

# ***Does Rhizotomy Lead to Crouched Gait in Cerebral Palsy?***

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# *Introduction*

- Rhizotomy outcomes favorable 1 year post-operatively
- Few long-term studies
- Trends noted in our gait laboratory
  - Progressive pronatory collapse of midfoot
  - External rotation of tibial segment
  - External foot progression angle
  - Crouched gait



# *Research Questions*

- **What is the incidence and severity of crouched gait prior to, and 1 and 2 years after rhizotomy?**
- **How do characteristics of crouched gait vary over time?**
- **Are there significant improvements in velocity and stride length 1 and 2 years after rhizotomy?**



# *Methodology*

- **Descriptive study**
- **n=11 subjects with spastic diplegia**
- **Age 4.1 - 15 years (median 5.4 years)**
- **3 females, 8 males**
- **Gait analysis pre-op, 1 year post-op, 2 years post-op**



# *Crouch Profile*

- **Sagittal Kinematics**
  - - Knee extension in stance
  - - Dorsiflexion in stance
- **Transverse Kinematics**
  - - External tibial rotation
  - - External foot progression angle



# ***Crouch Profile (cont.)***

- **Video rating**
  - – **Pronatory collapse (5-pt ordinal scale)**
- **Physical exam**
  - – **Popliteal angle**
  - – **Knee flexion contracture**
  - – **External thigh-foot angle**
- **Spatial/temporal parameters**
  - – **velocity**
  - – **stride length**



# Crouch Severity Index

- **5-Point Ordinal Scale**

- Hyperextended knees in midstance -1
- No crouch/  $<10^\circ$  knee flexion 0
- Mild crouch:  $10-24^\circ$  1
- Moderate crouch:  $25-39^\circ$  2
- Severe crouch:  $\geq 40^\circ$  3



# Results

## Crouch Severity Index

	<u>HyperExt</u>	<u>No</u>	<u>Crouch</u>		
			<u>Mild</u>	<u>Mod</u>	<u>Severe</u>
Pre-Op	2*	1	3	3	2
1 Year	4	1	4	1	1
2 Year	2	1	7	1	0

\* Frequency Counts



# Results

## Incidence of Crouched Gait

Pre-op	73% (mild, moderate & severe crouch)
1 Year	55 % (mostly mild crouch)
2 Year	73% (mostly mild crouch)



# Results

<u>Kinematics</u>	<u>Pre-Op</u>	<u>1 Year</u>	<u>2 Year</u>
Max knee ext	23°	8°	13°
Max ankle DF	0	14°	18°
Max tibial rot'n	15° int	8.5° ext	18° ext
Foot progression	9° ext	30° ext	25° ext



# Results

The majority of subjects demonstrated equinus foot positioning in stance pre-operatively, while moderate pronatory collapse of the midfoot was noted at 1 and 2 years post-operatively.



# Results

<u>Physical</u>	<u>Pre-Op</u>	<u>1 Year</u>	<u>2 Year</u>
Popliteal $\Delta$	50°	40°	45°
Knee ext ROM	5°	5°	5°
Thigh foot $\Delta$	11° ext	17.5° ext	6° ext



# Results

## Spatial/Temporal

### Parameters\*

	Pre-Op	1 Year	2 Year
Velocity	40%	50%	68%
Stride length	60%	66%	74%

\* Expressed as a percentage of normal



# *Discussion*

