



The effects of a conservative rehabilitation program for multidirectional instability of the shoulder



Lyn Watson, DPhysio^{a,b,c}, Simon Balster, BPhysio(Hons)^{a,c}, Ross Lenssen, BHSc^{a,b,c}, Greg Hoy, FRACS^c, Tania Pizzari, PhD^{b,*}

^aLifeCare Prahran Sports Medicine Centre, Prahran, VIC, Australia

^bLa Trobe Sport and Exercise Medicine Centre, La Trobe University, VIC, Australia

^cMelbourne Orthopaedic Group, Windsor, VIC, Australia

Background: Conservative management is commonly recommended as the first-line treatment for multidirectional instability (MDI) of the shoulder. Despite this, the evidence for efficacy of treatment is limited, and until recently, guidance for clinicians on conservative rehabilitation programs has been inadequate. This study evaluated the effectiveness of a physiotherapy-led exercise program for participants with MDI.

Methods: In a single-group study design, 43 participants (16 male, 27 female; mean age, 19.8 years, standard deviation, 4.9 years) diagnosed with MDI undertook a 12-week exercise program. Primary outcome measures were the Melbourne Instability Shoulder Score, Western Ontario Shoulder Instability Index, and Oxford Shoulder Instability Score. Secondary outcomes were strength and scapular position. All measures were taken at baseline and repeated at the conclusion of the program. Test differences before and after rehabilitation were evaluated with dependent *t* tests and single-group effect size calculations (standardized mean difference [SMD]) to provide a measure of the magnitude of the difference.

Results: Large effects were found between pre- and postrehabilitation scores on all functional instability questionnaires, with the Western Ontario Shoulder Instability Index demonstrating the largest effect (SMD, -3.04). Scapular upward rotation improved significantly in the early ranges of abduction (0°-60°), with moderate to large effects (SMDs, 0.54-0.95). All strength measures significantly improved, with large differences identified (SMDs, 0.69-2.08).

Conclusion: The identified improvement in functional status, shoulder muscle strength, and scapular positioning after rehabilitation allows greater confidence in the value of conservative management of MDI and informs further research by way of clinical trials in the area.

Level of evidence: Level IV; Case Series; Treatment Study

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*Reprint requests: Tania Pizzari, PhD, La Trobe Sport and Exercise Medicine Centre, La Trobe University, VIC 3086, Australia.

E-mail address: t.pizzari@latrobe.edu.au (T. Pizzari).

Multidirectional instability (MDI) of the shoulder is the presence of symptomatic inferior instability (sulcus sign) in addition to either or both of anterior and posterior dislocations or subluxations of the glenohumeral joint.^{24,43,47}

Conservative rehabilitation is generally considered to be the best initial management strategy for MDI,^{2,5,7,14,18,21,39,57} with the rationale that retraining of the dynamic shoulder stabilizers to maintain the humeral head centered in the glenoid may compensate for deficits in passive restraints. Despite this premise, the evidence for the benefits of rehabilitation programs for MDI is very low quality,^{37,61,62} and guidance on the content of rehabilitation programs implemented is limited.

Conservative rehabilitation programs traditionally recommended for MDI have focused on the rotator cuff.^{21,22,24,33} Others, such as the Rockwood program, have added exercises for deltoid and scapular stabilizers in a standardized format.¹⁴ Several authors have commented on the importance of scapular stabilizers in MDI,^{5,7,38} and the lack of scapular upward rotation considered a feature in this population has been implicated in the development of MDI.^{15,26,48,49,60} Proprioceptive and plyometric training aimed at rehabilitating the sensorimotor system in recurrent instability has been reported more recently.⁶

No randomized controlled trials (RCTs) to date have evaluated the conservative management of MDI, and the pre- and postintervention studies have substantial methodologic limitations^{61,62} or have only evaluated small numbers of MDI patients.^{6,14} As a first step to evaluating the effect of conservative rehabilitation, it was considered that a pre-post study design evaluating the effect of a rehabilitation program designed specifically for the MDI population, with outcomes measured using instability-specific scales, would be appropriate. Evaluation of the treatment protocol using a pre-post study allows the collection of evidence for treatment efficacy (or otherwise) before embarking on an RCT. The aim of this study was therefore to examine the effects of a conservative rehabilitation program (the Watson Program) on patient-reported shoulder function, muscle strength, and scapular position in patients with confirmed MDI of the glenohumeral joint.

Materials and methods

This was a single-group, pre-post study design with a blinded assessor and 1 treating physiotherapist. Participants were recruited for the study from patients presenting to or referred to Lifecare Prahran Sports Medicine Centre or Melbourne Orthopaedic Group, Melbourne, Australia. Participants were aged between 12 and 35 years of age, were willing and able to provide informed consent, and were diagnosed with MDI of at least 1 shoulder. The lower age limit was set at 12 years because MDI is a condition commonly observed in teenagers and young adults. The upper age limit minimized the potential confounder of secondary degenerative compensation.¹³ All patients, and guardians, where relevant, provided written informed consent.

Diagnosis of MDI was made by 1 of 2 experienced shoulder orthopedic surgeons. For the purposes of this trial, MDI was defined as symptomatic instability in 3 directions,^{1,25,34,47,51} including discomfort, pain, apprehension, or guarding during instability tests. Positive signs of inferior laxity were examined using the sulcus test,⁴ and anterior and posterior instability were established using the

anterior and posterior draw tests in 10° to 30° abduction and during 80° to 120° abduction^{4,20,59} and the anterior^{29,42,54,59} and posterior apprehension tests. These tests have adequate psychometric properties when symptomatic subluxation and apprehension symptoms are present.^{17,27,42,59}

Participants were excluded if there was any evidence of neurologic deficit, previous shoulder surgery, previously diagnosed connective tissue disorders, predominance of volitional instability, history of significant shoulder trauma, or evidence of bony, labral, or significant tendon lesion on magnetic resonance imaging (MRI). Individuals with a significant history of trauma are more likely to have a structural lesion and predominantly unidirectional pathology.³⁴ All participants underwent MRI (Philips Ingenia 3T scanner, Andover, MA, USA), and all images were read and reported on by the same senior radiologist.

Outcome measures

All participants were examined by an independent experienced shoulder physiotherapist (S.B.), during which the participants' presenting history, duration of symptoms, mechanism of onset, previous treatment, occupation, effect on occupation, and demographic data (age, sex, height, weight, affected side, arm dominance) were recorded. Patients were asked to rate their level of disability in their general daily activities using a 10-point numerical rating scale (NRS). Each participant was screened for the presence of generalized ligamentous laxity according to the protocol described by Beighton et al.⁹ The presence of generalized ligamentous laxity was considered with a score greater than 4 on this scale.⁸

Primary outcome measures—questionnaires

At this initial measurement session, each participant was asked to complete 3 shoulder instability questionnaires: The Melbourne Instability Shoulder Score (MISS), Western Ontario Shoulder Instability Index (WOSI), and Oxford Shoulder Instability Score (OISS).^{30,46,64} These 3 glenohumeral joint instability-specific questionnaires have been identified as the only 3 validated self-report scales specific to shoulder instability.⁵³

Secondary outcome measures

Scapular upward rotation

Scapular position at rest and upward rotation through abduction range of motion was measured according to a standardized protocol.⁶³ The technique uses 2 Plurimeter-V gravity referenced inclinometers (Dr Rippstein, Zürich, Switzerland). One inclinometer was positioned perpendicular to the shaft of the humerus, and the other was placed on the superior scapular spine. The angle displayed by the inclinometer on the superior scapular spine recorded the degree of scapular upward rotation at rest, at 30°, 45°, 60°, 90°, 120°, and 135°, and the end range of motion of glenohumeral abduction.⁶³ This outcome assessor (S.B.) has demonstrated good overall intratester reliability (intraclass correlation coefficient, 0.88) across the positions of abduction (intraclass correlation coefficient range, 0.81-0.94)⁶³ using this technique.

Scapular coordinates

Bilateral scapular coordinates at rest, 90°, and at the end range of motion of glenohumeral abduction were measured in centimeters

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