

Clinical & PICO Question:

Your patient is a 64 year old male who comes in complaining of progressive right shoulder pain and weakness. After doing a physical exam and some tests, you discover that he has a full thickness rotator cuff tear. He asks you if he will require surgery to fix the tear.

Question: In patients with full thickness rotator cuff tears, is surgery more effective than conservative management at eliminating pain, restoring shoulder function and quality of life, and preventing retears?

PICO Search Elements:

P	I	C	O
Patients with rotator cuff tears	Surgery	Conservative management	Reduced pain levels
Patients with full thickness rotator cuff tears	Surgical correction	Medical Management	Better overall shoulder function
		No surgery	Repaired tendon
		Physical therapy	Decreased tear progression
			Improved quality of life

Search Strategy:

Outline the terms used, databases or other tools used, how many articles returned, and how you selected the final articles to base your CAT on. This will likewise be a revision and refinement of what you have already done. A minimum of 3 search databases should be used.

- 1) **PubMed-** “surgery for full thickness rotator cuff tear”- 1,197 results- filter: since 2017- 394 results, filter: systematic review, meta-analysis- 30 results
““surgery vs conservative treatment for rotator cuff tear”-17 results
- 2) **Science Direct-** “surgery for full thickness rotator cuff tear”- filter: since 2017- 1,475 results- filter: review articles- 170 results
- “surgery vs conservative treatment for rotator cuff tear”- 1,087 results- filter: since 2017- 482 results, filter: review articles- 70 results
- 3) **Google Scholar-** “surgery for full thickness rotator cuff tear”- 38,500 results- filter: since 2017- 17,500 results, filter: “systematic review” – 3,010 results

- this was still a lot of results, so I skimmed through the first few pages and looked for articles that had a full link attached, were systematic reviews and meta-analyses, and fit well with my PICO question.

I also tried some searches with filter: “all in title”:

“surgery rotator cuff tear”- since 2017- 28 results

“conservative Management rotator cuff tear”- since 2017- 8 results

Articles Chosen At least 6 articles for Inclusion (please copy and paste the abstract with link):

Please pay attention to whether the articles actually address your question and whether they are the highest level of evidence available. (Be aware that the instructor may also do a search and should not be able to find better articles that you overlooked).

If after reviewing you cannot find high quality articles, be prepared to explain the extensiveness of your search and why there aren't any better sources available. If you are having trouble finding better sources, please reach out to the librarian or one of the instructors for help with this.

1) Conservative versus surgical management for patients with rotator cuff tears: a systematic review and META-analysis

Longo UG, Risi Ambrogioni L, Candela V, Berton A, Carnevale A, Schena E, Denaro V. Conservative versus surgical management for patients with rotator cuff tears: a systematic review and META-analysis. BMC Musculoskelet Disord. 2021 Jan 8;22(1):50. doi: 10.1186/s12891-020-03872-4. PMID: 33419401; PMCID: PMC7796609.

Abstract

Background: This study aims to compare conservative versus surgical management for patients with full-thickness RC tear in terms of clinical and structural outcomes at 1 and 2 years of follow-up.

Methods: A comprehensive search of CENTRAL, MEDLINE, EMBASE, CINAHL, Google Scholar and reference lists of retrieved articles was performed since the inception of each database until August 2020. According to the Cochrane Handbook for Systematic Reviews of Interventions, two independent authors screened all suitable studies for the inclusion, extracted data and assessed risk of bias. Only randomised controlled trials comparing conservative and surgical management of full-thickness RC tear in adults were included. The primary outcome measure was the effectiveness of each treatment in terms of Constant-Murley score (CMS) and VAS pain score at different time points. The secondary outcome was the integrity of the repaired tendon evaluated on postoperative MRI at different time points. The GRADE guidelines were used to assess the critical appraisal status and quality of evidence.

Results: A total of six articles met the inclusion criteria. The average value of CMS score at 12 months of follow-up was 77.6 ± 14.4 in the surgery group and 72.8 ± 16.5 in the conservative group, without statistically significant differences between the groups. Similar results were demonstrated at 24 months of follow-up. The mean of VAS pain score at 12 months of follow-up was 1.4 ± 1.6 in the surgery group and 2.4 ± 1.9 in the conservative group. Quantitative synthesis showed better results in favour of the surgical group in terms of VAS pain score one year after surgery (-1.08 , 95% CI -1.58 to -0.58 ; $P < 0.001$).

Conclusions: At a 2-year follow-up, shoulder function evaluated in terms of CMS was not significantly improved. Further high-quality level-I randomised controlled trials at longer term follow-up are needed to evaluate whether surgical and conservative treatment provide comparable long-term results.

2) Operative versus nonoperative treatment for the management of full-thickness rotator cuff tears: a systematic review and meta-analysis

Piper CC, Hughes AJ, Ma Y, Wang H, Neviasser AS. Operative versus nonoperative treatment for the management of full-thickness rotator cuff tears: a systematic review and meta-analysis. *J Shoulder Elbow Surg.* 2018 Mar;27(3):572-576. doi: 10.1016/j.jse.2017.09.032. Epub 2017 Nov 21. PMID: 29169957.

Abstract

Background: Rotator cuff disease is the most common pathology of the shoulder, responsible for approximately 70% of clinic visits for shoulder pain. However, no consensus exists on the optimal treatment. The aim of this study was to analyze level I and II research comparing operative versus nonoperative management of full-thickness rotator cuff tears.

Methods: A literature search was performed, in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, to identify level I and II studies comparing operative versus nonoperative treatment of rotator cuff tears. Two independent researchers reviewed a total of 1013 articles. Three studies qualified for inclusion. These included 269 patients with 1-year follow-up. The mean age ranged from 59 to 65 years. Clinical outcome measures included the Constant score and visual analog scale (VAS) score for pain. Meta-analysis, using both fixed- and random-effects models, was performed on pooled results to determine overall significance.

Results: Statistically significant differences favoring surgery were found in both Constant and VAS scores after 1 year, with mean differences of 5.64 (95% confidence interval, 2.06 to 9.21; $P = .002$) and -1.08 (95% confidence interval, -1.56 to -0.59 ; $P < .0001$), respectively.

Conclusion: There was a statistically significant improvement in outcomes for patients managed operatively compared with those managed nonoperatively. The differences in both Constant and VAS scores were small and did not meet the minimal difference

considered clinically significant. Larger studies with longer follow-up are required to determine whether clinical differences between these treatments become evident over time.

3) Surgery for rotator cuff tears

Karjalainen TV, Jain NB, Heikkinen J, Johnston RV, Page CM, Buchbinder R. Surgery for rotator cuff tears. *Cochrane Database Syst Rev.* 2019 Dec 9;12(12):CD013502. doi: 10.1002/14651858.CD013502. PMID: 31813166; PMCID: PMC6900168.

Abstract

Background: This review is one in a series of Cochrane Reviews of interventions for shoulder disorders.

Objectives: To synthesise the available evidence regarding the benefits and harms of rotator cuff repair with or without subacromial decompression in the treatment of rotator cuff tears of the shoulder.

Search methods: We searched the CENTRAL, MEDLINE, Embase, Clinicaltrials.gov and WHO ICRT registry unrestricted by date or language until 8 January 2019.

Selection criteria: Randomised controlled trials (RCTs) including adults with full-thickness rotator cuff tears and assessing the effect of rotator cuff repair compared to placebo, no treatment, or any other treatment were included. As there were no trials comparing surgery with placebo, the primary comparison was rotator cuff repair with or without subacromial decompression versus non-operative treatment (exercises with or without glucocorticoid injection). Other comparisons were rotator cuff repair and acromioplasty versus rotator cuff repair alone, and rotator cuff repair and subacromial decompression versus subacromial decompression alone. Major outcomes were mean pain, shoulder function, quality of life, participant-rated global assessment of treatment success, adverse events and serious adverse events. The primary endpoint for this review was one year.

Data collection and analysis: We used standard methodologic procedures expected by Cochrane.

Main results: We included nine trials with 1007 participants. Three trials compared rotator cuff repair with subacromial decompression followed by exercises with exercise alone. These trials included 339 participants with full-thickness rotator cuff tears diagnosed with magnetic resonance imaging (MRI) or ultrasound examination. One of the three trials also provided up to three glucocorticoid injections in the exercise group. All surgery groups received tendon repair with subacromial decompression and the postoperative exercises were similar to the exercises provided for the non-operative groups. Five trials (526 participants) compared repair with acromioplasty versus repair alone; and one trial (142 participants) compared repair with subacromial decompression versus subacromial decompression alone. The mean age of trial participants ranged between 56 and 68 years, and females

comprised 29% to 56% of the participants. Symptom duration varied from a mean of 10 months up to 28 months. Two trials excluded tears with traumatic onset of symptoms. One trial defined a minimum duration of symptoms of six months and required a trial of conservative therapy before inclusion. The trials included mainly repairable full-thickness supraspinatus tears, six trials specifically excluded tears involving the subscapularis tendon. All trials were at risk of bias for several criteria, most notably due to lack of participant and personnel blinding, but also for other reasons such as unclearly reported methods of random sequence generation or allocation concealment (six trials), incomplete outcome data (three trials), selective reporting (six trials), and other biases (six trials). Our main comparison was subacromial decompression versus non-operative treatment and results are reported for the 12 month follow up. At one year, moderate-certainty evidence (downgraded for bias) from 3 trials with 258 participants indicates that surgery probably provides little or no improvement in pain; mean pain (range 0 to 10, higher scores indicate more pain) was 1.6 points with non-operative treatment and 0.87 points better (0.43 better to 1.30 better) with surgery.. Mean function (zero to 100, higher score indicating better outcome) was 72 points with non-operative treatment and 6 points better (2.43 better to 9.54 better) with surgery (3 trials; 269 participants), low-certainty evidence (downgraded for bias and imprecision). Participant-rated global success rate was 873/1000 after non-operative treatment and 943/1000 after surgery corresponding to (risk ratio (RR) 1.08, 95% confidence interval (CI) 0.96 to 1.22; low-certainty evidence (downgraded for bias and imprecision). Health-related quality of life was 57.5 points (SF-36 mental component score, 0 to 100, higher score indicating better quality of life) with non-operative treatment and 1.3 points worse (4.5 worse to 1.9 better) with surgery (1 trial; 103 participants), low-certainty evidence (downgraded for bias and imprecision). We were unable to estimate the risk of adverse events and serious adverse events as only one event was reported across the trials (very low-certainty evidence; downgraded once due to bias and twice due to very serious imprecision).

Authors' conclusions: At the moment, we are uncertain whether rotator cuff repair surgery provides clinically meaningful benefits to people with symptomatic tears; it may provide little or no clinically important benefits with respect to pain, function, overall quality of life or participant-rated global assessment of treatment success when compared with non-operative treatment. Surgery may not improve shoulder pain or function compared with exercises, with or without glucocorticoid injections. The trials included have methodology concerns and none included a placebo control. They included participants with mostly small degenerative tears involving the supraspinatus tendon and the conclusions of this review may not be applicable to traumatic tears, large tears involving the subscapularis tendon or young people. Furthermore, the trials did not assess if surgery could prevent arthritic changes in long-term follow-up. Further well-designed trials in this area that include a placebo-surgery control group and long follow-up are needed to further increase certainty about the effects of surgery for rotator cuff tears.

4) Surgical and Non-Surgical Interventions in Complete Rotator Cuff Tears

Schmucker C, Titscher V, Braun C, Nussbaumer-Streit B, Gartlehner G, Meerpohl J. Surgical and Non-Surgical Interventions in Complete Rotator Cuff Tears. *Dtsch Arztebl Int.* 2020 Sep 18;117(38):633-640. doi: 10.3238/arztebl.2020.0633. PMID: 33263527; PMCID: PMC7817785.

Abstract

Background: This systematic review compares the efficacy and safety of surgical and non-surgical interventions for full-thickness rotator cuff tears.

Methods: A systematic literature search was conducted in five databases. Randomized (RCTs) and non-randomized controlled trials of interventions (non-RCTs) for the surgical or non-surgical treatment of patients with traumatic or atraumatic full-thickness rotator cuff tears were included. The review protocol was published in the PROSPERO registry (CRD42018100343).

Results: Ten studies (three RCTs with 332 participants; seven non-RCTs with 650 participants) met the inclusion criteria. One year after treatment, shoulder function, measured with the 100-point Constant score, had improved by 6.7 points (95% confidence interval [2.3; 11.0]) and pain, measured with the 10-cm visual analog scale, by 1.1 cm (0.5; 1.7) in the full-thickness rotator cuff tears treated surgically compared with non-surgical treatment. In one study the difference in favor of surgery persisted after 10 years' follow-up. For other outcomes, such as range of motion, muscle strength, quality of life, and adverse events, the data were sparse and the group differences were similar. The findings of the non-RCTs were comparable with those of the RCTs.

Conclusion: With regard to functional improvement and pain reduction, surgical treatment of full-thickness rotator cuff tears was superior to non-surgical treatment in the short and the long term. Whether the differences between the groups are relevant for individual cases is uncertain, as the measured results were distributed below and above the threshold of clinical relevance. The conclusions may not be applicable to rotator cuff tears over 3 cm in size or to young persons.

5) What happens to patients when we do not repair their cuff tears? Five-year rotator cuff quality-of-life index outcomes following nonoperative treatment of patients with full-thickness rotator cuff tears

Boorman RS, More KD, Hollinshead RM, Wiley JP, Mohtadi NG, Lo IK, Brett KR. What happens to patients when we do not repair their cuff tears? Five-year rotator cuff quality-of-life index outcomes following nonoperative treatment of patients with full-thickness rotator cuff tears. *Journal of shoulder and elbow surgery*. 2018 Mar 1;27(3):444-8.

Background

The purpose of this study was to examine 5-year outcomes in a prospective cohort of patients previously enrolled in a nonoperative rotator cuff tear treatment program.

Methods

Patients with chronic (>3 months), full-thickness rotator cuff tears (demonstrated on imaging) who were referred to 1 of 2 senior shoulder surgeons were enrolled in the study between October 2008 and September 2010. They participated in a comprehensive, nonoperative, home-based treatment program. After 3 months, the outcome in these patients was defined as “successful” or “failed.”

Patients in the successful group were essentially asymptomatic and did not require surgery. Patients in the failed group were symptomatic and consented to undergo surgical repair. All patients were followed up at 1 year, 2 years, and 5 or more years.

Results

At 5 or more years, all patients were contacted for follow-up; the response rate was 84%. Approximately 75% of patients remained successfully treated with nonoperative treatment at 5 years and reported a mean rotator cuff quality-of-life index score of 83 of 100 (SD, 16). Furthermore, between 2 and 5 years, only 3 patients who had previously been defined as having a successful outcome became more symptomatic and underwent surgical rotator cuff repair. Those in whom nonoperative treatment had failed and who underwent surgical repair had a mean rotator cuff quality-of-life index score of 89 (SD, 11) at 5-year follow-up. The operative and nonoperative groups at 5-year follow-up were not significantly different ($P = .11$).

Conclusion

Nonoperative treatment is an effective and lasting option for many patients with a chronic, full-thickness rotator cuff tear. While some clinicians may argue that nonoperative treatment delays inevitable surgical repair, our study shows that patients can do very well over time.

6) Effects of arthroscopic vs. mini-open rotator cuff repair on function, pain & range of motion. A systematic review and metaanalysis

Nazari G, MacDermid JC, Bryant D, Dewan N, Athwal GS. Effects of arthroscopic vs. mini-open rotator cuff repair on function, pain & range of motion. A systematic review and meta-analysis. *PLoS One*. 2019;14(10):e0222953. Published 2019 Oct 31.
doi:10.1371/journal.pone.0222953

Abstract

Objective-To assess the effectiveness of arthroscopic versus mini-open rotator cuff repair on function, pain and range of motion at 3-, 6- and 12-month follow ups.

Design-Systematic review and meta-analysis of randomized controlled trials.

Setting- Clinical setting.

Participants-Patients 18 years and older with a rotator cuff tear.

Intervention/Comparison-Arthroscopic/mini-open rotator cuff repair surgery followed by post operative rehabilitation.

Main outcome measures-Function and pain.

Results Six RCTs (n = 670) were included. The pooled results, demonstrated no significant difference between arthroscopic and mini open approach to rotator cuff repair on function (very low quality, 4 RCTs, 495 patients, SMD 0.00, 3-month; very low quality, 4 RCTs, 495 patients, SMD -0.01, 6-month; very low quality, 3 RCTs, 462 patients, SMD -0.09, 12-months). For pain, the pooled results, were not statistically different between groups (very low quality, 3 RCTs, 254 patients, MD -0.21, 3-month; very low quality, 3 RCTs, 254 patients, MD -0.03, 6-month; very low quality, 2 RCTs, 194 patients, MD -0.35, 12-months).

Conclusion-The effects of arthroscopic compared to mini-open rotator cuff repair, on function, pain and range of motion are too small to be clinically important at 3-, 6- and 12-month follow ups.

FOR THE DRAFT & FINAL CAT (ROTATIONS 8 & 9) – YOU WILL INCLUDE THE PARTS ABOVE AND COMPLETE THE REMAINING PARTS BELOW:

Summary of the Evidence:

Author (Date)	Level of Evidence	Sample/Setting (# of subjects/studies, cohort)	Outcome(s) studied	Key Findings	Limitations and Biases

		definition etc.)			
1) Longo UG, Risi Ambrogio ni L, Candela V, Berton A, Carnevale A, Schena E, Denaro V., Jan 2021	Systematic Review and Meta-Analyses	6 studies including 257 patients- one group managed surgically and other group managed conservatively	Comparison of clinical outcomes, overall shoulder function, pain levels, and retears over 1-10 years in those treated conservatively vs surgically for rotator cuff tears	<p>-clinical outcomes were reported at 12 months in 3 studies, 24 months in 2 studies, and 5 and 10 years in 1 study</p> <p>- CMS score, which measures shoulder function and pain levels, showed no statistically different scores between the 2 groups at 12 and 24 month follow up</p> <p>- VAS pain score showed superior results in the surgery group as compared to the conservative treatment group at 12 month follow up, was unable to be assessed at 24 month follow up</p> <p>-MRI results for 69 patients from the surgical group found 24 (35%) retears at 12 month follow up</p> <p>- article with 5 and 10 year follow up found that at 5 years, both groups improved clinically but CMS score significantly increased in surgical group, and by 10 years, clinical outcomes of those with surgical repair remained stable while in those with conservative treatment, it decreased, leading to necessity of surgery in 14 of 51 patients (27%)</p>	<ul style="list-style-type: none"> - Significant heterogeneity between cohorts of patients in the studies (2 studies enrolled patients with isolated supraspinatus tears, one study enrolled patients with varying tears- infraspinatus, subscapularis etc) - Comparison of type of intervention for conservative treatment was difficult- one study added corticosteroid injections to conservative Treatment, number of sessions/ duration of PT were not clarified - Different surgical techniques were used- one cohort was arthroscopy, others were open and mini-open approach- though both result to be equivalent, unclear whether type of intervention can influence outcomes and pain perception

<p>2) Piper CC, Hughes AJ, Ma Y, Wang H, Neviasser AS., November 2017</p>	<p>Systematic review and meta-analyses</p>	<p>3 studies including 269 patients</p>	<p>Comparison of clinical outcomes, pain scores, and tear progression between patients treated conservatively vs surgically for full thickness rotator cuff tears</p>	<ul style="list-style-type: none"> - used Constant score and VAS score to measure pain - found statistically significant decrease in pain scores on both scales for those treated operatively as compared to those treated conservatively at 1 year follow up - however, both values were below the minimal clinically significant scores - study which did 2 year follow up found same results - study which did 5 year follow up found tear progression in 37% of patients treated non-operatively- 12 out of 52 opted for surgery at later time - overall shows no short term difference, but potential long term difference 	<ul style="list-style-type: none"> - Variations between studies in types of rotator cuff tears included- one limited to supraspinatus tears, another looked at supraspinatus, subscapularis and infraspinatus tears - In one study, a subset of traumatic rotator cuff tears was included and was not separated from atraumatic cuff tears- might have influenced the findings that more strongly favored surgery compared to other trials - Lack of uniformity in treatment modalities- one study used standardized PT protocol, and up to 3 steroid injections, but the others did not. Also, duration of PT was not controlled and left up to the patient. Finally, in 2 studies, surgery was open/ mini-open approach, and in the other study, it used arthroscopy
<p>3) Karjalainen TV, Jain NB, Heikkinen J, Johnston RV, Page CM, Buchbinder R., December 2019</p>	<p>Chocra ne Review</p>	<p>9 RCT's with 1007 participants, 3 trials including 339 patients with full thickness tears</p>	<p>Comparison of clinical outcomes- pain, function, overall quality of life, and patient rated treatment success</p>	<ul style="list-style-type: none"> - 3 trials including 339 patients with full thickness tears compared surgical repair with exercise compared to exercise alone - followed up with surgery and non-surgery group after 12 months - found surgery provides little to no improvement in pain, function, overall quality of life, or participant-rated global assessment of treatment success, as compared to non- 	<ul style="list-style-type: none"> - did not include placebo controls - mostly included small degenerative tears of the supraspinatus tendon so may not be generalizable to traumatic tears, other types of tears (such as subscapularis tendon), and younger people - did not look at long term follow up to see if surgery prevents arthritic changes

			between patients treated conservatively vs surgically for rotator cuff tears	operative treatment (exercise with/without glucocorticoid injections) <ul style="list-style-type: none"> - no trials included placebo control - unable to assess adverse effects, only one event reported across the trials with low certainty evidence (not deemed related to treatment), no serious adverse events reported - no longer term follow up 	<ul style="list-style-type: none"> - most of the studies were unblinded - conservative treatment group included PT with or without corticosteroid injections 	
4)	Schmucker C, Titscher V, Braun C, Nussbaumer-Streit B, Gartlehner G, Meerpohl J., September 2020	Systematic Review	10 studies (3 RCT's with 332 participants, 7 non-RCT's with 660 participants)	Comparison of clinical outcomes- pain, shoulder function, range of motion, muscle strength, quality of life between patients treated conservatively vs surgically for rotator cuff tears	<ul style="list-style-type: none"> - Looked at shoulder function in surgical group 1 year after treatment using 100-point Constant score- found improved by 6.7 points - Measured pain with 10 cm visual analog score- improved by 1.1 cm - Had 10 year follow up in one study- found benefits of surgery persisted after 10 years - Also studied other outcomes- range of motion, muscle strength, quality of life, and adverse events- but data was sparse and not much difference between the 2 groups 	<ul style="list-style-type: none"> - Quality of reporting was poor and often inconsistent (particularly in non-RCT's)- individual components of non-surgical treatment were not specified, and additional use of steroids or other medications was not described clearly - Surgical procedures were also not standardized - Different types of tears (one included only supraspinatus, others included infraspinatus and subscapularis) makes it difficult to standardize and compare accurately
5)	Boorman RS, More KD, Hollinshead RM, Wiley JP,	Prospective Cohort Study	Single prospective study with 116 patients → 93 patients from	Follow up of quality of life scores of patients treated conservatively	<ul style="list-style-type: none"> - Followed up with patients treated conservatively after 2 and 5 years - 63 patients completed questionnaire after 5 years, 3 patients died, of remaining 30 patients, 16 confirmed 	<ul style="list-style-type: none"> - Response rate was 84% at 5 year follow-up - Didn't physically examine shoulders at 5-year time point (ROM, strength, or imaging),

Mohtadi NG, Lo IK, Brett KR, March 2018		original cohort analyzed	ely after 5 years, compare to patients treated surgically	<p>whether or not underwent surgery but didn't fill out questionnaire</p> <ul style="list-style-type: none"> - Between 2 and 5 years, 3 of 63 patients underwent surgery, patients with conservative treatment had mean RC-quality of life score of 83/100, those with surgery had score of 89→ not significantly different after 5 year follow up 	<p>relied only on patient's self-reported outcome</p> <ul style="list-style-type: none"> - Cannot reliably report whether patients sought additional treatment besides surgery outside of their treatment center
6) Nazari G, MacDermid JC, Bryant D, Dewan N, Athwal GS, October 2019	Systematic Review and Meta-analyses	6 RCTs including 670 patients	Comparison of effectiveness of arthroscopic vs mini-open rotator cuff repair on function, pain and range of motion at 3-, 6- and 12-month follow ups	<ul style="list-style-type: none"> - Looked at effects of arthroscopic vs mini-open repair on function, and found no significant difference at 3, 6, and 12 month follow up - Found no significant difference in pain scores at 3, 6, and 12 months between the 2 approaches, with no heterogeneity - No significant difference in forward or rotation ROM between 2 surgical approaches at 3, 6, and 12 month follow up (no heterogeneity at 3 and 6 months, limited heterogeneity at 12 months) - Regarding external ROM, no significant difference at 3 and 6 months, but at 12 months, arthroscopic approach had significantly better outcomes - Overall, no clinically important difference between the 2 procedures 	<ul style="list-style-type: none"> - Did not look at adverse effects between the 2 methods - All trials were at high risk of bias, so evidence was considered low-quality - Only included RCT's (no prospective or retrospective observational studies) so risk of publication bias - No assessment of cost-effectiveness between 2 treatments - Did not compare surgical techniques to conservative treatment

Conclusion(s):

Briefly summarize the conclusions of each article, then provide an overarching conclusion.

1) When comparing surgical management for rotator cuff repair to conservative treatment, surgical treatment is significantly better for pain, but not function, at 12 month and 2 year follow up. At 5 and 10 year follow up, clinical outcomes of those treated with surgery

remained more stable than those treated conservatively, indicating that surgical management may be a better long term treatment option.

2) When comparing operative and non-operative (conservative) treatment for rotator cuff tear, those treated surgically had statistically significant, but not clinically significant, improvement in pain, as compared to those treated conservatively, at 1 and 2 year follow up, yet limited data indicates there might be clinically significant benefits over longer term. Studies also found 37% tear progression after 5 years in those treated conservatively, with many opting for surgical treatment later on.

3) When compared to non-operative treatment, surgery does not provide significant benefit in pain, function, overall quality of life, or participant-rated assessment of treatment success, at 12 month follow-up.

4) Surgery for full thickness rotator cuff tears provides a significant improvement in pain and function, as compared to conservative treatment, at both short term (1 year) and longer term follow up, and the benefit increases with time. Limited data on range of motion, quality of life, muscle strength, and adverse effects found no significant difference between the 2 groups.

5) Non-operative treatment is an effective and long-lasting treatment option for patients with chronic, full-thickness rotator-cuff tears. Patients who subsequently ended up needing surgery had similar quality of life outcomes as both those who underwent surgery earlier on in the study as well as those in which non-operative treatment was successful, with no significant differences.

6) Arthroscopic and mini-open rotator-cuff repair are similarly effective at improving function, pain, and ROM and they have no clinically important difference at 3, 6, and 12 month follow up.

Overarching Conclusion: There is evidence that there is a slight benefit of surgical management of rotator cuff tears compared to conservative treatment in improving pain, function, overall quality of life, and rates of re-tears over 1,2,5 and 10 years. However, most evidence, even if statistically significant, does not appear to be clinically significant. Furthermore, based on the limited longer term follow up, there is some indication that surgery could prove to be more beneficial than conservative treatment in the long term. The minimal data which assessed adverse effects found no difference in significant adverse effects in either group.

Clinical Bottom Line:

Please include an assessment of the following:

Weight of the Evidence:

- 1) I weighed my first article as the strongest evidence, since it followed up at 1 year, 2 years, 5 years, and 10 years, so there was a lot of opportunity to see the progression of differences. In addition, it looked at multiple outcomes, including pain and function, which were both measured using the CMS score, which measures both subjective and objective aspects of function, as well as the VAS pain score, which is primarily a subjective test. In addition, it also used MRI to look at retear rates, which is a more concrete way to measure treatment success/ compare surgical to conservative treatment. The combination of subjective and objective measures used made me decide that the weight of this evidence was strongest. Despite this, there were weaknesses, including significant heterogeneity between patient cohorts (and types of tears), as well as between types of conservative and surgical treatment used.
- 2) I weighed my fourth article second since it included over 1000 patients in total, and included both RCT's and non-RCT's. I think this is important because though RCT's are generally higher levels of evidence, there is risk of publication bias when

only RCT's are included. It is also good to compare RCT's to non-RCT's to see if you get the same results, which in this case, they did. This article mainly included 1 year follow up, but had one study with 10 year follow up, and it found that the benefits of surgery persisted at 10 year follow up. Interestingly, this study was the only one that found significant benefits of surgery as compared to conservative treatment (the others found no clinically significant difference). This article had limitations and weaknesses, such as limited standardization between the studies of what was considered conservative treatment, and surgical technique.

- 3) I weighed my third article as the third to strongest. This was a Cochrane review, which was very large, and looked at several questions related to rotator cuff repair. I focused on the 3 articles that were specifically related to my question, looking at surgical repair and exercise vs exercise alone for full thickness rotator cuff tears. It looked at several outcomes, including pain, function, overall quality of life, and participant-rated global assessment of treatment success, and found little to no difference between surgery and conservative treatment. It also slightly assessed adverse effects, which is important and was not always addressed. However, the follow up is mainly 1 year, with no long term follow up, and the types of tears assessed/ type of surgical/ conservative treatment is not standardized and differs between studies.
- 4) I weighed my second article fourth. This article was also a systematic review and meta-analysis, with a fairly large population, but it mainly assessed one outcome- pain. It did use 2 different scoring systems to measure pain scores, the Constant score and VAS score, which helped measure pain both subjectively and objectively. Another strength of this article was that while it mainly had 1 year follow up, it included 1 study with both 2 and 5 year follow up, which also looked at tear progression and found a large amount of progression in those treated conservatively. Overall, the study found surgery to be slightly more effective at reducing pain, but the results were not clinically significant. However, the longer term follow up studies showed increasing benefit, suggesting that benefits of surgery increase over time. It has similar weaknesses to other systematic reviews, including lack of standardization in types of tears/ surgery/ conservative therapy.
- 5) I rated my sixth article as fifth to strongest. This article is a systematic review and meta-analysis, which is the highest level of evidence, and it includes only RCT's, which are also high level of evidence articles. It does not directly relate to my PICO question- it compares different types of surgeries as opposed to comparing surgical vs conservative treatment, which is why I rated it fifth. However, I felt it was important to include this article because all of the articles I used included both types of rotator-cuff tear surgery and did not compare between the two. Thus, I wanted to find an article comparing the different types of surgery, and this article, which has a high level of evidence, confirms that the two surgeries have equivalent efficacy in terms of pain, function, and ROM. The biggest weaknesses of this article were that it did not compare surgery to conservative treatment, and since it included all RCT's, there was a risk of publication bias.
- 6) I rated my fifth article as the weakest. I included this article because it follows up with patients both after 2 years, which is shorter term, and after 5 years, and long term follow up was something that was more limited in my other research. However, it is a single prospective study which is a lower level of evidence than my other articles. It found that even after 5 year follow up, there was no significant difference between surgery and conservative management. However, this article has the smallest sample size of the articles I included, and at 5 year follow up, the patients shoulders were not physically examined, but rather they relied only on patients' self reported outcomes.

Magnitude of Effects:

Although I was able to find 5 systematic reviews and meta-analyses, so overall I assessed a large number of patients, the magnitude of effects is still relatively small. As I mentioned in the limitations section, there was lots of heterogeneity between patients and studies throughout all of the articles, both in terms of tears and in terms of treatments. Though I specifically assessed full thickness rotator cuff tears, patients came in with different types of tears (some assessed just supraspinatus, others also assessed infraspinatus etc.) In addition, the type of surgical treatment and the type of conservative treatment were not standardized between patients and studies, so that could have affected outcome. Furthermore, different articles I included had different results- most resulted in a small, but insignificant benefit of surgery over conservative treatment, while one study concluded that the benefits of surgery compared to surgery in improving pain and function are clinically significant. Additionally, most articles discussed chronic tears, while some, including the one that found significant benefits of surgery, discussed traumatic tears, so that could have skewed the results as well. Finally, most of the studies did not have sufficient long term follow up. Based on the studies that did longer term follow up (5/10 years), there is limited evidence to suggest that surgery has lasting benefits and the benefits become more clinically significant after more time has passed, there is not enough evidence to state this more definitively. Also, there was very limited information assessing adverse effects, and surgery in general will most likely have more potential for adverse effects as compared to conservative therapy, even though this would be a mild surgery.

Clinical Significance:

Several studies found slight, and sometimes statistically significant, benefit, or surgical treatment in improving pain, function, quality of life, and rates of re-tears, as compared to conservative treatment. However, overall, the majority of studies (except one) found that benefits of surgery as compared to conservative treatment are not clinically significant. So, based on my research, surgery is not more beneficial than conservative treatment in the short term for improving pain, function, quality of life, and re-tear rates. It is important to keep in mind that while most of these studies did not assess adverse effects, or only minimally assessed them and found no adverse effects in either treatment group, surgery, even minor surgery, has more potential for adverse effects than conservative treatment. In addition, though this was also not assessed, conservative treatment is most likely more cost-effective than surgical treatment. Generally, since the benefit appears to be so minimal, at least in the short term, surgery may not be the best option right away.

There are several aspects that were not adequately explored in my research that future studies should look at. Firstly, it is important to do more research on longer term effects to assess whether surgery could be a better and longer lasting option than conservative treatment. Secondly, the adverse effects and cost-benefit aspect of surgery vs conservative treatment should be explored to understand more about the harm/ benefit ratio of these two treatment options, other than the benefits already outlined of improving shoulder pain, function, quality of life, and re-tear rates. Studies should also be more standardized to decrease heterogeneity, such as comparing the same types of surgery and the same types of conservative treatment. There should also be studies comparing specific age groups, and traumatic tears vs chronic tears, because those things could also make a difference.

Overall, based on my research, there appears to be mild, but insignificant, short term benefit of surgery over conservative treatment for full-thickness rotator cuff tears. As a provider, I would discuss both treatment options with the patient, determine how much the shoulder pain and weakness is affecting his daily life, and decide together which treatment option is best for him.

- Weight of the evidence – summarize the weaknesses/strengths of the articles and explain how they factored into your clinical bottom line (this may recap what you discussed in the criteria for choosing the articles)
- Magnitude of any effects
- Clinical significance (not just statistical significance)
- Any other considerations important in weighing this evidence to guide practice - If the evidence you retrieved was not enough to conclude an answer to the question, discuss what aspects still need to be explored and what the next studies will have to answer/provide (e.g. larger number, higher level of evidence, answer which sub-group benefits, etc)

CAT Rubric

Criteria	Proficient (100%)	Developing (85%)	Minimum Performance (70%)	Unacceptable Performance (0%)
Clinical & PICO Question (5%)	Captures the scenario appropriately and clearly and PICO Question is aligned with the clinical question	Clinical Question does not completely capture the scenario or the PICO question is not well-aligned with the search question	The Clinical Question and the PICO Question are not clearly aligned with the scenario	Either the Clinical Question or the PICO Question is absent or too vague to guide the search
PICO Search Elements (5%)	Well formulated terms and data sources likely to capture all the desired results	Needs better terms or data sources to capture most of the desired results	Lacks important terms and data sources that would allow better capture	Minimal search terms or data sources are reflected
Search Tools & Strategy (5%)	The search tools and terms used are identified & and are consistent with the CAT. Any relevant limits, filters, etc.	The search tools and terms used are identified and are consistent with the CAT, but not all appropriate limits,	Fewer than 3 search tools are listed, or the search terms and limits, filters, etc. are	The search tool & strategy is inappropriate for the CAT.

	are included, with explanation on how the few articles were selected.	filters, etc. are included. Explanation on articles selection was discussed	not included or no explanation on articles selection was discussed	
Articles Selected (15%)	Sufficient articles (≥ 6) that address the clinical question fully and are high level evidence and current	Sufficient articles (≥ 6) that address the clinical question, but includes lower levels of evidence or outdated sources with no explanation given for their inclusion	Sufficient articles (≥ 6), but lacks any high level evidence even though it exists in the literature and there are outdated sources with no discussion of why they are included	Insufficient articles or articles do not address the search question posed
Summary of Evidence (15%)	Correctly summarizes articles method, outcomes, and key findings	Addresses method, outcomes and key findings, but does not correctly summarize all of these elements	Fails to address one of the elements	Fails to address two or more of these elements
Limitations & Biases (5%)	Identifies the important limitations & biases	Identifies some limitations & biases	Fails to identify important limitations or biases	Limitations and biases are not discussed or an understanding of the concept of biases is not demonstrated
Conclusion (15%)	Conclusion is clearly based on the articles retrieved and weights them appropriately. An	Conclusion is informed by the articles, but does not attempt to weight them based on level	Conclusion is only tangentially related to the articles or includes	Conclusion is unclear or based entirely on unsupported opinions

	overarching conclusion is present.	or strength of evidence or date of publication. An overarching conclusion is present.	unsupported opinions, or an overarching conclusion is NOT present.	
Clinical Bottom Line (15%)	Draws clear connections between the studies retrieved and practice. Is expressed in a scientific tone without over generalization	Identifies some issues of relevance to practice, but is unclear about how conclusions are supported or over generalizes results	Fails to draw connections to practice or inserts unsupported opinion in the conclusions drawn	Conclusions are entirely unsupported by the evidence retrieved
Response to content & critical analysis (5%)	Content clearly pertains to original post with in-depth critical analysis of the clinical bottom line and its supporting evidence, promoting scholarly discussion.	Content pertains to original post with good discussion of clinical bottom line and its supporting evidence	Connection to original post is vague with some reference to clinical bottom line or its supporting evidence. However, the bulk of the post is personal opinion/experience	Content & focus is unrelated to original post with incorrect or absent discussion of the clinical bottom line or its supporting evidence
Response Participation (5%)	Above the minimum (3 or more) and posted and all responses on different days.	Minimum postings required (two); and all responses on more than 1 day	Minimum postings required (two); OR all responses on same day (24 hrs period)	Less than two responses to fellow students

Timeliness (initial or responses) (5%)	Submission is among the earliest (at least 36 hrs from deadline).	Submission is timely (between 12-36 hrs of deadline)	Submission is within 12 hrs of deadline.	Submission is late
Organization and Incorporation of prior suggestions (5%)	Initial and Response posts are highly organized, and all prior suggestions addressed or N/A	Initial and Response posts are well organized, and most prior suggestions addressed	Initial or Response posts may not be organized well. Some prior suggestions addressed	Disorganized Initial or response posts. Prior suggestions were ignored