THE EUROPEAN SOCIETY OF MEDICINE
Medical Research Archives, Volume 12 Issue 8

RESEARCH ARTICLE

Intrafascial Glucopuncture for Tension-type Headache: A Clinical Case

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OPEN ACCESS

PUBLISHED
31 August 2024

CITATION
Kersschot, J., 2024. Intrafascial Glucopuncture for Tension-type Headache: A Clinical Case. Medical Research Archives, [online] 12(8). https://doi.org/10.18103/mra.v12i8.0000

DOI
https://doi.org/10.18103/mra.v12i8.0000

ISSN
2375-1924

ABSTRACT

As Tension-type headache is prevalent, it is interesting to look for new treatment modalities which are both safe and effective. Over the last decade, regional injections with dextrose 5% (glucose 5% in Europe) are becoming more popular among clinicians worldwide. Unfortunately, no large randomized clinical trials have confirmed their safety and effectiveness so far, except for the treatment of carpal tunnel. The scope of introducing the term "Glucopuncture" is to raise awareness among physicians and patients of the interesting risk-benefit ratio of regional sugar water 5% injections. This article describes a clinical case of a man who had pain in his head and neck for five months. He was pain free after three sessions with glucose 5% injections in the superficial fascia. Palpation-guided glucopuncture is especially interesting in remote areas where modern diagnostic and therapeutic facilities are not available to the majority of the local population. The purpose of this manuscript is to bring awareness to the potential benefits of applying this new injection technique for tension headache. This article is also an urgent invitation for further basic-science and clinical studies to clarify the potential benefits of regional sugar water 5% injections for patients with chronic tension-type headache.

Keywords: Tension-type Headache, Glucopuncture, Pain Modulation, Superficial Fascia, Intrafascial Injection

1. Introduction

Tension-type headache (TTH) is one of the most prevalent neurological disorders worldwide and is characterized by recurrent headaches of mild to moderate intensity [1]. Diagnosis of primary TTH is based on headache history and examination of head and neck. Secondary headache disorders are defined as headaches due to a serious underlying medical condition and are classified according to whether they are due to neoplastic, infectious, vascular, or intracranial volume causes [2]. It is obvious that patients with secondary headaches are not candidates for a series of Glucopuncture sessions. In contrast to migraine, TTH has a typical bilateral location and there is no nausea nor vomiting. Still, many patients have a unilateral type of TTH. It is hypothesized in this article that these headaches could originate from nociceptors in the superficial fascia in the pain region. Over the last decade, injecting superficially in the fascia in the head and neck area has become more popular because of easy application and interesting benefit versus risk ratio. Sometimes the pain in the forehead is referred from trigger points in the neck fascia (Fig. 1). In some cases, one can apply ultrasound-guided glucopuncture [3].

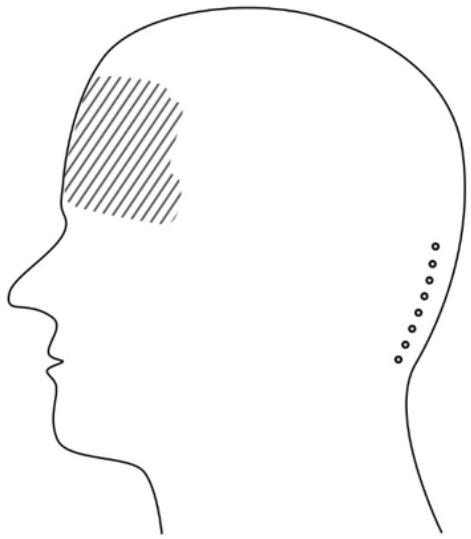

Fig. 1. Injections into Occipital Fascial Trigger Points for the Treatment of Left-sided Temporo-frontal Headache

2. Definition of Glucopuncture

Glucopuncture (GP) is an injection-based therapy for the management of a variety of musculoskeletal conditions [4, 5]. It consists of multiple regional injections with sugar water 5%. The most common injectates are Glucose 5% in Water (G5W) and Dextrose 5% in Water (D5W). Adding local anesthetics is not required. Steroids are never added to the injectate. In general, injections are given in fascia, muscles, tendons, ligaments and joints [6, 7]. One can also apply sugar water 5% injections in the epidural space [8, 9] or perineurally [10, 11, 12, 13]. Over the last decade, ultrasound-guided glucopuncture is becoming more popular (especially for perineural injections and hydrodissection), but this is not the topic of this article. In contrast to prolotherapy according to Hackett and Hemwall [14], hyperosmolar injectates such as D15W are not used in glucopuncture because these evoke osmotic cell destruction leading to connective tissue proliferation (hence the term "prolo") and tissue hardening. Glucopuncture shows exactly the opposite effect on connective tissue [15]. Yet, some physicians still apply the old term prolotherapy for sugar water 5% injections, although the history, application, mechanisms of action and clinical effect of glucopuncture are very different from prolotherapy [16, 17]. It is also interesting to realize that glucopuncture could be a safe option for diabetics and for pregnant patients, but there are no studies yet to confirm its safety.

3. Mechanism of Action of Glucopuncture

The ameliorative effect of sugar water 5% injections on neurogenic pain has a multifaceted mechanism [18]. Regional injections of D5W or G5W seem to alleviate pain and reduce inflammation by modulating key neuropeptides and ion channels [19]. Dextrose may indirectly downregulate capsaicin-sensitive receptors such as transient receptor potential vanilloid receptor-1 (TRPV1) and upregulation of TRPV1 is associated with neuropathic pain [20]. These TRPV1 receptors can be found on ligaments, tendons, fascia and peripheral nerves. Several studies also showed a potential anti-inflammatory effect of dextrose on nerves [21]. An in vitro study in 2022 showed that dextrose decreased the inflammatory markers IL-6 and IL1B in TNF-a-exposed nerve cells [22]. Similarly, it was found that TNF-a-exposed nerve cells exhibited increased survival in response to increasing dextrose concentrations [23]. Multiple studies have suggested that dextrose can increase substance P (SP) levels [24]. SP activates opioid receptors via NK1 receptor binding and is being considered a candidate for neuropathic pain treatment in human trials [25]. A study in 2022 showed that the levels of the degenerative neuropeptide Y (NPY) dropped markedly after three monthly injections with dextrose in osteoarthritic knees [26].

4. Clinical Application of Glucopuncture for Unilateral Tension Headache

During questioning, the patient is asked to point out the zones of pain referral. The pain is usually located in the temporal and / or occipital area. This region of pain as pointed out by the patient is here defined as the pain region (PR). Physicians who have no access to ultrasound, typically start treatment with multiple injections into the superficial fascia in the PR (a). The needle is positioned in a tangential direction (10 to 30 degrees) to inject the superficial fascia and to avoid injecting into underlying periost. The D5W or G5W injections are usually given 2 to 3 cm apart. About 0.5 to 1 mL is injected in each spot with a short 27G needle. Typically, between 5 and 10 injections are given at random in the PR each session. However, sometimes one can find specific spots in the superficial fascia in the PR which are very painful on digital pressure. These fascial pain points (FPPs) can each be injected (b). This approach is even more effective than injecting at random in the PR but may evoke a temporary worsening for about one or two days. However, in some cases, the pain is not a local pain but *referred* pain. This means that the pain in the head region can be referred from trigger points in the superficial fascia in the neck (c). Such fascial trigger points (FTPs) are typically found in the ipsilateral occipital area or trapezius region.

Table 1. Three Types of Injections in Superficial Fascia

a. Intrafascial Injections at Random in the Pain Region (FPR)
b. Specific Injections into Fascial Pain Points (FPPs) in the Pain Region
c. Specific Injections into Fascial Trigger Points (FTPs) *outside* the Pain Region

When fascial injections are not reducing the pain, deeper injections into muscular and ligamentous trigger points can be considered during the next visits (Table 2). Myofascial trigger points (MTPs) may be found in the deep occipital muscles and trapezius muscles. Ligamentous trigger points (LTPs) can be identified, for example, in the nuchal ligament. These techniques are not a topic of this article.

Table 2. Injections in Three Tissue Layers

IF	Intrafascial
IM	Intramuscular
IL	Intraligamentous

Sometimes, the patient experiences a temporary worsening of pain in the first 48 hours after the injections. This may be due to, for example, unvoluntary needle damage to the periost, or because the needle touched small peripheral nerves or vessels. It happens frequently, however, that the patient experiences immediate relaxation and pain relief a few minutes after the injections. This effect can last up to an hour or even a full day. This is rather surprising, as no local anesthetics are added to the sugar water 5%. Unfortunately, this pain modulating effect usually does not last for long. To obtain long term and lasting results, repetition is required. When dealing with chronic pain, the glucopuncture sessions are usually repeated weekly in the beginning and are then applied every two or three weeks after a few sessions. More clinical research is required to confirm these anecdotal experiences and to design an internationally standardized treatment plan.

Remark:

When FPPs are very sensitive during examination and when dealing with a very sensitive patient who typically expresses a lot of discomfort (jump sign, shouting) while palpating FPPs in the pain region, one might start with injecting small volumes very carefully in the superficial fascia (30G needle). One could also start injecting the FTPs in the neck first to avoid an initial worsening of symptoms after injecting the FPPs in the pain region in the head. It is interesting for the patient (and for the physician) to notice that the pain in the head disappears while only injecting in the FTPs in the ipsilateral neck area.

5. Case Presentation

A man (65) had pain in his head and neck for five months. He complained about rigidity of the neck in the morning and also severe pain on the left side of his neck and temporal region (Fig. 2, Fig. 3). Pain killers and NSAIDs did not alleviate his pain. His pain region was rather vague and superficial, which are both typical signs of fascial pain patterns. His Numerical Rating Scale (NRS) at the first visit was 7/10. Physical examination of the neck was normal, except for some reduced range of motion (ROM) when turning his head to the left. During clinical examination of the superficial fascia in the head and neck region, three pain points were found in the pain region, and three trigger points were found in the neck.

Fig. 2. Patients shows his pain region in the left occipital region.

Fig. 3. Patients shows his pain region in the left parietal region.

The treatment plan was to inject those three FPPs and three FTPs each session. After informed consent, he received 6 x 1 mL of G5W in these FPPs and FTPs (Fig. 4). There was a worsening of the pain the first 24 hours (NRS 8/10), followed by an improvement (NRS 3/10) which lasted for three days. Then the pain returned to NRS 6/10 at the end of the week. His complaints disappeared almost completely after the second session (NRS 2/10). His ROM normalized completely. After the third session, he was completely pain free (NRS 0/10). Follow-up after three months and six months confirmed the positive long-term effect of those three sessions without any other treatment options.

Fig. 4. Injections into Fascial Pain Points and Trigger Points with G5W (6 x 1 mL each session)

6. Discussion

Tension-type headache is a prevalent condition which is usually treated with oral pain killers and NSAIDs. Over the last decade, regional dextrose 5% or glucose 5% injections have become more popular for treatment of regional musculoskeletal and neuropathic pain. The term "Glucopuncture" is introduced to make the difference with prolotherapy, a treatment which exists for several decades in the US which uses irritants such phenol or hypertonic dextrose (dextrose 15% or more). This article describes a clinical case of a man (65) who had pain in his head and neck for five months. He was pain free after three sessions with glucose 5% injections in the neck and head area. The procedure is quite simple and straightforward. As most clinicians are not aware yet of this new technique, this case presentation may inspire colleagues in Europe and worldwide to test this new injection technique for their tension headache patients. It is obvious that more clinical studies are required to clarify the potential benefits of these injections for tension-type headache.

7. Conclusion

Over the last decade, several clinicians have experienced that patient-guided glucose 5% or dextrose 5% injections are an inexpensive and easy to learn treatment option to modulate pain in the neck and head area. Over the last decade, injecting in the superficial fascia in the neck and occiput area has become more popular but more research in this field is required to confirm these anecdotal findings.

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