

Effectiveness of Adding a Large Dose of Shoulder Strengthening to Current Nonoperative Care for Subacromial Impingement: A Pragmatic, Double-Blind Randomized Controlled Trial (SExSI Trial): Letter to the Editor

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Dear Editor:

Clausen et al³ concluded that adding extra strengthening exercises (even described as “a large dose”) to a standard exercise program does not result in a better outcome: so, just sexy. However, Powell and Lewis¹² regarded the statement “You need to strengthen your shoulder” as not sexy at all. So, is muscle strength relevant or not relevant for patients with shoulder pain (SP)?

Most patients with SP can generate less power on the SP side as compared with the healthy side.^{5,8} Is that clinical symptom caused by muscular insufficiency? Maybe, but more often the reduced tendon capability is the most relevant variable. Patients with subacromial pain syndrome (SAPS) are also described as having rotator cuff-related SP, where inflammation in the rotator cuff tendon is the source of nociception and pain awareness.⁶ Furthermore, patients with SAPS are confronted with rather long episodes of pain; so, sensitization plays a role and mental dysfunctions can easily develop, such as decreased self-confidence (“I’m not capable to realize that performance”) and dysfunctional cognitions (“My shoulder is damaged”). Besides local somatic tendon-related factors, mental, cognitive, and process factors are correlated to the amount of SP.^{2,6,7,9} A physical therapist using a handheld dynamometer to examine the generation of muscle strength is aware that many variables influence the outcome in Newton-meters. In fact, strength is a multimodal outcome. Is an increased amount of strength correlated with a decreased amount of SP? In my opinion, in the normal rehabilitation of patients with SAPS, that correlation is correct: if SP decreases, most patients can generate more strength attributed to better muscle-tendon performance and a decrease of mental, cognitive, and process dysfunctions (eg, sensitization).¹²

Recently we researched the literature to formulate recommendations for Dutch general practitioners to treat their patients with SAPS the best way. As with most other

guidelines, exercise therapy was recommended based on slightly positive clinical effects (short-term pain relief and function increase), low costs, easy access, and no negative side effects.¹¹ In a retrospective study in 2021 of patients with SAPS, Clausen et al⁴ predicted that the best exercise results were realized if strengthening exercises were part of the rehabilitation program. The odds ratio for good results for strengthening exercises when compared with nonstrengthening exercises was 1.65 (95% CI, 1.25-2.19). In a systematic review, Naunton et al¹⁰ stated that “resistant and progressive exercises provide an uncertain clinical meaningful improvement in pain and function compared with no treatment or placebo among people with rotator cuff related shoulder pain.” Because exercise therapy combines specific effects (muscle strength, tendon-loading capacity) and nonspecific effects (improved confidence, decreased sensitization, better health beliefs), it is difficult to find distinguished effects of different exercise programs.

Why do I not agree with the conclusions of Clausen et al³? First my compliments for the trial methodology, for sharing the clinical data, and for the recent articles^{3,4,8}: well done. But not well done in my opinion is the “large additional dose of home-based elastic band intervention.” Underneath 5 relevant shortcomings in the strengthening program:

- Patients were exercising in a strongly limited range of motion: not $>45^\circ$ of scaption, thereby dysfunctional and monotonous.
- The consequent slow tempo of the exercises: almost isometrical.
- The use of elastic bands for strengthening: it is difficult to realize a consistent loading.
- The boring exercises lead to diminished compliance: 160 s/d in the first 5 weeks, 82 s/d in the middle 5 weeks, and 52 s/d in the last 6 weeks.
- To realize strength increases, the patient had to exercise from 2 to 12 hours in 3 months: patients in this trial performed the strength exercises 2.9 hours in 4 months. The intervention group (standard exercises plus home strength training) exercised 45 min/wk, whereas the control group exercised 51 min/wk. So, the difference between the groups is quite small.

If the shortcomings are relevant, the objective of the program might not be reached; in fact, that is correct: 16 weeks of training in intervention group did not result in any strength increase (Figure 1; from Clausen et al³ SExSI trial).

Also, the pain scores, range of motion, and quality-of-life scores did not change. That is to be expected: if exercises are not able to increase tendon-loading capacity, pain scores do not change. So, nothing new: the exercise program is not effective.

Nevertheless, Clausen et al concluded, “Adding a large dose of shoulder strengthening to current nonoperative care for longstanding subacromial impingement (SAPS) did not result in superior outcome for shoulder-specific disability after 4 months.” In my opinion, there is no large dose (2.9 hours in 4 months, 93 s/d) and also no strengthening (elastic band; SExSI program could be valuable in

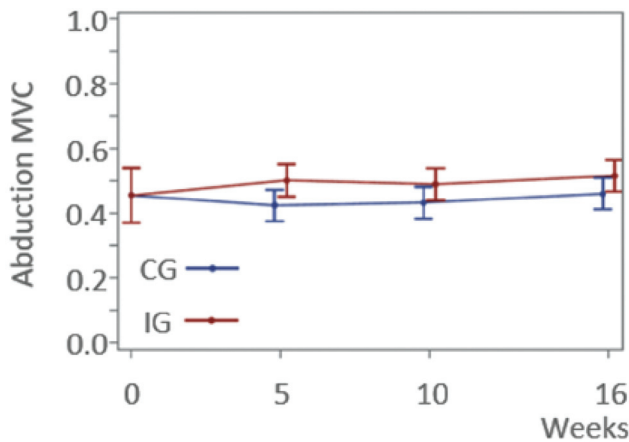


Figure 1. Abduction strength measured with HHD (handheld dynamometer) during 16 weeks of training. Strength is expressed as N·m per kg body weight. Values are presented as mean \pm SD. CG, control group (100 SP patients with normal rehab); IG, intervention group (100 SP patients with normal rehab plus ‘strengthen your shoulder’ program); MVC, maximal voluntary contraction.

the first training episode in cases with rather high pain awareness). If the strength was increased and the pain scores were not, the conclusion of the authors might be correct. The strengthening exercises are nonfunctional and in too slow a tempo, with elastic bands in a too limited a range of motion. Patients with SAPS were not challenged to perform the exercises, and possible nonspecific effects on mental, cognitive, and process dysfunctions were not realized.

To load tendons properly and thereby stimulate better function, we have to pull strong enough upon the tendon collagen fibers¹; so, in most patients with SAPS, we need strengthening exercises. A proper exercise program needs to be adjusted to the patients, and it needs to be functional.

Now physical therapists are challenged to repeat this treatment protocol with a better exercise program. My patients and I would be very disappointed to train for 16 weeks without pain relief and accompanying strength increase. Of course, in first-line physical therapist practice, most patients with SAPS are not referred to an orthopaedic center, so “my” SAPS population might have a better prognosis than the population in the SExSI trial.

Unfortunately, the SExSI trial combines a good trial methodology with a strengthening exercise program of insufficient quality. Because the objective strengthening is not realized, the conclusions are premature.

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