Treatment of Grade 1 Hamstring Injury with Glucopuncture: A Clinical Case

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Abstract

Hamstring strain injuries are common among athletes and often require intensive rehabilitation to prepare athletes for a timely return to sport performance. Return to sport is typically achieved within weeks of the hamstring injury. But subsequent athlete performance may be impaired. Both rehabilitation and preventive measures are crucial but not standardized yet. On top of the standard rehabilitation program, it would be interesting to add safe treatment modalities which could speed up recovery from such an injury. In this article we present a young athlete with a large grade 1 hamstring injury which was treated with regional sugar water injections into the muscular lesion. Although they can be biased, both treating physician as well as patient found that injury recovery went smoothly and quickly. The goal of this paper is to share this experience with other sports doctors and to invite the medical community to design randomized trials to confirm the clinical experience with this easy and safe technique. Unfortunately, the injectate is inexpensive and cannot be patented, making the product uninteresting for medical companies.

Keywords: Hamstring Injury; Muscle tear, Soccer; Orthobiologics; Physiotherapy; Sports injury; PRP; Glucopuncture; Prolotherapy; Young athlete

1. Introduction

Hamstring injuries are very common among, for example, football players, rugby players and hockey players. Such lesions can be very detrimental for athletic performance [1, 2, 3, 4, 5, 6]. In particular, injuries to the intramuscular tendon may be present in up to 41% of all HSI and have been described as a 'serious' thigh muscle strain [7]. Re-injury rates as high as 60% have been described in elite track and field athletes, as well as prolonged time to return to play (TTRTP) [8]. Most of these hamstring injuries occur during high-speed movements in sports requiring sudden directional changes [9]. Unfortunately, such muscle injuries have a high recurrence rate and can result in long term loss of ability to participate in training and competition [10]. To exclude lesions which require immediate surgery, early ultrasound or MRI are required. Typically, there are three grades of hamstring muscle injuries (Table 1). In this article, we discuss the treatment of a large grade 1 injury. For practical reasons, the patient had no opportunity to follow the usual physiotherapy protocol.

Table 1 Three Grades of Hamstring Injury

<table>
<thead>
<tr>
<th>Grade 1: mild muscle pull or strain</th>
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<td>Grade 2: partial muscle tear.</td>
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<td>Grade 3: complete muscle tear.</td>
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2. Treatment of Hamstring Injury

Standard management for low-grade tears includes activity modification, anti-inflammatoryatories, and physical therapy [11]. Platelet-rich plasma (PRP) injections, dry needling, and shock wave therapy may provide benefit as well [12]. PRP is even better than steroids [13]. Target injections with corticosteroid injections are becoming less popular because of potential side effects of steroids [14, 15, 16, 17, 18, 19, 20]. That is why sports doctors apply orthobiologic injections instead of steroid injections.

2.1. Orthobiologic Injections

The goal of orthobiologic injections is to improve regeneration of musculoskeletal tissues by injecting biomaterials [21]. Orthobiologic injections are given into tissues with intrinsic repair ability such as cartilage, tendons, ligaments and muscle. [24, 25, 26]. Typical orthobiologics (Table 2) are dextrose 5% in water (D5W), hyaluronic acid (HA), platelet-rich plasma (PRP), bone marrow aspirate (BMA) and mesenchymal stem cells (MSCs). The most popular orthobiologic among sports doctors over the last decades is PRP [22, 23].

Table 2 Examples of Orthobiologic Injectates

<table>
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<tr>
<th>Dextrose 5% (D5W)</th>
<th>Hyaluronic Acid (HA)</th>
<th>Platelet-rich Plasma (PRP)</th>
<th>Bone marrow aspirate (BMA)</th>
<th>Mesenchymal Stem Cells (MSCs)</th>
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Orthoregeneration can be a new solution for orthopedic surgeons, family physicians and sports doctors as an alternative for cortisone and in some rare cases as an alternative of surgery [27, 28]. Their application in sports injuries still requires more clinical studies [29, 30].

2.2. PRP versus D5W

Apart from PRP, injections of dextrose 5% in water (D5W) - or glucose 5% in water (G5W) - are becoming more popular because of their safety and easy application [31]. There have been several cases and studies to confirm the potential of sugar water injections as epidural injections [32, 33] or perineural injections [34, 35, 36]. However, there are no clinical trials yet to confirm their clinical efficacy in treatment of muscle tears in athletes. Clinical experience suggests that D5W injections have similar effects than other orthobiologics such as PRP [37]. D5W solutions are less expensive than PRP, but require to be injected in higher volume, frequency and number of sessions to obtain similar outcome [38]. On the other hand, D5W injections can provide quick pain relief in several clinical situations, even in regional neuropathic pain [39]. The latter is probably related to the direct effect of sugar water on tiny nerve endings. It is postulated that D5W injections can also be used to repair muscle tissue because they stimulate tissue repair through ATP [40]. There are several hypotheses which explain the effect of D5W through substance P [41]. Recent investigations suggest that glucose injection near peripheral nerves can increase levels of CREB, JNK, and p70S6K, pointing to antioxidative and anti-inflammatory actions [42]. These may have several favorable biochemical actions that enhance neuronal cell function. Lab investigations showed that intramuscular dextrose injection can induce phosphorylated extracellular signal-regulated kinase expression in dorsal root ganglion neurons expressing substance P [43].

2.3. D5W versus D15W

It is worth noting, however, that hypertonic sugar water injections such as dextrose 15% (D15W), as applied in prolotherapy, are avoided for muscle tears because these hyperosmolar injectates can cause local cell death (osmotic shock) and subsequent tissue damage [44]. In contrast to D5W, local anesthetics need to be added. Prolotherapy has been used for more than five decades in the US and worldwide. These hypertonic sugar water injections can lead to local proliferation of connective tissue, hence the term prolotherapy. These proliferant injections can be very effective in thickening and strengthening weak ligaments, tendons and bands [45]. Prolotherapy can be very interesting in well-chosen indications. These injections can also be given into a joint cavity, but then connective tissue proliferation is no longer in play [46], which means that the term prolotherapy is not applicable.
2.4. Clinical Case
The patient is a Belgian 22-year-old professional soccer player. He is playing in London for a few years. On August 2, he had a mild hamstring injury. It was not a sudden injury but rather developed over about a minute. He did not get ultrasound yet because he thought it was not so bad. A few days later, on August 8, he re-injured the same muscle in exactly the same region. Now, it was impossible for him to play soccer because of this injury. He came to Belgium to have ultrasound and glucopuncture treatment on short notice. The ultrasound on August 23 showed no muscle tear in the hamstring muscle. The radiologist concluded that it was a large grade 1 muscle pull without a major muscle tear. He received IM injections with sugar water 5% into the pain region. About 12 mL of GSW were applied in 12 spots in the muscle, using a 27 G needle (Fig.). Depth of injection was between 1 and 3 cm (0.4 – 1.2”). After the first session, there was immediate improvement regarding pain and stiffness in the area. He received a second session on August 25, before heading back to London. He had to travel to Portugal, so seeing his physiotherapist was not possible. If he would reinjure the same lesion, a third sessions could be considered.

3. Conclusion
Hamstring injury is a common sports injury in the young athlete which requires an individualized treatment to speed up recovery. In this article a soccer player with a fresh grade 1 hamstring injury was treated with regional sugar water injections into the muscular lesion. The goal of this paper is to invite the medical sports community to design randomized trials to confirm our clinical experience with this novel tool.

Compliance with ethical standards

Statement of ethical approval
Ethical approval was not required because the present article is not a research work on humans subjects but only a description of a specific treatment, as requested by the patient himself.

Statement of informed consent
Informed consent was obtained (for detailed case description and one photograph) from the individual participant included in this case study.

References


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