

SCIENTIFIC SESSION II

FRIDAY, OCTOBER 4, 2019 | 3:30PM – 4:30PM

8

Skin Temperature Asymmetry and Stimulated Skin Wrinkling: Reliability and Validity for Evaluating Obstetrical Brachial Plexus InjuriesT. PACKHAM¹, A. AHMAD¹, M. HUXTABLE¹, N. JACOB¹, D. SCHUTTEN¹, D. GJERTSEN³, C. DEMATTEO¹, J.C. MACDERMID^{1,2}, J. BAIN³¹School of Rehabilitation Sciences, McMaster University, Hamilton, ON, Canada²Western University, London, ON, Canada³McMaster Children's Hospital, Hamilton Health Sciences, Hamilton, ON, Canada

Purpose: Nerve injuries in adults are evaluated via sensation, manual muscle testing and nerve conduction studies. These evaluations are difficult, if not impossible, to perform in a wiggling infant or a young child who has not yet developed sufficient skill to follow instructions and provide verbal responses describing perception. This is further complicated in obstetrical brachial plexus injuries (OBPI), where there are no external cues (e.g. a laceration) to inform an anatomical hypothesis. Historically, evaluation of pediatric nerve injuries, including OBPI, rely on clinical observations of movement patterns, with the recent addition of limb length and circumference measures. Stimulated skin wrinkling in warm water or with EMLA has been proposed to supplement surgical decision-making, but the measurement properties have limited evidence.

Recent research in adults has suggested infra-red measures of skin surface temperature asymmetry may indicate nerve dysfunction, and graded ratings of EMLA-stimulated skin wrinkling have been proposed as a reliable method for identification of nerve injury. Given both these methods do not rely on substantial participant cooperation or verbal expression, there is an opportunity to evaluate their reliability and validity for pediatric nerve injury evaluation.

Methods: We conducted a cross-sectional measurement study in infants and children attending an OBPI clinic. We evaluated participants using 1) skin temperature asymmetry measures of distal cutaneous territories representing the median, ulnar, and radial nerves, 2) EMLA-stimulated skin wrinkling of the pulp of the index and small fingers (in children over age 2), and 3) digital photographs with polarized filters to allow image processing with TiVi software to analyze blood flow. We also extracted existing data on clinical evaluations of movement and nerve repairs (where applicable) from participant medical records for correlation.

Results: Data collection in this study is ongoing; however, to date we have evaluated 21 children. We will present analysis on 1) validity of skin temperature asymmetry using receiver operating curves to present ideal sensitivity and specificity of asymmetry in children with known nerve injury (post-repair), agreement compared to measures of blood flow, and relationship to validated clinical assessments of movement patterns; 2) inter-rater reliability estimates for a wrinkle rating scale for EMLA-stimulated skin wrinkling measures in children.

Conclusion: This study will generate insight into the measurement properties of novel evaluations for pediatric nerve injuries, including OBPI.

9

Purdue Manual Dexterity Scores: A Cohort Study of Community Dwelling ElderlyK. RULE¹, J. FERRO¹, A. HOFFMAN¹, J. WILLIAMS¹, S. GOLSHIRI¹, R. PADRE¹, J. AVILA¹, C. COCA¹, K.A. VALDES²¹Occupational Therapy, Gannon University, Powder Springs, GA, United States²Occupational Therapy, Gannon University, Bradenton, FL, United States

Purpose: The Purdue Pegboard Test (PPT) is a manual dexterity test that requires the manipulation of pegs, washers, and collars. Our population for this research intervention focused on the geriatric community due to the lack of recent available normative data. Much of the existing data was collected using the Purdue Pegboard model 32020 which is no longer available for purchase. Our objective was to gather normative data for community-dwelling seniors. The purpose of this study was to provide updated normative data for hand therapists to use in clinical practice to determine if seniors have dexterity deficits.

Methods: This cohort study was completed through a convenience sample. Participants were stratified into three age groups (60-69, 70-79, and 80+). The study was approved by the University IRB committee. Before data was collected, the participants signed a written consent form. The Purdue Pegboard model used Model 32020A. The participants performed 3 trials of the Purdue Pegboard test following the standardized test instructions.

Data Analysis: Descriptive data was collected. The participants mean Purdue Pegboard scores were analyzed using a un-paired t-test to determine if there was a statistically significant difference between male and female PPT mean scores. A one-way Analysis of Variance was used to compare the mean scores of each designated age group to determine if there was a statistically significant difference between the mean group scores.

Results: One hundred and twenty-eight participants were selected via convenience sample. The sample consisted of community dwelling seniors living a community in Florida. Fifty-nine males and sixty-nine females gave oral and written consent to participate in the study. Participants' ages ranged from 60-99. Approximately eighty percent of participants were right hand dominant and twenty percent were left hand dominant.

The entire senior population's mean Purdue Pegboard Test score for the right hand was =11, SD 2.68. left hand =10, SD 2.75, bilateral hands =8, SD 2.41, and assembly =28, SD 6.72. The highest score recorded for assembly task on the PPT, was 46 pieces and was achieved by the youngest participant in the sample. A 65-year-old female performed the lowest score recorded for assembly task on the PPT of 13 pieces. Scores were stratified into percentiles. A one-way analysis of variance reported statistically significant differences between the mean scores of the three age groups ($F= 15.03, P<.00$). The results found that those individuals who were younger (60-69) scored better on the assessment than those (80+). There was not a statistically significant difference between PPT mean scores of males and females.

Conclusion: Dexterity declines with age which may affect occupational performance over time. It is important that hand therapists compare patient performance scores to normative data to determine fine motor deficits and determine patient specific functional performance goals and interventions.