

## Treatment of lateral ankle pain with glucopuncture: A clinical case

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### Abstract

Chronic foot and ankle pain seriously decreases the health-related quality of life, especially among older people. It is important to look for treatment modalities that are safe and effective. Over the last two decades, isotonic sugar water injections have received more attention among clinicians worldwide. Clinicians have been injecting glucose or dextrose 5% into the carpal tunnel, epidurally, into joint cavities, perineural and into soft tissues such as muscles, tendons and ligaments. In this article, the focus is on periarticular and perineural injections in the ankle region.

**Keywords:** Musculoskeletal Pain; Ankle Pain; Glucopuncture; Prolotherapy; Neuroprolotherapy; Joint Degeneration; Ultrasound; Elderly

### 1. Introduction

Chronic foot and ankle pain has multiple etiologies, and management often involves pharmacological interventions, physical therapies, or surgeries [1, 2, 3]. It is sometimes accompanied by chronic ankle instability [4]. However, not all patients find relief through these standard methods of care. Injection of isotonic sugar water (ISW) without local anaesthetic has been used to treat various chronic pain conditions. This case study presents the use of Glucopuncture to manage chronic right lateral ankle pain in a 76-year-old male patient.

#### 1.1. Definition of Glucopuncture

Glucopuncture (GP) is an easy-to-learn outpatient procedure. GP is defined as an injection-based therapy for the management of a variety of musculoskeletal conditions [5]. It consists of multiple regional injections with sterile ISW. In Europe, glucose 5% in Water (G5W) is the most used solution, the origin of the sugar is usually potatoes. In other areas, dextrose 5% in Water (D5W) is more common, the origin is usually corn. Both products have similar effects. Adding local anaesthetics is not required. In general, injections are given in dermis, muscles, fascia, tendons and ligaments. One can also give the ISW epidurally, near peripheral nerve endings and into joints. Treatment is usually repeated every week to every two weeks.

#### 1.2. History of Glucopuncture

The use of ISW injections such as G5W (glucose 5% in water) or D5W (dextrose 5% in water) is gaining more interest in the last decade. ISW injections were first described in Korea 25 years ago for treatment of myofascial pain [6]. Later on, it was also used for Achilles tendinopathy [7,8], tennis elbow [9], carpal tunnel syndrome [10,11,12], rotator cuff tendinopathy [13], failed back surgery syndrome [14], epidural injections [15,16], mild neuropathic pain [17] and nerve hydrodissection [18,19]. The mode of action is still subject to research, although it is expected that ATP plays a major role [20]. Over the last decade, ISW injections have become more popular, although research in this field is still limited [21,22,23,24,25]. ISW injections have been found as affective as steroids when treating chronic rotator cuff tendinopathy [26] and ulnar neuropathy [27,28]. Typically, steroid injections are more effective in the short term but

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ISW injections are more effective in the long term. For example, in a carpal tunnel study, ISW showed to be more effective than triamcinolone ( $p < 0.01$ ) at 4-6 months [29]. Recently, clinicians illustrated that ultrasound-guided ISW injections for carpal tunnel syndrome have similar efficacy than steroids for improving pain intensity, functional limitation in daily life, electrophysiologic parameters and ultrasonographic outcomes [30,31]. Recent experiences indicate that intracutaneous ISW injections may also be used for regional neuropathic pain [32]. Physicians with a lot of experience with both ISW injections as well as PRP injections, hypothesize that ISW injections have a similar effect than PRP injections, but ISW injections should be given more volume each session, more frequently (typically once a week) and more sessions are required (three times more than PRP) [33,34,35,36,37,38,39,40,41,42,43]. Clinical examination, X-rays and MRI are used to exclude conditions which cannot be treated with glucopuncture, such as severe infection, joint degeneration or tumors. These days, more and more doctors are applying Glucopuncture as ultrasound-guided perineural or intra-articular joint injections.

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## 2. Case Presentation

### 2.1. History

A 76-year-old man has presented concerning the persistent discomfort he has been enduring on the outer portion of his right ankle for six years. At 70, he reported high energy levels and was still actively working while walking over 10000 steps daily. However, by age 75, he began to experience symptoms of depression, anxiety, and constant pain, significantly impacting his physical capabilities and making it difficult to perform everyday tasks. The patient's pharmacological regimen included Methotrexate and Leflunomide for rheumatoid arthritis, Amitriptyline and Meloxicam for pain, and Betahistine for balance disorder. His constant recalcitrant lateral foot pain developed six months following a total hip arthroplasty on the same side. A hip MRI excludes pathology of the sciatic nerve or implant complications. By 2021, his activity levels dropped significantly due to constant foot pain; he could not walk more than 100m without experiencing severe stabbing and sharp lateral foot and ankle pain. The patient had sought help from various medical specialists and had undergone an extensive medical workup, but his pain remained largely unchanged. He found partial relief with Reformer Pilates and custom orthotics. MRI right ankle (May 2022) indicated peroneus brevis tendinopathy without a discrete split tear. MRI lumbar spine (March 2022) showed lumbar degenerative changes without nerve root compression. Nerve conduction studies (July 2021) showed no significant large fibre neuropathy or evidence of tarsal tunnel syndrome.

### 2.2. Physical Examination

Pes cavus foot type was noted, with normal range of motion in ankle and midtarsal joints without gross laxity or instability. Muscle testing of the ankle was unremarkable. Doppler showed the bilateral biphasic arterial flow of the dorsalis pedis and posterior tibial arteries. Vibration sensation was absent bilaterally. To assess if the patient's pain originated centrally or locally, a diagnostic sural nerve block with 3 ml 2% lignocaine led to a nearly complete temporary resolution of symptoms, indicating localised pain of the sural nerve distribution.

Provisional clinical Diagnosis: Sural neuropathy/entrapment.

Differential Diagnosis: S1 spinal nerve root compression, chronic regional pain syndrome, small fibre neuropathy, CNS sensitisation and peroneal brevis tendinosis.

### 2.3. Impression

The sural nerve is likely to be involved based on the patient's symptoms and response to a nerve block. MRI ruled out significant L5/S1 nerve root compression, and the nerve conduction study didn't support a diagnosis of large fibre neuropathy or tarsal tunnel syndrome. Clinical testing indicated mild sensory neuropathy but not motor neuropathy. Peroneal tendinosis does not fully account for the patient's symptoms. It was observed that there were no indications of inflammatory arthropathy in the area where symptoms were present.

### 2.4. Intervention

An isotonic 5% dextrose solution was administered after obtaining the patient's consent. The 5% isotonic dextrose solution was injected at tender points using a 0.5" 27G needle along the approximate course of the sural nerve intervals of approximately 1 cm, depositing 1 ml subcutaneously. For deeper injections into the sinus tarsi and extra-articular lateral ankle gutter, a longer 27G needle was used. One month after the conclusion of the course of treatment, the patient reported that he was no longer experiencing severe lateral foot and ankle pain and could walk freely. This improvement

has enhanced comfort during daily activities and increased activity levels, positively impacting his outlook and mental health.



**Figure 1** The blue marks indication the injection sites for the patient discuss in the case study.

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### 3. Discussion

This case illustrates the potential efficacy of isotonic 5% dextrose injections in managing chronic lateral foot pain associated with sural nerve entrapment. The exact mechanisms by which isotonic dextrose alleviates pain in such conditions are yet to be fully understood. This case suggests that it may be a promising technique for patients without relief through conventional treatment modalities. More clinical research is required before Glucopuncture can become a widely accepted method of standard care.

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### 4. Conclusion

As chronic ankle pain can seriously decrease the health-related quality of life, especially among the elderly, it is important that such patients have access to treatment modalities which are safe, affordable and effective. Several clinicians worldwide have experienced that dextrose 5% injections are an inexpensive and easy to learn treatment to reduce their intake of pain medication. More research in this field may confirm their clinical findings.

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### Compliance with ethical standards

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#### *Disclosure of conflict of interest*

No conflict of interest to disclosed.

#### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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