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ABSTRACT

**Study Design:** Case report.

**Background:** The incidence of patients undergoing a total hip or total knee arthroplasty is continually increasing. Despite this increase in prevalence, few studies have reported the outcomes of physical therapy (PT) intervention for a patient who has undergone a simultaneous ipsilateral total hip and total knee arthroplasty. The purpose of this retrospective case report is to describe the clinical, functional, and patient reported outcomes impacted by skilled PT intervention in the rehabilitation of a patient who presented to acute care PT immediately post-op simultaneous right total hip (postero-lateral approach) and right total knee arthroplasty.

**Case Description:** The patient described within this retrospective case report was a 53-year-old Caucasian male who presented to acute care PT post-op day 1 after a simultaneous right total hip and right total knee arthroplasty. This patient had also undergone a simultaneous left total hip and left total knee arthroplasty within six months prior to this episode of care.

**Outcomes:** Following two days of PT intervention, with two PT sessions per day, the patient demonstrated improvements in pain ratings, functional mobility, gait velocity, ambulation distance, stairs ascended, and active range of motion (AROM) of the right knee and right hip.

**Conclusion:** PT intervention appeared to be correlated with improvements in functional and clinical outcomes for the patient described in this case report. Future research is needed to determine the long-term effects of PT intervention on clinical and functional outcomes for patients who have undergone a simultaneous ipsilateral total hip and total knee arthroplasty.

**Key Words:** Physical Therapy, Acute Care, Total Hip Arthroplasty, Total Knee Arthroplasty
Background

Lower extremity (LE) total joint arthroplasty (TJA) is a reliable and evidenced based procedure to relieve pain and improve function in patients with arthritis. The prevalence of patients living with a LE TJA (in the year 2010) has been reported by Kremers, et al., as 2.5 million individuals with a total hip replacement (THR) and 4.7 million individuals with a total knee replacement (TKR) in the United States. Even without a further rise in incidence, the aging of the population in the United States would result in an estimated 11 million individuals with a THR or TKR (4 million total hip and 7.4 million total knee) in the year 2030.

Freburger, et al., reported that of the more than 2 million people treated in acute care hospitals, 22.5% received physical therapy (PT) intervention. These authors have also reported that individuals with osteoarthritis (admitted for LE joint replacement) was one of the most common patient populations to receive PT intervention in the acute care setting of a hospital.

Acute care rehabilitation clinical pathways have been reported by Fancott, et al., as involving an interdisciplinary team throughout the episode of care for patients admitted for rehabilitation secondary to a LE TJA. In general, the interdisciplinary team in acute care settings providing care for patients who have recently undergone a LE TJA has been reported as involving the patient’s surgeon, nursing staff, PT, occupational therapy (OT), and rehabilitation assistants.

A study by Chen, et al., demonstrated that patients undergoing a LE TJA benefit from immediate post-operative PT intervention. The results of this study positively correlate immediate post-operative PT intervention with a decreased length of stay in the hospital, following a LE TJA.

Numerous outcome measures have been utilized during the rehabilitation of patients who have undergone a LE TJA. Two commonly utilized assessment tools following a LE TJA have been reported as the measurement of range of motion (ROM) and self-reported pain ratings on the Numeric Pain Rating Scale (NPRS).

McAuley, et al., identified these assessment tools as appropriate in the evaluation of limitations in the body structure/body function domain of the International Classification of Functioning (ICF) model.

Jette, et al., has reported that the Activity Measure for Post-Acute Care (AM-PAC) “6 Clicks” Basic Mobility Inpatient Short Form is a clinically valid outcome assessment tool to assess the activity limitations domain of the ICF model for patients in acute care settings. Menendez, et al., further expounded on this outcome measure’s validity and reported that the AM-PAC is a valid, simple tool for predicting discharge disposition after a LE TJA. The AMPAC includes the following 6 items related to basic mobility tasks: (1) difficulty turning over in bed, (2) sitting down and standing up from a chair, (3) moving from lying on back to sitting on the side of the bed, (4) moving to and from a bed to a chair, (5) walking in hospital room, and (6) climbing 3-5 steps with a railing. Each item is scored on a 4-point Likert scale from 1 to 4, with an overall score ranging from 6-24 and lower scores indicating a greater degree of limitation.

Recent research reported the use of the 10-Meter Walk Test as an applicable and reliable functional outcome measure for patients who have recently undergone a total hip or total knee arthroplasty. Unver, et al., reported results of a study that demonstrate
excellent test-retest reliability for the 10-Meter Walk Test in patients undergoing lower extremity surgery, including patients undergoing a total hip and/or a total knee arthroplasty.\textsuperscript{10} This outcome measure has been documented and reported by McAuley, et al., as an assessment tool utilized in the evaluation of the activity limitations domain of the ICF model.\textsuperscript{7}

Despite the prevalence of this patient population, few studies have researched and reported the effects of skilled PT on clinical, functional, and patient-reported outcomes for a patient with an ipsilateral total hip and total knee arthroplasty (occurring within the same plan of care).\textsuperscript{1,11} Even fewer studies have reported the effects of skilled PT on clinical, functional, and patient-reported outcomes for a patient who has undergone bilateral hip and knee arthroplasties within the same year.\textsuperscript{1,11} Hui, et al., in 2012, provided the most current outcomes of 14 patients with a total joint arthroplasty of both hips and knees.\textsuperscript{1} However, the authors reported that the patients within this study demonstrated a mean time frame of 17.5 years between the first and the last lower extremity total joint arthroplasty.\textsuperscript{1}

The purpose of this retrospective case report is to describe the clinical, functional, and patient reported outcomes impacted by skilled physical therapy intervention in the rehabilitation of a patient who presented to acute care physical therapy immediately post-op simultaneous right total hip (postero-lateral approach) and right total knee arthroplasty.

**Case Description**

The patient in this retrospective case report was an unemployed 53-year-old Caucasian male who presented weight bearing as tolerated (WBAT) to PT status post-op simultaneous right THR (postero-lateral approach) and right TKR. The preoperative report for this patient stated that he was limited in all activities of daily living/instrumental activities of daily living (ADL’s/IADL’s) and functional mobility, secondary to pain and stiffness. His symptoms were no longer responding to conservative treatment, including medication and lifestyle modification, and thus met the surgeon’s inclusion criteria for a simultaneous TJA of his right hip and right knee.

This patient was admitted into acute care for post-surgical rehabilitation of his right THR and right TKR. The patient’s previous medical/surgical history included a simultaneous left THR and left TKR (six months prior to this episode of care). The patient was a 1 pack/day smoker for the last 36 years, a modifiable risk factor that has been correlated with decreased outcomes status post TJA.\textsuperscript{12} The patient was 6’ 2”, weighed 227 pounds, and had a body mass index (BMI) of 29.22, a personal factor that has been reported to correlate with improved outcomes following TJA.\textsuperscript{13}

The patient’s chief complaint, at the initial evaluation of this plan of care, consisted of pain in the right hip and knee secondary to surgical intervention. The patient, at the date of the initial evaluation, presented to PT with the following: a patient-controlled analgesia (PCA), minimal edema noted around the right knee, pain in the right hip and knee at rest and with ambulation, decreased right hip and knee active range of motion (AROM), and impaired functional mobility.

During this episode of care, this patient received treatment and therapeutic intervention from a multidisciplinary rehabilitation team consisting of the following: referring surgeon, nursing staff, OT, and PT. The patient was seen for PT intervention on the acute care medical/surgical floor, after the initial
evaluation, twice per day for two days, including attending two group therapy sessions per day with patients who have recently undergone a LE TJA. The frequency, intensity, time, and duration of PT intervention for this plan of care followed a typical clinical pathway for patient’s presenting post-op LE TJA and was previously completed by this patient six months prior to this episode of care, secondary to his prior simultaneous left THR and left TKR.14

The patient, due to his previous successful outcomes for his left THR and left TKR, demonstrated a positive demeanor and was highly motivated to complete all PT interventions during this episode of care. The patient’s primary goals for PT included returning home with a reduction of pain and stiffness in his right hip and right knee during all ADL’s/IADL’s and being able to walk without limitations.

Clinical Impression #1

This patient’s primary impairments were directly related to his recent surgical intervention (simultaneous right THR and right TKR). Valid and reliable test and measures, including the 10-Meter Walk Test, the AM-PAC, ROM with goniometry, and the NPRS, were chosen to evaluate this patient’s impairments/deficits in functional mobility and track progression/regression within this episode of care.

This patient was a good candidate for a retrospective case report due to his current medical status, prior medical history regarding his left TJA’s, and the limited amount of evidence available describing the impact of PT intervention on such a patient.1,11

Examination

The initial PT evaluation for this patient was conducted on the acute care medical/surgical floor in the patient’s hospital room on post-op day 1. Data collection of impairments and functional deficits occurred during the initial PT evaluation and continued during subsequent PT sessions. Findings for tests and measures were recorded routinely during every PT session, with the exception of the two primary outcome measures being evaluated only at the initial PT evaluation and at the last PT session, prior to discharge.

Tests and Measures

Pain ratings on the NPRS, AROM of the right hip and knee with goniometry, ambulation distance, and number of stairs ascended/descended during a therapy session were chosen to evaluate this patient’s impairments and functional limitations and track progression/regression within the episode of care. The AM-PAC was utilized to evaluate this patient’s independence with basic functional mobility and the 10-Meter Walk Test was utilized to assess progression/regression in gait speed during the episode of care.

Numeric Pain Rating Scale

The patient’s self-reported pain ratings on the NPRS correlated to a numerical value between 0 and 10 (with 0 correlating to no pain and 10 being correlated to the worst pain possible).15

Assessment of pain ratings occurred at the beginning of all PT sessions and at the conclusion of all PT sessions, with separate pain ratings being provided from the patient for the right knee and hip. Research reported an intraclass correlation coefficient (ICC) between 0.673 to 0.822 (P < 0.001) across ratings of current pain and daily retrospective ratings of worst, least, and average pain for the NPRS in adults who
present with acute post-operative pain. The NPRS has also been reported to have higher compliance rates, better responsiveness, and ease of use relative to the visual analog scale and the verbal rating scale regarding assessment of pain intensity in adults.

During the initial evaluation, the patient reported right hip pain rated as a 4/10 at the beginning of the evaluation and a 5/10 after the conclusion of the evaluation and right knee pain rated as a 5/10 at the beginning of the evaluation and a 7/10 after the conclusion of the evaluation.

**Range of Motion with Goniometry**

Assessment of right knee AROM with goniometry occurred at the conclusion of every PT session. AROM at the knee correlated to the degrees of movement of the joint, as recorded using a standard, full circle, clear plastic, 12 inch, manual goniometer and landmarks as described in the Reese and Bandy textbook. When measuring extension, the patient’s legs were elevated (supine position in his assigned recliner chair, with a towel roll under the ankle) and the legs were bent, with feet flat on the floor, (sitting in his assigned recliner chair) when measuring flexion. Research reports an ICC for inter-tester reliability as 0.82 for hip flexion and 0.94 for hip extension when measuring hip range of motion in patients with hip osteoarthritis. The patient’s right hip AROM at the initial evaluation was recorded as 10 degrees for extension and 90 degrees for flexion (the limit of hip flexion for this patient secondary to surgical hip precautions).

**AM-PAC “6-Clicks” Basic Mobility Inpatient Short Form**

Functional impairments in basic mobility correlated to a numerical value between 1 and 4 for 6 basic mobility tasks (Figure 1). A study by Jette, et al., reported the ICC for the overall intertester reliability of the AM-PAC “6 Clicks” Basic Mobility Inpatient Short Form across rater pairs as .849 (95% confidence interval). Jette, et al., have also reported the minimal detectable change (MDC) for the AM-PAC as 4.72 points for the raw score of the 6 basic mobility tasks. The patient’s AM-PAC “6 Clicks” Basic Mobility Inpatient Short Form raw score was recorded as 17/24 at the initial evaluation.

**10-Meter Walk Test**

Gait speed, evaluated through the use of the 10-Meter Walk Test, correlates to a numerical value (in meters/seconds) that is mathematically calculated based upon the amount of time it takes a patient to ambulate 6 meters (the distance timed within the 10-Meter Walk Test) at the patient’s self-selected velocity after the patient has
ambulated with or without an assistive device for the designated 10 meters specified and timed by his/her assessor. A study by Unver, et al., reported the ICC for the test–retest reliability of the 10-Meter Walk Test as 0.95 in patients undergoing lower extremity surgery during inpatient rehabilitation, including patients undergoing a total hip or total knee arthroplasty. This patient’s gait speed, at the initial evaluation, was assessed as 0.65 meters/second and was calculated based upon the average of three trials.

Clinical Impression #2

During the initial PT evaluation, the patient presented with pain in the right hip and knee at rest and with ambulation, decreased right hip and knee AROM, decreased ambulation distance, an inability to ascend stairs, a decreased gait speed, and impaired functional mobility. It was necessary to improve the patient’s impairments, before his discharge, to allow for safety and independence in ambulation, transfers, ability to traverse environmental barriers, and functional mobility required for the patient to return to his home. Indications of progression/regression were identified through the use of the previously mentioned tests/measures and examination strategies. Standard interventions were used based upon the examination findings.

Interventions

Interventions chosen for this patient were reflective of patient oriented goals, impairments identified within the initial PT evaluation, specifically, sections of the AM-PAC “6 Clicks” Basic Mobility Inpatient Short Form when the patient scored below 4/4 for a functional task, and PT clinical decision making. Interventions were designated into 5 categories: patient education, bed mobility/transfer training, gait training, stair training, and therapeutic exercise. The interventions applied within this episode of care are reflected in Table 1.

Patient Education

Educational needs of patients undergoing a LE TJA have been identified by Soever, et al., as including an emergent theme categorized as the rehabilitation process and functional recovery. Correlated to these findings, the patient education provided within this episode of care included verbal instructions/cues of hip precautions (to decrease the risk of dislocation of the patient’s hip prosthesis), transfer and ambulation sequencing, car transfer sequencing, scar management, and positioning. Patient education was provided during every therapy session to help the patient perform the most efficient and safe movement patterns, as well as for patient comprehension.

Gait Training

Gait training has also been identified as a key intervention to improve outcomes in the postoperative rehabilitation of patients who have undergone a LE TJA. Gait training over the course of treatment included varying distances of ambulation from 250 feet to 1,000 feet in flat, tiled, hospital hallways, with verbal cues and varying levels of assistance provided (as
appropriate), and with a front-wheeled walker for safety and support.

**Stair Training**

Stair training, included in the postoperative rehabilitation for a patient who has undergone a LE TJA, has been correlated with improved patient outcomes. Stair training was provided with verbal cues and varying levels of assistance (as appropriate) for the patient to ascend/descend 2 stairs, with bilateral handrails, for 4 sets, to ensure the patient was safe to return home and ascend/descend stairs in his living environment.

**Therapeutic Exercise**

Therapeutic exercise included in the postoperative rehabilitation of patients who have undergone a LE TJA have been correlated with a decreased length of stay and improved functional outcomes. Therapeutic exercise consisted of seated and standing corrective exercises conducted in the patient’s recliner chair or standing in his front-wheeled walker for handheld support, with varying levels of assistance provided, and without additional resistance added to the corrective exercise (Figure 2).

**Other Interventions**

Other forms of intervention included wound and pain management by nursing staff and occupational therapy focused on self-care tasks, including dressing, toileting, and bathing.

**Outcomes**

This patient responded extremely well to PT intervention within the episode of care and demonstrated improvements in pain, AROM, gait speed, and functional mobility, including an increase in the raw score on the AM-PAC beyond the MDC
Figure 1: AM-PAC 6 Clicks Basic Mobility Inpatient Short Form

![Image of AM-PAC 6 Clicks Basic Mobility Inpatient Short Form]


Table 1: Interventions Applied Within Episode of Care

<table>
<thead>
<tr>
<th>Day of PT Intervention</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1 (AM)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Day 1 (PM)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Day 2 (AM)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Day 2 (PM)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

A = Patient Education, B = Bed Mobility/Transfer Training, C = Gait Training, D = Stair Training, and E = Therapeutic Exercise
Figure 2: Therapeutic Exercises Completed Within Episode of Care

Table 2: Outcomes Comparing Patient Progress from Initial PT Evaluation Throughout Episode of Care

<table>
<thead>
<tr>
<th>Date</th>
<th>Pain (NPRS) (0-10; 0= no pain and 10= worst pain possible)</th>
<th>AROM (goniometry; measured in degrees)</th>
<th>AM-PAC “6 Clicks” Raw Score</th>
<th>10-Meter Walk Test (measured in meters/seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R Hip At Start of PT R Knee At Start of PT R Knee At End of PT R Hip At End of PT Ext Flex Flex Ext</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Evaluation (POD 1)</td>
<td>4/10 5/10 7/10 -10</td>
<td>118 90 10</td>
<td>17/24 0.65</td>
<td></td>
</tr>
<tr>
<td>POD 1 AM PT Session</td>
<td>2/10 5/10 6/10 -7</td>
<td>121 90 12</td>
<td>Not Tested Not Tested</td>
<td></td>
</tr>
<tr>
<td>POD 1 PM PT Session</td>
<td>2/10 4/10 4/10 0</td>
<td>122 90 14</td>
<td>Not Tested Not Tested</td>
<td></td>
</tr>
<tr>
<td>POD 2 AM PT Session</td>
<td>4/10 3/10 4/10 0</td>
<td>123 90 17</td>
<td>Not Tested Not Tested</td>
<td></td>
</tr>
<tr>
<td>POD 2 PM PT Session</td>
<td>4/10 4/10 3/10 5/10 0</td>
<td>123 90 20</td>
<td>23/24* 0.68</td>
<td></td>
</tr>
</tbody>
</table>

**Key:** POD 1= Post-Op Day 1, POD 2= Post-Op Day 2, * = Significant Change

Table 3: Ambulation Distance Outcomes
Discussion

The purpose of this retrospective case report is to describe the clinical, functional, and patient reported outcomes impacted by skilled physical therapy intervention in the rehabilitation of a patient who presented to acute care physical therapy immediately post-op simultaneous right total hip (postero-lateral approach) and right total knee arthroplasty.

This retrospective case report provides key intervention techniques and protocols that can be utilized in future rehabilitation programs for similar patients. The documented results and outcomes of this retrospective case report appear to positively correlate PT intervention with improvements in pain, AROM, gait speed, and functional mobility for a patient who has recently undergone a simultaneous right THA and right TKA.

The patient’s outcomes follow the current trend identified in recent research. A recent study associated the use of a comprehensive joint replacement program, for patients who underwent a TKA, with satisfactory clinical outcomes, including, but not limited to, range of motion, length of stay in the hospital, and percentage of complications and lack thereof. Another study reported that the rate of hospital stay decreased without any increases in complications or readmittance through the utilization of a rapid recovery protocol within the plan of care for patients who underwent a THA.

A primary limitation for this case report lies within the use of a multidisciplinary care model that was provided during this patient’s episode of care. A systematic review reports that the use of early multidisciplinary rehabilitation, including OT services, results in improved outcomes at the level of activity and participation for
patients following a THA or TKA. OT services and wound and pain management by nursing staff were provided to this patient within his plan of care, and such, the results and outcomes recorded for this patient cannot solely be attributed to PT intervention alone.

Future research is needed to determine the long-term effects of acute care PT intervention on clinical and functional outcomes for patients who have undergone a simultaneous ipsilateral total hip and total knee arthroplasty within the same episode of care.

References


