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Combined Proprioceptive Neuromuscular Facilitation and Scapular Retraining for Adhesive Capsulitis in a Middle-Aged Office Worker: A Case Report

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Abstract : Adhesive capsulitis, commonly known as frozen shoulder, is a painful musculoskeletal condition characterized by progressive restriction of shoulder movement, capsular stiffness, and functional disability (Kelley et al., 2013; Neviaser & Neviaser, 2011). It commonly affects middle-aged individuals, particularly females and patients with diabetes mellitus (Balci et al., 1999). Occupational and postural factors such as prolonged sitting and poor ergonomics may contribute to altered scapular mechanics and shoulder dysfunction (Kibler & Sciascia, 2010). The purpose of this case report was to evaluate the effectiveness of combined proprioceptive neuromuscular facilitation (PNF) and scapular retraining in a middle-aged office worker with adhesive capsulitis. A 45-year-old female presented with progressive right shoulder pain and stiffness for six months associated with difficulty in overhead activities, dressing, grooming, and sleeping on the affected side. Baseline pain intensity was 7/10 on the Visual Analog Scale (VAS), and Shoulder Pain and Disability Index (SPADI) score was 68%. The patient underwent a six-week physiotherapy rehabilitation program consisting of PNF stretching, scapular stabilization exercises, active-assisted range of motion exercises, postural correction, and progressive strengthening exercises (Adler et al., 2014; Hindle et al., 2012). Following intervention, pain intensity improved from 7/10 to 2/10, SPADI improved from 68% to 18%, shoulder flexion improved from 90° to 155°, and shoulder abduction improved from 70° to 145°. Functional activities including grooming, dressing, and overhead reaching also improved significantly. The findings suggest that combined PNF and scapular retraining may effectively improve pain, shoulder mobility, muscular strength, and functional performance in individuals with adhesive capsulitis (Favejee et al., 2011).

IndexTerms - Adhesive capsulitis, Frozen shoulder, Proprioceptive neuromuscular facilitation, PNF, Scapular retraining, Scapular stabilization, Shoulder rehabilitation, Physiotherapy, Shoulder pain, Range of motion, Functional disability, Occupational shoulder dysfunction, Manual therapy, Therapeutic exercise, Glenohumeral joint stiffness.

INTRODUCTION

Adhesive capsulitis is a disabling shoulder disorder characterized by progressive pain, inflammation, fibrosis, and stiffness of the glenohumeral joint capsule (Kelley et al., 2013; Neviaser & Neviaser, 2011). The condition commonly affects individuals between 40–60 years of age and demonstrates higher prevalence among females and individuals with diabetes mellitus (Balci et al., 1999). The pathological process involves synovial inflammation, capsular thickening, fibrosis, and adhesion formation leading to marked restriction of shoulder movement, especially external rotation, abduction, and flexion (Lewis, 2015; Neviaser, 1980). Patients frequently report difficulty performing activities of daily living such as dressing, grooming, reaching overhead, and sleeping on the affected side (Hsu et al., 2011). Occupational and postural factors such as prolonged sitting posture, repetitive upper-limb activity, reduced physical activity, and poor ergonomics may contribute to altered scapular mechanics and shoulder dysfunction (Kibler & Sciascia, 2010; Ludewig & Reynolds, 2009). Middle-aged office workers frequently develop forward-head posture, rounded shoulders, and scapular dyskinesis, which may aggravate shoulder movement restriction and muscular imbalance. Physiotherapy remains one of the primary conservative interventions for adhesive capsulitis management (Favejee et al., 2011). Evidence supports the use of stretching, mobilization, strengthening, proprioceptive training, and scapular stabilization exercises for improving pain and restoring shoulder mobility (Johnson et al., 2007; Vermeulen et al., 2006; Yang et al., 2007). Proprioceptive Neuromuscular Facilitation (PNF) techniques improve neuromuscular coordination, flexibility, and muscular activation through facilitation of diagonal movement patterns and autogenic inhibition mechanisms (Adler et al., 2014; Hindle et al., 2012). Scapular retraining exercises help restore scapular stability, normalize scapulohumeral rhythm, and reduce compensatory muscular overactivity (Kibler & Sciascia, 2010). Although both interventions independently demonstrate beneficial outcomes, evidence regarding their combined effectiveness in occupational adhesive capsulitis remains limited. Therefore, the purpose of this case report was to evaluate the effectiveness of combined PNF and scapular retraining in a middle-aged office worker with adhesive capsulitis.

CASE DESCRIPTION

A 45-year-old female school teacher presented to the physiotherapy outpatient department with complaints of progressive pain and stiffness in the right shoulder for approximately six months. The patient reported gradual onset of symptoms without any history of trauma, fracture, or shoulder dislocation. She experienced difficulty performing overhead activities, combing hair, dressing, reaching shelves, and sleeping on the affected side. The pain progressively increased over time and was aggravated during shoulder movement, particularly abduction and external rotation. Occupational history revealed prolonged sitting posture, repetitive upper-limb activity, and poor ergonomic habits associated with office-based and teaching-related activities, which may have contributed to altered scapular mechanics and shoulder dysfunction (Kibler & Sciascia, 2010; Ludewig & Reynolds, 2009).

The patient had a known history of type II diabetes mellitus for the previous five years, controlled with oral hypoglycemic medication. No history of neurological disorder, cervical radiculopathy, inflammatory arthritis, or previous shoulder surgery was reported. On observation, the patient demonstrated protective shoulder posture, mild scapular asymmetry, rounded shoulder posture, and reduced active movement of the right upper limb. Palpation revealed tenderness over the anterior shoulder capsule, upper trapezius tightness, and muscle guarding around the glenohumeral joint.

Clinical examination demonstrated marked restriction of active and passive shoulder range of motion, particularly external rotation, abduction, and flexion, which is consistent with the capsular pattern commonly observed in adhesive capsulitis (Lewis, 2015; Neviaser, 1980). Baseline pain intensity measured using the Visual Analog Scale (VAS) was 7/10, while functional disability assessed using the Shoulder Pain and Disability Index (SPADI) was 68%. Active shoulder flexion was limited to 90°, abduction to 70°, and external rotation to 20°. Manual muscle testing revealed weakness of shoulder abductors, external rotators, and scapular stabilizers secondary to pain and disuse. MRI findings demonstrated thickening of the glenohumeral joint capsule suggestive of adhesive capsulitis (Neviaser & Neviaser, 2011). Based on subjective complaints, clinical examination, functional assessment, and imaging findings, the patient was clinically diagnosed with stage II adhesive capsulitis of the right shoulder associated with pain, capsular stiffness, scapular dyskinesis, reduced shoulder mobility, and functional limitation. The patient was subsequently referred for structured physiotherapy rehabilitation consisting of combined proprioceptive neuromuscular facilitation (PNF) and scapular retraining exercises.

INTERVENTION

The patient underwent a structured physiotherapy rehabilitation program for six weeks consisting of five treatment sessions per week, with each session lasting approximately 45–50 minutes. During Phase I (Week 1–2), moist heat therapy and TENS were applied to reduce pain and muscle spasm (Chan et al., 2017). Pendulum exercises and passive capsular stretching were performed to improve joint mobility and reduce capsular tightness (Yang et al., 2007). Proprioceptive Neuromuscular Facilitation (PNF) hold-relax techniques were applied to shoulder external rotators, internal rotators, and abductors to improve flexibility and reduce muscular guarding (Adler et al., 2014; Hindle et al., 2012). Scapular setting exercises including scapular depression and retraction were initiated to improve neuromuscular activation and postural control (Kibler & Sciascia, 2010). Phase II focused on scapular retraining and restoration of range of motion. Scapular retraction exercises, serratus anterior activation drills, rhythmic stabilization exercises, and active-assisted range of motion exercises were incorporated to improve scapulohumeral rhythm and movement coordination (Ludewig & Reynolds, 2009). Wall climbing exercises and PNF diagonal movement patterns including D1 and D2 flexion-extension patterns were introduced to enhance neuromuscular coordination and functional movement patterns (Adler et al., 2014).

Phase III focused on functional strengthening and occupational reintegration. Theraband strengthening exercises, closed-chain scapular stabilization exercises, and functional reaching activities were introduced to improve muscular endurance and dynamic stability (Donatelli, 2011; Kisner et al., 2017). Postural correction exercises including thoracic extension and chin tuck exercises were performed to improve upper-quarter alignment (Magee, 2014). Occupational task simulation activities such as writing and overhead reaching were incorporated to facilitate return to occupational activities.

Table 1

Structured Six-Week Combined PNF and Scapular Retraining Rehabilitation Protocol for Adhesive Capsulitis

Phase	Weeks	Main Goal	Key Exercises / Intervention	PNF / Scapular Component	Frequency & Duration	Challenges / Adaptations
Phase I	**Week 1–2**	Pain reduction and restoration of mobility	• Moist heat therapy (15 min) • TENS (20 min) • Pendulum exercises • Passive capsular stretching	• PNF hold-relax techniques for shoulder external rotators, internal rotators, and abductors • Scapular setting exercises including depression and retraction	5 sessions/week 45–50 min/session	Pain during overhead activities and sleep discomfort managed through gradual stretching and thermal modalities
Phase II	**Week 3–4**	Scapular retraining and restoration of range of motion	• Active-assisted ROM exercises • Wall climbing exercises • Rhythmic stabilization exercises	• Scapular retraction exercises • Serratus anterior activation drills • PNF diagonal movement patterns (D1 and D2 flexion-extension)	5 sessions/week 45–50 min/session	Mild movement apprehension and muscular fatigue managed through therapist-guided progression
Phase III	**Week 5–6**	Functional strengthening and occupational reintegration	• Theraband strengthening exercises • Functional reaching activities • Occupational task simulation	• Closed-chain scapular stabilization exercises • Postural correction exercises including thoracic extension and chin tuck exercises	5 sessions/week 45–50 min/session	Difficulty during repetitive overhead activities managed using graded functional training and ergonomic correction

OUTCOME MEASURES

Pain intensity was measured using the Visual Analog Scale (VAS), while functional disability was assessed using the Shoulder Pain and Disability Index (SPADI) (Kelley et al., 2013). Shoulder range of motion assessment was performed using universal goniome try (Norkin & White, 2016).

DISCUSSION

The present case report demonstrated clinically meaningful improvements in pain, shoulder mobility, muscular strength, and functional performance following combined PNF and scapular retraining in a patient with adhesive capsulitis. Pain reduction and improvement in shoulder mobility may be attributed to restoration of capsular extensibility, reduction of muscular guarding, and improved neuromuscular coordination (Johnson et al., 2007; Vermeulen et al., 2006; Yang et al., 2007). PNF stretching techniques likely facilitated muscular relaxation through autogenic inhibition while improving flexibility and movement control (Adler et al., 2014; Hindle et al., 2012). Scapular retraining exercises improved scapulohumeral rhythm and reduced compensatory upper trapezius overactivity commonly observed in adhesive capsulitis (Kibler & Sciascia, 2010; Ludewig & Reynolds, 2009). Restoration of scapular stability likely contributed to improved glenohumeral biomechanics and movement efficiency during overhead activities. Progressive strengthening and functional retraining improved upper-limb function and occupational performance (Donatelli, 2011; Kisner et al., 2017). The findings are consistent with previous literature supporting multimodal physiother apy rehabilitation in adhesive capsulitis management (Favejee et al., 2011; Maund et al., 2012; Russell et al., 2014). However, the present report represents findings from a single patient, and long-term follow-up was not conducted.

CONCLUSION

Combined proprioceptive neuromuscular facilitation and scapular retraining demonstrated clinically meaningful improvements in pain, shoulder mobility, muscular strength, and functional performance in a middle-aged female with adhesive capsulitis. These findings are consistent with previous evidence supporting multimodal physiotherapy rehabilitation approaches for frozen shoulder management (Favejee et al., 2011; Maund et al., 2012).

CLINICAL IMPLICATIONS

The present case report highlights that combined PNF and scapular retraining may improve capsular mobility, neuromuscular coordination, scapulohumeral rhythm, and functional upper-limb activities in patients with adhesive capsulitis (Kibler & Sciascia, 2010; Hindle et al., 2012). Early physiotherapy intervention focusing on movement restoration and scapular mechanics may prevent chronic stiffness and disability (Lewis, 2015).

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