

Comparative Study of Manual Therapy plus Shoulder Exercise versus Combined Therapy with Ultrasound in Patients of Subacromial Impingement Syndrome

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Abstract: Shoulder pain especially subacromial impingement syndrome (SIS) is commonest among various joint pains. Adjunct to physiotherapy, ultrasound therapy yielding ultrasound waves is recently of interest in palliation of pain in joint and other inflammatory conditions. It was worthwhile to objectively assess role of ultrasound therapy in SIS. Comparative study of outcomes of manual therapy plus ultrasound therapy alone versus combined ultrasound therapy was carried out in diagnosed patients of SIS. Twenty patients in either group duly inducted sequentially and fulfilling inclusion and exclusion criteria, completed the study. Physiotherapy with manual therapy plus exercise therapy administered daily for 3 weeks significantly reduced pain score but not disability score and range of various movements in the control patient group. The intervention group given ultrasound combination therapy with manual and exercise therapy yielded highly significant reduction in pain and disability scores and improved range of all studied movements. Ultrasound therapy was found to be significantly useful in giving relief in patients of SIS and perhaps relevant to several other joint and muscular conditions.

Keywords: Shoulder pain, subacromial impingement, ultrasound therapy, joint pain.

INTRODUCTION

Background

Physiotherapy is widely used in the management of subacromial Impingement syndrome (SIS) which includes various treatment methods such as shoulder exercises, manual therapy and electrotherapy. Physiotherapy has been found to be effective in reducing pain and disability in patients with shoulder impingement[1].

Ultrasound is commonly used electrotherapeutic modality for impingement as well as other forms of tendinitis and muscle injury. Therapeutic ultrasound is a modality commonly used by physiotherapist. In patients recovering from a shoulder injury shoulder exercises are an integral part in regaining the range of motion, muscle elasticity and strength. Manual therapy is used manually or mechanically applied movement techniques to improve joint movement[2]. Both therapeutic exercises and manual therapy are commonly used as part of physiotherapy programs aimed at improving shoulder kinematics.

Among the different diagnoses covered by the concept of shoulder pain, the most common is SIS. It is increasingly more common in athletes whose sports involve repetitive overhead motions. Also, in the older population this syndrome is common majority of SIS cases are managed with conservative treatment of exercise and manual therapy[3]. Adequate literature provides evidence to prove the effectiveness of various

therapeutic exercises and manual therapy techniques[4]. The effectiveness of ultrasound is debatable. Our study was designed to assess whether ultrasound therapy helps in rehabilitation of SIS in the acute and sub-acute stage, over that of physiotherapy and manual therapy.

SUBJECTS AND METHODS

This study was conducted in patients referred to the physiotherapy department of S.S. Hospital, Banaras Hindu University during the period march 2013 to September 2014.

Selection Criteria

Patients of shoulder pain referred for physiotherapy from orthopedics outpatients were examined for presence of SIS by following tests.

- **Neer Impingement test:-** Therapist grasp patient's wrist and passively move the shoulder through forward flexion. Shoulder pain and a look of apprehension on patient's face indicate a positive sign.

- Hawkins-Kennedy Impingement test:- Shoulder flexed as and elbow also flexed 90°, Internal rotation will cause pain. It indicates positive sign.

Informed consent: The patients were informed about the nature of two treatments and explained that they shall receive only exercise plus manual therapy or combination with ultrasound therapy. This was important for research to know if the two therapies bring different benefits. After this, patients were told that the details of their case will be used in research without revealing their personal identity without their consent. Patients were also given the option to withdraw from the study at any time. After this they were required to give written consent.

Selection criteria

Patients were allocated alternately to either group i.e.1'manual therapy and shoulder exercise or group 2 'ultrasound combined with manual therapy and shoulder exercise'. The age group of patients selected was between 18 to 35 years of either gender.

Exclusion criteria

- Primary scapuloarthrosis dysfunction due to paresis.
- Diagnosed instability or previous history of dislocation.
- Adhesive capsulitis.
- Shoulder surgery in the last 12 months on the involved side.
- Radiological findings of tumor lesions, avascular necrosis, and glenoid development defect, degenerative signs affecting intraarticular space and fractures.

Full history was taken and demographic details were noted (age, sex, weight, height).

Measurements

Pain intensity

It was measured on visual Analogue scale [VAS] of 10 points to evaluate intensity of pain where '0' represents no pain and '10' represents unbearable pain[5].

Shoulder disability

Disability of shoulder joint was measured using shoulder disability index. It was measured in various activities involving shoulder. The score was calculated out of 10. In which worse higher and reflecting "So difficult requiring help" and lower score as "No difficulty"[6].

Joint movement

It was measured with the help of universal goniometer. The axis of goniometer was placed at 2.5 cm inferior to the lateral aspect of the acromion process for shoulder flexion, at 1.3 cm inferior and lateral to the coracoid process for shoulder abduction and at the olecranon process of the ulna for shoulder internal and external rotation[7].

Treatment

Group-1 Exercise therapy and manual therapy

In order to restore muscular deficits in strength, mobility and coordination of rotator cuff and shoulder girdle muscle, standard exercise protocol and manual therapy were given. At the beginning of the treatment, all the participants were given a brief explanation on anatomy and biomechanics of shoulder complex and a short description of the etiology and pathology of SIS.

The treatment in the first week aimed at reducing the pain intensity and to prevent further damage and consist of manual therapy, techniques such as 'joint mobilization techniques' and 'transverse friction massage' and 'Shoulder pendular exercises'.

The second and third week aimed to restore the functional level by increasing, range of motion, muscle strength and flexibility and consist of range of motion exercises with rope and pulley, L-bar exercise, self-capsular stretching exercises, joint mobilization techniques and strengthening exercises with weights, therapeutic bands, springs and pushups. Treatment was given for a total of 15 treatment sessions of 40 minutes, over a period of 3 consecutive weeks/5 days per week.

Group-2 Ultrasound therapy with manual therapy and shoulder exercise -

Participants in the intervention group (group-2) received pulsed ultrasound for 5 minutes with a device that was operated at a frequency of 1 MHZ and intensity of 1w/cm². The treating physiotherapist using the technique of slow circular movements applied the transducer head over the superior and anterior periarticular regions of the participant's glenohumeral joint and on the shoulder trigger points. This is in addition to standard exercise and manual therapy as given in the control group (Group1). The treatment was continued from the first treatment day over the 15 day treatment period.

RESULTS

During the study, 51 cases were enrolled, however 11 cases failed to continue therapy for entire period of study. Among these, 4 were from control group (group1) and 7 from intervention group (group-2). The results show that exercise and manual therapy (group-1) give significant reduction only in the pain score and disability while range of motion were only modestly improved and were not statistically

significant. In Intervention group (group-2), all parameters viz pain, disability and range of various

movements showed statistically highly significant improvements.

Observations in Control group ie. Group I (Manual therapy plus exercise therapy) -

Table-1: Distribution of cases (numbers) by median (median pain score=6)

	No. of cases Above median	No. of cases at Median and below median	P value
Pre test	10	10	P=0.018
Post test	3	17	

Table-2: Distribution of cases (numbers) by median (median disability score=6)

	No of cases Above median	No of cases at Median and below median	P value
Pre test	11	9	P=0.0110
Post test	6	14	

Table-3: Distribution of cases (numbers) by median (median core for plexion and abduction is 110°, for internal rotation is 50° and for external rotation is 70°)

	No. of cases at median or below median	No. of cases above median	P value
Flexion	13	7	P=0.337
	10	10	
Abduction	14	6	P=0.197
	10	10	
Internal rotation	11	9	P=0.752
	10	10	
External rotation	17	3	P=0.273
	13	7	

Observations in group II (Ultrasound therapy with exercise plus manual therapy) -

Table-1: Distribution of cases (numbers) by median (median pain score=4)

	No. of cases above median	No of cases at Median and below median	P value
Pre test	15	5	P=.0001
Post test	1	19	

Table-2: Distribution of cases (numbers) by median (median disability score=3)

	No. of cases above median	Median and below median	P value
Pre test	16	4	P=0.0001
Post test	2	18	

Table-3: Distribution of cases (numbers) by median (median core by flexion is 130°, for abduction 120°, for internal rotation 40° and for external rotation - 70°)

	No. of cases at median or below median	No. of cases above median	P value
Flexion- pre test post test	18	2	P=0.0001
	2	18	
Abduction- pre test post test	19	1	P=0.0001
	3	17	
Internal rotation- pre test post test	19	1	P=0.0001
	5	15	
External rotation- pre test post test	18	2	P=0.0001
	4	16	

DISCUSSION

SIS is very common disorder of shoulder joint encountered in all adult age groups. Among the patients referred for shoulder pain physiotherapy, a quarter of cases showed positive tests to be labeled as SIS. During the course of our study, 51 such diagnosed patients were enrolled. These was relatively more (n=7) number of cases failing to come regularly for therapy in 'groups-2' then in 'group-1' (n=4). As was seen from the results, the patients probably got enough relief earlier with the ultrasound therapy and did not complete the full study course. Both group-1 and group-2 benefited in regard to pain and disability. However the 'group-2' had much stronger significant improvement compared to 'group-1'. Pain is a subjective sensation which also has large psychological component and the sense of receiving care undoubtedly should cause improvement in pain. The objective parameters namely disability improved significantly but range of various shoulder movements were not improved significantly in 'group-1' within 18 weeks duration of study.

In contrast to this, patients of group-2 (combination of ultrasound therapy) show consistently significant improvements in all objective parameters, ie pain score; disability score and range of various shoulder movements. These observations prove special additive therapeutic influence of ultrasound therapy on pathological components of SIS.

Ultrasound therapy has been reported to cause functional as well as structural changes of potential states[1,8,9].

There is no sufficient classify on mechanism how ultrasound cause therapeutic effect in injured tissue. These is suggestion that thermal effects of ultrasound aid in pain relief where as non-thermal effects enhance cell and tissue repair as well as resolve the inflammatory reaction[10].

There are many studies that show benefits of manual and exercise therapy in relief of shoulder pain[1,11]. However these studies had much longer treatment duration of motor control and strengthening exercises.

In general there are conflicting reports on benefits of ultrasound therapy. Studies suggest better assessment of Individual patients to monitor outcomes of the interventions [9,12].

In this study, the number of patients is limited and age group also diverse. There are differences among these patients with respect to social and occupational prospects'. The study duration was also 3 weeks. These may be genuine, limitations to generalization of the findings. However the benefits of ultra sound therapy observed in the limited study are

significant and consistent enough to demand wider scale evaluation.

CONCLUSION

This was study comparing beneficial effects of conventional manual therapy versus combination of ultrasound therapy in limited groups of 20 patients each of SIS. The results indicate good promise for employing additive ultrasound therapy as a routine practice for relief in SIS perhaps in other point pains.

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