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CENTRAL INDIANA ORTHOPEDICS

Anterior Cruciate Ligament Reconstruction
Patellar Tendon Graft

Pre-Surgical Rehabilitation ("Prehab")

The objectives with the pre-operative visits include physically preparing the knee for surgery, as well as, mental and emotional preparation of the patient and their support group to deal with surgery and the post-operative rehabilitation course. Patients with acute ACL tears will be placed on appropriate rehabilitation to decrease swelling and restore range of motion and strength to near normal levels. Appropriate patient education of the surgical technique and post-operative rehabilitation will assist in mental preparation of the patient.

- Clinical Goals
  - Restore full ROM and appropriate strength prior to ACL reconstruction with emphasis on full motion before beginning strengthening
  - Control swelling prior to ACL reconstruction
  - Ensure complete understanding of the basic principles of accelerated rehabilitation including
  - Full hyperextension and full flexion
  - Early weight bearing
  - Closed and open chain strengthening

- Exercises
  - Extension Exercises
    - Heel props, towel stretches for passive heel lifts, prone hangs
    - Extension board or other extension device as indicated
  - Flexion Exercise
    - Heel slides, wall slides, supine/seated flexion hangs
  - Quadriceps control exercises (Extension "Habits")
    - Active heel lifts
    - Standing knee "lock-outs"
  - Closed kinetic chain strengthening (only **after** obtaining full ROM with minimal swelling)
    - Leg press
    - Progressive squatting techniques
    - Step downs
    - Non-impact cardio (bike, stairmaster, elliptical, etc.)

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Phase 1 – Surgical recovery and return to normal ADLs
Week 1

- Clinical Goals
  - Full passive knee extension and 90° flexion
  - Independent straight leg raise
  - Weight bearing as tolerated

- Exercises
  - The patient begins using CPM the day of surgery, set from 0° to 30° flexion. The CPM machine is to remain on with the patient's leg in it at all times except when doing motion exercises.
  - A *Cryo/Cuff* or *Vascutherm* is placed on the patient's knee immediately after surgery. This provides compression and cold to minimize pain and swelling. The Cryo/Cuff also remains on the knee at all times, except when performing motion exercises.
  - During the first week the patient is to remain lying down with the knee elevated in the CPM/using cold therapy whenever not exercising. However, when getting up to go to the bathroom, the patient is encouraged to be full weight bearing as tolerated with the crutches as needed.
  - Extension range of motion exercises six times a day:
    - The knee is allowed to fully extend to terminal extension for ten minutes during each exercise bout.
    - "Thunks" are performed to demonstrate full, comfortable extension.
    - Elevate the heel on the Cryo/Cuff canister. A 2.5-lb. ankle weight is placed across the proximal tibia to facilitate terminal extension
    - Towel stretches to pull into a full passive heel lift
  - Knee flexion Exercises
    - Progressive CPM machine, from 60° to 110° (increasing 5°/day).
    - Continue to increase bend beyond 110° by pulling leg further to buttocks with hands and hold stretch for 3 minutes.
  - Leg control
    - Active quadriceps contraction with quad sets
    - Straight leg raises
    - Active heel height

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Phase 1 – Surgical recovery and return to normal ADLs
Week 2

- Clinical Goals
  - Full terminal extension and flexion to 110°
  - Minimal swelling and soft tissue healing
  - Normal gait (including ascending and descending stairs)
  - Demonstrate ability to lock knee with weight shifted to ACL leg

- Exercises
  - Regaining full extension range of motion is the most critical factor in this phase. Early terminal extension has been demonstrated through many clinical research studies to be the key to a successful result. The patient is encouraged to push extension by performing the following exercises:
  - Extension
    - Towel stretch
    - Heel props
    - Prone hangs
    - Patient is encouraged to lock out knee by standing with weight shifted to ACL leg so that extension is full and knee is fully locked (standing knee lock-out)
  - Flexion
    - Heel slides
    - Wall slides
    - Supine flexion hangs
  - Leg control exercises (once the patient has regained full knee extension and is ambulating normally)
    - Quarter squats
    - Knee extensions off side of bed with no additional weight

- Clinical Follow-up
  - The patient will return 2 weeks following surgery
  - The patient should have full terminal extension, full flexion to 110°, and good quadriceps control to demonstrate an independent straight leg raise and near-normal gait mechanics.

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Phase 1 – Surgical recovery and return to normal ADLs
Weeks 3 – 4

- Clinical Goals
  - Full terminal extension and 135° flexion
  - Continue leg control increases while full ROM is obtained

- Exercises
  - If the patient does not have full passive terminal extension or full flexion, an extension board or other extension device will be given to the patient for home use in addition to routine clinic visits to restore full extension.
  - Supine flexion hangs are the most common means of regaining terminal flexion, however kneeling down and sitting back on one's heels should be practiced as it is the goal for full, functional flexion. It is also used as the guideline for the patient, so the patients knows if he/she is overdoing it – losing the ability to sit on one's heels is an indicator that rest is needed until full, easy flexion returns.
  - Step downs may be added to leg control exercises with emphasis on stimulating the patellar tendon graft harvest site through high frequency and high repetitions as tolerated (to be determined by ROM and swelling).
  - Unilateral step downs
  - Quarter squats
  - Knee extensions with light weight to facilitate terminal knee control

Phase 1 – Surgical recovery and return to normal ADLs
Weeks 4 – 6

- Clinical Goals
  - Full symmetric terminal extension and flexion
  - Advance strengthening as above in anticipation of Strength and Balance Testing

Strength and Balance Testing – Baseline
6 weeks postop (prior to surgeon visit)

The goal is to establish a baseline of the patient's current strength and overall deficits to guide rehabilitation over the next 6 weeks. The goals will be to spend that time gaining symmetric strength in the lower extremities correcting any core or functional deficits.

- Functional movement screen (FMS)
- Y balance
- Single leg press
  - Number of reps at body weight (or what patient is capable of) on operative leg / number of reps at body weight on nonoperative leg = % score
- Isokinetic testing (if available)

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Phase 2 – Strength and Conditioning
Weeks 6 – 12

- Clinical Goals
  - Full ROM including terminal extension
  - Quadriceps tone continues to improve with noticeable quadriceps definition returning by this time
  - Demonstrate 80% quadriceps strength
  - Proprioceptive/agility specific program as appropriate

- Exercises- Continue with emphasis on patellar tendon graft site and quadriceps muscle
  - Unilateral leg press
  - Unilateral knee extensions
  - Unilateral step-downs
  - Progressive squatting/lunging movement patterns
  - Non-impact cardio – stairmaster, bicycle, elliptical, etc.

- Agility
  - Form running (short distance)
  - Backward running
  - Lateral slides and crossovers
  - Light impact (8 weeks) – only to be performed in PT, not on their own
    - Double leg jump in place
    - Double leg jumping straight
    - Single leg jump in place
    - Single leg hop for distance
  - Shooting baskets, dribbling soccer ball and/or other sport specific drills

Strength and Balance Testing (Repeat)
12 weeks postop (prior to surgeon visit)

- Functional movement screen (FMS)
- Y balance
- Single leg press
  - Number of reps at body weight (or what patient is capable of) on operative leg / number of reps at body weight on nonoperative leg = % score
- Single leg hop
  - Distance on operative leg / distance on nonoperative leg = % score
- Isokinetic testing (if available)

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Phase 3 – Return to Activity
3 – 6 months postop

- **Clinical Goals**
  - Maintain full ROM
  - Advance total leg strengthening
  - Increase sporting activities as appropriate

- **Exercises**
  - Maintain full ROM
  - Continue strength and conditioning program and adjust per needs of sport

- **Return to Sport**
  - Return to restricted practice
  - Patient, parents, coach, and ATC must be educated to know when and how to modify situation according to subjective and objective findings of the knee.

- **Clinical Follow-up**
  - Patient will return to the office for periodic visits between months 3 – 6.
  - Timing of visits will depend on the patient's progress and readiness to return to sport.
  - Strength and Balance Testing will be repeated monthly if previous scores were insufficient.

Return to Sport Testing

- **Modified T-Test**
  - Running in an "E" configuration from each direction, measure and compare time.
  - Monitor for abnormal push-off, leaning, or limb rotation.
- **Box jumps**
  - Double leg and single leg.
  - Jump down and back up, measuring timing from landing on ground to landing back on the box.
- **Single leg vertical jump**
  - 3 jumps each leg, compare best on each side as %.
- **Triple jump**
  - Distance comparison
- **Lateral jumps**
  - Monitor for varus, valgus, leaning, pronation/eversion, hard landings, landing in extension
- **Tuck jump test**
  - 15 seconds of jumps in a row
  - Monitor for varus, valgus, leaning, avoiding operative leg, hard landings, limited flexion
- **Subjective assessment** by the Physical Therapist of the patient performing sport specific activities.