

Title:

There is insufficient evidence to recommend passive range of motion and pendulum exercises over pendulum exercises for the first six weeks post total shoulder arthroplasty.

Reviewer:

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Clinical Scenario:

Exercise protocols for patients post total shoulder arthroplasty in a large teaching hospital vary greatly dependent on the surgeon performing the operation. One patient wants to know why they are not doing any exercises after their TSA while the patient in the next bed has already started an exercise program.

Focused clinical question: Do patients post Total Shoulder Arthroplasty achieve better range of motion by six months post operatively with a regimen of pendulum exercises and passive range of motion compared with pendulum exercises only for the first six weeks?

Search Strategy:

| Databases Searched | Search Terms | Inclusion Criteria |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| MEDLINE/PUBMED EMBASE CINAHL PEDro | Shoulder and arthroplasty and/or replacement AND exercise and/or protocol AND therapeutic outcomes AND physiotherapy or rehabilitation | English language articles published between 1990- 2007 full text available adults>60 |

Summary of Search: The search found five articles which briefly mentioned physiotherapy or rehabilitation after total shoulder arthroplasty with insufficient information to adequately reproduce treatment. One article provided an extensive literature review and clinical guidelines (Level V) for patients total shoulder replacement but with no evidence to support the recommendations. Two RTCs were identified that related to portions of the clinical question but were limited by the sample size (Level II). Two case series were also identified (Level IV). For the purpose of this CAT the two RTCs will be reviewed.

Clinical Bottom Line: While there is insufficient evidence at this time to recommend a

post op regimen of pendulum exercises and passive range of motion over pendulum exercises only for the first six weeks post total shoulder arthroplasty, the studies evaluated started exercises (pendulum, passive and/or active-assisted) day 1 postoperatively with no adverse results.

Limitation of this CAT: This critically appraised topic has not been peer-reviewed by one other independent person.

Citations:

1. Agoraites, I., Sinopidis, C., El Meligy, M., Yin, Q., Brownson, P., Frostick, S.P. (2007). Early Versus Late Mobilization After Hemiarthroplasty for Proximal Humerus Fractures. *J Shoulder Elbow Surg*, 16(3 suppl).

Summary of Study:

Population: patients with isolated non pathologic fractures of the proximal humerus, less than 6 weeks old that required hemiarthroplasty (indications for hemiarthroplasty-displaced 3- or 4-part fractures or articular fractures in physiologically old patients with poor bone quality)

Interventions: randomized to early or late mobilization- early group was kept in sling in neutral position for the first 2 weeks, while only pendulum and elbow exercises were allowed, between 3 and 6 weeks patients progressed to active-assisted exercises and then from 7 weeks active exercises. Late group was kept in sling in neutral position for 6 weeks with only elbow exercises allowed, from week 6 through 12, patients progressed from pendulum to active-assisted exercises and from the 13th week to active exercises. Both groups were supervised by a team of specialized shoulder physiotherapists. Followed for 12 months.

Outcomes: X-rays of shoulder obtained post op day 1, week 2 and 6 and at 3, 6, and 12 months to assess Greater Tuberosity (GT) migration. As well independent blinded observer completed the Constant Shoulder Assessment (includes both subjective and objective components including ROM) and Oxford score (purely subjective measure of function) at 6 and 12 months.

What happened: 59 patients were recruited between October 2002 and October 2003. Randomized into late or early mobilization group in the operating room after surgery completed. 10 patients were excluded from the analysis- 4 used different uncemented prosthesis, 1 had a pathologic fracture, 1 developed a deep infection week 2 post op, 2 had GT malpositioning related to intraoperative difficulty or prosthetic malalignment and 2 did not attend their follow up visits- left with 49 patients 26 in the early group and 23 in the late group.

Appraisal:

Validity checklist: This trial was randomized with concealed allocation. The two study groups were comparable at baseline. The authors completed between

group comparisons and used valid and reliable outcome measures. Bias would arise from lack of blinding of patients and therapists although the assessors were blinded. No intention to treat analysis was included and the follow up was limited to 12 months only. PEDro score 6/10.

Results: There was no statistically significant difference between the early and late mobilization groups in any of the outcomes. GT migration which occurred in 1 patient in the late mobilization groups and 3 in the early group but was not considered statistically significant (significance set at $P < .05$). There was also no statistical significant difference between range of motion, the Constant Shoulder (in all separate components- mobility, strength, pain and activities of daily living) and Oxford scores. The authors stated that both late and early mobilization is safe in this population.

Applicability: While the population of interest in this paper under went hemiarthroplasty rather than TSA the surgical techniques and restrictions tend to be the similar. Time to allow healing of bone post op is often cited as the reason to delay beginning exercises. Although the exercises started on day 1 by the early mobilization group in this study involved pendulum exercises (no passive exercises), they progressed to active assisted exercises at 3 weeks-earlier than the intervention in the clinical question. The harm/risk related to this program was not significantly increased compared to the late group. Also of note, the range of motion at 6 and 12 months showed no statistically significant difference between the early and late groups, showing no evidence of the detrimental effect of possible scarring with late mobilization.

2.Lo, K.Y., Litchfield, R.B., Griffin, S., Faber, K., Patterson, S.D., Kirkley, A. (2005). Quality of Life Outcomes Following Hemiarthroplasty or Total Shoulder Arthroplasty in Patients with Arthritis. *J Bone Jt Surg* 87A(10).

Summary of Study:

Population: Patients had a diagnosis of primary osteoarthritis of the shoulder, had failure of conservative/non-operative treatment, and wished surgical intervention. Exclusion criteria included rotator cuff tear, inflammatory arthritis, post-capsulorrhaphy osteoarthritis, major medical condition, active infection, substantial muscle paralysis and lack of fitness for surgery or unwillingness to be followed for 2 years.

Interventions: Patients randomized intra-operatively to either total shoulder arthroplasty or hemiarthroplasty group. Postoperatively patients were placed in sling and active-assisted exercises were begun on the first day post-op with emphasis on forward elevation and external rotation. Limit for external rotation was based on intra-operative assessment. Active range of motion exercises were allowed at 4 weeks postoperatively and strengthening exercises at 8 weeks. The patients returned to normal activities as tolerated over 3 to 6 months.

Outcomes: Blinded researcher performed a standardized assessment of all

patients preoperatively, at 6 weeks post-op as well as at 3, 6, 12, 18, and 24 months. At each evaluation, the patients completed a disease-specific quality of life instrument (Western Ontario Osteoarthritis of the Shoulder [WOOS] index), a general shoulder assessment instruments scale, Constant Shoulder Assessment score, general pain scale and a global health measure. Range of motion was extracted from the Constant score. Main outcome measure was WOOS.

What Happened: 42 patients were enrolled in the study. One patient died 2 days post-op and was excluded therefore 41 patients were randomized into TSA (20 patients) or the hemiarthroplasty (21 patients) group. Two patients in the hemiarthroplasty group crossed into the TSA group (one at 12 months and the other at 18 months) due to pain secondary to progressive glenoid arthrosis.

Appraisal:

Validity checklist: This RTC was prospective and double blinded. The sample size was justified prior to beginning the trial. Valid and reliable outcome measures were used. At baseline there was no statistically significant difference between the TSA and hemiarthroplasty groups in terms of age, gender or preoperative range of motion or functional status. Intention to treat analysis was included but the last score before cross over from hemiarthroplasty to TSA was used for the final analysis.

Results: Both groups showed significant improvement in disease specific quality of life as measured by WOOS as well as in the Constant Shoulder score, pain scales and range of motion at 2 years post surgery. Due to the limited numbers available though, there was no significant difference between the two groups. The investigators recognized that as the study demonstrated an insignificant difference, it was important to establish the power of the investigation in order to determine if the final conclusion was valid (ie there was truly no significant difference between the treatment groups).

Applicability: The population studied in this RTC are representative of the patients seen in clinical setting. The physiotherapy protocol was not reproducible in practice due to lack of information. Both treatment groups started with active assisted exercises day 1 post op and both groups demonstrated significant improvement in range of motion at 24 months with few complications even with a more “aggressive” exercise program than that of the intervention under review.

Conclusions:

Exercise is integral to a successful outcome for patients with total shoulder arthroplasties. Unfortunately protocols vary between surgeons. The evidence available at this time is not sufficient to recommend one intervention (passive range of motion and pendulum exercises) over another (pendulum exercises only) for the first six weeks postoperatively. While the protocols followed in the two RTCs that were reviewed lacked sufficient information to replicate in practice, both involved active-assisted exercises started within the first six weeks with limited risk. Further research is required to compare exercise

protocols and outcomes in patients post op Total Shoulder Arthroplasty to determine best practice.