Hip Status and Long-Term Functional Outcomes in Spina Bifida

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Third World Congress on Spina Bifida Research and Care
March 17, 2017
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Background
• Paralytic hip dislocation = common and difficult problem
  • 30-50% of patients with spina bifida will develop a dislocated hip by skeletal maturity
• Radical change in treatment strategy over time
  • Due to increased emphasis on functional outcomes
  • Still remains an AREA OF CONTROVERSY
• Previously, reduction was recommended for all children with a hip at risk, but no long-term functional evidence to support this
Background

• CGA of patients with low lumbar level and unilateral hip dislocation:
  • Gait symmetry corresponds to absence of hip contractures and is not related to hip dislocation
  
  Gabrieli et al J Pediatr Orthop 2003

• Examination of functional results after surgical hip reduction:
  • No improvement in hip ROM
  • No improvement in ambulatory ability
  • No decrease in pain
  • No decreased need for bracing

• Literature review:
  • Current treatment goals should focus on maintaining hip ROM with contracture release as needed
  • No role for hip reduction in patients with low lumbar or higher functional levels

  Swaroop and Dias Evidence-Based Orthopaedics 2008
Background

• Despite this, management of hip instability remains an area of some controversy

• Lack of long-term functional outcome studies
• To determine the influence of hip status on functional outcomes in a cohort of adult patients with myelomeningocele
Methods

• Patients prospectively enrolled from RIC adult spina bifida clinic over a 12-month period
  • IRB-approved cohort study

• Inclusion criteria:
  • Diagnosis of spina bifida
  • > 18 years of age

• Demographic data, neurologic level of involvement, functional mobility scale (FMS), and history of previous hip surgery obtained from chart review/patient interview.
Methods

• Clinical examination (performed by one of two senior authors):
  • Hip abduction
  • Hip flexion/extension
  • Hip internal/external rotation
  • Leg length discrepancy

• Radiographic examination (current AP pelvis):
  • Hip status: located, subluxated, dislocated
  • Reimer’s migration percentage
Methods

Outcomes measures:

- Patient-reported
- VR-12
  - Health-related quality of life
- NIH PROMIS®
  - Pain interference
  - Physical function
Methods

- **VR-12**
  - Health-related quality of life
- Valid for all ambulatory care settings for patients with chronic conditions
- Used by VA for all patients with chronic conditions
Methods

- NIH PROMIS®
  - Pain interference
  - Physical function

- Clinical validity amongst multiple chronic disease groups
  - Has not been validated for NM diseases
Methods

- Statistical analysis:
  - Chi square ($\chi^2$)
  - Pearson Correlation Coefficients
  - Linear regression models

Evaluate influence of hip status on outcomes
Results - Subjects

31 patients:

• 17 women / 14 men

• Average age of 31 years (range 19-49y)

• Level of involvement
  ▪ 8 thoracic level
  ▪ 9 lumbar level
  ▪ 14 sacral level
Results - Subjects

• **31 patients:**
  
  • GROUP 1 (N=20) - bilaterally located hips
  
  • GROUP 2 (N=5) - unilateral subluxation or dislocation
  
  • GROUP 3 (N=6) - bilateral subluxation or dislocation
Results

Univariate analysis:

- Compared each group (1-3) against the others in terms of:
  - MCS12 (VR-12 psychological score)
  - PCS12 (VR-12 physical score)
  - Pain interference (PROMIS psychological score)
  - LEF (PROMIS physical score)
Results

Univariate analysis:

• **PROMIS Lower extremity function scores:**
  • GROUP 1 (located hips) performed better than GROUP 2 (unilateral subluxation/dislocation)
    • (36.7 vs. 26.0, p=0.03)

• **PROMIS Pain interference scores:**
  • GROUP 1 performed worse than GROUP 3 (bilateral subluxation/dislocation)
    • (52.0 vs. 43.3, p=0.03).
Results

• After controlling for neurologic level,

• No statistically significant difference between groups:
  • VR-12 mental component summary scores (p=0.32)
  • VR-12 physical component summary scores (p=0.32)
  • PROMIS lower extremity function scores (p=0.26)
  • PROMIS pain interference scores (p=0.33)
Results

- No correlations between outcomes measures and migration percentage
Results

Box Plot for mcs12

Box Plot for pcs12

Box Plot for LE_function

Box Plot for pain_interference
Results

• Decreased extension (p=0.0038) and abduction (p=0.0032) were both indirectly correlated with VR-12 mental component score.

• Leg length discrepancy was not associated with any outcome measure.
Limitations

- Small sample size
- Reliability of data collection (patient-reported)
Conclusions

• Long term *functional outcomes are not associated with hip status* in adult patients with spina bifida.

• *Functional outcomes are more closely correlated with neurologic level and hip range of motion*

• In fact, the discordant outcomes noted in univariate analysis are likely reflective of neurologic level of involvement rather than hip status.
Efforts to keep hips reduced in patients with spina bifida are likely without functional benefit and should be avoided.

However, efforts should be made to maintain functional motion with contracture release as needed.
Thank you
References

- Cook KF, Jensen SE, Schalet BD, et al. PROMIS measures of pain, fatigue, negative affect, physical function, and social function demonstrated clinical validity across a range of chronic conditions. *J Clin Epidem* 2016;73:89-102