

**A critical appraisal of “Rehabilitation Following Arthroscopic  
Rotator Cuff Repair: A Prospective Randomized Trial of  
Immobilization Compared with Early Motion”**

**By**

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**In partial fulfillment of the  
requirements for the course:**

**PT 7240 Evidence-Based Practice in Physical Therapy**

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**November, 2019**

**Key words: rotator cuff, repair, immobilization, early motion, rehabilitation**

**Abstract**

This critical appraisal addresses the rationale, methods, results, and discussion of a study that was performed to test the clinical significance of postoperative protocols for rotator cuff repair on tendon healing. The two variables of the study were shoulder immobilization and early motion. One subject group began active motion activities 10 to 14 days after surgery while the other group was immobilized for 6 weeks before initiation of physical rehabilitation. The investigators had a strong introduction and results section, but minor discrepancies were found in relatively strong methods and discussion sections. The findings of the study explained that a long-term clinically significant difference was not found between immobilization and early motion on tendon healing. Exact rehabilitation protocols following rotator cuff repairs need further investigation to establish the most beneficial and safe outcomes.

## **Introduction**

Orthopaedic surgeons have developed various rehabilitation protocols based on current evidence of tissue healing following rotator cuff repairs. The topics surrounding this development typically involve the timing and implementation of motion based activities during physical therapy. The outcomes for motion related rehabilitation are relatively unknown which this study hopes to find new evidence to provide surgeons with greater knowledge to make decisions on rehabilitation protocols following rotator cuff repair. The importance of this critical appraisal is to evaluate the methods and validity of evidence this article presents to allow for a concise interpretation of protocols following rotator cuff repairs. In regards to rehabilitation timing, current protocols focus on either early motion or immobilization. Is postoperative shoulder immobilization more beneficial than early motion in rotator cuff repair patients?

## **Methods**

This article was found when searching the Cumulative Index of Nursing and Allied Health Literature (CINAHL) Complete database. When initiating the search, keywords such as shoulder immobilization, rotator cuff, repair, arthroscopy were used to find articles related to the topic. Search limits were not needed following the initial search because searching with these keywords found fifty-seven results which was a small enough population to begin reviewing articles. Articles among the fifty-seven that were related to subjects under the age of eighteen were excluded from the search because the interest of this clinical question was geared towards older adults that are typical subjects for rotator cuff repairs opposed to a teenager or child population.

This article was published in 2014 by the Journal of Bone and Joint Surgery, Incorporated. The researchers included Jay D. Keener, MD, Leesa M. Galatz, MD, Georgia Stobbs-Cucchi, RN, Rebecca Patton, MA, and Ken Yamaguchi, MD and the study was conducted at the Shoulder and Elbow Service, Department of Orthopaedic Surgery, Washington University, St. Louis, Missouri. This article was chosen for critical appraisal because it involved the two important variables of rehabilitation protocols, early motion versus immobilization, and the research was conducted using randomized controlled trials to provide high levels of evidence. This rationale was used when choosing this article for appraisal.

## **Results**

### Summary of the study

The researchers randomly assigned 145 patients (21 subjects were excluded, which left the results of the study on 124 subjects) to two groups, the first group began early motion during physical therapy at 10 to 14 days postoperatively, and the second group stayed immobilized in slings until 6 weeks postoperatively. With the exception of active external rotation, both subject groups showed significant improvement in active range of motion compared to the baseline measures. The early motion rehabilitation group compared with the immobilization group had significantly better mean active range of motion into elevation (136 versus 123;  $p = 0.02$ ) and external rotation range of motion (47.0 versus 40.1;  $p = 0.05$ ) at three months postoperatively. No significant differences were found in VAS pain score, active range-of-motion values, shoulder strength measures, or any of the functional scales between the groups at the time of the six-month, twelve-month, or final follow-up evaluations. At twelve months, ultrasound sonography was used to obtain tendon healing results for both groups which revealed that neither

group had significant differences in the amount of tendon healing (both groups did have significant healing however). This study discusses the fact that there was not a significant difference in tendon healing of patients who were immobilized 6 weeks before beginning motion activities versus patients who began early motion post rotator cuff repair.

#### Appraisal of the study introduction

The introduction of the article was comprehensive. Keener et. al. discuss the clinical relevance of the question that their study poses. They begin with a broad topic of arthroscopic shoulder rotator cuff repair and then narrow the writing's scope to their clinical question of tendon healing in patients who went through an immobilization period versus those who performed early motion following rotator cuff repair. The authors reference six valid studies in the introduction and have produced a sound rationale for the study. Overall, the introduction was strong and did not present any weaknesses.

#### Appraisal of the study methods

The study methods were based on a randomized control trial, it was retrospective, longitudinal, and a double-blind study. Two groups were employed (shoulder immobilization vs early motion) and was considered a between-subjects design. Each subjects' group assignment was concealed from the research nurse enrolling individuals by using a randomization computer program. The subjects were blinded as much as possible. The radiologists were trained in using ultrasonography to view the repairs and were blinded to the subjects' group. The groups were randomized thoroughly and after analyzation, no gross differences were found between subject groups. The investigators managed all groups in the same way besides the type of postoperative rehabilitation protocol which was the known

independent variable in the study. The intervention was quite simple, one group was immobilized for 6 weeks prior to beginning shoulder motion activities while the other group began early motion activities after just 10 days postoperatively. This study could be replicated easily assuming the surgeries performed, and the inclusion versus exclusion criteria remained unchanged.

The only weakness that may be noted was subject attrition rate. 145 subjects were recruited but 21 withdrew for various reasons. The listed reasons were: 16 excluded due to not passing inclusion vs. exclusion criteria, 1 subject died, 1 subject developed a deep infection, 1 was noncompliant with shoulder immobilization, 1 was noncompliant with early follow up visits, and 1 moved out of the country in the early period after surgery. Usually attrition can show bias in the results if not properly reported, but the investigators gave proper accounts for those who withdrew.

#### Appraisal of the study results

The results section is clear and concise with the display and organization of the data. Keener et. al. address the exclusion criteria and the rationale for subjects exclusion at the beginning of the study as well as why subjects withdrew. The researchers organized the data in the same way they initially presented it in the methods section. The authors reported the results for outcome measures such as: visual analog pain scale (VAS pain) score, the Simple Shoulder Test (SST)<sup>12</sup>, the ASES (American Shoulder and Elbow Surgeons) score, and the Constant score. Also, they reported outcomes for PROM and AROM such as: for flexion, external rotation with the arm at the side, external rotation with the shoulder abducted 90 degrees, and internal rotation with the thumb pointed cranially and behind the back. All tables were easy to understand

and labeled correctly. The data appears to be accurate with the accuracy being validated by a reliable statistical analysis program, the SAS/Stat software (version 9.3; SAS Institute, Cary, North Carolina). All in all, the results section was strong.

#### Appraisal of the study discussion

The authors did not simply repeat the results. The results were objective statements and the researchers discussion section involves the clinical significance of safe postoperative rotator cuff arthroscopy and how their findings impact the understanding of rehabilitation protocols in current clinical practice. The authors clearly tie the findings from the study into existing literature. They discuss traditional protocols to the newer evidence based protocols following rotator cuff repair. In the discussion section, previously performed studies which were closely related to this study were compared to further understand the results after the data was analyzed.

The authors did not report patient satisfaction as an outcome of the study. While many objective outcome measures were reported, a subjective outcome such as patient satisfaction is equally important. If the patients were not satisfied with their results, it is possible that neither immobilization nor early motion would have a clinically significant effect on the study. This inaction can be viewed as a weakness in the study and is represented in the discussion.

#### **Discussion**

The results from this study are clinically meaningful and explain the reasoning for postoperative rehabilitation using current postoperative protocols. The subjects in this study would not have displayed the same progression in tendon healing while maintaining or regaining range of motion and strength had physical rehabilitation not been initiated following surgery which was known before the study. However, the direct results that the investigators were

testing, immobilization versus early motion, indicate that a clinical significance for early motion versus immobilization following rotator cuff arthroscopy was not found which rejects the hypothesis that immobilization would produce greater tendon healing compared to early motion.

This study confronted most aspects regarding patient outcomes for two different postoperative protocols. The methods were executed with precision and accuracy. Findings of the study should be used by surgeons to make considerations for their patients in regards to postoperative care. Important qualities of immobilization versus initiation of early motion were addressed and thoroughly tested by the investigators.

The overall point of the findings of this article were to make recommendations for surgeons on post-operative rehabilitation for shoulder rotator cuff repair. Possible safety precautions to consider following this study are the pros and cons of immobilization and early motion following surgery. If the activities are too aggressive, re-tearing of the tendon can occur so it is recommended to begin with easy and safe activities to ensure complete healing of the tendon. At one year postoperative, both subject groups showed no significant difference in tendon healing and it may be safer to require a 6 week immobilization period following surgery. This will require greater compliance by the patient especially if they want to begin activities of daily living which means that patient education and understanding of the chosen protocol will be key for the best possible outcome.