

Failure of post-exposure prophylaxis after dog bite: Case Report**Shingare AD¹, Gadekar RD², Doibale MK³, Dimple VK⁴, Nair A⁵, Rajput PS⁶**^{1,5,6}Junior resident, ²Associate professor, ³Professor and head of the department, ⁴Assistant professorDepartment of Community Medicine, Dr Shankarrao Chavan Government Medical College, Nanded (Maharashtra)–
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Abstract: Rabies is 100% fatal, yet 100% preventable with timely and appropriate Post Exposure treatment. The Rabies Immunoglobulin (RIG) provides passive immunity in the form of ready-made anti-rabies antibodies, to tide over the initial phase of the infection before it is physiologically possible for the patient to begin producing his / her own antibodies following anti-rabies vaccination. In the present case report, non receipt of proper local wound treatment, use of rabies immunoglobulin after suturing of wound and face as a site of bite are the probable reasons for death of a child due to rabies.**Keywords:** Rabies, Rabies Immunoglobulin, Dog Bite, Death

INTRODUCTION

Half of the global human population lives in canine rabies-endemic areas and is considered at risk of contracting rabies [1]. Vast majority of the estimated 55,000 deaths caused by rabies each year occur in rural areas of Africa and Asia. In India alone, 20,000 deaths are estimated to occur annually; in Africa, the corresponding figure is 24,000 [2]. Rabies is an acute viral disease that causes fatal encephalomyelitis in virtually all the warm blooded animals including man. The virus is found in wild and some domestic animals, and is transmitted to other animals and to humans through their saliva (i.e. following bites, scratches, licks on broken skin and mucous membrane). In India, dogs are responsible for about 97% of human rabies; followed by cats (2%), jackals, mongoose and others (1%) [3]. Children are the most frequent victim of dog bite. The level of knowledge of the community and concern about dog bite injuries has an important role to play in dealing with this problem [4].

CASE REPORT

A 9-year-old female from Parbhani District in Maharashtra State, India was bitten by a street dog on 9th March 2014 around 2.00 pm, incurring three bite marks and one deep contused lacerated wound just below the line joining the angle of mouth to the auricle of ear on left side (WHO Class III bite). The dog was street dog, non observable, dog bite was unprovoked and on uncovered part of the body.

After washing the wound with water only for 1 to 2 minutes at home, the girl was taken to Rural Hospital Jintur, District Parbhani on the same day of

dog bite and received intramuscular injection of Tetanus Toxoid and first dose of cell culture anti-rabies vaccine. Girl was then referred to District Civil Hospital for anti-rabies serum. At District Civil Hospital suturing of the wound was done first and after suturing Inj. ARS (40IU/kg body weight) was infiltrated into and around the wounds at about 9.00PM. At the time of discharge, the patient was advised to take remaining four doses of cell culture vaccine as per the Essen regimen.

The patient received 2nd, 3rd and 4th dose of cell culture vaccine as per schedule. On 27th March 2014 patient started complaining pain at the site of bite, headache and restlessness for which patient received treatment from local private practitioner. On next day morning parents observed that the patient started dribbling of saliva from the mouth, unable to drink water and become violent. Immediately parents took her to Rural Hospital, Jintur, District Parbhani where Medical Officer observed that patient was having hydrophobia and intolerant to noise and told to the parents that the patient has developed rabies. The Medical Officer then referred the patient to Tertiary Care Hospital, Nanded. The patient was admitted in isolation ward of Dr. S. C. Govt. Medical College, Nanded. The patient died in the evening on 28th March 2014 i.e. 19 days after the dog bite.

DISCUSSION

The incubation period of rabies varies from 2 weeks to 6 years (average 2 - 3 months) depending on the amount of virus in the inoculum and site of inoculation. The proximity of the site of virus entry to the CNS increases the likelihood of a short incubation

period [1]. Upon infection, virus travels along the axoplasm towards brain and spinal cord 3mm/hr and then centrifugally along the nerve trunks to periphery including salivary glands where it multiplies and shed in saliva [5]. The incubation period depends on the site of the bite, severity of the bite, number of wounds, amount of virus injected, species of biting animal, protection provided by clothing and treatment undertaken [2]. When the bites are severe, multiple, and particularly those on head, neck, face, hands and genitalia are known to have a short incubation period, of even four days only [6].

In spite of receiving post exposure prophylaxis, there are reported treatment failures resulting in human rabies. There are various reasons for the same like; 1) Delay in starting treatment due to late reporting of patients. 2) No proper wound wash. 3) Application of irritants to bite wounds. 4) Suturing of animal bite wounds without local infiltration of RIG [7].

In the present case report a child died on 19th day after bite. In this case the probable reasons for the cause of death due to rabies in a child might be non receipt of proper local wound treatment and administration of RIG (rabies immunoglobulin) after suturing of the wound as well as face as a site of bite.

Prompt and adequate local treatment of all bite wounds and scratches is the first requisite and is of utmost importance. The purpose of local treatment is to remove as much virus as possible from the site of inoculation before it can be absorbed on the nerve endings. Local treatment of wounds is of maximal value when applied immediately after exposure but it should not be neglected if several hours or days have elapsed. Local treatment comprises of immediate flushing and washing the wound(s), scratches and the adjoining areas with plenty of soap and water, preferably under a running tap, for at least 15 minutes. This is followed by application of veridical agents - either alcohol (400-700ml/litre), tincture or 0.01% aqueous solution of iodine or povidone iodine. Bite wounds should not be immediately sutured to prevent additional trauma which may help spread the virus into deeper tissues. Animal experiments have shown that local wound treatment can reduce the chances of developing rabies by up to 80% [2]. In case of lacerated wounds with severe bleeding, where suturing cannot be avoided, the wound should first be infiltrated with rabies immunoglobulin (RIG) and minimum number of stay sutures should be applied later. If suturing is needed for cosmetic purposes, it is preferably done 2 weeks after starting vaccination, as patient would develop protective antibodies by then. In addition to local treatment, tetanus prophylaxis, analgesics & antibacterial treatment/antibiotics may be given [7].

The currently available anti-rabies vaccines in India are human diploid cell vaccine, purified chick

embryo cell vaccine, purified verocell vaccine and purified duck embryo vaccine [6]. Humoral antibodies play an important role in protection against rabies. Anti-rabies neutralizing antibody titre of 0.5 IU/ml or more in serum is considered as protective. This level is achieved in most healthy individuals by day 14 of a post exposure regimen, with or without simultaneous administration of rabies immunoglobulin [3]. Thus leaving the person vulnerable to rabies during this window period of the first fortnight. Thus, these individuals are vulnerable to rabies despite the timely and full 5-6 doses of any modern rabies vaccine and proper wound care. In these individuals only Rabies Immunoglobulin (RIG) are life saving [6]. RIG is life saving in severe (WHO Category III) exposures to Rabies, as vaccine alone would not suffice in these cases [8].

The dramatic life saving effect of administration of RIGs in man was demonstrated in a group of persons bitten by a rabid wolf in Iran in 1954. Of the 4 persons given vaccine alone, 3 died of rabies, whereas only 1 of the 12 administered equine rabies Antiserum and vaccine succumbed to rabies. According to WHO, all trans-dermal bites or scratches viz. wounds that bleed; irrespective of site, number and severity are Category III exposures. It is a common misbelieve that only severe, multiple wounds & bites on head and neck are category III exposures [7].

Unlike modern rabies vaccines, which are independent of body weight of the patient for their dosage, the dosage for administration of RIGs is decided on the basis of body weight. For HRIGs, the dosage is 20 IU per kg body weight subject to a maximum of 1500 IU. For ERIGs, the dosage is 40 IU per kg body weight subject to a maximum of 3000 IU. The dosage of RIG should not exceed the recommended dose as it may suppress the antibody production induced by the anti-rabies vaccine [7]. When the volume required to infiltrate the wound(s) exceeds the recommended dose of RIG, some clinicians recommend diluting the calculated dose in saline to yield a two- to threefold increase in solution volume to ensure that all wound areas receive adequate infiltration. RIG provides only short-term protection against rabies. Half-life of HRIG is approximately 21days [9] while that of ERIG is only 7 to 10 days [10]. Considering half-life of RIGs it will be better to infiltrate HRIG in cases having bites on head, neck and face as incubation period is shorter.

The Equine Rabies Immunoglobulin currently available in our country, are purified, economical, safe and cost effective. Their benefits clearly outweigh the remote risk of anaphylaxis due to ERIG. HRIGs are to be used only if they can be afforded by the patients [11].

Behera TR *et al.*; studied use of equine rabies immunoglobulin in patients positive to skin test dose of

ERIG and revealed that even in cases with positive skin reaction, ERIG can be safely administered with premedication with anti-histamine and there was no systemic anaphylaxis [8].

CONCLUSION

Eradication of rabies from India with its abundant wild life may not be practically possible. But prevention and control of rabies is feasible through awareness generation of the public and of the health care personnel's. Thus proper local wound treatment, avoiding suturing of the wounds as far as possible and passive immunization with RIG is highly recommended for category III animal bites to provide immediate protection against rabies.

REFERENCES

1. WHO Expert Consultation on Rabies. First Report. World Health Organ Tech Rep Ser. 2005; 931: 1–88. Available from: [http://www.who.int/rabies/Expert Consultation on Rabies.pdf](http://www.who.int/rabies/Expert%20Consultation%20on%20Rabies.pdf)
2. Park K, Rabies; Park's Textbook of Preventive and Social Medicine. Bansaridas Bhanot publication, Jabalpur (India). 2013; 22: 251-6.
3. National Centre for Disease Control Directorate General of Health Services Ministry of Health and Family Welfare Government of India, New Delhi. National guidelines on rabies prophylaxis. 2013; 1-24.
4. Khokhar A, Meena GS, Mehra M; Profile of dog bite cases attending M.C.D. dispensary at Alipur, Delhi. Indian Journal of Community Medicine. 2003; 28(4):157-160.
5. Kulkarni AS, Madhusudana SN, Gupta A, Natraj U; Dog bite on face by rabid dog: a case report. APCRI Journal. 2012; 14(1).
6. Sudarshan MK; Administration of rabies immunoglobulin's (RIGs): Allaying fears and instilling confidence. Infect Dis J. 2006; 15(1): 9-12.
7. Association for Prevention & Control of Rabies in India (APCRI). Manual on rabies immunoglobulin administration. 2009; 1-17.
8. Behera TR, Satapathy DM, Sahu T, Palo SK; Use of equine rabies immunoglobulin (ERIG) in patients positive to skin test dose of ERIG. APCRI Journal. Available from: <http://rabies.org.in/rabies-journal/rabies-08-2/OriginalArticle1.htm>
9. Rabies Immune Globulin; Available from: <http://www.drugs.com/monograph/rabies-immunoglobulin.html>.
10. Chawan VK, Tripathi RK, Sankhe L, Fernandes AC, Daftary GV; Safety of Equine Rabies Immunoglobulin in Grade III bites. IJCM. 2007; 32(1).
11. Singh TDK, Sampath G; Importance of Rabies Immunoglobulin in post exposure prophylaxis. APCRI Journal. 2013; 14(2).