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Case Report

Orthobiologics treatment for meniscal injury with early osteoarthritis of the knee: a case report

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ABSTRACT

Meniscal injuries are a common cause of knee pain with functional impairment with early degenerative changes in knee joint. Orthobiologics therapies have emerged as promising, minimally invasive approaches enhancing tissue healing and regeneration. We report case of 50-year-old female presenting with bilateral knee pain, with right knee being more inflammation over one year. Clinical examination revealed mesomorphic build, antalgic gait, swelling, and grade II tenderness over the medial aspect of right knee joint. The numeric pain rating scale (NPRS) score was 7/10. Knee flexion was limited to 100° (right) and 120° (left). Muscle strength using Oxford manual muscle testing (MMT) scale showed knee flexors at 4/5 bilaterally, and knee extensors at 3/5 (right) and 4/5 (left). Magnetic resonance imaging (MRI) demonstrated a radial tear of medial meniscus with mild degenerative changes and joint effusion. The Western Ontario Meniscal Evaluation Tool (WOMET) score was 1055/1600 (34%). The patient underwent autologous bone marrow aspirate concentrate (BMAC) along with enriched platelet-rich plasma (PRP) intra-articularly for two-days under fluoroscopic/ultrasound-guidance. At 9-month follow-up, the patient demonstrated significant clinical improvement. Interestingly, NPRS score reduced (1/10), knee flexion improved to 125° bilaterally, muscle strength to 5/5 in both flexors and extensors and WOMET score to 453/1600 (71.6%). Follow-up magnetic resonance imaging (MRI) showed no evidence of meniscal tear and stable mild osteoarthritic changes without progression. This case demonstrates that intra-articular intervention therapy (BMAC+PRP) serves as an effective non-surgical option for meniscal injuries followed by reduction in pain and functional responses evidenced by radiological outcomes.

Keywords: Meniscal injury, Knee osteoarthritis, Orthobiologics therapy, Non-surgical treatment, Meniscal repair, Regenerative medicine

INTRODUCTION

Meniscal injuries are one of the most common causes of knee pain and functional impairment, particularly among middle-aged and elderly individuals. The menisci are fibrocartilaginous structures that play a critical role in load distribution, shock absorption, joint stability, and lubrication within the knee joint. Damage to the meniscus, especially the medial meniscus, can result in pain, restricted joint mobility, and progressive degenerative changes that may eventually lead to the development of knee osteoarthritis (OA) if not untreated.[1]

Radial tears of the meniscus are clinically significant because they disrupt the circumferential collagen fibers responsible for maintaining hoop stress and load transmission across the knee joint and accelerate cartilage degeneration.[2] Traditionally, management of meniscal injuries includes conservative approaches such as rest,

physiotherapy, and anti-inflammatory medications, while severe cases may require surgical procedures including arthroscopic meniscectomy or meniscal repair.

However, surgical interventions may not always restore normal biomechanics and may increase the risk of early osteoarthritic changes.[3]

In recent years, orthobiologic therapies have gained attention as minimally non-invasive treatment options aimed at enhancing tissue healing and regeneration. Orthobiologic interventions, such as platelet-rich plasma (PRP), bone marrow aspirate concentrate (BMAC), and other biologically active preparations, contain growth factors and cytokines that can promote tissue repair, reduce inflammation, and improve functional outcomes in musculoskeletal disorders.[4-7]

The present case reports a 50-year-old female patient with a radial tear of the medial meniscus associated with early osteoarthritic changes, treated with intra-articular orthobiologic therapy for meniscal repair. Clinical, functional, and radiological outcomes were evaluated to assess the effectiveness of this non-surgical regenerative treatment approach.

CASE REPORT

Patient information

A 50-year-old female presented with bilateral knee pain, more severe in the right knee. There was no significant past medical or comorbid history.

Medical history

The patient reported an insidious onset of bilateral knee pain for one year prior (2024) and had gradually progressed over time and had worsened during the past few months, leading to increased discomfort during routine activities. During the initial clinical assessment in March 2025, the patient rated the pain intensity as 7/10 on the numeric pain rating scale (NPRS).

On clinical observation, the patient demonstrated a mesomorphic body type, antalgic gait, and swelling in the right knee joint. On palpation, grade II tenderness was noted over the medial aspect of the right knee joint, indicating localized inflammation and joint discomfort.

Family history

No significant family history was reported.

Psychosocial history

Persistent bilateral knee pain significantly limited the patient's mobility and contributed to psychological stress. However, no formal psychiatric consultation was sought.

Genetic information

No relevant genetic testing was performed.

Relevant past interventions

Patient complained with bilateral knee pains for one-year prior December 2024 and had gradually progressed over time and had worsened during the past few months, leading to increased discomfort during routine activities (March 2025).

Clinical findings

MRI findings in right knee (December 2024) showed radial tear of medial meniscus, with mild degenerative changes and joint effusion.

Diagnostic assessment

Clinical examination revealed mesomorphic, antalgic gait, swelling, and grade II tenderness over the medial aspect of the right knee joint with NPRS score was 7/10, and knee flexion was limited to 100°(right) and 1200 (left), muscle power (Oxford MMT scale) for knee flexors 4/5 (right), 4/5 (left) and knee extensors 3/5 (right), 4/5 (left). MRI performed in December 2024 demonstrated a radial tear of the medial meniscus with mild degenerative changes and joint effusion.

Therapeutic intervention

The patient opted for a non-surgical, two-day interventional orthobiologic protocol designed to maximize cellular dose and precision delivery. On day 1 (harvesting): autologous bone marrow was aspirated from the posterior iliac crest using a multi-site technique to maximize the concentration of mesenchymal stromal cells (MSCs). Peripheral blood was also collected to prepare an enriched platelet-rich plasma (PRP), targeting concentrations 20-40 times baseline. On day 2 (implantation): under high-resolution musculoskeletal ultrasound guidance, the patient received a site-specific intra-meniscal injection of the orthobiologic concentrate directly into the radial tear. This was supplemented by an intra-articular injection to address the inflammatory joint milieu and associated marrow edema (Table 1).

Follow-up and outcomes

Clinical outcomes were evaluated at baseline (day of treatment) and at 9 months post-procedure using NPRS score for pain assessment, knee range of motion (flexion), muscle strength using the Oxford MMT scale, and WOMET scores. The NPRS score decreased from 7/10 at baseline to 1/10 at 9 months, indicating significant pain reduction.

Knee range of motion showed improvement, with flexion increasing from 100° in the right knee and 120° in the left knee at baseline to 125° in both knees at the 9-month

follow-up. Muscle strength assessed by the Oxford MMT scale also improved.

At baseline, knee flexor strength was 4/5 in both knees, while knee extensor strength was 3/5 in the right knee and 4/5 in the left knee. At 9 months post-procedure, muscle strength improved to 5/5 in both knees for both flexors and extensors (Table 2).

Table 1: Time line for range of motion.

Timeline	Range of motion (knee flexors)	
	Right	Left
0 day – day of treatment	100º	120º
9 months	125º	125º

Table 2: Time line for muscle power (Oxford MMT scale).

Time line	Knee flexors		Knee extensors	
	Right	Left	Right	Left
0 day – day of treatment	4/5	4/5	3/5	4/5
9 months	5/5	5/5	5/5	5/5

The WOMET score also demonstrated marked improvement. At baseline, the aggregate WOMET score was 1055/1600 (550+290+215), corresponding to a percentile score of 34% (1600–1055=545)/16 (1600–1055=545)/16 (1600–1055=545)/16. At 9 months post-procedure, the aggregate score improved to 453/1600 (220+136+97), corresponding to a percentile score of 71.6% (1600–453=1147)/16 (1600–453=1147)/16(1600–453=1147)/16.

MRI performed at baseline in December 2024 demonstrated a radial tear of the medial meniscus with mild degenerative change and joint effusion. MRI findings at the 9-month follow-up (November 2025) showed no evidence of meniscal injury and stable mild osteoarthritic changes without further progression.

Pre-treatment findings

Pre-treatment findings showed mucoid degeneration of anterior cruciate ligament with ganglion cyst in proximal and distal part, small radial tear in body of medial meniscus, marrow edema in lateral tibial plateau and medial femoral condyle, old healed fracture in visualized distal femur, mild degenerative osteoarthritic changes of right knee as articular cartilage thinning and irregularity along medial femoral condyle and tibial plateau and minimal joint effusions.

Post-treatment findings

Post-treatment findings showed the meniscus completely healed/fracture with no active pathology, mucoid degeneration of anterior cruciate ligament, incidental findings, no evidence of meniscal tear or major degeneration, mild early osteoarthritic changes with no progression and mild decrease in joint effusion and marrow edema.

DISCUSSION

Meniscal injuries are among the most common causes of knee pain and functional impairment in middle-aged individuals.[8,9] Radial tears of the medial meniscus are particularly important because they disrupt the circumferential collagen fibers responsible for load transmission and shock absorption within the knee joint. Loss of this functional integrity alters knee biomechanics and increases tibiofemoral contact pressure, which may accelerate degenerative changes and contribute to the development or progression of knee osteoarthritis.[8,9] Conventional management strategies for meniscal tears include conservative therapy, physiotherapy, intra-articular injections, or surgical interventions such as arthroscopic meniscectomy or meniscal repair. Although arthroscopic procedures are commonly performed, partial meniscectomy may compromise meniscal function and has been associated with an increased risk of long-term osteoarthritic degeneration.[10,11] There is growing interest in biological and regenerative treatment strategies aimed at preserving meniscal tissue and promoting intrinsic healing.

In the present case, the patient presented with chronic bilateral knee pain associated with a radial tear of the medial meniscus in the right knee along with mild degenerative changes and joint effusion confirmed on MRI (data not shown). Clinically, the patient demonstrated significant pain (NPRS 7/10), reduced knee flexion, and decreased muscle strength, which adversely affected mobility and daily activities. Following therapeutic intervention, the patient exhibited substantial clinical improvement over a nine-month follow-up period. Pain intensity reduced significantly from 7/10 to 1/10 on the NPRS scale after nine months, indicating effective symptomatic relief. Improvements were also observed in functional parameters including knee flexion and muscle strength. Knee flexion increased from 100° in the right knee to 125° at the nine-month follow-up, while muscle strength improved to grade 5/5 for both knee flexors and extensors. These findings suggest restoration of joint mobility and improved neuromuscular stability around the knee joint.

Functional outcomes also improved considerably, as reflected by the WOMET score. The WOMET score increased from 34% at baseline to 71.6% at the nine-month follow-up, demonstrating a significant improvement in meniscus-related quality of life. The WOMET instrument has been widely used as a validated tool to evaluate symptoms, functional limitations, and emotional impact associated with meniscal pathology.[12] Radiological findings further supported the clinical outcomes to correlate their improvement, baseline MRI performed in

December 2024 revealed a radial tear of the medial meniscus with mild degenerative changes and joint effusion. However, MRI performed at nine months demonstrated no evidence of meniscal injury and stable mild osteoarthritic changes without progression. Structural improvement observed in imaging may indicate tissue repair and resolution of inflammation within the joint environment.

Biological and regenerative therapies have gained increasing attention in recent years for the management of musculoskeletal disorders due to their potential to enhance tissue healing, upregulate stem cells or progenitors, enhance growth factors, modulate inflammation, and promote extracellular matrix regeneration.[7]

Mesenchymal stem cell–based therapies and biologically active preparations have been reported to support cartilage and meniscal repair by secreting growth factors and cytokines that stimulate cellular proliferation and matrix synthesis while reducing inflammatory mediators.[6,7] Although the results observed in the present study has been encouraging it is imperative to conduct a randomised clinical trial, prospective studies to validate the long-term effectiveness, safety, and reproducibility of meniscal injuries and early degenerative knee conditions.

CONCLUSION

This case report demonstrated significant clinical and radiological improvement in a 50-year-old female with a radial tear of the medial meniscus and early degenerative knee changes following therapeutic intervention. The patient experienced marked reduction in pain, improved knee range of motion, restoration of muscle strength, and substantial enhancement in functional outcomes as measured by the WOMET score. Follow-up of MRI findings also indicated resolution of the meniscal injury with no progression of osteoarthritic changes.

These findings suggest that regenerative therapeutic strategies may represent a promising and minimally invasive option for the management of meniscal injuries and associated knee dysfunction. However, further large-scale clinical studies are required to confirm these observations and to arrive at standardized treatment protocols.

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