Use of platelet-rich plasma in the treatment of ulcerative keratitis in equine – Case report

Uso de plasma rico em plaquetas no tratamento de ceratite ulcerosa em eqüinos - Relato de caso

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Maurício Orlando Wilmsen
PhD in Department of Veterinary Clinical Science
Pontifical Catholic University of Paraná, PUCPR – campus Toledo, Paraná, Brazil
Adress: Rua Mem de sá, 1476, Marechal Cândido Rondon, Paraná, Brazil
E-mail: mauricio.orlando@pucpr.br

Ana Carla da Silva Rizzi
Graduating student in Veterinary Medicine
Pontifical Catholic University of Paraná, PUCPR – campus Toledo, Paraná, Brazil.
Adress: Rua Paraíba, 248, Toledo, Paraná, Brazil
E-mail: anarizzi1275@outlook.com

Ana Carolina da Silva Rizzi
Graduating student in Veterinary Medicine
Pontifical Catholic University of Paraná, PUCPR – campus Toledo, Paraná, Brazil
Adress: Rua Paraíba, 248, Toledo, Paraná, Brazil
E-mail: anac.rizzi@outlook.com

Caian Silva Correa
Graduating student in Veterinary Medicine
Pontifical Catholic University of Paraná, PUCPR – campus Toledo, Paraná, Brazil
Adress: Rua Prata, 276, Toledo, Paraná, Brazil
E-mail: caian20@hotmail.com

Karla Daniele Arboleya
Graduating student in Veterinary Medicine
Pontifical Catholic University of Paraná, PUCPR – campus Toledo, Paraná, Brazil
Adress: Rua Vital Brasil, 04, São José das Palmeiras, Paraná, Brazil
E-mail: karlaarboleya@outlook.com

Suélen Dalegrave
Resident veterinarian in small animals medical and surgical clinic
Pontifical Catholic University of Paraná, PUCPR – campus Toledo, Paraná, Brazil
Adress: Rua Padre José Gaertner, 28, Toledo, Paraná, Brazil
E-mail: suhdalegrave@hotmail.com
ABSTRACT
The platelet-rich plasma (PRP) has been applied to repair and regenerate different types of tissues. Currently, the use of platelet-rich plasma has demonstrated more and more effectiveness in the recovery of the lesion and in the gain of time in the treatment of the corneal keratitis or corneal ulcer in different species. The prevalence of traumas that affect the cornea in horses is high and represents the majority of ophthalmic injuries in this species. Due to its localization, it is more frequently subject to traumatic processes, such as corneal ulcer. The time it takes to make the diagnosis and start treatment may be decisive for the animal's prognosis. The aim of this study was to report a clinical case of ulcerative keratitis in a horse treated with platelet-rich plasma (PRP) associated with eye drops. A seven-year-old female horse was seen at an equestrian center, with a history of facial lesion evolving for six days, which was diagnosed as ulcerative keratitis. In the clinical exam the animal presented pain and intense agitation during the clinical evaluation besides corneal lesion, photophobia, blepharospasm, epiphora, conjunctival hyperemia, corneal edema, miosis and lacrimation. The animal was treated with autologous PRP and ophthalmic eye drops both with three TID drops. The PRP was obtained by collecting whole blood (80mL) by venipuncture of the right jugular vein in tubes containing sodium citrate, centrifuged and kept under refrigeration. During the treatment, antalgic therapy was performed using non-steroidal anti-inflammatory and the animal was kept with a tampon during the 15 days of treatment until the evolution of the case and the beginning of healing of the lesion site, demonstrating the efficacy of PRP treatment.

Keywords: Autologus PRP, Cytokines, Growth factors, Epiphora, Oxidative stress.

RESUMO
O plasma rico em plaquetas (PRP) tem sido aplicado para reparar e regenerar diferentes tipos de tecidos. Atualmente, o uso do plasma rico em plaquetas tem demonstrado cada vez mais eficácia na recuperação da lesão e no ganho de tempo no tratamento da ceratite córnea ou úlcera córnea em diferentes espécies. A prevalência de traumas que afetam a córnea em cavalos é alta e representa a maioria das lesões oftálmicas nesta espécie. Devido a sua localização, está mais frequentemente sujeita a processos traumáticos, tais como a úlcera de córnea. O tempo necessário para fazer o diagnóstico e iniciar o tratamento pode ser decisivo para o prognóstico do animal. O objetivo deste estudo foi relatar um caso clínico de ceratite ulcerosa em um cavalo tratado com plasma rico em plaquetas (PRP) associado a gotas oftálmicas. Um cavalo fêmea de sete anos foi visto em um centro eqüestre, com um histórico de lesão facial evoluindo por seis dias, que foi diagnosticado como ceratite ulcerosa. No exame clínico o animal apresentou dor e intensa agitação durante a avaliação clínica além de lesão corneana, fotofobia, blefaroespasmo, epífora, hiperemia conjuntival, edema corneano, mioso e lacrimejamento. O animal foi tratado com PRP autólogo e colírio oftálmico, ambos com três gotas TID. O PRP foi obtido através da coleta de sangue total (80mL) por punção venosa da veia jugular direita em tubos contendo citrato de sódio, centrifugado e mantido sob refrigeração. Durante o tratamento, a terapia antalgica foi realizada utilizando antiinflamatório não esteróide e o animal foi mantido com um tampão durante os 15 dias de tratamento até a evolução do caso e o início da cura do local da lesão, demonstrando a eficácia do tratamento com PRP.

1 INTRODUCTION

Ulcerative keratitis, also known as corneal ulcer, is a condition that can compromise visual acuity and progress to blindness if not treated in time. This condition consists of one of the main ophthalmological occurrences in the clinical medical routine, affecting different species. Usually, corneal ulcers in horses are among the most common eye disorders among these animals and arise as a result of some trauma caused by shocks against objects, such as vegetation, fences or stalls. Tissue repair can be performed through the use of PRP in the form of eye drops or tampons (ALIZADEH et al., 2019). The treatment with the use of platelet-rich plasma (PRP) consists of the use of a platelet concentrate obtained from the patient's autologous blood or in an allogeneic manner, when it comes from a donor. Platelets have a large amount of growth factors that are essential in the healing process (ACOSTA et al., 2019). Therefore, the present study aims to report a case of ulcerative keratitis in a horse submitted to treatment with PRP and eye drops.

2 CASE REPORT

An equine, female, three-drum athlete, seven years old, of the Quarter Mile equine, with 460kg, alazan coat was attended at the training equestrian located in Marechal Cândido Rondon - Paraná, Brazil. The owner complaint was that the animal had a history of facial injuries for six days ago. The synthesis of the trauma possibly occurred during the equine entry into the trailer, on the return of a competition. After the ophthalmological examination, ocular lesion, hyperemia of ocular conjunctiva, blepharospamus and epiphora in the right eyeball were found (Figure 1). Then, the sodium fluorescein dye was used, which indicated a positive result with a greenish coloration of the corneal ulceration area. In assessing visual acuity, the patient reacted to the stimulus in the reflex test, indicating integrity in visual ability. With a diagnosis of ulcerative keratitis, the animal was isolated in a stall and pain medication was established based on meglumine-flunexin at the dose of (1mL / 100kg - IV) once a day, for two days.

The treatment instituted for the eye lesion started with washing the affected area with 0.9% saline solution and eye drops based on disodium edetate hyaluronic acid and hydroxyethylcellulose (HYLO-COMOD®), in order to lubricate the eye and restore the tear film in addition, the use of autologous PRP was prescribed. The production of PRP was carried out in the training equine laboratory, and the collection was carried out using trichotomy and antisepsis and venopuncture of the left jugular vein using sodium citrate.
tubes. Twenty tubes with 4 mL were collected in each one. After the centrifugation protocols were applied to the blood samples, the PRP was kept refrigerated throughout the animal’s treatment period.

During treatment, the animal was kept with an eye plug due to photophobia, the same was removed only for the application of medications. To control secondary bacterial infection at the lesion site, chondroitin sulfate and ciprofloxacin-based eye drops (Ciprovet®) were prescribed. The eye drops and PRP used during the therapeutic procedure were instilled in the affected eye every 8 hours, 3 drops, with a five-minute interval between applications for 7 days. After this period, there was a significant clinical improvement with reduced epiphora and absence of blepharospasm. After 15 days from the beginning of the treatment, the tampon was removed and the animal had only a scarred area in the region close to the lacrimal commissure and was discharged.

Figures A / B: Evaluation of the injured eye diagnosed with ulceratitis keratitis, photophobia, corneal edema, chemosis, ocular conjunctiva hyperemia, epiphora and blepharospasm.
Figure C: Seven days after treatment with PRP and eye drops. A lesion with a scar characteristic is perceived.
Figure D: Evaluation of the lesion 15 days after treatment.
3 RESULTS AND DISCUSSION

The pain control in horses with corneal ulcers should be established immediately before the clinical examination, due to the animal’s reluctance to allow inspection of the lesion site. The use of meglumine-flunixin, have good efficacy and are used to suppress inflammation and control pain associated with corneal ulcers (TAMILMAHAN et al., 2013).

Clinically, ulcerative keratitis is the disease with a high potential for impaired vision, therefore, the faster the clinical diagnosis and adequate therapy is performed, the less the possibility of developing complications such as vision loss (MARTINS & BARROS, 2014). The clinical signs presented in this case are compatible with all those reported in the literature. Presence of ulceration, photophobia, blepharospasm, epiphora, conjunctival hyperemia, corneal edema, miosis and tearing (ABDEL-SAEED & SALEM., 2019).

During the ophthalmological evaluation, the diagnosis was made by staining the cornea with fluorescein, a dye that is retained by the underlying stroma and indicates the location of the lesion with the area pigmented by the greenish stain. The prescription of the treatment used an antibiotic eye drop to reduce the contamination of the lesion site by the microorganisms present in the ocular microbiota, considering that a wide variety has pathogenic characteristics that can become complicating factors during the treatment (WOUK et al., 2006). In addition, the topical instillation of these eye drops promotes faster healing, avoiding the formation of corneal scarring and reduction of ocular manifestations of inflammatory origin, and can be a complementary therapeutic resource in the routine of veterinary ophthalmology.

Physiologically, the establishment of the pathogenesis of the corneal ulcer results in the release of matrix metalloproteinases (MPMs), also known as serine proteases, aspartic proteinases and cysteine proteinases, belong to a group of zinc-dependent extracellular endoproteinases (LI et al., 2013). The presence of these biomarkers in the tears, indicates the establishment of oxidative stress at the lesion site as well as the primary degradation of corneal fibroblast and epithelial tissue due to the establishment of inflammation (FINI et al., 1995; MELLER et al., 2000).

Platelets contain growth factors, cytokines and integrins, which factors contribute to the proposed ability to heal the lesion (SANCHEZ_GONZALEZ et al., 2012). The use of PRP is considered a convenient, economical, non-immune and minimally invasive technique, in addition to being administered immediately after preparation (EVERTZ et
al., 2012). PRP can provide essential components for the regeneration of matrices and cell growth factors (KIM et al., 2012). The abundance of the number of platelets, favors the healing of wounds quickly through the implantation and adhesion of these cells in the sites of the injury, the release of several growth factors and cytokines that provide chemotaxis to the site of the lesion in addition to significantly influencing the deposition of extracellular matrix, contributing to the repair and reduction of tissue damage (FARGHALI et al., 2021).

4 CONCLUSION

Corneal ulcer, although it is a common condition in the clinical routine of this species, has an unfavorable prognosis when diagnosis and treatment are performed late, with the possibility of definitive impairment of the animal's vision. Thus, the treatment established in this case based on PRP and eye drops, proved to be an excellent option to quickly and effectively repair the lesion, in addition to accelerating reepithelialization, reducing inflammation and corneal opacity, helping to reestablish eye health.
REFERENCES


