

## Exploring the Potential of Ultrasound-Guided 5% Dextrose Prolotherapy for Partial Achilles Tendon Tear: A Case Report

Lita DN Tambunan<sup>1\*</sup>, Widiya Rahmi<sup>2</sup>

<sup>1</sup>Department of Physical Medicine and Rehabilitation, Dr. H. Moch. Ansari Saleh General Hospital, Banjarmasin, South Kalimantan, Indonesia

<sup>2</sup>Department of Physical Medicine and Rehabilitation, Dr. M. Djamil General Hospital, Padang, West Sumatera, Indonesia

\*Correspondence email: [lita.dame.na@gmail.com](mailto:lita.dame.na@gmail.com)

### Abstract

**Background:** Partial Achilles tendon tear may cause persistent heel pain, gait disturbance, and functional limitation when tendon healing is incomplete. Conservative treatment is commonly selected for partial tears, while surgical repair is usually reserved for severe or refractory cases. This case report aims to describe the clinical outcome of ultrasound-guided 5% dextrose prolotherapy as an adjunctive non-surgical treatment for partial Achilles tendon tear.

**Case illustration:** A 35-year-old man presented with sharp pain and tenderness in the left heel after approximately 30 minutes of walking. Ultrasound examination confirmed a partial Achilles tendon tear measuring 0.5 cm, located approximately 2 cm proximal to the calcaneal insertion. Conservative management was initiated within 48 hours after injury, including immobilization in plantarflexion, strict non-weight-bearing, and structured rehabilitation. The patient received three weekly sessions of ultrasound-guided 5% dextrose prolotherapy, with 3 cc injected per session into the margins and center of the tendon tear.

**Discussion:** Pain and tenderness improved within two weeks, with the Visual Analog Scale score decreasing from 5/10 to 1/10. Follow-up ultrasound one month after the final injection showed a more well-defined Achilles tendon and reduction of the tendon gap from 0.32 cm to 0.24 cm.

**Conclusion:** Ultrasound-guided 5% dextrose prolotherapy combined with structured rehabilitation may be a feasible adjunctive non-surgical option for partial Achilles tendon tear, although larger controlled studies are required.

**Keywords:** Achilles tendon tear; case report; dextrose prolotherapy; rehabilitation; ultrasound-guided injection.

### Background

Partial Achilles tendon tears are musculoskeletal injuries frequently encountered in athletes and physically active individuals. Patients may present with acute heel pain, tenderness, gait disturbance, and functional limitation. Management options include conservative therapy, rehabilitation, and, in selected cases, surgical repair.<sup>1</sup> The optimal non-

operative strategy for partial tears remains clinically important because incomplete tendon healing may contribute to persistent symptoms and delayed return to activity.

Connective tissue insufficiency may occur when injured ligaments or tendons fail to restore adequate tensile strength. In this setting, mechanical loading may stimulate mechanoreceptors and contribute to pain. Abnormalities involving tendons and ligaments may also be associated with myofascial pain, partly through mechanoreceptor-mediated muscle responses.<sup>2</sup>

Dextrose prolotherapy has been proposed as a low-cost and relatively safe regenerative injection technique intended to stimulate tissue repair. Ultrasound guidance may improve injection accuracy by ensuring that the solution is delivered precisely to the injured tendon region. This report describes the clinical course of a patient with a partial Achilles tendon tear treated with ultrasound-guided 5% dextrose prolotherapy combined with structured rehabilitation.

### **Case Illustration**

A 35-year-old man presented with sharp pain and tenderness in the left heel after walking for approximately 30 minutes. The pain was accompanied by mild functional limitation. The patient was referred by an orthopedic specialist after being diagnosed with a partial Achilles tendon tear. Relevant history of previous Achilles tendon injury, systemic disease, medication use, allergy, occupational activity, and sports participation was not specified in the source manuscript.

Ultrasound examination confirmed a partial tear of the Achilles tendon measuring 0.5 cm in length, located approximately 2 cm proximal to the calcaneal insertion. The clinical diagnosis was a partial Achilles tendon tear. Differential diagnoses considered on clinical grounds included Achilles tendinopathy, retrocalcaneal bursitis, ankle sprain, calcaneal stress injury, and plantar fascia-related heel pain; however, the ultrasound-confirmed intratendinous defect supported the final diagnosis of partial Achilles tendon tear.

Conservative non-operative treatment was initiated within 48 hours after injury. Initial management consisted of foot immobilization in plantarflexion and strict non-weight-bearing. The patient subsequently chose a non-surgical approach and underwent three sessions of ultrasound-guided 5% dextrose prolotherapy.

The prolotherapy regimen consisted of weekly injections using 3 cc of 5% dextrose solution per session. The solution was administered under ultrasound guidance, with 1 cc injected at each edge of the tendon tear and 1 cc at the center of the injured tendon fibers. Ultrasound guidance was used to improve the accuracy of needle placement and localize the solution to the injured tendon area.

The rehabilitation program included transcutaneous electrical nerve stimulation applied to the ankle, strengthening exercises for the posterior tibial and anterior tibial muscles, and intrinsic foot muscle strengthening exercises. Immobilization with a cast in maximum passive plantarflexion and strict non-weight-bearing were applied during weeks 1-

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2. During weeks 3-6, weight-bearing was gradually increased by approximately 25% of body weight per week. During weeks 6-8, heel lifts were gradually reduced while progressing toward full weight-bearing, followed by weaning from the boot over an additional week.

The patient reported a marked reduction in pain and tenderness within two weeks after starting prolotherapy. Although mild gait deviation and limitation of joint motion persisted, pain improved substantially, with the Visual Analog Scale score decreasing from 5/10 to 1/10. Functional improvement was observed gradually. Follow-up ultrasound performed one month after the final injection demonstrated a well-defined Achilles tendon and reduction of the tendon gap from 0.32 cm to 0.24 cm, suggesting progressive healing.

**Table 1.** Clinical timeline of the patient with partial Achilles tendon tear.

| <b>Time point</b>                              | <b>Clinical course and management</b>   |
|--|---|
| <b>Initial presentation</b>                    | Sharp left heel pain and tenderness after 30 minutes of walking, with mild functional limitation.                   |
| <b>Within 48 hours after injury</b>            | Conservative management initiated with immobilization in plantarflexion and strict non-weight-bearing.              |
| <b>Baseline imaging</b>                        | Ultrasound confirmed a 0.5 cm partial Achilles tendon tear located 2 cm from the calcaneal insertion.               |
| <b>Weeks 1-3 of injection therapy</b>          | Three weekly sessions of ultrasound-guided 5% dextrose prolotherapy, 3 cc per session.                              |
| <b>Weeks 1-8 rehabilitation</b>                | Immobilization, gradual weight-bearing, progressive heel-lift reduction, boot weaning, and strengthening exercises. |
| <b>Two weeks after prolotherapy initiation</b> | Pain and tenderness markedly reduced; VAS decreased from 5/10 to 1/10.  |
| <b>One month after final injection</b>         | Follow-up ultrasound showed a well-defined tendon and reduction in tendon gap from 0.32 cm to 0.24 cm.              |

## Discussion

This case highlights the potential role of ultrasound-guided 5% dextrose prolotherapy as an adjunctive non-surgical intervention for partial Achilles tendon tear. The patient experienced rapid pain relief and gradual functional improvement after a treatment strategy combining early immobilization, staged weight-bearing, progressive rehabilitation, and targeted dextrose prolotherapy. The reduction in pain from VAS 5/10 to 1/10 and the decrease in ultrasound-measured tendon gap support clinical improvement during follow-up.

Achilles tendon injuries are among the most common foot and ankle conditions associated with physical activity. Partial tears may be clinically challenging because symptoms can overlap with tendinopathy, bursitis, ankle sprain, or other causes of heel pain. In the present case, ultrasound examination was essential for identifying the location and size of the tendon defect, guiding treatment planning, and objectively monitoring tendon healing.

The proposed mechanism of dextrose prolotherapy involves stimulation of a localized reparative response. Dextrose transport into human cells is mediated by glucose transporter proteins, which participate in signaling pathways related to cell growth and repair. Exposure to elevated pericellular dextrose concentrations has been associated with changes in cytokine-related gene expression in several cell types, including fibroblasts, chondrocytes, and nerve cells.<sup>3-6</sup> Prolotherapy may induce a controlled proliferative response, stimulate growth factor production, promote fibroblast activity, and increase extracellular matrix and collagen synthesis, thereby supporting connective tissue repair.<sup>3,4</sup>

Ultrasound guidance is an important procedural component because it allows real-time visualization of tendon anatomy and improves the precision of injection placement. In this patient, the solution was directed to both margins of the tear and the central region of the injured fibers. This approach may improve therapeutic targeting while avoiding unnecessary irritation of adjacent structures.<sup>7,8</sup>

The rehabilitation protocol also likely contributed to the favorable outcome. Early immobilization in plantarflexion and strict non-weight-bearing can reduce mechanical stress at the injury site during the acute phase. Gradual progression to weight-bearing, reduction of heel lifts, and strengthening exercises provide controlled loading that may support tendon remodeling and functional recovery. Therefore, the observed improvement should be interpreted as the result of a combined treatment strategy rather than prolotherapy alone.

This case has several limitations. It describes only a single patient, lacks a control group, and does not include long-term follow-up. Objective functional measures beyond VAS and ultrasound tendon-gap measurement were not reported. Details regarding prior activity level, comorbidities, medication history, and validated functional scoring were also unavailable. [Data needs to be completed by author] Larger prospective studies are needed to determine the efficacy, optimal injection protocol, safety profile, and long-term outcomes of 5% dextrose prolotherapy for partial Achilles tendon tears.

## Conclusion

Ultrasound-guided 5% dextrose prolotherapy combined with structured conservative rehabilitation was associated with pain reduction, functional improvement, and ultrasound evidence of tendon-gap reduction in a patient with partial Achilles tendon tear. Although this case suggests that the technique may be a feasible adjunctive non-surgical treatment option, its effectiveness and safety require confirmation through larger controlled studies with standardized outcomes and longer follow-up.

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### Author Contributions

L.D.N.T. contributed to conceptualization, clinical data collection, manuscript drafting, and final approval of the manuscript. W.R. contributed to clinical interpretation, manuscript revision, and final approval of the manuscript.

### Conflict of Interests

The authors declare no conflict of interest.

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