

## Physical Therapy Protocol for Femur Lengthening

### **Phase 1: Inpatient PT**

*Post-op Day 1 through Discharge → physical therapy will be done daily*

#### **Goals:**

- 1) Independent ambulation on level surface and stairs with lateral supports. Partial weight bearing. Transfer training.
- 2) Instruct patient and family correct positioning of the leg.
- 3) Instruct in submaximal quadriceps sets, gluteal sets, abductor sets and ankle pumps.
- 4) Instruct and perform range of motion exercises for knee and hip.
- 5) Adjust and teach patient use of dynamic splint if applicable.

#### **Treatment:**

- 1) Ambulation training on level surface and stairs with bilateral supports (crutches) partial weight bearing. Patients in this stage will guard during ambulation. Weight bearing is not critical at this stage.
- 2) Correct position: knee fully extended. Elevation of the operated extremity for controlling post-op edema.
- 3) Submaximal isometric exercises of quads, hamstrings, glutei and hip abductors. Emphasis on patient performing these every couple of hours.
- 4) Active exercises of knee and active hip flexion and abduction in supine position.
- 5) Dynamic splint: knee extension by dynasplint at this stage is sometimes given as a prophylactic measure. Instruct patient and family adjustments on splint and emphasize on using for at least 10 hours a day.

### **Phase 2: Lengthening or Adjustment Phase**

Role of physical therapy is preventative in the lengthening phase. Focus is on prevention of knee flexion contracture and knee subluxation, maintaining knee range of motion and improving strength via maximal isometric sets and encouraging functional loading activities.

*Out-patient PT Program → As directed by your care team, at least 3 times per week*

#### **Goals and Treatment:**

- 1) Maintain full knee extension.
- 2) Encourage more weight bearing through the operated leg. Continue using two lateral supports. Achieve reciprocal ambulation with equal step length.
- 3) Progress from submaximal to maximal isometric sets of quads, hamstrings, glutei and hip abductors. May use EMG biofeedback or electrical stimulation for augmenting muscle contraction.
- 4) Incorporate functional loading activities in therapeutic regime. Active exercises of knee, TKE (Terminal Knee Extension) and hamstring curls in prone position. Active exercises for hip abduction in supine position.
- 5) Adjust dynamic splint (if prescribed) to correct tension. Do not increase tension unless patient can wear splint for 10hours at previous tension level.

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- 6) Pain relieving modalities such as ice, heat and TENS may be used. Heat is preferably used prior to stretching. Precaution: do not stretch vigorously after heat as this may cause micro rupture of dense connective tissue.

**Common Problems During Lengthening:**

- 1) Hamstring contracture resulting in knee flexion contracture.
- 2) Posterior Subluxation of proximal tibia.
- 3) Decreased appetite and weight loss.
- 4) Pin site infections.
- 5) Loss of knee flexion.

**Phase 3: Consolidation Phase**

In this phase all lengthening adjustments are over and the external fixator is on until bone mineralization is complete and bone is ready for removal of the fixator.

*Outpatient Physical Therapy → 2-3 times a week or as directed*

**Goals of PT and Treatment:**

- 1) Vigorous stretching to achieve and maintain full knee extension.
- 2) Progressively reduce lateral supports for ambulation. Encourage full weight bearing ambulation initially with cane and later without cane.
- 3) Ambulation training to ensure that patient maintains equal step length while reducing lateral supports.
- 4) Continue maximal isometric and active exercises of the leg.
- 5) Resistive closed kinetic chain exercises.
- 6) Progress in functional loading activities.
- 7) Ambulation training to ensure that patient maintains equal step length while reducing lateral supports.
- 8) Continue maximal isometric and active exercises of the leg.
- 9) Progress in resistive exercises for muscle strengthening. Include closed kinetic chain exercises.
- 10) Progress in functional loading activities.

**Phase 4: Protection Phase**

During this phase the external fixator is removed but the bone still needs protection. The patient will be in a cast or brace. No PT during this phase.

**Phase 5: Out of cast or brace**

Physical Therapy in this stage is restorative. Adequate precautions like good stabilization technique and placement of weight above the level of osteotomy for strengthening exercises will reduce the risk of refracture.

**Goals of PT and Treatment:**

- 1) Progressive resistive exercises to quads, hamstrings, ankle muscles and hip abductors.
- 2) Progressive resistive exercises in closed kinetic chain and later in open chain.

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- 3) Achieve full ROM at knee, ankle, subtalar joint and toes.
- 4) Gradual return to functional activities.
- 5) Ambulation training to ensure no limp and equal step length (No assistive device).

**Common Problems During Phase 5:**

- 1) Refracture, gradual axial deviation or buckling of bone.
- 2) Joint stiffness, as a result of persistent muscle contracture.