CANINE FRESH FROZEN PLASMA

SaBB SMALL ANIMAL BLOOD BANK

SaBB Veterinary Clinic and Laboratory Dubai 045 911 007 www.smallanimalbloodbank.com

Description

Fresh Frozen Plasma (FFP) is separated and frozen within 8 hours of collection of whole blood.
Fresh frozen plasma preserves the concentration and activity of all coagulation factors of a whole fresh blood unit while maintaining the same therapeutic power.

Contents

FFP contains plasma proteins including all coagulation factors both labile and non-labile. Source of all clotting factors, immunoglobulins, albumin, lipids and electrolytes, fibrinogen, fibronectin, and anti-inflammatory mediators; may also contain a small amount of erythrocyte.
Platelets, IF present, are not viable.

Indications

All coagulopathies: Liver disease, anticoagulant rodenticide toxicity and hereditary coagulopathies

- Control of bleeding in patients who require replacement of labile coagulation Factors (V and VIII and vWf) when simultaneous blood volume expansion is required.
- Patients that are actively hemorrhaging benefit from immediate supplementation of clotting factors in FFP.
- FFP is indicated for patients with thrombotic thrombocytopenic purpura (TTP) when platelet inactivation is due to an absence of vWF
- Immunoglobin (Ig) transfer (i.e. passive immunity) in situations where neonates never had colostrum
- Pretreatment of vWD and haemophilia patients before invasive procedures
- Can be considered for volume resuscitation in acute trauma with TS <4 g / dl.
- Non responsive hypotension*
    - FFP will but not significantly increase the patient's colloid osmotic pressure
- Hypovolemia
    - Not recommended by guidelines, but suggested to be effective
- Antioxidant properties
    - Through iron sequestration, which limits the production of free hydroxyl radicals.
        - No current guidelines exist for FFP administration with regard to its antioxidant effects.
- Sepsis
- Pancreatitis*

- FFP contains anti-proteases which allegedly counteract the proteases that are released as a result of pancreatic inflammation. Pancreatitis patients may have concurrent low albumin level
  Several veterinary studies show no decrease in morbidity or mortality and even some increase in morbidity with the use of plasma therapy for pancreatitis patients.
  In severe cases (e.g., necrotizing pancreatitis) that are coagulopathic or have clinical signs of SIRS, sepsis, or multi organ dysfunction syndrome the use of FFP is warranted. As well as cases of AKI and azotemia where colloids are not recommended

- DIC
- SIRS (peritonitis…)
- Hypoalbuminemia*

it is considered that the risks of transfusing such large volumes,(risk of reaction as well as cost) negate plasma as an effective sole treatment for hypoalbuminaemia

- To raise the albumin level in the body by 0.5-1g/dL, ~20-40ml/kg of plasma must be administered which is not cost effective and large volumes can be detrimental. Transfused albumin will also only remain in circulation for 24-48h. These undermine FFP as an effective sole treatment for hypoalbuminemia.

- Parvovirus/Panleukopenia*
  - Fresh frozen plasma transfusion**, if at all,** is required, to maintain blood volume, hydration status, and colloid oncotic pressure necessary for tissue oxygen delivery to body tissues.
    Significant losses of plasma proteins into the intestinal lumen can lead to hypoproteinaemia, hypoalbuminaemia, and, occasionally, coagulation abnormalities. The use of fresh frozen plasma in these patients is controversial, but it has sound rationale.
  - Recent studies have not found a beneficial effect in using FFP and have found that even recently recovered animals have minimal anti-CPV antibody concentrations.
- Neonatal hypoglobulinaemia due to colostrum deficiency
- Prophylaxis before invasive surgery in an animal with a known significant clotting factor deficiency

Contraindications

- Do not use FFP when coagulopathy can be corrected more effectively with specific therapies, such as Cryoprecipitate, vitamin K or others
- Do not use FFP when blood volume can be safely and adequately replaced with other volume expanders such as 0.9% Sodium Chloride or Lactated Ringer's or HES
- Do not use FFP for volume replacement alone
- It is not advised to use FFP as the sole therapy for hypoalbuminaemia in the absence of coagulopathy

Side Effects and Hazards

- Anaphylactic, anaphylactoid:
  - Characterized by urticaria, pruritis, erythema, edema, emesis, dyspnea, hypertension, bronchoconstriction, and severe shock. Can be mild or life threatening. Onset is rapid, occurring 1-45 minutes from the start of the transfusion.
- Circulatory overload (overdose):
  Transfusion related circulatory overload (TACO) and transfusion-related acute lung injury (TRALI)
  - Characterized by cough, tachypnea, pulmonary edema, congestive heart failure, vomiting, and urticaria. Can be mild or life threatening and is most common in small animals. Patients with underlying cardiac disease are most at risk.

    - If massive volumes of plasma are used, citrate toxicity, hypothermia and other metabolic problems may occur
- Others include:
    - Fever, hemolytic and allergic reactions
- **nonhemolytic reactions are by far the most likely reason for acute fever during transfusion.**
    - Febrile Non Hemolytic Transfusion Reactions can also occur during FFP administration from patient antibodies against donor plasma proteins
        - Fortunately, in both dogs and cats FNHTR are typically mild and of limited clinical significance.
    - In one large study of 558 dogs, transfusion reactions were reported in 8% of plasma transfusions, with fever being the most common reaction.
- Transmission of infectious diseases
- Plasma produced from whole blood collection cannot be guaranteed free of red cells.

Precautions

- If FFP is thawed but the temperature is below 11°C it can be re-frozen and used as Frozen plasma. This can be kept for an additional 4 years from date of production. If above 11°C use within 24h or discard.
- Always use a filter
- Discard any unused portion (Can be kept max 24h after being opened)
- Never mix IV medications, colloids, Ringer's lactate with the plasma, even in different lines or limbs. These products are not compatible with blood products and will cause clotting.
- Flush the IV line with saline before and after product administration
- Use NaCl 0.9% ONLY.
- Keep bags in an upright position to facilitate examination and potential unwanted thawing
- Handle frozen bags carefully as they rupture easily.
- Defrost frozen plasma within a protective pouch (Ziplock bag) in a water bath at 30-35°C for 20-30 minutes and stir occasionally. MAX 37°C. NEVER use a microwave

Administration

- A minor cross match would not be necessary in dogs for a first time or subsequent plasma transfusions (unless large volumes of plasma had been administered to the recipient)
- Infusion pump can be used.
- Plasma should be DEA 1 compatible with the recipient's red cells, if you cannot blood type use plasma from DEA 1 negative donors.
- Plasma administration is intravenous, however in very young or circulatory impaired animals it may be given intraperitoneally.

Dosage

- Dosage should be guided by close patient monitoring.
    - Monitor blood pressure to avoid volume overload.
- Retrospective studies in dogs have reported mean doses of 13.9 ml/kg in small dogs, 5.1 ml/kg in large dogs and, more recently, 16 ml/kg.

Quick guide:

- Textbooks recommend doses from 6–20 mL/kg with species-specific doses not explicitly stated.
- 6-10 ml/kg at 4-6 ml/minute over MAX 4h. Infuse as quickly as the patient can tolerate.
- Standard dose (hypo-coagulation, hypoalbuminemia or increased passive immunity):

10-30ml/kg every 12 hours to effect.

➔ Severe coagulopathies require the higher end of the dose range

If the volume transfused exceeds 20 ml/kg/day, serum calcium should be measured. Induced tetany and a hypo coagulable state can be triggered due to excess citrate.

Infusion rate

- First 15-30 minutes: slow 0.25 ml/kg/h and monitor for reactions.
    - Do not use this rate if the recipient is in hypovolemic shock due to acute hemorrhage.
- Normovolemic patients: 5-10 ml/kg/h for 2-4 h
- Haemorrhaging hypovolemic patients: up to 22 ml/kg/h.
- High risk overload patients (heart failure, renal failure or hypertension): 1-3 ml/kg/h
  Start with the lowest rate and gradually increase.