Review of the Literature on Platelet-Rich Plasma Injection for Thumb Carpometacarpal Joint Osteoarthritis

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Background: The thumb (first) carpometacarpal (CMC) joint is a common site of osteoarthritis (OA), often leading to significant functional impairment, with symptoms such as pain, weakness, deformity, instability, and reduced range of motion. Non-surgical treatment options for this condition include oral and topical NSAIDs, occupational therapy, activity modifications, splinting, and intra-articular corticosteroid injections. For patients who fail these options, surgical options may be considered such as trapeziectomy with ligament reconstruction, joint fusion, and implant arthroplasty. Platelet rich plasma (PRP) is an emerging treatment for OA. This treatment has been used for various musculoskeletal conditions including osteoarthritis of other joints in the body. PRP is defined as plasma with platelet concentrations that are greater than that of whole blood. It is autologous and is created by centrifuging the patient's own whole blood. Despite the prevalence of thumb CMC OA, limited research exists on the effectiveness of PRP injections for this condition. This review aims to evaluate the available literature on this treatment.

Methods: This review examines the literature on PRP for the treatment of CMC OA. A targeted search of PubMed and Google Scholar was conducted for studies of the past four decades, using keywords such as "CMC joint osteoarthritis", "orthobiologics", and "platelet rich plasma". Eligible studies included human studies in English such as randomized controlled trials, observational, prospective, and pilot studies. All records were independently reviewed by the author.

Results: Although evidence is limited, PRP shows promise as an effective treatment for CMC arthritis. Two randomized controlled trials have compared PRP to steroid and/or hyaluronic acid (HA). Malahias et al. found that PRP outperformed corticosteroid injections in reducing pain and improving function at 12 months [1]. In contrast, Sabaah et el. observed significant improvements in all three groups (PRP, HA, and corticosteroids) at 4 months, but only PRP and corticosteroids showed no significant benefit beyond 12 weeks [2]. Two retrospective chart reviews assessed pain and function; one reported symptom relief up to 16 months [3], while the other found no short-term benefit [4]. A pilot study showed pain improvement at 6 months but no significant functional changes [5].

Author, Year	Study Type	Sample Size	# of Injections (Image Guidance)	Injectate (Manufacturer)	Outcome Measure(s)	Significant Findings
Hasley, 2023 [3]	Retrospective Chart Review	19 patients	1 (Ultrasound)	PRP (Arthrex)	Symptom Improvement, Duration of Benefit, and PRP Cellular Analysis	68.8% of subjects reported moderate or excellent symptom improvement and mean duration of improvement was 15.6 months
Sward, 2022 [4]	Retrospective Chart Review	21 patients	2 (Fluoroscopy)	PRP (Arthrex)	Pain, Function (PRWHE), and Grip Strength	There was no significant effect on patient-reported pain, hand disability, or strength in the short term after IA PRP injection.
Malahias, 2021 [1]	Randomized Controlled Trial	33 patients	2 (Ultrasound)	PRP (Unknown) vs Methylprednisolone (Pfizer)	Pain, Function (Q-DASH), and Subjective Satisfaction	At 12 months, the PRP group had significantly better results compared to steroids in terms of pain, disability, and satisfaction
Sabaah, 2020 [2]	Randomized Controlled Trial	45 patients	1 (None)	PRP (Centurion Scientific) vs Hyaluronic Acid (Hyalgan) vs Betamethasone	Pain, Strength, and Function (AUSCAN)	All three groups demonstrated significant improvement in all outcome scales at 4 weeks, however, the significant improvement of both PRP and corticosteroid did not extend beyond 12-week follow-up.
Loibl, 2016 [5]	Pilot Study	10 patients	2 (Fluoroscopy)	PRP (Arthrex)	Pain, Strength, and Function (Mayo Wrist, DASH)	At 6 months, pain significantly decreased, grip was unaffected, and pinch declined.

Discussion & Conclusion: There is a notable lack of clinical trials specifically examining PRP for first CMC joint arthritis, and small sample sizes make it challenging to draw definitive conclusions. However, available evidence suggests that PRP is generally safe and may be an effective treatment option for treating thumb OA. The studies reviewed showed significant variability in PRP processing, injection techniques, injection frequency, and study outcome measures. Recent research has focused more on platelet counts and the dose-response relationship, though only one study performed a cellular analysis of the PRP. Additional high-quality randomized controlled trials are needed to assess long-term patient outcomes, including pain, pinch/grip strength, and range of motion, extending over one or more years. Furthermore, PRP characteristics should be thoroughly documented and analyzed to contribute to the body of data correlating these PRP characteristics with patient outcomes.

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