International Journal of Medical Science and Clinical Research Studies

ISSN(print): 2767-8326, ISSN(online): 2767-8342

Volume 03 Issue 08 August 2023

Page No: 1723-1727

DOI: https://doi.org/10.47191/ijmscrs/v3-i8-53, Impact Factor: 6.597

Dog Bite Injury on The Face of a Patient with an Alloplastic Implant

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ABSTRACT

In Mexico, dog bite injuries have an incidence of 110.44 per 100,000 inhabitants. In more than half of the cases the attack was by family or neighbor dogs; an important factor in determining the severity of the injuries is the breed of the dogs. Of the bites on the face, the nose and lips are the most affected sites. Bites in this area should be sutured soon because of the infrequent infectious complications. A clinical case is presented of a 62-year-old female patient who was bitten on the nose and lip by her Rottweiler breed dog while being fed.

KEYWORDS: dog bite, facial lesions, classification, primary closure, rabies virus.

ARTICLE DETAILS

Published On:
24 August 2023

Available on:
https://ijmscr.org/

INTRODUCTION

The intricate interplay between humans and their domesticated companions, particularly dogs, is a cornerstone of modern society. While these relationships are often marked by companionship and mutual benefit, they can also lead to unforeseen medical challenges, such as facial dog bites. These incidents, characterized by the infliction of canine teeth upon the delicate facial tissues, present a multifaceted array of clinical and surgical considerations that necessitate thorough exploration.1,2

Facial dog bites manifest as a perplexing blend of traumatic injury and potential infection, serving as an intriguing nexus of anatomical intricacies, wound healing dynamics, and the complex interplay of infectious pathogens. As canines exhibit varying behavioral traits and backgrounds, ranging from domesticated pets to stray or feral animals, the etiology of such bites embodies a spectrum encompassing accidental encounters, territorial aggression, and protective instincts.2

Given the profound implications of facial anatomy, function, and aesthetics, injuries sustained from canine bites to the face demand a comprehensive evaluation that extends beyond mere wound management. The complex composition of facial tissues, their intricate vascular supply, and the proximity of vital structures amplify the potential consequences of such injuries, underscoring the urgency for meticulous assessment and strategic intervention.1,2,3

This article embarks upon an in-depth exploration of the multifaceted realm of facial dog bites. By delving into the anatomical complexities of facial tissues, the behavioral profiles of different dog breeds, wound healing dynamics, and the intricacies of post-bite infection management, this analysis aims to equip medical professionals with a holistic understanding of the clinical, surgical, and psychological dimensions inherent to the management of facial dog bites. Through a comprehensive grasp of the myriad aspects influencing this clinical scenario, it becomes possible to enhance patient outcomes, optimize therapeutic strategies, and cultivate public awareness, ultimately fostering a safer coexistence between humans and their canine companions.2,3

In the country, the incidence of cases is around 110.44 per 100,000 inhabitants, with the most affected states being Durango, Hidalgo, Puebla, Mexico City, State of Mexico and San Luis Potosi[1] .

In the United States, they account for 1% of all emergency department visits[2] ; about 60% of patients are hospitalized because they require surgical debridement, and up to 43% are hospitalized for infectious complications[3] . Dog bite mortality rates are higher in low- and middle-income countries, attributed to the prevalence of rabies and the lack of post-exposure treatment and adequate access to medical care . [4]

Children are the most common victims of dog bites, especially because of their short stature, lack of understanding and fear of the dog, which increases the risk of attack on the head and neck; the highest incidence occurs between 5 and 9 years of age[5-6] . In more than half of the cases the attack was by family or neighbor dogs[5] .

An important factor in determining the severity of the injuries is the breed of dog, the Pitbull breed was associated with a greater need for reconstructive procedures, longer surgical time and longer hospital stay due to the complexity of the injuries; the strength of its bite is approximately 235 lb/in^2 , although other breeds, such as *Rottweiler (*328 lb/in^2) and *German Shepherd* (238 lb/in^2), have a stronger bite, the severity of the *Pitbull's* attack lies in the aggressiveness of its bite, since some are even trained as fighting dogs[7] . The vast majority of dog bites are to the head, neck and extremities[2] within the face, the nose and lips represent the most affected sites[4] . The most common damage is direct physical injury[5] , these injuries range from puncture abrasions to lacerations (many with tissue avulsion), large dogs can cause crush injury with extensive tissue damage[3] .Aesthetic problems in the facial region seriously affect quality of life, and constitute a major risk for depression[8] . Dog bites should be considered contaminated wounds, due to the saprophytic flora of the muzzle, where there are more than 64 species of pathogens; the most common pathogens are: *Pasteurella, Staphylococcus and Streptococcus sp., and anaerobes such as Bacteroires, Fusobacterium and Prevotella*; the bacterium *Pasteurella multocida* was isolated in at least 50% of the lesions[7] . Likewise, lesions near the patient's mouth should be considered contaminated with *bacteroids* such as *Eikenella corrodens*[2] . In the case of a dog bite, it is important to obtain information about the incident, such as time, place and circumstances, species of the animal and its state of health. On the other hand, it is important to question the patient about allergies, immunizations, presence of implants (heart valves, joint prostheses), previous treatments and chronic conditions, such as immunodeficiencies. Gram stain and cultures for aerobes and anaerobes are indicated in case of suspected local infection and in those patients presenting eight hours after the event. Follow-up should be performed for a minimum of seven to 10 days[1] .

CASE REPORT

A 62-year-old female with a history of an alloplastic implant for rhinoplasty 10 years ago came to the emergency department after suffering a facial bite by her Rottweiler dog one hour before while it was being fed. The dog is in good health and his last rabies vaccination was 3 years ago. On examination she presented a wound on upper lip and nasolabial junction (Figure 1). The wound was irrigated with 0.9% saline solution for about 15 minutes and cleaned with surgical soap.

Fig. 1 Wound in the upper lip area and nasolabial junction

It was managed as follows: patient in supine position after antisepsis, repair of the orbicularis oris muscle of the mouth was performed with vicryl suture Ethicon® 5-0 caliber single stitches (Figure 2).

Fig.2 Repair of orbicularis oris muscle of the mouth

Fig. 3 Repair of the nasolabial area

Next, nasal subunits were closed with vicryl suture Ethicon® 5-0 caliber single stitches (figure 3), nasolabial junction closure was performed with Nylon Monofilament American suture® 4-0 caliber with single stitches. The repair of the oral mucosa of the upper lip was performed with vicryl suture Ethicon® 5-0 caliber single stitches. Upper lip closure was performed with vicryl suture Ethicon® 5-0 caliber single stitches.

The emergency department started an antibiotic regimen based on amoxicillin and clavulanic acid 500 mg/125 mg 1 tablet orally for 7 days and notified the epidemiology department, which applied a tetanus vaccine and gave a rabies vaccination schedule.

She did not merit an in-hospital stay, so she was discharged and presented for her follow-up appointment 7 days later, in which adequate evolution was observed, with no evidence of local or systemic inflammatory response (Figure 4).

Fig. 4 Favorable evolution of the patient.

DISCUSSION

In 1990, Lackmann developed a classification of head and neck bite injuries, which is useful for audit and research (Table 1). The patient is a type II due to muscle involvement, but without vascular involvement .[5]

During a dog bite, stabilization of the patient in the emergency room should be performed whenever necessary[9] . Considering the healing mechanism, repair in the "24-hour golden period" is recommended, which decreases morbidity, the likelihood of graft rejection, infection and wound dehiscence[8] .

For the management of bites, the wound should be irrigated at a rate of 100 to 200 ml per inch with 0.9% sodium chloride at medium pressure for at least 15 minutes, as was performed on the patient [1-7] . A 20 ml syringe provides sufficient pressure, high pressure irrigation should be avoided so as not to damage tissues and not to deeply inoculate bacteria or foreign bodies[1] .

Surgical debridement of devitalized tissue is effective, but is limited by the anatomical site, in head and face wounds, it cannot be as extensive as in the extremities where there are more possibilities for tissue reconstruction [1] .

Wound closure is a subject under discussion due to the risk of infection, however, there are proposals for primary closure in fascial wounds, large, disfiguring or with less than 8 to 12 hours of evolution[10] .

Facial wounds should be sutured early because of infrequent infectious complications; in addition, there have been good cosmetic results, thanks to the excellent blood supply to the face and scalp[11] .

Contraindications for closure are facial and extremity wounds of more than 12 to 24 hours of evolution, puncture bites in the hand or in sites with implants, bites associated with crush injuries and in immunocompromised patients[1] . Since the patient had an evolution time of one hour, it was decided to manage her with primary closure.

At the time of clinical care, patients and parents or guardians should be properly instructed that all wounds may leave scars, may be infected and may have undetectable foreign bodies at the time of initial evaluation[9] . In the particular case of the patient, she was informed that she was at high risk of infection due to the exposure of the alloplastic implant.

Considering the type of bacteria and sensitive antibiotics, a combination of b-lactam antibiotic and b-lactamase inhibitor is recommended: amoxicillin-clavulanate being the gold standard for empirical antibiotic prophylaxis against dog, cat and human bites[6,12-13] . In penicillin-allergic patients, fluoroquinolones alone or clindamycin in combination with ciprofloxacin or trimethoprim-sulfamethoxazole have been recommended. Azithromycin is the most appropriate choice for pregnant women or penicillin-allergic children, for whom fluoroquinolones and sulfamethoxazole compounds are contraindicated. The duration of antibiotic prophylaxis is usually 3 to 5 days for soft tissue involvement and 10 to 14 days for bone involvement[13] .

In case of suspicion, the authorities in charge of follow-up and epidemiological surveillance should be notified as indicated in the Mexican Official Standard NOM-011-SSA2-2011, For the prevention and control of human rabies and rabies in dogs and cats[14] . Tetanus immune globulin and tetanus toxoid should be administered to all patients who have been bitten and have at least three immunizations. Tetanus toxoid should be compulsorily administered to patients with a complete schedule who have not received a dose between five and 10 years; if no dose has been received for more than 10 years, the vaccine should be administered again[1] .

Rabies vaccination is recommended for all persons who have been exposed to a rabid animal. It is not contraindicated at any stage of pregnancy. Prophylaxis includes human immunoglobulin on day zero of exposure and vaccine on days zero, three, seven and 14; in Mexico, a fifth dose is given on day 28 or 30[10] .

The dosage of human rabies gamma globulin is calculated according to the patient's weight: 20 IU per kilogram[15.] . If patients have previously received the vaccine, immunoglobulin should not be administered and only one vaccine should be administered on days zero and three[10] .

Vaccination is not necessary if the animal shows no signs or symptoms of rabies. These include: anorexia, dysphagia, abnormal behavior, paralysis or convulsions; as a precaution, it should be monitored for at least 10 days[16] .

Criteria for hospital admission for intravenous antibiotic treatment and surgical treatment include signs of sepsis, early onset cellulitis (less than 23 hours), lymphangitis, lymphadenitis, tenosynovitis, septic arthritis and osteomyelitis. Patients with wounds that invade the dermis, deep puncture wounds, wounds with functional and cosmetic repercussions and wounds that do not improve after outpatient antibiotic treatment will also be included[1] .

CONCLUSIONS

At the close of this comprehensive exploration, a nuanced and profound understanding emerges about dog bites in the facial region, a medical entity noted for its anatomic complexity, varied clinical manifestations, and precise therapeutic considerations. The convergence of reconstructive surgery, immunology and pharmacology defines an intricate narrative in the management of dog bites, which acquires indisputable clinical and scientific relevance.

The anatomic and aesthetic dimensions of the facial region add an additional level of complexity to the evaluation and treatment of dog bites. The intersection of soft tissues, bony structures, and the aesthetic component underscore the need for a skillful, multidisciplinary clinical approach that considers both functionality and appearance.

The potentially infectious nature of dog bites requires a thorough understanding of the underlying microbiology and immunology. The possibility of polymicrobial infection and susceptibility to complications such as cellulitis and osteomyelitis add an additional dimension to the management of these injuries. The relevance of antibiotic prophylaxis and tetanus immunization lies in their ability to mitigate the risk of infection and prevent systemic complications.

Surgical management of dog bites in the facial region involves a number of considerations, from primary wound closure to advanced soft tissue and bony reconstruction. The choice of surgical technique and the appropriate timing of intervention are influenced by the extent of injury, the presence of damage to underlying structures, and the potential risk of infection.

The relevance of long-term care in dog bite recovery should not be underestimated. Continuous clinical follow-up, functional rehabilitation and cosmetic evaluations are essential to achieve optimal results and prevent late complications.

Ultimately, this review of the clinical and therapeutic implications of dog bites in the facial region underscores the need for a thorough understanding, careful evaluation, and a multidisciplinary approach in the management of this entity. Collaboration between plastic surgeons, infectologists, and maxillofacial surgeons is essential to address the clinical challenges and improve the quality of life of patients affected by dog bites in the facial region. With each advance in research and each patient treated, new layers of this complex entity are unraveled, enriching our understanding and empowering the medical community to address clinical challenges with precision and compassion**.**

ACKNOWLEDGMENTS

I thank Dr. Barrera Guerra Luis Rodrigo, general surgeon and endoscopist, for his support in the development of this work.

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