Pediatric ACL Reconstruction / Tibial Spine Fracture Rehabilitation Protocol

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This protocol provides general guidelines for rehabilitation following pediatric ACL reconstruction / tibial spine fracture. Progression should be individualized based on the procedure, healing, and patient response, with modifications as directed by the surgeon.

Phase	Goals	Precautions / Restrictions	Treatment

Weeks 0–4	● **Protect surgical site**
	● Reduce pain and swelling
	● ROM: 0-90 degree
	● Full passive extension
	● Active quadriceps control
	● Reduce muscle atrophy
	● Safe use of crutches with altered weight bearing status
		● TWB x 4 weeks with crutches in brace
		● ROM:
		  ● Full extension week 1
		  ● **90 degrees** flex week 2-4
		  ● As tolerated week 4
		● **No resisted open chain knee extensions**
			General guidelines
			● Quadriceps recruitment/NMES
			● Global LE/hip strengthening
			● TWB gait training with crutches
			● Modalities as indicated
			  ● Cryotherapy: 5-7 times per day
			Initial Visit
			● FOTO, LEFS, PSFS
			Weeks 1-2
			● Follow up with MD

Weeks 4–8	● ROM as tolerated
	● Progression to WBAT
	● SLR without extensor lag
	● **Normalized gait mechanics**
	● Progression of quadriceps strength/endurance
	● Increase functional activities
		● Open kinetic chain is limited to bodyweight leg extensions (weeks 4-8)
		● **No resisted open kinetic chain exercises**
		● **No running, jumping, cutting, pivoting, or twisting**
		● **Avoid painful activities/exercises**
			General guidelines
			● AAROM - AROM
			● Core stabilization exercises
			● Global LE strengthening
			  ● Begin functional strengthening exercises (bridge, mini-squat, step up, etc)
			● Double limb to single limb balance/proprioception
			● Aerobic training:
			  ● Walking program when walking with **normal gait mechanics**
			  ● Stationary bike
			● Optional therapies (if available/as indicated):
			  ● BFR therapy
			  ● NMES
			● Modalities as indicated
			Week 4
			● Gait training progressing from assistive device beginning week 4
			● Optional therapy (if available/as indicated): Aquatic therapy once incision is healed and cleared by surgeon (4 weeks)
			Week 6-8
			● FOTO, LEFS
			Weeks 6
			● Follow up with MD

Phase	Goals	Precautions / Restrictions	Treatment

Weeks 8–12	• Full, symmetric and pain-free ROM
	• Progress quadriceps strength/endurance
	• Increase functional activities
		• May initiate resisted open kinetic chain exercise
		  • **90-45°** at 6 weeks
		  • **90-30°** at 8 weeks
		  • **90-0°** at 10 weeks
		  • **90-0°** with progressive loading at 12 weeks
		• **No running, jumping, cutting, pivoting, or twisting**
		• **Avoid painful activities/exercises**
		• **Avoid patellofemoral pain**
			General guidelines
			• End range flexion and extension
			• Aerobic training on stationary bike, elliptical, stair climber, UBE
			• Core stabilization exercises
			• Progressive double and single limb strengthening
			• Single to multi-plane exercise
			• Progression of balance/proprioception
			• Modalities as indicated
			Week 12
			• FOTO, LEFS, PSFS, ACL-RSI

Weeks 12-16	• Full, symmetric ROM
	• **No effusion with increased activity**
	• Increase intensity and duration of functional LE strength
	• Initiate return to jogging program
	• Begin low level plyometric and agility training
		• **Avoid painful activities/exercises**
		• Jogging program initiated at 12 weeks if cleared by surgeon
		  • **No effusion**
		  • Full AROM
		  • **>80%** LSI
		• **No jogging on painful or swollen knee**
			General guidelines
			• Increase loading capacity for lower extremity strengthening exercises
			• Continue balance/proprioceptive training
			• Functional assessment (see attached)
			Week 12
			• begin return to jogging program
			  • If applicable, start with pool/anti-gravity treadmill
			• Begin low level plyometric and agility training at 12 weeks
			Months 3-4
			• Follow up with MD

Months 4-6	• Continue to progress functional strengthening
	• Successful progression of the return to running program
	• Initiate higher level plyometric and agility training
		• **No jogging on a painful or swollen knee**
		• **Avoid painful activities/exercises**
		• **Avoid patellofemoral pain**
		• **No participation in sports unless specified by care team**
			General guidelines
			• Progression of return to jogging program
			• Gradually increase lifting loads focusing on form, control, and tissue tolerance
			• Progress as tolerated:
			  • Core Stability
			  • Strength
			  • Endurance
			  • Proprioception/Balance
			• Increase intensity of plyometric and agility training
			• Foot speed and change of direction
			Month 6
			• FOTO, LEFS, PSFS, ACL-RSI
			• Functional assessment at 6 months (see attached)

Months 6 – 9	• Continue to progress functional strengthening	• **No participation in sports unless specified by your care team**	**General guidelines**
			• Progress as tolerated:
			  • Core Stability
			  • Strength

Phase	Goals	Precautions / Restrictions	Treatment
	● Sport-specific training	● **Avoid painful activities**	● Endurance ● Proprioception/Balance ● Begin sport-specific training ● Single-to multi-task ● Reactionary drills ● Perturbation training ● Closed to open environment
Months 9+	● Pass return to play criteria (re-test at 12+ months, if necessary) ● Begin gradual return to sport	● Gradual return to full participation in sports	**General guidelines** ● Progress as tolerated: ● Core Stability ● Strength ● Endurance ● Proprioception/Balance ● Plyometric training ● Agility drills ● Sport-specific activities ● Gradual return to sport progression ● Functional assessment (see attached) **Month 9** ● FOTO, LEFS, PSFS, ACL-RSI **Months 9+** ● Follow up with MD

Anterior Cruciate Ligament Testing Protocol

Week 12

Goals

- Full, symmetric ROM
- Y-balance anterior reach asymmetry < 5 cm
- Quadriceps strength for isometric test > 80% of uninvolved side

Surgery applicability

- ACL reconstruction
- ACL reconstruction with meniscus repair
- ACL Allograft (12 week and 6 month recheck)
- ACL revision (12 week and 6 month recheck)

Testing

- Knee assessment including assessment for effusion
- Passive and active ROM
- Y-balance anterior reach
- Isometric knee extension at 60° and 90°
- F OTO, LEFS, PSFS, ACL-RSI

Month 6

Goals

- Full, symmetric ROM
- Y-balance anterior reach asymmetry < 3 cm
- > 80% LSI for isokinetic testing
- 90% LSI for functional testing
- ACL-RSI > 56

Surgery applicability

- ACL reconstruction
- ACL reconstruction with meniscus repair
- ACL Allograft (9 month)
- ACL revision (9 month)

Testing

- Knee assessment including assessment for effusion
- Passive and active ROM
- Hop Test
  - Single Hop
  - Triple Hop
- Isokinetic Test (90°, 180°/s)
- Y-Balance Anterior Reach
- Agility T-Test
- FOTO, LEFS, PSFS, ACL-RSI

Month 9-10

Goals

- Full, symmetric ROM
- > 90% LSI for isokinetic and functional testing
- Y-balance anterior reach asymmetry < 3 cm
- ACL-RSI > 56

Surgery applicability

- ACL reconstruction
- ACL reconstruction with meniscus repair
- ACL Allograft (12 month)
- ACL revision (12 month)

Testing

- Knee assessment including assessment for effusion
- Passive and active ROM
- Hop Test
  - Single Hop
  - Triple Hop
  - Cross-over Hop
- Isokinetic Test (90°, 180°/s)
- Y-Balance Anterior Reach
- Agility T-Test
- FOTO, LEFS, PSFS, ACL-RSI