Inclusion of Trigger Point Dry Needling in a Multimodal Physical Therapy Program for Postoperative Shoulder Pain: A Randomized Clinical Trial

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Abstract

Objective: The purpose of this study was to evaluate the effects of including 1 session of trigger point dry needling (TrP-DN) into a multimodal physiotherapy treatment on pain and function in postoperative shoulder pain.

Methods: Twenty patients (5 male; 15 female; age, 58 ± 12 years) with postoperative shoulder pain after either open reduction and internal fixation with Proximal Humeral Internal Locking System plate plate or rotator cuff tear repair were randomly divided into 2 groups: physiotherapy group (n = 10) who received best evidence physical therapy interventions and a physical therapy plus TrP-DN group (n = 10) who received the same intervention plus a single session of TrP-DN targeted at active TrPs. The Constant-Murley score was used to determine pain, activities of daily living, range of motion, and strength, which was captured at baseline and 1 week after by an assessor blinded to group assignment

Results: Analysis of variance showed that subjects receiving TrP-DN plus physical therapy exhibited greater improvement in the Constant-Murley total score ($P < .001$) and also activities of daily living ($P < .001$) and strength ($P = .019$) subscales than those receiving physical therapy alone. Between-group effect sizes were large in favor of the TrP-DN group ($0.97 < SMD < 1.45$). Both groups experienced similar improvements in pain ($P < .001$) and range of motion ($P < .001$).

Conclusions: Our results suggest that including a single session of TrP-DN in the first week of a multimodal physical therapy approach may assist with faster increases in function in individuals with postoperative shoulder pain.

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Key Indexing Terms: *Trigger Point; Shoulder Pain; Fracture; Rehabilitation*

Fractures of the proximal humerus account for between 5% and 8% off all reported fractures.[1-3] Recently, the incidence of proximal shoulder fractures has increased by approximately 15% per year resulting in substantial personal and economic burden to society.[4,5] The primary goal after a proximal humeral fracture is to eliminate pain and maximize function. It has been reported that around 80% of subjects experiencing a proximal humeral fracture can be treated conservatively; however, the remaining require surgical intervention.[1]

Surgical management strategies for proximal humeral fracture may include the placement of an intramedullary

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rod, shoulder arthroplasty, and, more recently, a Proximal Humeral Internal Locking System plate (PHILOS) has been used, which allows for angled stabilization and is attached with surgical screws.[6] Some studies have investigated the clinical results of a surgical intervention using the PHILOS plate after posthumeral fracture; however, not all individuals exhibit good outcomes, and most required postsurgical rehabilitation programs.[7,8]

A recent Cochrane systematic review found that immediate physical therapy resulted in better pain reduction and recovery compared with a group that began physical therapy after 3 weeks in patients with nondisplaced fractures.[9] In our anecdotal clinical experience, patients are usually referred to physical therapy postproximal humeral head fracture and surgical fixation using the PHILOS plate. However, none of the authors of this manuscript or the Cochrane Collaboration[9] could identify any published studies comparing the effects of various physical therapy interventions after such a procedure. Although no studies have examined the effects of physical therapy after surgery in this population, it is well known that many interventions are beneficial for the management of patients with general shoulder pain and function.

Another common surgical treatment used for the management of shoulder pain, particularly shoulder impingement, is a rotator cuff repair.[10] Rotator cuff repairs have an incidence ranging from 2.6 to 4.7 per 100 000 habitants[11,12] with an increase of 235% in the last decade.[13] Similar to a fracture repair with PHILOS surgical plate, rehabilitation programs are needed after rotator cuff repair surgery.[14] A Cochrane review found that physical therapy programs including mobilization combined with exercise are beneficial in the management of individuals with rotator cuff disease.[15] However, it also notes that more research is needed. More recent reviews concluded that there is no consensus for the optimal protocol for rotator cuff postsurgery rehabilitation.[16,17]

Because of either surgical procedure, soft tissues surrounding the shoulder area can be damaged. Surgery can be 1 potential mechanism for developing myofascial trigger points (TrPs).[18] Trigger points comprise hypersensitive spots in taut bands of skeletal muscles painful on stimulation and elicit a referred pain.[19] If they are active, TrPs cause spontaneous pain, and the elicited referred pain reproduces the symptoms experienced by patients. If they are latent, TrPs do not cause spontaneous symptoms, and the elicited referred pain reproduces none of the patient's symptoms.[19] We do not know the contribution of referred pain elicited by myofascial TrPs in postoperative shoulder pain and how early and management of the muscle TrPs would influence the clinical outcomes of these patients.

Using TrP dry needling (TrP-DN) has gained popularity in physical therapist practice for the management of several chronic pain conditions.[20,21] Recent evidence supporting the use of TrP-DN in various patient populations has increased. A recent meta-analysis by Kietrys et al[22] found that there is evidence for the effectiveness of TrP-DN for individuals with upper quadrant pain syndromes. However, it is not known if similar results would occur for patients' status postsurgical fixation of humeral fractures using the PHILOS plate or rotator cuff tear repair.

Early rehabilitation is usually claimed after shoulder surgery for preventing postoperative pain and stiffness; however, scientific evidence is conflicting.[23] The presence of active muscle TrPs in individuals with postoperative shoulder pain may delay proper rehabilitation outcomes in postoperative patients. Potentially, TrP-DN could help for better outcomes at the beginning of the therapeutic process and therefore lead to faster recovery.[24] Therefore, the purpose of this clinical trial was to compare the effects of including 1 session of TrP-DN in the first week of a multimodal physical therapy treatment on pain and function in individuals who experienced postoperative shoulder pain after a PHILOS procedure for proximal humeral fixation or rotator cuff tear repair to a group that did not receive TrP-DN. We hypothesized that individuals receiving TrP-DN into their first sessions of postsurgery rehabilitation program would exhibit greater improvements in pain and function than those patients receiving only conventional postsurgery physical therapy.

Methods

Participants

A randomized clinical trial was conducted (trial registered at ClinicalTrials.gov, NCT02122315). Patients with postoperative shoulder pain presenting to rehabilitation from September 2012 to March 2013 were eligible to participate in the study. Patients with proximal humeral fracture who underwent open reduction and internal fixation with PHILOS plate (Synthes, Switzerland) or with rotator cuff tear who underwent surgical repair were evaluated for eligibility criteria. All patients should experience their first attack of shoulder pain after the surgery and were naive to any treatment for postoperative shoulder pain. They were excluded if they exhibited any of the following: (1) no active TrPs were found; (2) multiple fractures; (3) previous surgery; (4) cervical radiculopathy/myelopathy; (5) diagnosis of fibromyalgia[25]; (6) having undergone any physical therapy intervention in the year before the shoulder surgery; (7) fear of needles; or (8) contraindication for DN, for example, anticoagulants or psychiatric disorders. The study protocol was approved by the local Human Research Committee of the Hospital General Universitario Gregorio Marañon (Madrid, Spain). All subjects signed an informed consent before inclusion in the study.

Trigger Point Diagnosis

Trigger point diagnosis was determined when all the following criteria were present[19]: (1) presence of a hypersensitive spot in a palpable taut band, (2) palpable