

Singh JA, Sperling J, et al. Surgery for shoulder osteoarthritis. Cochrane Database of Systematic Reviews 2010, Issue 10. Art # CD008089.

Design: Meta-analysis of randomized clinical trials

PICOS:

- Patient population: Adults with radiographically confirmed osteoarthritis (OA) of the shoulder
 - o Studies of tumors, adhesive capsulitis, shoulder instability, or fractures were excluded
 - o Patients with OA secondary to rheumatoid arthritis were included
- Interventions: surgical techniques such as total shoulder arthroplasty (TSA), hemiarthroplasty, arthroscopy with debridement, non-surgical modalities (injections, physical therapy, acupuncture etc), or no treatment
- Comparisons: alternative surgical interventions (e.g., TSA versus hemiarthroplasty, pegged versus keeled glenoid components), or no surgery
 - o Because no studies of surgery versus no surgery were found, the comparisons were contrasts of different surgical techniques or approaches
- Outcomes: pain on a VAS or other numeric scale, function (Constant, ASES, UCLA, DASH, or Western Ontario OA of the Shoulder Index—called WOOS but commonly called the WOMAC), quality of life scores (SF-36), patient satisfaction, adverse events, or revision/reoperation

Study selection:

- Databases were MEDLINE, CINAHL, OVID SPORTdiscus, EMBASE, Cochrane Central Register of Controlled Trials, and Web of Science
- Search dates went through Sept of 2009
- Non-English studies were eligible, but no search was done of the grey (unpublished) literature, and abstracts were also not eligible for inclusion
- Two authors independently reviewed studies for inclusion and for quality based on the Cochrane Risk of Bias Tool, which emphasizes technique of randomization, allocation concealment, blinding of participants, personnel, and outcome assessors, complete/incomplete followup, selective outcome reporting, and patients crossing over from one treatment group to the other treatment group during the course of the trial

Results:

- 1339 studies were found during the literature search; 15 were identified for full review, and 7 studies were included in the review
- The included studies were aggregated into four comparisons
 - TSA was compared to hemiarthroplasty
 - For TSA, pegged glenoid components were compared with keeled glenoid components
 - For TSA, computerized navigation for placement of the glenoid component was compared to conventional surgery in which the placement of the glenoid component is determined by the surgeon's experience and imaging
 - For TSA, cemented polyethylene glenoid components were compared to uncemented metal-backed glenoid components
- For TSA versus hemiarthroplasty, two studies with 88 participants were included in the meta-analysis, but only one study with 41 participants reported any pain scores
 - Pain scores were slightly more favorable for TSA than for hemiarthroplasty, but the differences were not statistically significant
 - Disability scores were available from both studies
 - For the ASES score, which is measured on a scale from 0 to 100, TSA was favored over hemiarthroplasty by 10.05 points, with a 95% confidence interval from 1.13 to 18.97 points
 - For the UCLA score, which is measured on a 35 point scale, one study with 41 participants reported TSA better than hemiarthroplasty by 3.23 points (95% CI from 1.18 to 5.23)
 - Data on adverse events from only one study with 41 participants was reported by the authors
 - TSA and hemiarthroplasty had similar rates of total adverse events, intraoperative fractures and infection
 - Both studies reported on deaths; there were no deaths in either group
 - For other outcomes (quality of life on the SF-36, WOMAC scores, and range of motion), only one study with 41 participants reported any data, and there were no differences between TSA and hemiarthroplasty
- For keeled versus pegged glenoid components for TSA, there were three studies included in the review, but none of them reported on pain, safety, or quality of life
 - One study with 27 participants reported function by the Constant score, and the groups did not differ in function
 - Two studies with 70 patients reported on radiolucency; the keeled components had a higher risk of radiolucency compared to the pegged, but the comparisons were made with different timing
 - One study reported on radiolucency at 6 weeks, where 14/23 keeled and 6/20 pegged shoulders were radiolucent (Relative risk of 2.03 for keeled radiolucency versus pegged radiolucency)

- The other study reported on radiolucency at 24 months, where neither group had much radiolucency (1/13 keeled versus 0/14 pegged)
 - Revision rates were the same for pegged and keeled components
- For computerized navigation versus conventional surgery, only one study with 20 participants had any data
 - The retroversion angle was smaller for navigation compared to conventional surgery, but the operating time was longer for navigation by about 30 minutes
- For cemented all-polyethylene versus uncemented glenoid components, only one study with 40 patients had any data, and the only outcomes were revision rates, which were similar (no pain or function scores reported)

Authors' conclusions:

- There were no randomized trials comparing surgery to nonsurgical treatment for shoulder OA, and the benefits of surgery versus nonoperative treatments are not known
- Studies with sample sizes of 20 to 40 patients are not likely to provide any meaningful clinical answers for patients and providers
- TSA does seem to produce greater functional benefit than hemiarthroplasty, but there is not enough information about pain and revision rates to make a meaningful comparison between the operations for these outcomes
- For keeled versus pegged glenoid components of TSA, there were no significant differences in the primary or secondary outcomes to compare the components; the differences between radiolucency rates at 6 weeks and 2 years must be interpreted with caution
- Computerized navigation may lead to better glenoid positioning as measured by the retroversion angle, but none of the primary or secondary outcomes were reported by one small study

Comments:

- The conclusions regarding functional outcomes for total shoulder versus hemiarthroplasty do not differ from those of Bryant 2005, who reported on the same two 2005 randomized trials making this comparison
- Most of the risk of bias criteria are familiar from the Cochrane Risk of Bias tool, but one "other source of bias" is "patients crossing over to other treatment groups"
 - Crossing over is not usually a source of bias if the data are analyzed by the intention-to-treat principle
- The authors are appropriately skeptical about drawing conclusions from single trials with small numbers of participants
- The methods used to make the comparisons are of high quality, even if very little light can be shed on deciding between different interventions

Assessment: High quality meta-analysis with good evidence that functional outcomes are better at two years for total shoulder arthroplasty as compared with hemiarthroplasty in patients with glenohumeral osteoarthritis

Reference:

Bryant D, Litchfield R, et al. A Comparison of Pain, Strength, Range of Motion, and Functional Outcomes After Hemiarthroplasty and Total Shoulder Arthroplasty in Patients with Osteoarthritis of the Shoulder. *JBJS Am* 2005; 87-A:1947-1956.