

Ultrasound Guided Dextrose Prolotherapy For Chronic Medial Collateral Ligament Injuries In Young Footballers

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ABSTRACT

Dextrose prolotherapy (DPT) is increasingly recognized for its regenerative potential in managing ligamentous injuries. However, evidence supporting its use in medial collateral ligament (MCL) injuries among young athletes remains scarce. This case series describes four adolescent footballers (aged 14–16 years) with chronic medial knee pain unresponsive to rehabilitation. Three athletes with isolated MCL injuries achieved complete pain resolution within 4–6 weeks following ultrasound-guided 12.5% dextrose injections, combined with knee bracing and structured rehabilitation. They successfully returned to full training after passing functional assessments, with no reinjury at 3- and 6-month follow-ups. Conversely, the fourth athlete, with concomitant MCL, anterior cruciate ligament, and meniscal injuries, experienced only partial pain relief and sustained reinjury after premature return to play, ultimately requiring surgical intervention. These findings suggest that DPT may accelerate recovery in isolated chronic MCL injuries but has limited benefit in multi-ligament knee injuries.

Keywords

dextrose prolotherapy, medial collateral ligament, knee injury, football, adolescent

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Received: 26th February 2025; Accepted: 10th June 2025

Doi: <https://doi.org/10.31436/imjm.v25i01/2879>

INTRODUCTION

Medial collateral ligament (MCL) injuries are prevalent in young athletes, especially in sports such as football and skiing. In football, MCL sprains rank among the three most common knee injuries, often resulting from valgus forces that overload the ligament. While most cases respond well to activity modification, early mobilization, bracing, and structured physiotherapy, incomplete recovery may result in persistent pain, instability, and prolonged absence from sport. Surgical intervention is rarely indicated in young patients with partial-thickness MCL tears, prompting interest in minimally invasive treatment modalities.

Prolotherapy is a regenerative injection therapy aimed at stimulating tissue repair. Dextrose, owing to its safety, affordability, and accessibility, is the most commonly used agent. Dextrose prolotherapy (DPT) is postulated to induce localized inflammation via osmotic mechanisms, initiating the healing cascade, and to modulate pain perception by acting on nerve ion channels. Although promising results have been reported for various

musculoskeletal disorders, there is limited evidence for its use in isolated MCL injuries. To date, only one published case report (2015) has described DPT for MCL injury. This paper reports four cases of adolescent footballers with chronic MCL injuries treated with ultrasound-guided DPT following suboptimal recovery from intensive rehabilitation

CASE SERIES

CASE 1

A 15-year-old male striker sustained a valgus injury to his right knee, presenting two months later with persistent medial knee pain (VAS 7/10) despite rehabilitation. Clinical assessment revealed proximal MCL tenderness and a positive valgus stress test at 30°. Ultrasound demonstrated a hypoechoic lesion over the proximal MCL. A diagnosis of chronic partial MCL tear was made. He underwent three ultrasound-guided 12.5% dextrose injections at two-week intervals. Two weeks after the final injection, his pain had resolved (VAS 0/10), with no tenderness and a negative valgus test. He resumed light

drills and returned fully to competition six weeks later after passing the Advanced Lower Extremity Sport Assessment (ALESA). No reinjury was reported at 3- and 6-month follow-ups.

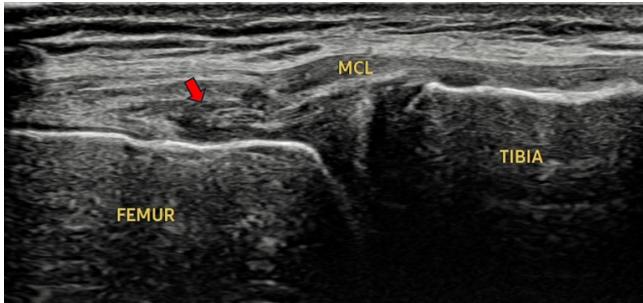


Figure 1: Ultrasound finding of right MCL, shows hypoechoic lesion over the proximal MCL (red arrow).

CASE 2

A 16-year-old male striker reported a two-month history of severe left medial knee pain (VAS 10/10) following a valgus stress injury. Examination showed proximal MCL tenderness and a positive valgus stress test at 30°, with ultrasound confirming a hypoechoic lesion. Chronic partial MCL tear was diagnosed. He received three ultrasound-guided 12.5% dextrose injections at two-week intervals. His pain resolved completely (VAS 0/10) within two weeks after the final injection, with a negative valgus test. He resumed sport-specific drills and passed ALESA testing at six weeks, returning to competitive play without reinjury at follow-up.

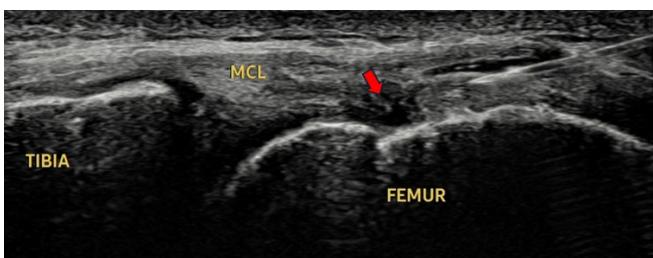


Figure 2: Ultrasound finding of left MCL, shows hypoechoic area at the proximal MCL (red arrow), with needle in situ during the guided procedure.

CASE 3

A 14-year-old male winger presented with a six-week history of left medial knee pain (VAS 8/10) after a missed tackle forced the knee into valgus. Proximal MCL tenderness and a positive valgus test at 30° were noted. Ultrasound demonstrated thickening of the proximal and mid-MCL. After a single ultrasound-guided 12.5% dextrose injection, his pain resolved completely (VAS

0/10) and valgus testing was negative. He returned to full training within three weeks after passing ALESA, with no recurrence at follow-up.

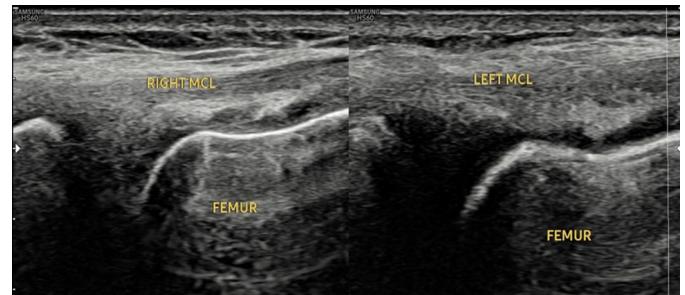


Figure 3: Ultrasound finding of thickened left MCL compared to the normal right MCL.

CASE 4

A 16-year-old female striker, with a four-year history of recurrent left MCL sprains, sustained a twisting injury causing pain (VAS 8/10), instability, and swelling. Imaging confirmed partial tears of the MCL, ACL, and medial meniscus. Despite surgical advice, she opted for conservative treatment to participate in an upcoming international tournament. She underwent three ultrasound-guided 12.5% dextrose injections at two-week intervals, achieving partial pain relief (VAS 4/10). However, premature return to play led to reinjury, and she subsequently required ACL reconstruction, MCL repair, and meniscus repair.

DISCUSSION

These four adolescent footballers presented with chronic medial knee pain that persisted despite out-of-training and intensive rehabilitation for at least 6 weeks. Clinical examination, supported by ultrasound confirmed the MCL injuries. They were treated with ultrasound-guided DPT using 12.5% dextrose solution, prepared by diluting 1 mL of 50% dextrose in 3 mL water for injection. Half of the mixture was injected within the MCL fibers and the other half just superficial to the ligament. NSAIDs were avoided during the treatment period to allow the desired inflammatory response. Patients were advised to apply ice compression after the injections. Paracetamol and Tramadol were permitted as analgesic, although none of the patients required them post-procedure. All patients followed structured rehabilitation protocols, including the use of hinged knee braces, under supervision of their respective team physiotherapists. Mild post-injection

soreness was reported by all patients but subsided within 48 hours after the injections.

Following treatment, the three footballers with isolated MCL injuries, achieved complete pain resolution within two to six weeks post, demonstrating the potential effectiveness of DPT. In contrast, the fourth case who sustained combined MCL, ACL and meniscus tears, demonstrated only partial pain relief before sustaining a re-injury after premature return to play, eventually requiring surgical intervention. The different outcomes highlight the importance of proper patient selection. Isolated MCL injury has excellent healing capacity due to its ability to increase blood supply through angiogenesis,⁸ making it suitable for non-surgical intervention like DPT. However, MCL injury with concomitant ACL and meniscus tears, may significantly compromise the knee stability. In such cases, surgical intervention is required for optimal recovery.¹ These findings indicate that DPT should not be used as universal solution for all knee injuries but rather as a targeted therapy for carefully selected cases.

DPT is believed to act via two main mechanisms: pain modulation and tissue regeneration. For pain modulation, dextrose opens potassium channels which lead to hyperpolarization of nerve fibers, as well as enhances inhibitory glycine receptors. These collectively suppress the nociceptive signals.⁹ Regarding tissue regeneration, dextrose acts in a concentration-dependent manner. Dextrose solution below 10% concentration promotes cell proliferation and tissue repair without triggering inflammation, whereas dextrose with concentrations above 10% create an osmotic gradient that triggers cell lysis and draws inflammatory mediators, facilitating tissue healing.¹⁰

Our findings align with the existing evidence that DPT may be an effective therapy for musculoskeletal conditions.^{4,5,6} When compared DPT to other regenerative therapies such as platelet-rich plasma (PRP) and stem cell, it is cost effective and easy-to-prepare, making it an accessible option for any clinical settings.

This case series highlight the diversity of patient outcomes in relation to the complexity of the injuries. While DPT

may be a potential treatment for isolated partial MCL injury, its effect appears limited in multiligamentous injuries as Case 4.

Given the small sample size, case series design and absence of a control group, definitive clinical recommendations cannot be made. Future studies with larger samples, particularly randomized controlled trials comparing DPT to placebo and other regenerative therapies, are essential to validate these preliminary findings and refine treatment strategies for MCL injuries in athletes. Additionally, a key limitation of this case series lies in the reliance on clinical assessment and return-to-play ability as outcome measures. Incorporating radiological evaluations at 3 and 6 months would have provided more objective insights into tissue healing and efficacy of DPT.

CONCLUSION

This case series suggests that DPT is a promising adjunct in the treatment of isolated MCL injuries, providing effective pain relief and successful return to play in young athletes. However, its role is limited in complex knee injuries, where surgical intervention remains essential. Proper patient selection is crucial to achieving optimal outcomes.

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