

Self-training versus physiotherapist-supervised rehabilitation of the shoulder in patients treated with arthroscopic subacromial decompression: A clinical randomized study

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In a controlled clinical prospective study, 43 consecutive patients (43 shoulders) with subacromial impingement resistant to conservative therapy and without full-thickness rotator cuff tears underwent arthroscopic subacromial decompression. The patients were randomized to either self-training or physiotherapist-guided rehabilitation for immediate postoperative rehabilitation. Postoperative follow-up was performed by an independent observer after 3, 6, and 12 months. With the use of the Constant score for evaluation of functional outcome, patients training themselves improved from a mean 53 points (range 26 to 81 points) to a mean 79 points (range 45 to 100) points after 12 months. Physiotherapist-supervised patients improved from a mean 54 points (range 20 to 90 points) to a mean 80 points (range 40 to 100 points). The self-training patients returned to work after a mean 8.5 weeks (range 1 to 14 weeks), whereas the physiotherapist-supervised patients returned to work after a mean 8 weeks (range 3 to 13 weeks). No statistical difference was found between the 2 rehabilitation methods. This study was unable to show any beneficial effect of physiotherapist-supervised rehabilitation after arthroscopic subacromial decompression of the shoulder. *J Shoulder Elbow Surg* 1999;8:99-101.)

Arthroscopic subacromial decompression is a state-of-the-art surgical procedure for the chronic subacromial impingement syndrome. The arthroscopic technique has proven to be comparable to the open method^{12,13} and has been found to be less traumatic with good

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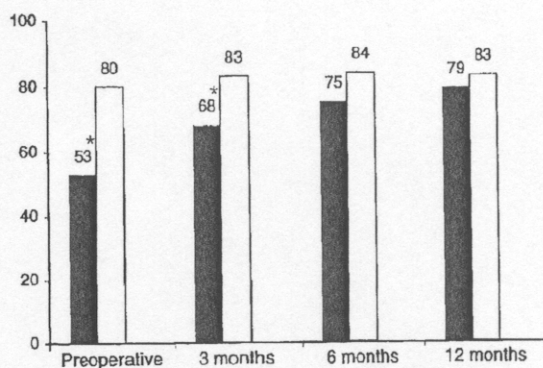


Figure Bars indicate Constant scores from preoperative examination to 12 months after surgery compared with opposite extremity. Significant improvement is seen after 3 and 6 months. No significant improvement is found in last 6 months of follow-up.

results.^{7,9,10,14} Physiotherapy is the gold standard for many centers for the rehabilitation of patients after this type of surgery, but to our knowledge no research documenting the effect of this specific type of resource-demanding rehabilitation is available.

Therefore the aim of this clinical randomized study was to compare both short- and long-term results after physiotherapist-supervised rehabilitation with a simple self-training program applied for the first 6 weeks of postoperative rehabilitation after arthroscopic subacromial decompression in patients who had subacromial impingement without full-thickness rotator cuff tears.

METHODS

Forty-three consecutive patients with subacromial shoulder impingement were included in the study at the Shoulder and Elbow Clinic, Department of Orthopaedic Surgery, University Hospital of Aarhus. The study was performed according to the Helsinki II declaration and was sanctioned by the National Ethics Committee. All patients gave a written informed consent before being included. Inclusion criteria were persistent impingement pain for more than 8 months without evidence

Table I Selected characteristics of the study population

	Self-training (n = 22)	Physiotherapy (n = 21)
Average age (yr)	50 (30-61)	43 (28-64)
Sex (male)	64%	57%
Duration of symptoms (months)	41 (10-120)	39 (11-120)
Affected dominant extremity	45%	62%
Partial rotator cuff ruptures	9%	11%
Worker's compensation cases	27%	24%
Shoulder demanding work/sports	41%	33%
Preoperative Constant score (0-100)	53 (26-81)	54 (20-90)
Preoperative pain score (0-15)	7 (3-11)	6 (4-9)

No significant differences were found.

Table II Mean scores from preoperative and postoperative examinations

	Follow-up	Self-training	Physiotherapist-guided	P value
Pain (0-15)	Preoperative	7.0 (3-11)	6.0 (4-9)	
	3 months	10.6 (5-15)	8.8 (4-15)	.032*
	6 months	12.9 (5-15)	11.6 (5-15)	.663
	12 months	12.5 (5-15)	12.2 (5-15)	.873
Power (kg)	Preoperative	5.5 (1-14)	4.3 (1-25)	
	3 months	5.3 (1.5-14)	5.0 (0-15.5)	.392
	6 months	6.5 (1.5-16)	6.6 (2.5-16)	.923
	12 months	6.1 (1.5-23.5)	6.6 (1.5-16)	.899
Constant score (0-100)	Preoperative	53 (26-81)	54 (20-90)	
	3 months	69 (30-99)	66 (19-92)	.638
	6 months	77 (32-95)	76 (42-100)	.734
	12 months	79 (45-100)	80 (40-96)	.503

Numbers in parentheses indicate the range of the shown observations.

of full-thickness rotator cuff tears and no or disappointing results after at least 6 months of conservative treatment.

The material consisted of 43 patients, 17 women and 26 men with a mean age of 46 years (range 24 to 64 years). The average duration of symptoms before treatment was 40 months, ranging from 10 to 120 months. The dominant extremity was affected in 53% of the cases. All patients were thoroughly examined with anterior-posterior radiographic projections in internal and external rotation combined with the supraspinatus outlet view. As functional outcome measure the Constant score was used.⁶ The Constant score was done before surgery and randomization and after 3, 6, and 12 months. It was always done by the same independent observer. The patients were randomized during surgery to either self-training or physiotherapist-supervised rehabilitation groups with sealed, numbered envelopes. The result remained unknown to the surgeon.

All patients underwent a standard rehabilitation regimen. This regimen consisted of daily passive pendulum exercise for the first 2 weeks. A sling was used for comfort in this period. Active training was started after 2 weeks, and the passive pendulum exercise was continued only if needed. After 6 weeks strength exercising was started with rubber tubes.

These exercises focused on strengthening the internal and external rotator muscles of the shoulder. These regimens equaled the method of the department used for several years with good results.¹¹

Patients randomized to the self-training group were

instructed at day 1 after surgery and provided with a written instruction leaflet. Subsequently, they handled all training by themselves. They were seen by the surgeon only for normal postoperative check-ups and further instructions after 6 weeks and 3, 6, and 12 months. Patients randomized to supervised training were instructed by a physiotherapist from day 1 after surgery and trained with a physiotherapist each day during admission. After discharge a written instruction was given for training at home. These patients consulted our physiotherapy department for 1 hour each week for the next 6 weeks. The physiotherapists assisted the patients with exercises and were free to modify or add training to fit the individual patient in this period.

The primary outcome measure in this study was the Constant score, in which the maximal score achievable is 100 points. We wished to detect a difference of 10 points between the groups. A previous study from this center concerning the same type of patients ($n = 66$)¹¹ was used to estimate an SD at 10 points. We designed the study with a type 1 error at 0.05 and a type 2 error at 0.20. According to this design 21 patients in each group were needed. For the statistical analyses we used the Wilcoxon-Rank sum test and Fisher's exact test. The level of significance was $P < .05$.

RESULTS

After randomization the 2 groups were examined regarding possible preoperative confounders that

might influence the results (Table I). It is well known that age, sex,⁴ and duration of symptoms⁸ can influence the result after arthroscopic subacromial decompression. Patients with affected dominant extremities,¹² partial rotator cuff ruptures,³ worker's compensation cases,^{7,11} and shoulder-demanding work have also⁵ shown inferior results after this type of surgery. We found no significant difference between the groups regarding the mentioned characteristics. Four patients (2 in each group) had a partial rotator cuff tear (all bursal side), which in all cases underwent arthroscopic debridement in the same session. No patients had full-thickness rotator cuff tears. No complications occurred with this treatment.

Results concerning pain and abduction-power subscores plus the full Constant score are shown in Table II. Results in all categories were significantly improved after 12 months. When the 2 groups were compared, we found that patients supervised by the physiotherapist had a significantly poorer pain score after 3 months of rehabilitation ($P = .032$) (Table II). No other statistical difference was seen between the 2 groups in any of the analyzed parameters including sick leave periods of mean 8.5 weeks and 8.0 weeks, respectively.

DISCUSSION

The aim of this study was to compare the results of self-administered rehabilitation and rehabilitation supervised by physiotherapists. The observed results showed in all but 1 parameter no statistical difference between these 2 types of rehabilitation at any of the follow-ups. It is not realistic to imagine that a significant difference toward either rehabilitation regimen would appear after a longer follow-up.

It could be speculated that the supervised training used in this study was not good enough and that more intense training would obtain significantly better results than in the self-training group, but this is unlikely. Patients have severe pain just after surgery, and intensive training seems to contribute to a prolonged rehabilitation course. This is best seen in the significantly poorer pain ratings the physiotherapists group achieved after 3 months compared with the group of self-trainers. On the contrary, we found that patients were able to regain normal function of the operated extremity after approximately 3 months, when the first painful period was over. This was possible only by combining simple written instructions with normal use of the arm during work, leisure, and sports.

In this study the population has been monitored at very short intervals, providing for the first time a detailed picture of the postoperative course. Because no difference was seen between the results in the 2 groups, it was possible to pool all results in 1 population to get a sense of the course of improvement after

arthroscopic subacromial decompression compared with the nonoperated extremity. When we did this, we found an overall sick leave of just more than 8 weeks. In the figure we have shown Constant score results from the affected and nonaffected shoulders. From this figure it is worth noting that significant improvement in shoulder function was found as early as 3 months after surgery and again after an additional 3 months. Although further improvement is registered in the last 6 months, this result was not significant. From this result it seems that 6-month follow-ups give a good indication of the final result. When compared with the unaffected extremity, we still find significantly lower results in the operated shoulder after 12 months.

We conclude that there is no beneficial effect of physiotherapist-guided rehabilitation when compared with a simple self-training regimen in patients with subacromial impingement treated with arthroscopic decompression. Therefore all patients in this category treated at our clinic are now training by themselves. Further studies will show whether self-training regimens can be applied on other categories of patients.

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