ABSTRACT

The introduction of ultrasound into pre-clinical medical education has demonstrated promising results. Practice with ultrasound prepares medical students for future clinical practice and may improve their understanding of anatomical concepts and palpatory skills. This randomized-controlled study was performed to determine whether the use of ultrasound as an educational supplement will improve osteopathic medical students' confidence in identifying landmarks. Students were divided into two groups to palpate four specific landmarks: the experimental group used ultrasound to assist with locating each landmark, while the control group did not. The results of this study indicate that ultrasound may increase medical students' confidence levels as they learn to identify and palpate certain landmarks.

BACKGROUND

The physical examination is a fundamental skill for all physicians, yet recent research has shown a steady decline in physical examination proficiency amongst clinicians.1 One component of the structural exam is the assessment of the shoulder. Although shoulder pain is a common complaint, studies show that physicians’ accuracy in locating anatomical landmarks of the shoulder is dismal.2

Ultrasound imaging has become exceedingly common as a diagnostic tool in clinical practice, and should be taken into consideration as a useful modality in educating future physicians.4 The growing use of ultrasound in clinical practice shows a necessity for its integration into medical education, but may be particularly useful in the osteopathic manipulative medicine curriculum as it may allow students to better identify and palpate anatomical and musculoskeletal landmarks.5

OBJECTIVE

To determine whether the use of ultrasound as an educational supplement will improve osteopathic medical students’ confidence in identifying and palpating anatomical landmarks.

METHODS

• Randomized-controlled trial, IRB approval obtained 12/9/2014 by NYIT- COM (IRB #BHS-1079).
• Subjects who had any prior experience in utilizing and interpreting ultrasound diagnostic imaging and who were previously trained foreign physicians or healthcare professionals were excluded from this study.
• Both groups were given a tutorial on anatomic landmarks of the shoulder, followed by time for palpation practice (with or without assistance of ultrasound). See Figure 2.
  - Group 1: Control group did not use ultrasound.
  - Group 2: Experimental group used ultrasound.
• Subjects completed a survey before and after the teaching/palpation practice session. The following question was asked: “How confident are you in palpatory (each landmark)?” The survey was created using a 10-point Likert scale (0 Not at all – 10 Extremely).
• SPSS was used to run an Independent-Samples Mann-Whitney U Test to compare the mean difference of scores pre and post each intervention.

RESULTS

Table 1: Summary of the pre and post Likert scores, as well as the mean difference between scores for Groups 1 and 2. *Statistically significant result p < 0.05

<table>
<thead>
<tr>
<th>Landmarks</th>
<th>Group</th>
<th>Pre</th>
<th>Post</th>
<th>Mean change</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicipital tendon</td>
<td>Group 1</td>
<td>2.5</td>
<td>4.5</td>
<td>2.0</td>
<td>0.031*</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>1.7</td>
<td>5.3</td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Coracoid process</td>
<td>Group 1</td>
<td>4.3</td>
<td>5.9</td>
<td>1.6</td>
<td>0.035*</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>3.3</td>
<td>8.9</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>Supraspinatus tendon</td>
<td>Group 1</td>
<td>2.29</td>
<td>4.81</td>
<td>2.5</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>2.28</td>
<td>5.34</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>T1 transverse processes (TP)</td>
<td>Group 1</td>
<td>6.9</td>
<td>8.2</td>
<td>1.3</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>Group 2</td>
<td>6.5</td>
<td>7.8</td>
<td>1.3</td>
<td></td>
</tr>
</tbody>
</table>

- Total number of subjects: 63
- Group 1: n = 31
- Group 2: n = 32
- The mean Likert score changes for the bicipital tendon were 2.0 in Group 1 and 3.6 in Group 2. This was statistically significant.
- The mean Likert score changes for the coracoid process were 1.6 in Group 1 and 3.1 in Group 2. This was statistically significant.
- The mean Likert score changes for the supraspinatus tendon were 2.5 in Group 1 and 3.1 in Group 2. This was not statistically significant.
- The mean Likert score changes for the T1 TP were 1.3 in Group 1 and 1.3 in Group 2. This was not statistically significant.
- There was no significant difference between groups in the pre-survey Likert scores.

CONCLUSION

The results of this study indicate that ultrasound increased the confidence levels of this group of osteopathic medical students in identifying and palpating certain landmarks. To our knowledge, this is the first study to explore the effects of ultrasound training on confidence levels of osteopathic medical students when teaching palpatory skills.

Strengths

The subjects were first year osteopathic medical students who had no previous experience with musculoskeletal ultrasound and little exposure to palpation. There were no significant differences between groups in baseline comfort levels with palpation of these specific landmarks.

Limitations

This is a small sample size. Also, this was not a part of the standard curriculum, so there may have been some difference in the level of engagement of the participating subjects.

Future Research

Subsequent studies could explore the use of ultrasound in other anatomical areas and the effects of more intensive ultrasound training. The increase in confidence levels demonstrated here is promising to start using the integration of ultrasound into pre-clinical medical education. Future research in training students to use ultrasound imaging in conjunction with palpation may help to improve current standards on how to teach anatomical landmarks and develop palpatory skills.

REFERENCES


ACKNOWLEDGEMENTS

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We would like to thank all of the subjects, faculty, staff, and medical student volunteers for their contributions to this study.

Figure 1: Shoulder Anatomic Landmarks palpated by students in this study.3

Figure 2 (Above): Protocol Flow Chart

Figure 3: Mean difference in Likert scores.