The Challenge with SDR

- destructive/irreversible
- CP is not uniform.
- Bad results d/t
  - poor patient selection
  - excessive rhizotomy
  - incorrect selection of nerve root levels
  - unmanaged lever arm
dysfunction/contracture/weakness

Selection process

- Gait analysis
- Multidisciplinary spasticity clinic
IC 14 - A MULTIDISCIPLINARY APPROACH TO IMPROVING GAIT IN CHILDREN WITH CEREBRAL PALSY WITH RHIZOTOMY: PATIENT SELECTION, AND OUTCOMES

Overall Factor Tree

Birth History

Tone

Selectivity

Strength

Energy

Birth/Imaging History Factor Tree

Born premature

Yes

No

Periventricular Leukomalacia

Yes

No
Physical examination

<table>
<thead>
<tr>
<th>SELECTIVITY, STRENGTH</th>
<th>L</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIPS</strong></td>
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<tr>
<td>Flexion</td>
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<tr>
<td>Extension</td>
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<tr>
<td>knee 0</td>
<td>2.3</td>
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<tr>
<td>knee 90</td>
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<td>2.2</td>
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<tr>
<td>Abduction</td>
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<tr>
<td>hips extended</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Adduction</td>
<td>1.5</td>
<td>1.5</td>
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</tbody>
</table>

Selectivity Grade Key
0 - Only patterned movement observed.
1 - Partially isolated movement observed.
2 - Completely isolated movement observed.

Hypertonia Assessment Tool (HAT)

- Increased involuntary movements or postures of the designated limb with tactile stimulus of a distant body part
- Increased involuntary movements or postures with purposeful movement of a distant body part
- Velocity dependent resistance to passive stretch
- Presence of a spastic catch
- Equal resistance to passive stretch during bi-directional movement of a joint
- Increased tone with movement of a distant body part
- Maintenance of limb position after passive movement

Dystonia
Spasticity
Rigidity
Physical examination

- Spasticity (Ashworth Scale)

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
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<tbody>
<tr>
<td>Hip flexors</td>
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<tr>
<td>Adductors</td>
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<td>4</td>
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<tr>
<td>Hamstrings</td>
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<tr>
<td>Rectus femoris</td>
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<td>3</td>
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<tr>
<td>Plantarflexors</td>
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<tr>
<td>Posterior tibialis</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ankle clonus</td>
<td>++/U</td>
<td>++/U</td>
</tr>
</tbody>
</table>
Good selective motor control

- Kinematics
  - Stiffness
  - Diminished ROM
  - Typical spastic movement pattern
  - Could be contractures

Sagittal plane kinematics

- Pelvic Tilt
- Knee Flexion/Extension
- Hip Flexion/Extension
- Ankle Dors/Plantar
IC 14 - A MULTIDISCIPLINARY APPROACH TO IMPROVING GAIT IN CHILDREN WITH CEREBRAL PALSY WITH RHIZOTOMY: PATIENT SELECTION, AND OUTCOMES

EMG cospasticity

Rectus Femoris

Medial Hamstrings

Energy Efficiency

Normalized O2 Consumption

Typical Velocity

3.44X
Normal
Rhizotomy Procedure

Peter Kim, MD, PhD
Pediatric Neurosurgeon
Gillette Children's Specialty Healthcare

Selective Dorsal Rhizotomy