



SURGICAL MANAGEMENT OF MAXILLOFACIAL TRAUMA DUE TO DOG BITE: CASE REPORT OF A PEDIATRIC PATIENT AT THE EMERGENCY DEPARTMENT OF A TERTIARY CARE HOSPITAL OF NORTH KARNATAKA

Dental Science

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ABSTRACT

The number of cases of Dog bites, reported in the emergency department in the United states of America is 1%¹ and managing animal bite wounds is a challenging task. A maxillofacial surgeon should be aware of the different animal bites and the risks associated with them, including the immunization status against clostridium tetanus. This article highlights the various modalities of management of a dog bite when the wounds of the dog bite are Grade 3 according to the WHO classification², and Grade 3A and above according to Latchman et al³ classification of animal bites, which required administration of Immunoglobulins⁴ and surgical management of the wound.

KEYWORDS

INTRODUCTION:

In India, Dog bites occur at the rate of 103-118/1000 urban population and accounts for 85-95% of animal bites. Among these, about 2% of the population bitten by canines would require hospitalization.

Dog bites account for 10-20% of deaths annually and typically involve domesticated pets predominantly Pitbull and Rottweiler breeds of dogs.

Usually Children are at a higher risk compared to adults. Their management is determined by Species involved, the location of the bites and the severity grade of the bite.

Lachman et al classified the facial animal wounds into based on the extent of injury.

Craniofacial injury (36%) is the most common site involved, followed by lower extremity (31%), upper extremity (19%) and chest (14%). Lips, nose and cheeks compromise the central area of the face.

Biting force varies from 30-32kg/cm² delivered by teeth of animals and with this amount of force can result in puncture, laceration and avulsion with or without soft tissue defects.

Puncture wounds are at a higher risk of infection, since the microorganism get inoculated in depths of wound which has a narrow entry point, which provides an environment ideal for the growth of anaerobic organisms. Typically, Dog bite infections are polymicrobial compromising both aerobic and anaerobic bacterial flora.

Aerobic bacterial flora includes alpha and beta hemolytic streptococci (24-46%), staphylococcus (10-25%), Pasturella (0-5%), pseudomonas, E. Coli and Moraxella species.

Anaerobic flora includes Bacteroids, Prevotella and ProBacterium species. Most predominantly the ProBacterium species (13-76%). Most predominantly anaerobic organisms cause serious infection in 50% of the population^{4,5}.

Latchman et al: Classification of Facial Bite Injuries³.

- Type I : Superficial injury without muscle involvement
- Type IIA : Deep injury with muscle involvement
- Type IIB : Full thickness injury of the cheek or lip with oral mucosa involvement (through and through wound).
- Type IIIA : Deep injury with tissue defect (complete avulsion).
- Type IVA : Deep injury with severed facial nerve/parotid duct.
- Type IVB : Deep injury with concomitant bone fracture.

Facial animal bite injuries pose a challenge to maxillofacial surgeons because of the aesthetics, infection and function. Hence the goal of

maxillofacial rehabilitation, should be restoration of aesthetic and functional defects in the injured, which is a biggest challenge to maxillofacial surgeons. This article highlights two such cases related to Dog bite injuries and its management.

Case Description

A two-year-old boy reported to the Emergency Department of a dental college hospital in North Karnataka, being attacked by stray dog while he was playing in front of his house. History couldn't reveal if the dog was instigated or it bit the victim without any provocation.

The victim had suffered multiple injuries over the face and neck. On the right side of the face there were multiple lacerations over the face mostly involving the lower part of the face. The patient suffered from class IIIA Dog bite wounds over the face along with associated with tear along the nasolabial fold around 1.5 cm lateral to the oral commissure. Laceration wounds involving almost half of the upper lip including loss of cutaneous tissue and the muscle. But there was no evidence of any bony fractures or any nerve (vital structure) involvement. Since the vaccination status was not known, the dog was tied in front of their house to a tree and observed for one weeks' time.



Management:

Initial examination of wound was done and the extent of the wound was evaluated. First the wound was thoroughly irrigated with normal saline and betadine. Rabies immunoglobulin was administered by injecting 20IU/Kg of immunoglobulin around the wound. The rabies immunoglobulin was administered locally as well as I.M. in the deltoid muscle. Later primary suturing of the wound was done using 3-0 vicryl with a round body needle and 4-0 ethilon [Tension free primary closure

was achieved].

Devitalized and multilayered tissue tags were excised and wound margins were freshened.

Later tetanus toxoid was administered and followed by Anti-rabies vaccination regimen and antibiotics (Amoxicillin with clavulanic acid 375 mg) for 5 days. Regular follow up was done and wound healed satisfactorily without any complications.



DISCUSSION:

Initial evaluation: Initial evaluation of the patient with Dog bite should be done by keeping the following things in mind and these include:

- 1) How did the bite occur?
- 2) Time elapsed since the bite
- 3) Whether the animal was provoked or unprovoked?
- 4) Vaccination status enquiry with the owner of the dog
- 5) Neurological examination to assure no underlying nerve injury has occurred.
- 6) Careful examination of the wound for vascular and soft tissue damage to determine any joints and tendons are involved.
- 7) Radiological examination is required because animal bites can cause deep tissue trauma and fractures to the underlying bone, also may leave broken teeth and foreign bodies in bite wounds.
- 8) Early aggressive irrigation is recommended for all animal bites and is essential to prevent secondary infection. This also allows for a clean and a bloodless field for thorough examination of the wound.
- 9) Irrigation of the wound is done using 0.9% NaCl and a viricidal povidine iodine solution. Volume of the irrigant used depends upon the size of the wound and the level of contamination usually around 250-500ml is used for irrigation.

Wound management:

Surgical management of animal bites in human varies from simple surgical examination of the wound to repair of complex structures using a microscope. The indicators for surgery are

- 1) Presence of severe infection in soft tissues

- 2) Penetrating injuries of the joint, underlying #, tendon breakage.
- 3) Osteomyelitis, tenosynovitis, septic arthritis and neurovascular involvement or the pressure of a foreign body such as tooth fragment in the wound.

Although there are chances of infection following primary closure, it is still indicated to close the wound primarily, keeping aesthetic concerns in mind, layer wise closure or subcutaneous closures should be avoided, unless indicated.

Also, because of rich vascularity of the face, bite wounds of the face can be sutured as they have less risk of infection after primary closure. The primary closure of all non-infected facial wounds is therefore indicated, while debridement and delayed closure may be used for certain high-risk wounds or that are already infected.

The wounds must be closed using a standard percutaneous technique with a Non-Absorbable suture such as single threaded nylon or polypropylene. Adhesive tapes and delayed closure is indicated for deep penetrating wounds.

In all, the above cases, regular follow-ups at an interval of 48 hours to 72 hours has to be done. Suitable instructions at discharge and ensuring proper follow up are highly important as the initial wound treatment. The patient must have been educated on wound care and the sign of infection in the case of which patient should request immediate treatment.

Antibiotic prophylaxis:

Assessment of the need for antibiotics:

- 1) Previous history-immuno-compromised, splenectomy.
- 2) Physical examination with assessment of infection
Risks such as depth of the wound, degree of crush injury, lymphadenopathy, nerve injury and injury to tendons bone under Local anesthesia if necessary.

Rabies vaccination Post Exposure Prophylaxis

According to WHO, proper post exposure prophylaxis can prevent human rabies completely. Inadequate knowledge regarding the classification of animal bite wounds leading to improper vaccination continue to be seen in other parts of the world. The definitive indications to administer Rabies vaccination should be determined by the following factors mentioned below:

- a) Information about the incident, was the dog sick?
- b) Did the dog salivate excessively?
- c) Did the dog behave out of character?
- d) Was the dog immunized against Rabies?
- e) Is the dog known or a domesticated pet?
- f) Is the dog a stray dog? known or unknown? And can it be traced and observed for 10 days?
- g) Epidemiology of rabies in the area where the dog bite took place?
- h) Is there an outbreak of rabies among the dogs or wild animals in that region and are there any human casualties?

WHO Classification² on the Levels of risk due to Dog bite and Post Exposure Prophylaxis schedule of the bite wounds from potentially rabid dog

	Type of contact of suspected or confirmed rabid	Recommendations
I	Touching or feeding of animals, Licks on the intact skin	None if reliable case history is available.
II	Nibbling of uncovered skin. Minor scratches or abrasions without bleeding licks on broken skin	Administer vaccine immediately Active Immunization and local treatment
III	Single / multiple (>5) transdermal bites or scratches, contamination of mucous membrane with saliva	Administer (AI+PI) vaccine and immunoglobulin immediately and local treatment

Rabies vaccine (Human diploid vaccine) should be given on days 0, 3, 7, 14 and 28. 1ml vaccine should be given in the deltoid muscle or anterolateral aspect of the thigh; when administered along with the immunoglobulin (RIG), the last dose can be omitted.

RIG(Immunoglobulin) is 20IU/Kg. It should be administered around the wound, as much as anatomically as possible. Remining can be administered at the intramuscular site, distance from that of vaccine

inoculation.

If RIG is unavailable on the first visit, it can be delayed by a maximum of 7 days from the day of 1st vaccination schedule.

Antibiotic treatment:

- 1) Metronidazole (up to 10mg/kg to 400mg orally, every 12 hourly, during 14 days. Plus, any of the following
 - a) Cefotaxime (50mg/kg upto 1 gm/kg in for 14 days
 - b) Ceftriaxone (upto 50mg/ kg upto 1 kg, i.v. daily.

Alternatives are:

- 1) Piperacillin+ tazobactam (in children 100+12.5mg/kg upto 4+0.5 gm) i.v. over 8 hours for 14days
- 2) Ticracillin+clavulanate (in children 50+1.7mg/kg up to 4+0.5 gm) i.v. over 8 hours for 14days

CONCLUSION:

Animal bites can be managed by early in-depth evaluation regarding the type of wound, anatomy affected and extent of injury, followed by intermittent irrigation with saline and betadine and early surgical intervention could save lives of majority of animal bite victims.

To conclude, Thorough knowledge of wound care, proper antibiotic selection, Anti-Rabies prophylaxis, maxillofacial surgeons can effectively treat and care for the patients with animal bites.

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