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Letter to the Editor: Dextrose Prolotherapy in Freiberg's Disease: A Clinical Observation

Dilara Ekici Zincirci

University of Health Sciences Türkiye, Prof. Dr. Cemil Taşcıoğlu City Hospital, Clinic of Physical Medicine and Rehabilitation, İstanbul, Türkiye

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To the Editor,

Freiberg's disease is a rare form of osteochondrosis that most commonly affects the head of the second metatarsal. It is thought to involve avascular necrosis resulting from repetitive microtrauma, mechanical loading and local circulatory impairment (1,2). It usually occurs during adolescence and young adulthood, and is more prevalent in females (3). Clinically, this condition presents with pain and tenderness in the forefoot that increase with weight-bearing and pose difficulties in selecting a treatment, particularly in cases that do not respond to conservative treatment.

A 44-year-old woman presented with a one-month history of pain localised to the forefoot region of the second toe on her right foot, worsened by walking and relieved by rest. At presentation, pain was 2/10 at rest and 8/10 with walking on the visual analog scale (VAS). Physical examination showed normal skin findings and marked tenderness over the second metatarsal head. Plain radiography demonstrated irregularity and flattening of the second metatarsal head consistent with Smillie stage III Freiberg's disease (Figure 1). Magnetic resonance imaging revealed deformity and T1-weighted signal loss at the second metatarsal head, findings compatible with osteonecrosis.

The patient was advised to use a metatarsal pad, modify footwear, and use oral and topical nonsteroidal anti-inflammatory drugs. She also underwent 15 sessions of physical therapy, including electrotherapy and underwater pulsed ultrasound (1.5 W/cm^2), without meaningful improvement. One month after physical therapy, approximately 2 cc of a 5% dextrose solution was injected around the second metatarsal head using a 27G, 40-mm needle. This procedure is known as periarticular prolotherapy and uses the palpation technique. One week later, the patient was re-evaluated, and the VAS score was 0/10 at rest and 5/10 when walking. A second periarticular injection was administered using 10% dextrose with the same technique. At the 3-week follow-up after the second injection, the patient was pain-free. At 6 and 12 month follow-up evaluations, she reported no recurrence of pain or functional limitations. No local or systemic adverse events were observed throughout follow-up.

Prolotherapy is a non-surgical injection approach intended to stimulate reparative processes in ligaments, tendons, joint capsules, and entheses (4).

Corresponding Author: Dilara Ekici Zincirci, MD, University of Health Sciences Türkiye, Prof. Dr. Cemil Taşcıoğlu City Hospital, Clinic of Physical Medicine and Rehabilitation, İstanbul, Türkiye
E-mail: drdilaraekici@gmail.com **ORCID ID:** orcid.org/0000-0001-7702-0227
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Figure 1. Radiographic appearance of Freiberg's disease. Direct radiography showed irregularity and flattening of the joint surface at the second metatarsal head (red circle), with the radiographic findings consistent with Smillie stage III Freiberg's disease

Proposed mechanisms for dextrose include local osmotic stress followed by an inflammatory response that may promote growth factor signaling, extracellular matrix remodeling, and collagen synthesis (5). Preclinical data provide mechanistic support: Harting et al. (6) reported rebound fibroblast responses after exposure to clinically relevant dextrose concentrations, and Johnston et al. (7) showed that hypertonic dextrose stimulated chondrogenic cell proliferation and collagen deposition. However, such *in vitro* findings do not establish clinical efficacy. While clinical studies suggest potential benefits of prolotherapy in osteoarthritis and selected chronic ligament conditions, its role in osteonecrosis-related pain remains supported by limited clinical data (8,9). There is no consensus on the dosage or frequency of application. However, concentrations below 10% are considered non-inflammatory (10). Therefore, a test dose of 5% dextrose was administered to the patient, and their pain and inflammatory response were monitored one week later. After a significant reduction in pain, prolotherapy was administered using a 10% dextrose solution.

In this Smillie stage III case, the absence of symptom recurrence over a 1 year period after periarticular dextrose prolotherapy is noteworthy. This observation suggests that periarticular dextrose prolotherapy may be considered a non-operative option for symptom control in selected patients with mid-stage Freiberg's disease refractory to conservative care. Larger case series stratified by standard staging systems and, if feasible, controlled studies are warranted to clarify efficacy, durability, and safety.

Footnotes

Informed Consent: Written informed consent was obtained from the patient for participation in this report and for the publication of clinical data and images.

Conflict of Interest: The author, Dilara Ekici Zincirci, is a member of the journal's review board. The editorial and peer-review process was conducted independently of this author.

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