Exposure to rabies during pregnancy

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A 44-year-old pregnant woman (gravida 6 para 3) received counselling after being bitten by a bat during her 26th week of pregnancy. The patient reported that a bat had flown down and bitten her hand in broad daylight. The patient's partner hit the bat, which fell to the ground. The patient thoroughly washed the wound and sought immediate medical attention. The bat's carcass was kept for testing.

The patient was immediately started on a postexposure prophylaxis schedule, including both rabies vaccine and rabies immunoglobulin. The bat was sent to the Canadian Food Inspection Agency Centre of Excellence for Rabies in Ottawa, Ontario, where a direct fluorescent antibody test confirmed that the bat had been rabid. The patient completed treatment — four doses of rabies vaccine and one dose of rabies immunoglobulin.

At 28 weeks' gestation, the patient presented with premature prelabour rupture of membranes. She received routine care (betamethasone for fetal lung maturation and prophylactic erythromycin). At 30 weeks, the patient went into preterm labour and underwent cesarean delivery. She gave birth to a healthy boy, weighing 1474 g (50th percentile), with no further complications.

Discussion

Rabies is a uniformly fatal viral infection characterized by acute progressive encephalitis.[1] Its incubation period varies from weeks to months depending on several variables, including the strain of the virus involved. Infected animals can infect others before clinical signs are present. However, only four cases of rabies in humans were reported in Canada between 1991 and 2016, owing to multidisciplinary efforts to minimize human exposure to rabies and to prompt, effective use of postexposure prophylaxis.[2,3]

Although exposure to rabies during pregnancy is uncommon, animal bites do occur, and pregnant women should receive postexposure prophylaxis. Treatment during pregnancy is the same as it is for nonpregnant women. Canadian health care providers must report all potential human exposures to rabies to local public health departments. Because the risk of rabies varies with different mammals and in different regions, providers are encouraged to seek public health guidance when rabies exposure is suspected.[2]

In North America, the most common source of human rabies exposure is bats.[4] Of Canada's 18 species of bat, two live indoors: the little brown bat and the big brown bat. Most bats found in homes are big brown bats, because they are better adapted to living inside year-round. Little brown bats are nearing extinction owing to an epidemic fungal infection called white nose syndrome. Along with the tricoloured bat and northern myotis, they are protected under Canadian law as endangered species because of their declining populations.[5]

KEY POINTS

- Bats remain the most common source of human rabies exposure in Canada.
- Postexposure prophylaxis is used in situations that involve direct contact with a bat (i.e., when there has been physical contact between human and bat), and a bite, scratch or exposure to saliva through a mucous membrane or wound cannot be ruled out.
- Pregnancy is not a contraindication for postexposure prophylaxis.

Other animals can be infected by rabies. In Canada in 2017, of the submitted animal specimens tested, 239 gave positive results for rabies. These specimens included raccoons, skunks, bats, arctic and red foxes, cattle, dogs and cats.[6] A substantial contributor to bats' perceived danger as a vector of rabies is their very fine teeth: a person may not see or feel a bite mark and thus may not be prompted to seek treatment. A 2009 study involving 14 453 people in Quebec found that about 1 in 1000 people experience bat exposures in bedrooms without recognized bites each year. However, researchers calculated that the incidence of human rabies resulting from such exposures is 1 per 2.7 billion human-years.[7] Thus, although bat exposures in the bedroom are common, the risk of rabies infection is remote without direct contact.

Current recommendations for bat exposure counsel "intervention for situations when there is direct contact with a bat (i.e., there has been physical contact between human and bat) and a bite, scratch, or saliva exposure into a mucous membrane or wound cannot be ruled out."[4] Examples of situations in which one might not be able to rule out direct contact include exposures in young children, older adults or people with disabilities.

If bats are found in a home, one should contact an appropriate pest control service, which will use the "exclusion method" to stop bats from re-entry: blocking potential points of entry with one-way doors (letting bats leave but not return) and sealing large structural cracks. These methods do not harm the bats, but are effective at preventing further nesting.[5]

Most bat species are protected in Canada and should only be captured for testing if direct contact has been confirmed.[4] Attempting to capture a bat puts a person at risk of exposure and should be left to trained wildlife professionals.

People who think that they may have been bitten by, or made direct contact with, a bat or other animal and cannot rule out a bite should immediately wash and thoroughly flush the wound with soap and water, then seek medical attention. We counselled our patient to begin a postexposure vaccination schedule. Because pregnancy is not a contraindication for postexposure prophylaxis[7] and treatment can be discontinued if there is proof that the animal is not infected, there is no reason to delay using inactivated vaccine and immunoglobulin to prevent lethal infection. In this case, testing confirmed that the bat was rabid, and a full course of postexposure prophylaxis was given (Boxes 1 and 2).[4]

Apprehension about using rabies vaccines and immunoglobulin in pregnancy is common owing to a lack of large cohort studies categorically establishing their safety. Live virus vaccines (e.g., smallpox, varicella, measles) are contraindicated in pregnancy because of the potential risk of congenital abnormalities that can from fetal infection. Rabies vaccines, however, are killed whole-virus vaccines and can be safely administered during pregnancy. No fetal adverse events have been reported with non-live virus vaccines. Rabies immunoglobulin is a blood product, and carries no more potential risk of viral infection than any other blood product. Immunoglobulin, when indicated, can be safely given during pregnancy.

Two cohort studies that documented the results of rabies postexposure prophylaxis during pregnancy found no negative outcomes. Sudarshan and colleagues tracked 14 cases in which postexposure prophylaxis was administered to pregnant women until their children were one year old, and found healthy outcomes for all exposed mothers and babies.[8] Toovey and colleagues documented 251 pregnancies during which postexposure prophylaxis was given, and found no cases of congenital malformation or spontaneous abortion.[9] In our patient's case, her pregnancy was complicated by prelabour

Box 1: Postexposure management to prevent rabies after a bite or contact with animal saliva[4]

Source of exposure	Recommendation
Pet cat, dog or ferret, available for observation for 10 days	• Local treatment of wound • Tetanus booster, if needed • Hold animal for observation • At first sign of rabies: rabies immunoglobulin (local and intramuscular) and first dose rabies vaccine
Unknown or escaped cat, dog or ferret, or a skunk, bat, fox, coyote, raccoon or other carnivore	• Local treatment of wound • Tetanus booster, if needed • Rabies immunoglobulin (local and intramuscular) • First dose rabies vaccine (Imovax or RabAvert) • Do not continue with subsequent vaccine doses if testing excludes rabies in animal
Livestock, rodent or rabbit	• Local treatment of wound • Tetanus booster, if needed • Consider individually and consult appropriate public health officials; postexposure prophylaxis may be recommended if the behaviour of the biting animal was unusual

Box 2: Postexposure prophylaxis for rabies[4]

Prophylactic agent	Dose	Schedule	Adminstration
For patients who have not previously received the vaccine			
Rabies vaccine (Imovax or RabAvert)	1.0 mL (equivalent to at least 2.5 IU of rabies antigen)	Day 0, 3, 7, 14, (5th dose at day 28 for patients with immunocompromise)	Intramuscular (deltoid)
Rabies Immunoglobulin	20 IU per kg body weight	Day 0	Intramuscular, directly into the wound and surrounding area, and a different site than the site of vaccine administration
For patients who have previously received the vaccine*			
Rabies vaccine (Imovax or RabAvert)	1.0 mL	Day 0, 3	Intramuscular (deltoid)

*For patients who completed a primary vaccine series with either Imovax or RabAvert within the previous 2 years, or who are known to have adequate serum levels of neutralizing antibody (> 0.5 IU/mL).

preterm rupture of membranes and preterm birth. We do not believe that her exposure to rabies was associated with these complications, and we were not able to identify any other reports of these complications after exposure to rabies or receipt of postexposure prophylaxis.

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