VANDERBILT MEDICAL CENTER
DEPARTMENT OF PHYSICAL THERAPY

KNEE ARTHROPLASTY REHABILITATION
INCLUDING PATELLO-FEMORAL ARTHROPLASTY/PFA, UNICONDYLAR KNEE ARTHROPLASTY/UKA & TOTAL KNEE ARTHROPLASTY/TKA

Purpose:

To guide patients through the pre-operative, acute and sub-acute phases of rehabilitation associated with Knee Arthroplasty, in an effort to assist the patient in becoming functionally independent following surgery.

Indications:

Patients who are considering or who have undergone Knee Arthroplasty.

Contraindications:

Any medical, surgical, or post-operative complication as stated by the attending physician.

Physical Therapy Goals:

Pre-Operatively:

- Explanation of the role of physical therapy in knee arthroplasty.
- Discussion/agreement on physical therapy goals.
- Instruction and demonstration of post-operative physical therapy procedures/treatments.
- Establish home exercise program to prepare for surgery/hospital admission.
- Initiate arrangements for post-discharge physical therapy.

Acute (In Hospital)

- Early motion with progression as rapidly as possible toward full anatomical range of motion, limited only by the prosthetic design and the patient’s potential.
- Muscle strengthening. Primarily of the hamstrings, quadriceps and hip abductors on the operative extremity.
- Prevention of knee flexion contracture. Commercially available knee immobilizers are used by some surgeons (Dr. Ginger Holt) in the acute and sub-acute rehabilitation phases for this purpose. Passive stretching of the hamstrings such as placing towel rolls under the operative ankle in supine with the operative extremity in neutral position (knee & toes facing upright) several times during the day may also be used to achieve full extension.
- Gait training. Assistive devices are used to assist with balance, and facilitate normal gait pattern. Patients are allowed WBAT (weight-bearing as tolerated) following knee
arthroplasty and may be progressed from their assistive device to a straight cane (if needed) at the discretion of the physical therapist.

Post-Discharge:

- Achieve maximal knee range of motion as allowed by the prosthetic design and limited only the patient’s potential. Average knee motion, which may be achieved, is approximately 140° flexion.
- Muscle strengthening of the entire lower quadrant of the operative extremity. Attention should also be directed toward any weakness present in the upper extremities, trunk, or contralateral lower extremity.
- Proprioceptive training to improve body/spatial awareness of the operative extremity in functional activities.
- Endurance training to increase cardiovascular fitness.
- Functional training to promote independence in Activities of Daily Living and mobility.
- Gait training. Assistive devices are discontinued when they are no longer needed, as deemed by the Physical Therapist. Attempts should be taken to achieve a safe, efficient gait pattern at that time.

**Physical Therapy Rehabilitation Guidelines**

Milestones for Patient Progression:

- Dr. Ginger Holt’s patients are required to sleep at night in their knee immobilizer for a passive hamstring stretch for 2 weeks following their knee arthroplasty.
- Discharge from the Acute Care setting with 90° knee flexion, approximately 2-3 days post-operative for standard TKA; discharge home post-op day 1 for UKA.
- Discontinue assistive devices for ambulation as soon as a safe gait pattern on all surfaces is achieved; this is at the discretion of the physical therapist.
- Discharge from Sub-Acute Physical Therapy program to independent home exercise program when knee flexion is ~ 120°.
- Patient are allowed to resume driving 4 weeks after surgery

Restrictions:

- No running or involvement in sporting activities requiring high-speed running and/or jumping unless approved by the attending surgeon, based upon the type of surgical implant (i.e. fixed-bearing versus mobile-bearing).
Treatment Parameters:

Pre-Operative

- Participation in education class on Knee Arthroplasty. Material covered in this class includes discussion of normal vs. abnormal knee joint anatomy, components of knee prosthesis, intra-operative sequence of events, identification of post-operative complications and preventative measures, admission procedures for Vanderbilt Medical Center, post-operative rehabilitation, and discharge needs.
- Pre-operative Physical Therapy assessment at the time of the knee class. This session includes a baseline assessment of joint range of motion, muscle strength, mobility and functional assessment using rehab specific functional tools.

Acute Care (Vanderbilt Medical Center)
BID physical therapy sessions with efforts to achieve discharge 2-3 days after surgery.

Day of Surgery:
- Operative knee is placed in Continuous Passive Motion Unit at the completion of surgery in the operating room by the surgeon. Hyperflexion range of motion settings of 60° to 100° knee flexion is initiated. Patients arrive on the orthopedic unit in the CPM and sleep the entire night in the machine.
- Dr. Holt’s patients are to be removed from the CPM at ~ 10:00 p.m. and sleep in a knee immobilizer each night beginning the night of surgery.
- Begin lower extremity isometric exercises and ankle pumps. Encourage the patient to perform these exercises every 30 minutes while awake.
- Post-operative pain control is via a multi-modal pain regimen including, but not limited to a single-shot Sciatic nerve block and indwelling peripheral femoral nerve blocks. If an indwelling femoral nerve catheter has been placed by the Acute Pain Service (APS), patients are required to wear an appropriate fitting knee immobilizer anytime they are upright/OOB until this catheter has been removed (morning of postoperative day 2), any numbness in the operative LE has resolved and quadriceps motor function in the operative limb has recovered to general postoperative expectations as determined by the patient’s physical therapist. At this time, the knee immobilizer may be discontinued when the patient is upright/OOB.

Post-Operative Day 1:
- Continue lower extremity isometrics and ankle pumps (every 30 minutes) and begin assisted straight leg raises (SLR).
- Initiate upper extremity and contralateral limb strengthening exercises as needed.
- Begin active, active-assisted range of motion exercises to the operative lower extremity (supine &/or sitting) with the emphasis on knee flexion and extension. No restrictions to motion and range is to the patient’s tolerance unless specifically restricted by the attending surgeon. Ice packs or the cooling machine should be applied to the operative knee at the conclusion of the therapy exercise session.
- LE CPM 2 hours with knee range of motion setting of 0-100 degrees knee flexion. *
• Begin assisted ambulation on level surface using an assistive device, WBAT on the operative extremity & wearing their knee immobilizer on the operative LE if an indwelling femoral nerve block is present in the operative limb.
• Begin discharge planning and home needs assessment.

*Note: At 6:00 a.m., nursing increases CPM motion settings to 0 – 100 degrees of knee flexion, slow speed setting. The CPM unit is used 2 hours on post-op day 1 then discontinued.

Post-Operative Day 2 – Discharge:
• Continue isometrics, SLR, SAQ/TKE exercises.
• Begin aggressive hamstring stretching exercises (toe touching exercises (long sitting hamstring stretch, passive SLR, etc).
• Continue A, AA, passive knee flexion/extension exercises with the patient in a supine or seated position on a firm surface (i.e. exercise mat). Soft tissue massage/mobilization, gentle joint mobilizations, contract/relax exercises, end-range strengthening exercises, etc. assist with increasing knee range of motion. Ice/cold therapy should be applied to the knee at the conclusion of the exercise session.
• Continue assisted ambulation on level surfaces refining gait pattern.
• Instruct in stair climbing technique.
• Begin stationary biking – seat height should be elevated - no resistance to motion (i.e. free pedaling) as patient is able.
• Review Home Instructions/Exercise program.
• Finalize discharge plans. Dr. Holt’s patients are required to sleep in a knee immobilizer for a passive hamstring stretch for 2 weeks following surgery.

Post-Discharge Care
Patients who have acutely undergone Knee Arthroplasty are strongly encouraged to receive follow-up physical therapy in an outpatient clinic setting. However, due to transportation limitations, support services, and/or functional limitations, this may not be a feasible option. If this is the case, the multidisciplinary team will, prior to discharge from the acute care setting, make arrangements for the patient to receive physical therapy services at home, Extended Care Facility (ECF) or Inpatient Rehabilitation Center. Criteria for each setting is listed below:

• Home Health Physical Therapy – Patients with transportation difficulties, functional limitations restricting mobility (difficulty with transfers, etc.). Home physical therapy services are to be discontinued as early as possible and utilized no longer than 2 weeks post-surgery with services transferred to an outpatient setting unless approved by surgeon.
• Out-Patient Physical Therapy – Patients with transportation available to an outpatient department are strongly encouraged to begin their post-discharge therapy in this setting.
• Extended Care Facility Physical Therapy – Patients who live alone or have limited support services to assist with home care activities (i.e. no family members or friends able to help with homemaker activities and transportation to/from therapy) and whose overall endurance level is diminished and would interfere with their participation in a comprehensive rehabilitation program.
• Inpatient Rehabilitation Center – Patients who pre-operatively lived alone and were independently functioning in that environment and will be returning to that living arrangement at the conclusion of their rehabilitation; also, their general medical status and cardiovascular endurance is sufficient to participate in an intensive rehabilitation program. Most importantly, insurance coverage/funding dictate treatment in this setting.

• Fitness/Wellness Centers – Younger and physically active patients who have achieved functional range of motion and muscle strength in their operative knee may be referred to fitness centers for instruction and/or supervision in general conditioning programs; this may be one of the later phases of rehabilitation following TKA, involving a limited number of patients.

Within each of the settings, a comprehensive treatment program should be implemented based upon each individual patient’s needs and within established therapy restrictions. Suggested physical therapy treatment/activities are listed below:

**Modalities for Pain Control, Edema Reduction:**

• Moist Heat
• FES
• TENS
• Ice
• Interferential
• Kinesio-taping
• Lymphedema Techniques
• Galvanic Stimulation
• Negative Electrical Stimulation

**Therapeutic Exercise:**

• Passive, active-assisted, active lower extremity range of motion
• Contract/Relax exercises
• Isokinetics for passive knee range of motion
• Joint mobilization to the knee (unless hinged knee prosthesis)
• Soft tissue mobilization of the hamstrings and quadriceps
• Closed kinetic chain activities
• Tibial rotational exercises
• Stationary biking – no resistance to motion
• PNF (lower extremity patterns) with/without resistance
• Lower extremity strengthening exercises using theraband &/or ankle weights; patients may progress to resistive exercises on the operative extremity as able
• Nordic Track
• Stair-Step Machine
• Aquatic Therapy/Activities
• Scar Massage/Mobilization – maybe initiated after suture removal and when the incision is clean and dry
**Gait Training:**

Level Surfaces
- Forward Walking
- Sidestepping
- Backward or Retro-Walking

Uneven Surfaces
Stair Climbing Activities

**Functional Training:**

- Standing Activities
- Transfer Activities
- Lifting
- Carrying
- Pushing or Pulling
- Squatting or Crouching
- Return-to-Work Tasks
- Sport Tasks

**Endurance Training:**

- UBE
- Upper and/or lower extremity restorator
- Ambulation activities
- One-leg cycling, using non-operative leg with no resistance to motion.
- Aquatic Therapy

**Balance /Proprioception Training:**

- Tandem Walking
- Lateral Stepping over/around objects
- Obstacle Course
- Lower Extremity PNF Patterns
- Weight-Shifting Activities
- Closed Kinetic Chain Activities
REFERENCES:


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SS PT, GTC