How to Establish an Equine Blood Donor Protocol

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The necessity of having and utilizing an equine whole blood donor protocol is widely overlooked in private practice due to its seemingly overwhelming complexity. Veterinarians and technicians together can make a life-saving procedure perform smoothly with simple tools and guidelines. Author’s address: Colorado State University, Veterinary Teaching Hospital, Equine Hospital, 300 West Drake Road, Fort Collins, CO 80523. © 2001 AAEP.

1. Introduction

Common indications for whole blood transfusion in adult horses are acute blood loss from trauma, ruptured uterine artery, maxillosinus complications and surgeries, guttural pouch mycosis, and neonatal isoerythrolysis. The author has not found a recent publication describing blood collection kits or protocols pertaining to the horse. Therefore, the purpose of this paper is to indicate the importance of having a supply of equine blood donors incorporated for private practice and to provide the necessary tools to establish this protocol. Knowing the donor individuals and having simple tools and plans regarding hemorrhaging patients will help ease chaos in an emergency situation.

2. Materials and Methods

A. The Donor Individual

An equine whole blood donor can be one that is housed at the practice facility or through a client. When dealing with a client-owned donor, there should be a consent form drawn up that gives the description and blood type of the donor, specific details describing how and by whom the animal will be used. Record keeping for all equine blood donors will need to include complete histories on the animal, current health regimen, and blood typing results.

Qualities in choosing a blood donor in order of importance are health, gender, breed, size, and temperament. The health of the donor is vitally important, so keeping their vaccinations and deworming current, having a negative Coggins test, and caring regularly for their teeth, hooves, and sheaths is a must. Have a complete blood chemistry and serum screening done annually on each donor. Blood donors should not have a history of either a whole blood transfusion or previous pregnancies. The chances of them being incompatible whole blood donors is fairly high because of high antibody production.1 Certain breeds and species (i.e., donkeys) tend to crossmatch better with their own breeds and species. Ideally, the weight of the horse should be above 1200 pounds to accommodate larger blood collection volumes. Obviously, a quiet horse is going to make for an easier collection in a stressful situation that could lack manpower. Once these qualities have been identified, the next step is to
have their blood typed and screened for antibodies (see Table 1 for blood typing laboratories).

Costs for blood typing should be covered by the practice. When typing the proposed donor blood, it will be tested for anti-red blood cell (RBC) hemolysins, agglutinins, and all of the equine blood type factors. It has been found that horses who have tested negative for hemolysins and blood types Aa and Qa are the most recommended.² Consult your blood typing laboratory to find out how often they recommend serum screening and what blood collection tubes they require. Costs incurred in crossmatching, collection, and administration of the blood should be covered by the recipient client.

B. Crossmatching

It would be ideal to crossmatch 2 donors with the recipient. Both ethylenediamine tetra-acetic acid (EDTA) and clot tubes should be taken from each potential donor and the recipient. At least, a major test (donor RBC, recipient plasma) will be necessary. A minor crossmatch (donor serum, recipient RBC) will need to be performed if the donor has not been previously tested for isoantibodies. An important rule in crossmatching is that horses not be donors for mules and donkeys because of naturally occurring antibodies against a donkey’s blood. Whereas naturally occurring antibodies against horse blood types does not occur in mules and donkeys, it is not recommended to transfuse between them.

If time does not permit a full crossmatch, it is recommended to choose a gelding of the same breed and mix donor serum and recipient RBC and vice versa on a microscope slide, and to grossly look for agglutination before transfusion.³

C. The Blood Collection Kit

Designing a permanent portable blood collection and transfusion kit is vital in any practice when in an emergency situation. The kit should have enough supplies to support a minimum of 2 donor collections. Portable tool chests with inner trays work well. Basic items are as follows (Fig. 1):

- Clippers or razor
- Antiseptic materials
- Lidocaine, 2%
- Catheters (14 g recommended)
- Male adapters
- Suture or super glue
- Heparinized saline
- Needle holders and scissors
- Microscope slides (if needed for agglutination test)
- EDTA tubes
- A variety of different sized needles and syringes
- 20 450 ml double blood collection bags⁶ (Fig. 2)
- Sterile gloves and exam gloves
- Sedation (Xylazine, Detomidine)
- i.v. drip set and fluids
- Betadine ointment pack
- Sterile 4 x 4 gauze pads and 2 rolls of 3” Elastikon

<table>
<thead>
<tr>
<th>Table 1. Laboratories Providing Equine Blood Typing Services</th>
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<tr>
<td>Dr. Gus Cothran</td>
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<tr>
<td>Equine Blood-Typing Research Laboratory</td>
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<td>University of Kentucky</td>
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<td>Department of Veterinary Science</td>
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<td>University of California</td>
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<td>Dr. David Colling</td>
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<td>Mann Equitest, Inc.</td>
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<td>335 Laird Road, Unit 4</td>
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<td>Guelph, Ontario N1H 6J3</td>
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<td>Telephone: (519) 836-2400</td>
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Fig. 1. Portable blood collection kit.

Fig. 2. Double blood bags. Second bag is used for plasma collection.
D. Blood Collection

Time is of the essence during a blood collection procedure. The author recommends a team approach, utilizing 3 people if available. One person will handle and restrain the donor, another will place and handle the catheter, and a third person will orchestrate the collection. Numbering the bags in order and labeling the start time of collection on the first bag and an ending time on the last bag will provide information on the viability of the blood. Whole blood has a window of 4 hours at room temperature before it needs to be refrigerated, and platelets are viable for 12–24 hours postcollection and function better at room temperature.4

It is best to isolate the team and donor from noise stimulants. A mild sedation at the start will facilitate a smoother and relaxed retrieval. The area over the jugular vein should be clipped and prepared using the antiseptic agent of your choice followed by a local anesthetic block over the jugular through the dermis and subcutaneous skin layers. Using sterile gloves, place a 14 gauge, 5.5 inch catheter in the opposite direction of blood flow in the jugular vein. This allows the natural flow of blood to speed the process of collection and avoids trauma to the held-off vessel (Fig. 3). After stabilizing the catheter with a few sutures and placing a male adapter, collect a small amount of blood to perform packed cell volume (PCV) and plasma protein tests. Horses with a PCV of less than 35% or a plasma protein of less than 6.0 g/dl should not be used as a blood donor. A healthy horse with a PCV of 35–40% at 500 kg body weight can safely give 8 liters of blood, or 20% blood volume, every 30 days.4

Aseptic technique should continue throughout the entire collection process (Fig. 4). A hemostat or clamp should be applied to the tubing between the needle and collection bag and removed once the needle has entered the male adapter. During the collection gently rock each blood bag to mix the blood and anticoagulant (Fig. 5). A standard blood bag will contain enough anticoagulant for 450 ml of blood. The manufacturers do not recommend overfilling the bags if you are using gravity, as a clot may form within the system. After each bag is filled, the tubing should be clamped near the needle and removed from the male adapter (Fig. 6). Blood in the line is ‘stripped’ into the bag and 3 knots or blood clamps are applied to the line and the line cut between the knots or clamps and the needle. Care should be taken not to allow air to enter the bag, as this causes a break in sterile technique. Heparinizing the catheter between bags is not necessary and not recommended. After the desired amount of blood is collected from your donor, apply an antiseptic agent to the site and apply an aseptic suture closure. The donor must be monitored for signs of postcollection reaction (Fig. 7).
tic ointment to the insertion site of the catheter and secure with a wrap. The same donor can be used for the same recipient within 48 hours or less without repeating a crossmatch. The same volume of blood can be collected from the same donor, as long as the donor’s PCV remains within 35–40%.

E. Blood Administration

Administer the whole blood to the recipient using a blood administration set while warming the blood to body temperature (100.0°F, 38°C). The blood administration set should be replaced after every 4 liters given. Give at a rate of 10–20 ml/kg per hour, monitoring the patient at least every 5 minutes for adverse reactions including tachypnea, dyspnea, tachycardia, piloerection, urticaria, muscle fasciculations, restlessness, or sudden collapse. Should any adverse reactions occur, stop or slow the transfusion and follow with isotonic crystalloid solutions. Epinephrine can be administered in the case of severe anaphylaxis (0.005–0.02 ml/kg of 1:1000).1–3 Premedication with nonsteroidal anti-inflammatory drugs (NSAIDS) such as flunixin meglumine (1 mg/kg i.v.)5 or antihistamines such as hydroxyzine (1 mg/kg orally) may decrease the incidence of adverse reactions.

F. Aftercare of the Blood Donor

If there are blood bags left over from the blood collection and they were properly collected and stored, they may be readministered back to the donor.6 In horses, long-term refrigerated blood storage is not highly recommended because of the difficulty in maintaining a closed system in collection and because the blood is rarely used before it goes to waste.4,6

In cases where the maximum amount of blood has been collected from a donor, it is recommended that intravenous isotonic crystalloid solutions be given. Giving even 5 liters of fluid to a donor who has given 6–8 liters of blood minimizes the risk of hypovolemia.

The author advises to give 1–3 pounds of complete feed and plenty of fresh water to the donor, not only as a treat but as a nutrient replacement as well. The catheter site on the donor should also be visually inspected periodically for 24 hours after removal for any inflammation.

3. Discussion

With a little equipment, a protocol, and a rehearsed staff, any facility could easily accommodate the most critical hemorrhaging patient. Much has been written on the guidelines pertaining to blood typing, crossmatching, and formularies regarding amount of collection. In the author’s opinion, not enough information has been written on the simple technical-description steps. Items as easy as permanent blood transfusion kits, record keeping for blood donors, and a team approach can make critical time efficient.

References and Footnote


*Animal Blood Bank, Box 1118, Dixon, CA 95620-1118.