

## Mid-Cheek Reconstruction after a Dog Bite: Case Report and Literature Review

Emmanuel Stephano Bracho Ruiz<sup>1\*</sup>, Carlos Alberto Nungarai<sup>1</sup>, Rebeca Pamela Parra Enciso<sup>1</sup>, David Gonzalez Garcia<sup>1</sup>, Mauricio Martinez Hurtado<sup>1</sup>, Jose Angel Tovar Ramirez<sup>1</sup>, Rodolfo Lucano Valdes Ramos<sup>1</sup>, Dulce Iveth De la Rosa Chavez<sup>1</sup>

<sup>1</sup>Plastica Surgery Sevice, Hospital Central Norte Pemex, Mexico City, Mexico

\*Corresponding Author: Emmanuel Stephano Bracho Ruiz  
Plastica Surgery Sevice, Hospital Central Norte Pemex, Mexico City, Mexico

Article History: | Received: 03.07.2023 | Accepted: 07.08.2023 | Published: 10.08.2023 |

**Abstract:** The incidence of animal bite injuries affecting the anatomical regions of the head and neck is notably prevalent, particularly among individuals within the younger demographic. Canine species have been identified as the primary source of the majority of bite injuries in the human population, the spectrum of injuries encompasses a range of traumatic manifestations, which may encompass uncomplicated lacerations or punctures, as well as more complex avulsions characterized by the presence or absence of accompanying tissue. The anatomical regions most frequently affected by the condition under investigation include the buccal region, nasal area, and labial region. The acquisition of comprehensive data regarding the vaccination status of both the animal and the patient is of paramount significance in the realm of medical research. Furthermore, it is imperative to duly administer prophylactic measures such as tetanus or rabies prophylaxis, contingent upon the presence of any indications warranting such interventions. The aforementioned wounds necessitate comprehensive assessment, meticulous cleansing, and, on occasion, surgical debridement or reconstruction within the confines of the operating theater. The selection of the appropriate reparative intervention is contingent upon a comprehensive assessment of the precise anatomical site and magnitude of the inflicted trauma, thereby encompassing a spectrum of potential modalities including primary closure, microsurgical replantation, dermal grafting, tissue flaps, and in rare instances, facial allograft transplantation.

**Keywords:** Face trauma, Face reconstruction, Face Surgery, Face flaps, Face and neck flaps.

**Copyright © 2023 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

### INTRODUCTION

Bite-related injuries are frequently encountered within the clinical setting of hospital emergency departments, constituting a notable proportion ranging from 0.3% to 1.1% of overall patient visits. Canine bites pose a significant public health concern due to their potential to compromise the physical well-being of individuals, while also serving as a means of transmitting the highly virulent rabies virus and inducing severe infectious complications. According to current estimations, a substantial proportion of American households, specifically 36.5%, are reported to possess a canine companion. Similarly, a significant portion of households, approximately 30.4%, are documented to harbor a feline companion. Moreover, it is imperative to acknowledge that a staggering approximate of 4.5 million individuals fall victim to

bites on a yearly basis within the territorial boundaries of the United States. In the realm of canine-inflicted injuries, it is evident that children bear the brunt of the consequences, both in terms of morbidity, referring to the state of being diseased or the incidence of illness, and lethality, pertaining to the capacity to cause death. It is postulated that a significant proportion, approximately 50%, of pediatric individuals have encountered dog bites at some point during their developmental trajectory. Notably, the cranium emerges as a prominent anatomical region affected by such incidents within this specific demographic, thereby exacerbating the morbidity burden. The conventional practice entails refraining from closing wounds inflicted by bites, with a subsequent postponement of reconstruction until the culmination of the period characterized by the highest susceptibility to infection.

**Citation:** Emmanuel Stephano Bracho Ruiz *et al* (2023). Mid-Cheek Reconstruction after a Dog Bite: Case Report and Literature Review. *SAR J Surg*, 4(3), 13-16.

In recent years, a growing body of literature has emerged, with numerous authors advocating for the prioritization of surgical interventions as the primary approach to managing canine bites specifically targeting the facial and scalp regions. Animal bites can lead to tissue damage by means of diverse mechanisms, encompassing but not limited to crush injuries, punctures, lacerations, avulsions, and, albeit less frequently, fractures. Canines, specifically domesticated *canis lupus familiaris*, have been identified as the prevailing species involved in incidents of animal bites, constituting a substantial majority ranging from 80% to 90% of reported cases within the geographical confines of the United States. In the present study, it is noteworthy to mention that cat bites account for a relatively modest proportion, ranging from 3% to 15%, among the overall population affected by animal-inflicted injuries. Intriguingly, a substantial subset of approximately 20% of individuals affected by cat bites necessitate medical intervention, underscoring the significance of this particular subset within the broader context of animal-related injuries. Predominantly, the aforementioned bites manifest in the craniofacial and cervicocephalic regions or the appendages, whereby craniofacial and cervicocephalic traumas constitute a range of 26.8-56.5% of the documented injuries in contemporary investigations. Among the various anatomical regions, injuries frequently manifest in the orofacial region, with particular predilection for the lip, cheek, or nose.

### SURGICAL TECHNIQUE

There is only one incision required for the cheek advancement flap. In every instance in which the defect crosses the inferomedial orbital rim and involves

the lower eyelid, a cheek flap operation is carried out to repair the area. The incision is made along the sidewall of the nose and extended into the lower eyelid; the length of the incision is determined by the quantity of tissue that needs to be recruited. Sutures made of prolene are used to secure the flap to the periosteum in order to reduce the amount of vertical traction and eyelid distortion that occurs. The subsequent steps involve the completion of the wound closure in layers. Full-thickness skin grafting (FTSG), frontal or glabellar skin flaps, V-Y advancement flaps, orbicularis oculi musculocutaneous flaps, and a combination of two or more of these techniques are just some of the many techniques that have been defined to reconstruct defects in this area. Because it has the advantage of being similar in color, texture, and thickness to the adjacent skin, our method consisted of using the skin that had been conventionally resected as the basis for the construction of a cutaneous island flap in order to close the defect in the upper eyelid. It is a straightforward method because it only requires a single act of surgery, only requires local anesthesia, and does not require moving the surgical incision. This is of especially greatest concern for patients who are elderly or patients whose health is in a fragile state.

### CASE REPORT

In this report, we provide a case study involving a 7-year-old female patient who had no prior medical conditions. The patient was brought to our clinic specializing in plastic and reconstructive surgery following a dog bite incident that occurred on her right mid-cheek. A reconstructive procedure with a cheek flap was conducted.



Figure 1: Mid-cheek dog bite frontal view



**Figure 2: Mid-cheek reconstruction**



**Figure 3: 7 days final surgical result**

## DISCUSSION

The initial evaluation of animal bites occurring in the anatomical regions of the cranium and neck necessitates adherence to the established Advanced Trauma Life Support (ATLS) guidelines. In order to ascertain the precise magnitude of the injury, it is imperative to subsequently conduct a comprehensive assessment encompassing the entirety of the cranium and cervical region. In the context of injuries affecting the cheek, it is imperative to accord particular consideration to the facial nerve and parotid duct, also periocular injuries necessitates a comprehensive evaluation to determine the potential engagement of the globe or lacrimal system. The implementation of irrigation techniques may be deemed indispensable in order to comprehensively assess the extent and nature of the inflicted injury. In light of this preliminary evaluation, it is imperative to procure an exhaustive anamnesis, encompassing the taxonomic classification

of the organism, temporal aspects of the inflicted trauma, immunization status of both the creature and the subject, and any additional pertinent data. In accordance with established protocols for wound management, it is imperative to ensure meticulous cleansing of the wound site, thereby facilitating the elimination of any extraneous matter or debris that may impede the healing process. The process of irrigation may encompass the utilization of hydrogen peroxide that has been appropriately diluted with sterile isotonic saline solution.

The process of debridement entails the complete removal of devitalized tissue, thereby facilitating the creation of sharper and more uniform wound edges. This meticulous procedure holds the potential to enhance the aesthetic results following reapproximation. In the context of individuals whose vaccination status remains undetermined or those who have received less than the recommended three doses of



the tetanus vaccine, the Centers for Disease Control and Prevention (CDC) advocates the concurrent administration of both the tetanus vaccine and tetanus immune globulin. According to the guidelines set forth by the Centers for Disease Control and Prevention (CDC), it is recommended that individuals who have been previously vaccinated receive further doses of the tetanus toxoid-containing vaccine if their last administration occurred no less than 5 years ago. In instances where the vaccination status of the animal is indeterminate or unobservable, it is imperative to contemplate the administration of rabies prophylaxis. Based on prior investigations, it has been established that a considerable proportion, amounting to approximately 18%, of canine-inflicted bite wounds exhibit signs of infection. The present study aims to elucidate the potential factors contributing to the comparatively lower infection rates observed in cases of bites inflicted on the head and neck regions. It is postulated that the rich vascularization inherent to these anatomical sites may play a pivotal role in mitigating the risk of infection. By exploring the intricate interplay between tissue vascularity and infection susceptibility, this investigation seeks to shed light on the underlying mechanisms that underpin this observed phenomenon.

Infections stemming from animal bites typically exhibit a polymicrobial nature, wherein multiple microorganisms coexist. The prevailing microorganisms implicated in such infections include *Staphylococcus* spp., *Streptococcus* spp., *Pasturella* spp., and various anaerobic species. The existing guidelines advocate for the implementation of wound cultures and the administration of amoxicillin-clavulanate therapy for a duration of 3 to 5 days as the primary therapeutic approach for facial dog or cat bites. In the context of wounds exhibiting discernible indications of ongoing infection, it is advisable to initiate a course of antibiotic treatment spanning a duration of 7 to 14 days. The variability in the severity of injuries resulting from animal bites is considerable, encompassing a spectrum of manifestations such as punctures or lacerations, tissue avulsion in the absence of tissue, tissue avulsion in the presence of tissue, or extensive tissue loss. Minor facial or scalp lacerations, which are frequently encountered in clinical practice, represent a prevailing occurrence that can be effectively managed through the implementation of primary closure as the primary therapeutic modality. In a recent study conducted, it was observed that a significant proportion of cases, precisely 69.8%, necessitated the implementation of primary closure as the sole method of wound closure. In the context of injuries necessitating more comprehensive reparative interventions, the selection of the appropriate reconstructive modality is contingent upon the anatomical site of the injury, the distinctive attributes of the wound, and the extent of residual tissue. The inherent variability in animal bites necessitates a corresponding diversity in treatment modalities.

## CONCLUSION

Every dog bite victim requires specialized care due to the particular nature of their wound. Skin grafts, local flaps, and microsurgical replantation are all possible options. Many of these processes may need more than one iteration or stage. When recommended, developed, and performed correctly, the advancement of the cheek flap can be an effective and relatively risk-free method of treating a broad variety of abnormalities in the cheek. However, precise surgical planning calls for an in-depth familiarity with the cheek's soft tissues.

## CONFLICTS OF INTERESTS

The authors would like to declare that there is no conflict of interest

## ACKNOWLEDGEMENTS

We express our deepest appreciation to the highly respected team for their exceptional contributions in conducting a remarkable case study.

## REFERENCES

- Rajas-Puga, J. Á., Manzanares-Espinosa, J. A., & López-Giacoman, C. (2022). Experience in the management of injuries from dog bite in the plastic and reconstructive surgery service at the general hospital of Zacatecas. *Revista Médica Del Hospital General de México*, 85(1). <https://doi.org/10.24875/hgmx.21000021>
- Chen, T., Karim, M., Grace, Z. T., Magdich, A. R., Carniol, E. C., Benson, B. E., & Svider, P. F. (2023). Surgical management of facial dog bite trauma: A contemporary perspective and review. *World Journal of Otorhinolaryngology-Head and Neck Surgery*, 9(2), 123–130. <https://doi.org/10.1002/wjo2.75>
- Hernández-Moreno, Á. A., Rodríguez-Rojas, E. del C., Caltenco-Solís, R. B., Reynoso-Saldaña, D., Rodríguez-Herrera, E. I., & Sánchez-Mejía, J. C. (2022). Reconstrucción facial secundaria a mordedura canina. *Cirugía Plástica*, 32(4), 177–181. <https://doi.org/10.35366/108772>
- Macedo, J. L. S., Rosa, S. C., Queiroz, M. N. D. E., & Gomes, T. G. A. C. B. (2016). Reconstruction of face and scalp after dog bites in children. *Revista Do Colegio Brasileiro de Cirurgioes*, 43(6), 452–457.
- Mendoza, J. M., & Chi, J. J. (2019). Reconstruction of animal bite injuries to the head and neck. *Current Opinion in Otolaryngology & Head and Neck Surgery*, 27(5), 407–412.
- Prem, B., Liu, D. T., Parschalk, B., Erovic, B. M., & Mueller, C. A. (2020). Surgical management of severe facial trauma after dog bite: A case report. *Acta Otolaryngologica Case Reports*, 5(1), 17–22.
- Saha, S. (2021). Life-threatening panfacial wild dog bites in a child. *Wilderness & Environmental Medicine*, 32(4), 511–516.
- Spille, J., Schulz, J., Spille, D. C., Naujokat, H., Wieker, H., Wiltfang, J., & Gülses, A. (2021). Microbiological characteristics and surgical management of animal-bite-related oral & maxillofacial injuries: A single center's experience. *Antibiotics (Basel, Switzerland)*, 10(8), 998.

