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Original Research Article

Epidemiology of mammal bite injuries: 5 year review of a level II regional referral hospital in Mexico city

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ABSTRACT

Background: Animal bites are a common cause of primary care and emergency department attention worldwide. However, the incidence of this pathology among Mexican population is not well known. Plastic surgeons are at the forefront of initial attention and final outcome of these destructive wounds in our country. The aim of this study was to describe the epidemiology of animal bites over a 5 year period at a level II general hospital in Mexico city. Objective of current study was to determine the incidence of animal bites in hospital "Rubén Leñero" in Mexico city over a 5-year period

Methods: Retrospective study; records of emergency room of all adult patients who sustained animal bites between January 2016 to December 2020 were collected. Details about age, gender, and location of the injuries were recorded and analyzed.

Results: From a total of 277 cases, 273 were dog bites (98.56%) and 4 cat bites (1.44%), 173 males (62.45%) and 104 females (37.55%) were affected. The two most injured places in the human body were the hand with 98 cases (35.37%), followed by the lips in 45 cases (16.25%).

Conclusions: Animal bites are a frequent injury in the primary care unit, representing a health issue in our country. Proper patient evaluation and treatments are essential to prevent further complications and subsequent infections. Further investigation will be required to establish risk factors for this pathology.

Keywords: Animal bites, Epidemiology, Dog bites, Cat bites

INTRODUCTION

Around 1% of all emergency department visits in the United States are caused by animal bites. It accounts for approximately fifty million in health care per year in this country.[1] Biting incidents typically involve dogs or cats, although bites from rodents and other domesticated wild animals are not uncommon.[2] Reports from the United States, Australia, and Italy are consistent with dogs representing the species most frequently responsible for bite-related injuries associated with vertebrate animals.[3] In most cases, the patient is familiar with the animal responsible for the bite injury.[1,4,5] Cat bites are the second most common domestic animal bite, constituting 5% to 15% of the total. Additionally, dog bites are more common in boys and men, and cat bites are more frequently found in adult women.[4,6,7]

Animal bite injuries exemplify a substantial worldwide health problem causing significant morbidity and even, in exceptional circumstances, mortality.[8] The majority result in nonfatal injuries that are most frequently encountered in the head, neck and extremities.[9]

However, the epidemiology of animal bites in Mexico is poorly studied. Therefore, the primary objective of this study is to determine the incidence of animal bites in a five-year periodin hospital "Rubén Leñero" at Mexico city. As secondary objectives we will study demographic information of included patients. Complications and management of wounds will be incorporated too.

METHODS

This is a descriptive retrospective study, based in data collection of the patients treated in the plastic and reconstructive emergency care unit in general hospital "Dr. Ruben Leñero" between January 2016 and December 2020. The data collection was retrieved from computerized patients records and administration system. Ethical approval to use patients' records for the study was obtained from the administration of general hospital "Dr. Ruben Leñero". The case files were then reviewed to identify mammal bites, demographic data, location ofinjuries in the human body, management and complications related to these injuries.

Inclusion criteria for the study were age of 15 years or older with mammal's bite in any place of the body attended within the plastic and reconstructive care unit in general hospital Dr. Ruben Leñero between January 2016 to December 2020. 376 patients were collected. Patients with human bites were excluded (99 patients), as well as pediatric patients (1 patient). Participants with any missing data were also excluded. SPSS version 18.0 for MAC (SPSS Inc. Chicago, IL, USA) was used for analyzing data.

RESULTS

Total 277 patients were included in current study, 173 males (62.45%) and 104 females (37.55%) with animal bites. 273 (98.56%) were due to dog bites and 4 (1.44%) account for cat bites between the years 2016 to 2020. The mean age was 39.8 years (Table 1). Among them the anatomic zone mostly injured was the hand with 98 cases(33.5%), followed by the lips with 45 cases (17.7%), legs in 41 cases (16.6%), upper extremity in 40 cases (12.3%), ear in 17 cases (6.9%), forehead in 15 cases (5.51%), nose in 7 cases (3%), eyelid in 3 cases(1.15%), thorax in 2 patients (0.7%). Eyebrow, breast, scrotum and chin with 1 case in each body area and 5 patients with multiples injuries (0.38%) (Table 2). The initial empiric antibiotic used in all patients was amoxicillin - clavulanate 850/250 mg. With this antibiotic there were no allergic response reported in the files. Primary treatment used was wound cleaning, debridement and primary closure. Reconstructive treatment was given to those were primary closure was not possible. All patients were sent to epidemiology center for the rabies post exposure prophylaxis as well as administration of tetanus toxoid. 214 cases (77%) of animal's attack were known to the victims. In 90 percent of cases (249 patients) primary closure of injury was performed. For reconstructive methods, the following was observed: 9 local flaps were realized in finger injuries (Moberg flap, V-Y flap and Kuttler flap), 1 nasogenian flap, 8 patients had distal phalanx amputation that required fingertip remodeling; 9 autologous skin graft were realized and 1 hand injury was associated to a phalangeal fracture treated with miniplate and screws (Table 3).

Table 1: Demographic information (n=277).

Parameters	N	%
Animal bites		
Dog	273	98.6
Cat	4	1.4
Gender		
Male	173	62.5
Female	104	37.5
Age (mean)	38.5 years	

Table 2: Anatomic zones mostly injured.

Anatomic zones injured	N (%)
Hand	98 (35.38)
Lips	45 (16.24)
Upper extremity	40 (14.44)
Legs	41 (14.80)
Ear	17 (6.14)
Forehead	15 (5.42)
Nose	7 (2.53)
Eyelid	3 (1.08)
Thorax	2 (0.72)
Upperextremity+leg	2 (0.72)
Eyebrow	1 (0.36)
Breast	1 (0.36)
Scrotum	1 (0.36)
Chin	1 (0.36)
Upperextremity+forehead	1 (0.36)
Lip+ear	1 (0.36)
Lip+nose	1 (0.36)

Infection was the most common bite-associated complication: there were 9 patients with wound infection due to poor attachment to medical treatment, these patients were hospitalized for intravenous antibiotics, wound cleaning and debridement; they all needed autologous graft for cutaneous coverage. One patient with cutaneous loss of the left nasal ala needed a nasogenian flap, in this case it was necessary a second procedure for flap and patient was released 3 weeks after initial procedure.

Table 3: Surgical approach for the repair of animal bite wound.

Type of repair	Dog bite wound	%
Direct repair	249	89.89
Reconstruction (flap)	10	3.61
Reconstruction (skin graft)	9	3.25
Fingertip remodeling	8	2.89
ORIF	1	0.36
Total	277	100

ORIF (open reduction and internal fixation)

DISCUSSION

During the period studied, 31,387 patients visited our emergency room, a total of 277 (0.94%) cases were reported. Therefore, our data showed that the incidence of animal bites in our center was approximately 1%.In 2020 Mexico city´s population was calculated as 9 209 944.[10] If incidence accounts for 1% of hospital population, 92,000 individuals may be at risk at our location. We also observed that the incidence of animal bites was higher among men and more frequent due to dog bites. Cat bites were more frequent in females as well as it is reported in literature. Worldwide literature report that around 90% of biting dogs are known to the victim[11], in our sample it was only 77%.

There has been one previous study related to animal bites in pediatric patients made in Michoacan, Mexico, which reported higher incidence in people of an age of 15 years or younger, and the majority of them were due to dog bites.[12] Another paper about the experience of the wound management at a plastic and reconstructive surgery hospital in Mexico city was done, but incidence was not reported.[13] Initially, when the patient is attended, injury should be cautiously explored, looking for tendon or bone involvement as well as foreign bodies. Teeth fragments could be locating around wound if the animal is considered as elderly or has periodontal disease, increasing the risk that a tooth will break off during a bite.[1]Radiography is indicated if a foreign body or bone involvement is suspected.[2]

The controversy regarding the therapeutic management of animal bite wounds has been described. Some recommendations suggested leaving hand and face wounds unsutured.[14]

Clinicians must be aware of the potential for occult trauma and be alert for the potential for serious infection. This is why animal bites continue to pose major public health challenges, and the clinical sequelae of bite injuries can extend far beyond simple wound management. In our study, the number of complications was low. By using empiric antibiotic treatment and primary wound closure, we did not observe more infections in our patients. According to literature, one of the most important factors contributing to treatment outcome was the timing of the management, with early treatment (<8h) resulting in lower infection rates and improved cosmetic appearance.[14] In a prospective randomized trial of all types of dog bite wounds, Maimaris et al found no difference in wound infections and cosmetic between primary repair and leaving the wound open.[14] It is recommended that immunoglobulin and tetanus toxoid should be administered to patients with a history of two or fewer immunizations. [6] The distribution of animal bites in the human body reflects the vulnerability of the hand, as well as the face. In our sample 8 patients had an amputation of the distal phalanx, in 9 local flaps for fingertip reconstruction were performed. In the face the most common place injured were the lips, with primary closure in most cases, only 1 patient needed a Goldstein flap. In this study the most anatomic zone injured was the hand, followed by the lips, this result does not have concordance to the worldwide literature, that report the face like the most common injured zone.[13]

Limitations

Nevertheless, authors acknowledge that collection of data was done retrospectively and restricted to one center, both representing limitations for current study. Authors are also aware that not all patients who suffer an animal bite injury seek medical advice. Further investigation will be required to establish this last proportion of patients as well as risk factors associated with this pathology.

CONCLUSION

Animal bites are a common occurrence in Mexico. Proper patient evaluation and treatment are essential to prevent further complications and subsequent infections. Diligent wound cleaning and debridement is a key factor in treatment. In our sample, primary closure of the injury did not increased risk for infection.The majority of dog bites continue to be from animals that are familiar to the victim, close to the home setting. However, we believe further investigation will be required to establish risk factors which mayincrease animal bite incidence rates.

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