Anterior Superior Iliac Spine Asymmetry Assessment on a Novel Pelvic Model: An Investigation of Accuracy and Reliability

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Abstract

Objective: The purpose of this study was to develop a novel pelvic model and determine the accuracy and the inter- and intraexaminer reliability of anterior superior iliac spine (ASIS) positional asymmetry assessment from both sides of the model by osteopathic predoctoral fellows and osteopathic physicians and to evaluate the effect of training.

Methods: Five osteopathic predoctoral fellows and 5 osteopathic physicians assessed 13 settings of varied ASIS asymmetry of a novel pelvic model for superior/inferior positional asymmetry from both sides of the model in a random order. Assessment from the right and left sides of the model occurred on 2 separate days. Fellows were trained for a week and retested.

Results: Average interexaminer reliability was greatest from the left side of the model for physicians and from the right side for fellows (physicians: $\kappa = 0.46$, fellows: $\kappa = 0.37$), whereas intraexaminer reliability was greatest from the right in both groups (physicians: $\kappa = 0.49$, fellows: $\kappa = 0.52$). Following training of fellows, interexaminer reliability remained highest from the right side of the model (right: $\kappa = 0.48$, left: $\kappa = 0.36$), whereas intraexaminer reliability was higher from the left side (right: $\kappa = 0.53$, left: $\kappa = 0.59$). Physicians and fellows before training were more accurate from the right side of the model ($\kappa = 0.56$ and $\kappa = 0.52$, respectively). Following training of fellows, accuracy increased from both sides of the model (right: $\kappa = 0.59$, left: $\kappa = 0.53$).

Conclusions: A novel pelvic model was developed to allow assessment of accuracy and reliability of ASIS asymmetry assessment. Individually, physicians and fellows varied in accuracy and inter-/intraexaminer reliability. Further investigation is warranted to understand the clinical and educational application of these results.

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Key Indexing Terms: *Palpation; Models, Anatomic; Osteopathic Manipulative Treatment; Chiropractic*

As research has begun to evaluate diagnostic and treatment models in manual medicine, the development of valid and reliable models of musculoskeletal dysfunction has remained elusive. Historically, manipulative therapies in these professions developed clinically; and subsequent anatomy and physiology were ascribed to them.[1] Bony anatomical landmark positional asymmetry is a commonly used form of musculoskeletal assessment hypothesized to give information regarding the relative positions of the structures in question and has gained widespread acceptance in manual medicine.[2-7] Some manipulative therapies from the osteopathic, chiropractic, and physiotherapy professions are based upon this method of assessment. Of these, muscle energy technique is the most well known and is currently taught in osteopathic institutions throughout the world.

Bony anatomical landmark positional asymmetry, however, is not the only method of assessment used by practitioners of manual medicine. Pain provocation, point tenderness, palpation for taut bands, range of motion, and motion testing are often used in combination with patient history comprising elements of the clinical evaluation. For motion testing in the spine and pelvis, current literature reviews demonstrate poor reliability.[8-11] Most pain provocation tests likewise have inadequate reliability.[12,13] In a recent literature review, only 2 pain provocation tests by themselves or multiple tests in a group demonstrated adequate reliability.[13,14] Although acceptable reliability has been demonstrated for some pain provocation testing,

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this form of palpation shares common confounding elements when assessing for "tender points" or tenderness. Because of the subjective nature of pain interpretation as well as the potential role of patient expectation with repeated assessments of tenderness or pain in research, the reliability of these methods, although adequate, must be interpreted with caution.

Positional asymmetry of pelvic landmarks is commonly ascribed to dysfunction of the sacroiliac joint (SIJ).[2-7,15] Positional findings are often named based upon motion testing hypothesized to localize the dysfunctional SIJ.[2-7,15] However, poor reliability and experimental evidence investigating the amount of motion occurring at the SIJ have called into question the validity of bony anatomical landmark positional assessment methodologies.[12,16-19] Although this challenges the current concepts of pelvic dysfunction commonly taught in manual medicine, recent research between pelvic bony asymmetry and gross coupled motion in the lumbar spine suggests the potential clinical relevance of bony pelvic asymmetry.[20,21]

Investigation into bony anatomical landmark positional asymmetry assessment in recent years has focused primarily on the pelvic girdle and medial malleoli (MM). Medial malleoli have commonly been included when evaluating the pelvic girdle because of an assumed association with dysfunction in this region.[3-7] Consistently, anterior superior iliac spine (ASIS) and MM have demonstrated higher reliability than other landmarks, with the MM always having the highest reliability.[22-26] Challenges such as examiner fatigue, thumb placement, amount of detectable asymmetry, and variation in technique have been discussed as potential factors related to the low interexaminer reliability observed in evaluation of these methods.[22,23,25,26] A recent experiment of MM assessment designed to address some of these concerns demonstrated the usual higher reliability for MM; and when approximately 4 mm of asymmetry was screened before assessment, interexaminer reliability was near perfect.[25] Thus, the amount of asymmetry appeared to be a significant factor in interexaminer reliability.

In another study, Fryer et al[26] (2005) evaluated the role of training on the reliability of bony landmark positional assessment and found that training improved reliability for some landmarks but not for others. For example, in this study, reliability of ASIS assessment improved significantly, whereas MM reliability did not significantly improve following training. Another more specific method of training termed *consensus training* was investigated in the lumbar spine by Degenhardt et al[27] (2005). This was designed to address the known low interexaminer reliability of musculoskeletal palpatory assessment. This training involved examiner discussion following observed differences of assessments during the training phase. In addition, throughout the experiment, examiners attempted to modify their evaluation procedures until methods were as similar as possible.[27] From this consensus training, significant improvements were demonstrated, indicating the high degree of skill and/or consensus that may be needed for reliable palpatory assessment.

Recent research into these methods of assessment has for the first time allowed practitioners of manual medicine to begin the process of objectively understanding the reliability of assessment methods used by these professions. Although these previous studies have allowed the first step in understanding the role of human perception in the palpatory process, they have not assessed the accuracy or role of examiner placement commonly advocated in manual medicine texts. With no criterion standard of musculoskeletal function, dysfunction, or pain, poor reliability testing affords the researcher with little more than an incomplete knowledge of a specific diagnostic method. Although this research has demonstrated clear trends, it is the opinion of the authors that understanding the role of human perception in the context of low reliability of palpatory assessment is of significant importance for professions that incorporate the use of these assessment methods. Thus, the goal of the experiment was to develop a novel pelvic model and determine the accuracy and the inter- and intraexaminer reliability of ASIS positional asymmetry assessment from both sides of the model by osteopathic predoctoral fellows and osteopathic physicians and to evaluate the effect of training on reliability.

Methods

Participants

Five Osteopathic predoctoral fellows and 5 Osteopathic physicians from the University of North Texas Health Science Center–Texas College of Osteopathic Medicine Department of Osteopathic Manipulative Medicine participated in this study. Predoctoral fellows are osteopathic medical students that have shown proficiency in manipulative medicine as observed by faculty and are pursuing an extra year of study to further develop their manipulative medicine skills. These fellows have participated in the first and second years of osteopathic undergraduate curriculum that have significant emphasis on anatomical landmark positional asymmetry as guided by the Educational Council on Osteopathic Principles. Recruitment was conducted on a voluntary basis. Three of the physicians were residency trained in Osteopathic Manipulative Medicine/Neuromuscular Medicine. All physicians were board certified in family medicine and/or Osteopathic Manipulative Medicine/Neuromuscular Medicine and in active clinical practice. The physicians had varied amounts of clinical experience: 5, 8, 28, 33, and 40 years. The project was approved by the Institution Review Board of the University, and all subjects signed informed consent before taking part in the experiment.