

OSVS Vitals

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Editor: Jodi Kershaw
June 2002

Volume 1

24-7

“Transfusion...it’s not just for anemia anymore”

Transfusions are most commonly thought of as a treatment for anemia, but there are many indications for blood products. The advancements in the understanding of transfusion medicine in small animals, and the increased availability of commercial blood banking for small animals has increased the use of blood components in small animal medicine. The use of component therapy (the administration of a blood component rather than whole blood) allows the targeted treatment of the patient’s deficiency and minimizes the risk associated with transfusion by preventing the transfusion of unnecessary components. It also allows for more efficient use of available blood products. While transfusions are relatively safe, their administration requires an understanding of potential transfusion reactions, blood typing, and appropriate storage and handling of the blood products.

Blood typing is very important in cats. Blood types in cats include A, B and AB. Type A is the most common in domestic short-haired cats and all purebred Siamese cats (and related breeds such as Burmese and Tonkinese) are type A. Type B is not common but present in a significant percentage of Exotic and British Shorthair cats, Cornish and Devon Rex cats, and to a lesser degree in the Abyssinians, Persians, Sphinxes, Scottish Folds, Maine Coons, and Norwegian Forest cats. Some “domestic short-haired” cats are type B, possibly due to a contribution of genes from an exotic breed. Type B cats given type A blood can have a severe, life-threatening transfusion reaction involving acute hemolysis, fever, vomiting, hypotension and shock. Type A cats generally have a less severe reaction to type B blood, but it is always safest to know the types of both the donor and the recipient.

Dogs are more forgiving when it comes to blood types. The blood type system involves a group of antigens which may or may not be expressed on the red cell membranes. The most important antigens are DEA 1.1 and DEA 1.2. When we refer to a dog as “A negative” it means that they do not express the DEA 1.1 antigen. Unlike cats, dogs do not have pre-formed antibodies against red cell antigens they do not express. For this reason, transfusion reactions are uncommon during the first transfusion. Dogs need to be sensitized to an antigen first, and then they build up antibodies against that antigen. The risk of giving DEA 1.1 positive blood to negative dog is that the dog will form strong antibodies to the 1.1 antigen and the next time it is exposed will likely have a severe hemolytic reaction. While it is ideal, therefore, to blood type dogs before their first transfusion (to minimize risks associated with future transfusions), it is not essential. Blood typing cards are easy to use, and are available for both dogs and cats. Both dogs and cats develop antibodies against red cell antigens following a transfusion. Significant antibody production takes at least five days. Therefore, if a patient

requires a transfusion and has received a transfusion more than five days prior, that patient should have a crossmatch performed against any unit of blood before it is transfused.

Hemoglobin is the factor that is deficient in cases of anemia. When the patient’s hemoglobin concentration falls below 7mg/dl of blood, or the hematocrit (or packed cell volume) falls below 15 or 20%, the patient’s tissues are at risk for injury and failure due to hypoxia. Hemoglobin is available in whole blood, packed red blood cells, and Oxyglobin. Maintaining a blood bank is not practical for most general practice situations. Red blood cells can be stored for only 35 days, and if a practice has a sporadic need for blood this is not likely to be cost effective. However, it is appropriate to have a small number of staff-owned dogs designated as potential blood donors in case of emergency. Dogs weighing 60 pounds or more can donate 450ml of whole blood. The blood is collected using sterile technique into a collection system containing 1ml CPDA anticoagulant per 10ml of blood. Blood collection from cats may pose a greater risk to the donor than collection from dogs. Blood collection requires heavy sedation in cats and a small number of cats have sub-clinical cardiac disease and cannot withstand sedation or acute blood volume depletion. We avoid using staff-owned cats for blood donation in most cases, and instead use stored packed cells, and maintain a small population of in-house donors that presented to the clinic as injured strays. These cats are later adopted to good homes. Cats can donate about 11ml/kg. Donors should not be used more than once a month and should have their hematocrit monitored before donation. Designated blood donors must be healthy and free of infectious diseases. Red blood cells should be administered through a specialized filter to remove microthrombi that may have formed. Blood components are administered at a dose of 10 to 20 ml/kg over 1 to 4 hours. The patient should be monitored closely for changes in temperature, vomiting, purities or erythema. In addition to transfusion reactions, patients may develop hypocalcemia due to binding of calcium by CPDA, or volume overload due to the large dose of colloid.

Oxyglobin, a purified bovine hemoglobin solution, is an excellent alternative to blood banking for many situations. Oxyglobin provides oxygen-carrying hemoglobin, and is not species-specific. It can be administered to dogs as well as to cats, ferrets, rabbits, and birds (although it is only labeled for use in dogs). It has a 2 year shelf life so it is a good way to be prepared for emergency transfusion needs. Oxyglobin can be used in cases of acute blood loss, chronic anemia, and acute hemolysis. There is a hypothesis that the use of Oxyglobin rather than red cells for transfusion to patients with immune-mediated hemolytic anemia avoids the potential exacerbation of hemolysis that may occur when additional red blood cells

Intervertebral Disc Disease

Intervertebral disc disease (IVDD) can occur in any area of the spinal cord caudal to C1-C2. IVDD most commonly affects young to middle-aged dogs, however, disc extrusion/protrusion can occur in older dogs. This disease is very uncommon in cats of any age.

There are two basic types of IVDD seen in canine patients. Each type is defined by its combination of pathologic and clinical features. Hansen's type I disc disease is generally seen in chondrodystrophic dog breeds (Dachshunds, Lhasa Apso, Shih-Tzu, Cocker Spaniels, etc.). Chondroid metaplasia occurs in the discs of these dogs very early in life. The loss of water from these discs reduces their pliability, thus increasing the strain placed on the disc during normal biomechanical activity. **Extrusion** of the nucleus pulposus into the spinal canal, resulting in spinal cord compression, causes acute clinical symptoms in these dogs. Hansen's type II disc disease is generally seen in middle-aged to older, larger non-chondrodystrophoid breeds (German Shepherd Dogs, retrievers, etc.). Fibroid metaplasia of the discs of these dogs occurs over several years. The resultant shift in glycosaminoglycan content increases the strain on the disc. Annulus fiber disruption occurs, although the exact mechanism has not been clearly established, and disc **protrusion** produces clinical symptoms in these dogs. Symptoms are often chronic, but may have acute manifestation.

Clinical signs can vary from spinal pain to varying degrees of neurologic dysfunction (paresis to paralysis). Nerve root signature ('lameness' in the affected limb) may be the only symptom displayed. This is more common with cervical disc extrusion than thoracolumbar (T-L) lesions. Although the signalment, history, and presentation can lead to a presumptive diagnosis of IVDD the diagnosis cannot be firmly established without diagnostic imaging.

Survey spinal radiographs should be taken with the patient under general anesthesia. Without anesthesia even well positioned plain films can only confirm the presence or absence of spinal fractures/luxations, bony tumors, and discospondylitis. Abnormalities associated with IVDD that may be seen on plain films include collapse of the intervertebral disc space, deformities of the intervertebral foramina, radiopaque material in the spinal canal, and collapse of the dorsal articular joint space. While suggestive of IVDD, these changes do not always correlate with clinically significant spinal or nerve compression. Accurate assessment of spinal cord compression is accomplished by myelography or cross-sectional imaging studies (CT or MRI). Extradural spinal cord compression at or around the disc space is characteristic of IVDD.

Despite the frequency with which IVDD is encountered in clinical practice, there are many aspects of diagnosis and treatment of the disease that are controversial. This is due in part to the lack of research models that accurately reflect the clinical syndrome and the inherent variability in the type and extent of associated spinal trauma. Additionally, inaccurate diagnoses, incomplete diagnoses, and poor objective follow-up evaluations hinder reported scientific perspectives on treatment of IVDD.

General guidelines have been established for selecting therapy of dogs with IVDD. The decision usually depends on the severity of clinical signs as a major factor of determining treatment. Mildly affected dogs (those with spinal pain or those that are ambulatory but parietic) may be managed with cage confinement alone. I generally suggest a 2-3 week period of restriction with a follow-up exam at the end. If the dog worsens before that time, or if there is no improvement in that time period definitive diagnosis and surgery should be considered. If improvement occurs, additional cage rest may be considered. I usually recommend another 2-3 weeks of confinement, although some animals may require longer periods of cage rest.

Many of these animals will benefit from a course of oral prednisone. In addition, methocarbamol may improve their comfort level and facilitate homecare.

To reasonably recommend conservative treatment of spinal disease you should have a strong degree of confidence in your presumptive diagnosis of IVDD. If anything doesn't quite fit the pattern of presentation then definitive diagnostics should be recommended.

More severely affected animals (i.e. non-ambulatory dogs) are considered surgical candidates and definitive diagnostics and surgical treatment are recommended. Dogs that have retained deep pain sensation at the time of surgery have an approximately 85% chance of regaining the ability to walk some time after surgery. Acute loss of deep pain carries a 56% probability of recovery. If deep pain has been absent for 12-36 hours the prognosis for walking falls to 25%. If deep pain perception has been absent for more than 48 hours the prognosis for walking diminishes to less than 5%. It is therefore important to institute appropriate management of dogs with spinal disease as soon as possible to prevent loss of deep pain sensation. Patients with **rapid** progression of clinical signs, whether deep pain sensation is present or not, should be treated as surgical emergencies.

Although no data exists to guide corticosteroid treatment for IVDD, guidelines for treatment are generally taken from spinal cord trauma studies or extrapolated from human data. Corticosteroids (methylprednisolone sodium succinate @ 30mg/kg IV) are beneficial if given within the first 8 hours after spinal trauma in humans. This period may be shorter in dogs, even as short as 1 hour. Methylprednisolone sodium succinate administration initiated after the first 8 hours has no beneficial effect, and in some research trials has had detrimental effects. Constant rate infusion (CRI) of methylprednisolone sodium succinate in the initial hours after injury appears to be advantageous, although this can be labor intensive. To circumvent the CRI but maintain spinal cord levels of methylprednisolone, it has been suggested that the administration protocol include additional doses of methylprednisolone sodium succinate at 15 mg/kg IV at 2 and 6 hours after the initial 30 mg/kg bolus. I generally administer successive doses of methylprednisolone sodium succinate at 15 mg/kg every 2 hours during surgery, and every 6 hours during the first 24 hour period after surgery. The protocol is then tailored to the clinical signs of the patient.

I generally perform a hemilaminectomy to achieve spinal cord decompression. The number of spaces opened is determined by the amount of spinal cord swelling evident on myelography. Post-operative recovery involves continued solumedrol therapy, narcotics, gastrointestinal cytoprotectants, and physical therapy. Dogs are discharged when their condition is stable and they have re-established urinary continence or their urinary bladder is easily expressible. Pharmacologic facilitation of urinary tract maintenance is used only when necessary.

Although research data indicates that gastrointestinal cytoprotectants do not prevent the clinical side-effects of corticosteroid administration, my clinical experience is that these problems tend to be less severe in patients treated with these medications. Famotidine (Pepcid) is the drug I most frequently use for both its ease of administration (once a day) and availability over the counter for clients.

The most difficult thing for owners to comprehend is the amount of work involved in caring for a non-ambulatory patient. Many often go through a crisis within the first two weeks of taking their dog home. A good support network, both at home and at the veterinary hospital, can make the difference in a successful outcome of a case and the owner giving up hope and electing euthanasia. It can take several weeks to months for a dog to become ambulatory again. There is no way to predict when function will return or how much

function will be recovered. They may never return to normal function, however they can rejoin family events and activities according to their functional capacity. Even permanently paralyzed dogs can have an excellent quality of life and maintain their mobility in a cart system. My preference is the *Doggon' Wheels* cart. It is available in a variety of sizes and has a clip-in harness system rather than a fixed system. The harness is made of neoprene and is easily laundered. (visit www.doggon.com for more information)

Dogs with acute IVDD can be referred to OSVS directly through the emergency service. If indicated, surgery will occur on the day of admission.

Kathleen E. Collins DVM, DACVS

Radiology Film Interpretation

with Sue Newell DVM, DACVR

Lunchtime Seminars at OSVS

2nd & 4th Thursday each month from
12 noon to 3pm

Bring your troublesome (and not so troublesome) cases, hobnob with your peers, and eat lunch!

\$75 per session

**Space is limited, so reserve your spot!
Contact Jodi Kershaw at (401) 886-6787**

Transfusion...continued

and their membrane antigens are added. The risks of Oxyglobin administration include allergic reactions and volume overload. There have been some reports that Oxyglobin induces pulmonary edema in cats, but this is most likely due to volume overload, due to the strong colloidal activity of Oxyglobin and the presence of occult heart disease in many cats. The risks associated with Oxyglobin can be minimized by administering the product slowly and monitoring the patient carefully throughout the transfusion. The dose of Oxyglobin is 10ml/kg (use a smaller volume initially in extra-label species). The main drawback to Oxyglobin is the cost, but the prolonged shelf life increases the likelihood that the product will be used.

Fresh frozen plasma contains albumin, clotting factors, Von Willebrand's factor, antithrombin III, acute phase proteins and some platelets. Plasma that is not frozen within 6 hours of collection, or plasma that has been thawed for more than 6 hours, loses clotting factor activity. Fresh frozen plasma can be stored for one year (if the freezer is reliable), after which it is considered to be frozen plasma (without clotting factors) and can be stored for 4 more years. Fresh frozen plasma has many potential uses and it reasonable for most clinics to keep a unit or two on hand. Fresh frozen plasma may be used to treat patients actively bleeding due to factor deficiencies, as in rodenticide toxicity or liver disease, and to provide extra clotting factors in patients at risk for bleeding during a surgery. The ability to measure prothrombin time (PT) and partial thromboplastin time (PTT) in-house allows the clinician to identify patients with a coagulopathy if they are not actively bleeding, and to monitor the patient's response to plasma. Patients that have lost a large volume of blood due to trauma, ruptured viscera, or intraoperative hemorrhage have lost both clotting factors and platelets, and may benefit from fresh frozen plasma

transfusion if whole blood is not available. Antithrombin III and clotting factors are both consumed during disseminated intravascular coagulation. During the hypercoagulable phase of DIC, ATIII is deficient and is provided by plasma transfusion, pre-incubated with heparin to activate the ATIII. Later in the development of DIC, active hemorrhage due to clotting factor consumption is treated with non-heparinized plasma. Fresh frozen plasma also contains acute phase proteins such as alpha macroglobulin which may be useful in the treatment of pancreatitis and severe enteritis.

Fresh frozen plasma does not contain a significant number of platelets, and the half life of platelets is short (less than one day). Platelet rich plasma is not readily available, and is indicated only for life-threatening hemorrhage due to thrombocytopenia. Hemorrhage secondary to thrombocytopenia can lead to the loss of clotting factors and red blood cells, so transfusions may be indicated to replace these components, but is rarely indicated for providing platelets. Plasma that no longer contains active clotting factors is used mainly to provide colloid activity and improve oncotic pull. This is particularly important in patients with hypoproteinemia at risk for developing peripheral edema. Albumin attracts water molecules, helping to maintain fluid within the intravascular space. Cryoprecipitate is a concentration of clotting factors. It is expensive and not readily available, and is used mainly for elective surgery on patients with a known clotting factor deficiency.

Blood components are invaluable in the treatment of numerous emergency conditions and critical illnesses. Their appropriate use, in addition to careful monitoring and definitive treatment of the underlying disorder, can greatly improve the survival of many small animal patients.

Justine A Johnson DVM, DACVECC



Special Delivery

Congratulations to Dr. Cassandra Nictakis-Nielsen on the birth of a healthy bouncing baby boy, Sonny Nielsen. Sonny was born on May 28th weighing in at 10 lbs.

Dr. Nictakis-Nielsen is expected to return work at OSVS part time this fall.

Changing of The Guards

We would like to say farewell to our current interns, Dr. Denny Koontz and Dr. Julia Hansen. Dr. Koontz will be joining an emergency/referral practice in Seattle, WA. and Dr. Hansen will be joining a general practice in Chelmsford, MA. Although we will miss them dearly, it's time to make room for the new interns: Dr. Lisa Math - Virginia-Maryland Regional College of Veterinary Medicine, Dr. Kimberly Hogrefe - Tufts University, Dr. Stacey Rodehorst - Atlantic Veterinary College, University of Prince Edwards Island, and Dr. Jon Epstein - Tufts University.

Also joining our staff this summer:

Emergency: Dr. Danna Torre and Dr. Honorata Lenk
Internal Medicine: Dr. Jennifer Junk
Surgery: Dr. George Coronado



Specialists

Gary Block DVM, MS, DACVIM
Kathleen E. Collins DVM, DACVS
Justine A. Johnson DVM, DACVECC
Susan M. Newell DVM, MS, DACVR
Tiffany Tapp DVM, DACVD
Vint Virga DVM, DACVB
Henry Wietsma DVM, MS, DABVP

Emergency

Jocelyn Cowan DVM
Michelle Lampe DVM
Honorata Lenk DVM
Kassandra Nielsen DVM
Susan Porter DVM
Danna Torre DVM

Interns

Jon Epstein DVM
Kimberly Hogrefe DVM
Lisa Math DVM
Stacey Rodehorst DVM

Hospital Manager

Cheryl Rizzo

Referral Coordinator

Jodi Kershaw

Staff Spotlight
OSVS Reception Staff



*From left to right: Angie, Pat, Karen, Morgan, Melissa, Kay, & Betty
Camera Shy: Heather, Sue, & Anna*

In this issue of OSVS Vitals we would like to introduce our reception team. These dedicated staff members have what may be the most stressful position in our hospital. They are responsible for greeting our clients and patients, answering ten incoming lines, filing, faxing, processing all forms of payments, and dealing with a myriad of financial concerns our clients may have. Our receptionists must deal with clients who are generally not at their best because one of their “family members” is either sick or injured. Our reception team tries very hard to be informative, respectful, supportive, and empathetic to all of our clients. One receptionist, Kay Potter, has taken on the very heavy burden of being our primary grief counselor. Kay has put together wonderful grief packets, which are given to all our clients who have a pet euthanized, and are sent to clients whose animals pass away while in our hospital. Kay’s unique ability to comfort our clients has been a blessing.