Putting the bite on rabies

Background and epidemiology: Two years ago Canada experienced its first rabies-related death in 15 years. The victim was a young Quebec boy who developed symptoms 3 weeks after an unrecognized (cryptogenic) bat bite.[1] In August 2002 US researchers described the March death of a 28-year-old California man[2] who had killed a bat in his house but denied any direct contact; 46 people received postexposure prophylaxis (PEP). Since 1925, there have been only 22 reported deaths from rabies in Canada,[3] but this low number belies the steadily increasing incidence of rabies in animals in Canada and the United States.

Between 1000 and 1500 Canadians receive PEP for rabies exposure each year.[4] Since the infection is almost invariably fatal, it is imperative that PEP be considered in every incident in which the possibility of exposure exists.

Rabies is an acute viral infection of the central nervous system (CNS) transmitted in the saliva of biting animals. Globally, rabies infection ranks about 11th in terms of mortality from infectious diseases.[4] Most of these cases occur in India, southeast Asia and Africa, and result from dog bites; due to effective domestic animal vaccination programs, wild animals are the most important vectors in North America.

Infection usually occurs from a bite or, less often, through the contact of an open wound or mucous membrane with the saliva of an infected animal. The virus replicates in local muscle fibres, binds to nicotinic acetylcholine receptors in the neuromuscular junction, travels by fast axonal transport (50–100 mm/d) to the CNS, replicates in the neurons of the spinal cord and dorsal root ganglia, infects brain neurons and then spreads centrifugally along nerves to the salivary glands, skin, corneas and other organs.[5] The incubation period is typically 20–90 days, although periods ranging from a few days to more than a year have been documented.[5,6]

Clinical management: Malaise, anorexia and nausea are early prodromal signs. Often there is a tingling and severe pruritus at the site of the bite. After 2–10 days frank neurologic signs appear. The majority of cases manifest as "classic" rabies and are characterized by periods of hyperexcitability and autonomic dysfunction (hypersalivation, piloerection, cardiac arrhythmias, priapism). It also causes "hydrophobia" — thought to result from the selective infection of neurons controlling the defensive reflexes of the airway — so that swallowing triggers prolonged diaphragmatic and inspiratory muscular contraction. About 20% of patients may present with flaccid paralysis.[5]

Treatment is supportive, and death almost invariably occurs within 2 weeks after symptom onset. Only a handful of cases of human survival have been documented, and all the patients reportedly had received PEP before the onset of signs or symptoms of neurologic disease.

Prevention: Physicians should consult a public health official whenever the possibility of exposure to a rabid animal arises. The newly revised *Canadian Immunization Guide*[4] outlines recommendations for PEP in different situations. In general, all animal bites need to be washed with soap and water, irrigated with an antiviricidal agent and left open if possible. When appropriate, antibiotics and a tetanus shot should be offered. People with bites from a dog or cat known to be vaccinated against rabies do not necessarily require PEP, provided the animal is healthy and can be quarantined and observed for 10 days, and the bite does not involve the head or neck.

Bites from wild animals such as bats and raccoons are signals to initiate PEP, as is the presence of a bat found in a room where someone is sleeping unattended. (Bat bites are needle-like punctures and are very difficult to see.) Bites from other animals, including rodents, need individual consideration.

PEP of previously nonvaccinated people involves 5 doses of 1 mL of human diploid cell vaccine (HDCV). The first dose should be administered intramuscularly (deltoid in adults or anterolateral thigh in infants) as soon as possible after exposure (day 0) with subsequent doses on days 3, 7, 14 and 28. The wound should also be thoroughly infiltrated with a dose of rabies immune globulin (20 IU/kg). About 40% of HDCV recipients experience mild systemic symptoms such as headache, abdominal pain and myalgia. Allergic reactions are rare with primary vaccination, but they have been reported in 7% of people receiving a booster dose. Animal control and wildlife workers, veterinarians, hunters and travellers to endemic countries are among the candidates for pre-exposure prophylaxis.

Pets pose little threat in North America

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