How to Safely Manage a Potentially Rabid Equine (21-Nov-2003)

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Abstract
Improved techniques for the successful euthanasia of horses with neurological injuries suspect of rabies are available to practitioners. Appropriate chemical and physical restraint techniques can be used to increase safety for personnel on scene conducting euthanasia of large animals to allow preservation of the brain tissue for rabies testing.

1. Introduction
Rabies is a fatal zoonotic viral disease of mammals [1]. Large animals (horses, llamas, cattle, captive or wild deer, etc.) with neurological injuries suspect of having rabies must be carefully handled to prevent exposure of attending personnel (animal control, veterinarian and staff, owner) and minimize suffering of the animal. As communities expand into wilderness areas and increasingly keep large animals in the "backyard," the potential for exposure to rabies in humans through domestic large animals has increased. In 2001, cases of rabies in horses decreased 1.2% compared with those reported in 2000 [2].

Anecdotes of practitioners attempting to euthanize affected animals with unsafe methods that increased their exposure risk have been reported, and an effort to proscribe a safe handling Standard Operating Procedure (SOP) was initiated. Little information could be found in the literature describing HOW to safely euthanize suspect rabies animals.

A rabid horse that displays aggressive behavior is said to be afflicted with the "furious" form of the disease, whereas one with extreme depression and lethargy is said to suffer from the "dumb" or "stuporous" form. Suspect animals must not be directly contacted (i.e., led or approached), they are extremely dangerous. They may bite, kick, or fall, and are extremely unpredictable.

The rabies virus (genus *Lyssavirus* the word *lyss* is Greek for "madness" or "rage") is a member of the rhabdovirus family. The virus can cause disease in any mammal; bites or licks are the biggest risk for transmission because the virus is found in infected animals' salivary glands and is transmitted through their saliva usually through a bite or a scratch, but potentially also through contact with the victim's mucous membranes or an existing wound [3].

The virus enters the victim's body through the bite wound, replicates in the local area, and invades local nerves. Localized redness or itchiness may occur near the bite wound; often no symptoms exist. During incubation, the rabies virus migrates by replication to the central nervous system. The length of the incubation period varies widely, depending on the location of the bite. Reports vary from 2 wk to as long as 6 mo with no clinical signs of illness. Acute rabies causes encephalitis or meningitis, symptoms can include high fever, temporary or permanent blindness, behavior changes, depression, excessive salivation, difficulty swallowing, heart arrhythmia, abnormal aggressive or excitatable behavior, colic, depression, and seizures. The horse might exhibit photophobia or hydrophobia from the maddening combination of excessive thirst and an inability to drink caused by paralyzed face and throat muscles [4].

Several pharmaceutical manufacturers offer rabies vaccines, and five are licensed for use in horses [5]. Horse from 3 mo of age and up should be vaccinated against rabies, with annual boosters [6]. Rabies vaccine is effective only when administered before exposure and must be administered under supervision of a licensed veterinarian to be legally recognized.

Horses displaying signs compatible with rabies infection (fever, lack of appetite, lameness, colic, facial nerve paralysis, weakness, restlessness, progressing to lack of coordination, self-mutilation, aggressiveness, vocalization, drooling, and
paralysis) should be examined by a veterinarian immediately [6]. When the local practitioner discovers a possible rabies case, they must contact their State Veterinarian’s office, County Animal Control, and County Health Department immediately for notification of possible rabies.

Rabies cannot be diagnosed through blood, saliva, or urine tests or by any other antemortem method. A definitive diagnosis is made by examining the victim's brain tissue after death, where a special stain (direct fluorescent antibody test or dFa) can identify Negri bodies (clusters of the rabies virus) in affected brain matter. Contact with brain, lymph node, and nervous tissue, which may contain significant virus levels, should be avoided. Virus may be shed in saliva a few days before clinical symptoms occur (exact time unknown for horses) [7].

If the practitioner is going to euthanize the horse, documentation with photography and a convalescent sample before euthanasia should be retained pending rabies diagnosis to facilitate diagnosis of Western equine encephalomyelitis (WEE)/Eastern equine encephalomyelitis (EEE) or West Nile Virus (WNV). If the horse is rabies negative and known to be unvaccinated for EEE/WEE and WNV, sera is available for testing, and they should be sent to the laboratory for WEE or EEE testing to rule out reportable diseases [8].

Materials and Methods
Materials needed are two 15-ft ropes, a cable-operated noose or chain, chemical capture equipment (see details below), and a camera or video camera (for documentation).

Suspect Rabies Case General Handling Precautions
Avoid contact with the horse directly when the horse must be touched for the euthanasia procedure, all personnel should be double gloved and take precautions to prevent saliva and mucosal surface/secretion contact. It is preferable that personnel have pre-exposure rabies vaccination titers.
Clothing for personnel should be full coveralls with long sleeves, boots, and double gloves. Only saliva contains the virus clothing, equipment and instruments that touch the bodily fluids of the animal should be sanitized with bleach, and all facilities cleaned thoroughly. Blood or urine do not contain the rabies virus.
Personnel attempting remote delivery of drugs for chemical immobilization must have documented training in this technique and should be required to demonstrate proficiency with the equipment on a regular basis. Drugs used for chemical immobilization must be used under veterinary supervision [a].
Photographs and/or video documentation of the horse's behavior before euthanasia should be taken and submitted to the state veterinarian for assistance with differential diagnosis and history.
Other mammals (dogs, cats, horses, cattle, etc.) with or without proof of rabies vaccination should be isolated on the property and quarantined in accordance with the State Rabies Control Officer (State Health Department) in consultation with the State Veterinarian's Office.

Protocol for Safe Chemical and Physical Restraint Preparing for Euthanasia of Suspect Rabies Horse
Execution of SOP is 5 min with three trained personnel. Stay clear of the horse's legs at all times (even when sedated). The person(s) injecting the IV euthanasia solution must always have a safety buddy. All animals should be fully sedated or anesthetized for this procedure to reduce the chance of injury or exposure to personnel. Pre-exposure rabies vaccinations for personnel in the practice should be considered.

1. The animal should be isolated by driving it into a safe enclosure such as a round pen or stall that is difficult to escape or kick out. If this is not possible, or the animal is loose, see procedure for darting below. Do not allow anyone to enter the enclosure for any reason.
2. Chemical immobilization is indicated to prevent aggressive biting, kicking, or exposure of personnel during euthanasia of the animal (Fig. 1). Administration of injectable chemical agents with a syringe by hand should not be attempted these animals are unpredictable and can be very aggressive even if it appears to be the "dumb" form of rabies.

Figure 1. A properly placed chemical capture dart b placed correctly (IM) in the muscles of the hind limb. Multiple darts may be required because of the volume of drug needed. - To view this image in full size go to the IVIS website at www.ivis.org . -

3. Immobilization may be accomplished by use of compressed air, CO₂ or .22 caliber charged dart pistol, dart rifle, blow dart projector, or jab/bang stick. Because of the volume of drug needed, multiple darts given in rapid sequence should...
be used [b].

4. The following drug combinations have been effectively used to immobilize a rabid horse:
   - Xylazine [c], 1 mg/kg
   - Ketamine [d] 2 mg/kg
   - Other sedative medications may be used. Individual resistance to and effect of these drugs must be considered.
   - Butorphanol Tartrate [e] 0.1 mg/kg
   - Detomidine [f] 20 µg/kg
   - Succinylcholine [g] 0.1 mg/kg [a] (may be used IM for rapid knockdown followed immediately by IV euthanasia solution without physical immobilization. This is NOT considered a humane method of euthanasia in normal situations, [9] but may be used here to increase human safety.)

5. Physical immobilization should be used after the animal is chemically immobilized to ensure safety for personnel humanely euthanizing the animal with IV euthanasia solution.

6. The legs should be tied using a slip knot around the pasterns of both front and back legs and anchor the ropes to the closest possible secure anchor (heavy vehicle, post, tree, etc., Fig. 2). A cane or boat hook may be used to slide the ropes around the legs. Personnel should remain behind the back of the downed animal to minimize the chance of injury (Fig. 3).

7. If the horse has a halter on, secure the head with a rope attached to the halter ring and stretch the head this increases the accessibility to the jugular vein.

8. Place a ligature or noose around the horse's jaws proximal to the nostrils this may be a rope, catch/pull cable [h] or similar device (Fig. 4).

9. Draw a blood sample before euthanasia to be retained pending rabies diagnosis and to facilitate differential diagnosis of other diseases. Induce euthanasia [7 ml/50 kg, IV, pentobarbital/KCl] [i] by kneeling behind the neck to administer it, with a buddy rope on the practitioner's belt to be able to recover him/her in case the animal struggles. Field euthanasia with a firearm/captive bolt is not indicated because it will destroy the brain and make laboratory diagnosis difficult.

10. The animal's skull or preferably the brain stem and cerebellum should be transported as soon as possible to the State Veterinary Diagnostic Laboratory for identification and diagnosis of the case. The head should be removed with a hacksaw (to minimize aerosolizing of the virus) at the first vertebral joint at the back of the calvaria. Refrigerate specimen for shipment and do not chemically fix tissues [10]. The animal's body must be immediately disposed of by incineration or burial.

In the event that rabies is diagnosed by examination of brain tissue, the local health department will investigate and consult with individuals who may have been exposed to the rabid animal and help determine if human post-exposure rabies treatment is necessary.
3. Results
When the attending veterinarian arrived at 10:00 a.m. on 12/30/02, a 5-yr-old Arabian mare was standing in crossties. (A previous diagnosis 12 h earlier was made by another veterinarian as colic). The horse broke out of the crossties as he approached, and began to exhibit colic symptoms, including looking and biting at her flanks, in the barnyard. When the neck was touched to attempt jugular administration of 1 mg/kg Flunixin meglumine [j] IV, the mare reacted by attempting to bite the practitioner and exhibited severe hyperesthesia.

The horse was relocated to an enclosed round pen and observed for 10 min, where she became recumbent, rolling and biting the ground (Fig. 5). The animal was quarantined immediately while authorities at the State Veterinarian's Office and DHEC were contacted. Within 2 h, the mare was self-mutilating (Fig. 6). Immediate euthanasia was recommended, and trained chemical/physical restraint specialists were brought to the scene.

![Figure 5](image-url) The initial clinical diagnosis of this Arabian mare was colic. She rolled, pawed, looked at her sides, and salivated. - To view this image in full size go to the IVIS website at www.ivis.org.

![Figure 6](image-url) The Arabian mare’s self-mutilation of her extremities within 2 h of the previous picture. The lacerations are to the bone. - To view this image in full size go to the IVIS website at www.ivis.org.

Using the protocol outlined above, the mare was chemically and physically immobilized for euthanasia. The samples were submitted to the state diagnostic laboratory, and a positive result was reported.

4. Discussion
Both horses that the authors have seen in the last 2 yr (which were later positively diagnosed with rabies) were alert, aggressive, and responsive to their environment. In contrast to the literature [2,10] unusual behavioral characteristics were the most common sign exhibited including aggression toward self, other animals, and people, swiftly progressing to self-mutilation and excess salivation. Both cases were initially diagnosed as colic because of rolling, sweating, pawing, and looking at sides.

Safety of humans and minimization of exposure to the rabies virus is paramount in this situation. Euthanasia of a large, aggressive animal is difficult in any circumstance, but particularly when neurologic symptoms indicate rabies. This SOP provides a safe and suitable means of euthanizing large animals suspect of having rabies while minimizing exposure for personnel. This procedure will allow practicing veterinarians to greatly improve safety yet preserve the animal's brain tissue for subsequent testing.

Footnotes
[b] CAP-CHUR Darts, Palmer Chemical and Equipment Co., PO Box 867 Douglasville, GA 30133.
[e] Torbugesic®, Ft Dodge Animal Health, Ft Dodge, IA 50501.
[f] Dormosedan®, Orion Corporation, Espoo Finland.
[g] Anectine, Glaxo-Wellcome, Greenville, NC 27834.
[h] Ketch-All, Animal Care Equipment, PO Box 3275, Crestline, CA 92325.

References
2. Centers for Disease Control and Prevention. Rabies section. MS G-33, Available online at


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