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CASE REPORT

MOTOR CONTROL TRAINING FOR AN AMATEUR BASEBALL PITCHER WITH ISOLATED PARALYSIS OF TRAPEZIUS: A CASE REPORT

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ABSTRACT

Study design: Case report.

Background: A case of an athlete with accessory nerve injury has not been previously reported although there have been a number of case reports and case series of non-athletes with accessory nerve injury. This case study reports motor control intervention for an amateur baseball pitcher with isolated paralysis of the right trapezius who lost pitching control after changing his pitching technique. The subject was able to restore ball control during overhead throwing after physiotherapy.

Case Description: The subject of this case report was a 20-year-old amateur male baseball pitcher, who presented with long-standing isolated paralysis of the right trapezius and a six month history of loss of ball control with shoulder pain during pitching. He was seen for a second opinion following unsuccessful conservative management and underwent physiotherapy to restore his ball control during pitching. Restriction of cervical rotation range of motion and decreased position sense during shoulder abduction and external rotation were revealed in the physical examination. Proprioceptive exercise was commenced with and without visual feedback to acquire a reproducible abduction angle in the cocking phase of a baseball pitch. His pitching form was modified to ensure his arm was being raised effectively in the cocking phase. Pitching drills that were utilized were targeted motor control of the upper quarter, and were progressed in steps. Cervical joint mobilization was undertaken to allow adequate range of motion for visualization of the target while pitching.

Outcomes: His position sense and cervical range of motion were restored. His pitching control was restored with conservative therapy on by the eighth week of intervention.

Discussion: The subject was able to return to competitive level of amateur baseball with accurate ball control. This case report demonstrates that achievement of control of a skilled upper quarter activity, such as baseball pitching, is possible with conservative management even in the presence of paralysis of trapezius, a major contributor to the movement.

Level of Evidence: 4 (single case report)

Key Words: Amateur baseball pitcher, ball control, isolated trapezius paralysis, proprioceptive exercise

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BACKGROUND AND PURPOSE

Paralysis of trapezius has been reported from damage to the accessory nerve occurring during lymph node biopsy, removal of lymph glands, rhytidectomy and minor tumour, carotid endarterectomy, median sternotomy, stretch injury, and war wounds.[1-7] Spontaneous onset of trapezius paralysis has also been reported.[8] Patients with paralysis of trapezius report severe shoulder and axillary pain, difficulty with overhead activities, combing hair, reaching for an object and maintenance of the position of the upper extremity in 90 degrees of abduction,[3,5,7-9] as trapezius has a critical role in elevating and stabilizing the scapula within the shoulder complex. Scapular control during overhead activity in abduction is achieved by contributions from all fibers of the trapezius.[1,5,10,14] However, in addition to insufficient scapular control during movement mentioned above, paralysis of trapezius results in malalignment of the scapula. Scapular internal rotation and excessive abduction are observed during shoulder abduction if the trapezius is paralyzed.[4,6,9] Paralysis of upper fibbers of trapezius results in a scapular alignment that is significantly depressed, protracted and rotated inferiorly (downward rotation) in upright posture.[15] In chronic cases, trapezius paralysis can lead to superior instability of the sternoclavicular joint and inferior instability of glenohumeral joint.[15]

Poor prognosis of conservative management for trapezius palsy has been reported, especially for highly active patients, since the other scapular muscles are unable to substitute for the role of trapezius. [1,8]

There has been no case study reported in relation to an athlete with paralysis of trapezius although there are case reports of conservative therapy in accessory nerve injury. [2,4,8,16] This case study reports motor control intervention for an amateur baseball pitcher with isolated paralysis of the right trapezius who lost pitching control after changing his pitching technique.

CASE DESCRIPTION

The subject was a 20-year-old (187 cm, 77 kg) male, amateur baseball pitcher, with isolated and complete paralysis of all portions of the right trapezius. His right accessory nerve had been paralyzed as a result of cervical lymph node biopsy performed when he was eight years old. He was unable to do gymnastics well at physical education class during his school days; however, he was not impaired for most daily functional activities.

He started to play baseball as an infielder when he was ten years old, switched to tennis between the ages of 13 and 15 years, returning to baseball as a pitcher at age 15. He belonged to a youth team between the ages of 15 to 19. His pitching style was overhand throwing and his maximum ball speed was 130 km/h.

He had a six-month history of loss of ball control with moderate pain over the medial side of his right scapula (numerical pain scale: NPS 4/10) following ball release. His presenting problem began 18 months previously, following advice from his coach to change his pitching style from overhand to sidearm throwing. Prior to this, he had no shoulder problems associated with pitching. Following the coach's recommendation, he pitched with a sidearm technique for a few days only but aborted pitching due to the onset of severe pain, over the medial aspect of his right scapula during the follow through phase of his pitch. He sought no treatment but rested from pitching for approximately six months, following which, he attempted to resume baseball with his previous overhand technique, but noticed that his ability to control flight of the ball had diminished. In addition, he reported a sense of instability on the right glenohumeral joint and discomfort throughout the right trapezius during the follow through phase. There was severe deep anterior shoulder pain (NPS 7/10) in the morning following a pitching session although the feeling of instability and trapezius discomfort did not last after pitching. He had previously attended physiotherapy at a local hospital, where he was given conventional exercises for strengthening his scapular muscles. However, he abandoned the exercise program a few months later as his ball control was not restored and his pain was not improved. He was admitted to our institution for a second opinion and underwent physiotherapy to restore his ball control during pitching.

There were four chief complaints: (1) loss of ball control when pitching with return to an overhand technique with deep anterior shoulder pain the morning following a pitching session, (2) difficulty raising his elbow in the cocking phase of the pitch and (3) similar severe deep anterior shoulder pain on the next training day, (4) with insufficient elevation of his elbow, his shoulder felt unstable from the cocking phase through follow-through and he lost accuracy of the throw. These complaints translated to a Patient Specific Functional Scale, (0-10 scale where 0 equates to a total inability to perform the activity and 10 equates to full function) score of 5-6 in pitching.

INITIAL CLINICAL IMPRESSION

The cause of the subject's medial scapular border pain was hypothesised to be a muscle strain of the fibers of middle trapezius and/or rhomboids because of the area of his symptoms and the aggravating activity of side arm throwing. However, there was no way to evaluate since the pain was already improved on the first day of physiotherapy.

In order to address the loss of control and anterior shoulder pain, examination of active shoulder movements and analysis of his pitching technique were planned. As a further hypothesis, his difficulty in raising his right arm combined with his sense of instability in the late cocking phase of the throw may be a consequence of altered scapular control resulting from the medial scapular pain. The evaluation of joint position sense in a position that replicated the cocking phase was considered appropriate.

EXAMINATION

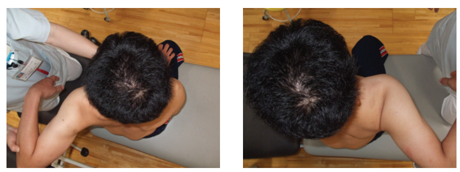
On observational posture analysis, the right scapula appeared depressed, downwardly rotated, and anteriorly tilted compared to the left, a position identified by Kibler et al as 'Type I scapular dyskinesis'[17], leading to a hypothesis of atrophy or inactivation of the trapezius and other scapular muscles. In contrast, hypertrophy of the right levator scapulae, pectoralis minor, and deltoid muscles was observed and confirmed by palpation. In standing, mild scoliosis was observed in the lower cervical to thoracic region (C5 to T12, concave to the left side).

Passive cervical range of motion measured: 80 and 50 degrees of rotation to the right and left, respectively; 20 and 25 degrees of lateral flexion to the right and left, respectively (Table 2).[18] Passive flexion and extension were normal, there was no pain or other symptom on active movement testing. Passive physiological cervical movements were normal, despite the presence of the scoliosis but there was local stiffness at C2/3 and C5/6 on passive accessory intervertebral movement testing on the right.

'The active elevation lag sign' was positive (Figure 1).[19] Resisted isometric external rotation in neutral, a technique that would normally generate activation in posterior deltoid, infraspinatus, teres minor and middle trapezius provoked anterior tilt and internal rotation about the long axis of the scapula.[21,22] The patient had difficulty actively maintaining 80 degrees of glenohumeral abduction because of an inability to hold the scapula. Moreover, further passive movement of his arm into abduction was prevented by excessive hyperabduction, anterior tilt, and internal rotation about long axis of the scapula. In active horizontal abduction, his scapula tilted anteriorly and prominence of the medial boarder of his scapula was noted, while levator scapulae, pectoralis minor and serratus anterior could be seen activating in an attempt to stabilize the scapula. However, passive shoulder movements from the anatomical position all demonstrated full range. The findings of observation and muscle length tests indicated that the right levator scapulae was relatively short while the right trapezius upper fibers were relatively lengthened compared to the unaffected side.[20] All shoulder muscles were graded as 5/5 on manual muscle testing except all fibers of the right trapezius, which were graded as 0/5. As a result of the scapular instability associated with the trapezius paralysis, some testing was performed with the scapula manually stabilized by two physiotherapists while a third examined muscle strength. A positive scapular flip sign, marked scapular winging with the isometric contraction of external rotators, was confirmed.[1] Furthermore, poor endurance in glenohumeral abductors was demonstrated as the subject was unable to lift his elbow more than ten repetitions without fatigue in shoulder abduction with elbow extension (Table 2).

Dynamic rotary stability test indicated poor glenohumeral control in concentric contraction of external rotation.[23,25] This clinical test is normally used to evaluate maintenance of humeral head position in the glenoid during isometric and isotonic rotations of the glenohumeral joint in different positions of elevation. The test is predicated on the knowledge that the humeral head should remain centred in the glenoid during active rotation. During isometric external

Table 1. *Key active shoulder girdle movement findings (no symptoms were provoked during testing).*

Movement	Range	Scapular movement & compensatory Glenohumeral joint movement
Abduction	80 degrees	Abduction & anterior tilt, arm drifts into scapular plane
Flexion	140 degrees	Arm drifts into scapular plane. The right scapula protracts excessively and is depressed in contrast to the left shoulder (Figure 1) 
Horizontal abduction	-25 degrees	Active assisted movement of horizontal abduction (left: unaffected side, right: affected side). The crease on the right handed photo implies hyperabduction of scapula. Figure 2: Unaffected side (Figure 2a-left side), and affected side (Figure 2b-right). 
Scapular elevation		Prominence of inferior angle

rotation in 90 degrees abduction, the patient's scapula rotated internally about long axis of the scapula whereas the typical abnormal response would be an increase in translation of the humeral head in the glenoid. In this case, the abnormal scapular rotation was likely a result of the paralysis of trapezius.

Position sense of shoulder abduction and external rotation was notably decreased (Table 2). When asked to replicate a given angle of elevation actively in upright posture after passively mobilized his right upper extremity into the desired position, he was unable to do so without visual feedback. There was a large discrepancy between his perception of his arm position and the actual position; with only 30% correct answers in shoulder joint position sense testing (three times out of ten) indicating diminished proprioceptive acuity. In particular, marked inaccuracy of position sense was confirmed around his ball release position in the joint position test.

His pitching form was assessed using basic video analysis. From wind-up to cocking phase, he appeared to use triceps and shoulder abductors to elevate his arm, as he used momentum to extend his elbow and abduct his shoulder, with his arm behind the scapular plane. As a result, the elevation angle achieved at the late cocking position was greater than range available during active abduction testing (Figure 3). When asked to shift his plane of elevation more into the scapular plane, he could raise his elbow higher. He demonstrated difficulty visualizing the target throughout wind-up and acceleration phases as a result of restriction of left cervical rotation, although the ball control was relatively stable if he kept his eyes on the target. However, he was unable to direct the ball due to proximal difficulty. When he threw

Figure 3. *Pitching assessment. Video, available on the IJSPT website.*

from the pitcher's mound, the ball did not cross the plate such that a catcher was unable to retrieve it.

CLINICAL IMPRESSION AFTER PHYSICAL EXAMINATION

His abduction angle in the cocking position was larger than his active range of abduction, likely as a result of the pendulum action he adopted. However, the findings of dynamic rotary stability test demonstrate a physical impairment to his ability to reach higher than his active abduction position as a result of poor scapular control and poor position sense implied insufficient awareness of his arm position in cocking phase. Furthermore, correcting his pitching form by asking him to bring the arm further into the scapular plane demonstrated immediate improvement of his ability to reach cocking position.

There were four hypotheses to consider when planning a program to restore ball control during pitching:

1. Improvement of his shoulder position sense may provide a more consistent cocking position as a result of more accurate feedback.
2. Improvement of scapular control during active external rotation may change his abduction strategy during wind-up reducing the increase in anterior scapular tilt.
3. Restoration of cervical rotation range would allow him to look at his target, thus allowing a more stable ball release position.
4. Improvement of shoulder abductor muscle endurance may enable him to consistently achieve a stable cocking position during repetitive pitching since muscle fatigue affects position sense.[26]

INTERVENTION

Physiotherapy was focused on four goals: to improve (1) position sense, (2) shoulder abductor muscle endurance for the cocking phase, (3) motor control of the rotator cuff in the cocking phase, and (4) cervical range of motion so that he could effectively visualize his target.

The findings of physiotherapy, outcome and intervention were depicted in Table 2. Proprioceptive exercise was commenced in the scapular plane using a mirror during the early phase of physiotherapy in order to acquire a reproducible abduction angle in the cocking phase. Marks were taped on a mirror as the target of elevation range. Initially, active elevation was performed with visual feedback followed by repeating the movement without visual feedback. If the end position deviated from the target, the discrepancy was pointed out by the therapist.

To avoid replicating dysfunctional horizontal abduction in his late cocking position, repeated active abduction exercises in the scapular plane were conducted in side-lying to diminish the impact of gravity on the long lever of the upper extremity. This exercise was stopped if his abduction deviated to horizontal abduction plane.

External rotation exercises in over 90° elevation of the scapular plane simulating his cocking position were also conducted in side lying. In this position, control of scapular movement was possible whereas scapular and humeral head control was lost in horizontal abduction. Again, the exercise was stopped when he could no longer control scapular or humeral head position or he drifted into horizontal abduction. The three exercises mentioned above were started from the early phase of rehabilitation. The position sense, the repetition of accurate abduction, and external rotation were evaluated as outcome measure. The position sense was evaluated by asking to replicate a given angle of elevation actively in upright posture after passively mobilized his right upper extremity into the desired position. The repetition of accurate abduction and external rotation was assessed by the same procedure as active abduction and external rotation exercises.

'Figure 8 throwing' exercise was designed to increase his elevation angle in the cocking phase and to improve his ball release position (Figure 4). This exercise was commenced under supervision from week two after he had begun to learn how to elevate his arm in scapular plane in side lying. This motion of the figure 8 was also designed to trace the cocking position, ball release position and follow-through position.

In standing, the right elbow moves in a 'Figure 8' motion in the frontal and horizontal planes. To replicate the combination of movements required to pitch, the player was instructed to rotate his trunk to the left (away from the pitching arm) when his elbow was in forward elevation (at or near sagittal plane) and to the right when his elbow was in backward elevation (scapular plane) while rotation of shoulder was in neutral. A ball was thrown when the three points were traced. Once the player was able to trace the three points, a short (approximately 5m) throw was added to the exercise in order to check his ball release position. He was encouraged to do the exercise in front of a mirror to provide further feedback on technique.

According to the finding of decreased passive accessory intervertebral movement, as well as decreased AROM into rotation and sidebending, small amplitude unilateral posterior-anterior accessory movement mobilizations into tissue resistance on C2 and 5[24] was performed to address his cervical joint impairments and restore cervical range of motion. This treatment was augmented with self-treatment using SNAGS as proposed by Mulligan (Sustained Natural Apophyseal Glides) into cervical rotation, a technique where the patient applies continuous accessory movement on the relevant zygapophyseal joint combined with active movement.[13] The range of cervical rotation, passive accessory intervertebral movement on C2/3 and C5/6 were reassessed after intervention.

In week five, the patient was required to return to his hometown, so was unable to continue attending the clinic. He was instructed to continue abduction in the scapular plane in front of a mirror, as well as the figure 8 throwing and external rotation exercises in the scapular plane as home exercises.

OUTCOMES

His cervical rotation range was restored to 80 degrees (Table 2) and he was able to visualize the target to which he was pitching. However, when he threw from pitcher's mound at discharge, his pitching control was still inadequate although his 5m figure 8 throwing was improved (Table 2). Abduction muscle endurance was not significantly improved. The accuracy of external rotation in scapular plane was slight improved. He was able to do the exercise three sets compared to two sets in the early phase of intervention. Patient Specific Functional Scale was improved to 7/10 in pitching. Active elevation lag sign, scapular flip sign, and MMT grade of the right trapezius were not changed. The position sense of the right shoulder was examined as the initial assess-

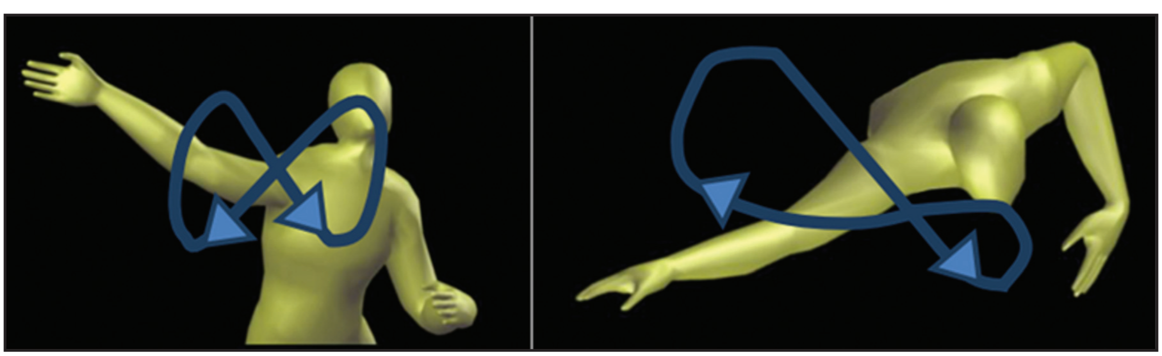


Figure 4. *figure 8 throwing. The left handed figure represents the frontal view. The right handed figure represents superior view. Blue lines depict the track of elbow and blue arrows represent direction of movements.*

Table 2. *Findings, outcomes, and physiotherapy regimen.*

Physical Examination	Findings	Physiotherapy Intervention	Treatment Regimen					Outcomes	
			Week 1 (Admission)	Week 2	Week 3	Week 4	Week 5 (Discharge)	Week 5 (Discharge)	Week 9 (week 4 from discharge)
Position sense	3/10 accuracy	Proprioceptive exercise for shoulder abductors	7 repetitions, 2 sets			7repetitions, 3 sets		7/10 accuracy	not evaluated
Muscle endurance of glenohumeral abductors	Unable to abduct his arm more than 10 repetitions	Repetitive active abduction exercises in the scapular plane	7 repetitions, 1set		7 repetitions, 2 sets			not significantly improved	not evaluated
Pitching accuracy	The ball did not cross the plate when throwing from a pitcher's mound.	External rotation exercises in an overhead position	10 repetitions, 2 sets		10 repetitions, 3 sets			Pitching control was inaccurate.	His pitching control was restored
	He could hit a target 6/10 times (5m distance)	5 m distance Figure 8 throwing exercise		Throw at the target 5m ahead, 10 repetitions, 2 sets				He could hit a target 8/10 times	
Cervical rotation range of motion (R/L)	80/ 50	Unilateral posterior-anterior mobilization on C2 and 5	grade IV, 60sec, 3 sets	Cervical rotation range (R/ L): 80/ 80					
Passive Accessory Intervertebral Movements	Local stiffness at C2/3 and C5/6								

ment. When asked to replicate a given angle of elevation actively in upright posture after passively mobilised his right upper extremity into a position where he can replicate actively. Reproducibility of abduction in the scapular plane was improved from 3/10 to 7/10 on discharge.

The final assessment was undertaken by telephone interview (ie the self-report measure) because he was unable to return to the clinic. Approximately four weeks after discharge, he reported that he had continued training with the prescribed exercises and had been able to pitch with adequate accuracy during whole practice baseball game. His anterior shoulder pain on the day following training could not be determined since he had not yet returned to full training.

DISCUSSION

The accessory nerve damage occurred in this patient when he was eight years old, resulting in trapezius paralysis. As a result, it is likely that he had successfully learned to compensate for the associated impairments to the point where he was able to pitch successfully at baseball with a technique he had modified to suit his capabilities. This adaptation was then challenged when the coach recommended a change of technique from overarm to sidearm, a technique requiring a different set of movement strategies and muscular contributions, one with which the player was obviously not familiar. Attempting to perform the new technique, which caused pain, clearly altered his ability to return to his previously familiar task, even following a six-month lay-off.

His loss of ball control on return to overarm pitching would seem primarily to be related to altered position sense. Marked decrease of joint position sense has been observed in patients with capsuloligamentous injury, an unstable shoulder, and rotator cuff disorders.[26-28] The limitation of this case report was that the authors' were unable to demonstrate the relationship between his shoulder pain and altered position sense. However, it might be likely that, during the six month layoff following provocation of pain with the altered technique, the patient lost the joint position sense he had previously developed that allowed him to pitch accurately with an overarm technique, despite his trapezius paralysis. In addition, the restriction of cervical range of motion and associated difficulty visualizing the throwing target was the other factor that may have contributed to his loss of position sense.

The proprioception deficit was confirmed when observing his altered shoulder movements. It resulted in an inaccurate pitching form related to the finding of his alternate arm elevation strategy in cocking phase and the finding of poor position sense in addition to the right trapezius palsy. The subject was trying to produce a humeral elevation moment with elbow extension (triceps) and shoulder abduction from wind-up to cocking phase with poor awareness of his arm position since it was impossible for him to abduct his shoulder to late cocking position without his scapular support. The authors' hypothesis was that his shoulder felt unstable between cocking phase through follow-through due to insufficient elevation of his elbow, associated wtih poor position sense. Insufficient position sense affects dynamic stability of shoulder.[26] Therefore, it might be reasonable that his acceleration phase would feel unstable if the elevation angle was not sufficient in the cocking phase, also leading to confusion as to the position in which he should to release the ball. He was not aware of this problem until it was demonstrated to him in front of a mirror. Impaired proprioception results in disorganized onset of muscle timing during complex motions.[26] Although he only undertook a four-week physiotherapy intervention, his position sense was improved on discharge.

The other hypothesis to explain the difficulty he had raising his elbow in the cocking phase of the pitch was that he was not aware that his strategy for abduction was not effective. Because paralysis of trapezius leads to anterior tilt of the scapula in abduction, the agonists in his attempted abduction were the posterior fibers of deltoid and infraspinatus, leading to a combined movement of glenohumeral horizontal abduction and elevation. His strategy to achieve elevation in the late cocking position led to an anatomical restriction of glenohumeral range, thus generating a vicious circle in relation to ongoing movement impairment. Active elevation exercises in the scapular plane and figure 8 throwing were aimed to modify his elevation strategy from wind up to cocking phase, using his available musculature. His cocking phase strategy needed to be trained since the scapular plane was the position in which he could maintain control. His lack of elevation torque in the phase was compensated for by using centrifugal force. Hence, it was easier for him to raise his arm when the direction of elevation plane was shifted from horizontal abduction to the scapular plane so that anterior tilt and medial rotation of scapula were minimized.

External rotation in the cocking phase may also have contributed to increased horizontal abduction. Normally, during resisted external rotation with the arm by the side, middle and lower fibers of trapezius contract to maintain the congruency of the medial border of the scapula on the chest wall.[1] However, in his original pitching technique, the moment of the external rotators may have been insufficient to counterbalance the lack of contraction from the paralyzed trapezius. As a result, scapular internal rotation may have occurred if the arm were abducted or externally rotated under resistance during movement into the cocking position where posterior deltoid and cuff muscles are highly active,[29,30] as has been demonstrated previously in patients with accessory nerve palsy.[9] Scapular internal rotation, coupled with glenohumeral external rotation will effectively lead to excessive horizontal abduction in this situation.

The enhancement of awareness is one target of motor control exercises.[23] Training for a revised activation pattern of rotator cuff muscles was required to prevent his abnormal elevation pattern. Hence, external rotation exercises were expected to allow him to achieve the cocking position without excessive horizontal abduction. Moreover, his prolonged scapular internal rotation position over several years may have been responsible for the positive findings in the dynamic rotatory stability test[23] during external rotation. Even though a similar abduction position to the unaffected side could apparently be achieved, his head of humerus on the affected side could be felt to deviate anteriorly in the glenoid with load into external rotation (Table 1). Dysfunction of the rotator cuff leads to alteration of the axis of rotation of the glenohumeral joint and excessive translation of the head of humerus.[23] In his case, dysfunction of rotator cuff muscles may have allowed his scapula to move under the humeral head. His humerus could be anchored on the scapula by rotator cuff muscles since the scapula could not be adequately anchored under the humeral head. This would lead to a relative anterior glide of the humeral head on the glenoid, which was in fact, a relative posterior glide of the glenoid on the humeral head since his right trapezius did not adequately stabilize the scapula. The deep anterior pain reported on the morning following pitching could have been the result of forced horizontal abduction position in the cocking phase overloading of the shoulder, particularly the anterior structures.

Typical signs of trapezius paralysis such as depressed scapula, active elevation lag sign, [19] and scapular flip sign[1] were seen via physical examination as a result of malfunction of trapezius. His passive range of motion was not restricted. Motor control training for the shoulder has previously been demonstrated as beneficial for patients with shoulder impingement syndrome.[31] This subject wished to remain active and participate in baseball activities. He was highly motivated to return competitive level baseball as a pitcher. The aim of his rehabilitation program was to improve position sense, acquire an alternative elevation plane for the upper extremity, and to enhance rotator cuff muscle control during the cocking phase. As a result, his pitching control was restored although the long-standing paralysis of the trapezius did not change. The results of this case report demonstrate that achievement of control of a skilled upper quarter activity, such as baseball pitching, is possible with conservative management even in the presence of paralysis of trapezius (a major contributor to the dysfunctional movement) that was not likely to improve.

CONCLUSION

The results of the case report demonstrate that improvement of control of a skilled upper quarter activity such as baseball pitching, is possible with a nine week conservative rehabilitation program, even in the presence of paralysis of the trapezius, a major contributor to the movement. Improvement in joint position awareness, movement patterning, and muscular endurance was achieved through a targeted rehabilitation program, leading to restoration of his ability to pitch accurately with an overhand technique and reduction in his previously severe medial scapular pain. This functional improvement appeared to have been achieved without any change to his paralyzed trapezius itself, since his manual muscle testing scores remained at zero for all parts of trapezius.

By focusing on evaluation of and attention to physical impairments found on critical clinical examination rather than on the diagnosis of accessory nerve palsy, a successful outcome was achieved with this young athlete.

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