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*Case Report*

# A New Hope for Early Thumb Base Osteoarthritis Treated with Single-Session Platelet-Rich Plasma: Case Report

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## Abstract

Osteoarthritis of the first Carpometacarpal (CMC) joint is a common cause of hand pain, functional limitation and reduced quality of life, particularly among postmenopausal women. Degeneration at the thumb base impairs pinch strength, grip and fine motor activities, often prompting intervention when conservative treatments fail. In recent years, minimally invasive injectable therapies such as Platelet-Rich Plasma (PRP) and hyaluronic acid have gained attention for their potential to reduce inflammation, improve joint lubrication and support a regenerative intra-articular environment.

We report a postmenopausal woman with bilateral first CMC osteoarthritis of differing severity. Both joints were treated in a single session using ultrasound-guided intra-articular PRP combined with hyaluronic acid gel. The left thumb, which demonstrated milder degenerative changes, showed complete resolution of symptoms maintained for 2.5 years. In contrast, the right thumb, affected by moderately severe osteoarthritis, failed to achieve sustained improvement and ultimately required surgical joint replacement.

This stage-dependent intra-patient outcome highlights the potential effectiveness of regenerative and viscoelastic injections in early CMC osteoarthritis while underscoring their limited efficacy in more advanced disease. The case emphasizes the importance of disease severity in patient selection and suggests that timely biological intervention may delay or prevent surgery in appropriately staged patients. We propose a double-blind randomized controlled trial to confirm these findings.

**Keywords:** First Carpometacarpal Joint; Thumb Base Osteoarthritis; Platelet-Rich Plasma; Hyaluronic Acid; Ultrasound-Guided Injection; Joint Replacement

## Introduction

Thumb base (first carpometacarpal or CMC) osteoarthritis is a common disabling condition that affects pinch and grip strength, impairs daily activities and predominantly affects women after midlife years [1]. It represents one of the most frequent forms of hand osteoarthritis and is a major contributor to hand-related disability in older adults. Patient education, joint protection techniques, splinting, structured exercise programs and appropriate analgesic use form the cornerstone of conservative management, delivered in a stepwise manner according to symptom severity and functional impairment in line with international guideline recommendations [2].

Similarly, the 2018 European Alliance of Associations for Rheumatology (EULAR) recommendations for hand osteoarthritis emphasize individualized non-pharmacologic management and acknowledge the role of surgery when symptoms remain severe despite optimal conservative treatment [3]. Injection therapies are frequently used but demonstrate variable efficacy in hand osteoarthritis, with outcomes appearing to depend on disease phenotype and stage, including the degree of structural collapse and joint instability [4].

Platelet-Rich Plasma (PRP) is an autologous blood product enriched with platelets and bioactive mediators that may modulate synovial inflammation and nociceptive pathways. Clinical studies have demonstrated symptomatic improvement in several osteoarthritis settings following PRP therapy [5]. In thumb base osteoarthritis specifically, emerging evidence suggests PRP may provide clinical benefit in early to moderate disease, whereas outcomes in advanced disease remain less predictable [6].

Hyaluronic acid injections aim to restore the viscoelastic properties of synovial fluid, improve joint lubrication and reduce mechanical stress within the joint. Ongoing investigations continue to evaluate their potential role in the management of first CMC joint osteoarthritis [7].

The rationale for the present report is that direct comparison of treatment outcomes within the same patient, exposed to identical biologic therapy but with differing disease severity, may provide useful insight into stage-dependent therapeutic responses.

**Case Presentation**

*Patient Information*

A 61-year-old female retired gardener presented with bilateral base-of-thumb pain consistent with first carpometacarpal joint osteoarthritis. Symptoms had been present for approximately three years, with the right thumb significantly more symptomatic than the left.

*Clinical History*

The patient reported constant pain rated 8/10 on the right and 4/10 on the left using a Visual Analog Scale (VAS) scale. Stiffness was mild on the left but severe on the right, with functional impairment predominantly affecting the right hand.

*Physical Examination and Investigations*

Clinical examination demonstrated low-grade swelling of the right first CMC joint with moderate to severe restriction of movement. The left thumb retained near-full range of motion, limited mainly by pain during forceful flexion. Plain radiography demonstrated mild osteoarthritis of the left CMC joint and moderately severe osteoarthritis on the right, characterized by joint space narrowing and subchondral sclerosis (Fig. 1).

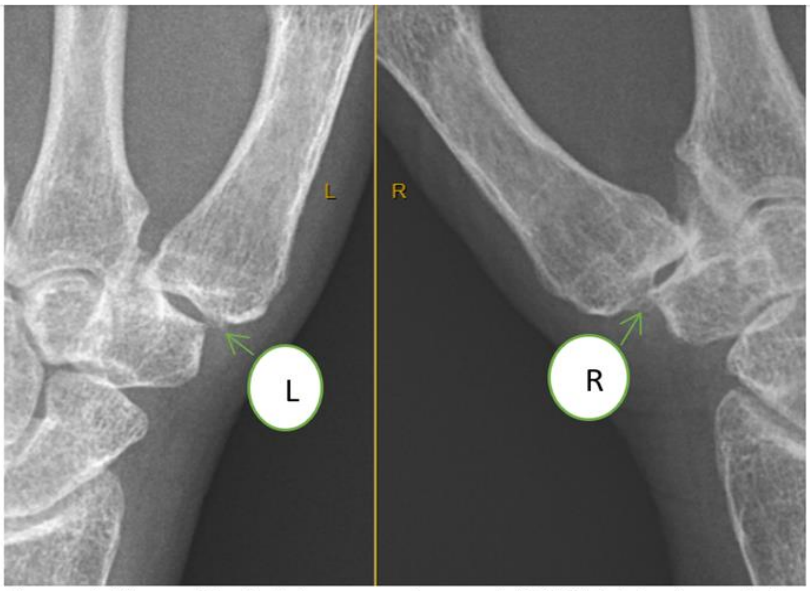


Figure 1. X-ray of both 1st carpometacarpal (CMC) joints shows left mild osteoarthritic (OA) and right moderately severe OA.

*Intervention*

Following clinical assessment and discussion of potential risks and benefits, informed consent was obtained. The patient underwent bilateral investigational ultrasound-guided injections of autologous platelet-rich plasma combined with soluble hyaluronate gel.

50 mL of peripheral venous blood were collected using ACD-A cellular matrix tubes coated with hyaluronate. The blood was centrifuged at 1500 rpm for five minutes, producing 5 mL of leukocyte-poor Platelet-Rich Plasma (PRP) mixed with 20 mg of soluble hyaluronate.

Under ultrasound guidance and using 0.2% ropivacaine for local anaesthesia, 2.5 mL of the biologic preparation was injected into each first CMC joint and the surrounding ligamentous structures (Fig. 2). The procedures (Video 1) were well tolerated and recovery was uneventful.

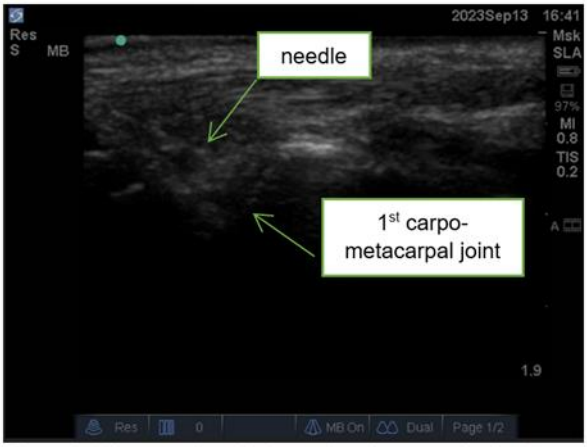

Figure 2. Ultrasound-guided needle placement in the 1st carpometacarpal joint.

**Results**

Two weeks following the procedure, the patient reported marked symptomatic improvement in the left thumb. This improvement remained stable for approximately 2.5 years, during which the patient remained essentially asymptomatic on the left side. In contrast, symptoms in the right thumb progressively worsened over time. Repeat radiographic imaging demonstrated progression of osteoarthritis and surgical joint replacement was ultimately performed. Postoperative recovery lasted approximately 6-12 months, after which pain resolved and functional use of the thumb improved.

**Discussion**

Thumb Carpometacarpal (CMC) osteoarthritis is characterized by progressive degeneration of articular cartilage, subchondral bone remodeling, synovial inflammation and ligamentous instability, all of which contribute to pain and functional impairment. Increasing evidence suggests that interactions within the osteochondral unit play a central role in disease progression, with cartilage degeneration and subchondral bone remodeling occurring in parallel during osteoarthritis development [8,9].

In earlier stages of disease, joint architecture remains relatively preserved and inflammatory mediators contribute substantially to symptom generation. In later stages, structural collapse, ligament instability and biomechanical overload become dominant drivers of disease progression.

These pathophysiological differences may partly explain why biologic therapies such as platelet-rich plasma appear to demonstrate greater clinical benefit in earlier stages of osteoarthritis. PRP contains a high concentration of platelets and growth factors that may modulate synovial inflammation and influence cellular repair pathways within the osteochondral microenvironment [10,11].

The present case illustrates a stage-dependent contrast in treatment response within the same patient. The mildly affected thumb demonstrated durable symptomatic resolution following a single PRP-hyaluronate injection, whereas the more structurally advanced joint progressed to surgical reconstruction.

Several clinical studies support the potential role of PRP in early to moderate thumb CMC osteoarthritis. Malahias, et al., reported

superior pain reduction and functional improvement with PRP compared with corticosteroid injection in a randomized clinical trial of thumb CMC arthritis [12]. Prospective investigations have also demonstrated improvement in pain and grip strength following PRP therapy in patients with early disease [13].

However, evidence remains inconsistent. A recent double-blind randomized placebo-controlled trial evaluating PRP for painful thumb CMC osteoarthritis found that a single PRP injection did not produce clinically meaningful improvement compared with placebo [14].

Hyaluronic acid injections remain an area of active investigation in thumb CMC osteoarthritis. By restoring synovial fluid viscoelasticity and improving joint lubrication, hyaluronic acid may reduce mechanical stress and contribute to symptomatic improvement in selected patients [7].

**Clinical Implications**

This case highlights the importance of disease staging when considering biologic therapies for thumb carpometacarpal osteoarthritis. In joints with relatively preserved structural integrity, biologic injections such as platelet-rich plasma combined with hyaluronic acid may provide meaningful symptomatic improvement and potentially delay the need for surgery. In contrast, once significant joint degeneration and instability have developed, the capacity of biologic therapies to alter disease trajectory appears limited. Early diagnosis and appropriate patient selection may therefore be critical for achieving optimal outcomes with regenerative interventions.

**Conclusion**

Single-session ultrasound-guided platelet-rich plasma combined with hyaluronate gel may provide sustained symptomatic and functional improvement in patients with mild first carpometacarpal osteoarthritis. In contrast, advanced structural degeneration is less likely to respond to biologic injection therapy and may ultimately require surgical reconstruction. Early disease staging and appropriate patient selection remain critical when considering regenerative injection therapies. A double-blind randomized controlled trial is warranted.

**Conflict of Interest**

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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**Data Availability Statement**

Not applicable.

**Ethical Statement**

The project did not meet the definition of human subject research under the purview of the IRB according to federal regulations and therefore, was exempt.

**Informed Consent Statement**

Informed consent was taken for this study.

**Authors' Contributions**

All authors contributed equally to this paper.

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