

Animal Bites in Children: A Developing Country's Perspective

Vijayendar Kumar¹, Vaibhav Pandey¹, Preeti Tiwari², Ajay Narayan Gangopadhyay¹, Shiv Prasad Sharma¹ and Ravinder Singh Bedi³

ABSTRACT

Background: Bites from animals are common in children. In developing countries with increasing urbanization, poverty and increasing population there is an ever increasing risk for children to get confronted with unusual animal bite with complex management. In past few years, we have encountered animal bite from pigs, rats, wild cats in children. We present our experience of **few unusual cases and five year review of animal bites in children** from a tertiary center of Northern India.

Material & Method: Retrospective appraisal of case records over a 5-year period between July 2009 and June 2013 in the Department of Paediatric surgery of a tertiary care center of northern India was conducted. All patients who were managed for animal bites up to 12 years of age presenting during the study period were included.

Observation: Total 168 children were included in the analysis. Out of these 45 cases had multiple bites (1.38 bite per case). Amongst total 168 cases recorded, 134 cases were of dog bite, 24 cases of monkey bite, 6 cases of cat bite, 2 cases of pig bite and 2 cases of rat bite. Culture from wound was positive in 31 cases with *E.*

coli being most common organism isolated. Primary repair of wound was performed in 20 cases, a diversion colostomy with a late definitive repair was done in 2 cases of pig bite. Laparotomy with reversal of ileostomy was performed in one case. Urethroplasty was performed in one case with penile bite

Conclusion: Animal bites in children have a very wide spectrum of presentation and management. In developing countries a more aggressive approach with respect to antibiotic prophylaxis and post exposure immunization against tetanus is required.

Keywords: Animal bite, rat bite, pig bite, maxillofacial bite

INTRODUCTION

Bites from animals are common in children. In developed countries bite from pet dogs and cats are most common.¹ In developing countries with increasing urbanization, poverty and increasing population there is an ever increasing risk for children to get confronted with unusual animal bite with complex management. In past few years, we have encountered animal bite from pigs, rats, wild cats in children.

Animal bites are common among children in developing countries with dog bites constituting the majority (85–90%), followed by cats (5–10%) and rodents (2–3%).² There is an ever increasing risk for children to get confronted with unusual animal bites in developing countries owing to increasing population and urbanization.³ Dog and cat bites are particularly more serious in children than in adults because children are more likely to be bitten on the face, neck and head in up to 70% of cases.⁴ Dogs are more likely to inflict superficial abrasions and lacerations, whereas cats, because of their slender, sharp teeth, more often cause deep puncture wounds.^{6,7} In these wounds around 50-75% cases contain *Pasteurellamultocida*, aerobes and anerobes including *S. aureus*.⁵ In cat bites 28-80% of cases become infected whereas in dog bite cases 3-18% becomes infected.^{4,5} Rabies is the most lethal disease transmitted from animal bite from India, especially in children from rural areas.² In western countries 66 % of dog bite are from pets which is in stark contrast to developing countries



Dr. Vijayendra Kumar completed his postgraduation (MS) in General Surgery from Patna Medical College & Hospital, Patna in year 1993 and MCh in Paediatric Surgery from IMS, BHU. Currently, he is working as Associate Professor, Department of Paediatric Surgery, IMS, BHU, India

¹Department of Paediatric Surgery, Institute of Medical Sciences, Banaras Hindu University, ²Oral & Maxillofacial Surgeon, Smayan Hospital, Varanasi, ³Oral & Maxillofacial Surgery, Saraswati Dental College & Hospital, Lucknow (UP), India.

Address for Correspondence:

Dr. Preeti Tiwari, Consultant Oral & Maxillofacial Surgeon, Smayan Hospital, Varanasi, (UP), India.

Contact: +91 9670999929

E-mail: drtiwaripreeti@gmail.com

Date of Submission: 09-10-2013

Reviews Completed: 21-11-2013

Date of Acceptance: 20-12-2013

where most of the bites are reported from stray animals.
³We present our experience of few unusual cases and five year review of animal bites in children from a tertiary center of Northern India.

MATERIAL & METHOD

Retrospective appraisal of case records over a 5-year period between July 2009 and June 2013 in the Department of Paediatric surgery of a tertiary care center of northern India was conducted. All patients who were managed for animal bites up to 12 years of age presenting during the study period were included. Data were collected about age, gender, duration, anatomical location, treatment, immunization status, hospital stay, mortality and postoperative complications in the patients.

OBSERVATION

Total 168 children were included in the analysis. Out of these 45 cases had multiple bites (1.38 bite per case) [Table. 1]. Amongst total 168 cases recorded, 134 cases were of dog bite, 24 cases of monkey bite, 6 cases of cat bite (Fig. 1), 2 cases of pig bite and 2 cases of rat bite (Fig.2). Out of 134 cases of dog bites, 8(6%) were from pet animals. Rest all cases involved stray animals while the child was alone.



Figure 1: Cat bite: multiple bite over face involving root of nose, left upper eyelid & forehead



Figure 2: Rat bite: nose tip bitten circumferentially with multiple bite on face.

Table 1: Distribution of bite according to Site of Involvement

Site	Number (%) (n=232)
Head & neck	128(55%)
Limbs	98(42%)
Trunk	4(1.7%)
Perineum	2(0.8%)

Total of 118 cases were males and 50 cases were females with a median age of 3.42 ± 2.12 years and median duration of presentation of 5.33 ± 2.34 days following the bite. Face was the most common site of involvement.

Two patients of pig bite had rectal prolapse and one case of dog bite had ileostomy prolapse. Four (4) cases had associated fracture of limbs due to fall while trying to escape. All were managed by immobilisation using plaster cast. All the cases had received 2 to 4 different antibiotics prior to presentation. Culture from wound was positive in 31 cases with *E. coli* being most common organism isolated. We gave antibiotics for a mean duration of 10.45 ± 2.85 days (range 10-14 days) with Amoxicillin-clavulanate being most common. Only 78 cases had a complete primary immunization against tetanus, rest had no prior immunisation. In none of the cases, animal was available for observation. 34 cases were immunized with human rabies immune globulin (HRIG) and all cases were given active

immunization with the human diploid cell vaccine (HDCV). The HDCV was administered intramuscularly on days 0, 3, 7, 14 and 28. Twenty four (24) patients required surgical intervention. Primary repair of wound was performed in 20 cases, a diversion colostomy with a late definitive repair was done in 2 cases of pig bite. Laparotomy with reversal of ileostomy was performed in one case. Urethroplasty was performed in one case with penile-bite (Table 2). All of the patients in our case series recovered with no mortality.

Table 2: Types of Surgical Procedures Performed

Type of surgical intervention	Number (%) (n=24)
Primary repair	17(70.5%)
Delayed repair	3(12.5%)
Colostomy	2(8.6%)
Urethroplasty	1(4.2%)
Laparotomy and ileostomy closure	1(4.2%)

DISCUSSION

In our experience 94% of cases (126 cases) of dog bites were from stray dogs that were not immunized for rabies and also could not be observed. All the rest of cases were from stray animals. The pet dogs were also not immunized against rabies. Definitive pattern of bites in children has been described in western literature. Dog and cat bites most commonly reported on face.⁶ The most common site of injury among reported cases of domestic pig bites is on posterior thigh.⁷ We have observed a definitive pattern of perineal bite in children.

Children with prolapsed rectum while defecating in open were attacked from pigs which were probably attracted by human excreta and prolapsed rectum.⁸ These bites are often associated with a very high rate of wound infections with variable flora of both aerobes and anaerobes. In view of the high incidence and severity of infection with a variety of organisms these patients require broad-spectrum antibiotics, including anti-anaerobe activity.⁹ All these cases had severe injury to perineum and prolapsed bowel and required complicated staged management.

The cases of rat bites have been increasing, as rats have become popular pet and study animal. In developed countries most cases of rat bite fever are reported in adult male, most common amongst pet store workers and laboratory technicians,¹⁰ whereas in developing countries most victims are under 1 year of age with no sex predilection. Most of the rat bites have occurred during sleep in unattended child, with the hands and arms being most common sites of rat bite.¹¹ In our two cases of rat bite, victims were neonates and were bitten on face. The bites were reported in winter season and neonates were completely covered except on their face.

Animal bite wounds require a careful examination and assessment of associated injuries. Since all such wounds are contaminated with the oral flora of the animal, prevention of local wound infection is the principal treatment concern along with rabies and tetanus prophylaxis.¹² Proper surgical toilet with wound irrigation followed by careful debridement remains the mainstay of treatment of all bite wounds.^{13,14} This significantly reduces the incidence of infection.¹⁵ Immediate irrigation with soap and water or water alone markedly decreases the concentration of bacteria in contaminated wounds and reduces the risk of infection and rabies.^{13,14} Adequate sedation and analgesia is required as child is agitated.¹³ Duration of presentation and presence of infection are important.¹³ Cultures should be taken from all the wounds at the time of presentation.¹⁶ Based on existing data, prophylactic antibiotics are recommended for high-risk wounds¹⁷ namely those more than 8 h old, deep punctures (particularly when inflicted by cats), wounds that require surgical repair, hand and lower extremity wounds (particularly those involving deep structures such as joints and bones), and wounds in immune compromised patients.¹⁸ Most of our cases presented very late with median duration of presentation of 5.33 ± 2.34 days. All were given antibiotics for a mean duration of 10.45 ± 2.85 days (range 10-14 days) with Amoxicillin-clavulunite being most common. Amoxicillin-clavulunite is the gold standard for empiric antimicrobial prophylaxis against dog, cat, and human bite wound infection since, it is active against most aerobic and anerobic isolates.^{19,20} Duration of treatment for established bite wound infection should be individualized based on the site involved and the response to treatment. A 7 to 14 day course is usually adequate for soft tissue infection whereas a minimum of 3 weeks therapy is recommended for infections involving joints or bones.²⁰ All bites are considered tetanus-prone wounds.¹⁵ The standard of care includes the administration of tetanus toxoid if a booster injection has not been given within the last five years.²¹ If the history of tetanus immunization of the victim is unknown or less than three doses of adsorbed tetanus toxoid have been received, tetanus immunoglobulin should be administered.²² In our series only 46% cases had prior immunisation, rest had no prior immunisation. Immune prophylaxis against rabies should be individualized. Bite from animals like stray dogs, wild cats, wolf hybrids, raccoon, fox are high risk and post exposure prophylaxis (PEP) should be given in all cases. In low risk group animals like squirrels, rats, mice, rabbits, hamsters, pigs and domestic dogs and cat PEP should be individualised. PEP should be considered if low risk animals exhibit signs of rabies infection unprovoked bites, aggressive or abnormal behavior, previous bite wounds and if animal is no available for observation.²³ All of our cases were given PEP for rabies as in all cases either the bites were unprovoked or the animal was not present for observation irrespective of its belonging to high or low risk group. PEP consists of immunization with human rabies immune

globulin (HRIG) and active immunization with the human diploid cell vaccine (HDCV). HRIG should be administered on day 0 as a single 20 IU/kg dose, half infiltrated around the site of exposure and the other half given intramuscularly on antero-lateral aspect of thigh or deltoid.²³ HDCV or RVA should be administered intramuscularly in a series of five 1 ml injections given on day 0, 3, 7, 14, & 28.^{23,24} There is a lack of consensus regarding the primary closure of animal bite wounds. The bite on face in children poses a special clinical situation. These bites are one of most common and are considered as high risk.^{15,20} Such cases are usually present with severe lacerations, underlying fracture and also have cosmetic implications.¹⁵ Most reports recommend primary suturing of all bite wounds to face & all other wounds unless they are high risk.^{5,19} Reconstructive procedures are required in cases with loss of ear, nose and eyelid. These are best performed immediately in cases presenting early. Delayed repair (after 4-6 weeks) is recommended in cases presenting late (> 8 hours) or with proven underlying infection.^{15,21}

High risk factor for wound infection in children are a wound located on hand, foot, major joints, scalp or face, puncture wounds, crush injuries, a treatment delay > 12 hours, immune-compromised child. These wounds can be closed if they are uninfected after 72 hours of initial treatment. Most of our cases presented very late so primary closure was only performed in bites involving face and scalp. In 3 cases delayed suturing of facial wound was done after 72 hours because of infection at initial presentation.

CONCLUSION

Animal bites in children have a very wide spectrum of presentation and management. In developing countries a more aggressive approach with respect to antibiotic prophylaxis and post exposure immunisation against tetanus is required as most of children are not immunised, bites are from wild non-immunised animals and mostly have a delayed presentation. Most of the attacks occur while the child is left unattended. Presence of a prolapsed stoma or rectal prolapse in children is a very high risk factor and bites in such children require major surgical intervention.

REFERENCES

- McLean, Ashby K. Animal and human injuries in Victoria. *Med J Aust* 2007; 186: 38-40.
- World health organization (WHO) 2004. WHO expert consultation on rabies, first report. Geneva, Switzerland.
- Fleisher GR. The management of bite wounds. *N Engl J Med* 1999; 340: 138-40.
- Abubaker AO. Management of post traumatic soft tissue infection. *Oral Maxillofac Surg Clin North Am* 2003; 139-46.
- Armstrong BD. Laceration of the mouth. *Emerg Med Clin North Am* 2008; 18: 471-80.
- Haug RH, Morgan III J. Management of human & animal bites. In Fonseca RJ, Walker RV, eds: *Oral and Maxillofacial Trauma 2nded.* Philadelphia: WB Saunders 1997: 875-96.
- Chen E, Hornig S, Shepherd SM. Primary closure of mammalian bites. *Acad Emerg Med* 2000; 7: 157-16.
- Gangopadhyay AN, Gupta DK, Dhulkotia A, Apte AV, Sharma SP. Pig bite prolapsed rectum in a child. *J Pediatr Surg* 2002; 37: 657-8.
- Barnham M. Pig bite injuries and infection: report of seven human cases. *Epidemiol Infect* 1988; 101: 641-5.
- Dendle C, Woolley IJ, Korman TM. Rat-bite fever septic arthritis: illustrative case and literature review. *Eur J Clin Microbiol Infect Dis* 2006; 25: 791-7.
- Richter C. Incidence of rat bites and rat bite fever in Baltimore. *J Am Med Assoc* 1945; 128: 324-6.
- Weber EJ, Callahan ML. Mammalian Bites. In: Marx JA, Hockberger RS, Wai RM, *et al* eds. *Rosen's Emergency Medicine.* 5th ed. St Louis: Mosby Inc; 2002: 783.
- Garbutt F, Jenner R. Best evidence topic report. Wound closure in animal bites. *Emerg Med J* 2004; 21: 589-90.
- Schwab RA, Powers RD. Puncture wounds and mammalian bites. In Tintinalli JE, Kelen GD, Stapezynski JS, eds. *Emergency Medicine: A comprehensive Study Guide.* 6th ed. New York: McGraw-Hill; 2004: 327-328.
- Capellan O, Hollander JE. Management of lacerations in the emergency department. *Emerg Med Clin North Am* 2003; 21: 205-31.
- Agrawal K, Mishra S, Panda KN. Primary reconstruction of major human bite wounds of the face. *Plast Reconstr Surg* 1992; 90: 394-8.
- Weber DJ, Hensen AR. Infection resulting from animal bites. *Infect Dis Clin North Am* 1991; 5: 663-80.
- Sztajnkrzyer MD, Trott AT. Wounds and soft tissue injuries. In: Knoop KJ, Stack LB, Storrow AB, eds. *Atlas of Emergency Medicine.* 2nd ed. New York: McGraw-Hill; 2002: 594-5.
- Fleisher GR. The management of bite wounds. *N Engl J Med* 1999; 340: 138-40.
- Goldstein EJC, Citron DM. Comparative susceptibilities of 173 aerobic and anaerobic bite wound isolates to sparfloxacin, temafloxacin, clarithromycin, and older agents. *Antimicrob Agents Chemother* 1993; 37: 1150-3.
- Centers for Disease Control. Diphtheria, tetanus, and pertussis: recommendations for vaccine use and other preventive measures recommendations of the Immunization Practices Advisory Committee (ACIP). *MMWR* 1991; 40 (RR-10): 1-28.
- Goldstein EJC. Bite wounds and infection. *Clin Infect Dis* 1992; 14: 633-40.
- Centers for Disease Control. Rabies prevention in the United States: recommendations of the Immunization Practices Advisory Committee. *MMWR* 1991; 40 (suppl RR3): 1-19.
- Human Rabies Prevention-United States, 1999 Recommendations of the Advisory Committee on Immunization Practices (ACIP). Available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/00056176.htm>. (Accessed March 24, 2006).