**Ketola S, Lehtinen J, et al. Does arthroscopic acromioplasty provide any additional value in the treatment of shoulder impingement syndrome? JBJS Br 2009;91-B:1326-34.**

Design: randomized clinical trial

Purpose of study: to determine whether an exercise program is as effective as arthroscopic acromioplasty in treating shoulder impingement syndrome

Population/sample size/setting:

- 140 patients (88 women, 52 men, mean age 47) treated for shoulder impingement syndrome in a university orthopedics department in Finland
- Patients were eligible if they had suspected shoulder impingement with chronic symptoms not relieved by conservative treatment
    - Inclusion criteria were a positive Neer's test with 5 ml lidocaine in subacromial space, at least 3 months of pain in shoulder resistant to rest, NSAIDS, subacromial steroid injections, and physiotherapy
    - All patients had undergone MRI and plain x-rays of the shoulder, but results of these tests were not entry criteria for the study
- PT had included exercise, massage, heat, and TENS; prior to entry, 59% of patients had had at least one subacromial steroid injection
- Exclusion criteria were glenohumeral or acromioclavicular osteoarthritis, signs of glenohumeral instability, previous surgery to the affected shoulder, full thickness tear of rotator cuff, cervical radicular symptoms, adhesive capsulitis, or neuropathy of the shoulder region

Main outcome measures:

- Patients were randomized to one of two intervention groups: a combined treatment group (n=70) and a supervised exercise group (n=70)
- Exercise group received an individualized home program from a physiotherapist which aimed at restoring painless and stable motion using a long painless series of repetitions with elastic stretch bands and light weights, aimed at tendon strengthening of the rotator cuff and other shoulder girdle muscles
    - Sessions were performed four times a week using 9 different exercises with 30 to 40 repetitions done three times; as progress occurred, resistance was increased and the number of repetitions was decreased
    - Seven visits to PT were generally required to ensure that the patient was able to maintain the established level of exercise independently
- Combined treatment group received arthroscopic debridement and decompression from a single surgeon, with release of the coracoacromial ligament and with acromioplasty using a burr drill

    - The surgical patients were discharged after an overnight stay with a collar and cuff sling for one week, followed by a rehabilitation program similar to that of the exercise group
- In both groups, examinations were done at 3, 6, 12, and 24 months from commencement of the trial
- Main outcomes were assessed by a physiotherapist from outside the surgical department; blinding was achieved by having all patients wear a T-shirt to conceal any surgical scars; Neer's test, passive ROM and muscle strength were measured, and patients completed the shoulder disability questionnaire at each visit
- Primary outcome was self-reported pain at 24 months after randomization; the "minimal clinically important change" was set at 2 points on the VAS
    - Additional outcomes were disability, night pain, working ability, and the proportion of pain-free patients in each group (defined as VAS<3)
- Crossovers occurred in both directions: 14 in the exercise group had surgery, and 12 in the combined treatment group refused surgery
- Both groups had favorable outcomes; their pain scores decreased significantly at 24 months (from 6.5 to 2.9 in the exercise group and from 6.4 to 2.5 in the combined group), but the treatment groups had no significant differences in the degree of pain relief
- The number of pain-free patients was nearly equal at 24 months; 42 pain-free patients in the exercise group and 43 in the combined group
- However, when the 3, 6, and 12 month measurements were compared, it appeared that recovery was faster in the combined group
- There was a greater delay from randomization to start of treatment in the combined group (8.3 months) than in the exercise group (1.2 months)
- An additional cost-effectiveness comparison was made, but this was sensitive to assumptions about the unit cost of acromioplasty, and was calculated in Euros; its relevance to costs in Colorado Workers Compensation is dubious, although combined treatment was more costly
- In the combined group, surgery discovered 14 patients with labral lesions not detected by MRI; in 5 patients, these lesions were suspected of being the main cause of symptoms, and in 9 patients, labral repair was combined with acromioplasty

Authors' conclusions:

- By 24 months, a structured exercise program and a treatment program combining acromioplasty and exercise produce very similar degrees of pain relief
- Relief of pain occurs more rapidly in the group which had acromioplasty
- The patient population had symptoms for an average of 2.5 years and 59% of them had received subacromial steroid injections as part of treatment, making them likely candidates for surgery at the time of entry
- Acromioplasty seems not to be more effective than exercise when evaluated at 2 years, and incurs higher costs; the indications for acromioplasty are not yet established

Comments:

- Most threats to internal validity were adequately controlled: clear randomization, intention to treat analysis, and adequate blinding of outcome assessment
- The time course to recovery in Table IV shows similar rates of recovery for working ability, but more rapid attainment of such outcomes as pain-free status (65% of combined group pain-free at 3 months and 35% in the exercise group)
- The cost data show that acromioplasty is more expensive than exercise ,but does not include some costs which would occur in workers' compensation, such as wage replacement costs; only a generic statement of additional cost is supported by the study
- 24 months is a fairly long time to wait for recovery after the start of treatment; the more rapid time course in the acromioplasty group may be of practical significance
- Although intention to treat analysis is the correct way to do the primary outcome comparison, there is no description of the crossovers, which were frequent in both groups; in this setting, an as-treated analysis would have been informative, since crossovers rarely occur at random
- The time of delay to treatment was reported as the mean number of months in each group, but it is not clear whether the crossovers are included in the calculations (not clear how the "months of delay" would be imputed for the patients who refused surgery)
- Although the design and conduct of the study are of high quality, it may have more than one interpretation: the analysis may underestimate the contribution of acromioplasty to prompt recovery
    - However, the 95% confidence intervals do not include a clinically important (2 point VAS pain) difference between combined treatment and exercise
    - At the same time, the study could support shared decision making for patients who want to avoid surgery, assuring them that they may make a good recovery if they are willing to wait longer for results

Assessment: Good evidence that a supervised, individualized exercise program may be as effective as a similar exercise program following arthroscopic acromioplasty for the treatment of shoulder impingement syndrome exclusive of rotator cuff tear, adhesive capsulitis, and glenohumeral or acromioclavicular osteoarthritis, but relief of pain may occur more rapidly with acromioplasty