Equipment Options and Positioning Recommendations to Encourage “Hip Health”

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Hip – Cerebral Palsy

- Children with cerebral palsy are rarely born with hip dysplasia.

- Developmental hip dysplasia is a very common complication of children with cerebral palsy and can lead to significant disability and pain.

Hip Development

- Growth of a child’s hip occurs in a sequential process from embryo up to adolescence.

- Cartilage in the acetabulum serves to deepen the hip socket resulting in more complete coverage of the femoral head = More stable hip.
Hip Development

- Development of the acetabulum is dependent upon articulation of the femoral head in the acetabulum and is promoted through **Weight Bearing**.


Normal Hip With Cartilage

- (Image removed due to copyright policy)

Definition Hip Displacement

- Gradual, lateral displacement of the femoral head from under the acetabulum.

- Hip displacement often used interchangeably with hip subluxation.
Migration Percentage

Hip Dislocation

- Femoral head is completely laterally displaced from under the acetabulum.
- MP = 100%
- Other definitions include MP of > 80%.

Hip – Cerebral Palsy

- GMFCS can be used to determine which children are at the highest risk for displacement.
Hip Displacement - CP

- Mean follow-up 11 years, 8 months.
- Incidence of hip displacement entire group was 35%.
- Incidence GMFCS Level I =0%.    Level V = 90%


Hip Displacement - CP

- Followed using X-rays until age 9-16 years old.
- 27% developed hip displacement > 33% and of these 18% showed displacement > 40%.

**Femoral Anteversion and CP**

- 147 children (267 hips) of children with CP studied.
- Early ages, angle of femoral anteversion similar to typically developing peers.
- As age, typical children’s angles decreased to normal adult degrees.
- CP children showed minimal change in degree of anteversion.


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**Coxa Valga**

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**Who Is At Risk?**

- GMFCS Levels IV and V are highest risk.
- Level III lesser risk but need monitoring.
Risk Factors

• 1. Asymmetries:
  – Muscle Imbalances
  – Range of motion limitations, especially at hips and knees.
  – Spasticity
  – Adduction contractures can directly lead to changes in the acetabulum and femur.

• 2. Lack of Normal Weight Bearing

Intervention

• 1. Tone Management

• 2. Postural management

• 3. Therapy

• Orthoses and Splinting

Postural Management

• Level 4 evidence suggests that use of postural management concepts and equipment before the age of 18 months, can decrease incidence of hip pathology in CP children at GMFCS Levels III, IV and V.

Positioning

• The following areas need to be addressed:
  – Lying Support
  – Seating
  – Standing

Standing

• Goal:
  – Symmetry
  – Neutral pelvis in terms of tilt, rotation and obliquity
  – Hips in ABDUCTION
  – Hips and knees in full extension

Why Abduction?

• (Image removed due to copyright policy)
**Martinsson and Himmelmann**

- Non-ambulatory children with CP, GMFCS levels III-V.
- 1 year of straddled weight bearing in maximum tolerated hip extension and abduction.
- Controls matched for age, motor ability and surgery.


**Dosing**

- 1. Bone Mineral Density – 60-90 minutes/day
- 3. Range of Motion of Hip Knee and Ankle – 45 to 60 minutes.
- 4. Spasticity – 30 to 45 minutes.

**Systematic Review Dosage**


**Sitting**

- **Goal:**
  - Symmetry
  - Neutral pelvis in terms of tilt, rotation and obliquity.
  - Hips in **ABDUCTION**

**Lying**

- Symmetry
- Hips in Abduction
- Comfort

**When Equipment Considered**

- **Lying Supports** – As soon after birth as possible.
- **Sitting programs** – About age 6 months.
- **Standing** – Age 10 to 12 months.
Positioning Children GMFCS Levels IV-V

Supine – Sunny Hill Health Centre

Use positioning rolls, wedges, bolsters that hold shape.
Use daily to tolerance. Avoid asymmetry.

- **Ages 0 to 2** - 15 to 30 degrees hip abduction, hip flexion 10 to 40 degrees, hip external rotation 5 to 30 degrees.
- **Ages 2 to 4** – Hip abduction to 20 degrees, flexion 0 to 15 degrees, external rotation 5-15 degrees.
- **6 and Over** – Hip abduction 20 degrees, flexion 0-10, external rotation 5-15.

Positioning Children GMFCS Levels IV-V

Sitting – Sunny Hill Health Centre

Aim for hip abduction 15 to 30 degrees. Hip external rotation 5 to 15 degrees.

**Infants** – Introduce about age 5 months to tolerance. Gradually bring to more upright to encourage head control. May adapt commercially available baby equipment.

**2 and Older** – Use for feeding, fine motor activities, interaction and mobility. Ages 2 to 6, up to 6 hours a day. Older than 6, 6 hours or more to tolerance.
Positioning Children GMFCS Levels IV-V

Standing – Sunny Hill Health Centre

- Use supine, prone, upright or sit to stand standers.

- Under 2 – Introduce about age 10 months. Aim toward 15 + degrees hip abduction. Daily per tolerance.

- Ages 2 and Older – Hip abduction 15 to 30 degrees. Avoid 0 degree hip abduction. Use daily 60 to 90 minutes.

Walking – Sunny Hill Health Centre

Supportive Walker/Gait Trainer

- Introduce for Level IV children after 10 months as appropriate.

- Provide support where needed from head down.

- Aim for active range of motion.

- Daily as per tolerance.

24 Hour Postural Care

- Literature shows strong correlation between postural asymmetries and hip displacement, scoliosis, knee flexion contractures.

- At least 1/3 of 24 hour day, is spent lying down/sleeping.

- Basis of this approach is to support the person in comfortable, well aligned, symmetrical position throughout day and night.
Montana Postural Care Project

- Pilot program funded by the Montana Council on Developmental Disabilities.

- Purpose: “Introduce 24 hour postural care as a practical approach for people with motor impairments in a large rural state with limited special services, while examining the results in the population served.”


Montana Project

- Participants: 30 people with physical impairments/spasticity.

- Training: 1 day course for all participants including therapists, caretakers, nurses, etc.

- Evaluation: Half day in home for each individual person in study. Included Goldsmith Indices of Body symmetry (GloBS), Pittsburgh Sleep Quality Index, Pediatric Pain Profile or other pain scale.

Montana Project

- Night Time Care Plan formulated.

- Provided: 4 postural supports
  - Non-slip mesh
  - Pressure relieving airflow mattress pad
  - 2 types lateral supports (usually included a leg positioner of some kind)
  - Additional household items (rolled towels, stuffed animals, cushions)

Photos Taken --- Ongoing support as needed.
Montana Project

- Results:
  - 80% improvement sleep quality vs. 0% controls.
  - 80% improved body symmetry vs. 0% controls.
  - 50% participants with pain issues, had lower pain scores.

- Anecdotal:
  - Most common report was improved day time alertness.
  - Several people who did not tolerate the full postural assessment at initial evaluation, tolerated at final follow up.

Surveillance

- Whole child oriented
  - Includes tone management, gross and fine motor development, hip and spine surveillance.

- Levels III to V GMFCS - Ortho
  - Radiographs hips annually starting 1 year to 8 years.
  - After 8, radiographs as needed.
  - MP calculated all radiographs
  - CPUP Hip Score
  - Hips at risk dislocation, MP > 40% surgery considered early.

Surveillance - Therapy

- Evaluation 2 times/year until age 6, then annually
- Evaluation includes joint range of motion using a goniometer, and clinical evaluation of spine.
- Goal: early detection of contractures and deformities to allow for early non-surgical treatments.
- Treatment includes:
  - Postural management
  - Orthotics and assistive devices
  - Individual training
  - Spasticity management