BLOOD TRANSFUSIONS: WHAT SHOULD I KNOW?

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Summary:

The purpose of this talk is to list and explain what factors should control the nurse in the process of transfusion of blood products. Transfusions are already a fairly common procedure in the veterinary practice. In this process, the nurses have a lot of work: extraction of the blood, analysis of the haematological factors of the patient that will determine the need for transfusion, management of the donor banks, typing of the animals who will intervene (donor / recipient), extractions and care throughout the process.

Introduction:

1.- Definition of transfusion

Transfusion is the process by which an attempt is made to improve the oxygen transport capacity, to increase the platelets count, or to increase the volume of the patient's bloodstream.

2.- When do I make a transfusion?

Transfusions are indicated in patients with acute or chronic anaemia, thrombocytopenia or thrombocytopenies, von Willebrand disease, coagulopathies and hypoproteinemias.

3.- Types of blood products:

The blood products commercially available are the following:
- Whole blood (fresh or stored)
- Packaged erythrocytes
- Plasma (fresh frozen, rich in platelets, cryoprecipitate and cryo-supernatant)

4.- What do I need to carry out a blood transfusion?

When it is decided that a transfusion must be done, we need to have located a blood product that is appropriate to the patient's needs, either through an instant donation or through a blood product that we obtain from the blood banks in the market.

If we are going to obtain whole blood from a donor, we will need:

- Volume: firstly, we must know what is the volume to be transfused. The formula to be followed is:
  Cats: Weight × 60 × (desired PCV-PCV recipient) / donor PCV
  Dogs: Weight × 80 × (desired PCV-PCV recipient) / donor PCV
It must be borne in mind that for each 2.2ml / kg of transfused whole blood the PCV will increase by 1%.

For packed red blood cells transfusions, for each 1ml / kg of transfused packed red blood cells, the PCV will increase by 1 point.

- Collection bag, with anticoagulant, suitable for the species or if not available, a syringe with pre-loaded CPD-A (anticoagulant) (1ml of CPD-A per 9ml of blood).

- Specific equipment with a blood filtering system for the moment of transfusion to the recipient.

- A tilting surface to maintain the mixing of the blood while it is being extracted.

5.- What animals are suitable?

The dogs chosen as donors must weigh more than 25 kg and be between 1 and 8 years old. They must have an PCV> 40% and be free of diseases such as leishmaniasis, erlichiasis, babesiasis, filariasis and anaplasmosis.

For each donor you can extract up to a maximum of 20ml / kg every 4 weeks.

The donor cats should weigh more than 4kgs and be between 1-8 years of age. The PCV should be between 30-35% and be negative to FIV / FeLV and Mycoplasma.

Sporadically, 60 ml can be extracted per donor or 10ml / kg every 4 weeks as maximum volumes.

As in human medicine, transfusions must follow a compatibility protocol.

In dogs, blood groups are called DEA (dog erythrocyte antigen) and the most relevant range is from DEA 1.1 to DEA 1.8, the former being the most antigenic and having the highest risk of adverse reactions. In a first transfusion, it is not relevant whether the donor and the recipient share a positive / negative group, but it does in the following ones, since antibodies that would cause reactions of severe extravascular haemolysis have been created in the first procedure.

Therefore, the universal donor is a negative DEA 1.1 donor.

The blood groups of cats are A, B and AB, with A predominating over B. The most common is A and the least common is AB.

Unlike dogs, cats do have antibodies before a first transfusion, and therefore donor and recipient must be compatible.

The compatibility tests that must be done before a transfusion are the cross matching tests and the typing tests.

The cross-matching test consists of a major cross-reaction that identifies the presence of antibodies in the plasma of the recipient to the erythrocyte antigens of the donor. And the minor cross-reaction test checks whether the donor's plasma contains antibodies to the antigens of the recipient's erythrocytes.
If there is agglutination in the reaction, it means that the receptor has antibodies to the donor, so that the transfusion can not be carried out.

If the agglutination is shown in the minor reaction, it means that the recipient has antibodies to the donor but at a level that does not involve serious risks, and therefore the transfusion may be carried out but with close monitoring of the recipient.

A mixture of erythrocytes and plasma from the recipient can also be included as a control test.

6.- How do we extract blood from the donor and transfuse it to the recipient?

The extraction needle is of large calibre, so we must avoid movements in the donor. This is done under sedation and the vital signs are controlled throughout the procedure.

The animal should be placed in lateral decubitus and the puncture site should be shaved. It should be thoroughly cleaned with chlorhexidine in order to avoid any extra contamination during the procedure.

The jugular is punctured and if the extraction is done into a syringe loaded with anticoagulant, it is slowly aspirated up to the pre-specified volume.

In case of using collection bags, place the bag on a lower surface than the table you are working on and leave the bag on the tilting surface so that it is mixed, thus avoiding the deposit in only one part of the bag.

Once the extraction is complete, the donor will be left to rest in a cage, and administered RL or 0.9% NaCl over about two hours through a permeable route, until reaching the extracted volume.

Having the blood drawn, the equipment is connected to the filtration system by means of the collection bag (in case it is by bag) and in turn to the permeable route carried by the patient. It is preferable to use the path for the transfusion just for this procedure.

You can not use another type of fluid therapy other than 0.9% NaCl since it can cause coagulation due to the presence of calcium.

Taking into account that the transfusion should not be done in less than 4 hours, the transfusion rate is the following:

Dogs: 5ml / kg / h over the first 30 minutes and then increase to 10-15 ml / kg / h
Cats: 3 ml / kg / h over the first 30 minutes and then increase to 5-10 ml / kg / h

When infusion pumps are not available, the approximate calculation is by drip: 1ml = 20 drops.

These values are calculated assuming that the patient has no associated extra cardiac or renal pathology.

7.- Intra-transfusion care

When the transfusion begins, it is necessary to have the vital signs monitored.
Over the first 15 minutes (HR, FR, temperature, mucous membranes colour, pulse, blood pressure, mentation, presence of vomiting, tremors or any other anomaly of the patient).

If everything goes fine, the transfusion rate may be increased and the monitoring is performed every 30 minutes, but the patient can not be left unattended at any time.

8.- Post-transfusion care

After the transfusion, patients may still have some type of adverse reaction to the procedure, which should be monitored over the first 30 minutes after completion of the transfusion and continue at least for 2 more hours.

Acute or delayed immunomediated reactions and not immunomediated reactions due to alterations of the blood products might develop.

The PCV controls are performed at 12h and 24h after the completion of the transfusion.

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