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(CASE REPORT)

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Treatment of fascial pain in the knee fold: A clinical case

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Abstract

Family physicians and sports medicine practitioners frequently encounter patients with musculoskeletal (MSK) pain that does not conform to specific diagnostic patterns. One potential explanation for such ambiguous pain syndromes is soft tissue injury, including fascial damage, which may not yet be detectable on imaging studies. The fascial system (FS) is an intricate network comprising both superficial and deep layers. Over the last decade, its dysfunction has been increasingly linked to MSK disorders and regional pain syndromes [1-3]. As a biomechanical structure and a major sensory organ, the FS houses numerous sensory receptors, making it crucial for both structural integrity and sensory modulation [4, 5].

Glucopuncture (GP) involves the administration of 5% glucose (G5W) or 5% dextrose (D5W or D-glucose) injections into fascia, muscles, ligaments, or joints. Particularly multiple superficial fascia injections have gained popularity as a treatment for poorly localized pain syndromes [6-8].

This article describes the case of a 75-year-old woman with a three-month history of pain in her left knee fold, successfully managed with palpation-guided GP. Interestingly, in this case, the injections targeted trigger points that are distant from the pain region, illustrating the potential for this method to address referred pain caused by superficial fascial dysfunction. GP represents an accessible, cost-effective, and eco-friendly approach for clinicians with limited access to advanced imaging or ultrasound. Further research is needed to confirm its efficacy and safety in treating vague MSK pain [9, 10].

Keywords: Fascial system; Chronic knee pain; Referred pain; Trigger points; Musculoskeletal pain; Glucopuncture; Prolotherapy; Neural therapy; Pain management

1. Introduction

The fascial system (FS) is a critical yet often overlooked component of the human anatomy. This complex connective tissue network spans the entire body, resembling a three-dimensional web. Composed primarily of collagen and elastin, the FS forms a matrix that envelops nerves, muscles, blood vessels, and organs. Rich in blood vessels, lymphatics, and sensory receptors, the FS connects the dermis, muscles, and internal organs, creating a unified structural network [11-13]. Recent studies highlight its dynamic properties, emphasizing its ability to adapt its biomechanical integrity ("fascintegrity") in response to various demands [14, 15].

The FS is densely innervated, containing sensory receptors responsible for vague MSK pain. However, such pain does not often correlate with findings on imaging modalities like X-rays, MRIs, or ultrasounds. As a result, managing these pain syndromes is challenging, as traditional imaging-based treatments frequently fail [16]. Glucopuncture has emerged as a promising intervention, involving injections of 5% glucose or dextrose into the regional fascia. Preliminary findings suggest that GP reduces reliance on NSAIDs and painkillers [17, 18]. While promising, further research is essential to

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establish the relationship between fascia and vague pain syndromes and to validate Glucopuncture as a reliable treatment [19, 20].

2. Mechanism of Action of Glucopuncture

Glucopuncture (GP) refers to the administration of 5% sugar water injections. This technique originated in the 1990s and involves glucose transport across cell membranes via specific saturable mechanisms [21]. By supporting intracellular ATP production, glucose contributes to cellular metabolism and recovery, often described to patients as "recharging cellular batteries" [22, 23].

Clinical studies suggest that GP modulates pain through several mechanisms, including the down regulation of TRPV1 (Transient Receptor Potential Vanilloid 1) and Substance P (Involved in pain perception (nociception) by transmitting signals from peripheral nerves to the central nervous system (CNS)), stabilization of neural activity, and reduction of neurogenic inflammation [24]. Additionally, high glucose concentrations may counteract TNF-α- (Tumor Necrosis Factor-alpha) induced NF-κB (Nuclear Factor kappa-light-chain-enhancer of activated B cells) activation and mitigate pro-inflammatory cytokine production [25]. Injecting glucose into fascia appears to promote tissue repair and relieve fascial tightness, potentially improving biomechanical integrity. This restoration of "fascia-integrity" may explain the observed post-treatment biomechanical adaptations in patients undergoing GP [26, 27].

3. Case Presentation

A 75-year-old woman presented with a three-month history of left knee pain. MRI findings revealed advanced joint degeneration, with her orthopedic surgeon attributing the pain to aging and advising knee replacement surgery [28]. However, the patient, familiar with GP from previous treatments, opted to explore this approach first.

During her initial consultation, the patient indicated a broad pain region in her left knee fold. Palpation-guided GP was performed, but no specific pain points (PPs) were identified within the knee fold. Examination of the posterior thigh revealed fascial trigger points (FTPs) more than 5-10 cm proximal to the pain region. This finding suggested referred pain originating from these FTPs [29].

The patient received a series of seven injections of 5% glucose into the identified FTPs using a 27-gauge needle (Figure1). She was informed about the possibility of a "reaction phase" (a temporary worsening of pain) after the injections. After the first session, there was no reaction phase but, unfortunately, there was no significant change. However, by the second session, her pain decreased by approximately 50%. Following three sessions, she reported near-complete pain relief. The patient also asked: “But what about my cartilage? You didn’t inject into my knee joint yet. Isn’t my pain due to my age?". This quick recovery was confirming the hypothesis that her pain was referred from fascial dysfunction rather than cartilage degeneration.

She was also informed that the right knee also exhibited similar age-related degeneration on MRI. In this case, the “radiological diagnosis” based on MRI indicated joint degeneration as the cause of her pain. However, the “functional diagnosis,” derived from clinical examination, suggested that her pain was referred pain originating from trigger points in the superficial fascia of the posterior part of her upper leg (see Table 1). In other words, it was hypothesized that these trigger points were referring pain to her knee fold.

Table 1 Radiological Diagnosis vs. Functional Diagnosis

Diagnosis type	Method	Findings
Radiological Diagnosis	MRI	Joint Degeneration
Functional Diagnosis	Examination	Fascial Trigger Points

However, if intra-fascial (IF) injections had failed, intramuscular injections in the left biceps femoris muscle could have been considered if muscular trigger points (MTPs) were identified. Alternatively, intra-articular joint injections with 5% dextrose or hyaluronic acid might have been an option. As a last resort, knee replacement surgery would remain an option. Nonetheless, even if joint replacement will be necessary in the future, optimizing the surrounding soft tissues with Glucopuncture would still provide long-term benefits. In such cases, Glucopuncture and orthopedic surgery can complement each other effectively [30, 31].

Figure 1 Seven injections into trigger points in the superficial fascia

4. Application of Glucopuncture in Superficial Fascia

Glucopuncture targeting the superficial fascia involves tangential needle insertion just millimeters beneath the epidermis. Each site typically receives 0.5-1 ml of injectate, with 2-10 injections per session depending on the pain region's size and the number of trigger points. Careful avoidance of visible blood vessels and skin abnormalities is critical to minimize complications [32].

5. Potential Side Effects of Glucopuncture

While generally safe, GP requires anatomical expertise and precise needle placement. Minor side effects include temporary bruising, itching, and mild pain exacerbation within 1-5 days post-procedure. Rarely, peripheral nerve irritation may result in prolonged discomfort. The use of fine needles (27G or 30G) minimizes these risks. Compared to steroid injections, GP's adverse effects are less severe, attributed to its less invasive nature and the harmless composition of the injectate [33, 34].

6. Maintaining Sterility

Strict sterility protocols are essential during GP. Ideally, each injection site should involve a new needle and syringe. When impractical, a single needle may be reused for multiple injections, following techniques like those employed in surgical wound closure [35].

7. Other Non-Steroidal Injection Therapies

Various non-steroidal injection therapies have been developed in the 20th century Europe, for MSK pain management. These include Prolotherapy (PrT), Neural Therapy (NT), and Therapeutic Local Anesthesia (TLA), each with distinct characteristics (see Table 2), and Mesotherapy (MT). GP stands out for its emphasis on fascial integrity, use of low-concentration glucose, and patient-guided approach [36-38].

PrT (Prolotherapy) is an American technique (Dr Hackett) which involves regional injections of a proliferant solution to induce a localized inflammatory response [1-2-3]. The goal is to stimulate the generation of new cellular tissue. Hackett applied the term prolotherapy from the term "proliferate", referring to its local stimulation of tissue growth [2-3]. In the early days, prolotherapists used irritant solutions such as phenol. Later, injections with hyperosmolar dextrose (more than 10%) became the international standard in modern PrT [2-3-4-5-6-7]. PrT is indicated mainly for chronic MSK pain and is especially effective to strengthen ligaments [2], and joint bands [2-3]. It is also applied into joints. Local anesthetics (LAs) such as lidocaine or bupivacaine are added because the injection procedure itself is painful.

MT (Mesotherapy) originated in France in the 1950s (Dr Pistor) and was originally used for regional pain management and sports injuries. It consists of multiple injections of LAs such as procaine mixed with vitamins and NSAIDs (e.g., piroxicam). Such injections are given in the dermis in the pain region [2-3]. Later, MT was mainly applied in esthetic medicine.

NT (Neural Therapy) is a German technique (Dr Huneke, Dr Dosch) to relieve chronic pain and organ dysfunction through the injection of low doses of LAs such as procaine 1% into joints, ligaments, peripheral nerves and autonomic ganglia [4-5-6]. It also applies injections into interference fields (scars, teeth). Treatment is based mainly on normalizing the dysfunctional autonomic nervous system. NT can be applied for organ dysfunction as well as for regional pain management [7-8-9].

TLA (Therapeutic Local Anesthesia) is an Austrian technique [2]. (Dr. Tilscher, Dr Eder) which applies multiple injections of LAs such as procaine 1% into dermis, tendons, ligaments and joints. This Austrian injection technique also includes intracutaneous injections, myofascial trigger point injections and perineural injections. In contrast to NT, it considers mainly regional injections for MSK pain management and does not consider injections into interference fields.

GP is a Belgian injection technique (dr. Kersschot) which is defined as the application of injections of G5W or D5W to modulate pain [11-12-13-14] and to optimize fascial integrity [2-3-4].GP consists of injecting glucose 5% or dextrose 5% to modulate regional pain syndromes. The injection techniques are like TLA, but procaine 1% was replaced by glucose (or dextrose) 5% based on the findings of a Korean study [2]. In the beginning, the injection techniques in GP were focused mainly on joints, muscles and ligaments [2]. Both injections in pain points as well as trigger points are applied [2-3-4-5-6]. Recently, injections into fascia have become more important [2]. GP can be performed with or without imaging guidance [2-3]. GP is not considered as a complementary injection method because diagnosis and treatment protocols are based on conventional protocols. Injections into acupuncture points are not considered as Glucopuncture. The important role of fascintegrity in GP is based on recent medical research [4].

Table 2 Differences between Prolotherapy, Glucopuncture and Neural therapy

	PrT	**GP**	**NT**
D5W or G5W		+	
D15 W (12,5 - 25% *net* %)	+		
Local Anesthetics	+		+
Steroids	-	-	-
Connective Tissue Proliferation	+	-	-
Effect on Fascintegrity		+	
Needle Effect/ Bleeding Effect	+	+	+
Patient-guided	+	+	+
US-guided	+	+	
ID Injections (dermis)		+	+
IF Injections (fascia)		+	

IM Injections (muscle)		+	
IL Injections (ligament)	+	+	
IA Injections (joint)	+	+	+
Acupuncture Point Injections	-	-	-
Trigger Point Injections (IF, IM)		+	
Ganglion Injections	-	-	+

8. Conclusion

Family physicians treating patients with musculoskeletal (MSK) pain daily often encounter complaints of pain patterns that do not align with strict medical diagnoses. Patients frequently describe vague pain patterns that overlap multiple anatomical structures. In some instances, the pain may originate from a distant source, such as fascial trigger points. Over the past decade, the global medical community has increasingly recognized the role of the fascial system in vague MSK pain syndromes, largely due to its abundance of nociceptors. Unfortunately, these small fascial lesions are not yet detectable with current imaging modalities, such as ultrasound.

Glucopuncture (GP) involves palpation-guided injections of 5% glucose or 5% dextrose to address regional fascial pain and dysfunction. This technique has gained attention as a potential method for modulating pain, particularly in patients with atypical or poorly localized pain syndromes. However, it is essential to first rule out other conditions, such as cancer or infections, that cannot be treated with GP. This requires detailed diagnostic imaging and laboratory evaluations.

Nevertheless, this palpation-based, non-ultrasound-guided technique provides a viable alternative, particularly in healthcare settings with limited access to advanced imaging technologies.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

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

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