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Comparison of the efficacy of local corticosteroid injection and physical therapy on pain severity, joint range of motion and muscle strength in patients with shoulder impingement syndrome referred to Rasool-e-Akram Medical Center from April 2008 to September 2009

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Abstract

Background: Subacromial impingement is a common cause of shoulder pain and many patients with this condition recover with conservative management. The most commonly used modalities of non-operative treatment include activity modification, anti-inflammatory medication and subacromial injection of steroid and ultrasound and physical therapy programs. This study assessed the value of physiotherapy versus subacromial corticosteroid injection in patients with shoulder impingement syndrome (SIS).

Methods: Seventy three patients with SIS enrolled in the study and treated through physiotherapy (n=37) and subacromial corticosteroid injection (n=36). Two follow-up sessions accomplished at the end of 4th week and 3rd month of treatment respectively.

Results: Corticosteroid injection caused dramatic improvement in the painful state ($p<0.0001$) and sleep dysfunction score ($p=0.039$) in the first follow-up. However, physiotherapy showed significantly better results regarding patients' pain score ($p=0.016$) and their shoulder join range of motions ($p=0.017$ and $p=0.029$ for the abduction and extension, respectively) in their second follow-up.

Conclusion: Our study results showed that subacromial corticosteroid injection primarily resulted in more improvement in the impingement symptoms. However, with the long-term follow-up the results were better for the physiotherapy. These results suggest that patients should not undergo surgery before having conservative treatment.

Keywords: shoulder impingement syndrome (SIS), physiotherapy, subacromial corticosteroid injection, randomized clinical trial (RCT)

Introduction

The shoulder impingement syndrome is a painful disorder of the shoulder joint along with limitation of the joint range of motion and severe disabilities and quality of life reduction in the affected patients. Two types of surgical and non-surgical treatments are used for treatment of this syndrome [1]. Physiotherapy [2], non-steroidal anti-inflammatory and analgesic drugs use, and the injection of a mixture of steroidal compounds with the lidocaine in the subacromial space [3, 4] are a range of already commonly applied non-surgical methods.

We can use non-surgical methods when the disease is not prolonged and no muscular atrophy existed. This atrophy is a result

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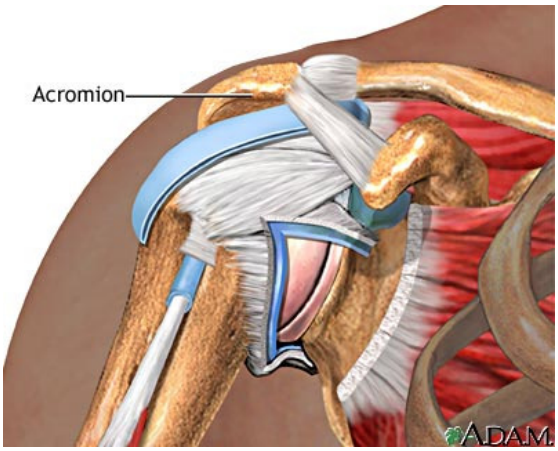

Fig. 1. When tendons become trapped under the acromion, the rigid bony arch of the shoulder blade, it can cause shoulder pain called impingement syndrome. The tendons become compressed, damaged, and inflamed leading to rotator cuff tendonitis.

of an old and giant rotator cuff tearing. If the disease symptoms did not improve up to 3 months and the patient was incapable of performing the daily duties, we can suggest ultrasonography, arthrography or MRI to better investigate the tendinous quality. The operational treatment is performed through arthroscopic or open surgery.

Several studies have already compared the efficacy of commonly used therapeutic modalities for this syndrome. It is clear that the selection of an appropriate therapeutic method will mainly depend on the patient's condition and disease status. A recent study in 2009 compared the efficacy of high power laser and ultrasound in treating this syndrome in 70 patients [5]. Dorestijn et al of Groningen, the Netherlands, have also reviewed recently the surgical and non-surgical therapeutic methods [5]. Another Turkish study investigated the efficacy of low-power laser in conjunction with routine therapeutic exercise compared to the exercises alone [5].

We could not find any previous study concerning the comparison of the efficacy of local corticosteroid injection and that of physical therapeutic techniques in the treatment of this condition.

In 1972, Neer first introduced the concept of rotator cuff impingement to the literature, stating that it results from mechanical impingement of the rotator cuff tendon beneath the anteroinferior portion of the acromion, especially when the shoulder is placed in the forward-flexed and internally rotated position [5]. In all Neer stages, etiology is impingement of the rotator cuff tendons under the acromion and a rigid coracoacromial arch, eventually leading to degeneration and tearing of the rotator cuff tendon.

Although rotator cuff tears are more common in the older population, impingement and rotator cuff disease are frequently seen in the repetitive overhead athlete. The increased forces and repetitive overhead motions can cause attritional changes in the distal part of the rotator cuff tendon, which is at risk due to poor blood supply. Impingement syndrome and rotator cuff disease affect athletes at a younger age compared with the general population [1,2].

Nonoutlet impingement also can occur. The consequences may include loss of normal humeral head depression from either a large rotator cuff tear or weakness in the rotator cuff muscles from a C5/C6 neural segmental lesion or a suprascapular mononeuropathy. This condition also may occur because of thickening or hypertrophy of the subacromial bursa and rotator cuff tendons [4,5]. Overuse or repetitive microtrauma sustained in the overhead position may contribute to impingement and rotator cuff pathology. Shoulder pain and rotator cuff disease are common in athletes involved in sports requiring repetitive over-

head arm motion (eg. swimming, baseball, volleyball, tennis) [3].

Secondary impingement often is attributed to impingement, which seldom is mechanical in nature in young athletes. Rotator cuff disease in this population may be related to subtle instability, and, therefore, may be secondary to such factors as eccentric overload, muscle imbalance, glenohumeral instability, or labral lesions. This has led to the concept of secondary impingement, which is defined as rotator cuff impingement that occurs secondary to a functional decrease in the supraspinatus outlet space due to underlying instability of the glenohumeral joint [5, 6].

These increased demands may lead to rotator cuff pathology (e.g. partial tearing, tendonitis). Furthermore, as the rotator cuff muscles fatigue, the humeral head translates anteriorly and superiorly, impinging upon the coracoacromial arch. This leads to rotator cuff inflammation. In these patients, treatment should address underlying instability.

- Should compare both shoulders either to detect bilateral pathology or to establish a control for comparison with the affected shoulder.

- *Impingement signs*

Neer test: Forcefully elevate an internally rotated arm in the scapular plane, causing the supraspinatus tendon to impinge against the anterior inferior acromion.

Hawkins-Kennedy test: Forcefully internally rotate a 90° forwardly flexed arm, causing the supraspinatus tendon to impinge against the coracoacromial liga*mentous arch.* (Note: Pain and a grimacing facial expression indicate impingement of the supraspinatus tendon, indicating a positive Neer/Hawkins impingement sign.)

Impingement test: Inject 10 mL of 1% lidocaine solution into the subacromial space. Repeat testing for an impingement sign. Elimination or significant reduction of pain constitutes a positive impingement test.

Drop arm test: The patient places the arm in maximum elevation in the scapular plane and then lowers it slowly (the test can be repeated following subacromial injection of lidocaine). Sudden dropping of the arm suggests a rotator cuff tear.

Supraspinatus isolation test/empty can test: The supraspinatus may be isolated by having the patient rotate the upper extremity so that the thumbs are pointing to the floor and apply resistance with the arms in 30° of forward flexion and 90° of abduction (assimilates emptying of a can). This test is positive when weakness is present (compared to the unaffected side), suggesting disruption of the supraspinatus tendon [1-6].

Treatment

Physical Therapy: A period of active rest should be recommended to the patient, eliminating any activity that may cause an increase in symptoms. Range of Motion (ROM) exercises may include pendulum exercises and symptom-limited active-assistive range of motion (AAROM) exercises. Joint mobilization may consist of inferior, anterior, or posterior glides in the scapular plane. Strengthening exercises should be isometric in nature, working on the external rotators, internal rotators, biceps, deltoids, and scapular stabilizers (rhomboids, trapezius, serratus anterior, latissimus dorsi, and pectoralis major). Exercises targeting the rotator cuff muscles are extremely important. Modalities may be used as an adjunct and can include cryotherapy, transcutaneous electrical nerve stimulation (TENS), high-voltage galvanic stimulation, ultrasound, phonophoresis, or iontophoresis. Patient education is particularly important for the acute phase regarding activity, pathology, and avoiding overhead activity, reaching, and lifting. The general guidelines to progress from this phase are decreased pain or symptoms, increased ROM, painful arc in abduction only, and improved muscular function. Treatment should begin locally and move globally as needed in order to achieve full function and the best result possible. Posture and scapula setting is important to correct in order for the joint and muscles to function in the position and at the length they were designed to therefore improving efficiency and facilitating correct force couples within the joint and surrounding tissues. It improves joint mechanics making it

less likely that the greater tuberosity will come into contact with the acromion. Improving capsule flexibility will allow the head of humerus to translate / glide more easily within the joint [5,6].

Using the patients' own lifestyle and normal demands to change posture and strengthen the appropriate muscles is very important because the demands on any one person are very different to the next. It also allows us to address the correct muscles usage for that individual. By incorporating normal Activities Daily Living (ADL) into the exercise regime for example: reaching forward for the telephone or up to a shelf with correct posture / position and facilitation of posterior cuff muscles (e.g. pretending that they are pushing back of their hand against a wall at the same time as reaching forward) means that this exercise can be done several times a day without taking any timeout. You could also build up stamina in a movement done on a regular basis. Resistance can be added to this in the form of theraband and copying the specific movement pattern.

Subacromial injection: During the acute to subacute phase, when pain and inflammation are predominant, a subacromial injection may be diagnostic and therapeutic as an adjunct to a rehabilitation program. Injection of 10 mL of 1% lidocaine solution (without epinephrine) into the subacromial space should relieve shoulder pain if pain and inflammation truly is originating from the supraspinatus outlet/subacromial space. Adding a low dose intermediate-acting injectable corticosteroid may provide a therapeutic effect. Betamethasone, triamcinolone, and methylprednisolone commonly are used.

One ml of Tiamcinolon mixed with 5 ml of Xylocain 2% and 10 ml of (injectable) water through anterior or posterior in subacromial space in sitting or beach chair position should be injected.

Surgical Intervention: In general, conservative measures are continued for at least 3-6 months or longer if the patient is improving, which could occur in 60-90% of patients. If the patient remains significantly disabled and has no improvement after 3 months of conservative treatment, the clinician must seek further diagnostic work-up, and reconsider other etiologies or refer for surgical evaluation.

Appropriate surgical referrals are patients with subacromial impingement syndrome refractory to 3-6 months of appropriate conservative treatment. In a systematic review, Dorrestijn et al attempted to compare the effects of conservative and surgical treatment for subacromial impingement syndrome with regard to improvement of shoulder function and reduction of pain [1]. Of 4 randomized controlled trials that met the investigators' criteria, 2 were of medium methodologic quality and 2 were of low methodologic quality, but there were no differences in outcome between the treatment groups. Their findings led Dorrestijn et al to note the scarcity of high-quality randomized controlled trials does not allow conclusive evidence for differences in pain outcomes and shoulder function in conservatively and surgically treated patients with subacromial impingement syndrome [1].

Results are generally good for properly selected middle-aged patients with evidence of impingement on history and physical examination and at the time of arthroscopy.

General consensus in the literature is that arthroscopic subacromial decompression results in a good return to the previous level of function in approximately 85-90% of patients; however, results are generally poor in young high-performance athletes who participate in overhead activities [5,6].

Complications: If shoulder impingement syndrome is not diagnosed and treated promptly and correctly, it can progress to rotator cuff degeneration and eventual tear. Other complications may include progression to adhesive capsulitis, cuff tear arthropathy, and reflex sympathetic dystrophy. Complications also may result from surgery, injection, physical therapy, or medication.

Methods

Our study was a cohort study. The statistical population for the study consisted of patients with shoulder impingement syndrome referred to the Rasool-e-Akram medical center during April 2008 to September 2009.

Sampling method: Sampling was done through simple randomized sampling method from among the study population.

Data collection tools: The data were collected through the history taking and the patients' physical examination and the shoulder radiography and MRI plains as well and entered in a data collecting form. Descriptive data presented as central and scattered indices. The T test (paired samples T-test and independent samples T-test) was used to compare the mean values in two groups; and the chi^2 test was used to compare the categorical variables in two groups.

Statistical Package for the Social Studies (SPSS) version 16.0 was applied to analyze the collected data.

Patients above 18 years of age with a diagnosis of shoulder impingement syndrome entered to the study.

Inclusion criteria were the followings:

- Age between 18 and 70 years
- Diagnosis of shoulder impingement syndrome

Exclusion criteria also included:

- Age < 18 years
- Age > 70 years
- Previous history of autoimmune diseases
- Any previous history of musculoskeletal disease
- Any previous history of shoulder joint operation
- Any previous history of shoulder joint trauma
- Muscular atrophy
- Positive Drop arm test
- MRI compatible with the complete tearing of rotator cuff tendon

Among the patients who had come with chief complaint of shoulder pain, to the orthopedic clinic of Rasool-e-Akram medical center from April 2008 to Sptember 2009, whom that had SIS as the diagnosis, on the basis of history and physical exam, was entered to our study, by considering the inclusion and exclusion criterias.

Patients who had history of shoulder surgery or previous therapy (including at least one local injection of corticosteroid or at least 10 sessions of physiotherapy) were excluded from the study.

Simple radiography including an AP view along with a Y-view and an auxiliary view performed for all patients. The MRI was requested for patients with suspicious diagnosis. Sixty nine percent of our patients referred us with a previous MRI study. The most prevalent finding in the MRI was partial tear of the rotator cuff (45.1%), and no patient had complete tear of the rotator cuff.

The patients were selected from among the study population and simply divided in two groups: Local corticosteroid injection group and Physiotherapy group.

The patients in each group underwent treatment using local injection of corticosteroid at the first session or physiotherapy protocol for shoulder impingement syndrome. The treatment period for both groups was12 weeks. The follow up visits consisted of two sessions at the end of 4th therapeutic week and at the end of 12^{th} week respectively. The required data representing the variables section were collected and entered in the prepared checklist.

Physiotherapy protocol: Two periods of physiotherapy composed of 10 sessions of stretching and strengthening exercises, without modalities, performed for each patient in a total of 40 days period (every-other-day distance of the sessions).

Local corticosteroid injection: A mixture of 2ml of betamethasone-LA with 3 ml of lidocaine 2% diluted in 5 ml of distilled water injected locally at the site of subacromial.

Follow up: Twelve weeks of follow-up

Table 1. The basic characteristics of study groups.

variable			Local corticosteroid group	Physiotherapy group	P value (test)
Age (year)			52.3±13.7	47.5±10.0	0.09 (t-tes
Gender		Male	14	11	0.410 (chi^2 test)
		Female	22	26	
Job		Hand-held working	6	6	0.932 (Chi^2 test)
		Non-hand-held work	9	8	
		Home-keeping	20	22	
Pain intensity			7.1±1.6	7.1±2.0	0.905 (t-test)
Range of motion (ROM) (degrees)		Flexion	149.7±34.5	146.5±35.0	0.692 (t-test)
		Abduction	153.2±35.4	151.1±35.3	0.799 (t-test)
		External rotation	61.43±25.81	61.80±25.39	0.951 (t-test)
		Internal rotation	Classified as ability to keep the hand adjacent to the hip or lower and every lumbar vertebrae		0.759 (Kendall's tau-b)
Muscle strength	Internal rotation	5/5	15	11	0.392
		4/5	18	24	(kendall's tau-b)
		3/5	3	2	
	Abduction	5/5	3	4	0.612
		4/5	29	26	(kendall's tau-b)
		3/5	3	6	
	External rotation	5/5	17	17	0.679
		4/5	15	19	(kendall's tau-b)
		3/5	4	1	
Height (cm)			164.8±6.9	165.2±6.9	0.826 (t-test)
Weight (kg)			67.9±11.5	66.2±10.6	0.500 (t-test)
Involved side		Right	24	20	0.463 (chi^2 test)
		Left	8	13	
		Both	4	4	
Dominant hand		Right	34	35	0.978 (chi^2 test)
		Left	2	2	
History of common exercise		Yes	3	2	0.620 (chi^2 test)
		No	33	35	

done for each patient including 3 follow-up visits sessions (primary, end of 4th week and end of 12th week). The (for the forward flexion, abduction, internal rotation, and external rotation), pain intensity (by using pain ruler), and muscular force 5 (for the abduction, Internal rotation and external rotation movements) were evaluated and graded from 1 to 5 in each follow-up session.

Results

A total of 73 shoulder impingement syndrome included in the study, 37 of which treated using physiotherapy techniques and 36 treated through local corticosteroid injection to the shoulder joint. Two groups were generally the same with regard to their basic characteristics. The patients' basic characteristics in two therapeutic groups are presented and compared in Table 1.

At the second measurement of the dependent variables pain score, forward flexion, abduction, internal rotation, and external rotation ranges of motion, and abduction, internal and external rotation strengths and pain level were significantly lower in local corticosteroid injection group ($p<0.0001$, Mann-Whitney U test). However these parameters reduced much more in

physiotherapy group to the levels beneath that of local corticosteroid injection group (p=0.016, independent samples t-test). However, two groups were of equal scores at the end of 12th weeks (p=0.135, independent samples t-test). The applied treatment modality did not affect the shoulder joint range of motions in the forward flexion, abduction, internal rotation, and external rotation movements at the end of 4th week of therapy. However, physiotherapy did improved the ROM significantly in all directions especially in abduction and external rotation motions at the end of 12th week of treatment (p=0.017 and p=0.025 for abduction and external rotation movements, respectively, independent samples t-test).

Muscle strength for abduction, internal and external rotation motions did not differ significantly between two groups neither for first follow-up nor for the second one (p

Table 2. The comparison of the impingement parameters at the end of 4th week and 3rd month of treatment.

				variable	2nd measure (4th week)	3rd measure (3rd month)
Pain score				LCI group	2.6±0.6	2.4±0.9
				PT group	3.9±1.5	2.0±0.7
				P value (test)	<0.0001 (Mann-Whitney U test)	0.016 (t-test)
Range of motion (ROM) (degrees)		**Flexion**		LCI group	163.2±22.7	168.5±16.0
				PT group	161.8±23.7	173.0±10.6
		P value (test)			0.792 (t-test)	**0.163 (t-test)**
		Abduction		LCI group	164.3±26.2	166.5±22.4
				PT group	165.9±19.0	176.2±6.4
		P value (test)			0.760 (t-test)	**0.017 (t-test)**
		External rot.		LCI group	67.50±18.34	70.00±16.03
				PT group	69.19±17.38	76.76±8.35
		P value (test)			0.687 (t-test)	**0.029 (t-test)**
		Internal rot.		LCI group	Classified as ability to keep the hand adjacent to the hip or lower and every lumbar vertebrae	
				PT group		
		P value (test)			0.303 (Kendall's tau-b)	**0.928 (Kendall's tau-b)**
			LCI group	5/5	18	26
				4/5	18	10
	Internal rotation			3/5	0	0
			PT group	5/5	20	29
				4/5	16	8
				3/5	1	0
				p value (test)	0.092 (chi^2 test)	0.766 (chi^2 test)
Muscle strength			LCI group	5/5	10	19
				4/5	25	16
	Abduction			3/5	0	0
			PT group	5/5	12	27
				4/5	24	9
				3/5	0	0
				p value (test)	0.664 (chi^2 test)	0.062 (chi^2 test)
			LCI group	5/5	20	25
				4/5	15	11
	External rotation			3/5	1	0
			PT group	5/5	22	33
				4/5	15	4
				3/5	0	0
				p value (test)	0.104 (chi^2 test)	0.250 (chi^2 test)

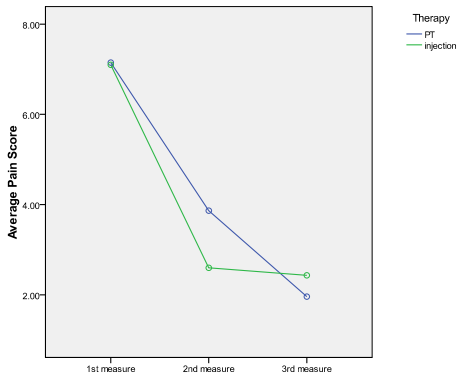

Fig. 1. Mean pain score (A) reduction trend in two groups

but it was noticeable clinically).

The comparison of the measured parameters in the first and second follow-up sessions are presented in Table 2.

Although with low power levels, comparison of the temporal changes in pain score did not show significant difference in two groups (p=0.289, Power=0.184; and p=0.481, Power=0.108, Repeated measures analysis of variances). Fig. 1 shows these changes clearly over time and their comparisons between two groups. On the other hand, despite much higher degrees of ROM especially for abduction and external rotation movements on the second follow-up measurement, there was no statistically significant difference between two groups in ROM changes over time (p=0.992, Power=0.05; p=0.584, Power=0.084 and p=0.421, Power=0.126, for flexion, abduction movements respectively). We observed variable trends and their differences in two groups (Fig. 2).

Muscle strength changes during abduction, internal and external rotation of the shoulder joint did not differ between two groups over the treatment period.

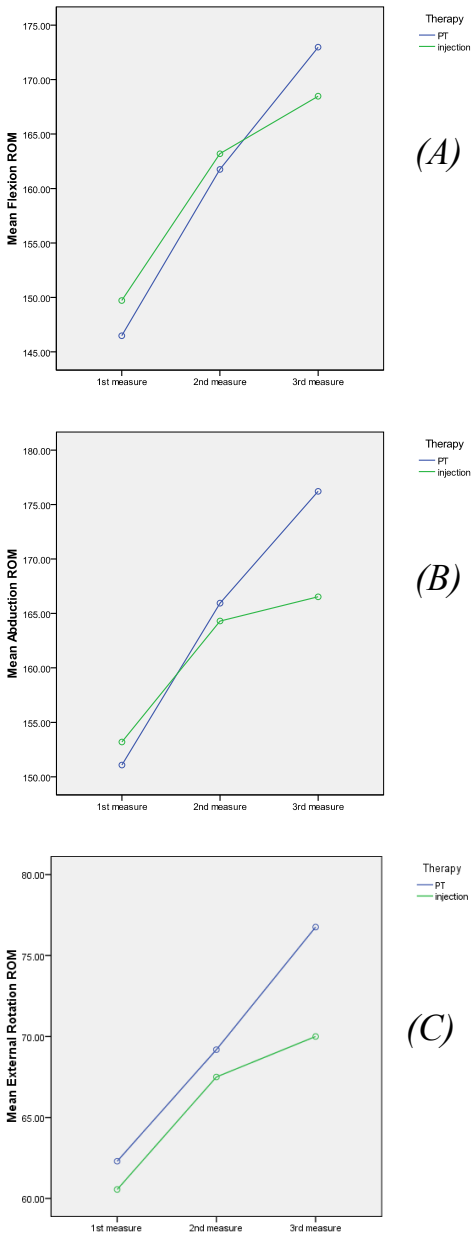

Fig. 2. Average range of motion (ROM) changes over time and their comparisons in two groups for flexion (A), abduction (B) and external rotation (C) movements of the shoulder joint.

Discussion

Our study results showed that subacromial corticosteroid injection primarily resulted in more improvement in the impingement symptoms. However, with the long-term follow-up the results were better for the physiotherapy. This was more evident in the case of shoulder joint range of motions. Few studies have yet compared the effectiveness of physiotherapeutic techniques in the treatment of shoulder impingement syndrome [8,9,11,13,14].

Ludewig and Borstad [19] investigated the effect of standardized home-based exercises of 10 weeks' duration, including 6 stretching and strengthening exercises in 76 male construction workers. They found sig-

nificant improvements in work-related pain and disability, and the shoulder rating questionnaire assessing shoulder specific activities in the exercise group (n= 34) after 10 weeks, compared with a control group (n=33) receiving no treatment.

Three studies compared physiotherapy with home-based exercises [20-22]. In 2 studies [21,22] instructions on the prescription for physiotherapy were "centring training" and, if necessary "mobilization". There were no further instructions or written protocols, and treatment decisions were left to the physiotherapists. In contrast, the standardized exercise protocol included defined exercises aiming at centering the humeral head and included isometric strengthening on a handout. After instruction the patients performed the exercises at home. No difference was found between the physiotherapy groups and the exercise groups. Additionally, the study of Walther et al [21]. Also included a control group wearing a functional shoulder brace for 12 weeks. This group also showed no significant differences compared with exercises or physiotherapy. Ginn & Cohen [20] compared the effect of home-based exercises with a single corticosteroid injection into the subacromial space and with a group receiving "multiple physical modalities" (MPM) in shoulder pain patients including a subgroup of patients with SIS (n= 61). The MPM group was taken as the physiotherapy group because of its typical physiotherapeutic content. The exercise group performed an individually planned shoulder program based on the information of the initial assessment, including strengthening and stretching exercises and exercises to gradually improve functional tasks. The program was supervised and adapted once a week. The MPM was a combination of electrophysical means, passive joint mobilization of the shoulder complex (twice a week), global range of motion (ROM) and strengthening exercises for the upper extremity to increase hand placement. After 5 weeks no difference between the 3 groups could be found. Given the restricted similarity in interventions there is only moderate evidence about the effectiveness. There is moderate evidence (141 patients) indicating exist that no difference exist in effects on functioning between a standardized shoulder-specific isometric exercise programme at home and physiotherapy addressing centring of the shoulder in patients with SIS at 5–12 weeks follow-up [16.18,19,20].

In the studies by Bang & Deyle [23] (n = 52) and Conroy & Hayes [24] (n= 14) the groups receiving physiotherapist-led exercises plus manual therapy showed significantly better results in the short term for pain and functioning than the control groups in both trials that received only physiotherapist-led exercises. The pooled effect size (standardized mean difference (95% CI) for pain after treatment was 0.88 (0.36–1.40). A standardized mean difference was calculated because different measurement scales used in the trials. The random effects model was chosen because an identical effect for both studies could not be assumed due to variations of the manual therapy protocol and a different frequency of its application. However, the small study populations and the limited simultaneity in timing of the measures do not justify a strong evidence level.

Brox et al [25,26] assigned 125 patients with SIS to 3 groups. The first group underwent subacromial decompression followed by physiotherapy, the second group had placebo laser and used as the control group, and the third group received physiotherapistled exercises. Using an intention-to-treat analysis, the median Neer score measuring shoulder functioning reached statistical significance in favour of the active treatment groups at 6 months and 2.5 years follow-up. Haahr et al [27,28] made the same comparison in a sample of 84 patients, but without the use of a placebo group. They found no differences between groups at any follow-up point, either for the constant score or for the project on research and intervention in monotonous work score assessing shoulder pain and disability.

Nykänen [29] compared ultrasound with

sham treatment in 73 patients. Both groups additionally received group gymnastics and massage therapy. After 4 and 8 months the investigators could not find any significant differences in pain and functioning between both groups.

Johansson et al [30] compared ultrasound therapy with acupuncture. Additionally, both groups performed home-based exercises on a daily basis for 5 weeks. Although both groups improved significantly, but no differences could be seen between groups after 3, 6, or 12 months.

Both, Saunders [31] and Vecchio et al [32] compared low-level laser therapy (LLLT) with sham treatment. In the study of Saunders [31] real treatment had a significantly better effect on pain than sham treatment after 3 weeks. In contrast, Vecchio et al [32] found no differences between the 2 groups after 4 and 8 weeks.

Binder et al [33] compared 8 weeks of electromagnetic field therapy (EMFT) with 4 weeks of sham treatment followed by 4 weeks of real treatment. A significant difference between groups was seen after 4 weeks for pain on resisted movements and the painful arc score in favour of the EMFT group, but not after 6, 8 and 16 weeks. This result could not be confirmed by Aktas et al [34]. They compared EMFT with sham treatment and found no differences between groups for pain and functioning after 3 weeks. Chard et al [35] compared 8 h of low-dose EMFT with 2 h of high-dose EMFT. No difference could be seen for any outcome measure at any follow-up.

Conclusion

Our results suggest that patients should not undergo surgery before being treated conservatively.

Although of better results in short term and acute phase of the disease, the corticosteroid injection did not show better results than the physiotherapy at the end of 12 weeks of treatment. This may suggest that in the case of any need for quick pain relief and also in severe pain cases, the local injection of corticosteroid could be a better choice; however, physiotherapy is the treatment of choice in the case of non-severe and tolerable pain.

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