



CASE REPORT

Treatment of Referred Back Pain using Fascial Dextrose 5% Injections: A Case Report

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ABSTRACT

The fascial system represents an intricate network within the human body, comprising both superficial and deep layers. Regional fascial dysfunctions can be related to overuse, trauma, stress and posture. Fascial dysfunction has been associated with both diminished range of motion as well as regional pain. Unfortunately, such tiny fascial lesions are not visible on ultrasound or MRI. Glucopuncture, a nonsteroidal injection technique, involves the administration of sugar water injections such as dextrose 5% (or glucose 5%) to treat regional pain and musculoskeletal dysfunction. This article is both a case report and a brief review article. It presents a patient with vague low back pain who received subcutaneous injections in the dorsal midline fascia. He experienced significant pain relief in the low back without receiving injections in the pain region itself. This clinical case highlights the potential of glucopuncture as a simple and safe method for modulating referred pain. This article also presents the interstitium as a potential way to explain the clinical outcome of this case. The difference between Glucopuncture and other nonsteroidal injection procedures is also discussed. This article makes also clear that further research is necessary to fully ascertain the efficacy and safety of intrafascial injections with dextrose 5% or glucose 5% for treating referred pain in the back.

Keywords: Referred Pain, Fascia, Glucopuncture, Biotensegrity, Musculoskeletal Pain, Interstitium, Neuraltherapy, Biopuncture, Prolotherapy, PIT, TLA, Low Back Pain

Introduction

The fascial system (FS) is a complex network of connective tissue which runs throughout the entire body.¹ In the subcutaneous layer, it is like a two dimensional spider web.² As fascia is also present around muscles and organs, it is in fact a three dimensional network connecting dermis, muscles, vessels and organs into one integrative system. Fascia contains a lot of nociceptors as well and as a result it is hypothesized that the FS may lead to musculoskeletal pain which does not match the diagnosis based on MRI or ultrasound. Dealing with such musculoskeletal pain syndromes can be challenging for both family physicians and pain specialists. Glucopuncture (GP) describes regional injections with sugar water 5% solutions such as dextrose 5% (D5W) or glucose 5% (G5W). In this paper, we present a patient with lumbar pain who improved a lot after a series of injections into the subcutaneous fascia on his dorsal midline. Although this technique is a common approach among glucopuncturists, this type of referred pain is rather unknown among most pain specialists, even those familiar with myofascial trigger points. To bring more attention to this new pain treatment is the major scope of this article. The difference between glucopuncture, prolotherapy and other nonsteroidal injection techniques is briefly discussed to prevent further confusion.

Anatomy

The musculoskeletal (MSK) system basically comprises myofascial system and bones. The myofascial system comprises both contractile muscle and connective tissue.^{3,4,5,6} Bones and muscles are obviously playing a basic role in both movement and posture⁷. These muscles and bones are connected to ligaments, tendons and fascia to function properly. This integrative system facilitates proper posture and harmonious body movement⁸. Ligaments typically connect bone to bone and tendons connect muscle to bone, while the fascial system (FS) plays a more complex role.^{9,10,11,12,13} The FS connects dermis, muscles, blood vessels and even internal organs of

the entire body into one complex network. Especially in the last decade, it has become more clear that the FS is an important but often neglected anatomical part of the MSK system. The FS is like a mechanical and neurological “parallel system” which is literally present in the entire body.¹⁴ It has biomechanical properties known as fasc integrity.¹⁵ On top of that, it also contains an important nociceptive system which may explain atypical vague pain patterns. Especially the superficial fascia is an easy target for regional pain management.

Treatment of Regional Pain with Glucopuncture

Historically, sugar water injections were considered placebo. Sugar water 5% injections were introduced by Kim et al. in Korea in 1997.¹⁶ They found that sugar water 5% injections were superior to local anesthetics or normal saline injection for treatment of myofascial pain. GP is a term introduced to describe regional injections with sugar water 5% into dermis, fascia, joints, muscles and ligaments.^{17,18} The most common injectates are G5W and D5W.^{19,20} These injections can also be applied perineurally^{21,22,23}, into joint cavities²⁴ or in the epidural space.^{25,26} Over the last decade, GP has become more popular worldwide, especially in low-income communities. Apart from several RCTs on carpal tunnel^{27,28,29,30}, clinical research is scarce. Research on the mode of action of GP is still limited. Both TRPV1 and Substance P may play a role in pain modulation.^{31,32,33,34,35,36,37}

The Potential Role of the Extracellular Matrix

When dextrose 5% injections are applied in soft tissues such as subcutaneous fascia, the injectate arrives automatically into the extracellular matrix (ECM). The ECM is a complex network of proteins and polysaccharides secreted by fibroblasts. The components of ECM are mainly collagen, elastin and proteoglycans. The ECM provides structural support, regulates cell behavior, and acts as a reservoir for signaling molecules. When glucose molecules arrive in the ECM, they can be transported into the cells

to support cell metabolism through ATP in the mitochondria (Krebs Cycle). This enhanced cellular metabolism may explain some of the effects of these injections such as enhanced tissue repair, but more research is required to confirm this hypothesis.

The Potential Role of the Interstitium

More recently a “new organ” was described, the so-called interstitium.³⁸ This interstitium contains the ECM but is much larger and wider than the ECM. The interstitium is sometimes described as an underground network of fluid-filled channels. This space between cells and blood vessels in tissues is filled with both interstitial fluid and ECM. This interstitial space is found in the dermis and fibroconnective tissues throughout the entire body. It is not clear yet if the injectate can be “transported in those channels” to adjacent regions. More research is definitely required to illustrate to what extent these “underground channels” of the interstitium might explain the effects of regional D5W injections at a distance.

Clinical Case

A 43-year-old painter had continuous pain in his low back for 3 years. In a regional hospital, he had an MRI which showed minor bilateral lumbar facet joint degeneration.³⁹ His pain was continuously present, except while lying in bed. He also complained about a sense of stiffness in his entire back. There was also a limitation in bending forward because of his so-called “muscle stiffness”. When he came to see me, he told me that he had received three sessions with steroid injections in his facet joints in a regional hospital. As he had no long term results, he wanted to try another approach. The Visual Analog Scale (VAS) was applied for follow up.⁴⁰ He described his pain as 8/10 in rest. He said his pain was located in the lumbar area (Fig 1). We describe it here as the pain region (PR). His pain was also worse after sitting in the sofa watching television for more than an hour. During clinical examination, no pain points were found in the muscles, ligaments or subcutaneous fascia in his PR. The pain was sometimes more on the left side, and at other moments more

on the right side. The latter is typical for pain coming from elsewhere, which we describe as the origin region (OR). It was hypothesized his pain might be referred from the dorsal region, although he said he never had pain in the dorsal spine. To test this hypothesis, he received a total of 10 mL (10 x 1 mL) of glucose 5% in the dorsal midline (Fig 2). A short 25G needle was used to inject the subcutaneous fascia (needle was directed tangentially, depth less than 0.5 cm or 0.2 in). He was surprised that he did not receive injections into his low back at all. After three weekly glucopuncture sessions in the OR, his complaints in the PR went down from 8/10 to 4/10. After three more sessions every two weeks, his pain had disappeared almost completely (1/10), without injecting the PR in the lower back. He also noted that he could bend his spine forward much better than before treatment. He did not take any oral pain killers nor NSAIDs during treatment. Follow up after four months did not reveal any relapse of his lumbar back pain (1/10).

Difference between Glucopuncture and Prolotherapy

It is important to differentiate GP from Hackett-Hemwall prolotherapy (PrT), which injects irritants (e.g. phenol) or hyperosmolar solutions (e.g. NaCl 3%, D15W - D25W) to evoke local cell destruction.^{41,42,43,44} For safety reasons, phenol is no longer applied. When applying dextrose, it is sometimes described as dextrose prolotherapy (DPT).⁴⁵ The hyperosmolar injectates are mainly applied into ligaments and bands. The goal of PrT is to induce localized cell destruction. When hyperosmolar solutions such as D15W arrive into the ECM, these provoke immediate water flux out of the cell, resulting in intracellular dehydration and cell shrinkage. This mechanical stress may cause significant changes within cellular structures and components of the cell membrane initiating a local inflammatory response. The latter leads to regional connective tissue proliferation – hence the term “prolo”. This proliferation can lead to thickening and strengthening of tissues such as ligaments, joint bands and tendons. Therefore, TrP is

sometimes considered as proliferative medicine.⁴⁶ Local anesthetics are typically added to the injectate. As a result of this mechanism, PrT is more effective than GP when dealing with thin ligaments or joint bands. For the same reason, when dealing with Dupuytren grade 1, glucopuncture is advised rather than prolotherapy.⁴⁷ When injecting D25W into a joint cavity, the mode of action is probably not related to connective tissue proliferation but to the effect of dextrose on the cartilage.^{48,49,50,51} According to

Prof Patterson, prolotherapy is not only used as a treatment for chronic pain but also for patients with varicose veins (vein sclerosing).⁵² GP, however, cannot be used for vein sclerosing. Despite these obvious differences, some articles still use the old term “prolotherapy” while in fact they are discussing D5W injections.^{53,54} Both doctors and patients should become aware of the differences between GP and PrT.⁵⁵



Fig 1: Patient shows his Pain Region

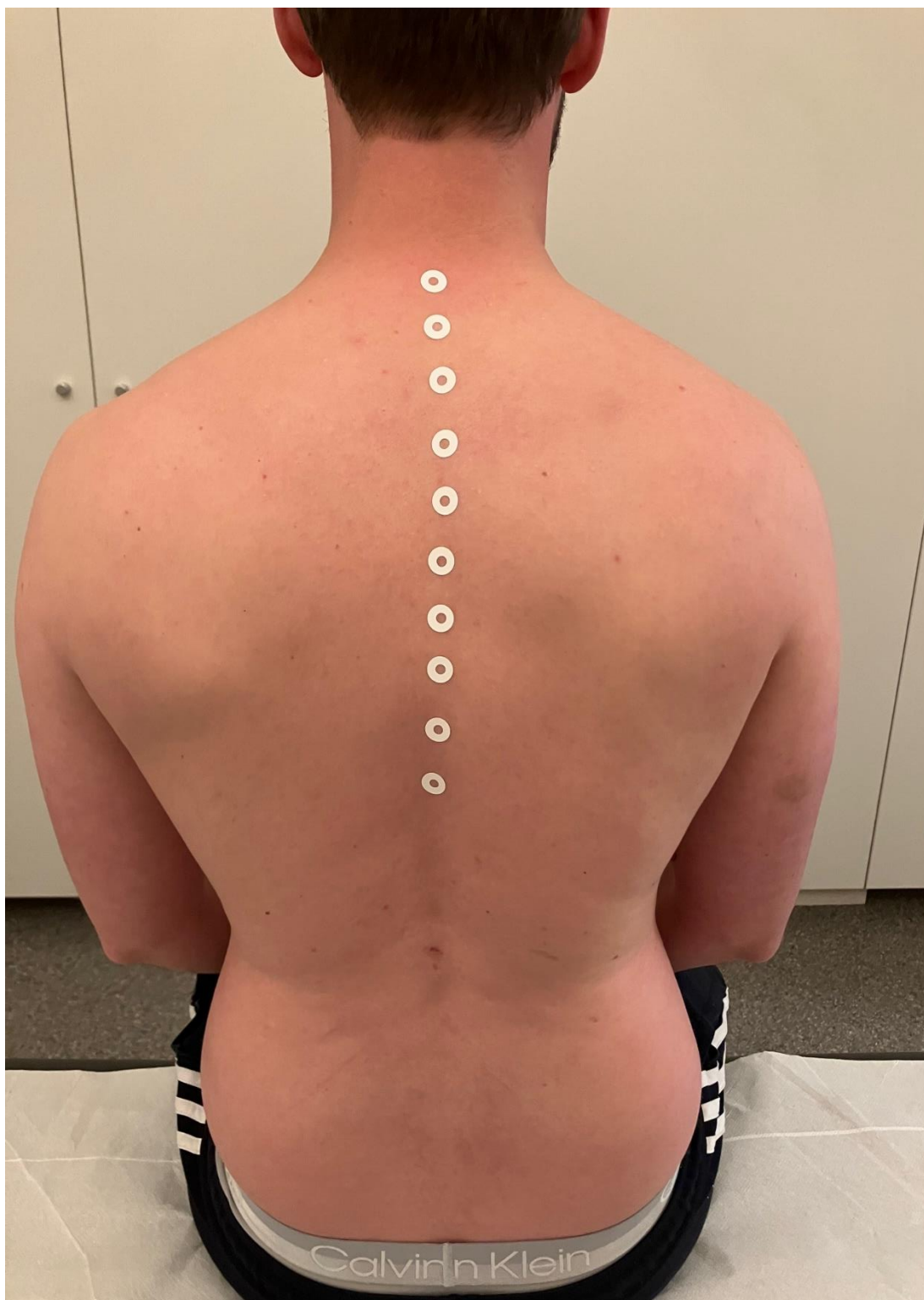


Fig 2: Ten SC Injections were applied on the Midline Fascia in the Origin Region

Difference Between Glucopuncture and Perineural Injection Therapy

Perineural Injection Therapy (PIT) and GP both apply low concentrations of sugar water (5%). PIT typically involves landmark-based injections of D5W along superficial peripheral nerves.^{56,57} These injections are all administered subcutaneously, while glucopuncture also targets deeper structures, such as joints, muscles

and ligaments. In contrast to PIT, GP is also applied for chronic functional complaints outside the field of MSK pain by injecting in the subcutaneous fascia in the pain region.⁵⁸ PIT according to Lyftogt typically applies buffered dextrose (pH 7.2) by adding bicarbonate to the D5W.^{59,60} The latter is not added to the injectate in GP.

Difference Between Glucopuncture and Neuraltherapy

Neuraltherapy (NT) is a German technique which involves landmark-based injections of procaine 1% along peripheral nerves and autonomic ganglia.^{61,62,63,64,65} The main goal of NT is to regulate the autonomic nervous system (e.g. stellate ganglion). One also injects into the region of complaints (segmental therapy), into joint cavities and into interference fields (e.g., scars). GP typically injects locally for regional pain modulation, while NT is considered as an holistic treatment because it takes into account the whole body.

Difference Between Glucopuncture and Therapeutic Local Anesthesia

Therapeutic Local Anesthesia (TLA) is an Austrian technique which involves landmark-based injections of procaine 1% into dermis, ligaments, muscular trigger points and along peripheral nerves⁶⁶. The main goal of TLA according to Tilscher is to reduce chronic regional pain. In contrast to NT, TLA is only applying regional treatments. The injection techniques of GP are historically based on the techniques described in TLA (subcutaneous, perineural, peritendinous, into ligaments, intramuscular, into joint cavities). The main difference is that TLA uses procaine 1% instead of dextrose 5% or glucose 5%. It is obvious one can combine TLA with GP, as long as one keeps the “net” concentration of sugar water close to 6% to avoid osmotic cell shock (between 5% and 7% net is considered iso-osmolar). For example, in a syringe of 10 mL, one can mix 6 mL of D10W with 4 mL of procaine.

Difference Between Glucopuncture and Biopuncture

Glucopuncture and Biopuncture (BP) apply the same injection techniques, but they differ only in applied injectate.⁶⁷ BP uses ultra-low dose botanical injectates such as Traumeel^{68,69}, while Glucopuncture uses D5W or G5W. Trigger point injections are used

in both GP and BP. Acupuncture points are not taken into account in GP or BP.

Discussion

The FS is a very well innervated multidirectional network, which runs throughout the entire human body. It plays an important role in posture, balance, and biotensegrity. The lack of specific clinical neurological symptoms, specific lab tests or well-defined signs on MRI or Ultrasound have resulted in lack of interest in the FS among family physicians, orthopedic doctors and pain specialists. As physicians worldwide have experienced and studied the effect of perineural D5W injections for carpal tunnel in several RCTs, we wondered if the same injectate could also be applied into other tissues such as superficial fascia. In this article, we focus on the subcutaneous fascia and hypothesize that it may play an important role in treating referred pain at a distance. The major aim of this publication is to draw attention to this promising, safe and inexpensive injection technique. In this article, the focus is on treating patients with GP suffering from MSK pain without any specific signs on MRI or ultrasound. It is hypothesized that both the extracellular matrix as well as the interstitium may play a potential role in the treatment of referred pain patterns. To illustrate the practical application of GP in daily practice, a clinical case of referred back pain is discussed briefly. But clinical correlation is not always true causation. Therefore, more fundamental and clinical research is warranted to confirm our clinical findings. This article is an invitation to check our findings and to design a controlled clinical study. The scope of this article is both general practioners worldwide who have no access to modern equipment as well as sports doctors or pain specialist who are dealing with patients who do not respond to epidural or facet joint steroid injections. The exact mode of action of GP is not completely known yet and it is clear that one clinical case does not have any scientific value. It is obvious that limitations in this case include a high risk of bias.

Conclusion

Over the last decade, physicians came to see that the fascia is a system that interconnects different parts of the body like an invisible three-dimensional web. This may be a way to explain how MSK pain can be referred from one region to another. Recently, it has been postulated that glucopuncture can regulate pain originating from subcutaneous fascial lesions. This technique may be important in patients with regional pain who show no pathological signs on MRI or ultrasound. The superficial fascia may also explain referred pain which does not correspond with myofascial trigger points, bulging discs, facet joint degeneration nor peripheral nerve patterns. It is still not completely clear yet how lesions in the dorsal fascia may refer pain to the lumbar area. Such referred pain may be related to both fascial system itself and interstitium. We realize that there are still a lot of unanswered questions here. This article is an invitation to do more fundamental and clinical research in this particular field.

Statement of Informed Consent:

Informed consent was obtained from the participant included in this case study.

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