

**The Efficacy of
Lumbar Spine Orthopedic Testing:
A Literature Review**

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ABSTRACT

“A wide variety of prespinal manipulative tests are used to determine whether there is abnormal function of the pelvis or spine (manipulative lesion, fixation, or subluxation) and if so, to identify its location. These tests of dysfunction involve observation, palpation, or each patient’s pain response in relation to various postures, movements, or manual pain provocative maneuvers. Some are performed on the passive spine, and others are performed during movement” (1).

Palpation is an extremely common method for identifying manipulable lesions, but its inconsistently rated intraexaminer and interexaminer reliability often leave it up for speculation as to its accurateness(2). Orthopedic testing is also a commonly relied upon method for identifying spinal lesions and disorders, but what evidence exists to show the validity and reliability of these tests? The purpose of this paper is to review the existing literature and identify the effectiveness of using orthopedic tests to aid in diagnosing and directing treatment of various spinal disorders, especially those localized to the lumbo-pelvic region. It is the goal of the reviewer to offer unbiased evidence either for or against the use of orthopedic tests utilized and relied upon to aid in diagnosis by many doctors and teaching institutions.

DATA SOURCES

Literature review was performed using a National Library of Medicine database Internet search from 1900 through present on various articles and studies using the terms “orthopedic tests” and “specificity” and “sensitivity”. Relevant documents from the Logan College of Chiropractic Library file and available journal articles were also reviewed. Two textbooks were also utilized to provide some background information into specific lumbo-pelvic tests.

INTRODUCTION

Manual methods of patient examination and assessment are used by Chiropractors to determine the presence and site of lesions to be treated, and to guide the selection of treatment procedures. Information is obtained through physician interpretations on performance, tissue status, and verbal feedback and other subjective findings (3). “However, our knowledge of back complaints and how they relate to various clinical manifestations is incomplete” (4). Orthopedic tests are presumed to identify painful anatomical structures, whereas chiropractic analytic tests are believed to provide information about the presence of subluxations or fixations. When doctors perform orthopedic and chiropractic tests to examine patients with back pain, they do not know the degree to which such procedures are useful, and yet they form the basis of most of the clinical decisions (4). The sensitivity (presence of a positive finding in afflicted subjects) and the specificity (absence of a positive finding in normal subjects) of most such tests have not been investigated and when they have, the results are often inconclusive and argumentative when compared with other similar studies. It is also unknown if there is a relationship between orthopedic and chiropractic findings (4).

There are several circumstances that make these types of tests difficult, mainly the fact that the clinical reality of the spinal manipulative lesion remains to be proven and is often nullified by various medical authorities, and thus met with a general

resistance throughout most of the medical field. Unfortunately, since it lacks a set of generally acceptable diagnostic criteria, there is no gold standard that can be used as a reference test (1).

DISCUSSION

A search was conducted for studies done on ten commonly taught and used orthopedic tests. These tests were the Straight Leg raise, Lasegue's Test, Kemp's Test, the FABERE test, Gaenslen's Test, Yeoman's Test, Nachlas Heel-to-Buttock Test, the Belt test, Hibb's Test and inclinometer measuring of ranges of motion. After an exhaustive search was conducted with very little success, it was decided not to limit the literature review to merely ten common tests, but to open it up to indeed *any* studied orthopedic test. This second search yielded more fruitful results, however, the focus of the review will still revolve around the ten aforementioned tests as much as possible.

The Straight Leg Raise

"Maneuvers of sciatic stretch or compression have been used for decades to evaluate patients with suspected lumbar disc herniation. The most recognized maneuver is the passive straight leg lift" (5). The first description of the straight leg lift was published by Lazar Lazarevic in 1880 when he anatomically demonstrated the increase in

sciatic tension with the maneuver (5). The mechanism of the test is this: “pain is induced by stretching the sciatic nerve or one of its roots. Any stretching of the nerve will become painful with moderate elevation of the lower limb. This is a positive Lasegue’s sign, which is usually evident before 60 degrees flexion is attained. At 60 degrees flexion, the sciatic nerve achieves maximal tension” (6). The question remains however, is that rationale a valid assumption and what tests are out there to prove or disprove it?

The outcome of one study on the Validity of the Active Straight Leg Raise Test for Measuring Disease Severity in Patients with Posterior Pelvic Pain After Pregnancy was quite favorable. It concluded that “the active straight leg raise test can be recommended as a disease severity scale for patients with posterior pelvic pain after pregnancy” (7). However, “no association was found between the active straight leg raise score and age, parity, duration of the postpartum period, height, or weight” (7). This study can be viewed as reliable data as it utilized 200 subjects. Also, the usefulness of the active straight leg raise test as a severity scale was compared with that of the Quebec Back Pain Disability Scale (7) and was proven to be reliable.

In another study however, the straight leg raise performed very poorly and was deemed unreliable in measuring diurnal changes. “Intra-observer repeatability of straight leg raising was poor” (8). This study suggests that to counteract the poor repeatability, a recumbency test might be a useful supplement to the usual single

measurement. This study was performed on 28 patients with criteria of lower lumbar disc protrusion (8).

A systematic review of the accuracy of the Straight Leg Raise in diagnosing herniated lumbar discs also questioned the validity of the maneuver. MEDLINE and EMBASE searches up to 1997 showed 17 diagnostic publications evaluating the straight leg raise test with surgery as reference standard. Quality of methods was assessed with a specific checklist (9). This study argued that “little evidence exists on the diagnostic accuracy of the widely used straight leg raising test and the cross straight leg raising test in diagnosing herniated discs in patients with low back pain” (9). The study further concluded that “the diagnostic accuracy of the straight leg raising test is limited by its low specificity” (9).

Yet another study looks at the effect of 10%, 30% and 60% body weight traction on the straight leg raise test of symptomatic patients with low back pain (10). This study proved increasing amounts of traction were shown to be effective in decreasing the symptoms of low back pain and improving the patient’s straight leg raise (10). What the aforementioned study helps to illustrate is that like many tasks done by any person, the conditions surrounding the administration of the test and the condition or position of the patient is key in producing reliable test results.

Sacroiliac Joint Tests

The Straight Leg Raise is just one of a plethora of orthopedic tests used to aid in diagnosing the cause of low back pain. “For many years the sacroiliac (SI) joint was considered to be one of the primary sources of low back pain” (11). What of the tests for that area of anatomy – Hibb’s, Nachlas, Ely’s, Yeoman’s, Gaenslan’s, the Belt Test? Are they reliable or not? Searches for studies that were done to test the intraexaminer and interexaminer reliability of these tests turned out to be fruitless, with few studies done on one specific test, but rather on several groups of tests together.

One test that was studied however was the Gillet test for SI joint motion. 41 male students were the subjects for this study, with all subjects being examined twice within a period of 3 weeks. The results of this study show that “the Gillet test, as performed in the prescribed manner is not reliable. Earlier performed reliability studies to the Gillet test had the same result as this study. Therefore, it is questionable whether the Gillet test has an additional value in the clinical situation” (12).

“Although there is no reproducible method for isolating SI joint motion by physical examination, a variety of maneuvers have been used in an attempt to reproduce pain by stressing the joint or its surrounding musculature. A series of tests proposed by Bernard and Cassidy rely on motion as well as pain production” (11). “The reliability of

these kinds of tests was reviewed by Laslett and Williams at the symposium [the First Interdisciplinary World Congress on Low Back Pain and its Relationship to the Sacroiliac Joint]. They quote previous work of Potter and Rothstein, wherein 13 tests of sacroiliac function were performed by experienced therapists on 17 patients. Only 2 of the 13 tests – the distraction and compression pain provocation tests – did the therapists’ agreement exceed 70%. Tests that purported to assess position or movement by palpation were all noted to be unreliable. Thus, Laslett and Williams used 7 tests to create familiar pain by stressing the joint. These tests are: Distraction, Compression, Posterior shear or Thigh thrust, Pelvic torsion/right posterior rotation, Pelvic torsion/left posterior rotation, Sacral thrust, Cranial shear test. In the Laslett and Williams study, 51 patients with buttock pain were tested. All tests had at least 84% agreement among examiners, who were experienced physiotherapists. The greatest agreement was in the thigh thrust test, with nearly as much agreement on the pelvic torsion tests” (11).

Another study released in the Journal of Manipulative and Physiological Therapeutics in January 2002 advocates using several tests to accurately assess the sacroiliac joint. These researchers used a combination of five tests, the Gapping test, the Compression test, the Femoral Shear test, the Pelvic Torsion test, and the Faber test. The authors of this study concluded that “the above pain provocation tests used...claim to load the SIJ and structures surrounding it. It is, therefore, difficult to make a concrete

statement regarding the integrity and validity of these tests with a gold standard that fails to include all the structures, extra-articular and intra-articular, that these diagnostic tests are intended to evaluate. For this purpose, a gold standard that validates the pathologic features of such structures is necessary. To date and to our knowledge, this standard is, unfortunately, not available, leaving diagnostic blocks as the most valid means of diagnosing pathologic conditions of the SIJ” (13).

The Faber Test

“The Faber test is a pain provocation test which indicates sacroiliac joint syndrome (SIJS), hip osteoarthritis, or iliopsoas spasm” (14). “The presence of muscle spasm, limitation of motion, or pain felt in the groin, anterior thigh, or trochanteric region indicates hip joint pathology, such as osteoarthritis. In contrast, pain in the opposite SI joint indicates SI joint disorder, such as sacroiliitis” (14). Slipman and colleagues found that Patrick’s test used in combination with at least two other positive provocation tests for determining SIJS, had a positive predictive value between 40-60%, which is thought to be quite high in the research field (14). However, Slipman also states that, “there are no studies confirming the accuracy of the provocation tests” (14). Broadhurst and Bond showed the Faber test to have a sensitivity of 77%...(14). Dreyfuss and colleagues examined 12 clinical tests on 85 patients pre- and post-SIJ block. This test was found to have a sensitivity of 50% (14). However, both the Broadhurst and Bond and Dreyfuss

studies showed a specificity of 100% (14). These test results make the Faber test one the most consistent and best rated tests for specificity and sensitivity found thus far.

Instrumentation

What of instrumentation used to measure back pain and disability? Goniometric and Inclino-metric measurement of movement in the spine is a commonly taught and commonly used method among chiropractors. One study tested the validity of goniometers by measuring it against a computer-assisted instrument, the isotecnologies B-200. "Test-retest measurements were performed, and the reliability of each method was determined. Generally, low correlations were obtained between two tests performed one week apart" (15). Because of the poor repeatability statistical analysis comparing the two instruments was not meaningful. The authors conclude that, "...inexpensive tools allow accurate measurements of, at least, flexion and extension. Small changes should not be taken to indicate true improvement or deterioration. Measurements to a single degree are not meaningful" (15).

Another study set out to investigate the validity of several different lumbar spine range of motion testing tools, one of which was the goniometer, and another, the inclinometer. These authors concluded that both range of motion measurement methods

“demonstrated poor validity and do not bear any consistent relationship to the level of physical or functional impairment in subjects with chronic low back pain” (16).

One interesting study evaluated the intratester reliability of inclinometers with the use of a pelvic restraint device. “Good intratester reliability was shown in the lumbar ranges of motion and lordosis measurement” (17). It was found that “inclinometer...measurements with the use of a pelvic restraint device are reliable for measuring lumbar spine range of motion. Use of the inclinometer technique to record lumbar lordosis also is a reliable measure” (17).

Clearly, the studies highlighted above differ in their conclusions, however, the latter study was testing the validity of range of motion measuring devices as they pertained to chronic pain, not acute pain and so, the case can be argued for both sides based on just that one piece of differing data.

Palpation

Static and motion palpation are often relied upon by Chiropractors to help identify sites of lesions. A review of the reliability of Chiropractic methods commonly used to detect manipulable lesions in patients with chronic low back pain evaluated motion and static palpation along with visual postural analysis, pain description by the patient, plain static erect x-ray film of the lumbar spine, leg length discrepancy, neurologic tests, and

orthopedic tests. The study used 3 experienced Chiropractors who examined 19 patients, and 2 experienced Chiropractors who examined 10 and 9 patients, respectively. The conclusion: "This study of commonly used chiropractic diagnostic methods in patients with chronic mechanical low back pain to detect manipulable lesions in the lower thoracic spine, lumbar spine, and the sacroiliac joints has revealed that the measures are not reproducible" (18).

Yet another study on the interexaminer reliability of eight evaluative dimensions of lumbar segmental abnormality that focused primarily on palpation had much different results than that of the above study. This study concluded that "palpation for pain (osseous and soft tissue) and visual observation produced good to excellent interexaminer agreement" (19). In fact, it went so far as to say that "palpation for pain is the *only* spinal assessment procedure to show consistent reliability in a number of studies" (19).

Another similar study argues this point by stating that "little significant agreement between examiners was found for active and passive motion palpation, muscle tension palpation and misalignment palpation" (20). This study suggests that "subjective" findings, such as pain, patient complaints, etc., may be among the most reliable of conservative spinal observations (20).

A study conducted to evaluate the interexaminer reliability of palpation for cervical spine tenderness that utilized thirty patients with unilateral mechanical neck pain,

symptomatic at the time of examination, argued that “palpation for cervical spine tenderness is a highly reliable examination tool” (21). It does go on to say however, that “further investigation is needed to assess the usefulness of spinal tenderness as an outcome measure...”(21). Clearly, there are mixed results and opinions regarding the use of palpation, with differing methods of conducting studies revealing conflicting answers and results.

Conclusion

“The practice of musculoskeletal medicine requires the use of a wide variety of clinical examination procedures to establish a diagnosis, plan treatment, and monitor patient progress” (22). Despite their extensive use, the reliability and validity of many of these assessment procedures remains questionable and indeed, is constantly doubted and argued about (22). While no one single orthopedic test really rates very highly on a reliability scale, it appears that combining several assessment methods – such as palpation for osseous and soft tissue pain, visual observation, as well as motion palpation for fixation – results in greater interexaminer reliability (2). A multi-test regimen also makes more sense, since clinicians usually use more than one test to make a clinical diagnosis. In several studies, “the reliability of various test regimens achieved better statistical reliability than individually performed tests” (13).

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