two V-Y advancement flaps were used: one from the labial mucosa and another from lip skin advanced upward to reconstruct the full-thickness lip defect. For full-thickness lip defects, there are procedures starting from simple closure for small defects to free flaps for large defects. The small full-thickness defect is closed in a straight line with excising wound margins and incorporating Z-plasty and W-plasty in closure of skin. Sometimes, the superficial small defect is converted into a full-thickness defect and then closure is done of each side of defect as myocutaneous flaps. If the larger defects are repaired in the same manner, then it results in reduced size of oral commissure. Another popular method for full-thickness repair is Abbey’s flap or Estlander’s flap. In this cross-lip repair, a patient experiences difficulty as he is not able to open his mouth for 2 weeks and difficulty in taking feeds and the patient also gets one extra scar on an otherwise normal donor lip. Straight-line local closure of lip and Abbey’s or Estlander’s flap leads to small oral size and microstomia and often distortion of oral commissure. Estlander’s flap invariably requires commissuroplasty for the correction of the distorted commissure. Tongue flap...
is used for the reconstruction of large vermilion defects. It is a two-stage procedure with limitation of lip and tongue movements and difficulty in speaking and eating for 14 days till the tongue flap is detached in the second operation. In wide lower lip defects after the excision of malignant tumors, flaps from upper lip cheek nasolabial and submental areas have been described in the literature. A decrease in lip size and functional loss of lip is a common sequelae of these reconstructions. Now, microsurgical free flaps are practiced for extensive lower lip defects in specialized centers.

CONCLUSION

In the present paper, we have described a new technique of reconstruction of partial defect of vermilion in a case of traumatic defect of lower lip. The vermilion was repaired with the myomucosal pedicle flap taken from the vestibular mucosa of the inner side of injured lip. Color match was perfect, and there was no irregularity of the surface of vermilion. The size of the mouth was normal with good lip seal, and there was no microstomia. The functions of lip and facial expressions were normal. The scar in lower lip was supple and smooth and acceptable to the patient. The patient was highly satisfied with the outcome of the surgical results both esthetically and functionally. We feel that in the future, this procedure will be considered as a novel method to repair lower lip defects.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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