CASE STUDY

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The management of rotator cuff tendonitis in a dancer

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Abstract

Introduction. Many forms of dance are associated with a high risk of injury due to the regular rehearsal of movements often with limited rest periods that may exceed normal range of motion and lower limb injuries are most prevalent. Aim of Study. This case study aimed to discuss the management of rotator cuff tendonitis in a dancer. Material and Methods. The patient was a female 24-year-old university dance student who attended a Sports Injury Clinic with a complaint of bilateral shoulder pain. The patient was reviewed by a physiotherapist who performed a subjective and objective assessment. Results. A diagnosis of rotator cuff tendonitis was made based upon the positive test for shoulder impingement and the reduction of these symptoms identified via a positive scapula assistance test and scapular retraction test. A positive empty can test, pain on abduction above 90° and pain on resisted abduction and tenderness were suggestive of involvement of the supraspinatus muscle. Conclusions. Management of rotator cuff tendonitis in dancers requires the identification of aggravating movements and the other underlying factors that can influence the development of this condition. A combination of pain relief, avoidance of aggravating activities and a gradual return to dance following a scapula stabilisation and rotator cuff strengthening programme proved successful.

KEYWORDS: shoulder, injury, dance, supraspinatus, scapula stabilisation, ballet positions.

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Introduction

Many forms of dance are associated with short sets of explosive movements requiring balance, athleticism, and artistry [20] which require strength, speed, power, agility, cardiovascular endurance, flexibility, coordination, and balance [2]. These movements are specific to the genre of dance and can include amongst others arabesque, jeté, sauté, plié and relevé within ballet and in modern dance may include stag, compass turn and fan kick movements. Regular rehearsal of movements often with limited rest periods that may exceed normal range of motion (ROM) may increase injury risk. Most dance injuries occur in the lower limb, with overuse and foot and ankle injuries the most prevalent [2, 9, 17]. Two systematic reviews [1, 13] have highlighted that most dance genres and levels are associated with a high risk of injury. During dance the shoulder region is less frequently injured however injuries can occur due to the requirement to perform manoeuvres such as lifts or load bearing on hands. Breaking is an unstructured dance style that requires gymnastic and acrobatic movements [19] and include demanding physical activities such as spins, splits, handstands and tumbling and is associated with shoulder injuries [5]. Breaking requires 'footwork' which involves rapid steps, 'freeze' which is the sudden halting of movement and 'power move' that requires the spinning of the entire body [5]. In ballet the requirements of 4th and 5th positon may potentially increase the risk of shoulder injury. Fourth position as described by the Royal Academy of Dance (RAD) requires one arm to be raised above the head at 90° while the other arm is at 45°. Fifth position RAD requires both arms

to be rounded and held above the head and therefore requires the arms to move above 90° shoulder abduction. One injury that can potentially develop from repetitive overhead movements is rotator cuff tendonitis which is an inflammation of the supraspinatus, infraspinatus, teres minor, and subscapularis tendons that compose the rotator cuff and in overhead sports can occur due to direct trauma, poor throwing mechanics or via falls on an outstretched arm [22].

Aim of Study

This case study aimed to discuss the management of rotator cuff tendonitis in a dancer.

Material and Methods

Subjective examination

The patient was a female 24-year-old university dance student who attended a Sports Injury Clinic with a complaint of bilateral shoulder pain. She was right handed and the pain was located at the anterior aspect of the right and left deltoid muscles. During consultation the patient indicated that 3 years earlier she suffered from shoulder pain at her left shoulder which had improved to some degree with osteopathy and a course of manipulation the specifics of which she could not recall. However, within the last 2 years she observed a gradual onset of worsening pain in both shoulders at the anterior deltoid region. For both shoulders there was no specific mechanism of injury however she had danced regularly using a contemporary or ballet style since the age of 8 years old. A family history of shoulder problems existed with her sister who also danced regularly having had a rotator cuff repair however her sister was unable to recall the specific details when asked by the patient. On consultation the patient reported an "ache" at rest of 2/10 on the Numerical Rating Scale (NRS) at the anterior deltoid region. Aggravating factors were identified as moving her arms above shoulder height particularly when she has to maintain a sustained position above her head for greater than 5 seconds. The ballet positons of 4th and 5th positon were problematic due to the requirement to move her arms above shoulder height. Rest and avoidance of aggravating movements were identified as easing factors. On occasions she had difficulty getting to sleep due to the pain and sometimes had to adopt pain relieving positions in bed which involved positioning of pillows under her shoulders. Her general health was good and the patient did on occasion take paracetamol for pain relief. The patient had not had any further investigation of her shoulders via X-ray or MRI. Following the subjective the physiotherapist performed an objective assessment. The participant gave their informed consent and the study was conducted in accordance with the Declaration of Helsinki and was approved the by the University Ethics Committee.

Table 1. Shoulder assessment

Active movements	ROM and pain	Passive movements	Resisted testing (Oxford scale)	Special tests
Right shoulder flexion	130°. Pain at 80° to 130° (4/10)	140°. Pain at 80° to 130° (4/10)	grade 4	acromioclavicular shear test [8]: negative
Left shoulder flexion	140°. Pain at 80° to 130° (4/10)	140°. Pain at 80° to 130° (4/10)	grade 4	scapular assistance test [15]: positive
Right shoulder abduction	125°. Pain at 80° to 125° (5/10)	145°. Pain at 80° (5/10)	grade 4	scapular retraction test [16]: positive
Left shoulder abduction	125°. Pain at 80° to 125° (5/10)	145°. Pain at 80° (5/10)	grade 4	Hawkins–Kennedy test [11]: positive
Right lateral rotation	60°, no pain	60°, no pain	grade 4	instability load and shift test [12]: negative
Left lateral rotation	50°, no pain	50°, no pain	grade 4	slap lesion, O'Briens test [18]: negative
Right medial rotation	T7, no pain	T6, no pain	grade 4	lift off test [10]: negative
Left medial rotation	T5, no pain	T5, no pain	grade 4	empty can test [14]: positive. Pain 7/10
Horizontal flexion	full ROM, no pain	full ROM, no pain	not tested	resisted abduction: positive. Pain 5/10

Note: All pain was reported using the NRS and was located at the anterior aspect of the deltoid. ROM was measured using a goniometer (Vivomed, Downpatrick, United Kingdom). Resisted testing used the Oxford Scale and movements were tested in standing and a supine position.

Results

Objective examination

On examination the right shoulder was slightly lower than the left with increased anterior rotation in comparison to the left side. Rounding of the shoulders was present. There was a normal kyphotic and lordotic curvature of the spine and no scapula winging was present. Cervical spine active and passive flexion, extension, side flexion and rotation were pain free and had full ROM. Left and right thoracic spine rotation was limited to ¾ ROM but pain free and the thoracic 5th and 6th vertebrae were stiff upon palpation. Scapulohumeral rhythm was abnormal on active shoulder flexion and abduction.

Discussion

Differential diagnosis

A provisional differential diagnosis of rotator cuff tendonitis was made based upon the positive test for shoulder impingement (Hawkins–Kennedy test) [11] and the reduction of these identified symptoms via a positive scapula assistance test [15] and scapular retraction test [16]. A positive empty can test [6], pain on abduction above 90° and pain on resisted abduction and tenderness at the supraspinatus tendon at its insertion at the greater tuberosity of the humerus were suggestive that the supraspinatus muscle was involved. All shoulder movements were rated as grade 4 (Oxford scale) suggestive of the development of a generalised weakness possibly due to the duration of symptoms and the fear of making symptoms worse through activity.

Management

The initial decision was to commence a course of physiotherapy with the aim of improving the patients' symptoms and at this stage further investigation via imaging was not considered. In rotator cuff tendonitis the tendons develop a swollen, hypercellular appearance associated with a disorganised collagen matrix and increased nerve density and vascularity which can result in proliferation and cell death [24]. Supraspinatus tendonitis can progress to a full rotator cuff tear and this has been observed at the time of surgery in patients with reoccurring tendinopathy [23]. It was reported in a systematic review that a therapy-based approach that avoids surgery is the optimal option for rotator cuff injury [7] and therefore a conservative approach was advocated initially in the case of this patient. A further systematic review and meta-analysis [21], suggested physiotherapy was effective for the treatment of subacromial impingement which was potentially an aggravating factor in the development of the injury. Therefore, the choice of physiotherapy was supported and following discussion with the patient it was clear that previous osteopathy treatment had focussed on manipulation techniques with little consideration of pain relief, avoidance of aggravating activities, scapula stabilisation and rotator cuff strengthening.

Pain relief and avoidance of aggravating activities

The first aim of management was to treat the tendonitis which could potentially be achieved via a number of options including ice treatment, avoidance of aggravating activities, the use of nonsteroidal anti-inflammatories, glyceryl trinitrate patches, electrotherapy, acupuncture and corticosteroid injection. These approaches have a varying evidence base and following discussion with the patient it was decided that the best approach initially would be ice treatment and avoidance of aggravating activities. The patient was reluctant to try any form of pharmacological approach. The patient stopped dancing completely for 2 weeks and maintained their cardiovascular fitness via regular gym based cycling 4 times per week which would not aggravate the shoulder joints and followed their normal lower limb strengthening and core stability work programme 4 times per week. The patient also commenced ice application using ice wrapped in a damp towel (15 minutes, 4 to 6 times daily). This treatment schedule was selected as it was deemed that the patient would have the time available to achieve this. Following this 2-week period they returned to dance with the instruction to avoid shoulder movements above shoulder height (90°).

Scapula stabilisation and rotator cuff strengthening

The second aim involved the correction of abnormalities that had been identified during assessment and included supraspinatus muscle weakness and inefficient scapulohumeral rhythm. The patient was provided with a series of scapular stabilisation exercises with the rationale that this would improve the performance of overhead movement based on the concept of kinetic chain and that fatigue may alter movement performance and increase injury risk. Four specific exercises were selected which have demonstrated activity in scapula stabilising muscles namely the scapular clock, low row, lawn mower and inferior glide [17]. The patient agreed to perform 3 sets of 6 reps of each exercise at least 4 times daily as they believed this was achievable and the physiotherapist believed that a joint goal setting approach was more likely to be effective than a prescriptive approach.

Following their initial assessment, the patient continued with this treatment programme and attended on two more occasions and on both occasions indicated that their pain levels had reduced to pain free movement when they attempted aggravating movements described previously. Following these reassessments, the decision was made to start progressing to movements above shoulder height via the development of closed chain exercises and further strengthening of the rotator cuff. At this point the patient was provided with exercises including isolated rotator cuff exercises and light resistance work using machines progressing to dumbbells including bench presses and pull downs. The patient was encouraged to focus on alignment, technique and joint stabilisation. One month following these sessions the patient made contact to state that they had returned to their previous dance schedule and they were encouraged to continue with their rehabilitation programme and make contact regarding any potential issues.

Other considerations

The family history of shoulder problems and rotator cuff repair described by the patient's sister may indicate that potentially this case could relate to issues with primary external impingement from structures that may encroach in the subacromial space. This can include congenital abnormality of the acromion which may present as excessively beaked, curved or hooked [3]. If the patient did not make adequate progress, then this potential cause could be considered further via referral for an x-ray.

The finding of reduced thoracic rotation and stiffness at T5/6 could potentially relate to the reduced ROM at both shoulders based on a concept of regional interdependence and may also have contributed to the development of the injury. If the patient did not make sufficient progress, then treatment of the thoracic spine could be considered via a manual therapy approach which has previously been advocated to reduce shoulder impingement symptoms [4]. However, as the evidence base for manual therapy is variable and potentially increases reliance on the physiotherapist from the patient it was decided that encouraging thoracic rotations and arm opening exercises would be advocated initially and would potentially aid restoration of a normal kinetic chain without the need to resort to manual therapy techniques.

Conclusions

Although lower limb injuries are more prevalent in dancers the requirement for overhead movements particularly in 5th position, partner lifting and weight-bearing through the hands can lead to the development of shoulder injuries. In breaking, the use of handstands and tumbling and power movements can also increase the risk of shoulder injury [5]. Management of rotator cuff tendonitis in dancers requires the identification of aggravating movements and the other underlying factors that can influence the development of this condition. In this patient a combination of pain relief, avoidance of aggravating activities and a gradual return to dance following a scapula stabilisation and rotator cuff strengthening programme proved successful.

Conflict of Interests

The author declares there was no conflict of interest.

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