High Prevalence of Early Language Delay Exists Among Toddlers with Neonatal Brachial Plexus Palsy

KWC Chang, MA, L Driver, MS, MA, CCC, LJS Yang, MD, PhD, VS Nelson, MD, MPH
UM Brachial Plexus Program

Association of language impairment with Neonatal Brachial Plexus Palsy (NBPP) has not been reported in the literature. Current treatment paradigm for NBPP focuses on upper extremity functional motor recovery, with little formal assessment of other aspects of development, including language and communication. This pilot study formally evaluated the prevalence of early language delay in toddlers with NBPP and the potential NBPP-related factors involved.

We observed high prevalence (46%) of early language delay among NBPP toddlers with gender differences; however, no NBPP-related factors correlated with language impairment. Early identification and timely intervention may be crucial for improving communication/developmental outcome for this population.

RESULTS

Inclusion criteria
- NBPP toddlers from 24 to 36 mos with no secondary or cognitive impairment
- Parents/caregivers ≥ 18 yrs old
- Monolingual English-speaking families

Exclusion criteria
- Children with cognitive or neurologic impairment other than NBPP
- Bilingual families

Data collection
- Patient Demographics, family SES status and family history of language delay
- Patients’ clinical status (palsy side, treatment type, Narakas score and biceps MRC score)
- Preschool Language Scale (PIS-4) measured by a certified speech-language pathologist

METHODS

Statistical Analysis
All statistical analyses were performed using SPSS version 18 (IBM SPSS, NY). Numerical variables were compared among delay and non-delay groups by Student t test and categorical variables by chi-square or Fisher’s exact test. Logistic regression was applied to analyze factors associated with language delay, and statistical significance level was established at p < 0.05

CONCLUSIONS

- High prevalence of language delay exists in the NBPP population.
- Gender differences: Logistic regression shows males are 3.3 times more likely to exhibit language delay than females (P<0.03), which is consistent with the literature regarding speech and language delay in the general population.
- No other demographics or NBPP-related factors were found to influence NBPP children’s language development in this study.
- Early identification of language delay and timely intervention may improve outcome for NBPP patients.

REFERENCES


ACKNOWLEDGEMENT

This study is supported by Michigan Institute for Clinical & Health Research (MICH) Practice Oriented Research Training (PORT) Program
DENISE JUSTICE, OTR

Early Full Passive Range of Motion Maintains Shoulder Integrity and Improves Active Range of Motion

D Justice, OTR1; KWC Chang, MA1; L Rasmussen, OTR1; LJS Yang, MD, PhD1; VS Nelson, MD, MPH1; SL Murphy, ScD OTR2; MDiPietro, MD1

1UM Brachial Plexus Program; 2Department of Physical Medicine & Rehabilitation; 3VA Ann Arbor Health Care System GRECC; 4Department of Radiology

ABSTRACT

In patients with Neonatal Brachial Plexus Palsy (NBPP), incidence of posterior shoulder dislocation during the first year is approximately 7.4 to 9.2%.2 Controversy exists regarding the timing and extent of shoulder passive range of motion (ROM) exercises for shoulder stability. Patients who underwent full passive ROM exercises at the shoulder initiated prior to 6 months were assessed between 2-4 years of age, clinically for passive and active ROM, and with an ultrasound evaluation. We found that passive ROM remained stable, active ROM improved, and shoulder function was maintained. Therefore, we suggest that optimal treatment for patients with NBPP includes early rehabilitation and full ROM exercises.

METHODS

Inclusion criteria
• NBPP patients from 2 to 4 years old who received treatment at UM prior to 6 months of age
• Patients of caregivers who perform full ROM exercise

Exclusion criteria
• Patients of caregivers not performing full ROM exercise
• First appointment at the UM BPP Clinic after 6 months of age

Data collection
• Demographics
• Parent survey to query for full ROM exercises
• Active and passive ROM measurements at shoulder and elbow at initial visit and follow-up prior to ultrasound study

Ultrasound evaluation
- Occupational therapist provides static and dynamic ROM sequences for shoulder flexion, external rotation in abduction
- Radiologist records clinical impression
- Patient seated for posterior approach

RESULTS

Birch Shoulder Deformity Score

<table>
<thead>
<tr>
<th>Number of Patients</th>
<th>Maintained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>All Pre-UPS</td>
</tr>
<tr>
<td>No Shoulder</td>
<td>32/42</td>
</tr>
<tr>
<td>Dx:</td>
<td>10/0/25</td>
</tr>
<tr>
<td>Rx:</td>
<td>2/8/90</td>
</tr>
<tr>
<td>Combination of Deformity Score</td>
<td>3</td>
</tr>
<tr>
<td>Shoulder ROM (mm)</td>
<td>11/56</td>
</tr>
<tr>
<td>Ultrasonography (n=30)</td>
<td>10/36</td>
</tr>
</tbody>
</table>

CONCLUSIONS

• Passive and active ROM at the shoulder remained stable with early rehabilitation using full passive ROM.
• Full passive range of motion maintains shoulder function (Birch Shoulder Deformity Score) among NBPP patients.
• Future studies will quantify provalence and extent of shoulder subluxation by ultrasound evaluation.

REFERENCES


ACKNOWLEDGMENTS

Sponsored by the UM Pediatric Orthopedic Research Program and the Department of Neurosurgery, University of Michigan/Trinity Medical Center.

Contact Information

University of Michigan Department of Radiology Research Program

www.roadsm.IsActive.com

313-763-9311

OBJECTIVES

• To evaluate shoulder integrity among NBPP patients between the ages of 2 and 4 years
• To evaluate the changes in active and passive ROM after early full shoulder ROM exercises

Statistical analysis

All statistical analyses were performed using SPSS version 18 (IBM SPSS, NY). P-values of < 0.05 were considered statistically significant. Figure 3 describing Birch Shoulder Deformity Score2 represents the change between initial and follow-up visits using Fisher’s exact test, p=0.55.
Lynette Rasmussen, OTRL

DVD Use Maintains Accuracy of Movement in Home Exercise Program

L Rasmussen, OTRL, KWC Chang, MA, D Justice, OTRL, LJS Yang, MD, PhD, VS Nelson, MD, MPH

UM Brachial Plexus Program

Abstract

For patients with Neonatal Brachial Plexus Palsy (NBPP), performing range of motion (ROM) exercises accurately in the home is critical for optimal recovery of function. After caregivers were given the DVD entitled “Home Exercise Therapy Program for Brachial Plexus Palsy,” we investigated (1) the accuracy of ROM movements and (2) the change in active ROM during the study period. The expected decrease in the accuracy of ROM movements over time was not observed with use of the DVD, and active ROM improved by 20% during the study period. We suggest that the use of DVD to demonstrate home exercises significantly contributes to the optimal treatment of NBPP.

Methods

Inclusion criteria
- Adult caregivers (≥18 years old)
- Portion of care by UM BPP
- Prevented participation due to immobilization

Exclusion criteria
- Non-English speaking caregivers
- Participants in filming of DVD
- Surgical interventions at time of study

Data collection
- Demographics
- Initial clinic visit
  - Exercise demonstrated by OT
  - Caregivers performed the exercise
  - OT evaluated caregiver accuracy
  - Exercise DVD given to caregivers
- Follow-up at 3, 6, and 12 months

Survey measure
- Dichotomy Scale (Yes=1, No=0)
  - Exercise movement accuracy on five joints
  - Hand placement
  - Maintained stretch
  - Exercise correctness

Active Range of Motion
Evaluated at follow-up visits and stored in the IRB-approved data base.

- Shoulder flexion
- Shoulder extension
- Elbow flexion
- Wrist extension
- Fingers flexion

Statistical analysis
All statistical analyses were performed using SAS version 9.2 (SAS Institute Inc, Cary, NC). P-values of < 0.05 were considered statistically significant.

T-test utilized:
- Compare descriptive statistics of demographics
- Each visit exercise accuracy rates and corresponding active range of motion presented

Results

<table>
<thead>
<tr>
<th>Home exercise DVD Recipient Demographics</th>
<th>Initial</th>
<th>3 mos</th>
<th>6 mos</th>
<th>12 mos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total caregivers evaluated</td>
<td>79</td>
<td>63</td>
<td>48</td>
<td>28</td>
</tr>
<tr>
<td>Months of follow-up evaluation (days)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months Sodium Storm SD</td>
<td>21±1</td>
<td>20±1</td>
<td>20±1</td>
<td>20±1</td>
</tr>
<tr>
<td>Age Range when receiving DVD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 to 12 months</td>
<td>35±2%</td>
<td>30±4%</td>
<td>30±4%</td>
<td>30±4%</td>
</tr>
<tr>
<td>1 to 4 years</td>
<td>24±14%</td>
<td>25±14%</td>
<td>25±14%</td>
<td>25±14%</td>
</tr>
<tr>
<td>Mean child age when receiving DVD (SD:mm)</td>
<td>10±18%</td>
<td>10±18%</td>
<td>10±18%</td>
<td>10±18%</td>
</tr>
<tr>
<td>Mean difference in child’s age when starting DVD compared initial evaluation (SD:mm)</td>
<td>3±4</td>
<td>3±4</td>
<td>3±4</td>
<td>3±4</td>
</tr>
</tbody>
</table>

Conclusions

- Exercise accuracy did not change significantly during the study period of 1 year, except at the shoulder; shoulder exercises are more complicated in positioning/stabilization and may require more in-depth review with the caregiver.
- Active range of motion improved progressively during the study period

We suggest that DVD instruction is useful as a patient reference to maintain accurate positioning of the arm during the home exercise program for NBPP.

References
The Global Rehabilitation Certificate Program of the International Rehabilitation Forum

Olubisi Ajetunmobi, Any Haig, MD, Sean Smith, MD
University of Michigan Health System, Department of Physical Medicine and Rehabilitation, Ann Arbor, Michigan; International Rehabilitation Forum

ABSTRACT

Global collaboration in medical rehabilitation is increasing with the advent of better technology with which to share information. Additionally, the desire for medical students, residents, and attending physicians to participate in global health initiatives has increased concurrently. Rehabilitation provides a unique challenge in the era of global health, as it does not easily lend itself to visiting physicians providing high-quality care. While other specialties may allow a physician to make an impact with a short-term collaborative effort, the need for sustained, long-term care for the rehabilitation patient necessitates a strong framework for cooperation that can last indefinitely.

Part of a long-term, sustainable effort is the need for the collaborating specialist to have a solid understanding of the cultural aspects of the country or region in which they will be visiting, and how successful cooperation can best be achieved within that framework. This is an outline for a standardized global rehabilitation elective to promote cultural competency and therefore successful collaboration.

BACKGROUND

The program will require the resident or medical student to study the country before going overseas, and write a brief summary of their findings. This will serve to educate the prospective global health collaborator, and also to document important information for futurerotates in the following months and years.

There will also be standardized requirements for the resident or student overseas. They will visit a local disabled persons organization (or similar body that advocates for the disabled), and exchange knowledge with local professionals working with that patient population. They will also use the Language Independent Functional Evaluation (LIFE) to interview patients, and ideally perform an epidemiological study for eventual publication. Once home, they will make a report of their findings (including their background report if needed), and make a brief (approximately 3 minute) video discussing their experience.

After completing the three phases of this program, the resident will be considered an official candidate for the IRF.

AS more and more rotating students and residents generate reports on the countries they visit, the International Rehabilitation Forum will archive them as an educational resource. This will be done on the IRF’s website, with the goal of making this an interactive multimedia experience for users, thus promoting global medical rehabilitation.

In the future, users will be able to contact past-rotates for their advice. This may range from everything from medical content, to navigating ethical board pre-study surveys in other countries, to good local restaurants.

The first resident to complete this program recently returned from Ghana, and the program added the student in working with members of the medical community, and broadened their knowledge of the country beyond what they would have learned without the structured curriculum.

HOW IT WORKS & GOALS

The program will require the resident or medical student to study the country before going overseas, and write a brief summary of their findings. This will serve to educate the prospective global health collaborator, and also to document important information for future graduates in the following months and years.

There will also be standardized requirements for the resident or student overseas. They will visit a local disabled persons organization (or similar body that advocates for the disabled), and exchange knowledge with local professionals working with that patient population. They will also use the Language Independent Functional Evaluation (LIFE) to interview patients, and ideally perform an epidemiological study for eventual publication. Once home, they will write up a report on their findings (including their background report if needed), and make a brief (approximately 3-minute) video discussing their experience.

After completing the three phases of this program, the resident will be considered an official candidate for the IRF.

As more and more rotating students and residents generate reports on the countries they visit, the International Rehabilitation Forum will archive them as an educational resource. This will be done on the IRF’s website, with the goal of making this an interactive multimedia experience for users, thus promoting global medical rehabilitation.

In the future, users will be able to contact past-rotates for their advice. This may range from everything from medical content, to navigating ethical board pre-study surveys in other countries, to good local restaurants.

The first resident to complete this program recently returned from Ghana, and the program added the student in working with members of the medical community, and broadened their knowledge of the country beyond what they would have learned without the structured curriculum.

SAMPLE REPORT & MODULE CONTENT

Pre-rotation module:
- Demographic breakdown of the country (population, ethnicities, etc.)
- Language(s) spoken
- Basic economics of the country (developing, developed, etc.)
- Major religion(s)
- Visa status for visitors
- Approaches to disability within the country
- Medical system description
- If doing research, obtain ethical board approval

During the rotation:
- Meet with local professionals who work with rehab patients
- Visit local organizations that advocate for and assist the disabled
- Conduct research, if applicable
- Interact with patients using LIFE, if possible
- Attend lectures, give lectures, and in general exchange knowledge

After the rotation:
- Complete a summary report of the experience, preferably in video format
- Compare data with previous rotators’ results
- Complete research project, if applicable
- Share important logistical information for future rotators, such as who to contact before arriving, tips on how to optimize productivity, good places to stay and eat, and so on.

CONCLUSION

The world has become more connected in recent years through technology, and the PM&R community is increasingly eager to participate in global outreach. As such, good systems need to be in place to produce better experiences in global health. The International Rehabilitation Forum seeks to standardize the international elective rotation to promote cultural competency, make collaborations more productive, and make interacting with members of the rehabilitation community easier. There will be challenges as this program begins, and adjustments will be inevitable.