CASE REPORT

Intra-articular platelet-rich plasma for advanced carpometacarpal osteoarthritis in an Arabian horse: Long-term clinical outcome

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ABSTRACT

Osteoarthritis (OA) is a common degenerative joint disease in horses, characterized by cartilage degradation, synovial inflammation, and progressive lameness. Intra-articular platelet-rich plasma (IA-PRP) therapy has emerged as a promising regenerative treatment, aimed at promoting cartilage repair and reducing inflammation through growth factor release. A 10-year-old Arabian stallion presented with acute carpal lameness, graded 3/5 on the AAEP scale. Initial treatment with phenylbutazone and intra-articular corticosteroid (IA-GCs) injection resulted in temporary improvement, however lameness progressed to grade 5/5. Due to failure of conventional therapy and the inability to pursue further referral, IA-PRP therapy was initiated. The treatment protocol consisted of four IA-PRP injections administered at two-week intervals, followed by a prophylactic booster (fifth IA-PRP injection) six months after the fourth treatment. PRP was prepared using a double-spin centrifugation protocol. Early improvement was observed after PRP initiation, allowing NSAID discontinuation. Lameness progressively improved to near-normal function, with no recurrence of pain or gait abnormalities at the 18-month follow-up. This case highlights the potential of IA-PRP therapy as a steroid-sparing treatment option in the management of equine osteoarthritis.

Keywords: Equine osteoarthritis, intra-articular therapy, lameness management, platelet-rich plasma (PRP), regenerative medicine

INTRODUCTION

Osteoarthritis (OA) in horses is a complex disorder characterized by articular cartilage degradation, subchondral bone sclerosis, synovial inflammation, and osteophyte formation (McIlwraith et al., 2012). The disease may originate in any joint structures or result from combined pathological changes affecting multiple structures (McIlwraith, 2005). OA develops due to mechanical stress, joint instability, or age-related degeneration (McIlwraith et al., 2012; Ribitsch et al., 2021) and has a multifactorial etiology (Nedergaard et al., 2024). It causes pain, reduced mobility, and impaired performance. Breed predisposition has been reported, e.g., Arabian horses appear at increased risk of severe carpometacarpal osteoarthritis, possibly related to anatomical variations in the metacarpal region (Malone et al., 2003). Diagnosis of OA is based on clinical signs and imaging, with radiography used to assess bone changes and ultrasonography to evaluate soft tissues (Baccarin et al., 2022). Advanced diagnostic techniques may be limited to specialized centers, making their use challenging in regions with restricted diagnostic resources, such as Bosnia and Herzegovina (BiH). As no single therapy can halt OA progression or restore joint homeostasis, combined treatments are commonly used to improve outcomes and support return to athletic performance (Baccarin et al., 2022). In recent years, regenerative therapy has emerged as a promising alternative and is becoming increasingly prevalent in the treatment of equine OA (Baccarin et al., 2022). Among these, platelet-rich plasma (PRP) therapy has received increasing interest because several *in vitro* and *in vivo* studies have demonstrated that platelets can modulate inflammation and promote healing (Garbin and Olver, 2020). PRP exerts its therapeutic effects through bioactive molecules released from platelets, including growth factors and cytokines, which modulate the intra-articular inflammatory environment. These factors promote cartilage repair, synovial regeneration, and reduce pro-inflammatory signaling, contributing to pain reduction and improved joint function (Garbin et al., 2021; Fraile et al., 2023; Carmona and López, 2025). Autologous PRP is prepared by centrifuging patient's peripheral whole blood. Different centrifugation protocols have been described (Cavallo et al., 2014; Garbin and Olver, 2020; Hessel et al., 2015; Textor et al., 2011). This case report describes an effective use of IA-PRP (intra-articular platelet-rich plasma) therapy for treatment of carpometacarpal joint lameness in a 10-year-old Arabian stallion, showcasing this IA-PRP centrifugation protocol's potential to resolve lameness and restore joint function.

CASE PRESENTATION

Informed Consent

Written informed consent was obtained from the owner prior to all diagnostic procedures and therapeutic interventions described in this case report, including consent for publication.

A 10-year-old Arabian stallion was referred to the University of Sarajevo-Veterinary Faculty for acute carpal lameness. The horse was purchased a year earlier with a cold non-painful swelling over the left carpal joint that gradually became firmer but remained painless. No history of trauma was reported, and the owner observed no signs of discomfort during rest or movement. Consequently, the horse had not undergone any veterinary examinations or diagnostic imaging. At presentation, the horse had a lameness grade 3/5 according to the American Association of Equine Practitioners (AAEP) scale. Conservative treatment was initiated with stall rest and phenylbutazone (Eqipalazolone, Dechra, Denmark) at a dose of 2.2 mg/kg q12h per os. Radiographic examination included lateral, dorsopalmar, flexed lateromedial, dorsolateral- palmaromedial oblique (DLPMO), and palmarolateral- dorsomedial (PLDMO) oblique. The lateral projection is presented in the main manuscript (Figure 1), while additional projections are provided in the Supplementary Material.

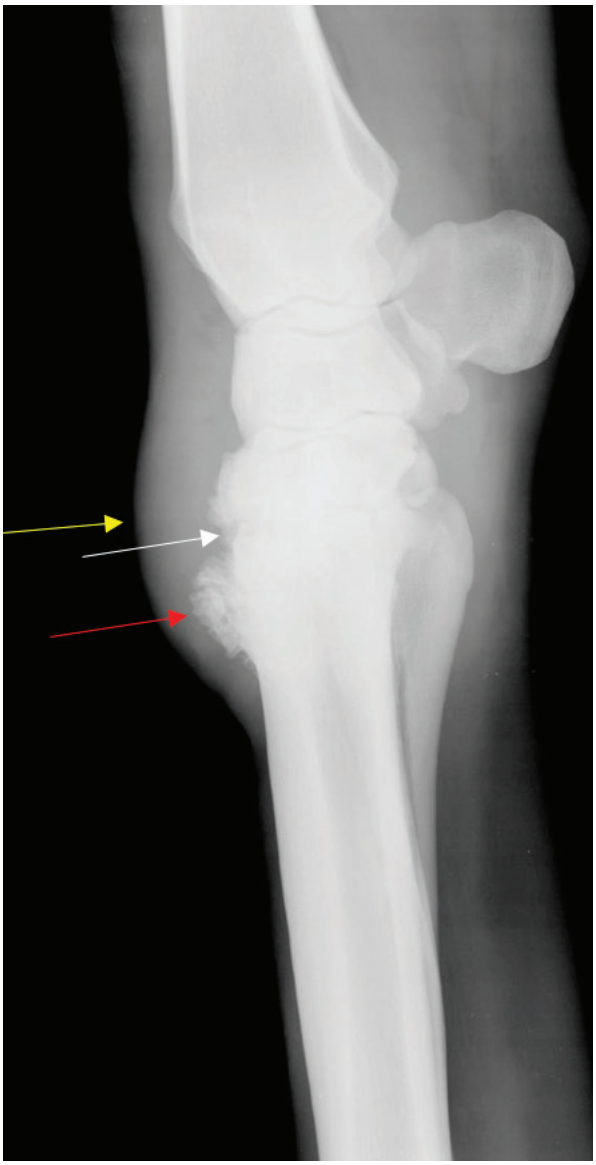

Figure 1 Lateral view of the carpal joint, demonstrating findings consistent with carpal osteoarthritis, including irregular bony proliferation (red arrow), narrowing of the joint space (white arrow), and soft tissue swelling (yellow arrow)

Radiographs revealed severe degenerative changes consistent with advanced carpometacarpal osteoarthritis, including extensive periarticular osteophyte formation, marked irregular remodeling of the proximal metacarpus and adjacent carpal bones, and narrowing or loss of the carpometacarpal joint space. A follow-up examination, conducted seven days later, showed moderate improvement with lameness reduced to 2/5 on the AAEP scale. One time IA administration of triamcinolone (Kenalog, Krka, Slovenia; 12 mg) and amikacin (Amikacin, Zentiva, Czech Republic; 250 mg) was performed. Clinical improvement persisted for one month, after which lameness worsened to grade 5/5 on the AAEP scale. Due to the insufficient response to previous therapy and the inability for further referral of the horse due to financial constraints, PRP therapy was initiated. Blood was aseptically collected from the jugular vein using an 18G needle into five 10 ml sodium citrate tubes (BD Vacutaner®), 50 ml whole blood in total. After resting for two hours at room temperature, as previously suggested to potentially improve platelet yield (Miranda et al., 2019), samples were centrifuged at 252 g for 10 minutes. The plasma was transferred into 10ml conical tubes and centrifuged again at 447 g for 10 minutes (Kwirant et al., 2019). Following the second centrifugation, 1 mL of plasma from the bottom of each tube was preserved and deemed as PRP, while the supernatant was considered platelet poor plasma (PPP). Both centrifugations were performed at room temperature and PRP was administered one hour after preparation. For each IA treatments, the horse was sedated with an intravenous bolus of 0.5 mg/kg xylazine (Xylazine Bio 2%, Bioveta, Czech Republic) and 0.02 mg/kg butorphanol (Torphadine, Le Vet B.V., Netherlands). The joint was clipped and prepared aseptically using chlorhexidine soap and solution. A total of 4 ml of PRP was administered intra-articularly into the middle carpal joint using a sterile 18G needle to target the communicating carpometacarpal joint. Using a dorsal approach, the middle carpal joint was identified by palpating the distal edge of the radial carpal bone and the medial aspect of the proximal third carpal bone before needle insertion (Garvican and Clegg, 2007). Afterward, a protective bandage was applied. The same protocol was consistently followed for every subsequent application of PRP. The treatment included four PRP injections into the left CMC joint at two-week intervals. Five days after the first injection, the horse began to bear weight while standing and shifted weight more comfortably, moving from static weight-

bearing to deliberate movements. Phenylbutazone was discontinued due to indicators of reduced pain. At day 14 (2nd PRP injection), lameness was assessed at grade 3/5, with improved gait fluidity and voluntary movement. At day 42 (4th PRP injection), lameness reduced to grade 2/5, showing mild stride inconsistencies during trot. At day 60, the horse showed no behavioral and facial signs of pain and returned to near-normal function, with slight gait changes on hard surfaces graded 1/5. Six months after the 4th PRP injection, an additional 5th IA PRP treatment was administered as a prophylactic booster to support long-term joint stability. Follow-up radiographs performed at that time suggested minimal progression of the previously described changes, without significant clinical relevance. At the 18-month follow up after the booster injection, no gait abnormalities or signs of pain were observed.

DISCUSSION AND CONCLUSION

A retrospective study of carpometacarpal osteoarthritis (CMC-OA) in Arabian horses reported severe form of this condition affecting primarily older Arabian horses (Malone et al., 2003). Malone et al. (2003) suggest that absence of the MC2-MC3 articulation in this breed, a variation that compromises joint stability, may predispose them to severe OA. Consequently, CMC-OA in this breed is often associated with guarded prognosis (Malone et al., 2003; Panizzi et al., 2009). Long-term follow up after regenerative IA therapies, such as PRP, is rarely reported (Carmona and López, 2025; Mayet et al., 2023). Documenting an 18-month soundness outcome offers practical value for clinicians working under field conditions where corticosteroid treatments frequently provide only transient improvement. This case provides a valuable, real- world example of PRP as a steroid-sparing therapeutic option for advanced CMC-OA. The horse in our case had a gradual onset of joint changes, which were left untreated for an extended period of time, resulting in the development of severe lameness. The absence of objective gait analysis represents a limitation; however, subjective lameness grading remains widely used in equine clinical practice and continues to serve as a standard method for evaluating treatment response (Nedergaard et al., 2024). Additional limitations include the lack of standardized PRP characterization and the absence of advanced imaging, which would have strengthened diagnostic certainty and helped exclude concurrent pathology. In this case, quantitative characterization of the PRP product, including platelet concentration, leukocyte content, and classification, was not performed due to limited laboratory resources. However, the double-spin protocol used has been previously described to yield platelet-enriched plasma with reduced leukocyte content, suitable for intra-articular use (Segabinazzi et al., 2021). Despite this, the observed clinical improvement supports the biological effectiveness of the preparation. Nevertheless, the marked clinical improvement following intra-articular PRP supports the presumptive diagnosis, as therapeutic response may provide indirect diagnostic confirmation when comprehensive diagnostics are not feasible. Automated PRP preparation methods are standardized and minimize operator variability, but their high cost may limit accessibility in smaller practices. Manual techniques are more cost-effective and do not require specialized equipment. These protocols include one or two centrifugation steps to concentrate platelets into a small plasma volume (2–5 mL) suitable for tendon or IA applications. The double-spin PRP preparation protocol, as used in this case, has been shown to maximize platelet concentration while minimizing leukocyte content, making it suitable for joint injections (Segabinazzi et al., 2021). Before centrifugation, the blood sample was rested for two hours at room temperature, as it has been suggested that this may be beneficial for obtaining a higher platelet count (Miranda et al., 2019). The inclusion of a resting period prior to centrifugation, although not universally applied, reflects the variability and lack of standardization in PRP preparation protocols (Carmona and López, 2025). The four-injection protocol administered at two-week intervals appeared to support gradual tissue regeneration. Mirza et al. (2016) demonstrated that repeated PRP injections over several weeks lead to cumulative improvements in lameness scores and joint homeostasis, which is consistent with the progressive clinical recovery observed in our case. PRP does not provide immediate analgesia, and clinical improvement develops only once its biological effects manifest. Previous studies similarly report a delayed therapeutic response, with improvement occurring from the second week onward (Bertone et al., 2014; Mirza et al., 2016). Improvement was maintained at the six-month follow-up, when 5th, booster PRP injection was administered. The observed clinical effects are likely mediated by PRP-derived growth factors and cytokines that modulate inflammation and support tissue repair within the joint (Carmona and López, 2025). These findings align with Textor et al. (2013), who reported sustained pain relief for up to six months post-PRP

therapy. A prophylactic booster PRP injection was administered to support long-term joint homeostasis, since the biological activity of PRP is known to be time-limited, with growth factor release and anti-inflammatory effects diminishing over time (Moraes et al., 2015; Textor et al., 2013). Clinical improvements following intra-articular PRP administration have also been reported in recent studies (Park et al., 2022; Peng et al., 2024).

This case report demonstrates that IA-PRP therapy can reduce lameness and improve joint function in an Arabian horse with advanced carpometacarpal osteoarthritis. The treatment resulted in sustained clinical improvement over an 18-month follow-up period, suggesting that PRP may represent a viable steroid-sparing option for managing advanced CMC-OA in field conditions. Further standardized studies are required to clarify its long-term efficacy and role in equine osteoarthritis management.

CONTRIBUTION

Conception: NS, BJ, AG; Design: NS, AG; Supervision: NS, AG, AM; Materials: NS, BJ, MO, AG, SKM; Data Collection and/or Processing: SKM, AM; Literature Review: NS, BJ, MO, AG, SKM, AM; Writing: NS, BJ, MO, AG, SKM, AM; Critical Review: NS, BJ, MO, AG, SKM, AM.

CONFLICT OF INTEREST

The authors declared that there is no conflict of interest.

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Intraartikularna primjena plazme bogate trombocitima kod uznapredovalog karpometakarpalnog osteoartritisa kod arapskog konja: Dugoročni klinički ishod

SAŽETAK

Osteoartritis (OA) je česta degenerativna bolest zglobova kod konja, karakterisana degradacijom hrskavice, sinovijalnom inflamacijom i progresivnom hromošću. Intraartikularna terapija plazmom bogatom trombocitima (IA-PRP) pojavila se kao perspektivna regenerativna metoda, usmjerena na poticanje reparacije hrskavice i smanjenje upale putem oslobađanja faktora rasta. Desetogodišnji arapski pastuh prikazan je sa akutnom hromošću karpalnog zgloba, ocijenjenom kao 3/5 po AAEP skali. Početno liječenje fenilbutazonom i intraartikularnom injekcijom kortikosteroida (IA-GC) rezultiralo je privremenim poboljšanjem, međutim hromost je napredovala do ocjene 5/5. Zbog neuspjeha konvencionalne terapije i nemogućnosti daljeg upućivanja na specijalistički tretman, započeta je IA-PRP terapija. Protokol liječenja se sastojao od četiri IA-PRP injekcije primijenjene u razmaku od dvije sedmice, praćene profilaktičkim pojačavajućim tretmanom (peta IA-PRP injekcija) šest mjeseci nakon četvrte aplikacije. PRP je pripremljen korištenjem dvostrukog centrifugiranja. Rano poboljšanje je primijećeno nakon početka PRP terapije, što je omogućilo prekid upotrebe NSAIL-a. Hromost se postepeno poboljšala do skoro normalne funkcije, bez ponovne pojave bola ili abnormalnosti hoda u 18-mjesečnom praćenju. Ovaj slučaj ističe potencijal IA-PRP terapije kao alternativne metode koja smanjuje potrebu za kortikosteroidima u liječenju osteoartritisa kod konja.

Ključne riječi: Intraartikularna terapija, osteoartritis kod konja, plazma bogata trombocitima (PRP), regenerativna medicina, upravljanje hromošću