

Pediatric Dog Bite Injuries of Head and Neck: An Algorithm for the Treatment of Our Clinic

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Abstract

Background: Dog bite injuries are more frequent injuries than they are supposed to be in our country. **Aims and Objectives:** This study presents our pediatric dog bite injuries of head and neck and a simple algorithm of the treatment. **Materials and Methods:** A retrospective screening was done of the cases, and data was collected. Descriptive statistical analysis was done about age, sex, type of injury, time of injury, type of dog breed, and closure options. **Results:** A total of ten children were enrolled to the study. The mean age was 6.4 years, and most of the cases were preschool-aged children. Scalp was the most affected region at head and neck. Pit bull was the only known dog breed. The common time of the injuries was morning. Major injuries were more than minor ones, and they were closed with graft or flaps. **Conclusion:** We think that dog bite injuries are an important problem in our country. Therefore, further detailed multi-centered studies should be done.

Keywords: Children, dog bite, head and neck, pit bull

INTRODUCTION

Dog bite injuries are yet a modifiable public health problem. A total of 4.7 million people are bitten by dogs annually, and pediatric cases are 50% of these injuries.^[1] Dog bite injuries cause significant psychosocial, esthetic, and functional sequelae, and underreported patients are common. Pit bulls are associated with severe traumas, needing surgical reconstruction. Covering of large tissue defects that involve hair-bearing areas of the head and neck in children is especially difficult. Moreover, reconstruction of the esthetic structures of the face is another challenge in pediatric patients.

The purpose of this study is to present pediatric cases of dog bite injuries of our clinic and report a basic algorithm of our clinic in light of the literature.

MATERIALS AND METHODS

The retrospective study was performed at University Faculty of Medicine according to the ethical guidelines of Helsinki Declaration. A photo sharing authorization form was signed by the parents. Data were collected with regard to the age and sex of the patients, location, type, and time of the injuries. Moreover, type of the dog breeds and treatment methods were

collected [Table 1]. The type of injury was scored according to the scale designed in our clinic [Table 2]. In addition, a simple algorithm was included in the present study [Figure 1].

Descriptive analysis was performed using SPSS 17.0 program, (Version 17.0, Chicago, IL, USA) and results were reported.

RESULTS

A total of 10 children admitted to our clinic between June 2013 and December 2018 were enrolled in the study. Ages were between 3 and 14 years (mean age: 6.4). A total of 7 children were male (70%) and 3 were female (30%).

The most common ages of the injury were 6 and 7 years. The majority of the cases were preschool-aged children [Table 1].

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Table 1: Descriptive table of the patients

Patient	Age	Sex	Location of the injury	Type of the injury [†]	Time of the injury [‡]	Type of the dog breed	Treatment method
1	7	Female	Scalp	Major	Morning	Pit bull	Flap
2	14	Male	Face	Major	Morning	Pit bull	Flap and graft
3	6	Female	Neck	Major	Morning	Pit bull	Flap
4	3	Male	Face	Major	Afternoon	Unknown	Flap
5	6	Male	Scalp	Major	Morning	Unknown	Flap
6	7	Male	Scalp	Major	Morning	Unknown	Flap
7	3	Male	Neck	Minor	Afternoon	Unknown	Primer repair
8	7	Female	Scalp	Minor	Morning	Unknown	Primer repair
9	6	Male	Scalp	Minor	Morning	Pit bull	Primer repair
10	5	Male	Face	Minor	Morning	Unknown	Primer repair

[†]According to the table 2, [‡]Morning: 5 am to 11: 59 am, Afternoon: Noon to 4:59 pm

Table 2: Classification of the dog bite injuries according to the surgical repair

Type of the injury	Defining the injury according to the surgical treatment option
Major	Deep injuries that need nerve, tars, tendon, canal or vessel etc., repair Tissue defects that need flap or/and graft
Minor	Injuries that can be closed primarily Dermabrasion or the other injuries that need only wound dressing

The location of the injuries was scalp (50%), face (30%), and neck (20%). The common time of the injuries was morning (80%) and afternoon (20%). Most of the injuries were major (60%) and needed a flap or graft. Remaining minor cases were closed primarily (40%). The breed of the dogs was mostly unknown (60%). The others were pit bull (40%) [Figure 2].

Case 1

A 7-year-old girl was referred to our clinic from another hospital with two large scalp defects due to dog bite [Figure 3a]. She and her mother have bitten by pit bull. Emergency treatments have done by another hospital. After a detailed examination, the patient was consulted to infectious diseases clinic and pediatrics. According to the pediatrics’ offer, the reconstruction was kept until the 3rd dose of the vaccine, and the two defects were closed with two rotation flaps. No complication was occurred after the operation [Figure 3b and c].

Case 2

A 14-year-old boy presented to our clinic with left eyelid injury [Figure 4a]. There were large crush injury and lacerations at his left eyelid involving the tars and around the orbit. Frontozygomatic fracture was also observed in his computed tomography [Figure 4b]. He has bitten by pit bull. The child was consulted to the ophthalmologist and the other necessary clinics according to our algorithm [Figure 1]. After the first intervention, the patient was operated, and the tissues were closed. No complication was seen after the operation [Figure 4c].

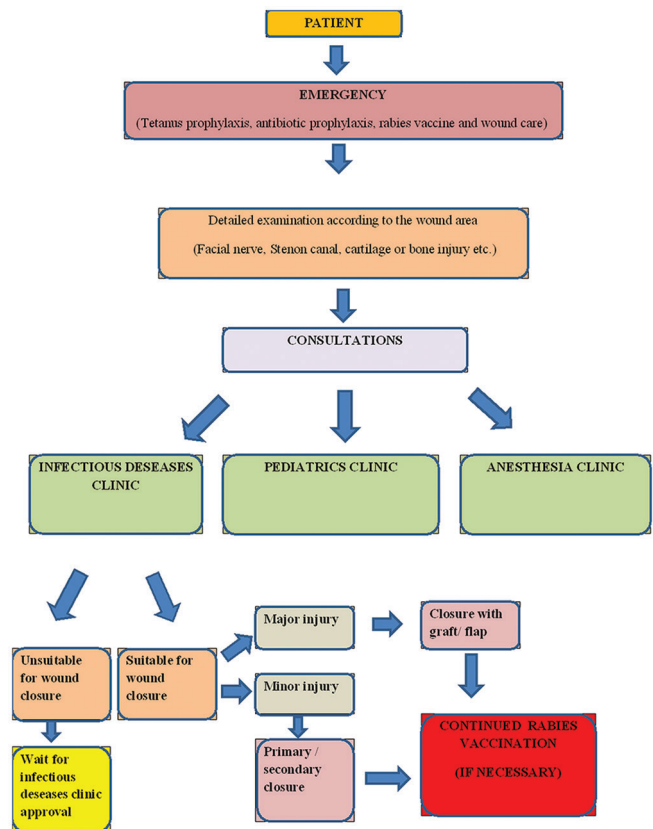


Figure 1: An algorithm of our clinic about dog bite injuries in pediatric population

DISCUSSION

Dog bites are common injuries in the world.^[1] However, they are usually underreported in our country. In addition to injury, the rabies virus and other agents in dog’s flora may cause a delay in the time of closure. The delayed closure may cause other different problems such as infections and contraction of the wound edges.

After dog bites, several problems may be observed such as granuloma telangiecticum, lymphangitis, endocarditis, meningitis, abscess, and sepsis. Another complication is immediate wound infections caused by *Capnocytophaga*

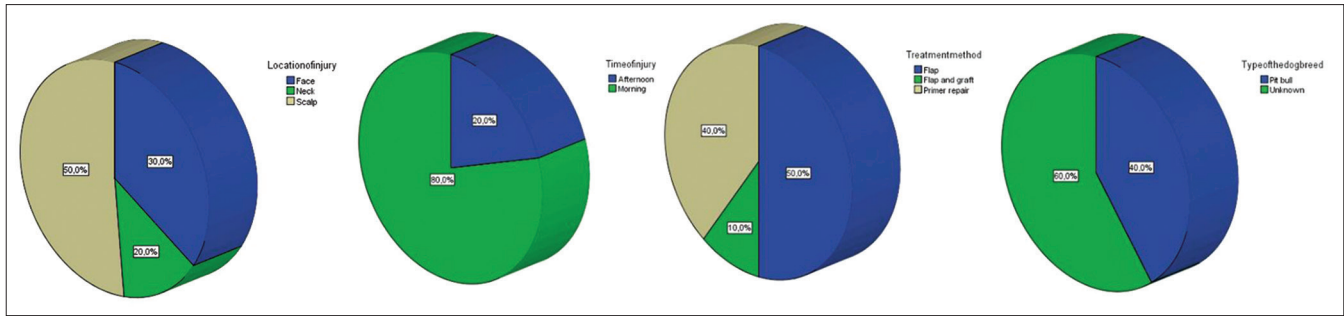


Figure 2: Location and time rates of the dog bite injuries, treatment options rates, and dog breed rates were shown in this figure



Figure 3: A 7-year-old girl was referred to our clinic with large scalp defects due to dog bite (a). Two flaps were designed to ensure the integrity of the hairy skin (b). Six month view of the child could be seen in this photo (c)

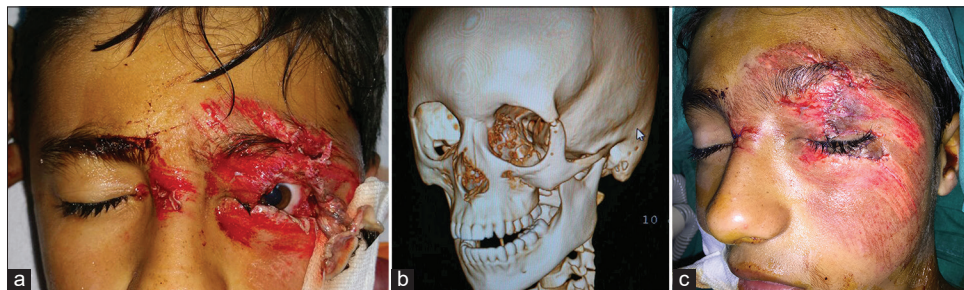


Figure 4: A 14-year-old boy was admitted to our clinic with severe upper lid injury due to dog bite (a). He had maxillofacial fracture in his computerized tomography sections (b). His wound was closed primarily after tars repair (c)

canimorsus, *Staphylococcus aureus*, *Staphylococcus intermedius*, *Pasteurella multocida*, *Eikenella corrodens*, and alpha-hemolytic *Streptococcus* which are located in dog's flora.^[2] The large defects are more prone to these microorganisms. Prophylactic antibiotics could be used in these wounds such as penicillin, cephalexin monohydrate, erythromycin, clindamycin, and ciprofloxacin.^[3,4] We prefer to consult the pediatric patients to the infection diseases clinic for the prophylaxis according to our algorithm. Moreover, tetanus prophylaxis could be done by the emergency clinic.

Rabies virus affects central nervous system (CNS). It reaches to the CNS by peripheral nerves and moves into the salivary glands. The closer the injury site to the brain, the easier and faster the transport of the virus. Therefore, head-and-neck injuries are more susceptible to virus infection. Vaccination on 0, 3, 7, 14, and 28 days of the dog bite and injection of

heterologous rabies antiserum are essential in both adults and children.^[2]

We want to present ten pediatric dog bite injuries that located at head and neck. According to our study, preschool-aged children were the most common affected population as in the literature.^[5,6] This may be related to the low level of defense and awareness of children.

A total of seven children were male in our study. It was thought that boys act more individually than girls and are independent of their parents in our residential area.

Head and neck is more vulnerable to the dog bites in children.^[7] All of the pediatric patients who were admitted to our clinic were injured in the head-and-neck region during our retrospective screening. However, adults were mostly bitten in the body, according to the literature.^[8-10] As the child

grows, he became more able to protect himself, and dog bites occur more peripherally.^[8] The scalp was the most frequently effected area according to our work. Conversely, the face is the most affected area in children in another study.^[9] The neck was rarely injured in the present study. This may be due to the fact that neck is more secret region.

Children are exposed to dog attack, especially in the morning. This result may be associated with the fact that dogs are the most hungry and herd in the morning hours. However, afternoon and evening periods are the most common injury times of the day in the other two studies in the literature.^[11,12]

Pit bulls are the most known type of the breed of the dogs in our study. These types accounted for 82% of 34 dog bite fatalities in the United States.^[5] The pit bull population in our country is unknown. In addition, pit bull feeding is forbidden in our country.^[13] Moreover, familiarity with a dog does not prevent the incidence of major injuries.^[11]

In the present study, we want to classify the dog bite injured wounds as major and minor. There are many classification methods in the literature according to the injured tissues or surgical needs.^[11,14,15] We thought that classification, according to the surgical method, could be more simple and useful for plastic surgeons. Furthermore, we also tried to design an algorithm to guide the plastic surgeon's approach to the patient. There is a detailed algorithm in Alizadeh *et al.*'s study in the literature.^[7] However, according to our clinical practice, the approvals of the other clinics about wound closure varies from patient to patient. Therefore, we think that the treatment attitude in cooperation with other clinics could be more accurate in our country.

In summary, dog bites constitute inadequately recorded part of the pediatric traumas. Those injuries, especially targeting the head-and-neck region, cause both esthetic and functional and psychosocial sequelae.^[16] Thereupon, the doctors should report these injuries more and the state should take stringent measures in this regard.

Consent

The parents were signed an informed consent form about publication of the data and the pictures of their children.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the legal guardian has given his consent for images and other clinical information to be

reported in the journal. The guardian understands that names and initials will not be published and due efforts will be made to conceal patient identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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