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Title Page

Title: Acute rotator cuff tendinopathy: Does ice or low load isometric exercise, or a combination of the two produce an analgesic effect?

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Introduction: Rotator cuff tendinopathies are the most commonly diagnosed musculoskeletal shoulder conditions and are associated with pain, weakness and loss of function [1]. Tendon swelling maybe associated with tendinopathy and may result from acute overload [2-3]. An increase in tendon cells (tenocytes) and upregulation of large molecular weight proteoglycans, such as aggrecan may increase tendon water content [2]. There is uncertainty as to whether the swelling is related to the pain or is an observed but unrelated phenomenon. Weakness detected clinically may be due to pain inhibition [4-5].

Early treatment of acute rotator cuff tendinopathy involves patient education, relative rest, and may include NSAIDs to reduce pain, swelling and inflammation. Subacromial corticosteroid injections are also used to achieve the same purpose. These techniques show low to moderate evidence of reducing short term pain but they do not improve function [6]. These medications have side effects such as gastrointestinal tract complaints [7], and corticosteroids may damage tendon tissue [8]. Identifying alternative ways to control pain and inflammation may be warranted.

Two clinical procedures to manage RC tendinopathy include ice wraps and isometric exercise however there is no empirical data supporting their use. This pilot study, conducted at the Illawarra Sports medicine Clinic NSW Australia, was designed to test (i) the short term analgesic effect of these interventions, and (ii) the feasibility of a larger clinical trial for adults diagnosed with acute rotator cuff tendinopathy (< 12 weeks).

Method: 13 women and 7 men, aged 20 to 67 (mean age 50 years) with unilateral shoulder pain (<12 weeks duration) and symptoms aggravated with active or resisted movement participated in the study. Inclusion criteria also comprised an unaccustomed increase in shoulder activity preceding onset of symptoms and evidence of tendinosis or bursitis on ultrasound imaging. Exclusion criteria included dominant biceps pain, frozen shoulder, full thickness or large partial thickness tears and traumatic onset of pain.

Participants were randomised to three intervention groups; (A) ice, (B) isometric external rotation (ER) exercises progressed from 3-5 times per day and from 10-20 seconds duration contractions, (C) combination of both group (A) and (B) protocols. Interventions were conducted for one week. Pain (VAS Scores), function (DASH scores), strength (forward flexion at 90°) and structural integrity (ultrasound) were measured pre and post intervention. The sonographer and chief investigator were blind to group allocation. Ethical approval (HE11/183) was granted from the University of Wollongong, New South Wales, Australia.

Statistical analysis: Mean changes, range and standard deviations were calculated for all outcome measures, and relative change was recorded where applicable. The intervention effect on all outcome variables was assessed via a repeated measures analysis of variance, with paired (time effects) and independent (group effect) *t*-tests used for *post hoc* analysis. All statistical analyses were conducted using SPSS software (SPSS 21 for Windows, Illinois, USA).

Results and Discussion: There were significant improvements ($p < 0.05$) in pain and function, isometric elevation strength at 90° and reduction in bursal size following

one week intervention Group (A) ice or (B) isometric ER exercise (Figure 1). There was no significant difference between the groups and no added benefit demonstrated when each therapy was combined (C).

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Reduction in bursal thickness (Figure 1c) was principally observed in Group (A) ice. This reduction may have the effect of reducing sub-acromial volume which may have influenced sub-acromial pressure. This suggestion however remains speculative.

Within Group B isometric ER exercise, a small reduction in tendon thickness was observed for 71% of participants following intervention (Figure 1d) although this was not statistically significant. Of these participants, 80% also demonstrated improvement in VAS post intervention. We speculate that ice and isometric exercise possibly target different structures or pain mechanisms.

As a pilot study our results are encouraging, however due to the small number of participants and lack of control group, they should be interpreted with caution and a definitive reason for pain relief cannot be extrapolated. Participants indicated that neither the treatment schedule nor the assessment procedures were excessive and they reported no adverse events. Our methodology is feasible for a study with a larger cohort.

References

1. Lewis JS. Rotator cuff tendinopathy. *Br J Sports Med.* 2009;43(4):236-41. Epub 2008/09/20.
2. Cook J, Purdam CR. Is tendon pathology a continuum? A pathology model to explain the clinical presentation of load-induced tendinopathy. *Br J Sports Med.* 2009;43(6):409-16.
3. McCreesh K, Lewis J. Continuum model of tendon pathology - where are we now? *Int. J of Exp Path.* 2013;94(4):242-7. Epub 2013/07/11.
4. Ben-Yishay A, Zuckerman JD, Gallagher M, et al. Pain inhibition of shoulder strength in patients with impingement syndrome. *Orthopedics.* 1994;17(8):685-8.
5. Wassinger CA, Sole G, Osborne H. The role of experimentally-induced subacromial pain on shoulder strength and throwing accuracy. *Man Ther.* 2012;17(5):411-5. Epub 2012/04/17.
6. Boudreault J, Desmeules F, Roy JS, et al. The efficacy of oral non-steroidal anti-inflammatory drugs for rotator cuff tendinopathy: a systematic review and meta-analysis. *J of Rehab Med.* 2014; 46(4):294-306.
7. Sostres C, Gargallo CJ, Arroyo MT, et al. Adverse effects of non-steroidal anti-inflammatory drugs (NSAIDs, aspirin and coxibs) on upper gastrointestinal tract. *Best Practice & Res Clin. Gastroent.* 2010;24(2):121-32. Epub 2010/03/17.
8. Dean BJ, Franklin SL, Murphy RJ, et al. Glucocorticoids induce specific ion-channel-mediated toxicity in human rotator cuff tendon: a mechanism underpinning the ultimately deleterious effect of steroid injection in tendinopathy? *Br J Sports Med.* 2014;48(22):1620-6. Epub 2014/03/29.

Figure Caption:

Figure 1: Rotator cuff tendinopathy symptoms treated by Ice (Group A), Isometric exercise (Group B) or Combined Treatment (Group C; * indicates a significant within-groups difference, $p < 0.05$).