European Journal of Public Health Studies
ISSN: 2668 - 1056
ISSN-L:2668 - 1056
Available on-line at: www.oapub.org/hlt

DOI: 10.46827/ejphs.v4i1.109 Volume 4 | Issue 1 | 2021

THE EFFECT OF DEXTROSE PROLOTHERAPY ON PAIN IN CHRONIC LATERAL EPICONDYLITIS TREATMENT

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Abstract:
The literature describes two treatment modalities for persistent lateral epicondylitis: surgical and conservative. While there are numerous conservative therapy options, there is no consensus in the literature regarding the optimal treatment. Although no treatment guide has been formed in the literature regarding prolotherapy injection, which is one of the conservative treatment modalities, each clinic has created its unique treatment protocol. Highly concentrated dextrose and morrhuate sodium solutions are most commonly used for prolotherapy. In this study, Visual Analogue Scale scores of 37 patients who were treated with double session 15% dextrose before the first injection and 6 months after the last injection were measured and compared statistically. It was also aimed to show possible complications. This study aimed to show the effectiveness of prolotherapy, one of the conservative treatment methods that seem to be ahead of other injection models in chronic lateral epicondylitis treatment because it is easily applicable, easily accessible, and affordable, and contributes to the literature by creating a treatment protocol.

Keywords: lateral epicondylitis, prolotherapy, injection

1. Introduction

Chronic lateral epicondylitis (CLE) is the most likely cause for upper extremity problems to be referred to a health care facility (Verhaar, 1994). While it occurs at a rate of 1-2% in the overall population, it occurs at a rate of between 20 and 40% in athletes exposed to repetitive trauma and tension forces through sports such as tennis (Shiri, Viikari-Juntura, Varonen, & Heliövaara, 2006). Chronic lateral epicondylitis has become a serious health problem affecting daily social and business activities for patients (Kahlenberg, Knesek, & Terry, 2015; Michael Scarpone, Rabago, Zgierska, Arbogest, & Snell, 2008). Conservative

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treatment options have risen in popularity in CLE, which includes both surgical and non-surgical treatments. There are a large number of non-surgical treatment options for CLE. These include pharmaceutical treatments (anti-inflammatory medication that can be used both systemical and local), forearm splints and braces, manual therapies (dorsiflexion exercises), extracorporeal shock wave therapy (ESWT), low-level laser therapy (LLLT), and trigger point injections (Bellapianta et al., 2011; Sims, Miller, Elfar, & Hammert, 2014).

Numerous trigger point injections have been described in the literature. Autologous blood, platelet-rich plasma (PRP), botulinum toxin, ozone-oxygen solution, hyaluronic acid, prolotherapy, steroid, and local analgesics are the most well-known and widely used techniques (Louw, 2014). We will present our findings in this study about prolotherapy, a process that is less frequently utilized than other procedures but is more accessible and cost-effective. Prolotherapy is the injection of a hypertonic glucose solution into the injured tissue to stimulate inflammation, subsequent collagen deposition, and tendon remodeling (M. Scarpone, Rabago, Zgierska, Arbogast, & Snell, 2008). The purpose of this study was to assess the efficacy of repeated prolotherapy injections. In this study, we will discuss our findings of prolotherapy, which is less frequently used than other procedures while being more accessible and cost-effective.

2. Material and Methods

Patients with CLE who were treated with double session prolotherapy were screened and included retrospectively in this study. The study enrolled 37 patients (21 females and 16 males) between the ages of 22 and 62 who had a minimum of 6 months of pain and tenderness on the lateral epicondylitis, and distress on the epicondyle while resisting wrist extension. Each patient had a visual analog scale (VAS) score of >4 and had received at least one of the conservative treatments for pain and CLE (non-steroidal anti-inflammatory medications [NSAIDs], physiotherapy, bracing, or other local injections) but had not achieved the expected treatment result. The study excluded patients having a history of steroid injection, prolotherapy, PRP, ipsilateral neurological disease, coagulation issue or anticoagulant treatment, pregnancy, trauma, concomitant pathology, or any upper extremity surgery within the previous three months.

As a prolotherapy solution, 5 ml of 15% hypertonic dextrose was utilized. Patients were positioned supine or sitting with the elbow flexed at 90 degrees, and physicians applied prolotherapy solution along the lateral epicondyle along the bone where discomfort was palpated, as well as on the annular ligament using the peppering technique. To account for tissue healing and injection efficiency, the second treatment was delayed by 15-20 days. Patients were instructed to abstain from strenuous exercise for three months following the initial treatment. The mean duration of follow-up for patients referred for control was determined to be seven months. All patients' VAS scores were questioned, as well as their need for a second application.

2.1 Statistical analyzes

SPSS 25 (Statistical Package for Social Sciences) was used to analyze the data. For numerical variables, descriptive statistics were expressed as mean, standard deviation, and median (minimum-maximum), whereas for nominal variables, they were expressed as a number of observations and (percent). The Kolmogorov Smirnov test was used to determine the normality of the distribution of numerical data. The Wilcoxon test was used to determine whether there was a significant difference in terms of numerical variables that were not regularly distributed. The results were deemed statistically significant at the $P<0.05$ level.

3. Results

All patients received two prolotherapy injection treatments, with the second dosage administered about 20.18 days later. Seven months following the last injection, the baseline VAS score dropped from 7.40 (range, 5 to 10) to 1,29 (range, 0 to 3) (Table 1). A statistically significant difference was found between pre-injection VAS and control VAS ($p<0.001$).

Table 1: Demographic and clinical information of the patients

	n=37
Gender (F/M)	21 (56.8%) / 16 (43.2%)
Localization (Right/left)	23 (62.2%) / 14 (37.8%)
Complication	0
Age	41.03±9.57
Pre-injection VAS	7.40 (5-10)
VAS after 2nd injection	1.29 (0-4)
2. dose	20.19±2.45
Follow-up time	7 (6-9) months

4. Discussion

A large number of injection therapies have been defined as a conservative treatment method for chronic lateral epicondylitis diagnosis in literature. While the superiority of these treatment modalities over each other cannot be demonstrated clearly, a statistically significant improvement effect has been shown for all of them (Ebell et al., 2004; Reeves, Sit, & Rabago, 2016). We obtained significant benefits in terms of recovery in this study by using double sessions of prolotherapy, which is the most accessible, cost-effective, and has the fewest side effects of all injection treatments.

Prolotherapy has been used for a long time for the treatment of musculoskeletal injuries. The effect of prolotherapy on muscle and connective tissue regeneration and decrease in pain severity is still not clearly explained (Hackett GS, 2008; Yildiz, Apaydin, Seven, & Orscelik, 2016). According to the leading hypothesis on this subject, hypertonic dextrose may induce osmotic rupture in cells, while an increase in glucose in extracellular

tissue may result in an increase in growth factors in several types of human cells (Yildiz et al., 2016). Growth factors release-activated fibroblasts. These activated fibroblasts secrete new collagen fibrils, which are necessary for the healing of damaged ligaments and tendons, and healing is promoted (Hackett GS, 2008).

There is currently no documented treatment guideline for prolotherapy. Numerous clinics modify treatment methods based on their own experience. Hypertonic dextrose and morrhuate sodium solutions are the most often utilized hypertonic solutions in tendinitis for prolotherapy (Tenforde & Fredericson, 2011; Yildiz et al., 2016). In 2008, Scarpone et al. compared the efficacy of prolotherapy (11 % dextrose) in the treatment of chronic lateral epicondylitis to that of a control group receiving normal saline injections. They discovered a considerable improvement in pain and muscular strength (Michael Scarpone et al., 2008). By increasing the concentration of dextrose solution, we demonstrated statistically significant improvement (15% dextrose).

A large number of clinical studies have been conducted comparing prolotherapy with steroid injection, one of the most applied injection treatments for CLE. In 2011, Crayannopoulos et al. compared prolotherapy (1.2% phenol, 12.5% glycerine, and 12.5% dextrose in sterile water) with methylprednisolone 40 mg/mL in a double-blind randomized controlled study. Following a 6-month follow-up, they found significant recovery in the functional state of both groups and as a result, they showed prolotherapy treatment did not have superiority over steroid injection (Carayannopoulos, Borg-Stein, Sokolof, Meleger, & Rosenberg, 2011). However, in a study conducted in 2013 by Rabago D et al., while no significant difference was found between prolotherapy injection and steroid injection in terms of the pain scale, a significant function loss was found in the steroid group in terms of hand grip strength (13). Following a six-month follow-up, they observed a considerable improvement in both groups' functional status, demonstrating that prolotherapy treatment was not superior to steroid injection (14). However, in a 2013 study conducted by Rabago D. et al., while no significant difference in pain scale was observed between prolotherapy and steroid injection, a notable function loss in the steroid group was observed in terms of hand grip strength (Rabago et al., 2013).

4.1 Limitation

Our primary limitation was the small number of patients and the absence of a control group.

5. Conclusion

Prolotherapy is a highly successful and dependable treatment technique for CLE. Elbow pain has demonstrated a significant improvement. Its main benefit is its accessibility and economic affordability.

Conflict of Interest Statement

The authors declare no conflicts of interests.

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