

Practical Equine Field Necropsy

Sally DeNotta DVM, PhD, DACVIM

University of Florida College of Veterinary Medicine

Post mortem examination is an important diagnostic procedure in equine practice, often providing invaluable insight to cases for which an antemortem diagnosis was not achieved. Unfortunately, the time required to perform necropsies coupled with owners' occasional wariness of having the remains of their horses dissected often deters clinicians from performing necropsies in the field. The described technique is an abbreviated method from the prosection routinely performed in diagnostic laboratories; suitable for examining the abdominal and thoracic cavities to evaluate the most common disorders. It can be performed reasonably quickly in the field and leaves the carcass relatively intact, making this an acceptable procedure for both clinician and horse owner.

Equipment (Fig. 1)

High quality knife	Digital camera
Rib cutters (tree pruners)	Identification tags
Hack saw	Plastic ziplock bags
Scissors	Umbilical tape
Sharpening steel	Specimen containers
Bard-Parker surgical blades ^a	Blood tubes



Fig. 1. Tools for field necropsy

Supplies can be organized together in a 'necropsy kit' that allows for easy transport from clinic or truck to the site of necropsy. If tools are to be kept in a truck, a storage box or tote also protects against contamination from necropsy tools to surrounding equipment. Protective clothing should always be worn to prevent contamination from the carcass and should include coveralls, plastic sleeves and/or gloves, non-permeable shoe covers and protective eyewear.

Procedure

- Ideally, the necropsy should be performed in a location that is accessible for carcass removal and is as far as possible from traffic and other animals on the property. An area that can be cleansed of contaminants post necropsy is best.
- The horse is placed in left lateral recumbency and examined for overall body condition. Any wounds or external abnormalities should be noted¹.

- Begin the necropsy by making a curving paracostal incision through the paralumbar fossa, ending at the xyphoid. Enter the abdominal cavity but avoid puncturing any underlying bowel. This can be particularly difficult when substantial gas distention is present, and careful incision through each separate layer of abdominal musculature can help prevent inadvertent puncture. Extend the incision cranially; coursing between the front limbs and up the ventral neck, ending at the mandibular symphysis. Make a second vertical incision behind the shoulder, just caudal to the triceps (Fig. 2). Starting ventrally, sharply dissect the skin and Latissimus dorsi from the rib cage, carefully avoiding puncturing the diaphragm. The resulting muscular flap can be reflected dorsally to expose the abdominal cavity and rib cage (Fig. 3).
- To examine the cardiopulmonary system, first make a stab incision into the diaphragm near the sternum. Suction of air into the incision confirms negative pressure within the thorax. Cut away the diaphragm along its attachment to the thoracic wall. Using rib cutters, transect each rib at its ventral and dorsal attachment and reflect the ribcage cranially (Fig. 4). Maintaining muscular attachment cranially will aid in the replacement of the rib cage back into position for later closure. The lungs can be examined in situ or removed from the chest for evaluation. The heart may be removed and opened for inspection of all chambers and valves. Dissect through the ventral neck incision to expose the trachea and esophagus. Both structures should be opened and inspected. Samples from any lesions or abnormal tissues should be collected for histology and/or microbiology.
 - NOTE: If a more thorough examination of the cardiopulmonary system or cranial mediastinum is required, the forelimb may be reflected dorsally by incising between the scapula and body wall. Reflection of the limb will provide a better view of the cranial thorax and thoracic inlet, but may also make incision closure and replacement of limbs back into normal anatomic position following necropsy difficult. The entire 'pluck' (tongue, larynx, trachea, esophagus, heart and lungs) may be also removed *en masse* for complete evaluation.
- To examine the gastrointestinal tract, first evaluate abdominal viscera for abnormalities in location and appearance prior to removal from the abdomen. Locate the pelvic flexure and exteriorize the large colon, laying it alongside the carcass. Removal of the large colon from the abdomen makes evaluation easier and allows better visualization of the remaining abdominal organs (Fig. 5). The entire length of the small intestine and small colon should be examined, as well as the liver, spleen, both kidneys, and adrenals. The urogenital tract can also be evaluated at this time. Again, samples should be collected from any identified lesions or abnormal tissues.



Fig. 2. Placement of initial incisions



Fig 3. Reflected latissimus dorsi

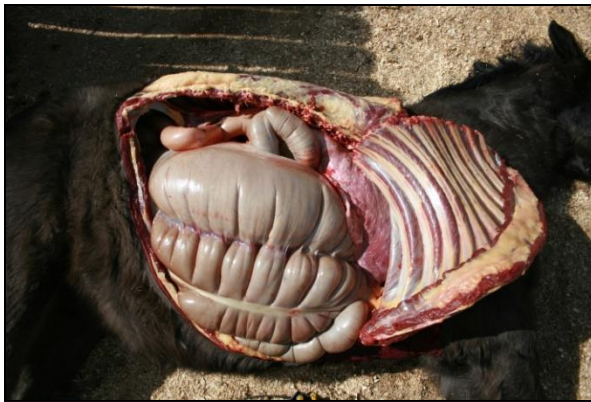


Fig 4. Reflected ribcage



Fig 5. Exteriorized gastrointestinal tract

- If the underlying disease process is neurologic in nature, collection of the brain for evaluation and submission is warranted. To extract the brain, first remove the skin and muscles from the dorsal skull. Use a hack saw to make a transverse cut through the frontal bone just dorsal to the eyes, then form a triangle by connecting the first cut with points just medial to the occipital condyles (Fig. 6). Lift and remove the section of calvarium to expose the brain.
 - **Note: Rabies and the equine encephalitides (WEE, EEE, VEE) are zoonotic and pose potential human health risk. Post mortem examinations on animals potentially affected by these diseases should be performed by a diagnostic laboratory.**

Sample Collection

Tissue samples should be collected from organs of interest and any identified lesions. Samples should be no thicker than 0.5cm and should be immersed in 10% neutral-buffered formalin (10:1 formalin to tissue ratio) to fix for histological evaluation². The brain should be fixed whole and separately from other samples. The eye should also remain intact, and formalin may be injected

into the vitreous chamber to aid fixation. Fresh, unfixed tissue samples should be collected if microbiology, virology or toxicology is required. Fluids to be cultured should be collected into red top tubes, while EDTA (lavender top) tubes are used for fluids requiring cytologic evaluation.

Closure

To close the carcass, replace all organs back into their respective body cavities. Slide the rib cage back into original position and replace the reflected muscular flap. Both umbilical tape and bailing twine work well for closure. Make several stab incisions in the skin and close in shoelace or simple continuous pattern (Fig. 7).

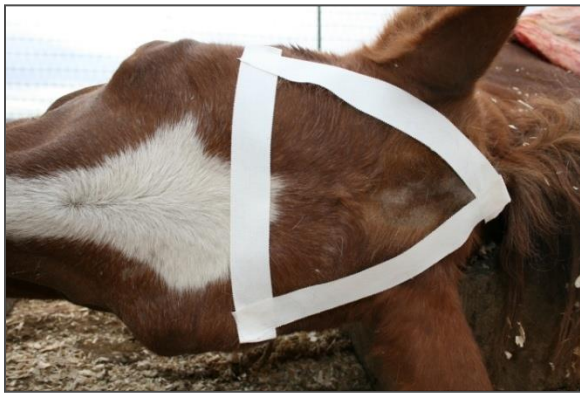


Fig. 6. Placement of skull cuts for brain removal



Fig. 7. Closed carcass

In some cases a gross anatomic diagnosis can be made, while others will require that samples be sent to a diagnostic laboratory for further evaluation. The outlined procedure can be easily modified to suit the needs of each differing case. When performed routinely, this procedure should take approximately 30 minutes to 1 hour, depending on the efficiency of the examiner and the completeness of the exam. Examinations of horses with terminal colic, where often only the abdominal cavity is explored, will generally take the least amount of time. More specific and time consuming procedures will be necessary on occasion, and may include removal of the cervical spinal cord, examination of the pelvic canal, or examination of joints and other synovial structures. In some instances it will behoove the clinician to weigh the time and skill required for more complicated procedures and consider sending the remains to a diagnostic laboratory for complete prosection.