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Scientific/Clinical Article

The scapular dyskinesis test: Reliability, agreement, and predictive value in patients with subacromial impingement syndrome

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ABSTRACT

Study Design: Prospective cohort.
Introduction: Assessment of scapular dysfunction is considered important in the clinical evaluation and treatment of patients with symptoms of subacromial impingement. However, sparse research has been conducted into the reliability and predictive value of clinical tests with which to identify scapular dyskinesis.
Purpose of the Study: To evaluate intrarater and interrater reliability and predictive value of the Scapular Dyskinesis Test (SDT) in patients with subacromial impingement syndrome.
Methods: Forty-five patients with subacromial impingement syndrome were included. The presence of scapular dyskinesis was classified by 2 raters using the SDT. Intrarater and interrater reliabilities were examined and compared. Patients with and without scapular dyskinesis were compared in terms of Oxford Shoulder Score and EQ-5D-5L scores at baseline and 3 months, as well rating of overall improvement in shoulder condition.
Results: SDT could not be performed in 5 patients, leaving 40 patients for further analysis. Kappa with squared weights was 0.64 for rater A and 0.86 for rater B; the intrarater agreement was 88% for A and 96% for B. For interrater comparison, the Kappa value was 0.59 and agreement 86%. No statically significant differences in Oxford Shoulder Score and EQ-5D-5L baseline and change scores or overall improvement in shoulder condition at 3 months were observed between patients with or without scapular dyskinesis.
Conclusions: Intrarater and interrater reliability and agreement of the SDT were determined. The findings that functional impairment and outcomes did not differ between patients with or without the presences of scapular dyskinesis may question the clinical value of the SDT in patients with subacromial impingement syndrome.
Level of Evidence: 1b.

Introduction

Abnormal scapular motion or scapular dyskinesis has been linked to a variety of shoulder pathologies.[1] Subacromial impingement symptoms in particular are thought to be affected by scapular position and motion. Clinical evaluation of scapular position and motion may therefore play an important role in the management of these patients.[2-4] A recently issued consensus statement recommends that scapular dysfunction be evaluated in the clinical assessment and rehabilitation of patients with shoulder disorders.[2]

A number of clinical tests have been developed to identify scapular dyskinesis. They can broadly be divided into visual tests (static or dynamic) and symptom alteration tests.[2,5] Although these tests are now widely adopted in clinical practice, recent systematic reviews report conflicting evidence supporting the clinical use of such tests, which is caused, among others, to poor reporting and to methodological shortcomings.[5,6] Furthermore, D'hondt et al[6]

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reported great diversity in the description, performance, and interpretation of similar tests and argued that authors should follow the original test description and procedure when evaluating the measurement properties of existing tests. Still, current literature seems to support the clinical use of standardized visual evaluation systems over symptom alteration tests.[5,6]

The Scapular Dyskinesis Test (SDT) is a dynamic, visually based test used to identify scapular dyskinesis.[7] In this test, the patient repeatedly performs active, weighted shoulder flexion and abduction while the clinician observes the scapulohumeral rhythm while standing behind the patient. The presence of scapula dyskineses is defined as an abnormal movement patterns, either dysrhythmia (the scapula demonstrates premature or excessive elevation or protraction, nonsmooth motion during arm elevation and/or lowering) or winging (medial border of the scapula and/or inferior angle of the scapula are posteriorly displaced away from the thorax). Based on the combined flexion and abduction test movements, the presence of scapular dyskinesis is classified as either not present (normal) or present (subtle dyskineses or obvious dyskinesis). The SDT classification system has shown moderate interrater reliability (weighted kappa 0.48-0.61, 75%-82% agreement),[7] and concurrent validity was demonstrated by 3-dimensional motion tracking system among college athletes.[8] However, measurement properties may vary by setting and population. Athletes have been shown to demonstrate a different pattern of scapular kinematics than the general population.[3] Moreover, the participants in these studies had only mild shoulder symptoms,[7,8] and none had sought treatment or been restricted in their participation in athletics. Therefore, these findings cannot be generalized to clinical populations; and further studies are needed to determine reliability, agreement, and the predictive value of the SDT in relevant patient population.

Purpose of the study

The objectives of the present study were to evaluate intrarater and interrater reliability and predictive value of the SDT in patients with subacromial impingement syndrome. We hypothesized that: (1) at least moderate levels of intrarater and interrater reliability and agreement of the SDT would be established and (2) patients with scapular dyskinesis would demonstrate greater functional impairments and poorer outcomes at 3 months than those without dyskinesis.

Methods

Study sample

Patients were recruited from rehabilitation units, physical therapy clinics, and one hospital in the Central Denmark Region. Inclusion criteria were being older than 18 years and having shoulder impingement syndrome as diagnosed by a medical doctor or physical therapist. Exclusion criteria were other shoulder pathologies, surgical treatment in the affected shoulder in the previous 12 months, mental disorders, or insufficient Danish language skills. A total of 74 patients were assessed for eligibility. Of these, 9 patients were excluded, 3 did not show up, 2 patients withdrew, 2 patients became ill, and 13 declined participation.[9] This left 45 patients for the present study. The study was approved by the Danish Data Protection Agency (No. 2015-41-4343), and all participants signed written informed consent forms. The regional research ethics committee determined that formal ethical approval was not required for this study (Act on Research Ethics Review of Health Research Projects, October 2013).[10]

Procedures

Data were collected using standardized clinical examinations and questionnaires at 3 different time points; T0 (first examination), T1 (within 2-4 days), and T2 (3-month follow-up). The clinical examination included an SDT assessment according to the procedure described by McClure et al.[7,8] In this test each patient was asked to perform 5 repetitions of bilateral active shoulder flexion and 5 repetitions of bilateral shoulder abduction. Test movements were weighted by 1.4 (3 lb) or 2.3 kg (5 lb) dumbbells; movements were performed on a 3-second count when elevating and lowering the arms. If the patients were not able to perform the test with weights because of pain, the test was performed without the weights. The examiner observed test movements while standing behind the patient, and the scapulohumeral rhythm was classified as either normal, subtle dyskinesis, or obvious dyskinesis. Clinical examinations were performed by 2 raters who were physical therapy students in their final semester, with 6 months of clinical experience as part of their clinical training but no prior experience with the SDT test procedure.

Before starting the study, the raters completed a brief standardized online training program http://gargoyle.arcadia.edu/ur/pt/Scapular_Dyskinesis_Test.pdf and pilot tested 20 patients with shoulder pain to familiarize themselves with the test procedures supervised by two experienced physical therapists with more than 10 years of clinical experience, including managing patients with subacromial pain. At T0 and T1, the patients were examined independently by each rater with a 1-hour rest in between the examinations. To reduce possible influence of same-day fatigue during clinical assessments, half of the patients were examined by rater A as the first tester and the other half by rater B as the first tester. The raters were blinded to their mutual test results and questionnaires. At the 3-month follow-up, clinical examination was performed once only by rater A.

Questionnaires, which included the Oxford Shoulder Score (OSS) and the general health status index (EQ-5D-5L) were completed by patients between the first and second clinical examination and before the 3-month clinical examination. The OSS ranges from 0 to 48, with 48 being the best outcome.[11,12] The scale contains 4 items related to pain and 8 items related to activities of daily living, each scored from 0 to 4 points. The reliability, validity, and responsiveness of the OSS have previously been demonstrated.[11-15] The EQ-5D-5L is a further development of the EQ-5D-3L questionnaire. It consists of 5 items regarding mobility, self-care, usual activities, pain/discomfort, and anxiety/depression[16,17]; scores are converted into values ranging from −0.6 to 1.0, with higher values representing better quality of life. Currently, no Danish index values are available for the 5-level version, but a crosswalk to the existing Danish EQ-5D-3L values has been established and was used in the presents study.[18,19] At 3 months, the patients were also asked to rate the overall change in their shoulder condition on a 7-point scale ranging from “much better” to “much worse,” and information on treatment received during the follow-up period was obtained.

Statistical analysis

Descriptive statistics were calculated for all variables. Percentage agreement and weighted kappa with squared weights (KW^2) were used to evaluate intrarater and interrater reliability and agreement.[20] For interrater comparison, the first examination day (T0) was chosen. Strength of agreement was interpreted according to the