

Animal related facial trauma

Urazy twarzy wywołane przez zwierzęta

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Abstract

Background. According to ICD-10 classification, animal related injuries may result from being bitten or hit, not to mention being stung or crushed by an animal.

Objectives. The aim of the study is to analyze and characterize animal related injuries.

Material and methods. 35 patients (13 men and 22 women) treated at Craniomaxillofacial and Oncological Surgery Department in MU of Lodz between 2004 and 2012 due to animal related injuries were enrolled into the study. The age of patients ranged between 15 and 75 years. A retrospective analysis focusing on medical documentation enabled us to collect data concerning the following: age of patients, gender of patients, animal that caused the injury, the site of the accident, alcohol consumption by the injured individual prior to the incident, as well as the period of hospitalization. Additionally, the FISS scale (Facial Injury Severity Scale) was used to evaluate the severity of facial injuries.

Results. Results lead to observations making it possible to declare that men suffered from injuries reported as severe according to the FISS scale much more frequently than women. More severe injuries also occurred significantly more often in agricultural farms. Injuries caused by large home animals are related with the incidence of the so-called high-energy injuries and stand as frequent multi-organ and multi-site injuries.

Conclusions. Animal related injuries are often multi-organ and multi-site injuries that require specialist treatment. More severe injuries were observed both in the masculine group and within the area of agricultural farms. The greater value of the FISS scale was associated with a longer period of hospitalization. Alcohol consumption is emphasized as a factor prompting the attack of the animal, as well as animal aggression against a human being.

Key words: animal related injuries, face trauma, Facial Injury Severity Scale

Słowa kluczowe: urazy odzwierzęce, uraz twarzy, Skala Ciężkości Urazów Twarzy

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According to ICD-10 classification, animal related injuries may result from being bitten or hit, not to mention being stung or crushed by an animal. The frequency and type of animal related injuries differ depending on the region of the world, which is related with the occurrence of specific fauna within a given area. In the United Arab Emirates frequently reported injuries include the ones caused by camels (212 such traumas have been reported during the years 2003–2012), whereas in Kashmir bear attacks seem to be the most problematic issue (on average, causing about 50 injuries a year).^{1,2} In the USA, where statistical information associated with animal related injuries has the best documentation, about 1.3 million animal related injuries are reported annually, where the most common reasons why injured people report to physicians include traumas caused by arthropods – 50%, dogs – 24% of all injuries. It has been calculated that about 200–500 people die every year due to animal related injuries. As far as the global perspective is concerned, we can observe an increasing number of dog bites, and in the USA about 9,500 patients are hospitalized for longer than one day because of being bitten by a dog, and what is more, in the USA and Canada more than 500 deaths are reported due to the above.^{3–5}

According to the data provided by the Agricultural Social Insurance Fund (pol. Kasa Rolniczego Ubezpieczenia Społecznego – KRUS), more than 2,800 people were treated in Poland in 2012 as a result of being hit, bitten or crushed by animals.⁶ Literature indicates a slight percentage of deadly dog bites – several cases each year.⁷ Such injuries constituted from about 2.5 to 8% of all reasons underlying traumas in Poland.^{7,8}

The aim of this study was to analyze and characterize animal related injuries.

Materials and methods

35 patients (13 men and 22 women) treated at Cranio-maxillofacial and Oncological Surgery Department in MU of Lodz between 2004–2012 due to animal related injuries were enrolled into the study. The age of patients ranged between 15 and 75 years of age – the average age in the whole group equaled 38.56 years \pm 16.6, whereas in the group of women the average age was 40.14 years \pm 16.62 and in the male group it reached 25.92 years \pm 16.01. A retrospective analysis focusing on medical documentation enabled us to collect data concerning the following: age of patients, gender of patients, animal that caused the injury, the site of the accident, alcohol consumption by the injured individual prior to the incident, as well as the period of hospitalization. Additionally, the FISS scale (Facial Injury Severity Scale) was used to evaluate the severity of facial injuries, as it enumerates 4 main groups covering certain traumas: soft tissue injuries, upper face height injuries, middle face height injuries and lower face height injuries (Table 1).⁹

Table 1. Facial Injury Severity Scale

Parameter	Points
Soft tissue injuries (facial laceration)	
≤ 10 cm	0
> 10 cm	1
Upper face height injuries	
Fracture of orbital roof/rim	1
Fracture of frontal sinus/bone	displaced 5
	nondisplaced 1
Middle face height injuries	
Maxillary fracture	Le Fort I 2
	Le Fort II 4
	Le Fort III 6
Unilateral maxillary fracture are appointed half of points	
Dento-alveolar injury	1
Naso-orbital-ethmoid complex fractures	3
Zygomatico-maxillary complex fractures	1
Isolated nasal bone fracture	1
Lower face height injuries	
Dento-alveolar injury of mandible	1
Fractures of mandible body, ramus/symphysis	2 x number of fracture fissures
Fracture of mandibular subcondyle, condyle or coronoid process	1

Statistical analysis

In order to verify statistical dependencies, all collected results were analyzed with a χ^2 test. $P < 0.05$ value was assumed as a predetermined significance level.

Results

The group of hospitalized patients suffered injuries caused by the following animals: dog (26 cases), horse (8 cases) and a bull (1 case). The majority of traumas caused by animals resulted in the occurrence of bite wounds (26 people) (Fig. 1 and 2). Facial bone fractures were diagnosed in the case of 9 individuals. 4 patients with facial bone fractures also suffered from facial wounds (Fig. 3).

The majority of people, namely 27 (0.77 fraction), experienced light injuries that were evaluated as 0–1 on the FISS scale. Facial wounds dominated within this group of patients (21 people), and they most commonly covered more than just one area of the face. No concomitant injuries were reported in this group of patients. As far as 8 people are concerned, traumas were classified as points 2–6 on the FISS scale. Men dominated this group. 3 pa-



Fig. 1. Woman, 37 years old. The wounds of the lower lip with tissue loss caused by dog bites. Reconstruction of the lower lip



Fig. 2. Man, 36 years old. Numerous facial wounds of all facial regions

tients had concomitant soft tissue injuries, whereas 5 individuals suffered from injuries covering other areas of the body. The most frequently observed concomitant injuries include chest injuries (including rib and collarbone fractures).

Within the whole examined group, 18 patients were intoxicated. From among 22 examined women, 12 of them (0.55 fraction) suffered from injury after alcohol consumption. As far as masculine group is concerned, 7 men (0.54 fraction) were sober, whilst 6 people (0.46 fraction) were



Fig. 3. Man, 54 years old – patient was hit by the horse's head. The wounds of the upper lip, nose, the mucous membrane of the oral cavity. Fracture of tooth crowns 14, 15. The total dislocation of teeth 12–26. The comminuted fracture of the nose, maxilla, left orbital floor fracture, zygomatico-maxillo-orbital fracture on the left side and fracture of left zygomatic arch

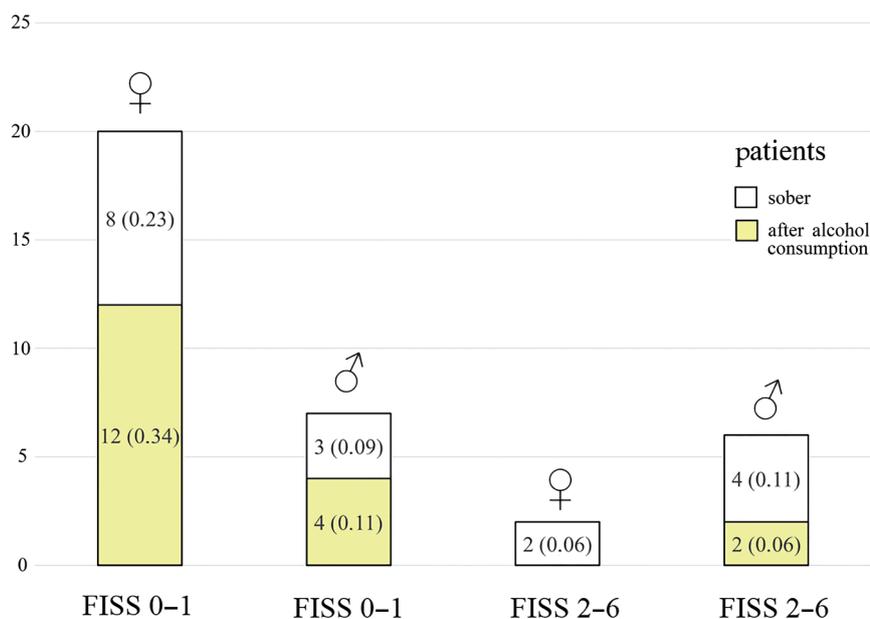


Fig. 4. Severity of the injuries according to the FISS scale in relation to alcohol consumption before the accident

intoxicated at the moment when the incident happened. Nevertheless, no statistically significant dependence between alcohol consumption and the severity of the injury was stated (only 2 people suffered from injuries evaluated between 2 and 6 points on the FISS scale following alcohol consumption). Observations revealed that men experienced more severe injuries, as far as the FISS scale is concerned, significantly more often than women (Fig. 4).

The statistical significance between alcohol consumption and the animal responsible for the injury was declared ($p < 0.05$). It was observed that significantly more intoxicated people than sober individuals suffered dog bites (0.89 fraction vs 0.59 fraction) (Table 2).

What was also observed is the fact that intoxicated people tended to have more than one area covered by the injury when compared with sober patients (fractions: 0.78 and 0.59) (Table 3). This difference did not prove statistically significant ($p > 0.05$).

Analysis focusing on the dependence between the severity of the trauma and the site of the accident revealed statistical significance ($p < 0.01$). It was proved that men were much more often injured in accidents taking place on agricultural farms than women (fraction 0.54 vs 0.09). On the other hand, women more often suffered from injuries in sites other than agricultural farms, such as: streets and households (0.91 vs 0.46). It was also observed that

Table 2. Alcohol consumption and the animal that caused the injury

Animal that caused the injury	Alcohol				Total
	yes		no		
	N	fraction	n	fraction	
Horse	2	0.11	6	0.35	8
Bull	–	–	1	0.06	1
Dog	16	0.89	10	0.59	26
Total	18	1.00	17	1.00	35

$p < 0.05$.

Table 3. Number of injured facial areas depending on alcohol consumption

Number of injured facial areas	Alcohol				Total
	yes		no		
	n	fraction	n	fraction	
1	4	0.22	7	0.41	11
> 1	13	0.78	6	0.59	19
Total	17	1.00	13	1.00	30

$\chi^2 = 2.915$; $p > 0.05$.

injuries of greater severity were significantly more frequently associated with agricultural farms (Table 4).

Observations focusing on the subgroup of patients with facial wounds revealed that intoxicated people had more than one area injured when compared with sober patients (fractions: 0.78 and 0.59). However, this occurred only slightly more frequently and this difference did not prove statistically significant ($p > 0.05$).

As far as the study group is concerned, the average hospitalization period in the case of patients treated for animal related injuries lasted 5 days (standard deviation reaching 7.92 days). The length of the hospitalization period depended on the severity of the trauma. In the case of more severe injuries (FISS 2–6), the period of patients' hospitalization was considerably longer ($z = 3.928$; $p < 0.001$) than it was the case among patients, whose injuries were evaluated as 0–1 on the FISS scale. Respective averages equal 14.6 ± 12.8 days vs 2.2 ± 1.96 days. Half of the patients with more severe injuries stayed in the hospital for longer than 9 days, whereas individuals suffering from 0–1 FISS injuries were hospitalized for 1 day.

Discussion

There is not a considerable number of titles in literature related to the topic of animal related injuries – especially as far as injuries of the head and neck are concerned. This seems to be a result of the noticeable prevalence of such injuries, which only involve epidermal abrasions and

Table 4. Severity of trauma in relation with the site of the accident (based on the pie chart)

Site of the accident	Severity of trauma				Total
	FISS 0-1		FISS 2-6		
	n	fraction	n	fraction	
Agricultural farm	0	0	8	0.23	8
Other sites where accidents happen: city, streets, home	26	0.74	1	0.03	27
Total	26	0.74	9	0.26	35

slight wounds that do not require surgical intervention. Chomel et al. state that up to 37.5 people per 100,000 will suffer from animal related injuries.¹⁰ On the basis of the available literature, it is essential to emphasize that the kind of animals causing injuries depends on the environmental and demographic factors. Depending on the climatic zone, as well as the scope of urbanization within the given region, authors tend to write about injuries caused by animals such as camels, snakes or scorpions in their research.^{11,12} When injuries that city dwellers suffer from are taken into consideration, other animals are cited as the cause of injuries – the most commonly mentioned animals in this case include home animals, such as dogs and cats, etc. Quite different animals cause injuries among rural inhabitants, which is due to the prevalent dominance of larger animals (farm animals such as horses, cows, etc.).¹³ The literature also covers injuries associated with human migration.¹³

The majority of research, similarly to our study, mentions dogs as being the animal that most frequently causes injuries to people (amounting up to more than 80% of all cases).^{13–18} This is due to the popularity of dogs as home animals – according to studies, there are more than 77.5 million dogs registered only in the USA. This is also the country where about 9,500 incidences of hospitalization exceeding 1-day period due to dog bites is observed. Dogs mainly cause slight injuries. Despite this fact, we can see alarming data reported in North America, where until the year 2006 more than 500 deaths related to dog bites were noted.^{4,5,19}

Slightly more than a half of injuries among patients from the discussed group involved intoxicated people. A noteworthy majority of injuries caused by dogs happened to people who drank alcohol prior to the accident. The studied group revealed a tendency indicating that alcohol consumption was related to the occurrence of more severe injuries, next to a greater number of injured areas. Certain authors emphasize that repeatedly; the attack of the animal was preceded by certain factors evoking animal aggression. Circumstances favoring the attack of the animal include: feeding, taking care of the offspring, playing, as well as protecting against another animal.²⁰ Patronek emphasizes that, apart from the lack of proper

behavior in human-animal relation, abuse of psychoactive drugs, including alcohol, by the animal owner or bite victims, stand as important factors underlying deadly dog bite related injuries.²¹ The available literature lacks proper research concerning the dependence between the severity of animal related injuries and the fact that the victim drank alcohol before the accident.

In most of our patients, we introduced antibiotic prophylaxis with the use of amoxicillin with clavulanic acids and we did not observe any inflammation complication. However, the literature data on this topic is not consistent. Some authors indicate that there is no statistical evidence that antimicrobial prophylaxis is effective.^{22,23} Others, recommend such therapy for older patients and patients with comorbidities, high-risk injuries like cats, horses, and birds bites, puncture wounds, extensive injuries, trauma in babies and infants and in the case of delayed surgical treatment of animal related wounds.^{22,24–27} Some authors strongly contraindicate antibiotic prophylaxis in case of scratch wounds and excoriations.²⁸ Others state that prophylaxis should be administered to all bite wounds after primary closure.^{29,30} Based on above-mentioned articles, it seems also that there is a great variety of antibiotics chosen for prophylaxis. All clinically infected wounds should be cultured.³¹ From the studies that have examined bacterial isolates from bite wounds it is known that cat and dog bite infections are polymicrobial.^{32,33} *Pasteurellae* and *Bacteroides* spp. predominate in early wounds, and, in those presenting after 24 h after the event, staphylococci or anaerobes are frequently present.^{34,35} Therefore, the prophylactic antibiotic should be a broad spectrum antibiotic, in which case co-amoxiclav seems to be a drug of choice.³⁶ The alternative prophylaxis for patients allergic to penicillin include tetracyclines, a second generation of cephalosporin with anaerobic activity, or combination therapy with clindamycin and fluoroquinolone.³¹

In the case of bite wounds, there is a threat of inflammatory complications, so careful debridement of necrotic tissue and wound toilet are always required.^{37–40} Primary closure seems to be the method of choice. The more complicated soft tissue injuries should be reconstructed with local flaps, mucosa advancement, full thickness grafts.⁴¹ In some cases, microvascular reconstructions with free flaps are good treatment options.^{42,43}

Results of this report lead to observations enabling us to declare that men suffered from injuries reported as severe according to the FISS scale much more frequently than women. More severe injuries also occurred significantly more often in agricultural farms. The obtained data are compliant with those presented by other authors. It was also observed that a greater risk of animal caused injury and death relates to men than to women.^{44,45} Injuries caused by large home animals are related with the incidence of the so-called high-energy injuries and stand as frequent multi-organ and multi-site injuries.^{13,45–48}

Conclusions

Animal related injuries are often multi-organ and multi-site injuries that require specialist treatment. More severe injuries were observed both in the masculine group and within the area of agricultural farms. The greater value of the FISS scale was associated with a longer period of hospitalization. Alcohol consumption is emphasized as factor prompting the attack of the animal, as well as animal aggression against a human being.

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