

Using Published Evidence to Guide the Examination of the Sacroiliac Joint Region

Although some people in the medical community accept the premise that the sacroiliac joint (SIJ) can be a source of pain secondary to pathology (eg, spondyloarthropathy, infection, malignancy, fracture),¹ whether SIJ dysfunction exists remains controversial. “Sacroiliac joint dysfunction” is a term often used to describe pain in or around the region of the joint that is presumed to be due to biomechanical disorders of the joint (eg, hypomobility, malalignment, fixation, subluxation).^{2,3} Some people consider the term “SIJ dysfunction” to be a misnomer because it is difficult to determine whether the joint itself is the source of the pain.^{4,5} Due to the anatomy and location of the SIJ, examination procedures presumed to test the joint may test other structures in the region. Others dismiss the SIJ as a source of pain because well-recognized pain-sensitive structures, such as the posterior facet joints and nerve roots, may refer pain to the SIJ region.^{5,6} Still other investigators have reported that 22%⁷ to 30%⁸ of subjects with pain around the SIJ region experienced some relief following anesthetic injection of the joint. Pain relief following anesthetic injection, however, does not necessarily indicate dysfunction of the joint. Structures unrelated to the joint, but in the same region, may be affected due to infiltration of anesthetic to soft tissues beyond the SIJ.⁹ Despite the controversy and differing views on the sources of pain in the SIJ region, we believe many therapists commonly examine some of their patients for the presence of what they call “SIJ dysfunction.” Battié and colleagues,¹⁰ for example, surveyed 186 Washington State therapists about the care of patients with low back pain (LBP) and found that 75% of the therapists would use screening procedures they believed tested SIJ function.

A variety of tests have been used by therapists to identify what we will refer to as “dysfunction of the SIJ region.” These tests generally fall into 1 or 3 categories: (1) tests designed to assess the location and relative symmetry, from left to right, of bony landmarks associated with the SIJ, (2) tests designed

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to assess the movement of bony landmarks associated with the SIJ, and (3) tests that require the application of forces to the SIJ or related structures in an attempt to reproduce the patient's pain. Tests that fall into these 3 categories are typically performed without the assistance of instrumentation (ie, the therapist uses visual estimation or tactile input to make the diagnosis). Physical therapists also use the patient's medical history and description of pain (eg, mechanism of injury, pain location, factors that increase or decrease the pain) to assist in the identification of dysfunction in the SIJ region.

In the past 2 decades, many studies have been conducted to assess the psychometric properties (eg, reliability, validity) of tests of the SIJ region. Initially, reliability studies tended to dominate the literature because a standard for assessing the diagnostic validity of data obtained with these tests was not available. More recently, a diagnostic test has been developed that is considered by some to provide a suitable standard for the confirmation of pain arising from the SIJ region. The test is a fluoroscopically guided anesthetic block of the SIJ.⁸ A needle is inserted into the SIJ, and a contrast medium is introduced into the joint space to confirm that the needle is in the SIJ. An anesthetic is then injected, and the patient's pain response is assessed. According to proponents of the test, a pain decrease of 50% or greater, depending on the criterion set by the examiner, confirms the pain is coming from the SIJ region. In the past 5 years, several studies have been published in which anesthetic blocks were used to examine the diagnostic accuracy (ie, diagnostic validity) of tests designed to detect dysfunction in the SIJ region.^{2,11-13} We contend that these studies have been an important addition to the literature. Diagnostic accuracy studies are especially important because diagnostic tests can demonstrate high levels of reliability, yet lack validity.¹⁴

The purpose of this update is to review studies that have examined the reliability or diagnostic validity of data obtained with clinical tests designed to detect dysfunction in the SIJ region. To identify articles reviewed in this

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update, we conducted a MEDLINE search from 1966 to June 2000 using the key word "sacroiliac" in combination with each of the following key words: "examination," "reliability," and "validity." In addition, the reference lists of all relevant articles found in the search were reviewed. Articles were included in our review if they met the following criteria: (1) examined the reliability or diagnostic validity

of data obtained with tests that were used to assess the symmetry of bony landmarks, movement of bony landmarks, or provocation of pain and (2) were conducted on subjects suspected of having dysfunction in the SIJ region. In addition, we included studies where researchers examined the diagnostic validity of the patient's medical history and pain description to identify dysfunction in the SIJ region. Finally, we eliminated studies that examined the reliability of data obtained with tests of the SIJ region that we believed are not commonly used in the physical therapy clinic (eg, tests that use instrumentation for the identification of dysfunction in the SIJ region).

We begin the update by discussing the evidence supporting or refuting the use of tests designed to assess the symmetry or movement of bony landmarks associated with the SIJ. We then review the literature on pain provocation tests and use of the patient's medical history in the identification of dysfunction in the SIJ region. We conclude by summarizing the evidence and, based on this evidence, make recommendations on how therapists can use these tests to determine the presence of dysfunction in the SIJ region. We do not review how these tests might be used to guide treatment. Although we provide brief descriptions of the various tests that were examined

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in the studies, readers are encouraged to review the original articles to gain further insight.

Symmetry and Movement Tests

Potter and Rothstein¹⁵ examined the intertester reliability of data obtained with various tests used by physical therapists to evaluate the symmetry of bony landmarks associated with the SIJ (ie, SIJ alignment). The tests required the examiners to palpate a bony landmark bilaterally (ie, anterior superior iliac spines [ASISs], posterior superior iliac spines [PSISs], or iliac crests) and make judgments about the relative heights of the bony landmarks. These tests were the following: palpation of iliac crest levels, palpation of PSIS levels, and palpation of ASIS levels, all with the patient positioned sitting and then standing. The sample consisted of 17 patients suspected of having dysfunction in the SIJ region. Randomly paired therapists examined the patients. The percentage of agreement for the 6 tests ranged from 35% to 43%, suggesting that the intertester reliability for assessments of SIJ alignment is poor. We found no other studies that examined the reliability or validity of visual estimates of SIJ alignment on patients suspected of having dysfunction in the SIJ region.

Potter and Rothstein¹⁵ also reported poor intertester reliability for all of the tests they examined that required the examiners to make judgments about the movement of bony landmarks. The tests examined were as follows: the flexion test with the patient positioned sitting and standing (the patient flexed the trunk in a sitting or standing position while the examiner palpated for movement of the PSISs), the standing Gillet test (the patient stood on one lower extremity and flexes the other hip and knee toward the chest while the examiner palpated for movement of the PSIS and sacral sulcus on the side being flexed), the supine long sitting test (the patient moved from a supine position to a long sitting position while the examiner palpated the patient's medial malleoli and determined any relative change in the lengths of the lower extremities), and the prone knee flexion test (the examiner grasped the patient's feet while the patient was positioned prone with knees extended and then passively flexed the knees while noting any change in the relative lengths of the legs). The percentages of agreement between therapists for these tests ranged from 24% to 50%. One limitation of Potter and Rothstein's study was that they did not calculate kappa coefficients. The percent agreement values they reported may have been artificially high because they were not corrected for chance agreement.

Dreyfuss et al² also reported poor agreement between the findings of a physician and those of a chiropractor when performing the Gillet test ($\kappa=.22$) and the spring test ($\kappa=.15$) on 85 subjects suspected of having dysfunction

in the SIJ region. The spring test was performed by delivering a posteroanterior thrust to the superficial aspect of the sacrum (in the area of the SIJ) and assessing the amount of joint play at end-range. Dreyfuss et al were unclear as to when the spring test is positive. They did state that the symptomatic SIJ is compared with the asymptomatic SIJ.

Dreyfuss et al² used SIJ diagnostic blocks and found that the Gillet test and the spring test had little diagnostic usefulness for identifying patients with dysfunction in the SIJ region. They found little difference between the results of the chiropractor's and physician's examinations, and they reported sensitivity values ranging from .46 to .69 for the Gillet and spring tests. *Sensitivity* is defined as the proportion or ratio of true positive cases detected by a test.¹⁶ Dreyfuss et al also reported specificity values ranging from .38 to .64 for the 2 tests. *Specificity* is defined as the proportion or ratio of true negative cases detected by a test.¹⁶

One explanation for the findings of Potter and Rothstein¹⁵ and Dreyfuss et al² is that asymmetries or movements of bony landmarks associated with the SIJs are too small to detect with palpation or visual assessment. Measurements obtained with symmetry or movement tests, therefore, may not be valid. Stuesson et al have provided data to support this contention. In 2 recent studies,^{17,18} they used intraosseous markers and roentgen stereophotogrammetric analysis to assess SIJ motion in subjects suspected of having dysfunction in the SIJ region. In one study,¹⁷ 22 subjects were examined in a variety of positions, including standing with hip flexion (ie, Gillet test). In the other study,¹⁸ 6 female subjects were examined in a variety of positions, including the reciprocal straddle position (ie, standing with both feet on the floor and one hip maximally extended and the other hip maximally flexed). In both studies, Stuesson et al found translatory motions of 2 mm or less and rotary motions of less than 2 degrees. Earlier work by Stuesson et al¹⁹ and Egund et al²⁰ also conducted on patients suspected of having dysfunction in the SIJ region demonstrated similar findings.

A recent study by Tullberg et al²¹ provides further evidence to question the accuracy of assessments of asymmetry or movements of the SIJ with palpation and visual estimation. Tullberg et al used intraosseous markers and roentgen stereophotogrammetric analysis to determine whether the position of the SIJ changed following manipulation and mobilization procedures. They identified 10 patients who met the following criteria: the patient had unilateral pain in the area of the SIJ; and 3 examiners, with an unspecified amount of specialized training, agreed that the patient had at least 10 out of 12 positive tests among those tests of the SIJ region.

Nine of the 12 tests involved the assessment of movement or symmetry of bony landmarks associated with the SIJ.

Immediately prior to the manipulation and mobilization procedures, each patient underwent the roentgen stereophotogrammetric analysis in a standing position to identify the position of the sacrum relative to the ilium. Following the intervention, the roentgen stereophotogrammetric analysis and the 12 tests of the SIJ region were repeated. The roentgen stereophotogrammetric analysis indicated essentially no change in the position of the sacrum relative to the ilium following the interventions. Translatory changes were on the order of 0.1 mm, and rotary changes were on the order of 0.3 degree. Tullberg et al²¹ did not report the reliability of data obtained with these measures. These small changes may have been due to measurement error. Despite the lack of change in the position of the SIJ (ie, sacrum relative to ilium), most of the tests of the SIJ region that Tullberg et al judged to be positive prior to the intervention were judged to be negative following the intervention.

The results of the study by Tullberg et al²¹ raise questions about the validity of data obtained with movement and symmetry tests for making judgments about the alignment of the SIJs. Although the position of the SIJ did not change following the intervention, the examiners in the study reported that the tests were negative following the intervention. One weakness of the study is that Tullberg et al did not control for the potential biases of the examiners. The examiners knew who received the intervention and, therefore, may have been biased when repeating the tests of the SIJ region. Furthermore, Tullberg et al judged the mobilization and manipulation to be successful based on the results of the tests. They did not indicate whether the patients in the study reported relief of symptoms or improvement in function following the treatment.

Combining the Results of Tests

Cibulka et al²² suggested using a combination of symmetry and movement tests to determine whether a patient has dysfunction in the SIJ region and reported high intertester agreement for the method they developed. They determined that dysfunction in the SIJ region was present in a patient if at least 3 of the following 4 tests were positive: the standing flexion test, the prone knee flexion test, the supine long sitting test, and palpation of PSIS heights in a sitting position. Cibulka et al did not quantify the size of the difference for the tests to be positive. Their method also did not allow them to actually show that the patient's symptoms were originating from the SIJ. Two therapists with an unspecified amount of training in the test procedures examined 26 patients with low back pain of a nonspecific origin.

Intertester agreement between the therapists for determining the presence of 3 positive tests was high ($\kappa=.88$).

We believe one limitation of the study by Cibulka et al²² was that a "positive" test was apparently not referenced to a particular side. For example, the standing flexion test was considered positive when movements of the PSISs were believed to be asymmetrical (ie, one PSIS moved more cranially than the other). The 2 therapists, therefore, could have determined that the standing flexion test was positive without agreeing on the type of asymmetry present. One therapist may have found that the right PSIS moved more cranially than the left PSIS, which according to the authors would have indicated that the right SIJ was hypomobile, whereas the other therapist may have found that the left PSIS moved more cranially than the right PSIS. In addition, each therapist may have had contradictory findings on the 4 tests they conducted. For example, one of the therapists may have found a standing flexion test result that indicated what the therapist believed was a hypomobile SIJ on the left, a prone knee flexion test result that indicated a posterior innominate rotation on the right, and a supine long sitting test result that indicated a posterior innominate rotation on the left.

The examination and treatment of dysfunction in the region of the SIJ sometimes requires identification of the *type* of asymmetry present and the correction of the asymmetry.^{4,6,22-24} For example, mobilization techniques designed to treat a right posterior innominate rotation require a different hand placement, point of force application, and line of force application than mobilization techniques designed to treat a left posterior innominate rotation.^{22,25} Knowledge of the degree of agreement on the *type* of asymmetry that is present, therefore, would be useful. We believe that the results of the study by Cibulka et al²² would be more powerful if we knew that each therapist found 3 positive tests that were consistent (ie, all indicated a problem on the left) and that both therapists agreed on the type of dysfunction present (ie, left posterior rotation of the innominate).

The external validity of the results of the study of Cibulka et al²² also is limited because only 2 therapists who were trained in the method participated in the study. Furthermore, only 26 patients were examined. Lastly, although the authors provided some evidence for the reliability of data obtained from a combination of SIJ region tests, they provided no evidence that the measurements reflected dysfunction of the SIJ. This study has yet to be replicated.

More recently, Cibulka and Koldehoff²⁶ reported on the sensitivity, specificity, and predictive value of their technique for determining whether a patient has dysfunction

in the region of the SIJ. Although this study was conducted on a large sample of patients (N=219), the investigators did not have a standard for determining whether patients truly had dysfunction in the SIJ region. The sensitivity, specificity, and predictive value of their approach cannot be determined without an acceptable standard.

Summary of Studies Examining the Reliability and Validity of Data Obtained From Symmetry and Movement Tests

Studies of individual clinical tests used to assess the symmetry or movement of bony landmarks associated with the SIJ indicate that the reliability and validity of data obtained with these tests are poor. In addition, the results of some of the more methodologically sound radiographic studies indicate that the amount of motion occurring at the SIJ in individuals with SIJ pathology is extremely small (ie, less than 2 mm and less than 2°).¹⁷⁻²⁰ We do not believe that movements of this magnitude can be assessed visually or with palpation. We therefore believe the results of these radiographic studies suggest that tests designed to assess the symmetry and movement of bony landmarks associated with the SIJ are invalid for the identification of SIJ dysfunction.

Although the use of a combination of movement and symmetry tests to identify dysfunction in the region of the SIJ appears to yield more reliable data than the use of a single test, further studies are needed to explore the usefulness of this combination approach. More specifically, these studies need to address the issue of the type of asymmetry present. In addition, studies using a suitable standard are needed to assess the validity of data obtained with movement and symmetry tests for detecting dysfunction in the region of the SIJ.

Pain Provocation Tests and Medical History/ Pain Description

Potter and Rothstein¹⁵ reported what they considered to be acceptable intertester agreement for 2 pain provocation tests. The percentages of agreement between therapists were 76% for iliac compression (with the patient positioned side lying, the examiner exerted a downward force on the uppermost iliac crest) and 94% for iliac gapping (with the patient positioned supine, the examiner crossed his or her arms, placed the heels of his or her hands on the ASISs, and pressed downward and laterally). Potter and Rothstein did not justify their criteria for acceptability nor did they calculate kappa statistics for the examination procedures. The percentages of agreement reported, therefore, are likely inflated because they did not correct for chance agreement. Furthermore, the sample size for the study was small (ie, 17 patients), limiting the generalizability of the results.

Despite the limitations of Potter and Rothstein's study,¹⁵ subsequent investigations demonstrated similar findings. In a study of 51 patients receiving physical therapy for unilateral low back or buttock pain, Laslett and Williams,²⁷ found high intertester reliability ($\kappa=.64-.82$) for measurements obtained with 5 of 7 tests used to provoke pain in the SIJ region. The 5 tests were iliac compression, iliac gapping, thigh thrust (with the patient positioned supine and the hip and knee flexed to 90°, the examiner applied a downward force through the longitudinal axis of the femur), pelvic torsion left (with the patient positioned supine and the right leg off the table, the examiner extended the right hip and maximally flexed the left knee and hip), and pelvic torsion right. McCombe et al²⁸ also reported moderate intertester reliability ($\kappa=.40-.63$) for measurements obtained with the following tests used to provoke pain in the SIJ region: active hip flexion, resisted hip lateral (external) rotation, and palpation over the SIJ.

In contrast to the findings of Potter and Rothstein¹⁵ and Laslett and Williams,²⁷ McCombe et al²⁸ reported poor intertester reliability for measurements obtained with the iliac compression and gapping tests ($\kappa=.09$ and $.11$, respectively). A possible explanation for the contradictory findings of McCombe et al may be due to the fact that 2 orthopedic surgeons and a physical therapist were the examiners in their study. The examiners in the studies by Potter and Rothstein and Laslett and Williams were physical therapists. Furthermore, McCombe et al did not standardize their test procedures. Potter and Rothstein had therapists review the SIJ region tests and come to a consensus regarding the operational definitions. Laslett and Williams conducted 2 training sessions to standardize the techniques of the therapists participating in their study.

More recently, several researchers^{2,11-13} have examined the validity of measurements obtained with tests designed to provoke pain in the SIJ region. Maigne et al¹¹ studied 54 patients with unilateral pain perceived to be over the area of the PSIS region who had tenderness over the SIJ and who were reported to have no sources of pain in the lumbar spine. The subjects were first given a short-acting anesthetic SIJ block (ie, a screening block). Prior to and after the screening block, 7 pain provocation tests were performed on the subjects. Subjects who responded positively to the screening block (ie, 75% or more improvement in their pain) were given a confirmatory anesthetic block 1 week later. Subjects were considered to have dysfunction in the region of the SIJ if their pain improved by at least 75% after the confirmatory block. Only 10 patients (18.5%) were diagnosed with dysfunction of the SIJ region. The authors used chi-square tests and found no relationships between the pain provocation tests and dysfunction of the SIJ region.

Dreyfuss et al² reported similar results for 5 pain provocation tests conducted on a group of 85 patients suspected of having dysfunction of the SIJ region who subsequently underwent SIJ blocks. In addition, Dreyfuss and colleagues reported likelihood ratios for positive test results. The likelihood ratio for a positive test result is the probability of a positive test (eg, reproduction of pain with a provocation test) in a patient with the target disorder (eg, dysfunction in the SIJ region) over the probability of a positive test in a patient without the disorder.¹⁶ A likelihood ratio of 1, for example, would indicate that a positive test would be equally likely in patients with and without dysfunction of the SIJ region. A test with a positive likelihood ratio (ie, the likelihood ratio for a positive test result) of less than or equal to 1 has no diagnostic usefulness.²⁹ Dreyfuss et al reported positive likelihood ratios ranging from 0.5 to 1.1, suggesting that none of the pain provocation tests were diagnostically useful.

Slipman et al¹² also examined the diagnostic accuracy of pain provocation tests for identifying dysfunction in the SIJ region. They studied 50 patients suspected of having dysfunction in the SIJ region. Patients were included in the study if they had pain in the region of the sacral sulcus, a positive Patrick's test (pain reproduction when the hip was passively flexed, abducted, and laterally rotated with the patient positioned supine), and pain with palpation over the ipsilateral sacral sulcus. Patients also had to have at least one other positive provocation test. The patients then underwent an SIJ block. Those patients who had a decrease in pain of at least 80% were considered to have dysfunction of the SIJ region. Slipman et al found that the positive predictive value¹⁶ of the physical examination techniques was 60%. That is, 60% of the patients who were found to have these physical examination signs had dysfunction of the SIJ region, as confirmed by an SIJ block. The design of Slipman and colleagues' study did not allow for the calculation of negative predictive values or specificity and sensitivity values.

Broadhurst and Bond¹³ examined the validity of measurements obtained with 3 pain provocation tests for inferring the presence of dysfunction of the SIJ region. Subjects were included in the study if they reported no pain in the area of the lumbar spine and if they reported the following pain characteristics: pain below the lumbosacral junction, groin pain (not defined), pain with full weight bearing on one lower extremity with no discomfort on medial (internal) and lateral rotation of the hip lying supine, and pain that was worse when going down hills or inclines. Subjects also had to report that their pain was reproduced during all of the 3 pain provocation tests used in the study. The 3 tests were the Patrick's test, the posterior shear test (comparable to the

thigh thrust described by Laslett and Williams²⁷), and the resisted hip abduction test (manually resisted hip abduction with the patient positioned supine).

Once a patient was identified as a candidate for the study, he or she was randomly assigned to receive an injection of the SIJ with either a local anesthetic or normal saline. The next patient admitted to the study would then receive the alternate injection (ie, local anesthetic or normal saline injection). Before the injection, each patient rated the intensity of his or her pain on a visual analog scale for each of the 3 pain provocation tests. The injection was then administered in a double-blind manner. That is, neither the examiner nor the subject knew whether a local anesthetic or normal saline was being injected into the SIJ. The 3 pain provocation tests were then repeated within 15 to 30 minutes of the injection of the SIJ, and each patient rated his or her postinjection pain level for each test.

Patients were considered to have dysfunction of the SIJ region if they had a decrease in pain of at least 70% from preinjection levels for each of the 3 pain provocation tests. None of the patients who received the saline injection had a meaningful decrease in their pain during the postinjection pain provocation tests. The majority of patients who received the local anesthetic had a reduction in their postinjection pain levels of 70% or better during pain provocation testing. The results varied somewhat for each test. The positive predictive values for the 20 patients receiving the anesthetic block were 70% for the Patrick's test, 75% for the posterior shear test, and 85% for the resisted hip abduction test. The design of the study did not allow for the calculation of negative predictive values or specificity and sensitivity values.

Medical History and Description of Pain

Dreyfuss et al² examined the diagnostic accuracy of a patient's medical history and pain description for identifying people with dysfunction of the SIJ region. They performed an anesthetic block of the SIJ in 85 patients suspected of having dysfunction of the SIJ region. Forty-five of the patients had a positive response (ie, 90% or greater relief of pain) to the block. The authors reported sensitivity and specificity values and likelihood ratios for historical data related to pain distribution (eg, pain in the area of the PSIS), functional activities (eg, pain relieved with sitting and standing), aggravating factors (eg, pain with coughing and sneezing), sleeping position, and whether symptom onset was associated with an injury. Likelihood ratios ranged from 0.8 to 1.5 for all but one test, suggesting that most historical data are not useful for diagnosing SIJ dysfunction. One item (pain relief with standing) had a likelihood ratio of 3.9, suggesting that patients who reported pain relief while standing were 3.9 times more likely to have dysfunction

Table.
Studies Using Anesthetic Block as a Standard for Identifying Dysfunction of the Sacroiliac Joint Region^a

Authors	SIJ Texts Examined in the Study	Criteria for Admission	Standard Measure
Schwarzer et al ⁸	No examination procedures studied	Patients referred by local and regional physicians for diagnostic blocks, pain below L5-S1, negative blocks to lumbar facet joints	75% or greater reduction in pain 10 minutes following a fluoroscopically guided injection of the SIJ; the authors did not report how changes in pain intensity were measured
Maigne et al ¹¹	Distraction, compression, sacral pressure, Gaenslen's, Patrick's, pubic symphysis pressure, pain with resisted hip lateral rotation	Unilateral LBP and buttock pain with or without thigh pain, tenderness over area of PSIS, VAS measured pain >4, unsuccessful epidural or lumbar facet injections	75% or greater reduction in pain, measured with a VAS, 10 minutes following the first injection and at least 2 hours of 75% pain relief with a second longer-lasting anesthetic injection
Dreyfuss et al ²	Distribution of pain on body diagram, patient pointing to site of maximal pain within 5 cm (2 in) of PSIS, sitting with buttock elevated on affected side, Gillet, thigh thrust, Patrick's, Gaenslen's, midline sacral thrust, tenderness in area of sacral sulcus, SIJ play	Patients referred by local physicians for SIJ blocks, pain below the area of the lumbosacral junction and in a distribution consistent with SIJ syndrome (Fortin)	90% or greater reduction in pain, measured by verbal pain rating, 20 minutes following a fluoroscopically guided injection of the SIJ
Broadhurst et al ¹³	Patrick's, posterior shear, resisted hip abduction	Patients with pain below the area of the lumbosacral junction, pain while unilateral weight bearing, no discomfort with hip medial or lateral rotation while positioned supine, pain increased when walking down inclines, groin pain, absence of pain in the lumbar region	70% or greater reduction in pain, measured with a VAS, 15 to 30 minutes following a fluoroscopically guided injection of the SIJ
Fortin et al ³⁰	No examination procedures studied	Consecutive patients referred for evaluation of LBP, symptoms greater than 2 weeks in duration, pain diagram suggesting pain in SIJ region	50% or greater reduction in pain, measured with a VAS, 45 minutes following a fluoroscopically guided injection of the SIJ
Slipman et al ¹²	Patrick's, pain with palpation in area of sacral sulcus or SIJ ligaments, shear, standing extension, Gaenslen's, Yeoman	Patients referred for examination with LBP and pain in the region of the PSIS, with or without lower-extremity pain; minimum of 3 positive SIJ pain provocation tests	80% or greater reduction in pain, measured with a VAS, 30 minutes following a fluoroscopically guided injection of the SIJ

^a SIJ=sacroiliac joint, LBP=low back pain, PSIS=posterior superior iliac spine, VAS=visual analog scale.

of the SIJ region than another type of low back pain. Although this likelihood ratio may seem high, Dreyfuss et al did not report the confidence interval.

Based on the findings of Dreyfuss et al,² pain perceived in the area of the PSIS or groin was not a useful diagnostic indicator of dysfunction in the SIJ region. Work by Fortin et al,³⁰ however, suggests that pain in the area of the PSIS may be a useful diagnostic indicator for dysfunction in the SIJ region. In their study, 16 patients with pain perceived near the area of the PSIS were tested with an anesthetic block of the SIJ on the painful side. Ten of the 16 patients had a positive response to the

block (50% or greater reduction in pain). The work of Broadhurst and Bond¹³ also suggests that the absence of pain in the lumbar region, pain below the lumbosacral junction, and pain in the groin area are useful diagnostic indicators of dysfunction in the SIJ region. Although Dreyfuss et al² found that pain in the area of the PSIS or groin is not indicative of dysfunction in the SIJ region, the 45 patients in their study with a positive response to an anesthetic block of the SIJ did not report pain above the lumbosacral junction.

Summary of Studies Examining the Reliability and Validity of Data Obtained From Pain Provocation Tests and Medical History

Although the results are mixed, evidence exists to support the reliability of data obtained with some pain provocation tests for determining the presence of dysfunction of the SIJ region. More importantly, we believe there is evidence to support the validity of data obtained with pain provocation tests for determining the presence of dysfunction of the SIJ region. In addition, there are data to suggest that a patient's description of the location of the pain may be useful in the identification of dysfunction of the SIJ region.

We believe the results of the studies that have used anesthetic blocks suggest that a combination of positive pain provocation tests and the patient's description of the location of the pain may be useful for ruling in the diagnosis of dysfunction of the SIJ region. The pain provocation tests that appear to have some support in the literature are the Patrick's test,^{12,13} palpation over the sacral sulcus,¹² the thigh thrust²⁷ or posterior shear test,¹³ resisted hip abduction,¹³ and iliac compression and gapping tests.^{15,27} The pain descriptions that appear to have some support in the literature include the absence of pain in the lumbar region,^{2,13} pain below L5,^{2,13} pain in the region of the PSIS,^{12,30} and pain in the groin area.¹³

Although anesthetic blocks have been a valuable tool for increasing our knowledge of pain in the SIJ region, our understanding of the sources of this pain is far from conclusive. The conflicting results of some of the studies that used anesthetic blocks illustrate this point. Part of the explanation for the conflicting results may be explained by differences in the methods of the studies (eg, research design, patient inclusion criteria, types of tests examined, types of examiners). The Table summarizes the methods of the studies that used anesthetic blocks. In addition, anesthetic blocks are not a perfect standard. Hogan and Abram⁹ contend that, in some cases, the pain relief associated with SIJ blocks may be due to infiltration of anesthetic to soft tissues beyond the SIJ, which we believe could lead to a false positive response with the block. Although there are no data to support or refute this notion, false positive tests have been found for anesthetic blocks of the lumbar facet joints.³¹

Conclusion

We encourage physical therapists to use evidence to guide them in the examination of the SIJ. Based on our review, there are few data to support the use of symmetry or movement tests in the identification of what has been considered SIJ dysfunction. In addition, the results of radiographic studies suggest that the motion that occurs

at this joint is too small to accurately assess with visual estimation and palpation. There is some evidence to support the use of pain provocation tests and the patient's pain description in the identification of dysfunction in the SIJ region. Until further research is conducted to offer us more guidance on how to examine the SIJ region, we suggest that therapists use pain provocation tests and descriptive information on pain location to identify what has been considered dysfunction of the region of the SIJ.

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