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Movement System Impairment Syndrome - Based Diagnosis and Treatment in Patients with Shoulder Hypomobility: A Case Report

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KEYWORDS

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Movement System Impairment (MSI),

Glenohumeral Hypomobility,

Good health and well-being,

Education.

ABSTRACT:

Introduction:

Two-thirds of people experience some form of shoulder pain in their lifetime. Sahrmann's MSI method examines movement patterns rather than structural damage to identify the type of shoulder pain an individual is experiencing. The primary goal for diagnosing shoulder pain is to locate the specific movement(s) that cause the pain and then correct them through movement retraining and proper alignment.

Materials and Methods:

A 59-year-old woman presented with left shoulder pain without a history of trauma for 3 months, which has been increasingly troublesome while sleeping and doing overhead movements and activities. Using a Movement System Impairment (MSI) approach, the patient participated in a four-week physiotherapy programme that consisted of three sessions per week. Physiotherapy aimed to reduce the patient's pain, improve their range of motion in the shoulder and rectify the abnormal patterns of movement associated with this condition. Treatment included education, exercise, manual therapy and the use of modalities for pain control.

Results:

At the end of 4 weeks of MSI-guided physical therapy, the patient showed significant improvement in shoulder pain and impairment. A marked pain relief was demonstrated by an

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NPRS score change from 8 to 0. Significant reductions were also evident in the SPADI scores, with overall improvements from 91% to 16.8%, disability reductions from 90% to 17.5%, and pain reductions from 92% to 16%. Clinically, the patient reported increased scapular control, an increase in range of motion, improved sleep patterns, and the ability to work overhead and perform daily functional activities with minimal discomfort.

Conclusion:

For a patient with Glenohumeral Hypomobility Syndrome, the MSI-based physiotherapy program effectively reduced pain and disability.

Introduction

Shoulder pain is a common complaint, with a prevalence point of 26% and a lifetime estimate of 67% [1]. Shoulder pain can be caused by a variety of conditions, including rotator cuff tears, acromioclavicular joint pathology, impingement, and instability. Doctors base their diagnosis on the findings of their examination and additional tests to identify the injured tissue that appears to be the cause of the symptoms and rule out other sources that might be causing pain in the shoulder area [2].

To direct physical therapy treatment, Sahrmann has created a set of shoulder diagnoses based on movement system impairments (MSI), assuming that the physical therapist's primary area of expertise is movement system analysis. Alignments and movements that seem to be connected to the patient's symptom behaviour are the basis for the diagnosis names. Instead of focusing on the pathoanatomic cause, the diagnosis concentrates on the movement that is causing the pain [3].

The MSI of shoulder problem classification is predicated on the fundamental idea that repetitive motions and postures in particular directions during daily activities lead to a loss of precise movement [3][4]. The biomechanical and motor control elements of the movement system are thought to change as a result of the repetition. For instance, tissue stiffness [5] and extensibility [6] may increase or decrease with repetition, and the timing or intensity of different muscles' activities may also alter. The loss of movement accuracy is thought to be a contributing factor to the tissues experiencing repeated low-magnitude stresses in the same direction. In a particular area of the shoulder, this buildup of stress on the tissues may result in microtrauma and ultimately shoulder symptoms [7][8].

According to MSI theory, until the biomechanical and motor control components are altered, the shoulder issue may continue or recur. The test is typically adjusted to address the issue if a person's preferred pattern is impacted by a movement. The treatment of shoulder injuries consists primarily of a comprehensive approach to resolve any underlying postural and/or movement-related issues that contribute to a patient's pain or dysfunction. This method focuses on aligning the trunk, scapula, and upper limb correctly, ensuring the patient sits or stands in a way that allows their joints to function smoothly. It goes beyond just improving posture.

There is a strong emphasis on making sure the scapula and humeral head move together properly during daily activities. Treatment typically begins by educating the patient about their poor posture and movement patterns—identifying the problems and outlining the necessary changes. Additionally, a set of exercises is tailored to address the patient’s specific issues that are hindering their movement.

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The aim is always to correct abnormal movement patterns, restore normal pain-free motion, and promote overall health and well-being.

Case Description

Patient History

The patient, a 59-year-old woman, came to the outpatient physiotherapy department complaining of left shoulder pain that had been getting worse over the previous three months. With no apparent cause, the pain started out as a dull ache that got worse over time. According to her, the pain was continuous and got worse when she did certain things or positioned herself. Her primary complaints included difficulty dressing and grooming, difficulty sleeping because she was unable to lie on the affected side or even in a supine position, and pain when performing overhead tasks like reaching up to shelves and hanging clothes. She also had trouble turning in bed, which frequently prevented her from falling asleep. A deep, aching feeling that is distributed over the anterior and lateral aspects of the shoulder is how the pain is described. There was no history of trauma, falls, or sudden-onset injuries.

The patient denied having any dislocation, subluxation, or tingling or numbness in their upper limbs. no prior surgical history. She has not been taking medication for this condition regularly, but when she is in excruciating pain, she occasionally applies ice packs and takes over-the-counter painkillers (paracetamol). She noticed a significant restriction in the range of motion of the shoulder, particularly in external rotation and abduction. When at rest, the pain is somewhat alleviated, but it returns when activity resumes.

The patient's only significant comorbid condition was her well-controlled type 2 diabetes mellitus, which she is currently managing with oral hypoglycemics. Neither musculoskeletal nor rheumatological disorders run in the family. She states that, as a homemaker, her limited shoulder mobility makes it challenging for her to complete household chores. There were no symptoms in the opposite (right) shoulder or cervical spine. Her average score on the Numeric Pain Rating Scale (NPRS) was 6/10, but during nighttime or overhead activities, her worst pain peaked at 8/10. Significant functional impairment was indicated by her initial score on the Shoulder Pain and Disability Index (SPADI), which was used to further evaluate functional disability.

Physical Examination

The Movement System Impairment (MSI)-based clinical examination framework was used in the outpatient physiotherapy department to evaluate the patient. Palpation, movement analysis during functional activities, active and passive range of motion (ROM), testing of muscle extensibility and strength, and postural analysis were all part of the evaluation.

Postural Alignment

The patient had protraction of both scapulae, which was more pronounced on the left, a forward head posture, and a slightly rounded thoracic spine when standing. The left scapula displayed downward rotation, anterior tilt, and internal rotation in contrast to the right. The left humeral head was slightly anteriorized in the glenoid fossa. The patient exhibited a greater dependence on thoracic extension for postural control during static alignment, with the left shoulder resting in internal rotation with a slight depression.

Movement Analysis

The patient exhibited altered scapulohumeral rhythm during active movement, which was represented by increased upper trapezius dominance during arm elevation, decreased upward rotation, and early scapular elevation. Scapular hiking and compensatory trunk side flexion were

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the outcomes of functional overhead reaching on the afflicted side. During eccentric lowering from flexion and abduction, scapular winging was evident. Particularly during active flexion and abduction, pain and restricted movement were noted.

Range of Motion (ROM)

The following limitations in the shoulder range of motion were documented

Table 1

Baseline characteristics of the patient		
Age (in years)		59 yrs
Height (in cm)		160 cm
Weight (in kg)		65kg
BMI (kg/m^2)		25.4 kg/m^2
Shoulder Range of Motion (in degrees)	Active flexion	90 degrees
	Passive flexion	120 degrees
	Active abduction	60 degrees
	Passive abduction	90 degrees
	Internal rotation	20 degrees
	External rotation	30 degrees

Palpation

Tenderness over the lateral deltoid insertion and anterior aspect of the glenohumeral joint was palpable. Crepitus, oedema, or warmth were absent. The pectoralis major and upper trapezius muscle bellies were found to be slightly constricted.

Muscle Performance and Extensibility

Rotator cuff testing indicated partial inhibition brought on by pain and weakness in the external rotators (Grades 3/5). Protraction and resisted scapular depression were accompanied by poor anterior activation of the lower trapezius and serratus. Due to pain, the middle deltoid and supraspinatus manual muscle testing (MMT) was limited, and the results showed a strength of 3/5.

Functional Assessment

The patient was unable to reach overhead or behind her back without compensatory trunk movement or scapular elevation. The patient had difficulty with basic tasks such as dressing and grooming. Pain and compensatory movements prevented their arm from reaching overhead past 90 degrees.

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MSI Diagnosis

After reviewing the medical history, performing an examination, and assessing their movement, the Movement System Impairment (MSI) classification was identified as Glenohumeral Hypomobility Syndrome.

Treatment

The patient was provided with a four-week physiotherapy program, applying the Movement System Impairment (MSI) approach across three focused sessions. The primary objectives were to improve glenohumeral mobility, enhance scapular control, correct faulty alignment and movement patterns, and increase muscle strength and flexibility. The progression of each session was modified according to the patient's pain levels and their responses throughout treatment.

Table 2

Week	Findings	Interventions	Outcomes
Week 1	Persistent shoulder pain; restricted ROM; poor scapular alignment; difficulty with overhead activities	Patient education; activity modification; interferential therapy; pendulum exercises; assisted shoulder flexion and abduction; scapular stabilisation exercises	Pain reduction initiated; improved awareness of posture and movement; mild improvement in shoulder mobility
Week 2	Reduced pain; limited end-range ROM; altered movement patterns with compensatory trunk movements	Glenohumeral joint mobilisations; visual feedback for scapular control; isometric shoulder strengthening; posture correction	Improved ROM in flexion, abduction, and internal rotation; better scapular control; reduced compensatory movements
Week 3	ROM improving; decreased pain; reduced strength and endurance in scapular muscles	Progressive strengthening; prone T and Y exercises; functional task training	Improved shoulder strength; enhanced scapular stability; improved functional performance with minimal pain
Week 4	Minimal pain; improved strength and mobility; needs integration into daily activities	Functional retraining, increased resistance and repetitions, closed-chain exercises; home exercise program;	Improved scapulohumeral rhythm; near-normal functional movement; increased confidence in daily activities; reduced risk of recurrence

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		ergonomic advice for ADLs	

Week1:

For the first week, the primary objectives were to reduce her pain, improve her mobility as soon as possible, and inform her about her injury. She was informed about Glenohumeral Hypomobility Syndrome and how it is caused by improper scapular alignment and excessive shoulder usage during overhead motion. Patient was instructed not lie on the affected shoulder and to modify certain activities that were aggravating her symptoms. To address the side effects of the injury on the patient, 15 minutes of interferential therapy prior to the beginning of exercise-based therapy was given. We began with pendulum exercises and progressions of assisted shoulder flexion and abduction in a supine position to activate the shoulder joint. The exercise regimen consisted of shoulder girdle stabilisation drills, both prone and supine, to strengthen and activate her lower trapezius and serratus anterior muscle groups.

Week2:

During the second week, the emphasis switched to correcting movement patterns and increasing joint mobility. The glenohumeral joint's posterior and inferior glides were among the manual therapy techniques used to improve range of motion in flexion, abduction, and internal rotation. With a focus on scapular retraction and upward rotation, wall slide exercises were included. Visual feedback was used to practice scapular control and spine-shoulder flexion to limit compensatory trunk movements. The shoulder muscles were strengthened by performing isometric contractions within a pain-free range. The patient continued posture correction exercises and pectoral stretching to strengthen alignment awareness when performing functional movements.

Week3:

By the third week, the patient's range of motion had improved, and their pain had decreased. Resistance bands were used to advance the strength training exercises. In a neutral shoulder position, exercises for external and internal rotation of the shoulders using a Thera band were started. To engage the rhomboids and lower trapezius, prone T and Y exercises were added. To increase scapular protraction and strengthen the serratus anterior, wall push-ups were done. Functional task training, which involved dressing and reaching overhead while maintaining posture and controlling movement, began at this point. The continuous flexibility training for the posterior capsule and pectoralis employed longer stretch holds and more repetitions.

Week4:

The final week of treatment focused on integrating the additional strength and mobility into activities of daily living. The patient practised back fills, overhead reaches, and grooming motions with good postural alignment and scapulohumeral rhythm. The number of repetitions and resistance in the strength-training exercises increased progressively. Closed-chain functional activities, such as wall clocks and standing reach, were used to facilitate better stability and control at the end range of motion. The Home Exercise Program (HEP) instructed the patient to perform mobility drills, TheraBand strengthening, and scapular control exercises twice daily. Patients were given ergonomic recommendations for cooking, cleaning, and sleeping to help ensure long-term mobility and reduce the risk of recurrence.

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Outcomes

At the end of 4 weeks, the patient reported a significant reduction in pain and functional improvement.

Table 3 Pain and Disability Scores

Measure	Baseline	4th Week	Difference
NPRS (0–10)	8	0	8
SPADI – Pain	92%	16%	76%
SPADI – Disability	90%	17.5%	72.5%
SPADI – Total	91%	16.8%	74.2%

Table 4 Range of Motion (Degrees)

Movement	Baseline	4th Week	Difference
Active Flexion	90°	160°	70°
Passive Flexion	120°	180°	60°
Active Abduction	60°	170°	110°
Passive Abduction	90°	180°	90°
Internal Rotation	20°	40°	20°
External Rotation	30°	60°	30°

Discussion

The case demonstrates that using the Movement System Impairment (MSI) model of diagnosis and treatment is an effective way to manage Glenohumeral Hypomobility Syndrome because it provides a method to address functionally based impairments. The MSI model supports the belief that chronic dysfunction in movement, rather than acute damage to joint structures, causes most shoulder pain [3].

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In this case, the major components leading to the dysfunction included limited posterior capsule (scapular) mobility, hyperactive anterior shoulder (pectoralis major) muscle tone and altered scapula position during arm movement. The structured plan of treatment took a gradual approach from initial education/pain management through increasing levels of mobility training (stretching/mobilising), followed by strength training and ended with integrated task-specific activity. Through this systematic approach, the impairments causing the dysfunction were addressed.

Patient education and retraining regular movement patterns were the primary avenues through which neuromuscular coordination was improved. The clinical relevance of the improvements in range of motion (ROM) and SPADI indicated significant progress. Specifically, the movement-specific rehabilitation led to 70° of shoulder flexion, and the SPADI total score decreased by 74.2%. Many case reports share similarities with this report in that there was no objective strength testing equipment or no long-term follow-up available. However, the symptom resolution as well as the differences seen pre- and post-treatment support the idea that the MSI model may have utility in the rehabilitation of the shoulder [9].

The efficacy of manual treatment for this population is supported by recent research. By increasing the glides at the posterior and inferior glenohumeral joints, manual treatment helps individuals with non-traumatic shoulder stiffness become more flexible. In order to improve patient mobility in terms of flexion and internal rotation, manual treatment techniques are frequently used. These techniques include posterior and inferior glenohumeral joint glides [10]. Joint mobilisation combined with therapeutic exercise produces greater pain relief and functional improvements than exercise alone, according to a systematic study [11]. The patient's improved mobility and functional ability were probably expedited by this combined therapy.

The study has the standard limitations of case report research, despite the fact that the results were positive. Strength was not objectively measured using specialist test equipment, and there was no long-term monitoring to see whether the strength gains persisted. However, the clinical usefulness of the MSI model in patients with non-traumatic shoulder hypomobility is supported by the significant symptom relief, quantifiable improvements in range of motion, and improved everyday function.

Conclusion

In this case study, a patient with Glenohumeral Hypomobility has successfully been screened and treated for their condition using the Movement System Impairment (MSI) model. Improvements were made regarding pain, range of motion, and daily living activities, due to the targeted manual and therapeutic treatment, exercise, and corrections to the dysfunction within the patient's movement. These positive outcomes support the inclusion of the MSI approach in routine clinical practice for non-traumatic shoulder pain. Future studies, including long-term follow-up, as well as randomised controlled trials, are needed to validate the effectiveness and duration of the MSI approach to shoulder treatment.

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