Hendricks Regional Health
ORTHOPEDICS

HENDRICKS ORTHOPEDICS
& SPORTS MEDICINE
100 Hospital Lane, Suite 300
Danville, IN 46122
317.718.4676

TOTAL KNEE ARTHROPLASTY

1. Guidelines:
    a. **Dressing**: Do not remove the dressing unless the boundary has been broken and exposed to outside. If the dressing is saturated greater than 50% it can also be changed. Pt can shower if the dressing is intact on the edges completely.
        i. IF the dressing needs changed, call the surgeon's office, and discuss with the surgeon before changing.
        ii. When changing the dressing, clean only the area where the dressing is to adhere with hydrogen peroxide, not the wound itself.
        iii. Dressing will be changed with a Waffle Opsite dressing.
        iv. Do not cut dressings to ensue good adhesion on all edges.
    b. **TED hose**, knee high, to be worn at least 12 hours per day when up for up to 4 weeks. Recommend do adding Tubigrip over the knee to control swelling at first visit.
    c. Follow Up with Surgeon:
        i. **2 weeks** post-op via a telemedicine visit. Please send updated PT notes to surgeon on last visit before telemedicine visit, fax to (317) 718-2476. Patient will be submitting on their own a picture of the incision via their EMR portal day before telemedicine visit.
        i. **6 weeks** in person with the surgeon. Please send therapy notes before follow-up appt.

2. Defined
    a. Total knee arthroplasty is a procedure involving the replacement of a worn, diseased, or damaged knee with an artificial structure. One component is usually metal and the other plastic.
    b. Osteoarthritis is the primary cause, however many other underlying pathologies can necessitate this procedure.
3. Goals
    a. Control post-operative pain and swelling
    b. Minimize hip and knee muscle atrophy
    c. Improve post-operative range of motion
    d. Protect healing tissue
    e. Progress gait through assistive devices
    f. Increase lower extremity active stability/proprioception/strength and kinesthetic awareness
4. Rehabilitation Principles
    a. Match the patient's rehab program to their pre-surgical functional level while considering their overall condition including age and general health
    b. Healing tissue should never be overstressed but appropriate levels of stress are beneficial

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i. Inflammatory phase days 1-3
ii. Tissue repair with proliferation phase days 3-20
iii. Scar tissue most responsive to remodeling 21-60 days but occurs from 1 to 8 weeks
iv. Final maturation taking as long as 360 days
v. Graft integration
    1. Renervation
    2. Revascularization

c. Eliminate inflammation as the cause of pain and neuromuscular inhibition
d. Progress closed-chain, functional activity in a graded fashion using patient signs and symptoms to direct progression (pain, swelling, ROM, changes in movement patterns)
e. Emphasize proximal stability and gain proximal limb control to allow distal skilled movements
f. Improve limb confidence through safe, controlled unilateral activities
g. Encourage achievement of intraoperative knee motion regardless of amount of pre-operative motion. However, realize there is a correlation between pre-operative and post-operative range of motion.
h. Identify range of motion complications early and initiate low-load, long duration stretching/positioning program

ROM expectations: post op: wk 2 – 100 degrees flex
wk 3 – 105 degrees flex
wk 4 – 110 degrees flex
wk 5 – 115 degrees flex
wk 6 – 120 degrees flex

*ROM expectations hold true unless otherwise indicated by physician on referral

i. Emphasize life-long, low-impact training following surgery
j. Assessment of post-operative malalignment and stability are imperative to protect structures on tension and unload structures under constant compression.
k. Factors that affect the rehab process
    i. Surgical approach
    ii. Tissue quality
    iii. Presence of concomitant pathology
    iv. Age of patient
    v. Comorbidities
    vi. Pre and intra-operative range of motion
    vii. Pain and sensitivity levels
    viii. Amount of therapy received at hospital/rehab unit, as well as home or assisted living facility since procedure. Can vary greatly from patient to patient.

5. Post op functional guidelines
    a. No driving earlier than 6 weeks
    dependent upon:

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- adequate muscle control for braking and acceleration
- proprioceptive/reflex control
- range of motion
- confidence level
- car insurance restrictions on driving after surgery

b. Return to work
dependent upon:

- symptoms (swelling and pain)
- range of motion
- adequate muscle control
- proprioceptive/reflex control of limb
- no limb velocity asymmetry
- demands of occupation (4 wks to 3 month range)

c. Golf
dependent upon:

- symptoms (swelling and pain)
- range of motion
- quad control
- proprioceptive/reflex control of limb
- no limb-velocity asymmetry with gait

d. Higher level recreational activities
- restricted from high impact activity
- no running, singles tennis, basketball, downhill skiing
- encourage low impact activity
- walking, dancing, golfing, hiking, swimming, bowling, and gardening

6. Post op equipment guidelines
   a. CPM use: 10 degree per day increase until at max setting for three consecutive days
   b. Polar care: as needed
   c. Brace – follow any unique/special MD instructions
   d. Assistive device (crutch, cane, walker) – must have 4/5 abductor strength to progress from walker to cane. Patient must have no

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significant trendelenburg sign with gait cycle (emphasize normal qualitative gait).

7. Rehabilitation
    a. **Phase I** (0-3 weeks) Protective ROM
        i. Goal: Improve ROM and strength while staying cognizant of tissue reactivity and joint inflammation. Reduce pain.
        ii. Assess for incisional issues and possible dvt symptoms. Emphasize compliance with continuous passive motion machine until meeting specific MD requirements. Avoid deep squatting or kneeling. **Use gait belt in clinic**.
        iii. RX:
            1. Educate patient on principles of daily weight bearing activity. Short, frequent bouts of sitting/standing are encouraged to allow body to adjust to the change in dependent blood flow positions. Explain the ramifications that these positions have on swelling/edema.
            2. Open chain quadricep and gluteal strengthening/re-education: quad sets, SAQ's, SLR's, bridging, clamshell/gluteus medius education, LAQ's, leg extension machine starting with painfree isometrics and moving toward 'safe ranges', and finally progressing to comfortable larger ranges.
            3. Closed chain lower extremity strengthening: initiated with simple standing exercises to accommodate to weight bearing and progressing to standing mini-squats (UE assist initially, progressing to wall slides), leg press (shoulder width initially), weight shifts (UE assist to independent performance; sagittal plane progressing to frontal), terminal knee extensions, single leg stance, step-ups (forward, lateral), dynaboard in bilateral standing progressing to independent performance with perturbations. Standing hip flexion and abduction with assistance advancing toward increased resistance.
            4. Normalization of qualitative gait: initiation of heel-strike and swing phase flexion with cone exercises, useage of walker progressing to cane in opposite upper extremity, and sagittal plane gait progressing to frontal plane performance (with theraband resistance eventually if able). Encourage patient to keep eyes on horizon when they have assistance. However, ***NEVER COMPROMISE SAFETY OF GAIT IN CLINIC OR OUT**
            5. Hamstring and hip flexibility exercises, especially for those who are not comfortable in full extension. May also start hamstring strengthening in the standing position (no resistance initially).
            6. Modality interventions: biphasic electrical stimulation as needed to increase quad muscle fiber recruitment, premodulated electrical stimulation as needed for pain,

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HVGS as needed for swelling (+ for acute swelling, - for chronic swelling), and ice as needed. Utilize vasopneumatic compression if safe (blood pressure parameters/medical history complications) and indicated.

7. Motion complication activities: create plastic deformation (TERT – total end range time of 60 minutes optimal): begin with active warm-up (bike), passive warm-up in a stretch to tolerance position with moist heat (20'), mobilization and myofascial techniques, active exercises using the newly gained passive ROM, and ice in a stretch to tolerance position for 20 minutes (collagen contracts but does not shorten in the elongated position). HEP – 1 more 20' session at home. Low-load, long duration overpressure: supine flexion overpressure, supine extension overpressure, wall slide overpressure, prone hang, sitting flexion overpressure, slide board assisted knee flexion.
8. Easy passive range of motion exercises designed to alleviate pain and encourage motion through joint oscillations and gentle flexion pressure. Avoid positions of discomfort for the patient and allow for periods of accommodation when the patient reaches new ranges. Patellar mobility exercises are crucial at this time as well. Patient will need mobility in all 4 planes if they are experiencing any motion restrictions.
9. Incorporate functional components of rehab that incorporate typical patient concerns. Example: performance of sit-stand transfers progressing to deeper positions that would replicate toilet height. Maintain safety.

iv. Rx/Clinical Expectations
1. initiate motion
2. improve patellar mobility
3. quadriceps reeducation
4. work on qualitative gait quality with walker

b. **Phase II** (4-6 weeks) Strengthening Phase
i. Precaution/Limits
1. Emphasize safety with gait and avoid deep squatting postions

ii. MD clearance needed for kneeling
RX**:**
1. Continuation of all necessary open chain quadricep and hamstring activities – increasing weight/resistance as able. Increased gluteus medius and maximus strengthening as well.
2. Continuation of all previous closed chain exercises (increase independence and height on step-ups if patient

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safe and utilizing controlled speed of performance). **Extreme caution necessary**. Incorporate gastrocsoleus strengthening.

3. Performance of 'step-on' with dynadisc progressing from assisted to independent and sagittal to frontal plane.
4. Transition from weight shifts to mini-lunges with advancement from assisted to independent performance and sagittal to frontal planes.
5. Advancement of dynaboard to eyes closed.
6. Pitch back activities advancing from chest position to overhead.
7. SLS activities advancing to unstable surfaces, perturbations, and eyes closed performance.
8. Multi-angle hip performance in all directions if able to utilize proper technique and control. Adduction to midline.
9. Trampoline activities such as mini-squats and SLS **with assistance.**
10. Gait advancement from level surfaces to unstable, outside environments while maintaining complete safety and avoidance of 'hiking/lurching'.
11. Recumbent biking.
12. Agility drills that focus on safety and avoidance of hip/lumbar compensation, while utilizing clinic props such as cones, etc..
13. Continue all necessary modalities.

iii. Rx/ClinicalExpectations

1. continue to progress motion and strength to desired MD motion expectations
2. avoid increases in inflammation and irritation
3. advance gait independence to performance without assistive device (must be at 4+ quad and abductors to wean from cane)
4. independence with home exercise program

c. Phase III (6 weeks and beyond) Advanced Strengthening Phase

i. <u>Goal:</u> Normalize gait, strength, and weight bearing tolerance

ii. Precautions/Contraindications:

1. No water/snow skiing, no running/jumping
2. No deep squatting with heavy weights
3. Caution with hiking on steep grades
4. MD clearance for kneeling

iii. Rx:

1. Generalized education on the impact that new activities can have on delayed swelling/edema.

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2. Continue all previously necessary exercises.
3. Water exercises can be initiated when incisions are healed and patient has MD approval.
4. Elliptical machine permitted, as well as recreational/treadmill walking once patient has normalized, independent gait and minimal swelling. Use handrails initially. Emphasize 5-8 minute exercise increments that increase by 5-10% over bi-weekly time periods.
5. Progress eccentric lower extremity control with various heights and unstable surfaces.
6. Ensure independence with transition to fitness club or individual, long-term home exercise programs.
7. Education on the importance of proper footwear support/protection to match levels/types of activities.

7. References

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e. Zheng et al. An analytical model of the knee for estimation of the internal forces during exercise. J Biomechanics 1998; 31: 963-967.