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Postoperative Rehabilitation Protocol: Pediatric Partial ACL Injury Non-Operative Management

Phase 1(Acute Phase) Weeks 1-3

Goals:

1. Control pain and swelling
2. Restore pain free ROM
3. Improve flexibility
4. Normalize gait mechanics
5. Establish good quadriceps activation

Precautions:

- WBAT with crutches until demonstrates normal gait mechanics
- Alert physician if patient reports episodes of knee buckling
- Fit for Functional ACL brace

Recommended Exercises:

Range of Motion

- Patella mobilization (Medial/Lateral, Superior/Inferior) 2 Sets of 20 Repetitions
- Belt stretch (calf/hamstring) Hold 30 Seconds 3-5 Repetitions
- Heel slides 2 Sets of 20 Repetitions
- Prone quad stretch Hold 30 Seconds 3-5 Repetitions
- Cycle (minimal resistance) 10-15 Minutes Daily

Strength

- Quad sets 2-3 Sets of 20 Repetitions
- Add sets 2-3 Sets of 20 Repetitions
- SLR *(no Lag)* 2-3 Sets of 10-20 Repetitions
- Hip Abd/Add/Ext/ER (against gravity) 2-3 Sets of 10-20 Repetitions
- Body weight squats (partial range) 2-3 Sets of 10-20 Repetitions
- Standing TKE with Theraband/cable column 2-3 Sets of 10-20
- Standing or prone hamstring curls 2-3 Sets of 10-20 Repetitions
- Heel raises 2-3 Sets of 10-20 Repetitions

Guidelines:

Swelling and ROM deficits must be resolved before progressing to next phase. Use exercise bike daily if possible for 10-15 minutes. Perform ROM exercises 3-5 times a day. Perform strengthening exercises 1 time a day.

Phase 2 (Sub-Acute/Strengthening Phase) Weeks 4-6

Goals:

1. Avoid patella femoral pain
2. Maintain ROM and flexibility
3. Restore muscle strength
4. Improve neuromuscular control

Precautions:

- D/C crutches if have not already
- Alert physician if patient reports episodes of knee buckling

Recommended Exercises:

Range of Motion

- Continue ROM and initiate LE flexibility exercises
- Cycle/elliptical 10-15 Minutes

Strengthening

- Continue Open Chain hip and knee strength from phase 1 progress with ankle weights
- Hamstring strengthening (progress from standing curl, leg curl machine, to curl on pball, single leg dead lift) 2-3 Sets of 15-20 Repetitions
- Leg press (progress from double-limb to single limb) 2-3 Sets of 15-20 Repetitions
- Step-up progressions (forward and lateral) 2-3 Sets of 15-20 Repetitions
- Squat progression (limit to 90 degrees) 2-3 Sets of 15-20 Repetitions
- Plank, side plank, single-limb bridge 2 Sets of 30 seconds each (15 seconds each leg with bridge)
- Proprioception
- Static Single-limb balance 3 Sets of 30-60 seconds (progress eyes open to eyes closed, foam, BOSU, *sport specific if applicable)

Guidelines:

Perform all ROM and flexibility exercises once a day. If possible, cycle daily. Perform strengthening exercises 3-5 times a week (frequency and volume programmed by PT).

Phase 3 (Limited Return to Activity Phase) Weeks 7-16

Goals:

1. Avoid patella femoral pain
2. Maintain ROM and flexibility
3. Progress with single leg strengthening to maximize strength
4. Progress dynamic proprioception exercises to maximize neuromuscular control
5. Initiate plyometrics and light jogging
6. Gradually begin return to sport activities pending physician's clearance

Precautions:

- Must avoid patella femoral stress
- Caution pivoting and lateral movements
- Alert physician if patient reports episodes of knee buckling

Recommended Exercises:

Range of Motion and Flexibility

- Continue ROM and flexibility exercises as needed

Cardio

- Cycle/elliptical/treadmill with progressive resistance

Strengthening

- Continue progressing Phase 2 strengthening exercises
- Step-up progressions (increase height of step) 2-3 Sets of 15-20 Repetitions
- Single-limb dead lift 2-3 Sets of 15-20 Repetitions
- Static lunge progressions (forward/backward/lateral) 2 Sets of 50 feet

Proprioception

- Single-limb balance with perturbations 3 Sets of 30-60 seconds (progress eyes open to eyes closed, foam, BOSU, *sport specific if applicable)

Plyometrcs

- Emphasize eccentric control, avoiding increased trunk flexion, dynamic genu valgum, and femoral internal rotation, must have appropriate strength to progress to plyometric program
- Simple double-limb jumps
- Complex double-limb jumps

Guidelines:

Perform stretching program daily. Cardio exercise is recommended 3-5 times a week for 20-30 minutes. Perform strengthening/proprioception exercises 3 times a week. Perform plyometric/jumping exercises 2 times a week. Monitor increased swelling with plyometrics. Decrease intensity if swelling persists. Strict attention must be paid to form and to minimize patella femoral pain with exercises.

Phase 4 (Return to Activity/Sport Phase) 4 months

Goals:

1. Maintain adequate ROM, flexibility and strength
2. Continue progressive/dynamic strengthening, proprioceptive, plyometric and agility training
3. Achieve adequate strength to return to sport (pending physician's clearance)

Precautions:

- Limited and controlled lateral movements
- Gradual return to sport pending physician's clearance
- Work with physician and physical therapist to develop specific return to sport progression

Recommended Exercises:

Stretching

- Continue daily lower extremity stretching

Cardio

- Continue cardio program and progress intensity and duration

Strengthening

- Continue strengthening program from phase 3 (increase load and decrease repetition)
- Progress from static to dynamic lunges

Proprioception

- Continue advanced proprioceptive training (increase difficulty of drills)

Plyometric

- Emphasize eccentric control, avoiding increased trunk flexion, dynamic genu valgum and femoral internal rotation
- Single-limb jumps
- Combination double-limb jumps
- Combination single-limb jumps

Sport Specific Drills

- Initiate sports specific drills
- Begin speed/agility program

Guidelines:

Perform stretching program daily. Cardio program is recommended 3-5 times a week for 20-40 minutes Perform strengthening/proprioception exercises 3 times a week. Perform plyometric/jumping/agility exercises 2 times a week. Perform return to sport activities as directed by physician and physical therapist. Alert physician if patient reports episodes of knee buckling.

Time	Weight Bearing and Gait	Focus	Range of Motion	Recommended Exercises	Precautions
Phase 1 Acute Phase	*WBAT with crutches and progress to FWB and d/c crutches when patient can demonstrate normal gait mechanics	*Control pain and swelling *Restore pain free ROM *Restore normal gait mechanics *Establish good quadriceps activation	*Emphasize knee extension equal to contralateral limb *Goal is to achieve full flexion	**ROM** Patella mobilization, calf/hamstring stretches, heel slides, prone quad stretching, bicycle **Strengthening** Quad/Add sets, SLR (no lag), hip Abd/Add/Ext/ER, partial range squats, standing TKE, standing or prone hamstring curl, heel raises	*Minimize joint effusion and edema *Alert physician if patient reports episodes of knee buckling
Phase 2 Sub-Acute Phase	*FWB	*Maintain ROM and flexibility *Progress strengthening *Improve neuromuscular control	*Maintain full ROM and optimize LE flexibility	**ROM** Continue Phase 1 exercises and initiate LE flexibility exercises, bicycle/elliptical with increased resistance **Strengthening** Continue Phase 1 strengthening, leg press, leg curl machine, step-ups, squats, plank series, single-limb balance **Proprioception** Single-limb balance exercises	*Minimize joint effusion and edema *Alert physician if patient reports episodes of knee buckling *Avoid patella femoral joint stress
Phase 3 Limited Return to Activity/Sport	*Straight ahead jogging per physician approval	*Maintain ROM and flexibility *Maximize strength, initiate single leg exercises *Maximize neuromuscular control *Initiate plyometrics and light jogging *Initiate return to sport/work activities with physician approval	*Maintain full ROM and optimize LE flexibility	**ROM/Stretching** Continue ROM and flexibility exercises as needed **Cardio** Bicycle/elliptical/treadmill with progressive resistance **Strengthening** Progress Phase 2 strengthening, step-up progressions, single-limb dead lifts, static lunges **Proprioception** Single-limb balance with perturbations **Plyometrics** Double-limb simple and complex plyometrics	*Alert physician if patient reports episodes of knee buckling *Avoid patella femoral joint stress especially with plyometrics *Monitor increased knee effusion with plyometrics *Caution pivoting or lateral movements *Not cleared to return sports
Phase 4 Return to Activity/Sport	*Sport specific program per physician clearance	* Maintain ROM, flexibility, and strength *Continue dynamic strengthening and proprioceptive exercises *Continue plyometrics and initiate agility training *Progress sport specific drills	*Continue daily LE stretching	**ROM/Stretching** Continue daily stretching **Cardio** Bicycle/elliptical/treadmill with progressive resistance **Strengthening** Progress Phase 3 strengthening, increase load and decrease repetitions **Proprioception** Progress Phase 3 proprioceptive training increasing difficulty of drills **Plyometrics** Begin single-limb plyometrics, advance double-limb and single-limb combination jumps **Sport Specific Drills** Begin speed and agility program	*Alert physician if patient reports episodes of knee buckling *Avoid patella femoral joint stress especially with plyometrics *Monitor increased knee effusion with plyometrics *Caution pivoting or lateral movements *Cleared for return to sport per physician