SACROILIAC ORTHOPEDIC TESTS

Contents

Adopted: 3/06

Sacroiliac Orthopedic Tests

This protocol contains descriptions of various orthopedic tests applied to the sacroiliac region. In addition, there is also an appendix with advice on charting. Note: These documents present a standardized approach to orthopedic testing to be used in UWS clinics.

The following tests are included (in alphabetical order):

- Active Straight Leg Raise (aSLR)
- Gaenslen's test*
- Patrick's FABERE test
- Sacral Thrust*
- SI Compression*
- SI Distraction*
- SI Provocations
- Thigh Thrust*

* These five tests can be performed and interpreted as a cluster.

Reliability and Validity of Sacroiliac Joint Tests

Clinical tests to differentiate sacroiliac joint (SIJ) pain from other sources of back pain fall into three categories: pelvic position or static palpation tests, motion palpation tests and pain provocation tests.

Static and motion palpation testing have been the subjects of many studies in the past. Static and motion palpation testing of the SIJ have unknown validity and their reliability is generally poor to fair (French 2000, O'Haire 2000, van der Wurff 2000, van Trijffel 2005, Waters 2003).

A 2019 systematic review concluded that studies of SIJ mobility tests only show poor and fair methodological quality and that the evidence for validity, reliability and responsiveness is conflicting and of low quality and that the use of "SIJ mobility tests in clinical practice or educational programs remain problematic." (Klerx 2019)

Selected pain provocation tests have been shown to have acceptable validity and reliability. It should be noted, however, that there are several problems with establishing reliability and validity of pain provocation tests for the sacroiliac joint.

- The incidence of SIJ pain is unknown. Reports on incidence vary widely (13% to 35% in patients with LBP and in pregnant women the incidence varies from 4% to 78%). These widely varying figures highlight the lack of consensus in defining SIJ pain. For example, some studies rely on self-diagnosis while others use clinical diagnosis; some studies are prospective while others are retrospective; some studies differentiate lower back pain from posterior pelvic pain while others do not. Most SIJ studies are performed on selected patient groups (e.g. chronic pain patients) and these may not apply to the general population. (Kamali 2019)
- Clinical trials vary widely in their methodology and quality. These variations often make it impossible to compare results across studies or pooled results from different studies.

- There is a lack of standardization in diagnostic test performance because different examiners perform clinical tests in different ways, leading to varying test results. In studies that include training sessions for the examiners, reliability is generally higher.
- There is a lack of standardization in interpreting patients' responses to diagnostic tests. Pain provocation testing is wholly reliant on patient report. Patients have widely varying reactions to clinical tests. In studies that include consensus on test interpretation, reliability is generally higher. (Peterson 2017)
- Achieving reliability in clinical test performance is time consuming (Laslett 2005, Strender 1997).
- There are variations in statistical analysis and reporting of study results.
- There is disagreement on which of the many commonly used clinical tests are appropriate to evaluate in clinical trials. Numerous writers (chiropractic, medical, osteopathic, physical therapy) have claimed that several clinical tests can diagnose SIJ conditions. Many orthopedic tests have never been evaluated for reliability or validity. The SIJ pain provocation tests described in this document have been shown to have acceptable validity and reliability.(Peterson 2017)

Lack of gold standard. Test validity refers to how accurately an assessment procedure measures the clinical state of a patient as compared to a gold standard. However, there is no universally accepted gold standard for evaluating sacroiliac pain. Fluoroscopically guided, anesthetic, double block injections have been proposed as a gold standard but their utility may be limited because they test only intra-capsular structures. Extra-capsular structures (ligaments, muscles and tendons) may also cause SIJ area pain. Clinical stress tests are unlikely to load the targeted structure alone. Testing of the SIJ may provoke pain of SIJ origin but may also provoke pain in a different nearby structure. Investigators do not agree on what degree of pain relief constitutes a positive injection test (a positive response varies from 70% to 90% pain relief after the SIJ injection). Rather than employ anesthetic injections as a gold standard, some investigators use a comprehensive history and physical examination in order to establish construct or face validity. In the absence of a gold standard, construct validity is used as a suitable surrogate. Construct validity is established through comparison with other measures that are theoretically related to the clinical condition being evaluated. Fluoroscopically guided, anesthetic, double block injections are an expensive, sophisticated and invasive technology perhaps more suited for research. Combinations of clinical tests that can be performed in the office without special equipment are probably more suited to analyzing a broad spectrum of lumbosacral, sacroiliac and posterior pelvic pain than diagnostic injections (Laslett 2005, Vleeming 2008).

Performance and Interpretation of Sacroiliac Joint Tests

Accuracy of sacroiliac pain provocation testing can be improved by the following:

- Follow the test procedures precisely and consistently. In order to achieve dependable results, the test must be performed in the same manner each time and by each examiner.
- Use a precise and standardized way for the patient to point out the exact location of the pain. This can be done by using a pain drawing or asking the patient to point with one finger to where the most pain is felt. Verify that the pain or other symptoms (such as aching, burning, paraesthesia or numbness) is the patient's *familiar* symptom, that is, the complaint that has led the patient to seek diagnosis and treatment. During a diagnostic test, the chief complaint must be distinguished from other symptoms produced by the test.

- Use sufficient pressure to stress the target tissue. Performing a pain provocation procedure with insufficient overpressure at end range may result in a false negative.

Interpretation

Keep in mind that pain provocation testing is wholly reliant on patient report and reaction. A patient report is influenced by many factors extrinsic to diagnostic testing and pathoanatomy (Barsky 1986, Main 1998).

Patient expectation, fear, dramatization, approval seeking, psychological distress and narrative styles are just a few of the factors that will affect a patient report and reaction (Barsky 2002, Carragee 2004). Many patients are understandably anxious about back pain, and this anxiety is heightened by fear that examination procedures will cause more pain.

It is important to identify patient anxieties and consider factors that may affect how the patient responds to assessment. Fears about the examination should be identified during the clinical interview before a physical examination is performed because they may influence the patient's reaction to examination.

In addition to precise test performance, examiners must take care to give patients clear and simple instructions. If appropriate, reassurance should be given that even if the exam recreates or enhances pain, it will not cause more harm and that it will help to determine the cause of the problem.

Test Combinations

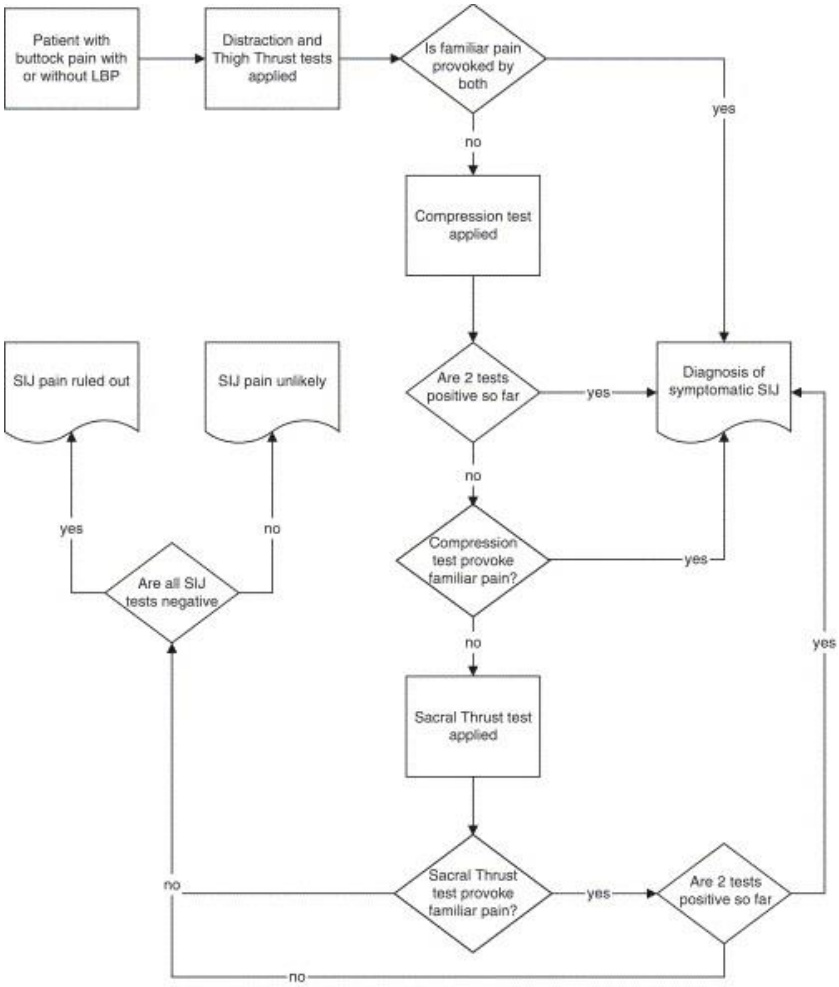
In two separate publications (Laslett 2003, 2005), a battery of sacroiliac provocation tests was compared to double block diagnostic injections in 48 patients thought likely to have sacroiliac pain. A positive likelihood ratio of 4.16 was calculated for a combination of three or more of the following tests: thigh thrust, SI distraction, SI compression, sacral thrust and Gaenslen's. When patients whose pain centralized or peripheralized with repetitive end range testing of the lumbar spine (based on McKenzie's assessment) were excluded, the positive likelihood ratio increased to potentially as high as 6.97. It should be noted that the patients in this study had chronic low back pain and were off work an average of 18 months. Whether these likelihood ratios can be generalized to milder or more acute cases is not known.
These findings have been confirmed in later studies. (Peterson 2017)

The authors also concluded that if all provocation tests are negative, symptomatic SIJ pathology can be ruled out.

In the Laslett 2005 study the test were performed in a specific order and the following is their rationale:

Because the thigh thrust and distraction tests have the highest individual sensitivity and specificity, respectively, performance of these tests first may be optimal. If both tests provoke familiar pain, no further testing is indicated. If one test is positive, the compression test is applied and if positive, a painful SIJ is likely and no further testing is required. If compression is not painful the sacral thrust test is applied. If this is painful, SIJ pathology is likely, whereas if it is not painful, SIJ pain is

unlikely. Performing the tests in this order may avoid subjecting patients to unnecessary tests. The following diagnostic algorithm was presented in the study.



Another study found similar results using a combination of a similar cluster of tests but including Patrick's Sign instead of Sacral Thrust. (van der Wurff, 2006)

Other sacroiliac tests recommended based on current evidence and expert opinion are Patrick's (FABERE) test (Albert 2000, Vleeming 2008) and palpating the long dorsal sacroiliac ligament (Vleeming 2008).

Additional orthopedic tests including the belt test or Yeoman's may also be performed based on biomechanical logic, although there is little published evidence to support these procedures. Joint and soft tissue palpation findings may be used to help determine selection of manual therapy.

Active Straight Leg Raise (aSLR) (*aka* pelvic instability test)

Indications for Testing

The active straight leg raise (ASLR) is indicated for patients with low back or posterior pelvic pain, with or without leg symptoms. It is primarily useful for pregnant and post-partum patients.

Procedure

The supine patient is asked to raise one leg after the other to a height of between 5 and 20 centimeters. The examiner then asks if the patient notes any effort differences between the two legs or if they experience pain in the area of the SI joint. If there are no positive findings, the test can be augmented by having the examiner press down against the raised leg to increase the load. The practitioner should note if there is trembling of the leg or any other signs of apparent difficulty. (Magee 2016)

Some authors suggest asking the patient to rate the difficulty of lifting each leg using a six-point Likert scale (see below under interpretation) This can be used as an outcome assessment. (Evans 2009, Reinman 2016)

If the test has positive findings, the examiner then re-tests the patient with the pelvis stabilized. This can be achieved using an SI belt, providing manual compression, or by having the patient abdominally brace to achieve force closure of the SI joints and prevent motion. Another modification is to ask the patient to flex and rotate the trunk toward the leg being elevated. The clinician resists this motion while the leg is being raised. This is to test the ability of the muscles to stabilize the SI joints during movement. (Magee 2016)

Mechanism

The leg acts as long lever load on the hip, sacroiliac joint, and lumbar spine, stressing joints and ligaments. It also engages the hip flexors. Added resistance to the test increases the load on the muscles and joints. Contracting the deep abdominal muscles or wearing a trochanteric belt is thought to stabilize the sacroiliac joint resulting in normalizing the test.

Procedural Errors

Instructing the patient to raise the legs too high changes the test into a nerve tension test. However, this can be done purposely as a pre-screening tension test before proceeding to the SLR test.

Interpretation

For the single leg active SLR, the test is considered positive if *any* of the following results occur: familiar/localized pain, a subjective sense of difficulty raising a leg, inability to raise each leg to a comparable height, or poor ability to resist the examiner's downward pressure. The practitioner should also watch for rotation of the pelvis which may signal difficulty in raising the leg.

A positive test is consistent with Posterior Pelvic Pain syndrome (PPP syndrome) from pregnancy and suggests that the sacroiliac joint or joints may be the source of symptoms in both the pregnant and non-pregnant patient.

Improvement in the test while wearing an SI belt, manual compression or performing abdominal bracing suggests both a hypermobile sacroiliac joint and a role for stabilization exercises and/or the belt therapeutically. Improvement in this test can be used to monitor favorable response to treatment.

This procedure should not produce nerve root stretching and so should not re-create true sciatica. In rare cases of a very large lumbar disc herniation, even slight raising of the leg may be impossible (Cox sign).

Charting

Chart location of the pain, any difficulty in raising the symptomatic side, and if there is improvement with bracing or belting.

One option is to grade the impairment on a six-point Likert scale:

0 = not difficult at all
1 = minimally difficult
2 = somewhat difficult
3 = fairly difficult
4 = very difficult
5 = unable to do

However, since this grading scale is not widely circulated, the grade would also have to be explained in words. In the original study (Mens 1999) a difference of at least 2 points between left and right side was classified as significant. See Appendix A, Charting the Results of Pain Provocation Tests, for other options for charting. Document the patient's response to this test as an ongoing outcome measure.

Reliability and Validity

Sensitivity is reported to be 0.87 and specificity 0.94 for pelvic pain during pregnancy. It is thought, but not proven, to be sensitive and specific for sacroiliac instability. The test is also useful to track patient improvement (a *responsive* test). ASLR in pregnancy related posterior pelvic pain has a high test-retest reliability (ICC = 0.83). (Mens 2001)

Gaenslen's Test (*aka* Pelvic rotation test)

Indications for Testing

This test is performed to confirm suspicion of posterior pelvic pain or sacroiliac joint disease,and is best used in combination with other tests of sacroiliac joint function (see Follow-up Testing). It may also be combined used to assess hip flexor muscle length. [1] (See Thomas test).

Procedure

The patient is supine near the edge of the table. On the side to be tested, the thigh should be unsupported, suspended off of the edge of the table. Next, the patient is instructed to approximate the opposite knee to their chest (flexing the hip and knee) where it is firmly stabilized by the examiner. Flexion of the indifferent knee and thigh should bring the lumbar spine firmly into contact with the table, so when passive end range extension is created on the affected side, it should only stress the hip and sacroiliac joint on that side. Alternately, the patient may be instructed to bring both knees as close to the shoulders as possible, then extend one leg off the side of the table. Elderly patients may need help doing this. A reasonable expectation is that the thigh of the dependent leg should at least be horizontal representing around 10° of hip extension normally. The examiner, standing on the side of the extended hip, places downward pressure on the knee of the dependent leg to create end-range extension loading at the hip and SI joints. (Magee 2016, Evans 2010, Reinman 2016)

The test can also be performed with the patient in a side-lying (lateral recumbent) posture. If done in this position, the examiner stands behind the patient. Th patients bottom leg is flexed toward the chest and the examiner extends the top leg while stabilizing the pelvis posteriorly. (Magee 2016).

Mechanism

Overpressure of the leg at end range in extension stresses the sacroiliac joint, anterior sacroiliac joint ligaments and hip joint on the side of leg extension. It also stretches the hip flexors and potentially stretches the femoral nerve along with the L2,3,4 nerve roots. In rare instances stretching the psoas may irritate an inflamed appendix or other organs along its course, such as a ruptured ovarian cyst (psoas sign).

Procedural Errors

Common errors include not clearing the thigh from the table enough to allow sufficient extension on the side being tested or not *maintaining* sufficient pressure on the flexed knee and hip on the indifferent side during the entire procedure. To accommodate the test on a low table, the practitioner must ensure that the flexed leg is firmly stabilized, and that the leg being tested is straight, not allowing the foot to rest on the floor. The practitioner may need to use his/her own foot to lift the patient's foot off the floor by straightening the patient's leg. As for most pain provocation orthopedic tests, insufficient loading of the joint may result in false negatives (Laslett 2005). Practitioners should exercise caution when performing this test on elderly patients or patients with osteoporosis. The side posture version of the test is an option in these cases. The accuracy of this version, however, is unknown.

Interpretation

The dependent thigh should have at least 10 degrees passive extension, otherwise the hip flexors may be tight or there is hip or sacroiliac pathology. The test is thought to be most strongly positive for SI involvement if the pain provoked is localized to the area of the sacroiliac joint or the test reproduces the patient's familiar pain (Laslett 2005). A softer positive (with likely poorer accuracy) is production of generalized pain over the buttock or groin. Occasionally the test may reproduce posterior thigh pain (Evans 2010). Pain on the affected side suggests a general sacroiliac lesion (e.g., anterior sacroiliac ligament sprain, inflammatory process in the sacroiliac joint such ankylosing sacroiliitis, sacroiliac joint dysfunction). It may also provoke the pain of a hip pathology. If the flexed hip is not stabilized, the test may have the unintended consequence of producing lumbar extension aggravating a lesion there.

A short, tight or painful psoas/rectus femoris muscle or inflamed bursa may also be detected. Sharp or electrical pain down the anterior thigh may be due to stretching of an irritated femoral nerve or its nerve roots (L2-4). This procedure may sometimes increase abdominal pain in a patient with appendicitis or other organs along its course, such as a ruptured ovarian cyst (psoas sign).

Charting

Describe the location of pain (e.g., "local left posterior pelvic pain in the region of the sacroiliac joint"). The quality of the pain and whether it reproduces the patient's familiar pain can also be charted. For other options, see Appendix A: Charting the Results of Pain Provocation Tests.

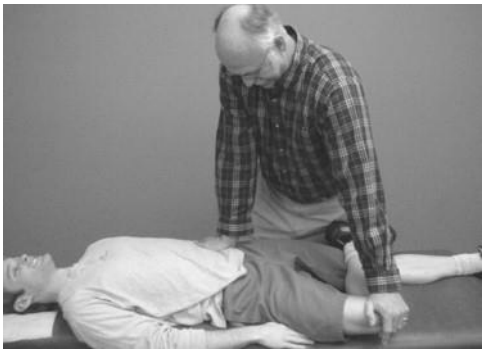
Sample language for use in a narrative report: "Loading left SI joint in extension with the uninvolved hip maximally flexed (Gaenslen's test) produced deep, dull local left posterior pelvic pain."

Reliability and Validity

This test is considered to have good interexaminer reliability (*k*= .54-.76) (Cleland 2016). Three different studies have assessed the validity of this test and have showed the specificity from .71 to .77 and the sensitivity from .50 to .53 (Laslett 2005, Dreyfuss 1996)

The work group creating the draft European Guidelines on the Diagnosis and Treatment of Pelvic Girdle Pain has recommended the use of this test (Vleeming 2008).

Patrick's FABERE Test (FABERE = flexion, abduction, external rotation, extension)



Indications for Testing
This is a test for mechanical dysfunction, inflammatory processes, and other pathology of the hip joint. This test has also been identified as a reasonable test for sacroiliac joint lesion, particularly when combined with other tests of sacroiliac joint function (see Follow-up Testing).

Procedure
The patient lies supine with the leg being tested in a figure-4 position. The heel rests just superior to the knee of the opposite leg. In this position of hip **F**lexion, **AB**duction and **E**xternal **R**otation, the hip is **E**xtended (FABERE) by the doctor exerting downward pressure on the thigh just above the knee, while stabilizing the opposite side ASIS (anterior superior iliac spine) with the other hand. Some practitioners have the patient place his/her hand over the ASIS for protection and comfort and exert additional stabilizing pressure over the patient's hand.

Practitioners should exercise caution when performing this test on elderly patients or patients with osteoporosis.

Mechanism
This test forces the femoral head into the acetabular cavity, loading the articular surfaces with maximal congruence. Because the test also stresses the sacroiliac joint, especially at end range, it may also produce pain in that joint when dysfunction exists there.

Procedural Errors
As is true for most pain provocation procedures, insufficient overpressure at end range may result in a false negative.

Interpretation
Pain in the hip indicates an inflammatory or infectious process present in the hip joint or may be consistent with uncomplicated mechanical joint dysfunction. Pain secondary to trauma can indicate a fracture in the acetabular cavity, rim of the acetabular cavity, or femoral neck. Pain may also be indicative of avascular necrosis of the femoral head. A spasm of the iliopsoas muscle may prevent the patient from relaxing the crossed extremity, preventing the practitioner from pressing the knee down toward the table.

In the case of a healthy hip joint, the next joint stressed in the kinetic chain is the sacroiliac joint. The test is thought to be most strongly positive if the pain provoked is localized to the area of the sacroiliac joint or the test reproduces the patient's familiar pain (Albert 2000).

Charting

Pain location and any radiation needs to be recorded. See Appendix A: Charting the Results of Pain Provocation Tests.

Sample language for use in a narrative report: "Anterior to posterior sheer pressure was applied to the right hip and sacroiliac joint with the hip pre-positioned in flexion, abduction and external rotation (Patrick's FABERE test) resulting in right posterior pelvic pain."

Reliability and Validity

For patients with hip pain, one study showed Patrick's test to have a *K*= .63 for intraexaminer reliability and another showed ICC= .90 for intraexaminer reliability for patients with suspected hip osteoarthritis. In a small study of patients with hip OA, interexaminer reliability was found to be *K*= .75 (Cleland 2016)

Whereas Strednel (1997) and Deursen (1990) found the test to have poor reliability for sacroiliac lesions, Dreyfuss found the test to have 85% agreement (1994, 1996).

Author	**Sensitivity**	**Specificity**	**Author's Conclusion**	**Methodology Score** (van der Wurff 2000)
Dreyfuss	69%	16%	Test not valid	58
Rantanen	57%	n/a	Test not valid	45
Maigne	n/a	n/a	Test not valid	39
Broadhurst	77 %	100%	Test valid	50

Based on a review of the literature and the consensus of the panel, the work group creating the draft European Guidelines on the Diagnosis and Treatment of Pelvic Girdle Pain has recommended the use of this test (Vleeming 2008).

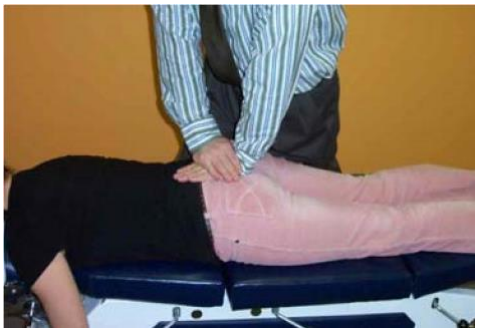
In a study published in 2000, Albert associated positive orthopedic tests with their ability to correlate with specific pelvic pain locations (sacroiliac, symphysis, or pelvic girdle in general) reported by 535 pregnant women. Patrick's test had poor sensitivity (ranging from 40-70%) but 99% specificity (based on a pool of 1734 pregnant women patient without pelvic pain.)

Follow-up Testing

When concerned for hip joint pathology, correlate with anvil test, Hibbs test, Nachlas' test, Ely's test, hip internal/external rotation, circumduction/scouring, diagnostic imaging beginning with plain film radiography.

Sacral Thrust (aka Sacral Apex Test)

Indications for Testing
This test is performed to confirm suspicion of posterior pelvic pain or sacroiliac joint dysfunction/disease and is best used in combination with other tests of sacroiliac joint function.

Procedure


The patient is prone. The practitioner stands facing the table at about the level of the patient's hip. The contact hand is on the sacrum at about the S2-3 level with fingers pointed up the spine. The other hand reinforces the contact hand. With this set-up, the practitioner leans onto the patient to take up any joint slack and adds a modified thrust posterior to anterior. Prudence would suggest that forces should be gradually applied at first before the thrust is added. The patient is instructed to notify the doctor at the first onset of discomfort. The sacral thrust used here is not intended to be therapeutic in nature and is lighter and slower than the high velocity low-amplitude (HVLA) thrust common in chiropractic treatment. Reinman (2016) suggests applying 3 to 5 thrusts.

Mechanism
Pressure applied to the sacrum in the manner described here presumably creates a shearing force along the sacroiliac joint and will stress both anterior and posterior SI joint ligaments as well as the interior structure of the SI joint. In the presence of joint pathology or dysfunction, pain generators in the anterior, posterior and interior supportive elements of the joint may be stimulated.

Procedural Errors
Care should be exercised to ensure that the contact is on the body of the sacrum and not on the coccyx. Pressure should be exerted posterior to anterior, avoiding cephalad or caudad vectors. The practitioner should avoid applying excessive force in order to minimize unnecessary discomfort while still applying sufficient force to avoid false negative results.

Interpretation
Pain in the region of the sacroiliac joint created by this procedure suggests SI joint pathology or dysfunction. The test is thought to be most strongly positive for sacroiliac involvement if the pain provoked is localized to the area of the SI joint or the test reproduces the patient's familiar pain (Laslett 2005).

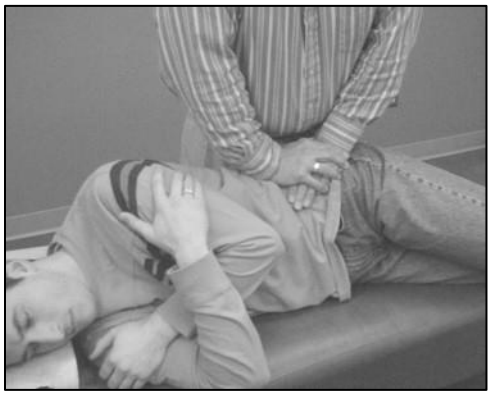
Charting
Chart location and any radiation of pain (see also Appendix A).

Sample language for use in a narrative report: "Posterior to anterior shear stress directed through the sacrum (sacral thrust) reproduced the patient's posterior pelvic pain."

Reliability and Validity

Sensitivity has been reported for posterior pelvic pain to be 0.63 and specificity 0.75 with a PPV of .56, a NPV of 0.80, an LR+ of 2.5 and an LR- of 0.50 (Laslett 2005).

SI Compression (*aka* Approximation or Pelvic Rock test)



Indications for Testing

The test is used when evaluating patients with low back pain, posterior pelvic pain, or suspicion of sacroiliac problems.

Procedure

The patient is positioned in a side lying posture, with the hips and knees bent for stability. The examining hands are then placed one over another and placed on the patient's ilium. Using body weight, a compressive force is then placed through the ilium directed towards the floor. In cases of a high table or a smaller practitioner, the practitioner should kneel on the edge of the table and lean over the patient. It is important to maintain a broad contact and to stabilize the patient.

An alternative method is to manually compress the patient's ilia toward each while the patient is supine. It is doubtful, however, whether sufficient compressive force can be generated using this method.

Mechanism

The sacroiliac joints are forced together potentially recreating the patient's pain. If the load is directed more through the anterior aspect of the ilium, a distractive force may be created across the posterior joint and ligaments.

Procedural Errors

Unless sufficient force is generated, the procedure may result in a false negative. A broad contact must be used by the examiner so as not to place too much force on one spot creating local pressure pain on the soft tissue.

Interpretation

A positive test is one which either reproduces the patient's pain or is localized to either sacroiliac joint. A positive suggests an SI sprain, mechanical dysfunction or pathological lesion. It may also be positive in the case of a fracture of the wing of the ilium.

Charting

Describe the location of pain (e.g., "local left posterior pelvic pain in the region of the sacroiliac joint"). Reproduction of the patient's familiar pain can also be charted. For other options, see Appendix A: Charting the Results of Pain Provocation Tests.

Sample language for use in a narrative report: "Compression of the pelvis produced the patient's characteristic pain over the right sacroiliac joint."

Reliability and Validity

Reliability

There is disagreement concerning the reliability of this procedure.

Authors	Agreement	Conclusion
Strender (1997)	79%	unreliable
Potter (1985)	76%	unreliable
Laslett (1994)	91%	reliable
McCombe (1989)	n/a	unreliable

In a study of 2269 pregnant women, the sacroiliac compression test scored among the highest in inter-examiner reliability with high kappa values (Albert 2000).

Validity

Authors	Sensitivity	Specificity
Rantanen (1989)	19%	n/a
Blower (1984)	0%	100%
Russell (1981)	7%	90%

SI Distraction (*aka* SI Gapping Test, SI Stretch Test)

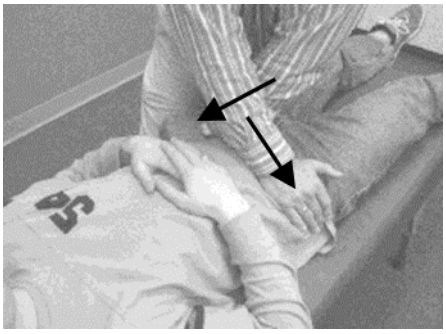
Indications for Testing

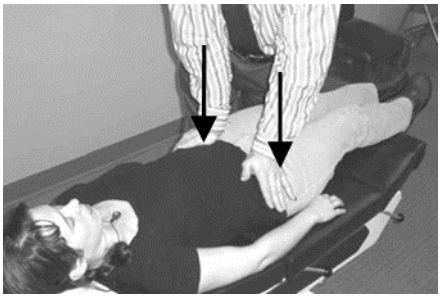
The test is used when evaluating
patients with low back pain, posterior pelvic pain, or suspicion of sacroiliac problems.

Procedure

The patient is instructed to lie in a supine position and the practitioner cups their hand over each ASIS. There are a number of alternating descriptions of how to direct the force. The one method with some evidence of validity has the line of force direct straight down producing more of a shear effect than true distraction (Laslett 2005). In most other sources, the doctor crosses his/her arms and directs a downward and outward force (Magee 2014, Reinman 2016, Evans 2009, Cipriano 2010).

Proper communication with the patient is important before contacting the anterior portion of the pelvis.





Mechanism

Simultaneous pressure on the ASIS in a downward direction will primarily cause a shear load across the SI joints bilaterally, stressing the joint surfaces and posterior ligaments. A more outward force will distract the anterior structures of the joints, while compressing the posterior.

Procedural Errors

Unless sufficient force is generated, the procedure may result in a false negative. A broad contact must be used by the examiner so as not to place too much force on one spot creating local pressure pain on the soft tissue.

Interpretation

A positive test is one which either reproduces the patient's pain or is localized to either sacroiliac joint. A positive test suggests an SI mechanical or pathological lesion.

Charting

Describe the location of pain (e.g., "local left posterior pelvic pain in the region of the sacroiliac joint"). Reproduction of the patient's familiar pain can also be charted. For other options, see Appendix A: Charting the Results of Pain Provocation Tests.

Sample language for use in a narrative report: "Downward force through the ASIS produced the patient's characteristic pain over the right sacroiliac joint."

Reliability and Validity

There is disagreement concerning the reliability and validity of this procedure.

Reliability

One study which used crossed arm pressure in patients with chronic low back pain reported Interexaminer reliability as *K*= .50. Other studies using posterior force on ASIS's in patients with low back pain found interexaminer reliability as *K*= .26-.69. (Cleland 2006)

Validity

A study of 48 patients with SIJ pain reported sensitivity= 69, specificity= 69, +LR= 2.20, -LR= 0.46 (Reinman 2016)

SI Provocation (flexion/extension, nutation/counter nutation, inferior/superior sacral glide)

Indications for Testing

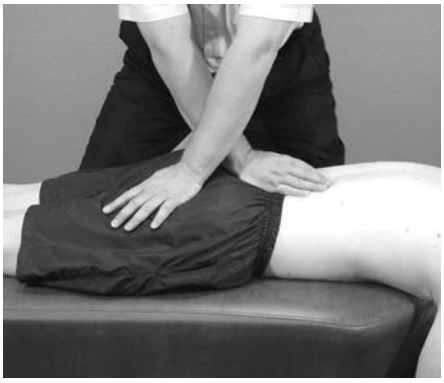
This test is used to evaluate the sacroiliac joint in a patient with a complaint of low back or posterior pelvic back pain. It is used to help differentiate between pain arising in the SI joint versus the lumbar spine.

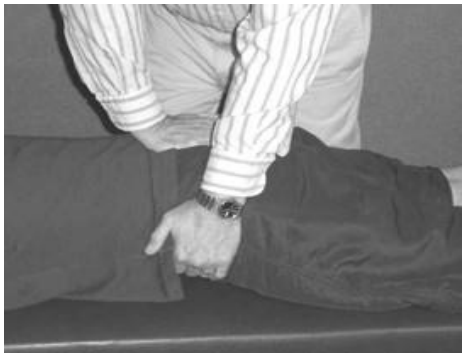
Procedure

The patient is prone. The joint can be tested in flexion and extension and for inferior and superior glide. Joint play and pain are assessed.

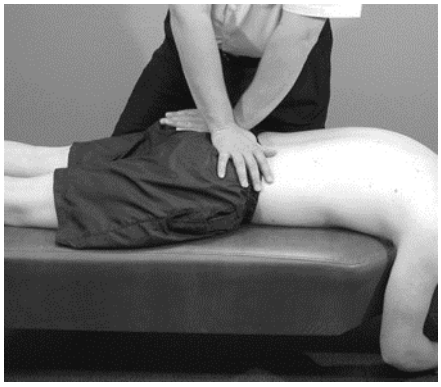
To challenge the joint into flexion, the doctor places one hand (thenar or hypothenar) on the sacral base while the other hand reaches in front and cups the patient's anterior ilium at the anterior superior ischial spine (ASIS). To execute the procedure, pull posteriorly with the ASIS contact while pushing anteriorly on the sacral base. Alternatively, keep the one hand on the sacral base and place the other hand (thenar or hypothenar) on the ischial tuberosity. While stabilizing the sacrum, push the ischial tuberosity toward the table (pressing the ilium into flexion).

Sacral nutation with ilial flexion
(SI joint flexion)





To challenge the joint into extension, place one hand (thenar or hypothenar) on the PSIS and the other (thenar or hypothenar) on the sacral apex and apply anterosuperior pressure against the PSIS and anterior-inferior pressure against the sacral apex.



To evaluate superior sacral glide, the examiner places the hypothenar of one hand at the apex of the sacrum and pushes cephalad while the other hand pushes caudad against the iliac crest.

To evaluate inferior sacral glide, the examiner places the hypothenar of one hand on the sacral base and pushes caudad while the other hand pushes cephalad against the ischium.

Other hand positions may also be used to assess these vectors.

Mechanism
Loads are placed along a variety of vectors creating sheer and tensile stress across the SI joint and associated soft tissues.

Procedural Errors
Accurate placement of the hands is important to avoid inadvertent contact with peri-anal soft tissues. A false positive may result from poor placement of contacts resulting in direct compression of periarticular SI tissues which are tender or inflamed.

Interpretation
In a normal SI joint, there will be minimal movement and that movement will be painless. In the case of SI joint pathology or dysfunction, there may be decreased, or increased movement and the patient will experience pain located near the SI joint. Due to the small amount of movement possible, the production or absence of pain is more significant than the doctor's ability to evaluate motion. This test cannot be used alone to determine sacroiliac dysfunction nor to identify the SI joint as the source of the pain. Pain may result from the associated soft tissue or from adjacent joints (e.g., the lumbosacral joint). Pain relief caused by challenging the joint in a specific vector may also be used to suggest a therapeutic loading strategy (e.g., manual therapy or exercise).

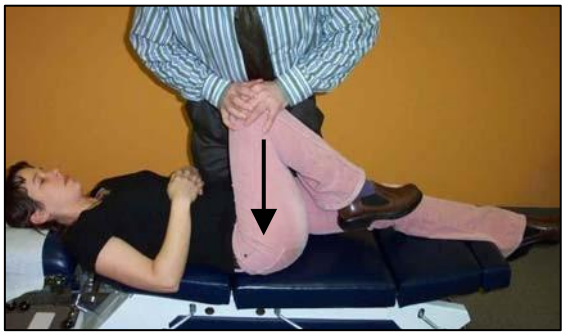
Charting
The examiner should note whether s/he perceives a difference in mobility between SI joints (e.g, restricted or exaggerated) and whether the patient experiences pain or pain relief during these provocative maneuvers. For other options on charting, see Appendix A, Charting the Results of Pain Provocation Tests. In cases of abnormal findings, the direction of load (i.e., sacral flexion vs. extension) must also be charted.

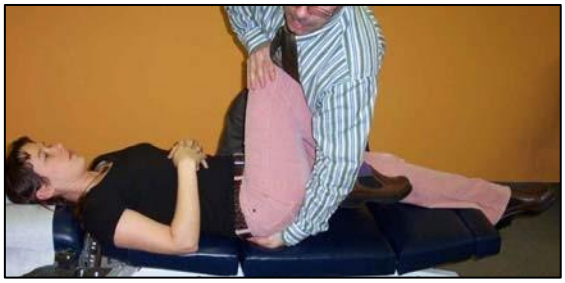
Reliability and Validity
Unknown

Thigh Thrust (*aka* Femoral Shear test, Posterior Pelvic Pain Provocation test, P4 test)

Indications for Testing

The test is used when evaluating patients with low back pain, posterior pelvic pain, or suspicion of sacroiliac problems.



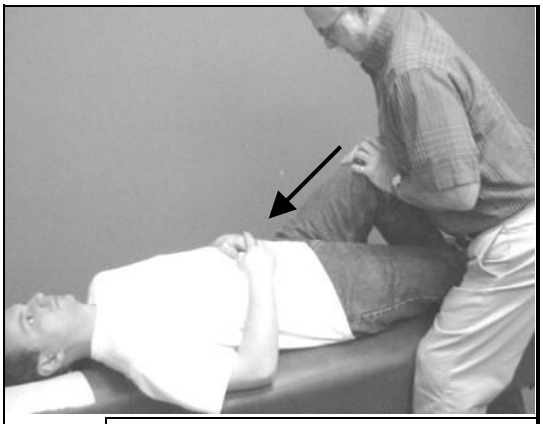


Procedure

The patient is supine. The evaluator pre-positions the hip in about 90 degrees of flexion and slight adduction (approximating the angle of the SI joint), then applies gradual downward pressure along the axis of the femur. Alternatively, the practitioner can slip his or her indifferent hand underneath the sacrum, forming a ledge to accentuate the shear force across the SI joint. Alternatively, Magee (2005) suggests starting with the hip flexed 45° and adding axial compression at that angle. If this method is chosen, the final testing position should still be 90 degrees.

Mechanism

The starting position helps to stabilize the hip joint so that when pressure is applied it tends to shear the sacroiliac joint from anterior to posterior. Local pain at the sacroiliac joint suggests local pathology in the joint.



Magee and Cipriano option

Procedural Errors

Some authors caution about too much adduction causing patient discomfort. As with most pain provocation orthopedic tests, insufficient loading of the joint may result in false negatives (Laslett 2005).

Interpretation

Pain produced in the region of the sacroiliac joint suggests pathology or joint dysfunction. The test is thought to be most strongly positive for sacroiliac involvement if the pain provoked is localized to the area of the sacroiliac joint or the test reproduces the patient's familiar pain (Laslett 2005). The test may also be positive in cases of hip pathology.

Charting

Chart location and any radiation of pain (see Appendix A, Charting the Results of Pain Provocation Tests).

Sample language for use in a narrative report: "Anterior to posterior shear stress directed through the femur to the left SI joint (thigh thrust) reproduced the patient's posterior pelvic pain."

Reliability and Validity

This is one of the few sacroiliac tests where there is general agreement about an established validity. (Cattley 2002) Sensitivity is reported to be 80% (Broadhurst 1998, Ostergaard 1994). A specificity of 100% was reported in one study (Broadhurst 1998) and 81% in another study on pregnant patients (Ostergaard 1994). These studies were considered to have acceptable methodology (van der Wuff 2000). On the other hand, one more poorly designed study (Dreyfuss 1996) reported poor sensitivity and specificity of exams by MD's and DC's (42 to 36% sensitivity and 45 to 55% specificity) yielding a positive likelihood ratio of only 0.7.

In a study published in 2000, Albert correlated positive orthopedic tests with their ability to correlate with specific pelvic pain locations (sacroiliac, symphysis, or pelvic girdle in general) reported by 535 pregnant women. The thigh thrust test had high inter-examiner agreement (.70) and 99% specificity (based on a pool of 1734 pregnant women patient without pelvic pain.) Sensitivity was 84% for women with one-sided SI syndrome and 93% for double-sided SI syndrome.

Based on a review of the literature and the consensus of the panel, the work group creating the draft European Guidelines on the Diagnosis and Treatment of Pelvic Girdle Pain has recommended the use of this test (Vleeming 2008).

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APPENDIX A: CHARTING THE RESULTS OF PAIN PROVOCATION TESTS

Recording positive results

When recording the results of orthopedic pain provocation tests, there are a few basic principles that should always be followed and a number of optional notations that can also be made. *A test should NEVER be simply noted as being positive!*

Basic principles

- Record pain location including any radiation pattern.
- If the procedure reproduces the symptoms exactly, this should be recorded. This may be marked as "CC" for chief complaint. However, there will be situations when it is important to note more specifically which chief complaint or which part of the chief complaint has been aggravated (e.g., if the patient has both headache and neck pain, which portion of the chief complaint was affected?).
- If a procedure is designed to be sustained for a certain length of time (e.g., Roos test), note when the symptoms were reproduced/aggravated.

Optional

- Record the quality of the pain if it is noteworthy (e.g., sharp, burning, electrical).
- Record the intensity of the symptoms (any verbal scale is acceptable as long as the denominator is recorded, e.g., 3/5 or 6/10).
- Record whether the symptoms were aggravated at end range only.

Recording negative results

Sometimes the test is technically negative for what it is primarily designed to test, but yields other useful information. For example, a SLR may be negative as a nerve tension test but may reveal that the hamstrings are tight at 70 degrees. On WSCC exam forms, circle the item and describe the finding. In narrative formats, likewise, describe the finding. For example, "SLR on the right was negative for nerve involvement but aggravated the patient's back pain."

All negative tests must be recorded. Do not leave them off an exam form or out of a SOAP note just because they are negative. The fact that the test was performed must be part of the chart.

Record inability to perform a test

Cases in which an attempt is made to perform a pain provocation test, but the patient cannot tolerate it, record "not performed due to pain." This can be abbreviated "NP d/t P." Sometimes procedures are not performed for other reasons. In these cases, line out the procedure on the exam form and write NA (not applicable) or NP (not performed).