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Versatility of Local Rotational Flaps on the Management of Traumatic Facial Injuries: A Case Report and Review of the Literature

Nicolás Solano^{1,2}, Ejusmar Rivera¹*, Anixa Álvarez², Ana Villarroel² and Carlos Medina²

¹Oral and Maxillofacial Surgery Unit, Servicio Autónomo Hospital Universitario de Maracaibo, Venezuela

²Oral Surgery Postgraduate Residency Training Program, La Universidad del Zulia, Venezuela

*Corresponding Author: Ejusmar Rivera, Oral and Maxillofacial Surgery Unit, Servicio Autónomo Hospital Universitario de Maracaibo, Venezuela. Received: January 18, 2021Published: May 11, 2021© All rights are reserved by Ejusmar Rivera., et al.

Abstract

The reconstruction of traumatic facial injuries of soft tissues represents a challenge for the surgeons due to its anatomical complexity. The use of local rotational flaps in these defects is a great advantage since it allows the restoration of the facial contour, leaving a scar in prudent areas with proper planning; it can be performed without complications and with minor surgical time. The objective of the present study was to show the use of the local rotational flap as a treatment of traumatic facial injuries by reporting a clinical case, a male patient who suffered facial trauma after interpersonal violence with a sharp pointed object. Initial wound management is performed on a delayed basis and at 3 weeks later, direct wound closure is performed in the chin and parotid region, in addition to a locally rotated flap in the left buccal region. In our experience, the use of local rotational flaps is an advantage for closure in traumatic facial wounds, being an alternative of choice due to its versatility in design, providing functional results with aesthetic outcomes. **Keywords:** Facial Injuries; Facial Trauma; Rotation Flap; Reconstructive Surgery; Case Report

Introduction

The management of severe facial trauma is a challenge for the surgeon, due to the anatomical complexity of the area and its impact on the patient's personal identity and self-esteem. A thorough evaluation is necessary for the initial management of these facial wounds, after stabilizing the patient, in order to establish a treatment plan oriented towards reconstruction whose purpose is to provide ideal cosmetic results, in addition to adequate masticatory and neural function. reducing the risk of complications with optimal results [1-3].

Traumatic wounds affect a great part of the facial region, it can be achieved by primary repair, however, local rotational flaps are an alternative that allow correcting medium and large defects, showing satisfactory results [4]. Rotation flaps are pivotal with a curvilinear arrangement, they must be designed contiguous to the defect, and as a result, one edge of the defect functions as a leading edge for the skin flap, which can reduce and redirect tension, remaining attached to a vascular supply. The rotation of the flap is given by the cutaneous elasticity of the receiving area. The relation-ship between the length and the base of the flap is essential for the survival of the displaced skin; it must be taking into consideration, a good vascularization and the type of surgical design to be performed [5,6].

When reconstructing traumatic facial wounds, it is important to consider, the face has certain unique characteristics, it can be

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classified into aesthetic units, that are independent of each other, being important to respect the limits of the aesthetic units and subunits, resulting in better aesthetically outcomes due the scars will be more imperceptible, in addition, the natural color of the skin, shape, symmetry, thickness, texture and mobility should be considered. Without forgetting the orientation of the skin, concerning the lines of maximum extensibility and the relaxed skin tension lines, the incisions parallel to these lines, will be a point in favor [6-8]. There is evidence that facial injuries with extensive wounds, the use of local flaps are considered the gold standard, being an effective alternative due its aesthetic and functional result [9]. The objective of the present study is to describe the use of the local rotational flap as treatment for traumatic facial wounds management by a case report.

Case Report

A 32-year-old male patient victim of interpersonal violence with a sharp pointed object was referred to the emergency room of the University's Hospital of Maracaibo, Venezuela, presenting facial trauma with 12 hours of evolution. A clinical evaluation revealed a communicated wound in the chin area, a laceration in the parotid region and buccal region of the left side (Figure 1). Initial management was performed, including debridement and profuse irrigation of the wound and a delayed closure in the chin region was performed and tetanus immunization was indicated. Extensive washing and debridement of the wound were performed every 72 hours for 3 weeks, until the contamination present in the wound was controlled. Once negative cultures and adequate granulation tissue are obtained, surgical intervention is performed under general anesthesia for the direct closure of wounds in the chin. In the absence of damage to the seventh cranial nerve or damage to parotid gland or Stensen's duct, direct closure of the parotid region was performed. Due to the loss of tissue from the wound located in the left buccal region, a local rotation flap was made (Figure 2) where the facial aesthetic units were respected, achieving a primary closure with 4-0 nylon (Figure 3). Finally, a compressive dressing was placed with a microporous surgical tape prior to the use of antibiotic ointment (0.2% Nitrofurazone). Periodic follows-up were monitored for a period of one year, showing adequate wound healing.

Discussion

In facial trauma, soft tissue injuries can be isolated or related to other injuries, this damage can be limited to superficial tissues Figure 1: Traumatic wound in mental, buccal and parotid region of the left side.

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Figure 2: Cheek rotation flap design for the defect repair.

or involve deeper structures. There is no gender predilection for these injuries and they usually occur in the second decade of life. The most common etiologies of soft tissue facial trauma include falls, automobile accidents, interpersonal violence, sports and recreational activities, self-inflicted injuries, and animal attacks [2,3].

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Figure 3: Rotation flap in position.

Reconstruction options range from primary wound closure, rotational or local advancement flaps and free flaps or skin grafts; it should be present that the defects vary according to the size, dept, availability of tissue, proximity to adjacent aesthetic units with the purpose of restoring the appropriate tissue volume of the defect.

For small size wounds, primary wound closure can be performed, as well as single rotation flaps, defects greater than 6cm, the use of local rotational flaps allows a sufficient blood supply, easy manipulation due its flexibility, and become indicated when other flaps can produce a poor result. Multiple rotational flaps have been described, including simple rotation, where a curved incision is described that mobilizes to close the defect, being the pedicle greater than the defect; The Blascovicz flap consists of a rotational flap with excision of a similar Burow triangle, where a triangle of the skin of the border that opposes the defect is dispensed with. An alternative to solve the management of the incompatibility in the length of the wound margins is to change the movement of the flap, from a solely pivoting movement to one that is pivotal and forward, which allows greater mobility. The Dofourmentel and Mouly procedure in which a Z-plasty is performed at the base of the flap. In addition, Kazajian and Converse also known as back-cult that reduces the length of the pedicle, which is contraindicated in regions of low vascularity and the OZ flap, where from a circular defect and by two pedicles in diagonal areas it is transformed in a Z [4-6].

Several aspects must be considered for the management of traumatic facial wounds, the time of evolution being one of the most relevant, because wounds treated after 12 hours of evolution usually have a high degree of infection. Similarly, it is necessary a thorough exploration of these wounds, to discard edges devitalized tissue loss, section of nerve structures and the presence of foreign bodies. The evaluation of these aspects defines the type of closure to be used in this type of wound, performing a delayed closure in wounds with a high degree of contamination, as in the present case, previous surgical cleaning, systemic antibiotic therapy, daily washings of the wound twice a day, which allowed a more adequate granulation tissue, facilitating local conditions, for closure in a second intervention, and therefore better healing [10,11].

It is important to mention that facial traumatic wounds, specifically in the buccal region, must take into consideration the adjacent anatomical structures such as the facial nerve and the Stensen's duct, in which according to Van Sickels [12] classifies damage the parotid duct site, which depending on the place of trauma, the treatment to be performed will be defined, In our case, there was no damage to these structures, however, were considered at the time of evaluation and treatment [13].

In the cases presented in this study, at the time of the assessment of the wound, not only the defect was taken into consideration, but also the way the defect can be strategically changed giving a more functional and aesthetic result, the most advantageous alternative was the use of local rotation flaps, it allowed us greater elasticity and less tension required in the closure, due the defect was of greater magnitude, making the geometric incisions in the relaxed skin tension lines, providing the flap skin with a texture and similar color, in addition to a similar thickness, avoiding discrepancy in the reconstruction areas, camouflaging the scars in compliance with the principles of aesthetics. It is important to maintain the function in the facial region to be reconstructed, due if it is performed incorrectly can develop complications such as infections, flap necrosis, wound dehiscence and postoperative bleeding [8].

In this case, the most appropriate design was the Blascovicz rotational flap, in order to satisfactorily cover the defect; a skin triangle must be designed at the basal portion of the flap, because a pivotal restriction appeared on the rotational flap that, by eliminating this Burow triangle allowed the defect to enlarge, improved

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movement, avoiding a skin deformity, facilitating its healing and taking into account a broad base for increases blood supply.

There is a lack of evidence discussing the use of local flaps for reconstructive traumatic wounds. However, Wordsworth., et al. [14] carried out a retrospective study in the management of facial trauma in British soldiers during combat operation in Afghanistan, where one of the flaps they used was the local flaps, where unfavorable cosmetic results were presented, as dehiscence of the wound and the need for new reintervention, in our case, performing the local rotation flap for this type of traumatic wound, was satisfactory as none of the aforementioned complications occurred. Villanueva-Alcojol., et al. [15] presented a combination of local flaps and microvascular free flap for reconstruction of the lower facial third after gunshot trauma, they mentioned the use of local flaps due their great advantage in terms of aesthetics and muscle function, although limited due to the little amount of tissue that the patient presented, adding additional free flaps. In our clinical cases, muscle tissue was not a limitation; the management was resolved with the rotation flap variants, with the same advantages mentioned by the author (Table 1).

Authors	Wordsworth., <i>et al</i> .	Villanueva- alcojol., <i>et al</i> .	Solano., <i>et al</i> . (Our study)
Type of study	Retrospective	Case report	Case report
Injury mechanism	 Improvised Explosive Device, Mine, Gunshot, Rocket Propelled Grenade, Grenade, Mortar, Other 	Gunshot	Sharp pointed object
Management	 Free flaps Local flaps Free fibular flaps 	Local and free microvascular- ized flap	Local Rotation Flaps
Complication	 Dehiscence of wounds Unfavorable cosmetic results 	None	None
Reintervention	Yes	No	No

Table 1: Comparison of our clinical case with other reportedcases.

Conclusion

In our experience, we conclude that, the advantages of the local rotational flap are numerous, it provides an adequate amount of tissue, obtaining a tension-free closure, minimizing complications. In addition, it presents a wide base with a favorable length-width ratio, providing great flexibility in the design and positioning of the flap, easy to perform and quite safe with ideal blood supply, the scars are located in areas of minimum visibility using the units and subunits of the face as a reference, they also promote lymphatic drainage and reduce congestion and flap edema. For all these reasons, the use of the local rotational flap in traumatic wounds is an alternative of choice due to its versatility in design, providing functional results with adequate cosmetic outcomes.

Conflict of Interest

None.

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