A Multidisciplinary Total Hip Arthroplasty Protocol With Accelerated Postoperative Rehabilitation: Does the Patient Benefit?

Claire E. Robbins, PT, DPT, Daniel Casey, PT, James V. Bono, MD, Stephen B. Murphy, MD, Carl T. Talmo, MD, and Daniel M. Ward, MD

Abstract

Since its debut over 10 years ago, minimally invasive total hip arthroplasty (THA) has often been associated with accelerated postoperative rehabilitation when compared with THA performed with a traditional surgical approach. The objective of this study was to investigate the effect of accelerated postoperative rehabilitation and early mobilization on length of stay and hospital readmissions in patients undergoing THA at one institution.

We retrospectively reviewed a consecutive series of 590 patients who underwent THA between January 31, 2011 and April 30, 2011. Six arthroplasty surgeons using varying surgical techniques participated. One hundred ninety patients received accelerated rehabilitation and were mobilized on the day of surgery. The remaining 400 patients were mobilized on postoperative day one (POD1). Length of stay for the accelerated rehabilitation group was 2.06 days and 3.38 days for the standard group. One patient was readmitted to the hospital within 30 days (.52%) in the accelerated group compared to 19 re-hospitalizations (4.72%) in the POD1 group. Ninety-six percent of the accelerated group were discharged home versus 62% in POD1 group. Our results support the use of an accelerated rehabilitation protocol at one institution following total hip replacement surgery.

Total hip arthroplasty (THA) and its related perioperative care have successfully evolved over the past 40 years. However, that history has been marked by some controversy and debate. For example, hip reconstruction pioneers John Charnley and Otto Aufranc agreed on the importance of preoperative patient education and postoperative use of a cane but disagreed on the hierarchy of postoperative exercise and the need for physical therapy after discharge home.[1,2]

Since its debut over 10 years ago, minimally invasive THA has often been associated with accelerated and improved postoperative rehabilitation and clinical outcomes when compared with THA performed with a traditional surgical approach. This association is still debated.[3-6] Recently, improvements in surgical technique, surgical implants, multimodal pain protocols, and accelerated rehabilitation (AR) have influenced the movement toward "fast-track" or "same-day total hip" programs and the prospect of routinely performing THA in an outpatient setting.[7-11] Some in the field question the safety and efficacy of this advancement.

In 2004, our institution implemented a comprehensive rehabilitation approach in which THA patients initiate postoperative physical therapy on day of surgery. Initial findings showed shorter length of stay (LOS), more patients discharged home, and improved achievement of functional mobility goals.[12] Unfortunately, the program failed because of lack of administrative and surgeon support, poor communication, and inadequate physical therapy staffing.

In 2010, an AR protocol for THA was introduced. This protocol, a modified version of the standard THA clinical protocol, received initial support from 2 of our arthroplasty surgeons. A multidisciplinary approach, the protocol uses advances in perioperative pain control, extensive preoperative patient education, and early mobilization, which has proven benefits. However, months after its debut, the THA-AR protocol struggled to secure full institutional support.

We compared the effect of a THA-AR protocol, in which a patient is mobilized on day of surgery, with that of a standard THA protocol, in which a patient begins mobility activities on postoperative day 1 (POD1) at one institution. We hypothesized shortened LOS, more patients discharged home, and fewer hospital readmissions and complications with the AR protocol.

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Materials and Methods

After obtaining institutional review board approval, we retrospectively reviewed a consecutive series of 590 patients who had THA performed at one hospital between January 31, 2011 and April 30, 2011. Patients were selected from the hospital database. One hundred ninety patients received an AR protocol and were mobilized on day of surgery by physical therapy and nursing, and the other 400 patients were mobilized on POD1, following the hospital's standard THA rehabilitation protocol (**Figure**).

Of the 590 patients, 303 (51%) were women, and 287 (49%) were men. Mean age at time of surgery was 62.6 years (range, 15 to 90 years). Of the 190 AR patients, 91 (48%) were women, and 99 (52%) were men. Mean age of the AR patients was 58.6 years (range 31 to 87 years). Body mass index was not examined.

Inclusion criteria for the THA-AR protocol included age between 15 years and 90 years and an underlying diagnosis of osteoarthritis, rheumatoid arthritis, or traumatic arthritis that required primary THA by a select group of 6 surgeons. Exclusion criteria included patients undergoing revision THA surgery or having bilateral hip replacement surgeries performed on the same day.

Patient selection for the THA-AR protocol was biased on 3 levels: Selection of surgeons was based on their present and prior support of early mobilization and immediate postoperative rehabilitation; each of their patients was eligible for selection unless a significant comorbidity posed a high risk for participation; and the physical therapist's selection decisions were often influenced by postoperative time constraints and staffing.

The THA-AR protocol differs from the standard THA protocol in several ways. The preoperative communication/education between surgeon/preadmission care team and patient emphasizes an anticipated 24- to 48-hour LOS and discharge home, patients are discharged from the postanesthesia care unit (PACU) to the patient floor by stretcher versus hospital bed, patients are transferred to a patient care unit where staff (nursing, physical therapy, occupational therapy, case management) receive special education and instruction on postopera-

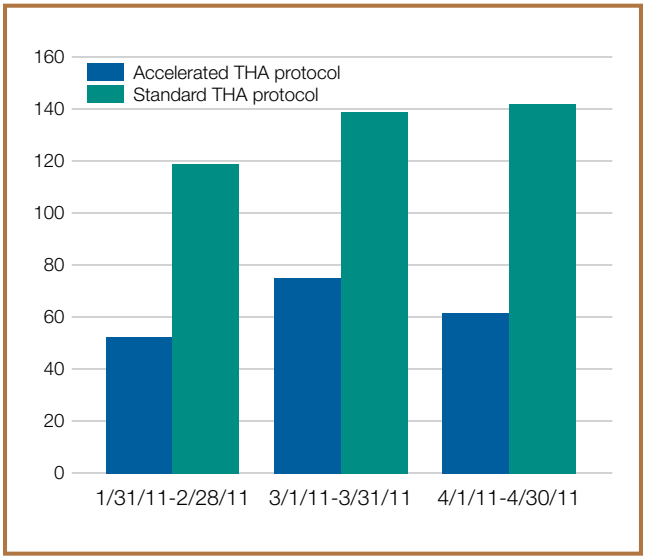

Figure. Number of patients participating in accelerated-rehabilitation THA protocol and standard THA protocol.

Table I. **Differences in Participating Surgeons' Surgical Technique and Perioperative Care**

Surgeon	Surgical Technique	Premedication	Preoperative Autologous Blood Donation	Intraoperative Local Injection	Postoperative Rehabilitation
1	Posterior with tissue preserving anatomical capsular repair	Oxycodone/ acetaminophen Celecoxib	Yes	Deep capsule and subcutaneous tissue, bupivacaine with epinephrine	Immediate mobility, unrestricted motion and weight-bearing
2	Posterior	Oxycodone/ acetaminophen Celecoxib	Yes	Morphine, ketorolac, bupivacaine with epinephrine	Posterior precautions for 6 weeks, weight-bearing as tolerated
3	Superior capsulotomy	Acetaminophen/ celecoxib Slow-release oxycodone	Yes	Bupivacaine with epinephrine into gluteus maximus and subcutaneous	Immediate mobility, unrestricted motion and weight-bearing
4	Posterior with tissue preserving anatomical capsular repair	Oxycodone/ acetaminophen Celecoxib	Yes	Deep capsule gluteus maximus and subcutaneous tissue, bupivacaine with epinephrine	Immediate mobility, unrestricted motion and weight-bearing
5	Posterior	Oxycodone/ acetaminophen Celecoxib	Yes	Deep capsule and subcutaneous tissue, bupivacaine with epinephrine	Immediate mobility, unrestricted motion and weight-bearing
6	Posterior and capsular repair with external rotators	Celecoxib 400 mg day before surgery, 200 mg morning of surgery	Yes	Bupivacaine with epinephrine into maximus, medius, and anterior capsule and subcutaneous tissue	Immediate mobility, unrestricted motion and weight-bearing

tive care of this patient cohort, mobilization/gait training is initiated as soon as possible from stretcher to hospital bed with a walker or crutches. A stand pivot transfer or slide transfer is used with patients who have been determined inappropriate for gait training at time of admission to the medical unit.

Six arthroplasty surgeons using varying surgical techniques were selected for the study. Selection of surgeons was based on their support of the AR protocol. **Table I** highlights individual differences among surgeons with respect to surgical technique and perioperative care. One senior surgeon reported his early patient data and personal experience since implementation of the AR protocol at this institution.[13] However, the objectives of this study were to include several surgeons and demonstrate the safety and efficacy of the protocol institution-wide.

LOS, discharge disposition, and hospital readmission data were obtained from the hospital database by members of the case management team using the THA diagnosis. The THA diagnosis code did not differentiate between AR patients and standard protocol (POD1) patients. In addition, it did not differentiate between readmissions and complications. Therefore, individual medical records and databases were reviewed twice for data accuracy.

A *t* test with 95% confidence interval was used to compare LOS means and determine a significant difference. The Fisher exact test was used to identify and compare discharge disposition (home vs rehabilitation facility) in each THA protocol group. $P < .05$ was considered significant. Percentage was used to calculate incidence of readmissions and complications.

Results

There are many reports of successful fast-track or AR protocols in the literature and on Internet sites. Our multisurgeon results compared favorably with previously reported results.[10,14,15]

Length of Stay

LOS was 2.06 days (range, 1 to 9 days) for AR/early-mobilization patients and 3.38 days (range, 1 to 23 days) for POD1 patients. The difference was statistically significant (calculated confidence interval, 95%). No patients were discharged on day of surgery during the study's time frame.

Mean number of physical therapy sessions per day was 2.5 for AR patients and 1.5 for POD1 patients (**Table II**). Mobilization with the nursing staff was not recorded.

Discharge Disposition

Initial review of the data indicated what appeared to be similar findings for the AR and POD1 protocols with respect to discharge disposition. However, the similarity did not hold up.

Of the AR patients, 4% were discharged to a rehabilitation facility, and 96% were discharged home. Of the POD1 patients, 38% were discharged to rehabilitation, and 62% home. The differences, the Fisher exact test showed, were statistically significant ($P = .001$).

A detailed breakdown of discharge destination for both groups showed that patients discharged home likely received home services and patients discharged to a rehabilitation facility likely went to a skilled nursing facility (**Table III**).

Readmissions and Complications

Twenty postoperative complications and readmissions were reported for the 590 patients included in this retrospective review. Three of the 20 patients were disqualified from data analysis, as their admission to the hospital during the study's time frame was to the ambulatory care unit for complications from primary surgeries several years earlier. Another patient was disqualified because cardiac complications sent him to another acute-care facility before he was able to receive physical therapy.

One AR patient (0.52%) was rehospitalized for a right thigh hematoma 6 days after POD2 discharge home. Readmission LOS was 7 days secondary to muscle spasms limiting functional mobility; pain; and symptomatic anemia. This patient was discharged home on adjusted-dose warfarin and had no further complications.

Fifteen POD1 patients (3.75%) had postoperative complications that extended LOS or required rehospitalization. Mean age of these patients was 70 years, and mean LOS was 6 days. Of these 15 patients, 9 were initially discharged home, 5 were discharged to rehabilitation, and 1 was discharged to acute rehabilitation.

Table II. Rehabilitation Sessions for Accelerated Rehabilitation and Standard Protocols

Protocol	Mean No. of PT Sessions, Day of Surgery	Total No. of Visits		Mean No. of Visits/Day		LOS (days)
		PT	OT	PT	OT	
Accelerated rehabilitation	1.6	5.0	1.6	2.5	.78	2.06
Standard	0	5.0	1.3	1.47	.38	3.38

Abbreviations: PT, physical therapy; OT, occupational therapy.

Table III. Discharge Destination of Combined Accelerated Rehabilitation and Standard Protocol Groups

Description	%	n
Acute rehabilitation facility	4.75	28
Skilled nursing facility	22.03	130
Home with Visiting Nurse Association services	72.37	427
Home without services	0.34	2
Acute-care hospital	0.17	1
Long-term acute-care facility	0.17	1
Home with outpatient services/private help	0.17	1

One patient was rehospitalized 16 days after surgery secondary to hip pain. Another patient was admitted to the hospital's ambulatory care unit (on a daily basis for 6 days) 3 weeks after surgery for intravenous antibiotics secondary to a hip infection. A third patient, who had a major postoperative complication (a significant leg-length discrepancy) detected while in PACU, returned to the operating room for revision THA on the same day of surgery. Other complications included tachycardia, hypoxia, postoperative anemia, atelectasis, lower extremity swelling, atrial fibrillation, pneumonia, confusion, ileus, respiratory arrest, bradycardia, elevated international normalized ratio, and lower extremity hematoma. There were no deaths.

Discussion

Between 1990 and 2002, use of primary THAs increased steadily. The rate is projected to rise substantially over the next 2 decades, with the demand for THA increasing by 174% by 2030.[16,17] Advances in technology, surgical technique, and perioperative care over the past few decades have made THA more suitable for patients in a wider age range and have influenced the progression of rapid or accelerated rehabilitation THA programs.[8,10,13,18]

We retrospectively studied the hypothesized benefits of AR/early mobilization versus a standard (POD1) protocol for THA patients at one hospital. We examined the effect of AR, independent of surgical technique, on LOS, discharge disposition, readmissions, and complications.

AR influenced LOS in THA patients. AR patients received 2.5 sessions of physical therapy per day, and POD1 patients received 1.5 sessions. AR patients were more likely to be discharged home and to have fewer postoperative complications and rehospitalizations.

Our study had a few limitations. Its nonrandomized, retrospective design did not control for age, comorbidities, or other preoperative factors, such as preoperative education or patient expectations. There was selection bias (discussed earlier). Automatic patient selection bias was consequential to selecting surgeons who supported the THA-AR protocol. Patient selection was further influenced by comorbidities or other factors that posed a high risk. Further, simple t test, Fisher exact test, and percentage were used to assess our findings. Absence of a power analysis and multivariate analysis limited the statistical significance of our findings. Despite these limitations, we believe this study provides valuable insight into the positive effects of a THA-AR protocol used with a select group of THA patients. A prospective, randomized, controlled design may have improved the clinical significance of our findings and eliminated issues of selection bias.

A THA-AR protocol can decrease LOS, influence discharge disposition, and decrease the likelihood of postoperative complications and rehospitalizations. Our results support use of an AR protocol at one institution after THA.

Dr. Robbins is Research Assistant, Department of Orthopedics; Mr. Casey is Senior Physical Therapist, Department of Rehabilitation Services; Dr. Bono is Vice Chairman, Director of Education, and Surgeon, Department of Orthopedics; Dr. Murphy, Dr. Ward, and Dr. Talmo are Staff Surgeons, Department of Orthopedics, New England Baptist Hospital, Boston, Massachusetts. All surgeons are Clinical Professors, Tufts University School of Medicine, Boston, Massachusetts.

Address correspondence to: Claire E. Robbins, PT, DPT, Department of Orthopedics, New England Baptist Hospital, 125 Parker Hill Ave, Boston, MA 02120 (tel, 617-754-5919; fax, 617-566-2257; e-mail, crobbins@nebh.org).

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