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Case Report

Effect of Wall Slide and Ground-Based Push Up Exercises on Scapular Alignment and Shoulder Range of Motion in A Greater Tubercle Fracture of Humerus with Brachial Plexus Injury: A Case Report

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ABSTRACT

The purpose of the study was to see the effect of wall slide and ground-based push up exercises on scapular alignment and shoulder range of motion in a greater tubercle fracture of humerus with brachial plexus injury. Patient complaints of pain on shoulder, difficulty in shoulder movements, loss of movement and strength in wrist and elbow. Clinical findings include reduction in shoulder mobility, increase in scapular alignment has been done with lateral scapular slide test. **Rationale:** static push-up and ball push-up exercise, upper limb and abdominal muscles largely contribute to maintaining balance without any instability. **Results:** This study showed improvements in range, strength, and Functions with the use of wall slide and ground-based push up exercises.

KEY WORDS: Greater Tuberosity, wall slide, scapular downward rotation, push-up exercise.

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INTRODUCTION

About 3% of upper limb fractures occur in the proximal humerus and the injury influences both younger and older citizen. In greater tuberosity (GT) fractures, constitute about 20% of proximal humerus fractures and minimum 2 mm of superior displacement remarkably increases the tension needs for abduction which results in subacromial impingement [1]. GT is the insertion site for tendons of supraspinatus, infraspinatus and teres minor muscle and even small amounts of displacement could remarkably affect the range of motion, functions, and pain increases in involved joint. In addition, following GT fracture partial or full tears and tendinopathy might occur because of the proximity of the biceps tendon to the GT [2].

Shoulder pain is one of the most common chief complaints of patients during clinical practice which particularly involves scapula, altered alignment of the scapula showed up as a usual clinical problem with shoulder. Abnormal scapular alignment gives an indication about the resting length of scapular muscles. This altered alignment results in scapular muscle imbalance most commonly scapular upward rotators such as the upper trapezius (UT), lower trapezius (LT), and serratus anterior (SA) caused a scapular downward rotation (SDR). SDR is one of the most common abnormal

alignments of scapular impairments in population with shoulder pain [3].

Abnormal alignment of scapula can directly have an impact on glenohumeral joint biomechanics by changing tension at the cervico-scapular muscle, which might leads to shoulder impingement.

During shoulder abduction, Patients with SDR experience restriction of upward rotation of the scapula at 60° and compensatory scapular elevation. Repetitive use of UT muscle results in scapular elevation. However, during treatment of scapular muscle imbalance in a patient with SDR, it is necessary to do exercises which corrects the abnormal alignment of the scapula by strengthening the scapular upward rotators and extending the scapular downward rotators [4]. Jeong et al. conducted a study on healthy adults and measured activities of UT, SA, and deltoid while performing push-up plus exercises on a stable base of support and an unstable base of support, i.e. a sling. He got the results that the SA and UT has higher muscle activities in a push-up plus exercise conducted on a sling [4].

CASE REPORT

A case of 36 years old female a housewife with right hand dominance has no past medical history, met with a road traffic accident at umred on 1st February 2021.she was first admitted to kothari hospital where investigation was done and CT scan showed Right shoulder communicated mildly displaced fracture of head of the humerus & greater tubercle. MRI showed Right shoulder post ganglionic neuropraxic injury. She was diagnosed with case of dislocation of right shoulder. relocation of right shoulder joint was done under general anesthesia whereas nerve injury left untreated and she got discharged on 13 February 2021.after that patient went to Arogyam hospital for the further treatment and final diagnosis was done as a case of dislocation of right shoulder joint with greater tuberosity fracture with brachial plexus injury. However closed reduction internal fixation was done for greater tuberosity on 15 February 2021 under regional anesthesia. She was advised to do active finger movements and was referred for physiotherapy.

After 4 week she began physiotherapy treatment with complaints of pain on shoulder, difficulty in shoulder movements, unable to extend or loss of movement and strength in wrist and elbow. Initial assessment for range, strength and function was done after initial findings treatment was planned and she was improved with increase in shoulder range, strength of elbow and wrist extensors but scapular alignment was altered which may leads to restriction of shoulder movements and overhead shoulder activities so after three months of physiotherapy treatment the assessment of scapular alignment and shoulder range was done by lateral scapular slide test and ranges was measured by universal goniometer are mentioned in table no.1. Based on the final assessment, intervention was planned for 6days/week for 3 week. Each session starts with the wall slide exercise, which includes 1.wall slide 2.wall slide with rotate away 3.wall plank with rotate away, to strengthen the SA muscle, the affected arms slides upward on the wall with the elbow and shoulder joints flexed at 90°, and the trunk fixed in a standing position,. She was told to perform each exercise with 20 repetitions [4].

Followed by wall slide exercises an intensive ground based push-up on stable and unstable base of support was given which includes push-up on ground and push-up on ball with 20 repetitions on each session. Study Aimed to improve shoulder AROM, Shoulder Rehabilitation includes, stretching, strengthening, activity modification the involved limb was started including pectoral stretch on foam roller, doorway stretch, horizontal abduction and adduction at 3 angle stretch, dynamic kneeling latissimus-dorsi stretch with 3 repetition and 20 sec hold for each stretch and shoulder strengthening with 1kg dumbbell [5]. Post-intervention after 3 weeks showed slight decrease in scapular alignment and increase in range, strength and function of shoulder described in table 1. She was pleased with her ability to actively do or move her shoulder in all direction without any restriction and was able to do ADL's on her own with minimal

impairment.

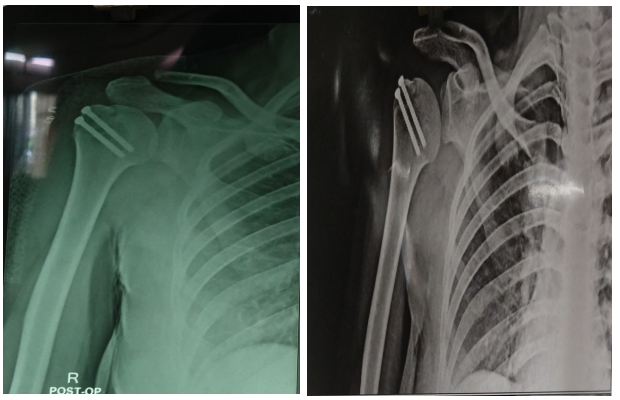
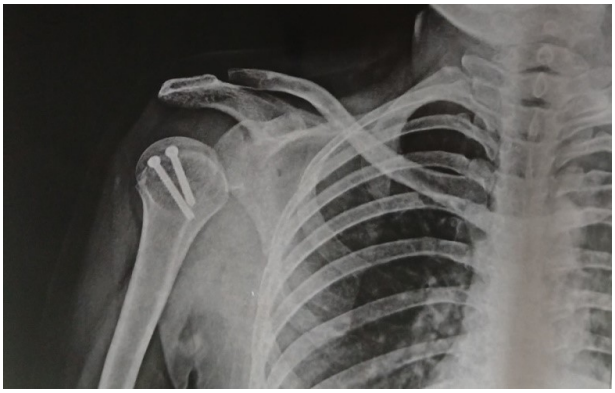


Fig. 1: X-ray of the patient



CRI: closed reduction internal fixation

Table 1: Showing the Pre and Post Intervention for lateral scapular slide test at various degrees.

Pre- intervention				Post- intervention		
Lateral scapular slide test- at	**Right**	**Left**	**Difference**	**Right**	**Left**	**difference**
I level 0 degree	T7-10cm	T7-10cm	-	10cm	10cm	-
Y level 40 degree	T7-10cm	T7-10.5cm	0.5cm	11cm	11.5cm	0.5cm
T level 90 degree	T7-10.5cm	T7-11.1cm	0.6cm	8cm	8.3cm	0.3cm
Shoulder ROM-				**Shoulder ROM-**		
Flexion-			0-119°	**Flexion-**		0-153°
Abduction-			0-110°	**Abduction-**		0-126°
Extension-			0-30°	**Extension-**		0-38°
External rotation-			0-35°	**External rotation-**		0-75◦
Internal rotation-			0-45°	**Internal rotation**		0-80◦

RESULTS

Results of the study showed increase in ranges of shoulder i.e flexion, abduction, external, and internal rotation. But did not show correction in alignment of scapula as showed in table 1.

Fig 2: Shows pre-intervention and post- intervention shoulder abduction.

DISCUSSION

The present study showed improvements in range, strength and Functions with the use of wall slide and ground-based push up exercises with early electrical stimulation & passive and active-assisted mobilization exercises after closed reduction internal fixation of greater tubercle.

Previous studies concluded that other instability devices were used to increase the co-contraction of muscles of extremities to control the position of the limb and perform the task correctly. The current study used ball as an unstable surface and the result of current study supports above theory which is also showed increase contraction of upper extremity and can be comment as the ball

based push-up exercise where unstable grips can be maintained in position by co-contraction of the elbow flexors and extensor muscles. According to results, the study suggested that while doing static push-up and ball push-up exercise, upper limb and abdominal muscles largely contribute in maintaining balance without any instability (Sumiaki Maeo et al 2014). For maintaining normal alignment of scapula, it needs to regain the normal length of scapular upward and downward rotators (Tae-Ho Kim et al 2016). Cools et al. stated that exercises assist in strengthening weakened muscles, and stretching was helpful to increase length of shortened muscles. However, the wall slide exercise goes along with downward rotators to stretch them for three weeks to correct muscular imbalance, and was helpful in decreasing abnormal alignment of the scapula (Tae-Ho Kim et al 2016). In present study, the difference between pre and post LSST has slightly reduced but did not show correction in alignment of scapula. Increase in ranges of shoulder and increase mobility of scapula observed.

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Conflicts of interest: **None**

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