

Selective Dorsal Rhizotomy Physical Therapy  
Adapted for ORG C from Dr. XXXX's protocol at the XXXXXXXX

Required Frequency and Duration of sessions:

- Surgery to 6 months post op—4-5 times per week
- 6 months to 12 months post op—3-4 times per week
- 12 to 36 months post op—2-4 times per week
- The duration should be 60 minutes per session

Precautions:

- No passive hip flexion greater than 90 degrees for 6 weeks after surgery. Active flexion can occur past 90 degrees depending on the patient's tolerance.
- No passive trunk rotation/lateral flexion into extremes of range of motion for 6 weeks after surgery. Actively, the patient can perform this as tolerated.
- No vigorous hamstring stretching for 6 weeks after surgery. Hamstring stretching should be limited by back pain and not discomfort caused by stretching the hamstrings themselves.
- Splints and braces should be worn in the standing and ambulating activities because of increased weakness in the ankles and feet.
- Expect some sensory changes in the lower extremities after surgery. Commonly, patients will have hypersensitivity on the plantar surfaces of their feet. This usually resolves within 2 months. This can be accommodated by handling feet firmly and wearing socks.
- Children may be more frustrated because of perceived loss of function.
- Do not begin aquatic therapy until cleared after first postoperative visit which occurs 2-3 weeks after surgery.
- Do not begin electrical stimulation until 6 weeks after surgery.
- Do not begin hippo-therapy, aquatic therapy, horseback riding, or contact sports until 6 weeks after surgery.
- Work with physiatrist or treating neurologist for any changes to the child's orthotics to assist in weaning their reliance on the orthotics.

Recommended Post-operative Phases of Treatment

- Every child will recover at his/her own pace, but this provides a framework for progression through phases of therapy.

Phase 1: Surgery to 6 weeks post op—Strengthening

- The patient should walk as much as possible as soon as they are able. Assistance should be provided until the child is safe to ambulate with or without assistive devices. Even if the gait is not yet ideal, the child should be encouraged to walk. Supported walking should be used if alignment is poor.
- Posterior walkers are recommended for post op patients. It is recommended that the walker have swivel front wheels that can be locked in a non-swivel

- position. Often a pelvic stabilizer, hip extensor pad, and sometimes a folding seat are needed.
- Increase range of motion where limited through stretching and use of splinting such as knee immobilizers at night while sleeping.
  - Increase strength in target muscle groups including the trunk, especially the abdominals, lower extremity musculature, and eccentric as well as concentric control of anti-gravity musculature.
  - Begin or increase weight bearing in lower extremities.
  - Begin isolated movements in the lower extremities.
  - Improve postural alignment in developmental positions, i.e., sitting, tall kneeling, ½ kneeling, standing, and ambulation if possible.
  - Initiate movement in typical gross motor patterns.
  - May begin partial weight bearing gait therapy if appropriate.

#### Phase 2: 6 weeks – 3 months post-op

- For children who are not yet walking independently with or without assistive devices, a stander may be indicated.
- Aquatic therapy may begin when cleared by surgeon (typically 2-3 weeks after surgery)
- The focus should be on improving alignment, weight shift, and step/stride length and control in ambulation
- Development of balance and equilibrium reactions in static and dynamic sitting, kneeling, ½ kneeling, and standing.
- Continue development of isolated movements in lower extremities.
- Development of initiation and inhibition of movements throughout lower extremity range of motion.
- Continue strengthening of antigravity musculature and development of concentric and eccentric control needed to hold posture against gravity throughout the range of movement.
- Work on isolated muscle strength and control throughout the available range of motion (i.e., strengthen gastrocnemius, soleus, and hamstrings in the lengthened position).
- Direct attention to strengthening lower extremity musculature at the end of available passive range of motion. In particular, the gastrocnemius, soleus and hamstrings are typically weak at the mid and end range and especially at the lengthened position of the muscle.
- May begin NMES if indicated.
- Treadmill walking for improving gait pattern and endurance

#### Phase 3: 3 – 6 months post-op

- Continue strengthening of trunk muscles, specifically internal and external oblique's, thoracic and lumbar extensors, while attempting to incorporate strengthening exercises into functional activities in CKC.
- Direct attention to strengthening lower extremity musculature. Functional activities in the home, school, and community such as playground should be regularly practiced.

- Continue development of a typical gait pattern with attention to alignment, step/stride length and weight shift.
- Continue development of concentric and eccentric muscle control in major muscle groups of the lower extremities.
- Begin placing greater emphasis on speed of movement in functional transitions and in a variety of patterns of movement.
- The family should be encouraged to take the child to the playground, climbing walls, and long walks. The child should walk around the home even if help is required.
- Crawling or creeping in the home should be discouraged.
- All toys in the home should be placed on a surface that requires the child to tall kneel or stand based on the functional level of the child. Floor play should be discouraged.

#### Phase 4: 6 – 12 months post-op

- Strengthening of specific muscles needed for functional movement patterns.
- Assess symmetry of strength in calves, ankles and feet. Most children will be somewhat asymmetric in strength, range of motion, and motor control. More work may need to be directed to the more limited extremity.
- Refinement of balance and equilibrium reactions in sitting, kneeling, ½ kneeling, and standing on stable and dynamic surfaces.
- Increase the speed and control of reciprocal movements of the lower extremities.
- Address individual components of gait (step and stride length, hip extension, terminal knee extension, and propulsion) to improve smoothness, coordination, and level of independence in ambulation. Weakness in calf muscles is almost always a problem for children with cerebral palsy, which can cause a crouch gait and toe walking.
- Improvement of endurance in daily activities.

#### Phase 5: 12 months – 3 years

- Continue development of strength, balance, coordination, speed, and endurance with the addition of sports, dance, and recreational activities.
- Continue refinement of gait pattern by assessing the individual components of gait, and addressing range of motion and strength deficits.
- Continue strengthening in areas of persistent weakness, concentric and eccentric activities. Muscles below are listed in priority of greatest weakness and need for strengthening:
  - Gastrocnemius and soleus in the mid and end range
  - Gluteus maximus and medius in mid and shortened ranges
  - Hamstrings in the lengthened range
  - Quadriceps in the shortened range.
  - Anterior tibialis in the shortened and mid range