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Scapular Muscle Tear in a Young Female

A Case Report

Capstone Project

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**Abstract:**

Faulty scapulohumeral rhythm can be commonly seen in the outpatient physical therapy setting particularly in patients diagnosed with shoulder pain. This faulty rhythm is more commonly referred to as scapular dyskinesis and described as an alteration in static scapular position and dynamic motion.<sup>1</sup> Such scapular abnormality leads to a loss of proximal stabilization of the upper kinetic chain.<sup>2</sup> The importance of scapular stabilization to establish a proximal base of support for the glenohumeral joint has been investigated extensively.<sup>3-6</sup>

There is a growing body of literature associating abnormal scapulothoracic kinematics with a variety of shoulder pathologies including: shoulder impingement, rotator cuff tendinopathy, rotator cuff tears, shoulder instability and adhesive capsulitis.<sup>7-11</sup> Given the contribution of the scapula to the normal movement pattern and stability of the shoulder, assessing scapular movement and position is considered an important part of the clinical examination of the shoulder complex.<sup>12</sup>

Presently, there is a paucity of research regarding the effect of scapular muscle tears on medial scapular border pain, scapular dyskinesis and upper extremity function. The purpose of this study is to examine a one subject case report regarding the differential diagnosis and treatment of a scapular muscle tear and to bring forth preliminary information in the treatment of scapular muscle tears.

This will be presented as a single case report based on a patient treated in an outpatient orthopedic setting. The patient was followed for Physical Therapy treatment both pre-operatively and post-operatively. Measuring tools within the case report include: the numeric pain rating scale, manual muscle testing, and the American shoulder and elbow surgeons shoulder scale. Findings in the assessment of scapulohumeral rhythm and manual muscle testing confirmed provocation of the patient's pain despite the lack of significant findings with MRI. Both the numeric pain rating scale and the American shoulder and elbow surgeons shoulder scale offer data regarding significant decreases in pain and improved upper extremity function post

surgically. The duration of treatment for this patient from time of injury to surgical intervention extended over a time frame of approximately two years.

## **Introduction:**

Shoulder pain is a very prevalent musculoskeletal disorder with a lifetime prevalence of up to 66.7%.<sup>6</sup> The scapula is attached to the thorax by the clavicle and muscular attachments. A critical function of the scapula is its role as an area of force transfer and shoulder stability facilitating upper extremity function.<sup>13</sup> Upper extremity function depends on a stable base that creates proximal stability for distal mobility while at the same time offering mobility to allow for positions and motions necessary for functional use of the upper extremity.<sup>14</sup> The glenohumeral joint hangs by a very small strut via the sternoclavicular articulation. This paucity of boney support gives weight to the role the musculature of the scapula holds.

Differences in scapular kinematics have been found in individuals with shoulder instability, rotator cuff tears, and impingement syndrome.<sup>7,15-17</sup> Alteration of scapular stabilization to establish a proximal base of support for the glenohumeral joint has been established as a contributing factor in shoulder pain.<sup>5,7-8</sup> Also contributing to shoulder pain is fatigue in the muscles responsible for scapular retraction. Fatigue leads to decreased force production of the rotator-cuff muscles and contributes to glenohumeral internal impingement.<sup>18,19</sup> Exercise-induced fatigue of the scapular-retractor muscles, per the research done by Tyler T et al<sup>20</sup> revealed a decreased torque production in external and internal shoulder rotation in both the impingement group and the control group. These findings emphasize the importance of the scapular retractors for proper function of the shoulder rotators particularly with the arm in an abducted position.

Scapular dyskinesis is a term that refers to dysfunctional movement of the scapula and can be seen in various shoulder conditions such as impingement,

instability, labral and rotator cuff injuries, neck pain and whiplash-associated disorders.<sup>1-</sup>

<sup>9</sup> Per Dr. Ben Kibler, scapular dyskinesis is found to be a generalized response to a variety of pathologic shoulder conditions with no specific scapular position associated with a specific shoulder diagnosis. Kibler further links a lack of scapular stability to glenohumeral instability and notes that when scapular stabilizers fatigue, the glenoid fossa of the humerus is not positioned properly and harmful stress can be placed on the anterior capsule of the glenohumeral joint. These harmful stresses can lead to instability of the shoulder as well as pain. Scapular muscle tears can be a one of the causes for lack of proper scapular muscle stabilization.

Individuals who fall into the subgroup of patients with medial scapular pain due to scapular muscle tears do not fit the clinical findings of patients presenting with neurological problems due to nerve palsies of the long thoracic, accessory or dorsal scapular nerves.<sup>21</sup> Kibler further describes that each patient in the cohort of scapular muscle tear present with the following clinical history and physical examination findings:

- (1) A traumatic or disruptive event to the scapular stabilizing structures on the medial border with early manifestation of symptoms, (2) pain of a high degree of intensity localized along the appropriate area of the medial border, (3) frequently a palpable defect in the area of pain, (4) weakness and arm dysfunction in positions that require scapular control against arm position (forward flexion, overhead motion, push/pull), (5) substantial but temporary relief of symptoms on clinical examination by manual scapular stabilization, (6) nonresponsive to therapeutic and medication interventions, and (7) a consistent group of surgical findings.

At this time, per Dr. Kibler, the diagnosis of scapular muscle tear remains a clinical one.

### **Case Presentation:**

The patient to be addressed within the case study is a 22 year old female without significant past medical history or co-morbidities. She sustained a trauma to her right scapula in August of 2010 while playing golf and aggressively attempting to get a

ball out of a steep sand trap repeatedly. Following this episode, the patient had an immediate onset of constant right medial border scapular pain.

When the patient was referred to me with right periscapular pain, she had already had the following medical interventions: chiropractic treatments without improvement, family physician diagnosed right shoulder muscle strain and referred patient to physical therapy where her treatment involved electric stimulation, deep tissue work, heat, arm ergometer and open chain upper extremity strengthening with theraband. With this treatment approach the patient noted that her symptoms were worse. The patient again sought assistance from her family physician due to unrelenting pain in the medial border of her right scapula and was referred to an orthopedic surgeon who diagnosed the patient with right shoulder weakness. Both cervical and right shoulder MRIs were ordered with subsequent negative results and the patient was sent for further physical therapy treatments. During the second round of physical therapy, the physical therapist questioned a possible tear of the rhomboid due in part to just having treated a patient with a similar clinical presentation who was seen in Lexington, Kentucky for a muscular repair of the rhomboid. The second course of physical therapy was unsuccessful in decreasing the patient's pain or improving function. Following a consult call to the Shoulder Clinic in Lexington, Kentucky by the physical therapist the patient was referred to a different orthopedic surgeon. This surgeon sent the patient for a third round of physical therapy this time at the clinic where I work.

A thorough history was obtained from the patient prior to the physical evaluation. The numeric pain rating scale was used to quantify the patient's pain level. This rating of pain has been reported by Katz and Melzack in their research regarding measuring pain.<sup>22</sup> Due to pain being a personal and subjective experience, these authors found patient's self-reports to provide the most valid measure of the experience. Paice and Cohen<sup>23</sup> looked at the pain numeric rating scale (NRS) and found a correlation between the visual analog scale (VAS) and the NSR that was statistically significant with  $r = 0.847$ ,  $p < 0.001$ , supporting the validity of the verbally administered NRS.

The patient's initial pain rating using this scale was 8/10. She described her pain as being constant in the posterior right medial shoulder blade. Symptoms increased with

sitting, laying on the right side, lifting and use of the right upper extremity particularly with activities with the right arm away from the body. Mild relief of symptoms was noted with the use of Aleve and Vicodin. The patient also completed the American shoulder and elbow surgeons shoulder scale (ASES). This self report scale assesses pain and function subscores based on a total of 50 points each, with a maximum total score of 100 points. This form was filled out by the patient pre-surgery, post surgery and at her one year follow- up (table 1). The ASES, as reported by Michener et al, has been determined to be a reliable tool based on test-retest reliability (intraclass correlation coefficient 1-way random effects of 0.84; 95% CI lower limit, 0.75).<sup>24</sup>

Postural assessment of the patient, revealed moderate forward head posture, anterior positioning of the right humeral head and an elevated right scapula compared to the left. Both medial and inferior scapular winging were noted in the right scapula in static posture.

Standing assessment of shoulder movement revealed full excursion in range of motion in all planes including: flexion, extension, abduction, hands behind the head, hands behind the back and horizontal adduction. Visual observation of scapular movement particularly during flexion (refer to figure 1) and abduction revealed significant right scapular dyskinesia compared to the noninvolved left upper extremity. The patient's pain and aberrant movement in the right scapula were further pronounced by placing three pound dumbbells in her hands. The use of weights was incorporated into the assessment of scapular dyskinesia per work done by McClure.<sup>25</sup> This author assessed scapular dyskinesia as a causative factor in shoulder injuries. His work added to the body of clinical methods for detecting scapular dyskinesia by determining interrater reliability for assessment of scapular dyskinesia. The results of his work, to detect scapular dyskinesia using a self-instructional format with standardized operational definitions and videotaped examples of normal and abnormal motion, showed a percentage of agreement between 75% and 82% and a weighted kappa range from 0.48 to 0.61.

After confirming provocation of symptoms with resistance, the scapular assistance test was assessed. This test assists with upward scapular rotation and

posterior tilt as the patient elevates the arm.<sup>26</sup> A positive test incriminates the scapular dyskinesis in producing the symptoms. Use of this test, while the patient went through active shoulder flexion and abduction resulted in a decrease in symptoms per the patient's report particularly in the eccentric lowering phase.

Due to the patient's faulty head carriage a scan of the cervical spine was addressed using Cyriax's selective tissue tension testing<sup>27</sup> for cervical active range of motion and passive range of motion with overpressure. Per Pettman,<sup>28</sup> resistance was assessed with the cervical muscles in their lengthened position. Further testing of the cervical spine included compression, distraction, quadrant positions, and key upper extremity muscle tests. None of these tests produced a positive response.

Clinical assessment was then directed to test the muscular contractile response with manual muscle testing to the scapular muscles as per Kendell.<sup>29</sup> Manual muscle testing for the right rotator cuff was unremarkable, however, muscle testing to the right middle trapezius, lower trapezius, and rhomboid were weak and reproduced the patient's pain. (Figures 2 and 3)

Palpation along the right medial border of the scapula produced exquisite pain from the mid to lower vertebral border.

A clinical decision based on possible tear of the right scapular musculature was made on the following basis: history of incriminating trauma, negative cervical MRI and right shoulder MRI, initial and persistent symptoms located at the medial border of the right scapula, inability to use the right upper extremity away from the body, weak and provocative muscle testing of muscles originating on the medial scapular border, thoracic spinous processes, and apex of spine of the scapula, and palpation findings of a persistent area of edema and pain along the lower right vertebral scapular border. The patient was referred to Dr. Ben Kibler for further assessment with subsequent scapular muscle repair being performed on 2-21-2012, eighteen months following her initial injury.

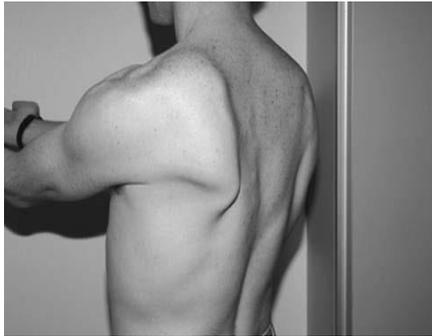


Figure 1. Left scapular dyskinesia in standing during shoulder flexion

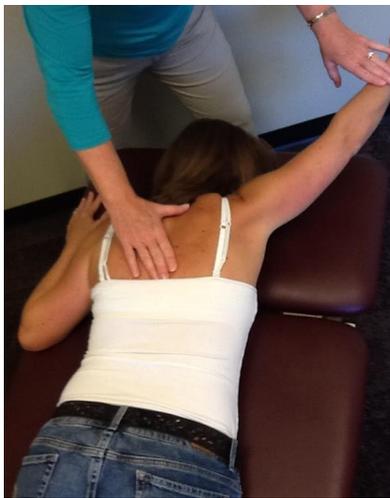


Figure 2. MMT lower trapezius



Figure 3. MMT rhomboid

**Table 1. ASES Scores**

Pre surgery pain value	Pain score out of 50	Function Value	Function score Out of 50	ASES Total Out of 100
8	10	14	23	33
Post surgery pain value (discharge)	Pain score Out of 50	Function Value	Function score Out of 50	ASES Total Out of 100
2	40	19	32	72
Follow-up at one year	Pain score Out of 50	Function Value	Function score Out of 50	ASES Total Out of 100
2	40	22	37	77

## **Discussion:**

This patient presented with all of the clinical history and physical examination findings noted by Kibler in the cohort of scapular muscle tear presentations based on his work in the surgical treatment of medial scapular muscle detachment.<sup>21</sup>

It was determined, by this therapist, that the previous resisted open chain exercise the patient was prescribed failed due to the lack of proximal muscle stabilization by the scapular muscular due to the tear(s). The patient was therefore instructed in closed chain exercises in standing with the right upper extremity being supported by a table or countertop. The emphasis during the performance of the exercises was placed on the proximal scapular muscles without an increase in symptoms and dosed below the level of muscle fatigue or increase in visible right scapular dyskinesis. Over the next several weeks of performing closed chain exercises, the patient noted a mild decrease in right scapular symptoms, however, she was unable to progress the initial exercises in any way due to increase in pain. At that point, the patient was scheduled with Dr. Ben Kibler for consultation in Lexington, KY. On February 21, 2012, eighteen months after her initial injury, the patient underwent surgery for muscular reattachment of her right lower trapezius and rhomboid.

Scapular muscle tears can be a painful, debilitating, and poorly diagnosed condition due to the present lack of research. The exquisite pain, which persists following the initial onset, is in and of itself a clinical flag. Once the supporting balance of the scapular musculature is lost, the ability of the individual to use the affected upper extremity away from the body is impaired and persists until surgical intervention and correction. The reattachment of musculature to the medial scapular border results in significant decrease in pain, improved upper extremity function and improved quality of life. At this time, proper treatment is delayed by the lack of a concise diagnosis incriminating the scapular muscle tear. This lack of a proper diagnosis leads to an extended period of time between tissue failure and effective treatment. To date, there is a lack of information and research regarding the diagnosis and treatment of scapular muscle tears within the Physical Therapy profession.

At this time, Dr. Ben Kibler is the only orthopedic surgeon in the United States performing surgical repairs of scapular muscle tears. In the past eight years, Dr. Kibler has performed 173 surgical scapular muscle repairs. His preliminary research on this subject has recently been approved for publication in the Journal of Shoulder and Elbow Surgery.

**Conclusion:**

It is the very infrequency that the injury of medial scapular muscle tear(s) is acknowledged in the present literature that offers its need for further research. In addition to increasing the present body of information, further research into the assessment and treatment of scapular muscle tears could include confirmation of the clinical findings as outlined by Dr. Kibler to a greater patient cohort and the possible use of diagnostic muscular ultrasound to confirm detachment of the musculature from the medial scapular border to assist the clinical diagnosis.

This case study would potentially be submitted to the Journal of Orthopedic and Sports Physical Therapy for publication to contribute to a body of knowledge informing Physical Therapists about scapular muscle tears as well as open the exploration of scapular muscle tears for future research studies.

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