Assessing Palpation Thresholds of Osteopathic Medical Students Using Static Lumbar Spine Models

Eric J. Snider, DO; Kenneth L. Pamperin, MS; Jane C. Johnson, MA; Natalie R. Shurtz, MHA; Brian F. Degenhardt, DO

Eric J. Snider, D.O.
Associate Professor Neurobehavioral Sciences
A.T. Still University of Health Sciences-Kirksville College of Osteopathic Medicine
Osteopathic Palpatory Diagnosis

- Manual methods of spinal diagnosis are taught at all COMs

- Few objective measures
  - Skill acquisition
  - Skill assessment
Palpation Models 2006

- Models introduced to aid student manual skill development

- Static Positional Asymmetry
  - Lumbar spine
  - Pelvis
Palpation Models 2007

- Performance measured
- OTM course grade included participation points for completing the activity
Palpation Models 2008

- OTM course grade included points for accurate performance
- Data used to narrow the range of asymmetry for testing in subsequent years
- Plastic spine models replaced with bronze
Palpation Models 2009 & 2010

- Baseline assessment – ungraded
- One graded assessment per quarter
- Ad lib access to models for two weeks prior to testing
- Remediate if score below 70%
- Testing moved from OTM lab to research space
- Online video tutorial
Current Study: 2009 & 2010

- Design: Observational
- Goal: Simulate the evaluation of spinal rotational asymmetry in the transverse plane of a prone patient

- Participants:
  - OMS1 students (n=334)
  - Enrolled in OTM course at ATSU-KCOM
  - Classes of 2013 (n=171) & 2014 (n=163)
Methods

• Assessment 1
  – Baseline, first week of school
• Assessment 2
  – End of Quarter 1
• Assessment 3
  – End of Quarter 3
• Local IRB approved the study
Methods

• For each transverse process pair
  – Determine if right is anterior or posterior to the left
  – Forced choice, dichotomous response
• Block transverse process & bronze lumbar spine models
• Both foam-covered and uncovered models
Block Transverse Process Models

- 6 or 10 wooden block pairs
  - 10 mm × 15 mm surface area
  - Block heights 3-14 mm
  - Total asymmetry 1-6 mm
- Uncovered
- Foam rubber covered
  - Blocks 12 mm layer
  - Entire model 4 mm layer
    - foam and fabric
Methods: Lumbar Spine Models

- 5 lumbar vertebrae
  - Cast in bronze
  - Secured to wooden base
  - Total asymmetry 2-6 mm

- Uncovered

- Foam rubber covered
  - TPs 25 mm layer
  - Entire model 12 mm layer
    - foam and fabric
Methods: Statistical Analysis

• Random-intercept logistic regression model
  – students treated as random effects
  – correlation of performance within and between assessments for individual students
• Outcome variable: Whether the student correctly determined the direction of the asymmetry
• Predictor variables: Magnitude of the asymmetry, the type of lumbar model, and the assessment
• 80%, 90%, and 95% Thresholds: Defined as the magnitude of asymmetry where the predicted probability of correctly determining the direction of the asymmetry exceeded .80, .90, and .95, respectively
Results: Comparison Of Uncovered And Covered Block Transverse Process Models
Results: Comparison Of Uncovered And Covered Lumbar Spine Models
Results: Comparison Of Covered Block Transverse Process And Lumbar Spine Models
Asymmetries where probability of correctly identifying the direction of asymmetry was above .80, .90, and .95

<table>
<thead>
<tr>
<th>Model Type</th>
<th>Assessment</th>
<th>Threshold (mm) with Probability:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>.80</td>
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<tr>
<td>Block Transverse Process</td>
<td>Uncovered</td>
<td>1</td>
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<tr>
<td></td>
<td>Covered</td>
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<tr>
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<td>2</td>
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<tr>
<td></td>
<td>3</td>
<td>1</td>
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<tr>
<td>Lumbar Spine</td>
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</tr>
<tr>
<td></td>
<td>Covered</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4**</td>
</tr>
</tbody>
</table>

* Probabilities for 5-6 mm asymmetries were less than .90.
** Probability for 6 mm asymmetry was less than .80.
Discussion: Future Directions

• Does accuracy when palpating lumbar spine models translates to accuracy when palpating humans?

• Which palpation pressures are associated with improved accuracy?
Discussion: Future Directions

• Training Schedules
  – Ad lib access
  – Training immediately prior to testing

• Model refinement
  – Simulate different BMI, different muscle mass/tone
  – Dynamic models (motion restriction)
  – Tissue texture abnormalities
  – Combination of tests (TART for somatic dysfunction)
Discussion

• This study used a forced-choice, dichotomous response design
• Established good accuracy thresholds for palpation of asymmetry of two paired structures
• A recent study evaluating ASIS asymmetry used a trichotomous response design (included equal as a possible response) was unable to establish good accuracy
Discussion: Relatively Cost Effective

- Other Institutions
  - Norway, Portugal, Japan
  - SOMA-ATSU
- Workshops (20-40 hours)
  - Objective feedback
  - Models, camera systems
- Ken Pamperin
  - Director of Research Support
  - kpamperin@atsu.edu
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Questions or Comments