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Glucopuncture for Traumatic Periostitis of the Tibial Crest. An Alternative for NSAIDs?

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Abstract

When treating traumatic sports injuries, glucopuncture (GP) is a new treatment modality with an interesting benefits risk ratio. GP is defined as the clinical application of multiple glucose 5% injections into soft tissues to modulate pain and to support tissue repair. Unfortunately, no large randomized clinical trials have confirmed its effectiveness so far. This article describes a clinical case of traumatic periostitis treated with GP. It invites the medical community for further basic-science and clinical studies to clarify the potential benefits of local glucose 5% injections for traumatic periostitis in professional athletes.

Keywords: Glucopuncture; Sports Injury; NSAID; Trauma; Periostitis

1. Introduction

Traumatic periostitis (TP) is a contusion of soft tissues which arises as a result of blunt trauma. The most frequently affected areas are bones that do not have a muscular cover and are close to the skin such as the crest of the tibia, the skull bones, and the lower third of the forearm. Traumatic periostitis of the tibial crest because of a direct hit on the tibial shaft is rather common in hockey, football, karate, ice-hockey, or kick boxing. In this article, a professional kick boxer came for medical advice 8 days after the traumatic event to her left leg. Her pain disappeared completely after three Glucopuncture sessions. She did not take pain killers or non-steroidal anti-inflammatory drugs (NSAIDs).

2. Symptoms of Traumatic Periostitis

Bone bruising of the tibia is caused by a direct blow to the shin with a hard object such as a boot, stick or ball. The impact causes the periosteum to be damaged [1]. The periosteum contains nerve fibers and blood vessels, which can evoke pain and bleeding respectively. Damage to the nerve fibers in the periosteum causes immediate pain. Damage to the blood vessels in the periosteum can cause a collection of blood. When this blood clots, it forms a hematoma which may take days to weeks to disappear. In some cases, however, only the dermal nociceptors are injured and pain is the major complaint.

3. Differential Diagnosis

When dealing with a high impact trauma on the shin, such as a race car accident or bike accident, one should exclude tibial fracture by imaging techniques such as X-Rays, ultrasound or MRI. Traumatic periostitis should be differentiated from non-traumatic medial tibial stress syndrome [2], which evolves slowly over weeks or months and is not related to trauma.

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4. Clinical Evolution

Bone bruising of the tibia causes immediate sharp pain and swelling. Extreme pain is felt at the time of injury as the nerve fibers within the periosteum and dermis are irritated. This acute pain generally settles within less than fifteen minutes. The pain may return, however, as bleeding occurs under the periosteum. A painful lump may be seen on the front of the shin. In some cases, the pain becomes chronic. Secondary symptoms may include reduced range of movement of the leg, gait problems and balance problems. Those secondary complaints may impede the athlete to engage in competition. However, some athletes suffer from bothersome pain without major swelling.

5. Treatment of Traumatic Periostitis in Professional Athletes

Traumatic injuries are very common among young athletes [3, 4]. Most treatment protocols for traumatic sports injuries include rest, ice, elevation, physiotherapy, pain killers and NSAIDs [5]. This protocol is also applied for TP. The goal of these measures is to manage pain and swelling on the one hand and to support tissue remodeling on the other hand, with a minimum amount of side effects. When dealing with professional athletes, it is also important to use medication which is not on the World Anti-Doping Agency (WADA) list [6]. Most physicians today avoid steroid injections when dealing with tibial pain, even in recalcitrant cases [7, 8].

6. Regional Glucose 5% Injections

In the search for efficient yet safe treatment modalities, local subcutaneous glucose 5% (or dextrose 5%) injections are used for mild sport injuries [9]. The application of glucose 5% injections was first introduced in South Korea by Dr Kim MY in 1997 for treatment of myofascial trigger points [10]. Glucose 5% injections are used for tennis elbow [11], carpal tunnel syndrome [12], rotator cuff [13, 14], epidural injection [15], Achilles tendinopathy [16], ulnar neuropathy [17], mild neuropathic pain [18], Dupuytren's Grade 1, anterior knee pain [19], and nerve hydrodissection [20]. In a 2021 study, the short term effects of perineural glucose 5% injections were similar to steroids, and their long-term effects were even better than steroid injections [21]. It seems that glucose 5% injections might replace steroid injections in the near future, especially in the treatment of mild forms of non-rheumatic musculoskeletal pain [22]. It may also become a tool for sports doctors to reduce the use of oral NSAIDs, especially among young athletes.

7. Working Hypothesis

Although research into GP is still at an early stage, the available clinical evidence indicates that these regional injections can become effective in improving the pain experience in a wide range of clinical settings. The clinical benefits are especially interesting in athletes who want to recover faster and avoid NSAID intake as much as possible. The exact mechanism of action of glucose 5% injections is still subject to debate [23]. Similar to brain cells, peripheral nerve cells require adequate levels of glucose. It is no surprise that ultrasound-guided perineural injections with glucose 5% showed interesting outcome in clinical trials [24, 25]. Even palpation-guided perineural injections can have a positive impact on neuroinflammation of peripheral nerve endings [26]. But other tissues such as dermis, muscle, tendon and fascia also contain many small nerve endings. These nerve endings are very tiny so one cannot identify them on ultrasound. Yet, they may be very important for certain types of regional pain. It is likely to presume that these peripheral nerve endings recover quicker when supplied with glucose 5%. Both upregulation of MMP2, EGF, CXCL 9 and IL-22 [27] as well as release of substance P may play a role [28]. Interleukin-1beta could also be important for neuropathic pain [29, 30]. It is hypothesized that glucose supports ATP production in the mitochondria, which may lead to better cell function and thus lead to pain modulation and enhanced tissue repair. However, this hypothesis still remains to be proven [31].

8. Avoidance of NSAIDs

Athletes should be careful with NSAIDs usage after a sprain or traumatic injury [32]. NSAIDs may be used to reduce pain and swelling, but usage is not without complications and NSAIDs may suppress innate tissue repair mechanisms [33]. Still, NSAIDs are widely consumed by athletes worldwide to increase pain tolerance, or reduce pain / inflammation from injuries. Given that these drugs also can slow down tissue protein turnover, it is important to research the implications of acute and chronic use of these drugs in relation to exercise performance and the development of long-term training adaptations [34, 35]. NSAIDs also have potential cardiovascular side effects [36]. Therefore, a detailed risk-benefit analysis and professional guidance are strongly advised before the athlete considers such medicine for training or competition. Overall, greater awareness among athletes and their coaches on the potential adverse effects of NSAIDs is required [37].

9. Regional Glucose 5% Injections for Traumatic Periostitis of the Shin

During clinical examination, the area which is tender to palpation needs to be identified first. This zone may vary depending on the type of injury. The treatment itself is remarkably simple and straightforward. After identifying the tender zone, one gives multiple shallow injections with glucose 5% in that zone. The injections are usually given 1 cm apart. About 1 mL is given in each spot with a 30 G or 27 G needle. The total volume per session is between 5 and 10 mL, depending on the size of the tender zone. Usually, the patient experiences less pain a few minutes after the glucose 5% injections. Unfortunately, this analgesia does not last for long. To obtain long term and lasting results, repetition is required. It is obvious that more clinical research is required to confirm these anecdotal experiences.

10. Clinical Case

The patient, a 24-year-old professional kick boxer, presented with pain in the lower leg. It started after a leg trauma during training, eight days earlier. She accidently kicked with her left leg the elbow of the coach instead of the coach's kick shield pad. She had to stop the exercises immediately. During clinical examination, the lower part of the shin was very painful and swollen (Fig. 1: the white line illustrates the contours of the swollen area). She received intradermal injections with G5W (Glucose 5% in Water), without adding local anesthetics or other ingredients. The injections were applied into the painful area (May 19, 23 and 30, 2022). About 15 injections were given each session (Fig. 2). The total volume injected was 5 ml. After the first session, the flexion of the ankle improved dramatically. After these three sessions, her symptoms had disappeared, and she could join the kickbox competition again. She did not take any NSAIDs or pain killers before, during or after the sessions.

Figure 1 Pain Zone Left Shin

Figure 2 Injection Sites Left Shin

11. Conclusion

As traumatic sports injuries are very prevalent, it is important that young athletes have access to treatment modalities which are safe and effective. Several clinicians worldwide have experienced that glucopuncture is an interesting treatment modality for non-rheumatic musculoskeletal pain, including traumatic sports injuries. However, more clinical research is necessary to confirm its use to modulate pain and to support tissue repair. The goal of this clinical case is to invite colleagues to initiate more research to investigate the safety, working mechanisms and efficacy of this new injection technique in the treatment of sports injuries.

Compliance with ethical standards

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Disclosure of conflict of interest

Both authors declare that there are no conflicts of interest or source of funding. The first author declares that he is the practitioner who has given the regional injections, exactly as described above.

Statement of informed consent

Informed consent was obtained from the patient. She has provided permission (May 30, 2022) to use her medical file for this case report.

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