The Children's Hospital
Affiliated with University of Colorado at Denver and Health Sciences Center

CGMA
Center for Gait and Movement

Post-op: Aggressive PT Protocol Without Casting

***Compliance and motivation relative to the patient, family, school and physical therapist are essential for success in the single event multi-level surgery outcome**

Inpatient stay:
PT visits while in hospital will be provided 2x/day

- Pain management provided by the epidural. Begin physical therapy care with epidural in place. Attempt isometrics of gluts, quads, hamstrings, calf
- Below knee casts to protect calf or foot surgery
- Minimal immobilization to encourage tissue mobility and reduce scarring. Use knee immobilizers to stabilize the knees for transfers, to position/ support the knees while stretching the hamstrings
- Positioning (supine, **prone** and long sitting) Prone positioning to address hip flexor tightness. PT to assist with finding a prone position of comfort which is tolerable for the patient. Nursing staff to assist with this positioning as able/ as tolerated
- Early knee range of motion (with PT and begin CPM - continuous passive motion machine. The goal is to use the CPM for 12-18 hours per day. If the surgical procedures are bilateral, the CPM can be alternated between the legs at 2-4 hour intervals.
- Practice transfers before discharge – if too big to be lifted then should practice pivot transfers if ok'd by MD. Use knee immobilizers to stabilize the knees for pivot transfers
- Discharge home with:
  - Home exercise program (ROM 3 x/day)
  - Positioning (supine, **prone** and long sit)
  - Equipment (w/c, walker, CPM etc.)
  - Parent Education

Home exercise program to include:

- ROM 3 x/day
- CPM machine when out of knee immobilizers **at least 10-12** hours per day initially
  - 1st week 0-30°
  - 2nd week 0-60°
  - 3rd week 0-90°

*Caution – watch for dysesthesia with hamstring lengthenings when using CPM to 0^{o}. Check pre-op knee extension to determine starting point on day 1.

- Isometric/isotonic exercises for hips and knees
  - o SLRs all 4 directions
  - o Quad sets
  - o Glut sets

Goals of physical therapy post-operatively:

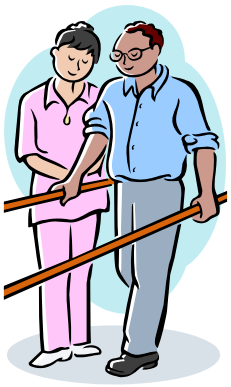
- Effective pain relief
- Relief of muscle spasms
- Positioning to maintain muscle length
  - Supine
  - **Prone lying (day 2)**
  - Long sitting (day 3)
- Early knee range of motion is essential to reduce scarring and stiffness at the knees (day 3)
- Standing - if **no** bony surgery has been performed then the child is allowed to begin weight bearing early (at post-op day 5-10 / at week 3 if bony surgery is performed
- Transfers - as independent as possible, use knee immobilizers for external knee support
- Discharge
  - home exercise program
  - daily positioning and range of motion
  - equipment

**** Knee immobilizers are used to support the knees and maintain hamstring length once the epidural is removed. The braces remain on at all times except for when the patient is exercising, using the CPM or bathing!**

Weeks 1-3:

Physical therapy 2- 3 times per week (1x could be done in pool)
Should get an x-ray when bony procedures are done prior to standing to determine healing
Begin weight bearing at the end of week 3 post-op

- Daily range of motion
- Continued use of CPM daily
- Positioning (supine, **prone** and long sitting)
- Begin standing with PT using knee immobilizers
- Strengthening progression continues (short arc quads, heel slides, etc)
- Can begin to start short sitting in alternation with long sitting by the end of week 3.
- Sit to stand activities
- Standing and walking can be done without knee immobilizers

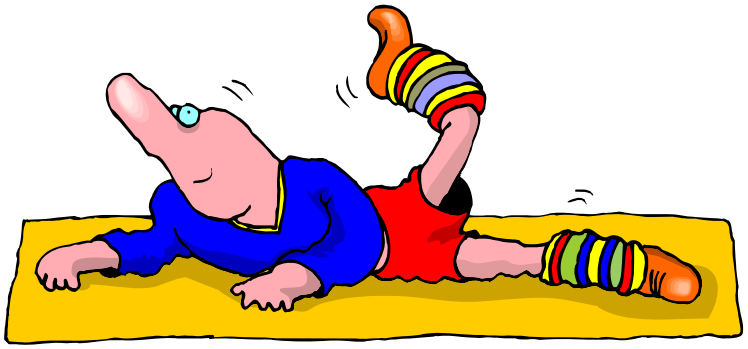


once they can control their knee position. Start by removing the immobilizer on the least involved side and walk with one or alternate until there is no fear of collapse (~14-21 days post-op) with a walker or other assistive device. Ground reaction AFOs (GRAFOs) can be used following the progression out of the knee immobilizers.

Weeks 1-3 post-op: Goals

PT 2-3 times per week

1. Maintain muscle length passively
2. Increase knee flexion range of motion after surgery while maintaining full passive extension
   Goals: Week 1 0^o-30^o of knee flexion
   Week 2 0^o-60^o of knee flexion
   Week 3 0^o-90^o of knee flexion
3. General lower limb strengthening as able with emphasis on the quadriceps, gluteals and abdominals
4. Good standing posture in full hip and knee extension - if able to bear weight. Knee immobilizers can be used to assist this posture and should be worn 24 hours a day except for when they are bathing or exercising.



Weeks 3-6:

Physical therapy 2-3 times per week (1x could be done in pool)
Should get an x-ray prior to removing casts to determine healing
GRAFO for standing activities
Physical therapy program to include:

- **Walking with assistive device using good hip and knee extension.**
- **Increased strengthening**
- **Prone hip flexion stretching for rectus femoris**
- **Begin stairs and functional strengthening**
- **Stationary bike riding with no resistance can be started**
- **Therapy ball activities for balance and trunk strengthening**
- **Continue use of knee immobilizers (discontinue use of CPM if ranges have been met 0-90^o)**

Week 6: The physician may request a return visit to CGMA for video analysis of gait pattern and to check orthosis and consider adjustment to AFO.

Weeks 3-6 post-op: Goals:

PT 2 - 3 times per week with active assisted knee range of motion 4-5 times per day.
As above plus:

1. Standing and walking, encouraging good extension posture and gait - may need to begin with an assistive device.
2. Progress strengthening program
3. Prone knee flexion stretches for rectus femoris transfers.
4. Knee immobilizers should be worn nightly and at least 3-4 hours per day.

Weeks 6-12 (most important time of rehab)

Physical therapy 2-3 times per week

- **Progress strengthening program**
- **Gait training and use of treadmill to optimize gait efficiency**
- **Knee immobilizers used at night time only at this point**
- **Biking on stationary bike and walking on treadmill for endurance training**

Weeks 6-12 post-op: Goals:

1. Fit and check orthotics. May need to return to CGMA to determine bracing needs using slow motion observational video analysis.
2. Progress strengthening program - include more weight bearing activities
3. **GAIT TRAINING -** optimize gait pattern
4. Hydrotherapy and treadmill training at this stage is extremely beneficial. Knee immobilizers are used at night only by this point in the rehab process.

****The 6-12 week post-op phase is the most critical period of the whole rehabilitation program. Typically, this is when the most rapid improvement occurs and physical therapy must be comprehensive with patient/ family compliance**

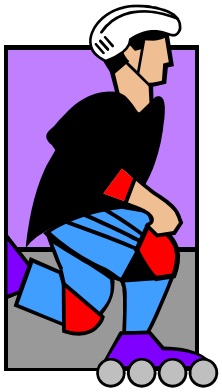
3-6 MONTHS GOALS:

This phase continues to be a strengthening phase. However, muscle length continues to be monitored with stretching as a key component.

PT is often 2-3 times per week with the addition of hydrotherapy

1. Increase general total body strength with specific strengthening of the lower extremities
2. Increase overall endurance
3. Optimize function and independence
4. Very important to include fun and enjoyable activities into the rehab program at this point. Activities such as swimming, bike riding, Hippotherapy and gym-based exercising (ie: stair steppers) as tolerated.

Knee immobilizers are often no longer needed.



6-12 MONTHS GOALS:

Typical social activity participation is emphasized with PT decreased to 1 time per week. Avoid burnout by integrating the child into more normal recreational and social exercise activities.

- **At 12 months post-operatively, the child should return for another full gait analysis. The purpose of this follow-up analysis allows the team to determine if any further minor surgical procedures are indicated, to evaluate PT progress with regards to gait efficiency and to evaluate bracing needs and adjustments. If additional procedures are indicated, this can be combined with the hardware removal event.**

This information is intended to assist the physical therapist in decision-making and goal writing for the post-operative patient who can benefit from aggressive physical therapy with reduced casting. It was compiled as a guideline only. Should questions or problems arise the referring orthopedic surgeon should be contacted.

We would like to thank the Hugh Williamson Gait Laboratory in Victoria, Australia for their development, assistance and expertise in this approach.

Revised 06/08