The Use of Ultrasound to Assess Cervical Spine Segmental Rotation as a Component of Somatic Dysfunction

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BACKGROUND

Ultrasound (US) use has increased in both clinical practice and in undergraduate medical education (UME). Ultrasound is used in UME to assist in teaching concepts of anatomy, physiology, pathology, and clinical diagnosis. Osteopathic UME has expanded its use to further exploration of osteopathic concepts of musculoskeletal biomechanics, somatic dysfunctions (SD), and manipulative medicine techniques. Palpation assessment and diagnosis are fundamental to osteopathic student education. Prior studies have demonstrated correlation between US findings and lumbar rotational diagnosis. Validation of US to assess cervical spine rotation could potentially assist with student learning and confirm cervical somatic dysfunction diagnosis, thereby providing inter-examiner reliability.

METHODS

Subjects:
- 41 subjects participated in this prospective observational study conducted at NYIT-COM.
- IRB approval BHS-957; 52/1/2013
- Inclusion criteria:
  - Asymptomatic, healthy subjects
  - Exclusion criteria:
  - Acute, severe spinal pain, radiculopathy, ligamentous laxity, prior spinal surgery, history of seizure or stroke
- See Table I

Cervical Diagnosis:
- Two physicians independently diagnosed the most prominent cervical rotational asymmetry from C2-C7 using segmental rotational motion testing (Figure III)
- Segment was confirmed and marked

Ultrasound Imaging:
- Images and measurements obtained using SonoSite M-MSK US system with SonoSite M-Turbo HFL50x transducer (Figure I)
- Radiologist, blinded to the rotational preference, obtained US measurements of the marked segment left and right AP (Figure IV, VI)

RESULTS

Nineteen of the 41 palpatory findings agreed with US findings. Results demonstrate no significant difference in rotation of the AP in-cases where US agreed with palpatory findings (N = 19, M = 103.6, SD = .07819) and in cases where US disagreed with palpatory findings (N = 22, M = 1373, SD = .2043; (-.674), p = .099).

CONCLUSION

Our study shows that US measurements did not correlate with physician diagnostic findings and therefore cannot currently be used as a means of cervical spine diagnosis standardization. Given the increasing use of US in UME and the importance of establishing a reference standard for cervical spine palpatory diagnosis, further studies should be conducted to improve US assessment of the cervical spine.

DISCUSSION

Table II. Cervical & Lumbar Range of Motion

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cervical</th>
<th>Lumbar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion (°)</td>
<td>45-90°</td>
<td>70-90°</td>
</tr>
<tr>
<td>Extension (°)</td>
<td>45-90°</td>
<td>30-45°</td>
</tr>
<tr>
<td>Sidesbending (°)</td>
<td>30-45°</td>
<td>25-30°</td>
</tr>
<tr>
<td>Rotation (°)</td>
<td>70-90°</td>
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</table>

Results demonstrate that US measurements did not accurately correlate with physician palpational findings. As a result, we are forced to question whether US is a reliable instrument for confirming cervical rotational preferences. Therefore, US cannot currently be used to confirm palpational assessment as part of osteopathic medical education. We hypothesize there are several reasons as to why this occurred including increased cervical spine range of motion as compared to that of the lumbar spine, the effect of subject positioning on coupled cervical intersegmental motion, the US technique, and the changes in cervical musculature.

ACKNOWLEDGEMENTS

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REFERENCES