Lip Commissure Reconstruction with the Facial Artery Muscular-Mucosal (FAMM) Flap: A Case Report of a Child with Electrical Commissural Injury

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Abstract

Electrical burn damages constitutes of 4% of all burn trauma. Approximately 20% of total electrical burn injuries occur in children. Most electrical injuries in children occur at home. When the child bites or chews an electrical cord, it results in oral and commissural injury. It is also noted that male children are predominantly affected with electric current injuries than female children. We introduce an immigrant 3-year-old boy admitted in the hospital one week after an electrical injury of the oral cavity due to biting a television cord. He had a necrotic lesion on his right oral commissure. There is controversy about the time and relevant management of mouth commissure injury. In this case, because of lack of parents' consent, we did the reconstruction of his oral commissure very late without any molding intervention.

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Keywords

- Electric injury
- Mouth and lip
- Flap repair

There is more than 200 techniques in the management of lip and oral commissural injury; we used a Facial Artery Mucosal-Muscular (FAMM) flap for the repair with good result. Although with the improvement of burn care and its management outcomes, prevention is still the best way of minimizing the prevalence and severity of electric current burn injuries.

Introduction

Most electrical burns occur before four years old, and injury to oral commissures, lips, mouth, and tongue occur disproportionately in injured kids presenting with electrical traumas. The oral cavity is the most common place of damage, and most patients are under4 years of age (93%). There are two phenomena that usually explain the mechanism of electrical trauma: the electrical arc and the contact injury.[1] There are several classification systems for the commissural burn but none of them gained widespread acceptance.

Surgical reconstruction interventions sometimes are needed to restore normal structures, functions, and aesthetics of injured parts. There is controversy about the regulations and relevant management of electrical trauma to the mouth commissure. Interventions can be categorized based on the time that has been passed: primary management; which is done within several days of trauma, Intermediate management; which is done when the margin of necrotic tissue is distinguished from normal appearing part (usually 1-4 weeks), and postponement technique; when the entire of trauma site is healed (usually after a few months).[2] The favorite management plan depends on the gap between the initial injury and the final repair, amount, and harshness of trauma. It is also based on the surgeon's choice.[2] The Facial Artery Muscular-Mucosal (FAMM) flap, is a composite flap that is harvested from lateral inner buccal muscular-mucosal tissue. However, the material of this flap is not similar to the oral commissure, but it has some features that would be a suitable substitution for mouth commissure restoration.[3] Herein, we report an electrical commissure burning case, involving the reconstruction of the labial commissure using a FAMM flap that produced favorable outcomes.

Case Presentation

A three-year-old immigrant boy was admitted to our hospital (22 Bahman Hospital, Mashhad, Iran) one week after an electrical trauma to the mouth commissure due to biting a television cord.

At first the boy was examined and managed in the accident department of another hospital abroad and then his

parents transferred him to our hospital for more assessment. The child was active, alert, and in no distress, with severe inflammation and necrosis of right-side labial commissure when seen **Figure 1**. His parents claimed when the child has been playing in home, he suddenly screamed and had fallen near a television without any convulsion or loss of consciousness. After that, a pale lesion appears on the right side of his lips angle and redness of his right cheek. Clinical examination revealed a more than 2 cm circular, severe inflammation and necrosis of right side of labial commissure. His teeth were intact with normal occlusion. The parents and first physician have not found any bleeding from the injury site.

In the former department, the boy had taken normal saline for mouth wash along with tetracycline ointment and cephalexin syrup. When we saw him, we performed minimal debridement and then referred him to the dentistry clinic for oral molding. Unfortunately, he left the country without oral molding. He came back 4 months later with severe drooling, commissural contracture, and swallowing problems, then we used a Facial Artery Muscular-Mucosal (FAMM) Flap for repair. We designed a 20 mm (width) × 30-35 mm (length) Musculo-mucosal flap in the right cheek which had an inferior pedicle, where the facial artery consists of its base **Figure 2, 3**. After the incising the mucosa on the marking of the flap, a further dissection was made in the buccinators muscle to achieve free movement of the flap. The flap was included a branch of the facial artery deep inside the muscle. The flap was rotated and sutured to lip commissural defect. To obtain consistency and movement of the flap, the muscular part of the flap was sutured to the upper orbicularis oris muscles. The donation site of the flap was closed primarily. Unfortunately, the patient and his family left the country three days after surgery. Three weeks later, the hospital social worker contacted the family with the phone call and reported that he had a good condition without swallowing problems **Figure 4**.

Figure 1: severe inflammation and necrosis at first visit

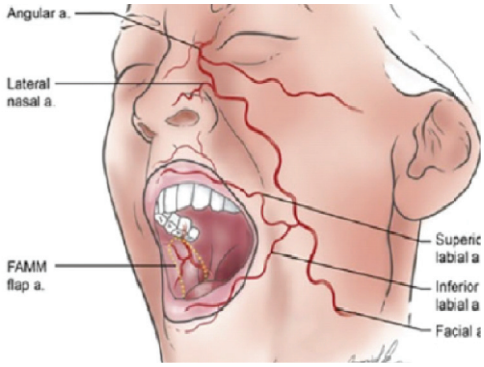

Figure 2: vascular anatomy of FAMM flap

Figure 3: An inferior-based FAMM flap marking on right facial artery and vein

Figure 4: After flap repair

Discussion

Lips, mouth, and mouth angles are places that electrical injury falls out due to an electrical arc mechanism. Initially, these injuries happen in mucosa due to wetness by saliva and low resistant mucosal membranes. These traumas usually occur because of biting or sucking a power cord by infants.[1] Labial commissure destruction causes difficulty in swallowing and drooling, which results not only in interruption of lips integrity and swallowing function and decrease in quality of life, but also damages aesthetics.[4, 5] It also has many negative effects on self-confidence and psychological status.[6, 7]

The objective of oral commissure restoration is to build up normal structures to their normal positions and create a thin, mobile lip part that moves dynamically and uniformly with facial mimics.[1] Lips and commissure defects restoration is tuft. Because they are complicated structures, and consist of several parts[3], more than 200 different methods have been proposed by various scientists to reconstruct this area for many purposes like cancers, vascular anomalies, and trauma.

"Schulten (1894) used a double-pedicle flap and Lexer described a tongue flap in 1909. Friedlander Spira, Stal, Kolhe and Leonard described other types of local advancement flaps. A cross-lip mucosal flap was described by Mazzola and Lupo in 1984 for superficial resurfacing of the vermilion and then again by Standoli in 1994. This flap borrows labial mucosa from the inner surface of one lip to resurface the vermilion of the other lip. Sakai et al in 1988 described an interesting technique, and then Iwahira et al again described in 1998, which involved the bilateral island vermilion flap or the sliding-door flap. Uni-pedicle and bi-pedicle cross-lip vermilion flaps were described by Kawamoto in 1979 and Lew et al in 1987".[1, 8]

Reconstruction of the oral commissure with Estlander flap, is the most common method used in oral defects. The Fries technique suites for horizontally oriented defects. Platz and Wepner method, the Brusati method, and Zisser flap are other techniques to reconstruct oral commissure.[2, 9, 10]

In commissural restoration procedures, it is best to use identical or the same tissues, which results in favorite function outcomes in texture, and color.[5]Pribaz et al [11] in 1992, introduced the FAMM flap, that was somehow different from the mucosal buccinators or buccal flaps indirection and vascular supply. The FAMM flap consists of mucosa, submucosa, and a small amount of buccinator muscle, the deeper plane of the Orbicularis Oris muscle, and the facial artery and venous plexus. One of the prominent advantages of this flap is being completed in one stage, as compared with tongue flaps and cross-lip flaps, which require a next procedure for stalk excision and inset of the flap. Since then, new modifications were developed with subsequent publications, and the FAMM flap became more versatile for use.[3, 12]

Varied algorithms depend on the range of the defect have been explained.[5]Hence, we selected the FAMM flap, because of the features and advantages of FAMM flap over the other methods. Reliability, ease for harvest, proximity to the defect, and the same mucosal coverage, absence of external scar, and lower rate of significant complications are the advantages of this flap. Therefore, this flap is an optimal donor site for labial commissure reconstruction.[3,13] In addition to local flaps, mucosal-free grafts have also been described by Ahuja[14] that used labia minor grafts for vermilion reconstruction. However, we used FAMM flap in this patient, and both aesthetically and functionally, satisfactory outcomes have been achieved successfully three weeks after the procedure.

Conclusion

Oral commissure electrical burns management in infants and children remains controversial. In most circumstances, a postponed repair is accepted to give time for the initial wound being healed by itself. The use of oral commissure splinting, although challenging in practice, has been shown to help prevent the need for surgical reconstruction of the oral commissure in the future. If operational restoration is inevitable, the objectives include both normal function and cosmesis. Different procedures have been recommended for the reconstruction of the oral commissure; each has particular advantages and disadvantages, and FAMM flap is the one we found to have some good results.

Ethical Considerations

This study was approved by Islamic Azad University-Mashhad Branch with code number IR.IAU.MSHD.REC.1399.184. Written informed consent was obtained for operation.

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Conflict of interests

There are no conflicts of interest.

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