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

CGMA

Center for Gait and Movement Analysis

PT26: PATELLA ADVANCEMENT WITH DISTAL FEMORAL EXTENSION OSTEOTOMY

Indications: Patella alta due to spasticity of the quadriceps. This results in reduced force generation of the quadriceps and extensor lag. Fixed knee flexion contractures and inability to extend at the knee during gait. The goal of the procedure is to improve knee extension range by altering the distal femur bony anatomy.

Procedure: If the patient is **skeletally mature**, the tibial tubercle is excised by a "V" wedge from the proximal tibia and secured at a more distal position with hardware. This procedure is a more secure fixation and needs to be protected for ~3 weeks/ or per MD recommendation.

If the patient is **skeletally immature**, a portion of the patella tendon is removed and sutured in a shortened position resulting in re-alignment of the patella. The remaining tendon is re-attached via sutures passed through the inferior pole of the patella and interwoven through the body of the patella tendon. This procedure requires more attention to post-op protection for ~6 weeks/ or per MD recommendation.

Anterior femoral wedge is removed from the distal femoral metaphysis and fixed with a blade plate and side screws

Immobilization: Long leg/cylinder cast, knee flexed to ~20^{o} for 3-6 weeks, protected weight bearing for 3-6 weeks. If the tibial tubercle is advanced, the patient is allowed weight bearing at an earlier stage compared to the patella tendon shortening procedure.

********The surgeon may elect to use a CPM immediately post-op instead of long leg casts to minimize surgical tissue scarring. The CPM can be used in 2-4 hour intervals with a goal of 6-8 hours per leg per day. If this procedure is completed bilaterally, one CPM can be alternated between both legs.

Healing Time: Approximately 6-8 weeks

Precautions:

-Child with spasticity may experience increased spasms/ discomfort when the cast is removed and motion at the knee joint is initiated. Periodic use of a knee immobilizer or bi-valved cast may be helpful as the child is weaned from casting support.

-Using a CPM may reduce the spasms and discomfort associated with the protected phase of healing

-The skeletally immature surgical procedure requires more protection of the healing tissue compared to the bone to bone union

-Protect surgical site, both skin incision and bony healing – **Non-weight bearing**

-If the child is not casted, they are able to weight-bear for assisted transfers only with knee immobilizers donned during the first 3 weeks if the parent/ care provider cannot lift them for dependent transfers

Contraindications: No forceful quadriceps contraction, no resistive knee extension minimize risk of falling for 6 weeks post-op/ until advised by the MD

Phase 1: Post-op day 1-7

PRECAUTIONS/ CONTRAINDICATIONS:

All range of motion (PROM, AAROM) is limited to 0-30^{o} of knee flexion including ROM provided by the CPM

GOALS:

-Long leg sitting while immobilized to stretch the hamstrings

-Pain management, this may include use of modalities. Please clear use of modalities with MD

-Mid range passive, active assistive and active range of motion at the hip and ankle joints

-Isometric contraction of the gluteus maximii, hamstrings, sub maximal isometric contraction of the quadriceps

-Development of home exercise program – including isometrics, ankle pumps, ADL skills

CRITERIA TO PROGRESS:

-Safe mobility and non weight-bearing transfers with knee immobilizers for completion of ADLs

-Able to demonstrate understanding of home exercises and contra-indications

Phase 2: Post-op day 8-21

PRECAUTIONS/ CONTRAINDICATIONS:

-Range of motion 0-60^{o} of knee flexion at post-op week 2

-Range of motion increased to 0-90^{o} of knee flexion at post-op week 3

-**No resistive quadriceps contraction**

GOALS:

-Increase knee range of motion to 0-60^{o} at the end of post-op week 2. Begin AAROM through 0-60^{o} range of motion

-Increase knee range of motion to 0-90^{o} at the end of post-op week 3. Continue AAROM through 0-90^{o} range of motion, begin AROM 0-90^{o}

-Independent mobility of operative limb for independent transfers and protected mobility with knee immobilizer donned

-Progression of home exercise program

CRITERIA TO PROGRESS:

-Active range of motion 0-90^{o}

-No quad lag with active knee extension throughout 0-90^{o}

Phase 3: Post-op week 3- completion of PT care

PRECAUTIONS/ CONTRAINDICATIONS:

-Avoid impact, sudden, forceful contraction of the quadriceps

GOALS:

-Improve scar mobility by cross fiber friction massage once good incisional healing and closure is achieved (Approx 4-6 weeks)

-Improved knee extension during stance phases of gait

-Full knee extension at terminal swing, initial contact during gait

-Improved knee extension endurance, strength and power. Work toward no quad lag with active contraction, manual muscle test of 3+/5 or greater of all lower extremity groups

-Anticipate return to full activity ~ 3 months post-op

- assess bracing needs, consider ground reaction AFOs to encourage full knee extension during stance phases of gait, for safe transfers (*splinting, orthotic and equipment needs will need to be authorized by the MD)*

-begin transverse friction massage to surgical scars if well-healed

-begin progressive weight bearing as advised by the referring physician

-Obtain full knee ROM once casts are removed

-Functional standing balance for safe transfers, minimize opportunities for the knee to flex/ collapse suddenly, minimize risk for falling
-E-stim may be indicated post-operatively for muscle re-education

CRITERIA TO PROGRESS:
-full active and passive knee range of motion over full arc of motion

PHASE 4: Post-op week 7-completion of PT care
PRECAUTIONS:
-none
GOALS:
-modify bracing needs, continue using ground reaction AFOs to encourage full knee extension during stance phases if needed, may consider fixed AFOs if full knee extension is achieved during gait
-Gait re-training with emphasis on knee extension at terminal swing / initial contact and full knee extension at mid – terminal stance phases of gait. Goal is **quality** of gait not quantity/ distances of gait for the first 6 months.
- Full range of motion at the hips, knees and ankle joints
-Strengthening exercises once casts are removed. E-Stim may be indicated post-op for muscle re-education / strengthening.
-Lower extremity strengthening exercises with emphasis on the gluteus maximii, quadriceps, and calf musculature.
-Functional balance to return to pre-operative level of function
-Return to pre-operative function and activity

When multiple procedures are performed at the same surgical event, the post-op physical therapy care needs to default to the most conservative time frames and guidelines.

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