

# THE SHOULDER MEDIAL ROTATION TEST: AN INTERTESTER AND INTRATESTER RELIABILITY STUDY IN OVERHEAD ATHLETES WITH CHRONIC SHOULDER PAIN

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## ABSTRACT

**Objective:** The purpose of this study was to examine intertester and intratester reliability of the shoulder medial rotation test (MRT) and reliability differences depending on examiner expertise.

**Methods:** Seventeen athletes with chronic shoulder pain participated in the study. Four independent observers with different experience levels simultaneously rated MRT performance as “correct” or “incorrect,” after a standardized assessment protocol, the same day (for intertester reliability) and in a 7-day interval (for intratester reliability).

**Results:** The intratester reliability was admissible for 2 experts and one novice, with  $\kappa$  values ranging between 0.32 to 0.76 and poor for one novice ( $\kappa < 0$ ). Interrater agreement for all 4 assessors demonstrated slight agreement ( $\kappa = 0.06$ ; 95% confidence interval: 0.06-0.47), increasing to fair agreement ( $\kappa = 0.33$ ; 95% confidence interval: 0.21-0.69) when comparing the MRT findings between the 2 experienced assessors. Practice with the MRT in novices only marginally improved their level of agreement.

**Conclusions:** Reliability of the MRT for detecting movement control of the shoulder girdle was fair at best for experienced examiners and poor overall. Dexterity and repetitive performance of the test is necessary for correct interpretation of the MRT. (*J Manipulative Physiol Ther* 2014;37:198-205)

**Key Indexing Terms:** *Shoulder Joint; Physical Examination; Reproducibility of Results*

Shoulder disorders are the third most common musculoskeletal condition presenting in general practice after neck and low-back pain, with an estimated lifetime prevalence of 42% in people performing highly repetitive overhead motions.<sup>1</sup> Shoulder symptoms

are often persistent and recurrent, with 40% to 50% of patients reporting persistent symptoms after 6 to 12 months<sup>2</sup> and 14% of patients continuing care after 2 years.<sup>3</sup>

Altered dynamic control of the shoulder complex (ie, scapular dyskinesis) appears to be a significant factor contributing to shoulder dysfunction.<sup>4-7</sup> Consequently, evaluation of such control and treatment directed to its improvement forms currently an integral part of diagnosis and management of all shoulder disorders. Classification of movement control faults have been proposed to guide diagnosis and treatment of patients with shoulder pain.<sup>8-10</sup> For example, Caldwell et al<sup>10</sup> illustrated how an impaired movement system aids diagnosis in a patient with shoulder pain guiding the clinician in prescribing treatment.

Several movement pattern alterations have been detected at both the glenohumeral and scapulothoracic joints in people with shoulder pathology.<sup>4,6,7,11,12</sup> Specifically, lesser upward rotation, lesser posterior tilting, and greater internal rotation of the scapula have been consistently shown in subjects with shoulder pain of different etiologies.<sup>6</sup> Studies demonstrating differences in movement patterns for symptomatic shoulders usually applied expensive and specialized equipment (ie, full 3-dimensional motion tracking

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systems)<sup>13-15</sup>, making its application difficult in a clinical setting.<sup>12</sup> Therefore, feasible and reliable test maneuvers that have strong clinical utility to detect shoulder movement abnormalities are required.<sup>16</sup> Without them, clinicians cannot identify whether patients need interventions that are focused on retraining motor control at the shoulder region.

Movement control tests specifically designed to identify movement faults at the shoulder complex have been proposed, such as the dynamic rotary stability test or the dynamic relocation test<sup>17,18</sup>, but their reliability or validity remains to be established. Adequate levels of reliability have been reported for other tests such as the scapular dyskinesis test.<sup>19</sup> However, a recent systematic review questioned the validity of methods used to identify alterations in position and motion of the scapula, mostly due to their lack of correlation with symptoms.<sup>20</sup> One test suggested to evaluate optimal movement control and function of the shoulder girdle is the shoulder medial rotation test (MRT). The MRT is a dissociation or motor control test firstly described by Morrissey et al<sup>21</sup>, which assesses the patients' ability to actively dissociate and control scapular movement and glenohumeral translation during active glenohumeral internal/medial rotation.<sup>8</sup> The ideal pattern for the MRT has been described as a completion of 60° of medial rotation of the humerus, starting with the shoulder in 90° of abduction and in the plane of the scapula (30° anterior to the coronal plane), without any significant scapulothoracic movement (>6 mm) or glenohumeral anterior translation (>4 mm)<sup>21</sup>. Uncontrolled or excessive movement at the scapula or glenohumeral joint is considered a positive test. The most common movement faults identified during the test are uncontrolled forward tilt, downward rotation, or elevation of the scapula and excessive anterior translation of the humeral head. Uncontrolled scapular movement during active shoulder internal rotation is identified through excessive movement of the therapist middle finger placed on the coracoid process toward the ceiling (forward tilt), patient feet (downward rotation), or patient head (elevation), with the patient in supine. Excessive anterior humeral head translation is ascertained when the therapist index finger located at the humeral head moves excessively toward the ceiling during shoulder internal rotation. Moreover, presence of excessive movement at the scapula has been linked with risk of impingement, whereas uncontrolled anterior translation of the humeral head has been related with glenohumeral instability risk.<sup>21</sup> However, the validity of these assertions is unknown, as no study has evaluated possible correlations between positive results on the MRT and the prevalence or future incidence of those pathologies. In addition, as the scapula is stabilized by the weight of the body during the MRT, its assumed ability of dissociating scapular movement and gleno-

humeral translation during active shoulder medial rotation may be questioned.

Although accuracy of examiner palpation during the MRT was explored by Morrissey et al<sup>21</sup> with 3-dimensional ultrasound and motion analysis measures, agreement between different examiners when interpreting the test has not been previously examined. Nonetheless, some studies have used the MRT as part of their clinical assessment protocol of the shoulder girdle.<sup>22,23</sup>

The aim of this study was therefore to examine the intertester and intratester reliability of MRT in a population of overhead athletes with chronic shoulder pain. In addition, the possible influence of the therapists' clinical experience on the reliability of the MRT was also explored.

## METHODS

### Subjects

Seventeen athletes (11 men, 6 women), ages of 18 to 60 years (mean  $\pm$  standard deviation [SD], 30  $\pm$  7.27 years), height of 175.29  $\pm$  6.78 cm, weight of 70.64  $\pm$  9.23 kg, and 5 months of average shoulder pain duration, were included in this study. Table 1 shows the descriptive characteristics of the athletes. Recruitment was performed via notices distributed in the sports medicine sections of the Valencia Technical College and the University of Valencia. Besides presenting with a history of chronic shoulder pain (ie, shoulder pain lasting  $\geq$  3 months), athletes were required to play overhead sport (ie, volleyball, handball, and tennis) regularly (at least once per week), in an organized way and have at least 60° of passive shoulder medial rotation, measured in supine position with the scapula in the coronal plane and 90° of shoulder abduction.

Subjects were excluded if they had a history of surgery to the shoulder complex, upper thorax, upper back, or humerus in the past year or cervical radiculopathy.<sup>24</sup> Subjects were told to avoid any medication intake during the week before the study commencement.

All participants received an information leaflet and gave written informed consent before the study beginning. The study was approved by the Ethics and Research Committee of the University of Valencia (Spain), and the procedures were conducted according to the Declaration of Helsinki.

### Study Design

An interobserver and intraobserver reliability study of the MRT was conducted. Four assessors with different experience levels rated the MRT performance the same day (for intertester reliability) and at interval of 7 days (for intratester reliability). The 7-day interval was chosen as we considered that movement faults at the shoulder girdle, if present, should be revealed at 2 different points in time (day 1 and day 7). Subjects were told to continue with normal activity during the 7-day interval between the 2 measurement points. Two raters were clinical specialists in the field

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