

Effect of Rigid Taping on Scapular Re-Alignment in Shoulder Dysfunction.

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Abstract: Background: Shoulder complex solves its mobility versus stability conflict by distributing its large range of motion across its entire mobile component. Altered scapular kinematics has been recognized in various shoulder condition. However, management of the muscles surrounding the scapula which affects the position of scapula is often disregarded during shoulder rehabilitation. Thus, the study aimed to verify the effect of rigid taping on scapular re-alignment in shoulder dysfunction.

Material and Methods: - The sample size of n=54 in the age group of 30-50 years with moderate unilateral shoulder pain on numerical pain rating scale for more than 1 week were selected. Neurological problems, pregnancy, and sports player subjects were excluded from the study. Pre assessment of Shoulder range of motion for flexion and abduction shoulder should be 90° or more, Pectoralis minor tightness in supine position, scapular lateral translation- distance measured from fourth spinous process to medial border of scapula and lateral scapular slide test in three different positions were taken. Position 1: Inferior angle of scapula to adjacent thoracic spinous process when arms relaxed at the sides of the body. Position 2: Inferior angle of scapula to adjacent thoracic spinous process with arms 45° abducted resting on ipsilateral hip. Position 3: Inferior angle of scapula to adjacent thoracic spinous process with arms 90° abducted and internally rotated (thumb down position) were taken. On first day, underwrap and rigid tape was applied bilaterally from first thoracic spine to twelfth thoracic spine and from center of the spine of scapula to twelfth thoracic spine for five days. On third day tape was removed and reapplied instantly. On fifth day, tape was removed and post assessment was taken immediately. **Results:** - Pre and Post rigid taping outcome measure showed improvement in numerical pain rating scale (p<0.0001), shoulder flexion (p<0.0001) and abduction (p0.0003) range of motion, Pectoralis tightness (p<0.0001), lateral scapular translation (p0.0025), lateral scapular slide test position 1: (p0.0001), position 2: (p<0.0001) and position 3: (p0.3305).

Conclusion: Scapular re-alignment by rigid taping was found effective in shoulder dysfunction.

Keywords: Rigid taping, Pectoralis tightness, Lateral Scapular Slide Test, Shoulder dysfunction, Scapular dyskinesia.

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I. INTRODUCTION

Musculoskeletal problems are quite common in traumatic and degenerative conditions of the shoulder complex.¹ Majority of shoulder injuries resulting from overuse of muscle, repetitive overhead shoulder activities with abnormal posture, macro-trauma or micro-trauma to the joint.¹⁻⁴ Frequently seen pathological conditions at the shoulder region are: Impingement: It is the most common musculoskeletal problem and caused by inflammation as well as reduced subacromial space. Rotator cuff / supraspinatus tendinitis: Repeated overhead activities, trauma and degeneration are among the main causes of injury and inflammation of tendons of the rotator cuff. Frozen shoulder: In frozen shoulder, capsule of the joint undergoes shortening with adhesions due to microtrauma and disuse.⁵ Posture: Postural mal-alignment often seen in the upper quadrant of the body is forward head posture with rounded shoulders.^{6,7} These modifications in shoulder girdle are due to altered muscle length tension relationships, joint congruity, ligamentous laxity, arthrokinematics of the various joints proximal and distal to the shoulder complex.^{6,7} These alterations leads to scapular dyskinesia. Scapular dyskinesia is a commonly use term which denotes the loss of control of normal scapular physiology, joint mechanism and movement.^{6,8} Alterations in the resting position or dynamic motion of the scapula changes the scapular muscle recruitment affects many aspects of normal shoulder function. Thus, rigid taping has been effectively used as a mode of therapy for achieving stability and restoration of joint function.⁹ The basic principle of taping is to provide protection and support an injured part and permit best possible functional movement. It helps to limit unwanted joint movements and allows optimal healing without stressing the injured structures. Applications of

tapes help in providing feedback during exercise, neuromuscular control and proprioceptive training.^{10,11} Thus, this method was used in the study for achieving re-alignment of scapula in shoulder dysfunction.

II. METHODOLOGY

Institutional ethics committee approval was taken for this study. The research was conducted at physiotherapy department of K.J.Somaiya College of Physiotherapy. Subjects with 30-50 years old with moderate unilateral shoulder pain for more than 1 week and flexion and abduction range of motion 90° or more were included in the study. Pre-assessment was taken Demographic data, numerical pain rating scale, bilateral shoulder flexion and abduction range of motion was taken in supine position by goniometer. Alignment of scapula was measured by the following parameters:

Distance between:

- Posterior aspect of the acromion and plinth for the tightness of pectoralis minor muscle.^{12,13}
- Medial border of scapula to fourth thoracic spinous process.⁴⁵
- Lateral scapular slide test:³¹ Position 1 - Inferior angle of scapula to adjacent thoracic spinous process when arms relaxed at the sides of the body.
- Position 2: Inferior angle of scapula to adjacent thoracic spinous process with arms 45° abducted resting on ipsilateral hip.
- Position 3: Inferior angle of scapula to adjacent thoracic spinous process with arms 90° abducted and internally rotated (thumb down position) as shown in Image 1.

The patient was taught to attain shoulder retraction and depression. After achieving the position, tape was applied bilaterally from first thoracic spine to twelfth thoracic spine and from center of the spine of scapula to twelfth thoracic spine. Patient was asked to report any form of irritation experienced or if the tape was slacken. The patient was asked to remove the tape immediately with precautions and return for another visit to have the scapula re-taped. Patients were called for a follow up on the 3rd day for re-taping. On 5th day tape was removed and post tape removal assessment readings were taken.¹⁶

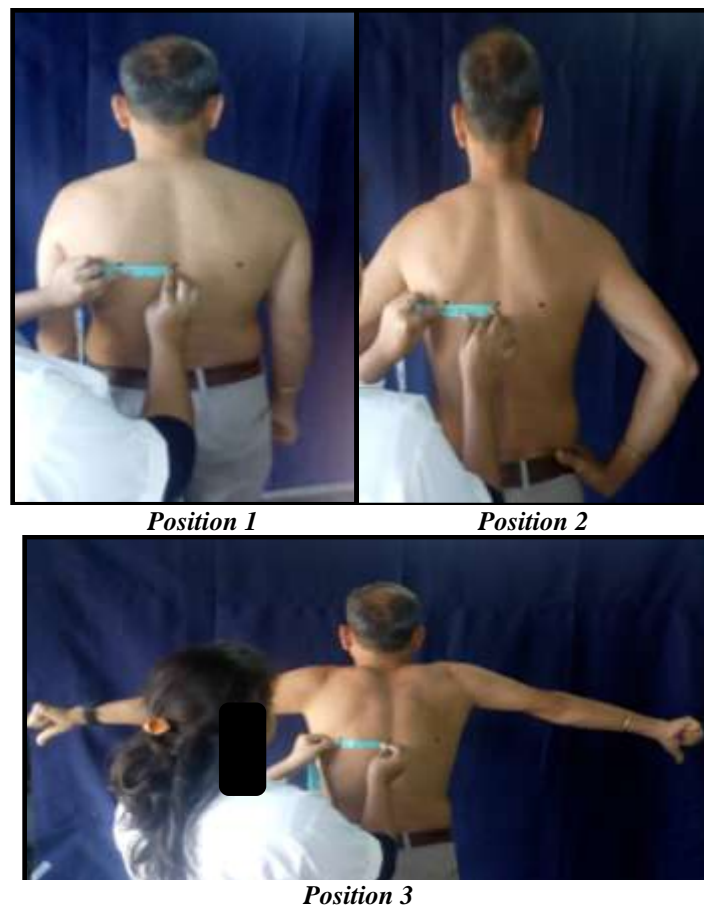


Image 1: Lateral Scapular Slide Test Measurements

III. RESULTS

The data of 54 subjects (n=54) with 27 females and 27 males in the age group of 30-50 years of age (mean=41.87) was collected. Effect of rigid tape on pain intensity for re-alignment of scapula on shoulder conditions were seen to be statistically significant p value <0.0001. The improvement of shoulder flexion and abduction range post taping of scapula was statistically significant p value 0.003. Reduced tightness of pectoralis minor muscle after five days of rigid tape application was found statistically significant p value <0.0001. Alignment of scapular position was found statistically significant 0.0025. Effects of rigid taping on the Lateral scapular slide test in three positions were seen as follows: The distance between inferior angle of scapula to adjacent thoracic spinous process when arms to the side of body (position 1) and when arms were 45° abducted, arms resting on ipsilateral hips (position 2) was found statistically significant p values 0.0001 and p value <0.0001 respectively. The distance between inferior angle of scapula to adjacent thoracic spinous process when arms were 90° abducted and internally rotated with thumb down position (position 3) was not found to be statistically significant p value 0.3305 as can be seen in table 1.

Outcome Measure	Pre		Post		Test	p value	Significance
	mean	SD	mean	SD			
NPRS	5.944	0.979	2.37	1.719	Paired t test	<0.0001	Significant
Shoulder Flexion	-31.48	19.8	-27.53	21.97	Wilcoxon matched -pairs	<0.0001	Significant
Shoulder Abduction	-51.18	21.88	-42.63	21.87	Paired t test	0.0003	Significant
Pectoralis tightness	0.457	0.175	0.305	0.258	Wilcoxon matched -pairs	<0.0001	Significant
Lateral scapular translation	0.355	0.187	0.281	0.181	Wilcoxon matched -pairs	0.0025	Significant
LSSL: Position 1	0.298	0.224	0.183	0.244	Wilcoxon matched -pairs	0.0001	Significant
Position 2	0.1	0.419	0.0009	0.342	Wilcoxon matched -pairs	<0.0001	Significant
Position 3	-0.139	0.532	-0.196	0.502	Wilcoxon matched -pairs	0.3305	Not significant

NPRS- Numerical pain rating scale

Table 1: Pre and Post Findings

IV. DISCUSSION

Effect of taping:

The effects of taping on scapular re-alignment could be explained on the basis of postural correction achieved by the rigid tape. Five days of taping was firm enough to maintain the scapular alignment. This firmness increased with movement which was sensed consciously by the patient, which might have given stimulus to correct the movement pattern. Length tension ratio increased the muscle length and decrease pectoralis minor tightness. Retracted position lengthened the tight fibres of pectoralis minor muscle.^{13,17} Taping also activates the lower fibres of trapezius^{11,18} and decreases over activity of upper trapezius fibres.¹⁹⁻²¹

Effects of taping on different shoulder condition:

Impingement and Painful Arc Syndrome: Along with these changes, taping may have facilitated paraspinal muscles to maintain extended position of thorax which reduced kyphotic posture and also increased the subacromion space. Thus, reducing the pain and improving range of motion.^{18,20,22,23}

Rotator cuff or supraspinatus tendinitis: Increased subacromion space improved clearance of rotator cuff tendon by getting impinged and decrease the mechanical abrasion of these tendons.^{14,23-25} Thus, improved shoulder range of motion and pain was found. Lateral scapula slide test measurements were found significant in position 1 and position 2 and not significant in position 3.

Frozen shoulder: Correct posture may have decreased anterior capsular tightness. Improvement found in lateral scapula slide test was not significant. By posterior tilting of scapula mild increase in range of motion was found and slight decrease in pain was found.^{14,18}

Effect of rigid taping was found more in Impingement than rotator cuff tendinitis than frozen shoulder.

V. CONCLUSION

Scapular re-alignment by rigid tape was found effective in improving shoulder pain and range of motion and also aligning the scapula in subjects with different shoulder condition.

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