CONCISE COMMUNICATION

Management of Rabies Prophylaxis for Potential Bat Exposures in a Level III Neonatal Intensive Care Unit

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This report describes the unique challenges of managing potential exposure to bats in a neonatal intensive care unit. The outcome demonstrates that rabies post-exposure prophylaxis can be safely administered to preterm infants with evidence that preterm infants are able to develop adequate titers post vaccination.

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Rabies post-exposure prophylaxis (PEP) was administered among at-risk neonates in response to potential exposure to bats in a neonatal intensive care unit (NICU). The parents of neonates who received rabies PEP were asked to return after 6 months to measure serologic response. The objective of administering PEP was to prevent the development of rabies among those potentially exposed. Due to the lack of evidence or recommendations for the safety and efficacy of rabies PEP in neonates, the infection prevention team used this opportunity to evaluate the immune responses, medical complications, and clinical outcomes in these patients. Safety and efficacy of PEP was measured through serologic evidence of immunity upon 6-month follow-up and absence of rabies infection.

METHODS

Setting

A live bat was discovered in the sink in an open design, level 4 NICU located on the top floor of an 8-story hospital in Central Texas. Austin is home to millions of bats, including the reputed largest urban bat colony in the world.[1] The 2 surrounding counties have the highest confirmed rabies case numbers in bats in Texas, far exceeding the other 252 counties. This bat and a second bat found flying in the nonpatient hallway were captured and released outdoors by plant operations staff before rabies testing could be performed.

The infection prevention and pediatric infectious diseases teams were contacted to advise on the incident.

Patients

The NICU where the exposure occurred has 44 beds; 28 of which were occupied at the time of the exposure. No direct contact with the bat was noted by any staff member and there were no visible bites on any of these infants. Cases of rabies transmitted by bats have occurred even in the absence of a documented bite, which may go unnoticed.[3] Rabies PEP is recommended in cases of exposure to bats in infants and young children even in the absence of an obvious bite.[4]

In an attempt to quantify risk, each patient in the NICU at the time of the exposure was given a risk score. Neonates who were unclothed in open warmers were described as "high risk"; neonates in open warmers who were swaddled with only the face and head exposed were described as "low risk"; and neonates in incubators were considered to be at "no risk." Of the 28 infants, 6 were categorized as high risk, 13 as low risk, and the remaining 9 as no risk of exposure. Patient characteristics are summarized in Table 1.

Intervention

A thorough review of the literature and government recommendations on rabies did not reveal any evidence for safety and efficacy of rabies PEP in premature infants whose immune systems may be quite immature. Conflicting results were found regarding a newborn or premature infant's ability to respond to vaccines.[5,6] Furthermore, inadequate response to rabies PEP has been documented in immunocompromised patients.[7] Rabies infection is essentially 100% fatal in the absence of immunoprophylaxis; therefore, there are no expressed contraindications to the rabies PEP.[8,9] The Texas Department of State Health Services as well as the Centers for Disease Control and Prevention (CDC) rabies experts were contacted for additional guidance. Given the fatal consequences of a rabies exposure and the fact that the bats were not available for rabies testing, the team concluded that rabies PEP was warranted for at least some of the infants.

The decision was made to recommend rabies PEP to all 6 of the high-risk infants and to offer rabies PEP to the 13 infants at low risk. Patient families were informed in writing of the known risks of possible exposure to rabies and that the risks and efficacy regarding administration of rabies PEP to preterm infants were unknown. The final decision to undergo prophylaxis was left to the parents. The families of 5 of the 6 infants at high risk and 2 infants at low risk consented to the administration of rabies PEP.

The standard recommendations for rabies PEP administration in adults and children at risk of exposure (including suspected contact with bats) were applied: human rabies immune globulin (HRIG) 20 IU/kg given intramuscularly (IM), and a 4-dose rabies vaccine series: 1 mL IM dose on days 0, 3, 7, and 14 in the anterolateral thigh. A fifth dose given at 28 days was included based on the assumption of decreased immunocompetence due to prematurity.[9,10]

All 5 of the high-risk infants who participated completed the entire series, including the HRIG and 5 doses of the vaccine.

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TABLE 1. Patient Characteristics and Outcomes

Patient No.	Age at Time of Exposure, d	Gestational Age at Birth, wk	Weight, g	Risk Score	Rabies PEP in Hospital[a]	Rabies Titer Result at 6-mo Follow-up, IU/mL [b]
1	2	29	1,280	High	Full course	>4.0
2	2	29	1,440	High	Full course	>4.0
3	2	29	1,210	High	Full course	3.57
4	11	31	1,630	High	Full course	No follow-up
5	11	31	1,850	High	Full course	No follow-up
6	30	33	1,750	Low	HRIG + 3 doses	No follow-up
7	23	35	2,850	Low	HRIG + 1 dose	No follow-up

NOTE. PEP, post-exposure prophylaxis.
[a]Full course defined as HRIG + vaccine at 0, 3, 7, 14, and 28 d.
[b]Adequate response defined as ≥0.5 IU/mL.

In addition, 1 of the low-risk infants completed the HRIG and 3 doses of the vaccine and the second participating low-risk infant received the HRIG and 1 dose of the vaccine prior to discharge. Despite scheduled follow-up, these 2 infants did not return to complete the series at this facility.

Families were instructed to follow-up 6 months after completing the series with the pediatric infectious diseases clinic to assess the response to the rabies PEP via serum rabies vaccine titers. Of the 5 patients who completed rabies PEP, 3 returned for the recommended 6-month follow-up.

RESULTS

No known medical complications were identified in the 7 neonates who received rabies PEP, and none of the 28 infants in the NICU at the time of the exposure developed rabies. Rabies titers collected at 6-months post-rabies PEP administration were found to be adequate at ≥0.50 IU/mL in the 3 infants who completed the series and returned for follow-up with the pediatric infectious diseases clinic (Table 1).[8] The remaining 4 infants did not return for follow-up and were not tested.

DISCUSSION

This incident presented several challenges to the infection prevention team. The bats were released prior to testing for rabies; there was no report of contact; and there were no visible bites or marks. The CDC recommends that prophylaxis be considered in situations where a bite could have gone unnoticed, such as in the case of an infant.[4] Although a conscious adult or older child can often notice a bite from a bat, rabies has been transmitted by bats in the absence of a documented bite that may have occurred during rest or gone unnoticed.[3] The potential for devastating consequences of true exposure to a bat with rabies drove the decision to take the most cautious approach and administer rabies PEP, even with unknown risk and response in neonates.

None of the infants developed clinical rabies indicating the PEP was effective in preventing the development of clinical rabies if any of the prophylaxed infants were truly exposed. Despite the small sample size, we can conclude that preterm infants are capable of mounting an adequate immune response to rabies PEP without medical complications. The absence of medical complications in this report cannot be assumed for all neonates, given the small number of patients studied here.

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