

Gebremariam L, Hay EM, et al. Effectiveness of Surgical and Postsurgical Interventions for the Subacromial Impingement Syndrome: A Systematic Review. Arch Phys Med Rehabil 2011;92:1900-13.

Design: systematic review of randomized clinical trials (RCTs)

Study objective: To provide an evidence-based overview of the effectiveness of surgical and postoperative interventions for shoulder impingement syndrome (SIS)

PICOS:

- Patient population: patients with SIS not caused by trauma or any systemic disease
 - o “Systemic disease” (Huisstede et al 2011) includes both rheumatic arthritis and osteoarthritis
- Interventions: any intervention, including surgical or postsurgical, for SIS
- Comparison: any other intervention for SIS
- Outcomes: results on pain, function, or recovery with a minimum followup period of 2 weeks
 - o Short term was defined as less than 3 months after baseline
 - o Middle term was defined as occurring between 3 and 6 months after baseline
 - o Long term was more than 6 months after baseline
- Study types: relevant literature was classified under three different headers: systematic (Cochrane) reviews, recent RCTs published after the search dates of the systematic reviews of the same intervention, and additional RCTs of the same intervention not yet described in any systematic review

Study selection:

- Databases included PubMed, EMBASE, the Cochrane library, PEDro, and CINAHL with dates up to February 2009
- Two reviewers independently applied inclusion criteria to select potentially relevant articles and assessed them of methodologic quality with 12 items for scoring
 - o These were adequate randomization, allocation concealment, blinding of patient, care provider, and outcome assessor, acceptable dropout rate, intention-to-treat analysis of outcomes, absence of selective outcome reporting, baseline similarity of treatment groups, similar co-interventions, acceptable compliance in all groups, and similar timing of outcome measurement
- The authors defined five different levels of evidence
 - o Strong evidence: consistent (more than 75% of trials reporting the same positive, significant findings) within multiple higher quality RCTs
 - o Moderate evidence: consistent positive significant findings within multiple lower quality RCTs or on high quality RCT

- Limited evidence: positive significant findings within one low quality RCT
- Conflicting evidence: conflicting significant findings in the RCTs
- No evidence: RCTs available, but no significant differences between intervention groups were reported

Results:

- The literature search retrieved 31 potentially relevant systematic reviews and 562 potentially relevant RCTs
- 1 systematic review (Coghlan 2008) and five (2 “recent” and 3 “additional”) RCTs were selected for the review
 - The Cochrane review of Coghlan 2008 had 11 RCTs of interventions for SIS
 - All 11 of these studies were low quality
 - Among the 5 RCTs which had not been included in Coghlan 2008, only 2 were high quality
 - Failure of allocation concealment, intention-to-treat analysis, and blinding were the most common reasons for low quality assessment
- Because of heterogeneity in populations and outcome measures, no meta-analysis was done
 - Instead, a “best evidence synthesis” was done, in which all 11 studies in the Cochrane review and the 5 studies not in the Cochrane review were described separately
- For the comparison of surgical (either open or arthroscopic) decompression versus active conservative (physiotherapy or exercise) treatment, there were 3 low-quality studies
 - None of the 3 studies reported significant differences between surgical decompression and conservative treatment for SIS in the short, middle, or long term
- For the comparison of arthroscopic (ASD) versus open (OSD) subacromial decompression for SIS, there were 5 low quality studies, none of which showed significant differences between ASD and OSD for SIS
 - Therefore, there was no evidence of any differences between ASD and OSD in the short, middle, or long term
- For OSD, one low quality study compared the Neer and modified Neer technique reported differences in shoulder abduction after 8 weeks, but this could not be verified from the data; there was no evidence of a difference between techniques
- For ASD versus OSD to remove calcium deposit in calcific tendonitis, a low quality study reported no differences between the groups for pain relief and shoulder function; there was no evidence to compare ASD and OSD for removal of calcium deposits in the short or middle term

- Two different ASD techniques were compared in a low-quality study: holmium laser versus electrocautery; a small significant difference was found for electrocautery in the ASES score at 6 months (but not at 3 or 12 months); there were no significant differences in the UCLA score at 3, 6, or 12 months
- For the comparison of ASD versus radiofrequency-based plasma microtenotomy, a single high-quality study showed no significant differences in pain or function in the short, middle, or long terms
- For platelet-leukocyte gel as add-on therapy in patients undergoing OSD, the patients in the treatment group had significant differences in pain compared to the control group, but exact data were not given, and only low p values were reported; this was interpreted as moderate evidence for the effectiveness of platelet-leukocyte gel in the short term for patients undergoing OSD
- For postoperative treatments, there were three low quality studies, none of which had been reviewed by Coghlan 2008
 - o One study compared two different postoperative physiotherapy protocols in patients with SIS who were recovering after ASD
 - A “traditional” group waited 6 weeks for active assisted dynamic exercises and 8 weeks for strengthening exercises
 - A “progressive” group waited only one day for active assisted dynamic exercises and 6 weeks for strengthening exercises
 - Both groups improved their Constant scores
 - The progressive group had significantly higher Constant scores at 6 weeks, and at 12 months, but at 3 months, the group Constant scores did not differ
 - This was interpreted as limited evidence that progressive physiotherapy is more effective than traditional PT in the short and long term
 - o One study compared ketoprofen 200 mg daily with placebo, and reported that ketoprofen patients had significantly less pain at the 6 week followup; this was interpreted as limited evidence that ketoprofen is effective in the short term
 - o One study compared a ropivacaine pain pump with a rehabilitation program after ASD, but reported not evidence for effectiveness of the pain pump

Authors' conclusions:

- There is no evidence that surgical treatment is superior to conservative treatment for SIS; because of lower costs and fewer complications, conservative treatment may be preferred to surgery

- There is no evidence for the superiority of one particular surgical technique over any other surgical technique for SIS, but arthroscopic decompression may be preferred to open surgery because of the generally faster recovery
- Early postoperative active physiotherapy may have positive results compared to delayed PT, but this requires additional study for confirmation
- Coghlan's 2008 Cochrane review used a different quality scale with fewer than 12 items (appropriate randomization, allocation concealment, blinding of participants and outcome assessment for this review, number lost to follow up, and intention to treat analysis); if the same criteria had been applied to the five RCTs included in this systematic review, there would have been three high quality studies instead of only two, but the conclusions would not have changed
- The studies tended to be small and the negative ones may have been underpowered

Comments:

- The term "subacromial impingement syndrome," which is the condition of interest in the combined studies, was introduced in 1972 before current methods of shoulder diagnosis were available, and may need reexamination as a distinct diagnosis (Papadonikolakis 2011)
 - o Some of the included studies used clinical criteria without imaging for inclusion, and may have included more than one rotator cuff pathology, such as tendinosis and rotator cuff partial thickness tears
 - o If a wide spectrum of rotator cuff pathologies are included in a single trial, differences between them with respect to responsiveness to surgery (e.g., tendinosis versus partial thickness tear versus small full thickness tear) could be obscured in the analysis
 - o Although it was not one of the 12 quality criteria in Table 1, it is reasonable to add an additional question to that table: "Was the pathology defined clearly enough to ensure that a particular diagnosis is present in all participants?"
- Statistical significance of reported findings are sometimes presented in a way which seem clinically dubious
 - o For example, the comparison of traditional versus progressive postoperative PT reported higher Constant scores in favor of the progressive PT group at 3 months, but not at 6 weeks or 6 months
 - o It appears that the results of the two PT approaches are equal at 6 weeks, unequal at 3 months, and unequal again at 6 months
 - o The play of chance could be at least as plausible as any physiological variables in explaining this sequence of events
- Blinding of care providers is not attainable for studies of surgery, and there are methods of evaluating nonpharmacologic interventions which apply more appropriate criteria here (Boutron et al 2005)

- For care provider and patient blinding, Boutron et al proposed that equal co-interventions and equal dropout rates could be considered for the control of bias when such blinding cannot be done
- In one of the “negative” studies of surgery versus PT (Rahme et al 1998), the abstract indicates that at 12 months, the groups could not be compared because 13 of 18 patients randomized to surgery had chosen surgery; a crossover rate this high raises concerns about the effectiveness of the PT intervention in that study
- A more recent comparison of surgery versus PT (Moosmayer) met quality criteria which include blinding of outcome assessment, clear allocation concealment, and intention-to-treat analysis; in addition, the rotator cuff pathology was defined by sonography and MRI to consist of full thickness tears less than 3 cm and moderate but not severe supraspinatus atrophy
- The surgical approach (arthroscopic versus open) may be equal in terms of outcome, and the choice can be made on the circumstances of the individual patient
 - Although the five studies were graded down for quality on the basis of lack of blinding of care providers, this does not necessarily invalidate their findings
 - Van der Zwaal 2013 is consistent with the other studies that open and arthroscopic surgery are comparably effective, and that arthroscopy may lead to an earlier recovery
- The traditional versus more aggressive early rehabilitation comparison (one study) is likely to have been superseded by studies published more recently
- The quality of the remaining comparisons preclude evidence statements concerning their effectiveness

Assessment: Adequate for good evidence that arthroscopic and open rotator cuff surgery do not differ in long term outcome results. Inadequate for evidence that surgery and active PT are equally effective for supraspinatus syndrome (quality issues with underpowered studies of pathologies not clearly defined)

References:

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