

**ORG A**  
**Physical Therapy/Occupational Therapy**

**Selective Dorsal Rhizotomy Protocol**

- SDR is a spasticity reducing procedure performed by a neurosurgeon with the involvement of a doctor of Physical Medicine & Rehabilitation (PM&R) and physical therapist. All candidates for SDR are initially assessed in spasticity clinic by a team including the neurosurgeon, doctor of PM&R, an orthopedist, and a physical therapist.
- All candidates being considered for an SDR will be seen by a physical therapist for a pre-operative evaluation, family education and to establish home program.
- The family (with the assistance of the ORG A PT/OT department) is responsible for determining availability of home town therapeutic services. Verification of insurance coverage is initiated & discussed at this time.

**Ideal Rhizotomy Candidate:**

- Spastic Diplegia with GMFCS of Level 1, 2, or 3
- Age 3-6
- Lower extremity spasticity is limiting functional progress
- No lower extremity contractures; no previous orthopedic surgeries
- No significant dystonia
- Child is able to cooperate with therapy follow-up and parental compliance with therapy is good

**Goals for Presurgical PT and OT**

1. Evaluation
  - Pretest with GMFM, GMFCS, ROM, Ashworth Tone Scale, observational gait analysis, Functional Gait status, quality of movement, Participation and Quality of Life Scale, Sensation, and Muscle Actions/Strength – to be re-tested 1 year post-op. Portions of the evaluation will be videotaped.
2. Inform family of inpatient and outpatient therapeutic protocol.
3. Teach post-operative home program to parents and child to begin performing 1 x/day prior to surgery.
4. Work in conjunction with parents and therapists concerning home management and expectations for mobility after surgery, including arrangement for rental or purchase of:
  - Prone Stander
  - Wheelchair with solid back and seat
  - Appropriate assistive device
  - Appropriate orthotics

5. Assist family in procuring post-op PT /OT

## Post operative Treatment Procedure

All post-operative treatment will be performed with physician approval, and is dependent on child's tolerance

### **Recommended frequency of physical therapy sessions:**

- Inpatient acute phase on Neurosurgery service for 4 days with PT 1 time/day and OT 1 time
- Inpatient rehab stay Day 5-Day 18: 2 times/day for 6 days/week
- Hospital discharge to 6 months post-op: 4-5 times per week
- 6 to 12 months post-op: 3-4 times per week
- 12 to 36 months post-op: 2-4 times per week, based on individual needs. The frequency will vary during this period and includes intensive bursts of therapy and transitioning into community-based activities
- 36 or more months post-op: Physical therapy needs will be assessed by the rhizotomy team and recommendation given at the time of follow-up visits.

### **Recommended frequency of occupational therapy sessions:**

- During Rehab Stay, OT to concentrate on dressing, feeding, sensory integration, and postural control for ADL skills
- Outpatient services will vary based on child's upper extremity and sensory involvement, fine motor skill and ADL performance
- Frequency will be from consult to 3x/week as indicated

### **Precautions that should be followed after Surgery:**

- No **passive** hip flexion past 90 degrees for 6 weeks after surgery. The patient can perform this actively to his/her tolerance.
- No **passive** trunk rotation/lateral flexion into extremes of range for 6 weeks after surgery. The patient can perform this actively to his/her tolerance.
- No vigorous hamstring stretching for 6 weeks after surgery. Hamstring stretching should be limited by **back pain** and not discomfort caused by the stretching of the hamstring muscles themselves.
- Because of increased weakness in the feet and ankles, splints should be worn during standing and ambulation activities.
- Expect some sensory changes in the lower extremities, especially some hypersensitivity on the bottom of the feet. This may be alleviated by handling feet firmly and wearing socks and shoes. This hypersensitivity usually resolves in the first few weeks.

- As the edema resolves around the site of the surgery, a bump may appear just above the scar. This is the spinous process of T-12 or L-1 and should not be a cause for concern.
- If drainage from wound is purulent or increases, contact neurosurgery.
- It is common for the child to tire more easily than normal. Changes in behavior such as irritability and frustration for no apparent reason are common as the child learns that movement feels different. They may not have the motor control and/or strength to produce the desired movement.
- **Do not** begin Aquatic therapy or swimming until two weeks after surgery. Incision site must be closed or covered with impermeable dressing.
- **Do not** begin or resume electrical stimulation of any kind until 4 weeks after surgery. Focused primarily on lower extremities.
- **Do not** begin Hippo-therapy or horseback riding until 6 weeks after surgery.

## **Physical/Occupational Therapy Post-Operative Protocol**

### **INPATIENT THERAPY**

#### ***Day 2-4:***

- PT/OT treatment begins at bedside only.
- Positioning may include:
  - side lying with pillow between knees
  - supine with roll under knees (to decrease lumbar lordosis)
  - prone
- Movement precautions include:
  - No hip flexion past 90
  - No trunk rotation- log rolling for position changes
  - Lie completely flat without a pillow
- Generally treatment is in a static position as listed above and focuses on assessment of muscle activation and selectivity, Lower extremity strengthening, and monitoring of equipment needs
- Parent education on positioning, exercises, sensory changes, and preparation for discharge

#### ***Day 3-5 (Initial sitting up as ordered by physician):***

- Begin sitting post-op day 3-5 with therapist supervision: log- roll and push to sit; monitor for any signs of discomfort or dizziness.
- Child is positioned in wheelchair with solid back and seat to fully support trunk, with hips and knees flexed no more than 90°. Begin using solid AFO's for positioning if needed approximately 3 days post-op.

- Patients/caregivers are taught proper techniques to get the child to sitting, and for all transfers. Progressively increase time in sitting as tolerated by child.
- Continue to add therapeutic exercises as child masters exercises

### **General Precautions**

- Avoid passive trunk flexion and trunk rotation and hip flexion beyond 90 degrees
- Allow any active trunk motion the child does.
- Avoid abnormal motor patterns and movements, especially W-sitting and bunny-hopping
- Avoid using walker as assistive device if highest anticipated level of independent ambulation is with canes or without assistive device.

### **2-3 WEEKS POST-OP:**

- Patient will stay on Rehab service from Day 5- Day 15, followed by 1 week of Day Treatment
- Upon discharge, patient and family stays in housing close to hospital for treatment for daily PT and OT as needed.
- Treatment is on a daily basis, with sessions tailored to meet individual needs.

### **Therapy Considerations**

- Make sure adequate strength is present prior to allowing independent mobility progression, i.e., 3+ hip extensors to tall kneel and knee walk, 3+ quads, 3+ hip extensors, and 3+ abductors to ambulate.
- Therapist should work on sit to stand, cruising and ambulation in parallel bars. Paying careful attention to proper alignment and facilitation of proper movement patterns during gait is critical during this period.
- It is rare for a child to be independently ambulating without therapist supervision with or without a device at this point in their rehab.

### **Focus of Treatment:**

- Activation and strengthening of isolated muscle groups- strengthen concentrically and eccentrically.
- Facilitate trunk control and weight shifting skills in sitting, quadruped and kneeling – provide enough handling assistance to facilitate optimal alignment.
- Facilitate developmental milestones using isolated muscle control. Discourage substitution to compensate for muscle weakness.
- Transitional movements using desired movement patterns.
- Daily ROM – stretching using AFOs and knee extension splints if necessary. May also need to begin serial casting for increasing ROM.
- Begin weight bearing using a prone stander – make sure to use AFO's
- May begin partial weight bearing gait therapy if appropriate and available followed by progressive gait training with appropriate assistive device.
- Continue to monitor and progress home program.

- Positioning – wheelchair, prone stander, adapted seat, potty seat
- Mobility - wheelchair, crawling as tolerated, trike with feet controls and trunk support.

### **Physical Therapy Goals:**

- Work in coordination with occupational therapist.
- Work on lower extremity active range of motion and strengthening.
- Work on trunk strengthening and balance reactions.
- Inhibit Abnormal movement patterns
- Assist in planning for discharge to primary therapist. Contact hometown physical and occupational therapists to confirm schedule and to communicate patient progress. Assist in arranging therapy schedule if needed.
- Transition child to hometown therapist. Send folder containing updated copies of home program and treatment suggestions, and when possible send video demonstrating home program and treatment techniques.

## **OUTPATIENT THERAPY**

### **4-6 WEEKS POST-OP**

#### **Therapy Considerations**

- Make sure adequate strength is present prior to allowing independent mobility progression, i.e., 3+ hip extensors to tall kneel and knee walk, 3+ quads, 3+ hip extensors, and 3+ abductors to ambulate.
- Therapist should work on sit to stand, cruising and ambulation in parallel bars. Paying careful attention to proper alignment and facilitation of proper movement patterns during gait is critical at this time.
- Although child may be capable of ambulating without assistive device for household distances, the use of an AD is recommended to prevent deterioration of gait pattern associated with fatigue.
- It is rare for a child to have returned to their pre-surgical ambulatory status at this point in rehab.

#### **Focus of Treatment**

- Activation and strengthening of isolated muscle groups of trunk and lower extremities. Strengthen muscles concentrically and eccentrically.
- Facilitate trunk control and weight shifting skills in sitting, quadruped and kneeling. Provide enough handling assistance to facilitate optimal alignment and standing.
- Add trunk extension and abdominal strengthening program
- Daily ROM – stretching using AFO's and knee extension splints if necessary.

- Continue standing approximately 30 minutes daily in prone stander.
- Continue to integrate new movement skills into activities of daily living.
- Update home program – add weight if child can independently complete exercise 10x with good form. Continue to emphasize to parents importance of performing home program twice daily.
- Positioning – wheelchair, prone stander, adapted seat, potty seat, independent sitting (Indian, long, ring, and side) with UE play.
- Mobility- wheelchair, tall knee walking if patient has good hip extension, crawling, on/off bench or sofa with proper assistance and facilitation, adapted trike.
- Aquatic therapy may occasionally be substituted for land based therapy. All precautions, therapy considerations, and the focus of treatment remain the same as those of land based therapy.

## **6 WEEKS TO 6 MONTHS POST-OP**

### **Therapy Considerations**

- Development of balance and equilibrium reactions in static and dynamic sitting, kneeling, ½
- kneeling, and standing.
- Continue development of isolated movements in lower extremities throughout range of motion. Avoid abnormal patterned movement..
- Continue strengthening of antigravity musculature and development of eccentric control needed to hold a posture against gravity throughout the range of movement.
- Work on isolated muscle strength and control throughout the available range of motion. Direct attention should be paid to strengthening lower extremity musculature at the **end of available passive range of motion**. In particular, remember that the gastroc/soleus and hamstrings are typically weak at the mid range and especially at the lengthened position of the muscle.
- Ambulation with appropriate assistive device should stress improving alignment, weight shift and stride length.
- Treadmill training is used to increase endurance and improve gait pattern
- Continue to adapt and progress HEP
- Assist in setting up participation in community based fitness program. Hippo-therapy (therapeutic horseback riding) may begin 6 weeks post surgery
- May begin NMES if indicated and available

## **6 MONTHS TO 12 MONTHS POST-OP**

### **Therapy Considerations**

- Strengthening of specific muscles needed for functional movement patterns, especially in the closed kinetic chain.
- Address symmetry of strength in calves, ankles and feet.
- Refinement of balance and equilibrium reactions in sitting, kneeling, ½ kneeling and standing
- Increase speed and control of reciprocal movements of the upper and 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**.
- Improvement of endurance in daily activities.
- Adapt and progress HEP
- Continue participation in community-based fitness program
- Re-evaluation including all pre-test measures, including videotaping
- Depending on skills level and tolerance to therapy, child usually participates in an intensive burst
- Frequency of therapy may be temporarily increased or decreased based on emerging functional skills, endurance level, and family goals.

### **Occupational Therapy Goals:**

1. Maintain and improve range of active and passive motion of upper extremities.
2. Improve upper extremity strength.
3. Inhibit abnormal patterns of movement.
4. Improve functional skills of upper extremities and trunk.
5. Maximize activities of daily living skills.
6. Provide appropriate home programming and parent education

### **Recommended frequency of physical therapy sessions:**

- Hospital discharge to 6 weeks post-op: 4-5 times per week
- 6 weeks to 6 months post-op: 3-4 times per week
- 6 months to 12 months: 2-3 times per week
- 12 months post-op and beyond: Based on individual needs. The frequency will vary during this period and includes varying models of therapy and transitioning into community-based activities.