

Research Article

# WHO Needs to Re-look at Animal Bite Wound Classification for Rabies Post Exposure Prophylaxis to Save People from Deadly Rabies!

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## A B S T R A C T

Rabies is a deadly zoonotic disease that is largely caused by bites or scratches of an infected dog. WHO has defined wound classifications for taking decisions on Rabies Post Exposure Prophylaxis (PEP) after bites. Some experts have suggested a change in WHO classification to include another category IV in severe wounds. As we work in the rabies endemic country contributing the highest number of rabies deaths annually, we discuss what changes in Rabies PEP classification are actually required based on our clinical practice. We discuss here how the lives of victims of rabid animals were saved and what factors led to the failures of PEP. We also discuss why there is no need to expand existing wound classification to category IV and no need to use higher concentrations of RIG for severe wounds like those on the head and neck. We recommend omitting category II and keeping only categories I and III for wound classification for rabies PEP based on our clinical experience with rabid dog bites and scratches i.e. either there is exposure or no exposure using spirit test in doubtful abrasions without bleeding. Moreover, because the rabies virus attaches to the nerve at the site of the bite and there is no viraemia in rabies infection, therefore, to classify a scratch or abrasion with or without bleeding is not rational.

**Keywords:** Wound Classification, Scratches, Rabies, Post Exposure Prophylaxis

## Introduction

Rabies is a zoonotic viral disease that affects the central nervous system leading to respiratory or cardiac failure. Dogs are not only a major source of rabies infection in human beings but domestic and wild animals have also been victims of rabies mainly due to infected dogs. Rabies is 100% fatal but largely preventable if proper and timely Post Exposure Prophylaxis (PEP) is given. India is endemic

for rabies with more than 20,000 deaths annually.<sup>1</sup> A dog is the main reservoir of rabies and dog bite contributes to more than 96% of deaths due to rabies in rabies-endemic countries like India. Children are more susceptible to animal bites and suffer almost twice the attacks as compared to adults and 35% of deaths are reported in children only.<sup>2</sup> Children are even more susceptible to dog bites and get life-threatening injuries on vital parts like the eyes and

scrotum.<sup>3</sup> World Health Organisation (WHO) has defined wound classifications for taking decisions on Rabies PEP. WHO classification of animal bite wounds consists of three categories. Category I is touching or feeding animals or licking on intact skin and no PEP is recommended. Category II is nibbling of uncovered skin or minor scratches or abrasions without bleeding, here wound management with vaccine administration is recommended as PEP. Category III is for single or multiple transdermal bites or scratches, licks on broken skin, and contamination of mucous membrane with saliva (i.e., licks). Wound management along with vaccine and rabies immunoglobulins is recommended in this case.<sup>4</sup>

## Materials and Methods

We followed the WHO classification for many years for rabies PEP in our state of Himachal Pradesh in India but we found many cases of rabies due to minor scratches without bleeding as many of them did not avail rabies PEP. This phenomenon of deaths due to scratches forced us to look for an easy test to decide about rabies PEP in cases of scratches without blood. We started doing the “Spirit Test” to check if the skin is broken. If the skin is broken, then the spirit would cause a burning sensation. If the spirit test is positive, we administer both vaccines into both deltoid skin (ID) and immunoglobulins into scratch(s) after wound wash like that in category III wounds.

In our clinic at DDU Hospital, Shimla, a total of 7,499 patients were registered from June 2014 to July 2016 in just over 2 years and of these, 244 patients were bitten by potentially rabid dogs and 26 by laboratory-confirmed rabid dogs. We studied these 26 people in our study. Their details have been given in Table 1.<sup>5</sup>

Ethical Statement: All studies conducted by us and referred to in this article as well as the tables and pictures shared, have due IEC clearance and written consent of patients.

## Results

Spirit (ethyl alcohol or methyl alcohol) tests have been performed on thousands of patients without any PEP failure in case of minor scratches without bleeding (WHO category II). Therefore, in our clinical practice, we have only two wound classifications for rabies PEP i.e. either category I or category III. We have no category II and the spirit test decides if the wound is a category I wound or a category III wound, and accordingly PEP is administered.

In the 26 people with bites from the laboratory-confirmed rabid dogs, it was seen that the bites were in many sensitive areas but with only wound infiltration of RIG and vaccination, there were no failures reported. The minimum dose of eRIG given to these patients was 0.5 ml and the maximum dose was 6.5 ml. Only normal eRIG with a minimum concentration of 300 IU/ml was used. Table 1

shows the biting sites that were highly innervated but all patients survived.

## Discussion

We started looking for a reliable method of wound classification when we found a patient who died of rabies due to minor abrasion caused by a scratch of a clinically rabid dog in 2009. Being a minor abrasion (without bleeding), the patient did not seek any rabies PEP. Later, we reported the incident to a journal.<sup>6</sup> This information was alarming and we started using the spirit test as a guide for rabies PEP decisions in 2014 and have continued it since then. In 2016, we did a rabies death review of 7 years (2009-2015) from Indira Gandhi Medical College and found 19 deaths due to rabies. Of these, five deaths were caused by “scratches/ abrasions without any bleeding” and no PEP was sought. The minimum incubation period was 22 days due to scratches on the face in front of It tragus and the maximum incubation period was 102 days due to a trivial scratch on the right forearm by a furious rabid dog.<sup>7</sup> Further, this review showed that 4 of 19 rabies deaths were where the vaccine was administered but RIG was not given irrespective of the area involved. In the Philippines, a study showed that almost all cases of human rabies occur from dog-related injuries including bites and scratches. This study also shows that deaths due to rabies can happen with wounds not only on the head and neck but anywhere in the human body.<sup>8</sup> In a recent review of rabies deaths in Bangladesh, authors found that 5% of the patients developed rabies due to scratches or abrasions without bleeding either by cats or by puppies, either by teeth ( $n = 13$ , 3%) or by claws ( $n = 10$ , 2%), and 56% of cases were attributed to a single bite ( $n = 223$ ).<sup>9</sup> Out of 7,499 patients registered from June 2014 to July 2016, 4531 were type III and were given only local eRIG infiltration in and around the wound(s) with Intra-Dermal Rabies Vaccination (IDRV) without any PEP failure.<sup>5</sup> Out of these patients, spirit test was used in those who had minor abrasions or scratches and the wound was treated as category III if the spirit test was positive. Since 2014, we have been injecting eRIG only into wounds due to the scarcity of RIG<sup>5</sup> and this method of only wound infiltration of RIG later helped WHO shape new rabies prophylaxis guidelines in 2018<sup>10</sup> and also led WHO to request for eRIG as an essential medicine<sup>11</sup> that is a dose and cost sparing alternative.<sup>12</sup> Short incubation periods in rabies are not uncommon, therefore it’s wise to over-treat than to undertreat. Out of 164 patients in China, the incubation period was less than 1 week in 3 cases (1.83%),<sup>13</sup> and above 1 week but less than 1 month in 31 patients (18.90%). Similarly in another study from Bali, a shorter incubation period of 12-21 days was recorded in patients with bites around the head and neck.<sup>14</sup> We have reported a minimum incubation period

of 22 days in the scratches above.<sup>7</sup> Recently experts have advocated the introduction of category IV for severe bites/exposure, especially on the head and neck.<sup>15,16</sup> We have given Rabies PEP to thousands of bite victims who were bitten on sensitive innervated areas like the head and neck, even the scrotum (Figure 1). There has been only one confirmed PEP failure at Theog Government Hospital, 30 km away from our clinic in Shimla, where a facial nerve was torn by a rabid dog. This PEP failure in a girl child could have been due to many reasons, such as a) there was a delay of 17 hours in seeking PEP, b) the parents of the 8 years old girl child did not immediately wash the wound, c) there was facial nerve involvement, and d) maybe all the wounds were not infiltrated with sufficient eRIG till depth.<sup>17</sup> Animal experiments have proven that even diluted RIG can save lives in experimentally infected mice.<sup>18</sup> We have also used diluted eRIG in many cases having wounds on the head and neck without failure and have advocated that even a small volume of RIG covering the surface of the wound till depth is effective for rabies PEP.<sup>19</sup> A 4-year-old girl who was seriously bitten by a confirmed rabid dog in rural China survived with only wounds infiltration of hRIG diluted 15 times to a concentration of 33.33 IU/ml.<sup>20</sup> Therefore, there is no need of using concentrated RIG for wounds on highly innervated areas like the head and neck and expanding the categories to category IV, however, all

wounds/ scratches should be carefully assessed, washed with soap and water, and RIG infiltration should be done to cover the surface of the wound(s) till depth along with rabies vaccination for effective rabies PEP.

### Conclusion and Recommendations

Based on our clinical practice, we suggest that there is no need to expand existing wound classification for rabies PEP to category IV and no need to use higher concentrations of RIG for severe wounds like those on the head and neck. However, we recommend omitting category II and keeping only categories I and III for wound classification. Scratches without blood need to be tested with a spirit test to save the lives of patients from rabies and wounds need to be sufficiently infiltrated with RIG to cover the entire surface of the wound till its depth, as recommended by WHO in the 2018 edition of TRS-1012. Many national guidelines, for example, USA,<sup>21</sup> Canada, and Switzerland do not make a difference between category II and III wounds and recommend rabies vaccination along with RIG administration on potential exposure to rabid animals irrespective of the type of wounds. Since there is no viremia in Rabies<sup>22</sup> and lab evidence clearly show that rabies virus can invade the nerve endings directly, both sensory as well as motor with equal efficacy within hours of inoculation, without prior muscle replication also support our clinical observations.<sup>23</sup>

**Table I. Follow-up of 26 Patients (With No Previous Vaccination) Bitten by Laboratory-confirmed Dogs who Received Only Wound Injection of eRIG Followed by Rabies Vaccination**

S. No.	ID No.	Age in Years	Gender	Time Interval between Bite and ERIG (in Days)	Site of Bite	Volume of RIG injected into Wound(s)	Follow-up Interval after RIG Injection (in Weeks)	Status of the Bitten Person
1.	DDU/ 529	50	M	1 day	Rt leg	2 ml	70	Alive
2.	DDU/ 530	25	F	Within 8 hours	Rt thigh	1 ml	70	Alive
3.	DDU/ 534	41	M	Within 8 hours	Rt knee	6 ml	70	Alive
4.	DDU/ 536	16	F	1 day	Rt leg	0.5 ml	70	Alive
5.	DDU/ 541	12	F	1 day	Rt thigh	3 ml	70	Alive
6.	DDU/ 542	06	F	Within 8 hours	Lt lumber area	2.5 ml	70	Alive
7.	DDU/ 567	33	M	3 days	Lt thigh	6.5 ml	70	Alive
8.	DDU/ 1531	40	F	Within 8 hours	Leg	5 ml	58	Alive
9.	DDU/ 1534	32	M	Within 8 hours	Arm	1 ml	58	Alive
10.	DDU/ 1535	20	F	Within 8 Hrs	Leg	1 ml	58	Alive
11.	DDU/ 1542	34	M	Within 8 hours	Chest	0.5 ml	58	Alive

12.	DDU/ 1554	48	F	Within 8 hours	Lt hand	1 ml	58	Alive
13.	DDU/ 1566	57	F	Within 8 hours	Rt leg	1 ml	58	Alive
14.	DDU/ 1568	30	M	Within 8 hours	Back	2 ml	58	Alive
15.	DDU/ 1582	51	M	Within 8 hours	Rt abdomen	1 ml	58	Alive
16.	DDU/ 1585	35	M	Within 8 hours	Rt arm	0.5 ml	58	Alive
17.	IGMC/ 56	2	F	Within 8 hours	Peri-anal area	400 IU	58	Alive
18.	IGMC/ 01	5	F	Within 8 hours	Rt thigh	250 IU	58	Alive
19.	IGMC/ 04	58	M	Within 8 hours	Rt leg	40 IU	58	Alive
20.	IGMC/ 09	15	F	Within 8 hours	Rt wrist	40 IU	58	Alive
21.	IGMC/ 10	38	M	Within 8 hours	Rt knee	40 IU	58	Alive
22.	IGMC/ 11	34	M	Within 8 hours	Lt leg	40 IU	58	Alive
23.	IGMC/ 12	7	F	Within 8 hours	Rt knee	460 IU	58	Alive
24.	IGMC/ 16	30	M	Within 8 hours	Lt arm	40 IU	58	Alive
25.	IGMC/ 25	46	M	Within 8 hours	Both legs	600 IU	58	Alive
26.	IGMC/ 26	17	M	Within 8 hours	Lt leg	300 IU	58	Alive



**Figure I. Wound Infiltration into Scratch/ Contusion as Identified with “Spirit Test” on the Scrotum**

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