Case Report

Survival of child after lion attack

Carlos F. Dabdoub, Carlos B. Dabdoub, Mario Chavez, Felipe Molina1

Department of Neurosurgery, and 1Division of Pediatric Critical Care, Japanese University Hospital. Santa Cruz de la Sierra, Bolivia

E-mail: Carlos F. Dabdoub - cdabdoub45@hotmail.com; *Carlos B. Dabdoub - carlosdabdoub@hotmail.com; Mario Chavez - mariochavez2000@hotmail.com; Felipe Molina - fmvalenzuela@gmail.com

*Corresponding author

Received: 20 April 13  Accepted: 20 May 13  Published: 12 June 13

This article may be cited as: Dabdoub CF, Dabdoub CB, Chavez M, Molina F. Survival of child after lion attack. Surg Neurol Int 2013;4:77.
Available FREE in open access from: http://www.surgicalneurologyint.com/text.asp?2013/4/1/77/113317

Abstract

Background: Injuries to humans caused by attacks from large predators are very rare, especially in the United States, Europe, or Latin America. A few cases were reported on accidents in zoos or animal farms, being very uncommon in children. The purposes of this report include describing the case of a child who sustained an attack by a lion named “Bang-Bang,” which resulted in injuries to the head, chest, and abdomen, as well as the subsequent neurosurgical treatment and providing a review of the literature.

Case Description: We report the case of an 8-year-old boy who was attacked by a lion during a circus show. The patient underwent an emergent neurosurgical procedure, including parietal craniectomy, cleaning, and extensive surgical debridement of the wounds. Despite open severe head trauma with brain damage as well as thorax and abdomen trauma, the child survived, with minimal neurological sequelae.

Conclusions: Human injury resulting from encounters with nondomesticated animals is increasingly rising throughout the world. This case highlights the potentially violent and aggressive nature of wild mammals held in captivity. Unusual wild animal attacks and the complex injuries that result may pose a challenge to surgeons practicing in resource-limited settings. In this sense, the best treatment in the mentioned case is the prevention of human injuries by these animals. In addition, to attend to these infrequent cases, the authors emphasize the importance of a multidisciplinary approach to achieve the best cosmetic and functional results.

Key Words: Big cat attack, head injury, lion bite, trauma

INTRODUCTION

Injuries to humans caused by attacks from large predators are very rare, especially in the United States, Europe, or Latin America. In the medical literature, few cases are reported on accidents in zoos or animal farms, being very uncommon in children. In a list of some of the captive wild animal attacks on children that have occurred in the United States and Canada between 2000 and 2010, seven were by tigers and only two by lions. This article reviews the most relevant clinical features related to severe head trauma with penetrating brain injuries in a child who survived a lion attack and analyzes the most substantial facts to be considered in such cases.

CASE REPORT

History and examination

A local newspaper wrote, “According to the owner of the circus, a lion became excited by the noise of the
audience during the evening show, escaped from its unlocked cage and attacked an eight-year-old boy. The victim was dragged about twenty feet. The four-year-old lion was called ‘Bang-Bang’ and weighed about 200 kg” [Figure 1]. The patient was sent to a rural hospital (approximately 150 km from the capital city) and was transferred to our hospital almost 5 hours after the attack.

Upon arrival to the emergency room, the patient was in poor condition: Extremely pale, no arterial pressure, semiobstructed airway, breathing difficulty, and unstable vital parameters (heart rate, 170 beats per minute; respiratory rate, 34 breaths per minute; Glasgow Coma Scale (GCS), 5/15 points; and hemoglobin, 5.5 g/dL). Orotracheal intubation was performed immediately.

The results of the clinical examination were as follows:

- **Head and neck:** Multiple scalp wounds, with profuse bleeding; extensive bilateral fronto-parieto-temporal injury with brain matter escaping through perforations caused by the bite; right ocular globe with hyperemia, enlarged right pupil (8 mm), and upper and lower eyelid edema; wound at level of left orbit; and bleeding neck wound
- **Chest:** Open wound on left side, measuring approximately 15 cm; fractures of the fourth, fifth, and sixth costal arches; muscle, pericardium, and mediastinum exposed; dullness upon percussion; decreased breathing sounds on left side; and collapsed left lung
- **Abdomen:** Open wound in the left infraumbilical region, measuring 9 cm, with irregular edges; reduced bowel sounds; and abdomen taut upon palpation
- **Extremities:** No injuries.

He received 2 L of normal saline and 2 U of whole blood through two large bore peripheral intravenous line and vitamin K, improving his vital signs. In the initial cranial computed tomography (CT) scan, severe trauma was predominantly seen to the left of the skull, including dislocated fractures. Intracranial injuries with areas of intracerebral contusion and bleeding as well as subdural air accumulation in the areas where the lion’s canines penetrated the skull were found [Figure 2].

**Operation**

The child was sent directly to the surgical ward, received tetanus toxoid and then postexposure rabies prophylaxis,
and was assisted by the medical team (pediatric surgeon, neurosurgeon, and cardiovascular surgeon).

The following procedures were performed:

- **Head:** Surgical cleaning and detailed washing with normal saline and povidone iodine were performed throughout the extensive scalp injury, followed by the control of bleeding. Multifragment fracture of the left parietal bone, with depression and exposure of the brain matter through orifices situated at the bifrontal, biparietal, and occipital levels was found [Figure 3]. Small bone fragments were removed from the left parietal region, along with protruding injured extradural brain tissue. Only hemostasis was performed due to the hemodynamic instability with hypovolemic shock.

- **Chest:** Surgical cleaning of thorax and thoracotomy, evidencing three rib fractures, no injuries to the lungs, pericardium, or diaphragm; chest tube left connected to water-sealed flask; left chest tube returned 400 mL of fresh red blood.

- **Abdomen:** Median, supraumbilical, and infraumbilical laparotomy, revealing abundant free-moving milky fluid in abdominal cavity and swollen intestinal rings; cavity inventory performed, revealing absence of visceral injuries; laparotomy left contained with bag and compresses.

**Postoperative course**

The patient was admitted to the intensive care unit under mechanical ventilation with sedation and analgesia (heart rate, 115 beats per minute; blood pressure, 100/70 mmHg; GCS, 4/15 points) [Figure 4]. Cefotaxime, cloxacillin, metronidazole, 20% mannitol, and phenytoin were initiated parenterally. The ophthalmological evaluation discarded injury to the left ocular globe.

On the fourth postoperative day (GCS, 6/15 points; left brachiocephalic hemiparesis, 3/5), the patient progressed with fever and right basal pneumonia. New antibiotic therapy was instituted (ceftazidime, vancomycin, and metronidazole), followed by the closure of abdominal cavity.

On the sixth postoperative day (GCS, 10/15 points), mechanical ventilation and chest drainage were removed and 20% mannitol was suspended. Blood derivative products (packed red blood cells and fresh frozen plasma) were used because of low prothrombin time (52%) and thrombocytopenia.

On the ninth postoperative day (GCS, 12/15 points), Acinetobacter baumannii and Pseudomonas aeruginosa were isolated from sputum/tracheal secretions. The patient was sensitive to imipenem and amikacin; hence, the consequent change of antibiotic. An occurrence of cerebrospinal fluid fistula in the left parietal region was found.

On the twelfth postoperative day, in the operating room, the correction of occipital depressed fracture and hermetic closure of the dura defect in the parietal region, with free autologous periosteal graft, was performed using interrupted 3-0 absorbable sutures.

On the fifteenth postoperative day (GCS, 14/15 points), the child was discharged from the intensive care unit. During his hospital stay, he presented behavioral disorders (obsessive–compulsive disorder and panic attacks) and was treated with clomipramine and clonazepam. Seven months later, he developed amblyopia without other neurological deficit.

**DISCUSSION**

**Epidemiology**

Each year, several million Americans are bitten by animals, resulting in approximately 300,000 visits to emergency departments, 10,000 hospitalizations, and 20 deaths, mostly among young children.[32] According to Talan et al.[29] from a total of 110 patients enrolled in their study, 22% were younger than 18 years and 5% were younger than 3 years. A total of 90% of these bites were from dogs and cats, and 3-18% of dog bites and 28-80% of cat bites become infected, with occasional sequelae of meningitis, endocarditis, septic arthritis, septic shock, or intracerebral abscesses.[13,26]

Head or neck trauma due to cat and dog bites is not infrequent in pediatric age.[10,25,33] However, reports of other big felines in children are uncommon.[3,5,18,28] Kadesky et al. documented 50 cases of cougar attacks.

Figure 4: Child after immediate admission in the intensive care unit, showing (a) the scalp and lesion in the left orbital region and (b) the chest wound. 

![Figure 3: (a) Scalp view demonstrating three penetrating skull fractures (arrow) in the left frontal-parietal region caused by the lion’s canines and (b) depressed skull left parietal fracture with dura mater laceration](image-url)
on children, with a 25% fatality rate. Most children were not alone at the time of the attack (92%), and in many instances, adult supervision was present or nearby. Severe head and neck lacerations along with puncture wounds were the most common injuries.[11] However, to the best of our knowledge, we previously did not find published reports about severe head trauma in children caused by lion attacks.

**Infection prophylaxis**

Large animal bites are prone to infection in 10-20% of cases.[1] There are more than 60 isolated germs mainly by dog bite, among which the most common ones are *Pasteurella multocida*, *Staphylococcus aureus*, and anaerobic bacteria (*Prevotella*, *Clostridium*, and *Peptostreptococcus*).[26] *P. multocida* is the most common bacteria found in these patients, and it forms part of the normal flora in the nasopharynx or gastrointestinal tract in many domestic and wild animals. It is a nonspore-forming, nonmotile, Gram-negative coccobacillus that was isolated by Pasteur in 1880. In 1913, Brugnatelli[31] reported the first case in a farmer’s wife suffering puerperal fever and septicemia, and infection from a cat bite was first reported in 1930.[12] Hence, this bacterium is associated with infections caused by dog or cat bites. Serious *P. multocida* infection has also been reported as a complication of lion, cougar, and tiger bites.[2,12,8,34]

Kumar et al.,[15] in a review of cases in *P. multocida* meningitis, found that 40% occurred in infants younger than 1 year, with an overall mortality of 30%, being higher in the elderly (63%). Sometimes its diagnosis could be confused with other agents, such as *Neisseria meningitidis* or *Haemophilus influenzae*. Besides, many other organisms can grow and infect the patient at the same time; so the administration of multiple antibiotics is necessary. Indeed, wound infections from feline bites result in a median of five bacterial species per culture,[5] which underscore the importance of obtaining preantibiotic wound cultures.[29]

The first-line treatment of *P. multocida* is penicillin, although this therapy may be insufficient for the coinfecting agents. In these cases and for patients allergic to penicillin, some authors used cephalosporin, trimethoprim, and sulfamethoxazole. In contrast, amoxicillin and clavulanate—which cover the range of Gram-positive species, Gram-negative species, and anaerobes—would be sufficient.[5] The mean duration of treatment could be more than 14 days, especially in meningitis. For Morgan,[21] where clinically justified (severity of wound, lower limb, etc.), coamoxiclav—a combination antibiotic of amoxicillin trihydrate, β-lactam antibiotic, and potassium clavulanate, a β-lactamase inhibitor—is the prophylactic antimicrobial of choice after bites by large cats, covering staphylococci, streptococci, pasteurella, and anaerobes.

In the present case, we used antibiotics for 5 weeks. Emami et al.[6] administered Cefuroxim for 6 weeks for initial prophylactic antibiotic therapy, although no pathogenic bacteria were found in the smear cultures obtained during the initial cranial surgery.

In addition, big animal bites also mandate the consideration of tetanus and rabies prophylaxis, although rabies in lions is less common. Current guidelines recommend that postexposure rabies prophylaxis is dependent on the type of animal involved, whether the exposure was provoked, the local epidemiology of rabies, and the availability of the animal for observation or testing.[1,17]

**Evaluation and treatment**

The precise and diligent evaluation of a lesion caused by an animal bite may prevent further life-endangering complications.[26] In general, animal bites pose a greater risk of infection. This increased risk is due to a combination of sharp teeth causing deep wounds that are difficult to clean properly, a high inoculation of anaerobic bacteria in the wounds, and inadequate antimicrobial prophylaxis.[21]

For these reasons, timely and copious irrigation with normal saline or Ringer’s lactate solution is mandatory to reduce the rate of infection markedly. Some authors suggest that injection of the tissue with an irrigant solution should be avoided because this irrigation can spread the infection.[23] We believe that copious irrigation will tend to dilute the organisms and enable the patient’s immunological defense system to overcome a lower bacterial colonization. Necrotic or devitalized tissues should be removed, but care must be taken not to debride so much tissue as to cause problems with wound closure. Because any foreign material in a contaminated wound increases the risk of infection, subcutaneous sutures should be used sparingly. In our case as well as in a report by Emami et al,[6] we do not have postoperative infectious complications, perhaps due to washout and extensive wound debridement and early antibiotic prophylaxis.

The small size of children, their limited ability to fend off an attack, and their excited movements mimic those of small prey, stimulating big cats and dogs to attack particularly the head, chest, and neck. Therefore, evaluation involves the assessment of plain radiographs and CT scans of the head and cervical spine injuries. Several cases of tiger attacks described sustained penetrating trauma to the neck and cervical spine,[11,14] emphasizing the hereditary ferocity of such felines and the way in which they prefer to inflict lesions to the neck.[14] In a retrospective study of 654 children with dog bites, 65% of the wounds were located on the head, face, and neck, especially in patients younger than 4 years.[19]
Our patient survived the lion attack, which is somewhat uncommon. Likewise, Emami et al. reported a case of a tiger attack where the patient survived despite severe head trauma. In order to understand the mechanism of the tiger’s bite to the cranium and the excellent outcome of the patient, these authors perform a simulation of the attack using a human skull and a tiger skull with a three-dimensional CT scan reconstruction. According to Emami et al., the animal’s bite was unable to clamp down on the patient’s skull between its canine teeth, but instead both upper canines slid downwards at the moment of jaw closure. This must have led to reduced reactive forces being applied by the lower canines, which subsequently did not penetrate the patient’s skull.

The treatment of these cases requires a multidisciplinary approach, including at many times a general surgeon, a maxillofacial surgeon, an orthopedic surgeon, a plastic surgeon, intensive care physicians, and a microbiologist to achieve the best cosmetic and functional results. Each animal attack often leaves lasting physiological and psychosocial difficulties for the patient. Depending on the injuries, physiotherapy and occupational therapy should also be available to maximize patient outcome. In addition, the psychological trauma of such a devastating event should never be overlooked.

CONCLUSIONS

Lions, tigers, and other large predators are being held in private settings with increasing frequency. Unregulated private zoos are cropping up in many rural and suburban settings across the world. The number of attacks from captive predators is also on the rise.

Human injury resulting from encounters with nondomesticated animals is increasingly common throughout the world, particularly as ecosystems change and humans encroach on previously wild land. More unusual wild animal attacks and the complex injuries that result may pose a challenge to surgeons practicing in resource-limited settings. This case highlights the potentially violent and aggressive nature of wild mammals held in captivity. In this sense, the best treatment in all these cases is the prevention of human injuries by these animals.

The Humane Society of the United States—one of the largest animal advocacy organizations in the world—has monitored circuses for many years, chronicling training methods and living conditions that the animals routinely experience. It refutes six myths of circuses: (1) circus animals perform tricks out of love for their trainers; (2) circus animals are like beloved children, taught and nurtured their whole lives; (3) after the show, the animals rest in comfort; (4) the circus is safe for the whole family; (5) circuses serve endangered species by educating children and adults; and (6) laws protect animals in circuses.

The management of these patients with severe injuries has several important elements: Adequate prehospital care, rapid transport to a specialized center, complex in-hospital care, and rehabilitation. The prehospital phase plays a vital role in determining the outcome of treatment when done appropriately and contributes significantly to reducing morbidity and mortality, a fact that does not always occur in the case of developing countries.

We recommend that after the initial management and exclusion of life-threatening injuries, patients should be transferred to a tertiary care facility capable of managing the adequate treatment, such as the one presented in this instance, emphasizing the importance of multidisciplinary teamwork to attend these infrequent but dangerous cases.

REFERENCES

1. Anderson M, Uster P, Sztakowski J, Patrick T, Duncan W, Turner N, et al. Cervical spine injury: Tiger attack. Orthopedics 2008;31:12.
2. Burdge DR, Scheiffele D, Speert DP. Serious Pasteurella multocida infections from lion and tiger bites. JAMA 1985;253:3296-7.
3. Captini CM, Herrero IA, Patel R, Ishitani MB, Boyce TG. Wound infection with Neisseria weaveri and a novel subspecies of Pasteurella multocida in a child who sustained a tiger bite. Clin Infect Dis 2002;34:74-6.
4. Ciraponeiro S, Camiade B, Legros M. Basic instinct in a feline. Am J Forensic Med Pathol 2001;22:46-50.
5. Chum M, Ng WP. Traumatic tiger attack. J Neurosurg Pediatr 2011;8:530-4.
6. Emami P, Kaiser TM, Regelsberger J, Goebell E, Fiehler J, Westphal M, et al. Case report: Surviving a tiger attack. Neurosurg Rev 2012;35:621-4.
7. Hazani R, Buntic RF, Brooks D. Microsurgical scalp reconstruction after a mountain lion attack. Ann Plast Surg 2008;61:265-8.
8. Hubbert WT, Rosen MN. Pasteurella multocida infection due to animal bite. Am J Public Health Nations Health 1970;60:1103-8.
9. Humane Society of the United States 2009. Available from: http://www.humanesociety.org [Last accessed on 2013 Apr 01].
10. Iannelli A, Lupi G. Penetrating Brain Injuries from a Dog Bite in an infant. Pediatr Neurosurg 2005;41:41-5.
11. Kadesky KM, Manarey C, Blair GK, Murphy JJ 3rd, Verchere C, Atkinson K. Cougar attacks on children: Injury patterns and treatment. J Pediatr Surg 1998;33:863-5.
12. Kizer KW. Pasteurella multocida infection from a cougar bite. A review of cougar attacks. West J Med 1989;150:87-90.
13. Klein DM, Cohen ME. Pasteurella multocida brain abscess following perforating cranial dog bite. J Pediatr 1978;92:588-9.
14. Kohout MP, Percy J, Sears W, Yeo JD. Tiger mauling: Fatal spinal injury. Aust N Z J Surg 1989;59:505-6.
15. Kumar A, Devlin R, Velland H. Pasteurella meningitis in an adult: Case report and review. Rev Infect Dis 1990;12:440-8.
16. Langley RL. Fatal animal attacks in North Carolina over an 18-year period. Am J Forensic Med Pathol 1994;15:160-7.
17. Manning SE, Rupprecht CE, Fishbein D, Hanlon CA, Lumldertbach B, Guerra M, et al. Human rables prevention-United States: Recommendations of the Advisory Committee on Immunization Practices. MMWE Recomp Rep 2008;57 (RR-3):1-28.
18. McKee D. Cougar attacks on humans: A case report. Wilderness Environ Med 2003;14:169-73.
19. Méndez Gallart R, Gómez Tellado M, Somoza Argibay I, Liras Muñoz J, Páis Piñeiro E, Vela Nieto D. Dog bite-related injuries treated in a pediatric surgery department: Analysis of 654 cases in 10 years. An Esp Pediatr 2002;56:425-9.
20. Mitchell KB, Kotecha VR, Chandika A. Bush animal attacks: Management of complex injuries in a resource-limited setting. World J Emerg Surg 2011;6:43.
21. Morgan MS. Tiger bites. J R Soc Med 1999;92:545.
22. Nabi DG, Tak SR, Kangoo KA, Halwai MA. Increasing incidence of injuries and fatalities inflicted by wild animals in Kashmir. Injury 2009;40:87-9.
23. Presutti RJ. Prevention and treatment of dog bites. Am Fam Physician 2001;63:1567-72.
24. Rollins CE, Spencer DE. A fatality and the American mountain lion: Mark analysis and profile of the offending lion. J Forensic Sci 1995;40:486-9.
25. Rzepecka-Woźniak E. Dog-bite related deaths. Arch Med Sadowej Kryminol 2006;56:56-60.
26. Santana-Montero BL, Ahumada-Mendoza H, Vaca-Ruíz MA, Castro-Sierra E, Sánchez-Herrera F, Fernández-Portilla E, et al. Cerebellar abscesses caused by dog bite: A case report. Childs Nerv Syst 2009;25:1137-41.
27. Schiller HJ, Cullinane DC, Sawyer MD, Zietlow SP. Captive tiger attack: Case report and review of the literature. Am Surg 2007;73:516-9.
28. Steinbok P, Flodmark O, Scheifele DW. Animal bites causing central nervous system injury in children: A report of three cases. Pediatr Neurosci 1985-1986;12:96-100.
29. Talan DA, Citron DM, Abrahamian FM, Moran GJ, Goldstein EJ. Bacteriologic analysis of infected dog and cat bites. N Engl J Med 1998;340:85-92.
30. The tiger next door [home page on the internet]. Available from: http://www.thetigernextdoor.com/news (2010) [Last accessed on 2013 Apr 01].
31. Weber DJ, Wolfson JS, Swartz MN, Hooper DC. Pasteurella multocida infections. Report of 34 cases and review of the literature. Medicine (Baltimore) 1984;63:133-54.
32. Weiss HB, Friedman DI, Coben JH. Incidence of dog bite injuries treated in emergency departments. JAMA 1998;279:51-3.
33. Wilberger Je Jr, Pang D. Cerebellar injuries from dog bite in an infant. Neurosurgery 1981;9:426-8.
34. Woolfrey BF, Quall CO, Lally RT. Pasteurella multocida in an infected tiger bite. Arch Pathol Lab Med 1985;109:744-6.

Disclaimer: The authors of this article have no conflicts of interest to disclose, and have adhered to SNI's policies regarding human/animal rights, and informed consent. Advertisers in SNI did not ask for, nor did they receive access to this article prior to publication.