

Use of plasmapheresis in the treatment of immune-mediated diseases in dogs

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INTRODUCTION

Therapeutic plasmapheresis is the most commonly used apheresis technique in veterinary medicine, in which plasma is separated from blood by centrifugation or membranes. The main modalities are double filtration plasmapheresis (DFPP), immunoadsorption (IA) and therapeutic plasma exchange (TPE). In the treatment of immune-mediated diseases in dogs, this technique offers advantages over immunosuppressive therapy, such as avoiding immunosuppressive myelosuppression and modulating cellular immunity, but also carries risks, including thrombosis, hypocalcaemia, hypoalbuminemia, hypotension and infection (14, 25, 26).

OBJECTIVES

This review discusses the mechanisms, indications and complications of therapeutic plasmapheresis in veterinary medicine, using clinical cases to demonstrate its use in immune-mediated diseases in dogs.

THERAPEUTIC PLASMAPHERESIS MODALITIES

Double Filtration Plasmapheresis (DFPP)

- Uses two membrane filters (14).
- Selectively removes macromolecules based on size (14).
- Replacement fluids not required (14, 19).

Immunoadsorption (IA)

- Plasma filtered by staphylococcal protein A columns (7, 21, 22, 23).
- Removes antibodies and immune complexes (7, 21, 22, 23).
- Replacement fluids: not required (7, 21, 23).

Therapeutic Plasma Exchange (TPE)

- Plasma removed by centrifugation or filtration (5, 25).
- Removes pathogenic plasma components (5, 11, 26).
- Replacement fluids: required (5, 11, 26).

BENEFITS AND COMPLICATIONS

Benefits

- Minimal blood loss (26)
- No myelosuppression (9)
- Useful in critically ill patients as supportive treatment (5, 25)
- Modulates cellular immunity (9, 25)
- Effective in diseases with intravascular components (25)
- Replenishment of plasma components in TPE (9)

Complications

- Thrombosis (8)
- Hypotension (14, 21) and hypovolemia (23)
- Hypocalcaemia (5, 28)
- Hypoalbuminemia (14)
- Poor catheter performance (14, 21)
- Clotting factor depletion (14)
- Allergic reactions to replacement fluids (5, 14, 21)
- Infections (14, 21)
- Bleeding (14)
- Hypothermia (21)
- Vomiting (5, 21)
- Haemodilution (23)
- Citrate accumulation

APPLICATIONS IN VETERINARY MEDICINE

Table 1. Clinical indications, cases and outcomes of DFPP, IA, and TPE in dogs.

Modality	Indications	Number of Cases	Clinical improvement rate		Survival rate	
DFPP	Leishmaniasis	3 dogs	67%	83%	67%	34%
	Hyperviscosity Syndrome (HVS)	1 dog	100%		0%	
IA	Immune-Mediated Hemolytic Anemia (IMHA)	1 dog	100%	100%	100%	67%
	Leishmaniasis	1 dog	100%		100%	
	Myasthenia Gravis (MG)	1 dog	100%		0%	
TPE	Immune-Mediated Thrombocytopenia (IMT)	4 dogs	75%	90%	75%	65%
	IMHA	32 dogs	84%		84%	
	Myasthenia Gravis (MG)	1 dog	100%		100%	
	Acute Canine Polyradiculoneuritis (ACP)	1 dog	100%		0%	



Figure 1. A Diapact CRRT machine (B Braun Avitum) continuous renal replacement therapy machine used in the DFPP modality. Photo by: Perondi F, Brovida C, Ceccherini G, Guidi G, Lippi I. 2018. Double filtration plasmapheresis in the treatment of hyperproteinemia in dogs affected by Leishmania infantum. J Vet Sci. 19(3):472-476. doi:10.4142/jvs.2018.19.3.472.

CONCLUSIONS

Therapeutic plasmapheresis is gaining importance in veterinary medicine, showing encouraging results as a supportive or rescue therapy in complex clinical cases. However, evidence is still largely based on case reports and more rigorous studies and animal-specific protocols are needed.



BIBLIOGRAPHY