

The Golden First 24 Hours in Management of Facial Soft Tissue Injuries due to Dog Bites

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ABSTRACT

Background: As a plastic surgeons one of the most common problems we manage in the emergency department are facial soft tissue injuries due to dog bites. Infection represents one of the main complications of such type of trauma. The aim of our study was to establish recommendations for early treatment of such injuries based on analysis of our own cases with stressing on the importance of early management within the first 24 hours.

Patients and Methods: 49 cases of facial soft tissue injuries due to dog bites were managed within the first 24 hours through proper surgical debridement, immediate primary closure with administration of the proper vaccines and proper antibiotic coverage.

Results: Early management of facial soft tissue injuries due to dog bites markedly improved the rate of wound healing-without increasing the risk of wound infection. Also operating fresh tissues before tissue inflammation or retraction allowed easier reconstruction and so better cosmetic results.

Conclusion: Early proper wound cleaning, surgical debridement, immediate primary closure and the 3 A (Antirabies vaccine, Antitetanus vaccine, antibiotics) ensure satisfactory results in management of facial soft tissue injuries due to dog bites.

Key Words: Dog – Bite – Facial – Injuries.

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INTRODUCTION

Facial soft tissue injuries are common emergency conditions encountered in our Accident and Emergency Department [1]. One of the most common causes of such injuries is the animal bite. Dog bites represent 91.5% of such animal bites. Children are commonly affected more than adults mostly due to their short stature and so the face becomes more vulnerable to such trauma [2].

Dog bites can cause different types of trauma such as perforations, lacerations, crushes, avulsions or even bone fractures. There is a common picture seen with dog bites called (hole- and -tear) and it occurs as the dog commonly causes combination of torn tissues with a nearby perforation [3].

Dog bites perforations or penetrating injuries carry higher risk of complications than other types of trauma. This is because such puncture wound allows more entrance of the microorganisms deeply to the tissues and also due to poor drainage of this punctures so proper cleaning of such punctures and leaving them open without closure is very important [4].

Dog bites commonly cause many types of complications such as the tissue damage, infection and psychological distress; however wound infection represents the most serious complication. This is due to the large number of aerobic and anaerobic microorganisms that may be present in the animal mouth and saliva. Pasteurellacanis, a-streptococci and Staphylococcus aureus are among the most common bacteria identified in dog bites [5,6].

Proper management of dog bite injuries is controversial. In the past there was a concept of leaving the dog bite wound opened to heal by secondary intention for fear of infection that commonly occurs from such type of injuries [7]. However in a study done by Maimaris and Quinton there was no significant difference in the risk of wound infection between the sutured and the non-sutured wounds [8].

In this study we highlight the importance of early management of facial soft tissue injuries due to dog bites.

PATIENTS AND METHODS

A- Patients:

Between July 2020 and April 2021 in Plastic and Reconstructive Surgery Department, Beni-Suef University and other private hospitals 49 cases of facial soft tissue injuries due to dog bites were managed.

Inclusion criteria:

- Patients who were exposed to dog bites at the area of the face causing just soft tissue injuries.
- Patients who came to the emergency department within 24 hours from the time of trauma.

Exclusion criteria:

- Patients who had dog bite injuries in other areas other than the face.
- Puncture wounds.
- Associated maxillofacial fractures.
- Patients who came to the hospital later than 24 hours from the time of trauma.

Patient counseling and consent:

The study was approved by the Faculty of Medicine, Beni-Suef University Research Ethics Committee. Written informed consent about the procedure and any complications including postoperative wound infection was obtained.

B- Preoperative assessment and preparations:

Firstly any life threatening conditions was managed like airway problems, severe bleeding from large vessels.

Proper history was taken like species of the animal, time of the trauma, immunization status of the patient (rabies, tetanus) and associated comorbidities.

Proper wound examination was done like: Number, site, size, shape and depth of the wounds, presence of foreign bodies like broken animal teeth and finally assessment of associated deeper structures injuries.

Preoperative laboratory investigations like (CBC, Coagulation profile, Random blood sugar) and radiological investigations like Plain X-ray or CT facial bones if suspecting bony fractures or foreign bodies were done.

Regarding Tetanus and Rabies vaccination:

- If the patient completed his Tetanus vaccination and 5 years passed since the last dose, he should

receive Tetanus toxoid. If the patient was not vaccinated, both tetanus toxoid and tetanus immunoglobulin should be received.

- If the patient received rabies vaccine previously, 2 poster doses should be administered but if he was not vaccinated, rabies immunoglobulin and a full vaccination course with human rabies diploid cell vaccine should be administered [9].
- Prophylactic Antibiotic therapy (a combination of amoxicillin and clavulanic acid) for all cases.

C- Surgical technique:

Anesthesia: 37 cases received general anesthesia either being children or had large sized wounds, 12 cases were managed by local anesthesia.

Cleaning: Proper and repeated wound cleaning using 20% liquid soap and water or saline and then betadine.

Debridement: Meticulous debridement of any devitalized tissues, blood clots or heavily contaminated parts with removal of any foreign bodies. Care was taken during debridement of special organs like nose, eyelids or lips not to lose their landmarks that will help us during face reconstruction.

Closure: Proper approximation of the wound using wide skin sutures (5-0 or 6-0 polypropylene) with proper preservation of the landmarks. We avoided deep subcutaneous sutures except in areas having dead spaces like the vermillion or oral commissure. If any associated deeper structures were injured like parotid gland, parotid duct or facial nerve, they were repaired at the same time or delayed to another session if it was difficult to be managed at the same operation.

D- Post-operative observation index:

- 1- *Assessment of the rate of wound infection:* By detecting the manifestations of infection like fever (body temperature $\geq 38^{\circ}\text{C}$), wound erythema, tenderness or purulent discharge.
- 2- *Evaluation of the cosmetic outcome of the scars:* So post-operative follow-up extended for 6 months post-operatively. We used the Stony Brook Evaluation Scale (SBSES) for scar evaluation (Table 1), A higher score denotes a better outcome using the SBSES (range: 0-5) [10].
- 3- *Healing time:* Time between the surgical intervention and complete wound healing with sutures removal.

Table (1): Stony Brook Scar Evaluation Scale (SBSES). A higher score denotes a better outcome using the SBSES (range: 0-5).

Scar Category	Point
Width:	
>2mm	0
<2mm	1
Height (Elevated/Depressed in relation to surrounding skin):	
Present	0
Absent	1
Color:	
Darker than surrounding skin	0
Same color or lighter than surrounding skin	1
Hatch marks / Suture Marks:	
Present	0
Absent	1
Overall appearance:	
Poor	0
Good	1
Best Outcome (highest score)	5

RESULTS

Statistical analysis:

Categorical variables were presented as number and percent. Numerical variables as mean and standard deviation. Comparison between two groups regarding scale variables was done using *t*-test and regarding categorical variables was done using chi-squared test. Correlation between two numeric variables was done using Pearson's correlation. *p*-value was considered significant at less than or equal 0.05.

The rate of infection was low; only 6 patients (12.2%) had surgical wound infection, while 43 patients (87.8%) healed without infection (Table 2).

Regarding scar evaluation the Mean \pm Std. Deviation was 3.5 \pm 0.7 which was considered an accepted score (Table 2).

Also we noticed that the time of healing was shorter and the rate of infection was less in younger than in older patients (Table 3).

Table (2): Descriptive for baseline characteristics and outcomes.

Items	Values (No=49)
Age:	
Mean \pm Std. Deviation	15.7 \pm 13.9
Range (Min-Max)	(5-55)
Median	10.00
Sex:	
Females	16 (32.7%)
Males	33 (67.3%)
Affected areas:	
Cheek	6 (12.2%)
Combined	7 (14.3%)
Ear	5 (10.2%)
Lip	16 (32.7%)
Nose	15 (30.6%)
Healing time:	
Mean \pm Std. Deviation	7.9 \pm 2
Range (Min-Max)	(6-14)
Median	7
Scar evaluation:	
Mean \pm Std. Deviation	3.5 \pm 0.7
Range (Min-Max)	(2-5)
Median	3.0
Infection rate:	
No	43 (87.8%)
Yes	6 (12.2%)

**p*-value is significant.

Table (3): Relation between the age categories and different parameters.

Items	Young age (No=41)	Old age (No=8)	<i>p</i> -value
Sex:			
Females	13 (31.7%)	3 (37.5%)	0.749
Males	28 (68.3%)	5 (62.5%)	
Affected areas:			
Cheek	5 (12.2%)	1 (12.5%)	0.876
Combined	6 (14.6%)	1 (12.5%)	
Ear	5 (12.2%)	0 (0.0%)	
Lip	13 (31.7%)	3 (37.5%)	
Nose	12 (29.3%)	3 (37.5%)	
Infection:			
No	39 (95.1%)	4 (50.0%)	<0.001*
Yes	2 (4.9%)	4 (50.0%)	
Healing time:			
Mean \pm Std. Deviation	7.61 \pm 1.48	9.88 \pm 3.18	<0.001*
Scar evaluation:			
Mean \pm Std. Deviation	3.46 \pm 0.74	3.50 \pm 0.75	0.900

**p*-value is significant.



Fig. (1): Facial dog bite injury in a child. (A) Immediately at time of injury. (B) Immediately post-operative. (C) 2 months post-operative.

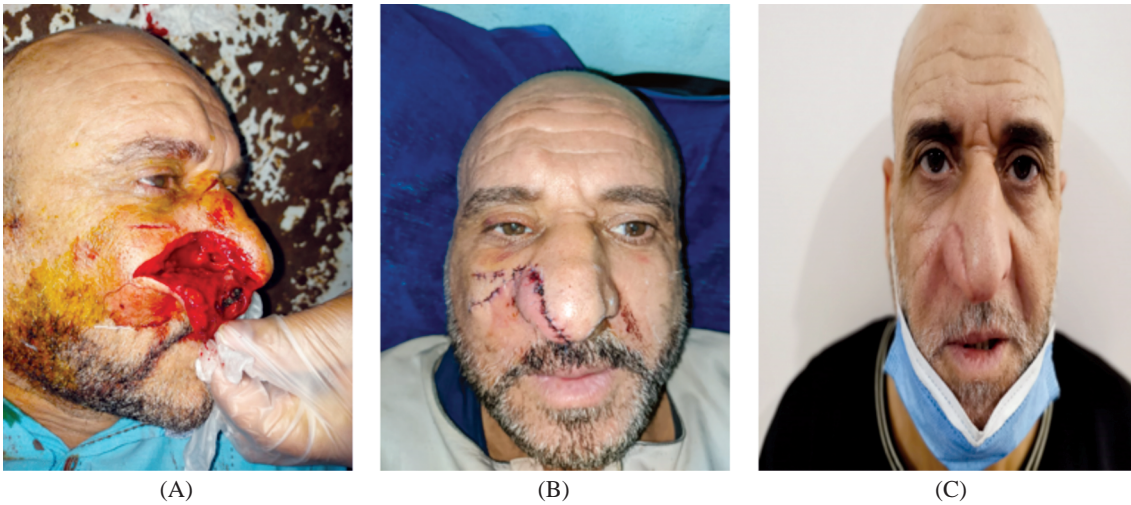


Fig. (2): Facial dog bite injury in an adult patient. (A) Immediately at time of injury. (B) 2 days post-operative. (C) 2 months post-operative.



Fig. (3): Facial dog bite injury in a child. (A) Immediately at time of injury. (B) Immediately post-operative. (C) 7 days post-operative.

DISCUSSION

Management of dog bite injuries is controversial. In many countries like china conservative management of dog bite wounds in the form of proper wound cleaning and debridement to be closed later than 24 hours from the time of trauma by secondary sutures is considered the common method of treatment [11]. The main concept of leaving the dog bite open without closure is the fear of wound infection. Many previous researches proved that there was no big difference in the rate of wound infection between sutured and non-sutured patients but on the other hand there was better cosmetic outcome with optimal cosmetic scores in the cases that received primary wound closure [12,13,14]. The aim of our study is to assess the effect of early intervention and primary closure of facial dog bites on improving the esthetic outcomes of the scars and to estimate the risk of surgical site infection in such wounds.

Many previous researchers studied the importance of early intervention and management of facial dog bite injuries. Chen Rui-feng et al., found that early primary closure of facial dog bites resulted in good cosmetic outcome with the same rate of infection in relation to the cases that were managed conservatively by leaving the wound open without suturing [13]. Also Nikolaos et al., concluded that early intervention and management of dog bite injuries (with or without suturing) minimized rate of wound infection and so improved the cosmetic outcomes [14]. Regarding the time factor, Maimaris and Quinton noticed that delay of patient's presentation of more than 10h has been associated with an increased rate of infection [8] and so early intervention in such injuries allowed better results and less infection rate. Also, Gopinath et al., mentioned that primary repair of late-presenting wounds to achieve a less noticeable scar, carries increased risk for infection [15].

The results in our research confirm the role of early intervention for minimizing the rate of wound infection and so better cosmetic outcome. Beside the timing factor, we suggest that proper management in the form of proper wound cleaning, debridement, primary closure and adequate antibiotic coverage is the corner stone for the better results.

Conclusion:

Early management of facial dog bite injuries in the form of proper wound cleaning, surgical debridement, immediate primary closure and the 3 A (Antirabies vaccine, Antitetanus vaccine,

antibiotics) appeared to give us good cosmetic outcomes without increasing the rate of wound infection.

Study limitations:

One of the limitations of our study was the improper standardization of the used images; another limitation was the small sample size of the patients. This makes further studies are inevitable.

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