CASE REPORT

An unusual etiology of a scrotal dog bite injury and review of the literature

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ABSTRACT

Soft tissue injuries from animal bites are encountered occasionally in rural areas, resulting from attacks by, for example, dogs, wolves, horses, donkeys, and cats. The commonly affected body parts include the face, head and neck, nose, ears, hands, arms, and legs. The traumatic exposure of the external genital organs following an animal bite is a highly rare condition. Dog bite injuries in this area are a clinical condition that requires careful management due to the bacterial density of the oral flora of dogs, and also the potential bacterial flora in the genital area, resulting in a high risk of infection. Tissue defects following dog bites to the genital area are at high risk of morbidity, and may even result in life-threatening conditions in the event of a major infection. The classical treatment approaches to soft tissue defects resulting from animal bites include wound irrigation, debridement, rabies and tetanus immunoprophylaxis, antibiotic therapy, and reconstruction after the elimination of the infection. Recently, however, the early acute approach seems to have replaced the conventional late period treatment, with studies recommending surgical repair in the early stage where possible. In this article, an unusual etiology of scrotal defect was determined under the light of detailed literature data. The present study reports on a case in which an early repair was made after wound cleaning and care, debridement, and then prophylactic antibiotic therapy, soon after the referring of the case to the hospital. No signs of local or systemic infection were noticed at the wound site during follow-up. Post-operative recovery was uneventful and the repair performed on the case had a satisfactory outcome. Based on our clinical experience, we believe that reconstruction accompanied by an early prophylactic antibiotherapy can produce satisfactory outcomes in genital defects caused by animal bites.

Keywords: Animal bites; dog; genital; surgical treatment.

INTRODUCTION

Wild animal attacks are more common in rural settlement areas, while domesticated wild animal attacks are more common in urban settlement areas.[1] The type and frequency of animal bites vary in accordance with the ecological characteristics of the region.[2] Animal bites account for approximately 1% of all injury's patients presenting to emergency departments.[3,4] Globally, most perpetrators of domestic animal injuries are dogs, who are responsible for 80–90% of animal bites presenting to emergency departments.[3] Aggressive dog breeds are usually used as domestic guard dogs, and it is these kinds of dogs that are usually dominant in the etiology.[5] In the United States, 10–20 people die every year from the bites of aggressive dogs,[3] with the age of the victims varying from younger than 1 year to 91 years (median age; 15 years). Children are 3.2 times more likely to be bitten than adults,[4,6] and the incidence rate is higher among young boys, especially those aged between 0 and 9 years.[7] Dog bite injuries may vary from minor traumas to complicated tissue defects,[5] and

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such injuries are most often sustained face, head and neck, arms, hands, and legs. Genital traumas caused by animal bites are rare.

There is no standard protocol for the treatment of dog bites, but the main applications include sufficient debridement, wound care and explorative surgery, when necessary. There have been some discussions related to prophylactic antibiotherapy and surgical timing.[5] In the conventional classic approach, the preferred method of treatment involves leaving the wound open in the early period, monitoring with wound care, and making a subsequent late repair. Today, however, there are different opinions on this matter, with most surgeons recently preferring early surgical closures, in direct contrast to the conventional approach.[3] We present here a case of a dog bite injury to the scrotum in an adult patient that was successfully managed with an urgent surgical repair and appropriate antibiotic prophylaxis.

CASE REPORT

A 45-year-old man was wandering in a wrecking yard when he was attacked by a stray dog, which bit him through his jeans in his genital area. The patient referred to the emergency department of our hospital with a scrotal injury 2 h after the attack.

A physical examination revealed the patient's general status to be good, and he was hemodynamically stable. Anamnesis and examination revealed no systemic problems, and it was ascertained that the patient had not had a tetanus vaccine within the past 5 years. A genital examination revealed a bilateral laceration of the scrotal skin, tissue defect, scrotal hematoma, and edema. There was bleeding in a way of defect leakage. Skin and tissue loss were worse on the right, with the right testis and spermatic cord clearly visible (Fig. 1). The scrotal lesion was classified as Grade III according to the American Association for the Surgery of Trauma Organ Injury Scale.[8]

Figure 1. Preoperative view of the scrotal defect case, leading to testicular exposition.

Necessary explanations were given to the patient about the treatment and his written consent was obtained. The patient was taken for surgical intervention within the first 24 h following the referral, including wound cleaning and reconstructive procedures, carried out under spinal anesthesia. First, a wound site tissue culture was taken, after which, prophylactic parenteral ampicillin-sulbactam (Combicid®, Bilim Drug Inc, Istanbul, Turkey) treatment was initiated. The wound was then irrigated with saline and blood clots were removed. The tissue defect was irrigated with a 7.5% povidone-iodine (Batticon®, Adeka Drug Inc, Samsun, Turkey) antiseptic solution. An exploration of the left testis revealed no signs of trauma. The right spermatic cord and testicular integrity were preserved. The crush wound edges and wound base were surgically debrided. After the debridement of the necrotic tissue, the wound defect was repaired with rotation-advancement fasciocutaneous flaps, followed by the placement of a scrotal drain. On the 2nd postoperative day, the scrotal drain was removed.

The attack dog could not be caught since it was a stray, and so could not be kept under observation. As the dog was not domesticated and the case had not had a tetanus vaccine within the past 5 years, he was administered tetanus and rabies prophylaxis. The tetanus vaccine (Tetavax®, Sanofi, Pasteur SA Inc, Paris, France) was intramuscularly administered in a single dose of 40 IU/0.5 ml to the deltoid area. Heterologous rabies antiserum (HRIG: human rabies immunoglobulin, Imogam®, Sanofi, Pasteur SA Inc, Paris, France) was administered at a dose of 40 IU/kg, with half to the vicinity of bite site and half via the intramuscular way. The case was enrolled in the rabies (HDCV: Human Diploid Cell Vaccine, Imovax®, Aventis, Pasteur SA Inc, Lyon, France) vaccine program, to be administered a 1-ml dose into the deltoid muscle on days 0, 3, 7, 14, and 28.

No signs of local or systemic infection were noticed at the wound site during follow-up. The wound site culture revealed the presence of *Staphylococcus aureus*. Oral antibiotherapy was initiated after the 3rd postoperative day, and the treatment was scheduled to complete in 10 days. The case had no signs indicative of tetanus or rabies infection during the follow-up period. Postoperative recovery was uneventful and the case was discharged on the 5th postoperative day. The repair performed on the case had a satisfactory outcome (Fig. 2).

Figure 2. Postoperative view of the case.

DISCUSSION

Non-domesticated dogs are the most common perpetrators of wild animal-related injuries in rural areas.[9,10] In the United States, 1–2 million people are bitten by animals every year, with the majority of cases being dog bites.[4,11] The affected body areas are usually the face, head and neck, ears, nose, hands, and legs. Literature contains several reports on adult scrotal injuries resulting from animal bites.[4] Cummings and Boullier reported on the treatment of seven scrotal dog bite cases.[12] Kadıoğlu et al.[13] in turn reported a case involving an injury to the urethra and corpus cavernosum resulting from a dog bite. Lakmichi et al.[14] presented a case of mule bite of the male genitalia that led to complete penile and anterior urethral amputation. Saleh et al.[15] reported on a case of scrotal dog bite in an adult resulting in testicular loss. Our case is equally intriguing due to the rarity of such injuries.

Dogs (*Canis lupus* familiaris) are a subspecies of the family canidae. Although dogs are generally dangerous predators, they can be domesticated due to their advanced social communication characteristics. As such, injuries resulting from attacks by domesticated predator dogs are often encountered in urban areas in the present day. The jaw structure of dogs provides a very strong bite and is shaped in a manner consistent with wild life.[16] Canine teeth are not very sharp, but are very strong and have a high tearing power.[3] Accordingly, while an injury to superficial tissue may appear to be minor, there may be more serious injuries to deeper tissues or organs. Canine bites may result in avulsion, particularly in parts of the body with loose skin.[5] Likewise, external genital injuries can take various forms, from minor skin defects to testicular or penile amputation. The present case had an avulsion of loose scrotal skin, but no testicular avulsion. It should be kept in mind, however, that such cases may have penetrating injuries that extend into internal organs that may be missed during a normal examination. As such, particular attention was paid to the exploration of both testicles during surgery in the present case.

Leaving a wound open to secondary healing is an old treatment approach to animal bites. Articles published by Jones and Shire[17] in 1979 and Weber and Hansen[18] in 1991 argued for late repair due to the high risk of infection. In a similar vein, Goldstein[19] suggested in 1992 and Lewis and Stiles[20] argued in 1995 that such wounds should be left open for the first 24 h, and a late repair performed. The preference for this approach is based on concerns regarding that the rabies virus, if present, could be spread into deeper tissues during the surgical intervention, although the likelihood is negligibly low. Another reason is the potential high risk of infection. The more accepted approach these days, however, involves early closure with sufficient debridement, as an effective treatment under prophylactic antibiotic therapy. In some cases, when referral to hospital is delayed and there is an associated development of infection, and a dirty or discharging wound, the surgical reconstruction following wound care can be postponed to a future date. This is not a common situation, as such cases usually refer to healthcare facilities in the acute period. Late period closures increase the risk for infection due to the prolonged exposure of the wound and is likely to result in unacceptable outcomes in cosmetic terms. For these reasons, modern approaches tend to favor sufficient debridement, irrigation, antibiotherapy, tetanus, and rabies prophylaxis, along with early wound closure.[3,4,21,22] In this regard, the most important point to consider is high-pressure irrigation and a meticulous early debridement, as a means of minimizing bacterial colonization.[4,23,24] In particular, a detailed aggressive debridement and cleaning of devitalized tissues are highly important in reducing the risk of infection.[3,22,25] In the present case, the intervention was initiated at the earliest possible time; sufficient irrigation and wound debridement were performed using a saline solution for 20 min to decrease the bacterial load, and the wound site was made ready for reconstruction. The defect reconstruction with rotation-advancement flaps resulted in satisfactory outcomes.

Animal bites can lead to a number of complications, including granuloma telengiectaticum, lymphangitis, endocarditis, meningitis, brain abscess, sepsis, and diffuse intravascular coagulation, leading to a prolonged hospital stay. Among these, the most common complications are wound site infections caused by the inoculation of infectious agents that are present in oral flora of animals. Canine oral flora contains *Capnocytophaga canimorsus, S. aureus, Staphylococcus intermedius, Pasteurella multocida*, oral anaerobic agents, *Eikenella corrodens*, and alpha hemolytic streptococci.[3] It is highly likely that these agents will lead to infection, and especially in cases with a full-thickness wide defect. The agent for the infections emerging within the first 48 h is usually *P. multocida*, which is responsible for approximately 50% of all dog bite-related infections. In general, wound infection rates vary between 6% and 29% for uncomplicated dog bites.[4] Since the infection risk is very high, an immediate and meticulous approach is of great importance.[3]

One of the most controversial issues in dog bite-related injuries is the use of antibiotic prophylaxis. Broadly speaking, antibiotic prophylaxis is a must in of injuries affecting the joints and extremities, penetrating injuries, diabetes, old age, patients with prostheses, or those who are immunocompromised.[4] Due to genital bacterial flora and its relatively humid nature, we believe that prophylactic antibiotherapy should be considered for injuries in this area. The antibiotherapy options to be used for prophylaxis include cephalexin monohydrate, penicillin, erythromycin, clindamycin, trimethoprim sulfamethoxazole and ciprofloxacin,[25,26] with the agent most commonly used in clinical practice being ampicillin, which is a penicillin derivative, combined with sulbactam.[4] As our case had suffered both crush and fragmented dirty wounds in the genital area, prophylactic ampicillin sulbactam 2×1 g was administered parenterally for the first 3 days, and orally for the

next 7 days, totaling 10 days. Due to the wide spectrum of ampicillin sulbactam and its high effectiveness against S. aureus growth in the wound site, the infection risk in our case was successfully eradicated.

Although tetanus infections are rare clinical conditions, animal bites require due care and attention.[4] It is generally believed that all defects caused by animal bites are likely to be inoculated with tetanus spores, being common in the intestines and feces of many animals (horses, cats, cattle, sheep and, in particular, dogs). Therefore, a prophylactic tetanus vaccine is highly recommended after an animal bite.[16,24] Currently, the pediatric routine vaccine schedule calls for tetanus immunization, through which an adequate level of antibodies in the blood is ensured. Tetanus risk re-occurs, however, when the booster vaccination 5 years after the initial vaccine is neglected, and a traumatic exposure is experienced. If the individual has not been vaccinated before, if two or fewer primary immunizations have been performed, or if 10 years have passed since the vaccination, passive immunization with 250 IU human tetanus immunoglobulin is required.[4] In the present study, a tetanus vaccine was administered as 5 years had passed since the previous tetanus vaccine.

The rabies virus is a zoonosis that may lead to severe defects in the central nervous system. Before the disease can become symptomatic, this virus may be inoculated and concentrated in the oral secretion of the animal.[4] In developed countries, dogs are the main source of rabies transmission. Even though the risk is slight, there is a possibility of rabies infection after a dog bite.[4,16,27] In our country, rabies cases are encountered, but only rarely. It is important to irrigate with antiseptic solutions at the first sign of contamination, while a debridement of any devitalized tissues is necessary due to the risk of tissue inoculation from the virus carried in oral secretions.[4] In the conventional approach, it is believed that the rabies virus can spread to deeper tissues during debridement, leading to a postponement of reconstruction. The currently accepted view, however, is that early wound closure with sufficient debridement would be more appropriate. For protection against rabies, the HDCV vaccine is the most commonly preferred vaccine around the world, being a lyophilized vaccine used in doses of 1 ml in both children and adults, repeated on days 0, 3, 7, 14, and 28. The heterologous rabies antiserum recommended for such injuries is 40 IU/kg, with half of the amount administered to the vicinity of the bite site, and the other half via the intramuscular way. Antiserum must be administered in all cases where a vaccine is required.[28] In cases of pet cat and dog bites, vaccinations can be postponed for 10 days while the animal is kept under observation. If the animal is not domesticated, the HRIG and HDCV should be initiated.[4] In our case, the dog could not be caught, which prevented the dog from being kept under observation, and so the patient was not administered rabies antiserum and vaccine prophylaxis.

Conclusion

Dog bites to the scrotum are rare but have the potential to be a serious injury causing functional impairment. Although rare, genital injuries from dog bites may have various clinical characteristics, with morbidity directly associated with the severity of the initial wound and the waiting time before consultation.[4]

The surgical repair options for soft tissue injuries caused by domesticated or wild animals differ from those applied in the event of other etiological causes; however, it is important to begin surgical treatment without wasting time. Wound management can include extensive irrigation and debridement of devitalized tissue in the early period.[4,29] Antibiotic prophylaxis is empirical but advised for all cases.[30] In addition, other systemic diseases that may be transmitted by the biter animal should not be ignored, and the necessary precautions should be taken.[4] Rabies and tetanus prophylaxis must be performed in line with vaccine protocols. Investigations to identify any urethral injuries must also be performed. A surgical exploration of the scrotum will reveal the condition of the testes, vas deferens and spermatic vessels. An orchidectomy may sometimes be necessary, and the patient must be warned of this possibility. Our patient was referred immediately to the emergency department for medical and surgical treatment. In conclusion, early and appropriate surgical and medical interventions may lead to good functional and cosmetic results in most cases.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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OLGU SUNUMU - *ÖZ*

Nadir gözlenen bir skrotal köpek ısırığı hasarı olgusu ve literatür taraması

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Genellikle kırsal bölgelerde hayvan ısırıklarına bağlı yumuşak doku yaralanmalarına zaman zaman rastlanmaktadır. Özellikle köpek, kurt, at, eşek, kedi gibi hayvanların herhangi bir nedenle saldırması sonucunda bu yaralanmalar karşımıza çıkabilmektedir. Sıklıkla yüz, baş-boyun, burun, kulak, el, bacak gibi vücut bölgeleri, etkilenen alanlar arasındadır. Eksternal genital organların hayvan ısırığı sonrası travmaya maruz kalması, oldukça nadir gözlenen bir durumdur. Bu bölgedeki köpek ısırığı yaralanmaları, hem köpeğin ağız florasındaki bakteri yoğunluğu, hem de genital bölgedeki bakteriyel floranın enfeksiyona zemin hazırlama potansiyeli nedeniyle, iyi yönetilmesi gereken klinik durumlardan biridir. Genital bölgede oluşan köpek ısırıklarına bağlı doku defektleri, majör enfeksiyon oluşması halinde yüksek morbidite riski taşır, hatta hayatı tehdit edebilen problemlere yol açabilir. Hayvan ısırığı nedeniyle oluşan yumuşak doku defektlerinin tedavisinde klasik tedavi prensipleri; yaranın irrigasyonu, debridman, tetanoz ile kuduz immünoprofilaksisi, antibiyotik tedavisi ve enfeksiyon elimine edildikten sonra rekonstrüksiyonu içermektedir. Ancak günümüzde erken akut yaklaşım, geleneksel geç dönem tedavinin yerini almış gibi görünmektedir. Son çalışmalarda cerrahi onarımın mümkün ise erken dönemde yapılması önerilmektedir. Bu çalışmada, nadir görülen bir skrotal defekt etiyolojisi, ayrıntılı literatür verileri ışığında değerlendirilmeye alınmıştır. Çalışmamızda, olgunun hastaneye başvurmasından kısa bir süre sonra yara temizliği ve bakımı, debridman ve profilaktik antibiyotik kullanımı ile erken dönemde onarım uygulanmıştır. Takip döneminde lokal ya da sistemik herhangi bir enfeksiyon bulgusu saptanmamıştır. Ameliyat sonrası dönemde herhangi bir problem gözlenmemiş ve tatmin edici sonuçlar elde edilmiştir. Klinik tecrübemize dayanarak, hayvan ısırığı sonrasında oluşan genital defektlerde erken dönemde profilaktik antibiyoterapi eşliğinde uygulanacak rekonstrüksiyonun tatmin edici sonuçlar sağlayacağı kanaatindeyiz.

Anahtar sözcükler: Cerrahi tedavi; genital; hayvan ısırıkları; köpek.

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