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A Review of the Sacroiliac Joint with Emphasis on Evaluation and Treatment

Rachele Reber
University of North Dakota

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A REVIEW OF THE SACROILIAC JOINT WITH EMPHASIS ON EVALUATION AND TREATMENT

by

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Bachelor Science in Physical Therapy
University of North Dakota, 1994

An Independent Study
Submitted to the Graduate Faculty of the
Department of Physical Therapy
School of Medicine
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in partial fulfillment of the requirements
for the degree of
Master of Physical Therapy

Grand Forks, North Dakota
May
1995
This independent study, submitted by Rachele Reber in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

Faculty Advisor

Chairperson, Physical Therapy
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Department Physical Therapy

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ABSTRACT

Low back pain is a common reason for referral to physical therapy. Although the role of the sacroiliac joint in low back pain remains controversial, many physical therapists frequently evaluate and treat biomechanical lesions of the sacroiliac joint. It is important to have keen evaluation skills to pinpoint the type of sacroiliac joint lesion present. Having a good knowledge and understanding of the anatomy, movement, and function of the joint will aid the therapist to correlate the findings of the evaluation with the proper treatment regimen. The purpose of this independent study is to describe current evaluation techniques, pathological conditions, and corresponding treatment techniques of the sacroiliac joint. The procedure used will be a literature review comprised of the anatomy, motion, and function of the joint followed by the evaluation, pathology, and treatment sections. The results of this independent study will add to the body of physical therapy knowledge in evaluating and treating sacroiliac joint dysfunction.
CHAPTER I
INTRODUCTION

Low back pain is a common ailment that has plagued our society and puzzled clinicians for years. Today, we live in an industrialized society where low back pain is one of the most frequent "general" diagnoses referred to physical therapy for treatment. In the United States, for example, analysis of National Health and Nutrition Examination Survey II data indicates that 13.8% of persons between the ages of 25 and 74 have experienced, at some point in their lives, low back pain lasting 2 weeks or longer.\(^1\) Furthermore, 75% of this group reported having low back pain of this duration within the last year of the study.

As physical therapists, it is important to have evaluation skills which foster our ability to deduce the source of our patients' low back pain. In some cases, the sacroiliac joint (SIJ) has been implicated as the source of pain, although there is controversy on whether or not dysfunctional movement is possible. Cyriax\(^2\) does not deny that limited sacroiliac motion may exist; however, he states, "The possibility of a fixed sacroiliac subluxation causing symptoms is very dubious and no evidence for it exists." Many other authors\(^3-4\) have cited the dysfunctional SIJ as a source of low back pain. Despite the controversy surrounding the topic of whether or not the SIJ moves, it is a complex and unique joint that has been
definitely linked to a wide variety of pathological conditions affecting individuals throughout their life span.

Cadavers and living subjects have been used to investigate the SIJ. Nevertheless, there are inherent difficulties in studying SIJ motion. It is often difficult to visualize the SIJ and sometimes an extremely difficult area to evaluate radiographically. Because of this, it has been easier to study SIJ movement relative to the trunk and femur. For evaluation purposes, this is most commonly done prone, supine, and from sitting to standing positions.

The purpose of this independent study is to review the literature on the sacroiliac joint focusing on evaluation and treatment. The study will also include a review of anatomy, function, and pathology of the SIJ. The intent of this study is to give the physical therapist a reference for reviewing sacroiliac joint dynamics, evaluation, and treatment concepts.
CHAPTER II
ANATOMY

The sacroiliac joint (SIJ) is an extremely stable structure due to its bony configuration and ligamentous support. It is formed by the articulation between the paired ilia and the sacrum resulting in two sacroiliac joints.\textsuperscript{5-7} The Symphysis pubis also forms a joint which completes the pelvic girdle anteriorly. The sacrum is a double wedge, tapering from anterior to posterior and from cranial to caudal with convex auricular sides that tightly fit into the matching concavities of the paired ilia.\textsuperscript{7}

Mobility of the SIJ decreases or becomes obsolete over the aging process. For females, this occurs around the fifth decade of life, partially due to menopause. For males, the decreased mobility manifests earlier, around the fourth decade of life.\textsuperscript{6,7} With both women and men, the SIJ completely ossifies with age due to osteophyte formation.\textsuperscript{6}

Gender differences are also apparent in the shape of the sacrum. The female joints become more mobile and the ligaments become lax; the sacrum is shorter and broader, also. The male sacroiliac ligaments increase in strength in the mid-teens. Therefore, the female’s pelvis is not as rigid as the male’s. These differences become evident by 12 to 14 years of age.
In an article published by Alderink, reference was made to Lynch, Albinus, and Hunter (1700s). They were the first to demonstrate that the SIJ articulations were "true joints" possessing synovial membranes. Van Luschka described the SIJ as a true diarthrodial joint. Nevertheless, many authors proclaim that the SIJ is an amphiarthrodial joint, lined with hyaline cartilage and synovial fluid. These classifications differ mostly because of the type of cartilage found on the articular surface.

Displacements of the sacrum are palpable and measurable. For example, the sacrum must move in order to accommodate a fetus. Other authors claim that only 1 to 2 degrees of movement are possible in the SIJ. However, many of these authors used either cadavers or the elderly population as their research subjects. Rigor mortis is a main factor in the decreased SIJ mobility in cadavers, and ossification of the SIJ is present in the majority of the elderly population. This ongoing controversy can be traced back many years and has fueled the desire for further research.

The pelvis constitutes the base of the trunk, supports the superincumbent body structures, and links the vertebral column to the lower extremities. The pelvis also plays an important role in distributing ground reaction forces from the lower extremities. The pelvis can be divided into two arches by passing a vertical line or plane through the acetabular cavities. The posterior arch includes the upper three sacral vertebrae and the portion of the paired ilia from the SI joints to the acetabular fossae. The body weight is transmitted primarily through this
arch, which allows the weight of the trunk to drive the wedge-shaped sacrum down and forward between the paired ilia; thus locking the pelvis. The anterior arch is composed of the symphysis pubis and the superior pubic rami. This arch connects the posterior paired ilia which, in turn, prevents separation of the posterior arch. It also acts as a "strut" from the transmittance of the ground reaction forces up through the femur and across the pubic rami. Therefore, the ground reaction forces which tend to rotate the ilia posteriorly coupled with the trunk forces provide for a "screw home" mechanism of stability.

The ligaments of the pelvis are well-developed, strong, and contribute significantly to the overall stability of the pelvic joints. The ligaments of the SIJ are divided into three main categories: the interosseous, dorsal, and ventral sacroiliac ligaments. The interosseous sacroiliac ligament is massive and completely surrounds the joint; its fibers form the primary bond between the sacrum and the ilium. The dorsal sacroiliac ligament is comprised of several weak fasciculi which are distributed into cranial and caudal components. This ligament resists downslipping of the sacrum. The ventral sacroiliac ligament is located on the anterior surface of the joint and is a thickening of the fibrous capsule. This ligament resists anterior translation of the sacral promontory.

The sacrum is also stabilized by the extrinsic or "accessory" ligaments which are situated away from the joint. These ligaments are involved in SIJ movement; they are secondary to the origins and insertions of the intrinsic (major) ligaments and are termed extrinsic ligaments. The first of these is the sacrotuberous
ligament which is flat and fan-shaped. It originates at the posterior inferior and superior iliac spines and at the superior sacrum. It runs in an oblique fashion inferiorly and laterally to attach to the ischial tuberosity. The function of this ligament is to prevent flexion of the sacrum anteriorly and movement of the innominates.\textsuperscript{6,9} Next, the sacrospinous ligament is thin and triangular shaped. It originates from the sacrum and coccyx and runs horizontally to the ischial spine. Its function is to prevent sacral flexion on the innominates when placed under stress by an external force.\textsuperscript{1,6,9} The third extrinsic ligament is the iliolumbar ligament which consists of superior and inferior bands. The superior band originates at the transverse process of the fourth lumbar vertebra and attaches to the iliac crest. The inferior band originates at the transverse process of the fifth lumbar vertebra and attaches to the iliac crest and the anterior surface of the SIJ.\textsuperscript{6} Side bending of the trunk causes tightening of these ligaments contralaterally. Trunk flexion tightens the superior band and extension tightens the inferior band.\textsuperscript{2,5}

Several muscles influence the mechanics of the pelvis either directly or indirectly. The majority of these muscles originate and attach to the trunk and lower extremities. Alderink\textsuperscript{2} reported that even though there is only one muscle, the piriformis, with a direct attachment to the sacrum, it is evidence that many trunk and lower extremity muscles may exert a profound influence on SIJ mechanics. Porterfield and Oerosu\textsuperscript{13} describe several trunk and lower extremity muscles that directly and indirectly influence pelvic motion. However, Cassidy\textsuperscript{14}
reported that none of the muscles surrounding the SIJ are known to directly influence its movement. It is obvious that a controversy exists here, also, just as with movement of the sacrum.

The abdominal muscles, erector spinae, and quadratus lumborum provide three-dimensional gravitational and body weight forces. The deep erector spinae and multifidi muscles have expansions to the posterior sacroiliac and iliolumbar ligaments. The erector spine and quadratus lumborum muscles have a firm attachment to the sacrum and iliac crest, respectively. The abdominal muscles arise from the pubic symphysis.

The tensor fascia latae and other hip abductor muscles provide for pelvic stability in the frontal plane but can also affect innominate motion directly via their attachment to the ilium. The hip extensors provide for sagittal plane pelvic stability and may indirectly influence sacral motion via their attachment to the sacrotuberous ligament.

The rectus femoris and sartorius muscles can directly influence iliosacral movements in addition to their actions at the hip and knee. The origin of these two muscles is at the anterior superior and inferior iliac spines with attachments distally. Thus, innominate movement is possible if muscle imbalance occurs.

The hip adductors influence pelvic motion in general; however, acting unilaterally, they may have an effect on motion at the symphysis pubis. In addition, Walker reports that the adjacent muscles (ie, the quadratus lumborum, erector spinae, gluteus maximus, gluteus minimus, piriformis, iliac muscles, and
the more distantly located latissimus dorsi) have fibrous expansions that blend with the anterior and posterior SIJ ligaments and contribute to the strength of the joint capsule.

It is imperative for the physical therapist to have a working knowledge and understanding of the anatomy of bony structures, ligamentous support, and especially the musculature. The importance of this is underscored when this knowledge is combined with comprehending function, kinematics, evaluation, and treatment of the sacroiliac joint.
CHAPTER III
MOTION AND FUNCTION

The premise that the sacroiliac joint (SIJ) is a locus of low back pain rests on the assumption that SIJ is capable of motion. After reviewing the reported research and concluding that SIJ motion does occur, the importance of developing an understanding of SIJ function becomes evident. Gray's Anatomy states that the function of the SIJ is to lessen the concussion in rapid changes of distribution of body weight in two directions. The action of the SIJ is similar to that of a shock absorber and, in doing so, it undergoes some rotation. There are two components of force associated with the SIJ. One component of the force is expended in driving the sacrum downward and backward and is resisted by the wedge shape of the sacrum and the sacroiliac and iliolumbar ligaments. The second component of force produces a rotary movement in which the superior end of the sacral articulation is tilted downward and the inferior portion is tilted upward. It is also resisted by the wedge form and the sacroiliac, sacrotuberous, and sacrospinous ligaments.

Movement of the SIJ is extremely difficult to assess because direct palpation is virtually impossible. Even though there are critics who continually deny that movement occurs, other researchers contend that movement, although minimal, does occur.
Sacroiliac joint movement may be described as the movement of the ilium on the sacrum (iliosacral) or the movement of the sacrum on the ilium (sacroiliac). Cibulka reported that the most commonly seen movement is the iliosacral movement. After reviewing the literature, it is clear that very few authors distinguish between the two terms. Instead, 6 degrees of freedom are more commonly described. These 6 degrees of freedom are as follows: sacral anterior or posterior torsion, sacral nutation (flexion) or counternutation (extension), translation, iliac upslip or downslip, and iliac flair.

When thinking of movement of the human body, the physical therapist traditionally thinks of the motion occurring in a single plane or multiple planes about an axis. However, various studies on the orientation of the articular surfaces and their morphology give no support to the idea that SIJ motion occurs in classical planes about a single axis. Wilder et al. used topography and theoretical modeling with best-fit axes of rotation (AORs) for each SIJ contour to calculate "optimal axes of rotation." They concluded that a translatory motion could occur about a "rough axis" if some separation of the surfaces was present. However, Weisl using radiographic studies, concluded that sacral motion is not rotatory, nor determined by a single factor, and that previous reports of AORs were "erroneous." His postulation was that the surface morphology, or degree of sacroiliac congruency and compressibility of the articular cartilage, accounted for variation in axial positioning. Kapandji reported a potential axis at Bonhare's tubercle, which is a bony prominence between the cranial and caudal segments of
the sacral articular surface. This would cause a rotatory motion of the ilium on the sacrum, since the horizontal axis runs through the joint itself. There is much controversy surrounding the location of the SIJ axes of motion. However, there are typically five axes of motion. Even though specific location may vary as individual structures vary, these axes are as follows:

1. Transverse axis: This axis runs transversely through the symphysis pubis about which the pubes rotate allowing movement of the ilia in ambulation.

2. Superior transverse axis: This axis is found at the second sacral segmental area. This is the respiratory axis, about which the movements of flexion and extension occur.

3. Middle transverse axis: This axis is found at the level of the second sacral vertebral body. It is the principal axis of normal sacroiliac flexion and extension.

4. Inferior transverse axis: This axis runs transversely through the inferior pole of the sacral articulation and extends laterally through the ilia near the posterior inferior spines. It is regarded as the principal axis of normal iliosacral movements in locomotion. (The first and fourth axes move and "rotate" together--a fact important in treatment.)

5. Oblique axes: This axis runs obliquely through the sacrum extending from the superior end of the articular surface on one side (the base) to the inferior end of the articular surface on the other side (the apex). Each axis is named for its site of origin at the base, thus, the right oblique axis (ROA) and the
left oblique axis (LOA). Movement of the sacrum about the oblique axis results in sacral base movement anteriorly and inferiorly on the side opposite to the origin of the oblique axis. Furthermore, the apex of the sacrum on the same side as the origin moves posteriorly and inferiorly.

Having a good understanding of SIJ movement during functional activities is important--especially for evaluation purposes. The sacrum generally follows the motion of the lumbar spine, primarily because of the functional unit of the fifth lumbar and first sacral vertebrae. This functional unit is separated by the intervertebral disc and contains the facet joints which are oriented in a horizontal plane; thus, all lumbar motions occur at this level. In addition, this functional unit promotes a functional chain between the sacrum and the lumbar spine.

With lumbar flexion, the pelvis rotates anteriorly around the hip joint; however, the ilia rotate posteriorly relative to the trunk. The sacrum nutates (flexes) until end range and then paradoxically counternutates (extends). This counternutation is due to the tension of the hamstrings which pull on the ischial tuberosities at end range. With lumbar extension, the exact opposite occurs from flexion and when end range is reached, the iliopsoas will cause nutation of the sacrum. During lumbar rotation and lateral flexion, the sacrum follows the lumbar spine. For example, left rotation of the sacrum occurs around the left oblique axis during left trunk rotation.

During the gait cycle, the ilium rotates posteriorly during most of the swing phase until just prior to initial contact. At initial contact, it anteriorly rotates
because of the length ratio of the hamstrings, achieving maximal positioning for initial contact.\textsuperscript{2,6} This forward translation of the ilium with the swing leg combined with backward movement of the sacrum ipsilaterally, allows for accommodation of arm swing. At initial contact, the anteriorly rotated ilium is in an optimal position for the eccentric contraction of the hamstrings. At loading response, the ilium continues to anteriorly rotate because the hamstrings are still contracting. When midstance is reached, the pelvis is in neutral, primarily because the hip joint is also neutral. At terminal stance, the ilium is posteriorly rotated which gives a good length tension ratio of the iliopsoas for swing.\textsuperscript{6} The rotations that occur during gait are due to lower extremity movement (ie, shock absorption and weight shift) and upper trunk opposition (which rotates 180 degrees out of phase relative to the pelvis).\textsuperscript{6}

Sacroiliac joint movement in labor and delivery has been researched extensively.\textsuperscript{2,3,12,19} The research suggests that the SIJs increase in mobility during the gestational period secondary to hormonal changes.\textsuperscript{2,20} During labor, the hips are generally placed in extension which fosters a traction force on the hip flexor muscles.\textsuperscript{2} This results in an anterior pelvic tilt and simultaneously counternutates (extends) the sacrum, allowing for a wider pelvic brim for the descent of the fetus.\textsuperscript{2} The hips are then positioned in flexion, abduction, and external rotation during delivery. This situates tension on the hamstring muscles, which posteriorly rotate the pelvis relative to the sacrum (sacral nutation or flexion).\textsuperscript{2} This allows for an increased pelvic outlet, favoring delivery of the baby. As the expectant
mother pushes, the internal pressure increases which fosters increased expansion. If the hamstring muscles and associated ligaments are unusually taut, this will further increase rotation at the SIJ and possibly result in ligament strain and/or SIJ dysfunction.

In summary, sacroiliac joint motion has been described as occurring in 6 degrees of freedom rather than in cardinal planes. The general concept of SIJ movement is that SIJ movement exists during ambulation, flexion, extension, lateral flexion, rotation, and child birth. Nevertheless, the controversy of whether or not dysfunctional SIJ movement is possible continues to thrive. Many physical therapists are in agreement that motion occurs in the SIJ. This belief stems from years of clinical practice where the deduction has been made, through performance of manual therapy procedures relieving symptoms and restoring function, that movement must occur in order for SIJ dysfunction to be possible.
CHAPTER IV
EVALUATION

Evaluation of the sacroiliac joint is made easier when the physical therapist has a thorough understanding of the anatomy, motion, and function of the joint. However, because of the location and motion of the joint, it is a very "difficult" joint to assess. Furthermore, the intertester reliability of SIJ tests has been challenged. For example, a study was conducted in 1989 which examined the intertester reliability of 13 specialized tests for SIJ dysfunction. Eight physical therapists with ample experience in musculoskeletal evaluation and manual therapy examined 17 patients with lumbosacral pain and unilateral extremity symptoms.\textsuperscript{21} Intertester reliability was poor; 11 out of the 13 tests performed yielded less than 70\% agreement.\textsuperscript{21} Two of the tests performed relied solely upon subjective information and reported no information on SIJ position or mobility—they had an agreement of 70 to 90\%.\textsuperscript{21} In a more recent study, Laslett and Williams\textsuperscript{24} tested the interrater reliability of seven pain provocation tests for pain of the SIJ in low back pain patients. They found that five out of the seven tests employed were reliable and concluded that even though the tests are good for SIJ pain detection, their diagnostic power is questionable. Despite the fact that many SIJ tests have been reported to have a low intertester reliability, physical
therapists continue to advocate clinical investigation of the SIJ to help in their evaluation decision-making process.³

As with any pathology, clinical evaluation of the SIJ should begin with a thorough investigation of the patient's history and symptoms. Knowing as much as possible about the etiology of the mechanisms and onset of injury is very important. The following are examples of questions the physical therapist should included in the subjective portion of the evaluation:

1. What is the mechanism of injury? A sudden sharp jolt to the leg with the knee extended, a fall directly onto the buttocks, or sudden trunk flexion with rotation are common causes of SIJ strain.²²

2. Have the patient describe a "typical" day. What is the patient's habitual working stance? Is there a great deal of sitting or twisting? Does the patient walk up and down stairs frequently?

3. What type of physical exercise does the patient engage in?

4. Where is the pain, and does it radiate? With SIJ dysfunction, pain tends to be unilateral and can be referred to the posterior thigh, iliac fossa, and buttock on the affected side.²² Neurological examination is usually normal and muscle spasm is not a prominent feature.²³

5. When does the pain occur? Sacroiliac joint pain is usually felt when getting out of bed, or when stepping up with the affected leg. Many times the pain is constant and unrelated to positions. In contrast, symphysis pubis pain
tends to be localized and increased with any movement involving the adductor or rectus abdominis muscles.\textsuperscript{22}

6. If the patient is female, has there been a recent pregnancy? Sprain of the SIJ can be the result of increased laxity caused by hormonal changes. It usually takes 3 to 4 months or longer for the ligaments to return to their "normal" state after a pregnancy.\textsuperscript{22}

7. Does the patient have a past history of rheumatoid arthritis, Reiter's disease, or ankylosing spondylitis? Each of these conditions can involve the SIJ.\textsuperscript{22}

With SIJ dysfunction, subjective symptoms may not appear for many weeks or even months.\textsuperscript{25}

The objective portion of the examination follows discovery of any of the symptoms outlined in the subjective portion. When performing tests objectively, it is important to pay heed to "red flags" indicating that an underlying pathology may exist. For example, special notation should be given to any position of the lower limb, muscle tenderness, wasting, and reflex change that would indicate diminution of nerve conduction or bowel and bladder changes.\textsuperscript{2,4,6} Furthermore, if these "red flags" are found, the patient should be referred to the appropriate medical professional.

Dinnar\textsuperscript{26} suggests that tests should be classified in categories ranging from 1 to 5. Classes 1 and 2 are screening tests; classes 2 and 3 are used as scanning procedures; and classes 3, 4, and 5 are used to define the problem. The following progression, as illustrated by Magee,\textsuperscript{22} will be presented.
General observational and palpation tests are used to screen the patient for SJJ dysfunction. Observations are made with the patient suitably dressed to allow for direct and more accurate palpation. The patient stands and is viewed from the front, side, and back. The examiner should note the following:

1. Whether the posture and gait are normal.
2. Whether the anterior superior iliac spines (ASISs) are level when viewed anteriorly.
3. Whether both pubic bones are level at the symphysis pubis. This is done by the examiner placing one finger or thumb on the superior aspect of each pubic bone and comparing the heights.
4. Whether the patient stands with equal weight on both feet, favors one leg, or has a lateral pelvic tilt.
5. Whether the anterior superior iliac spines are equidistant from the center line of the body.
6. What type of pelvis the patient has.
7. Whether the sacrovertebral or lumbosacral angle is normal (140 degrees).
8. Whether the pelvic angle or inclination is normal (30 degrees).
9. Whether the sacral angle is normal (30 degrees).
10. Whether the iliac crests are level (leg length may alter the height).
11. Whether the posterior superior iliac spines (PSISs) are level.
12. Whether the buttock contours or gluteal folds are normal. The painful side will often be flatter if there is a loss of tone in the gluteus maximus muscle.

13. Whether there is any unilateral or bilateral spasm of the erector spinae muscles.

14. Whether the ischial tuberosities are level.

15. Whether there is excessive lumbar lordosis.

16. Whether the PSISs are equidistant from the center line of the body.

17. Whether the sacral sulci are equal.

18. Whether the feet face forward to the same degree. Often, the affected limb will be medially rotated.

19. Whether muscle tone, contour, and contraction are equal with regional palpation.

A peripheral joint scan should be done assessing the lumbar spine and hip. These areas frequently refer pain to the SIJ area because it is part of a syndesmosis. After the peripheral joint scan is completed, the physical therapist can rule out pathology of those areas and validate the focus on the pelvis. The following active movements should be done with the patient standing and the therapist looking for unequal movement, tissue contracture, tenderness, inflammation, or hypermobility:22

1. Forward flexion of the spine (40 to 60 degrees).

2. Extension of the spine (20 to 34 degrees).

3. Left and right rotation of the spine (3 to 18 degrees).
4. Left and right lateral spine flexion (10 to 20 degrees).

5. Hip flexion (110 to 120 degrees). Prior to the patient flexing the hip, the therapist should note whether the PSISs are level. As the patient flexes the hip maximally, observation should be made of the amount of available range, pain present, and movement of the posterior superior iliac spines. The ipsilateral SIJ should move caudally relative to the other SIJ.

6. Hip abduction (30 to 50 degrees).


8. Hip extension (0 to 15 degrees).

9. Hip internal rotation (30 to 40 degrees).

10. Hip external rotation (40 to 60 degrees).

The reason for doing the above motions is that the movements of the spine and hip put stress on the SIJ and are affected by SIJ lesions, respectively.

Passive tests are also performed on the pelvis. These are actually "stress tests" that assess the integrity of the ligaments. Common passive tests are as follows:22

1. Gapping test: The patient lies supine while the examiner applies crossed-arm pressure to each ASIS in an inferior and lateral direction. This test is considered positive if unilateral gluteal or posterior leg pain is produced.

2. Approximation test: The patient is sidelying while the therapist's hands are placed over the upper part of the iliac crests. The examiner then presses
down toward the floor. An increased feeling of pressure in the SIJ indicates a possible sprain of the ligament.

3. "Squish" test: With the patient in the supine position, the therapist places both hands on the patient's ASISs and iliac crests. Pressure is applied in an inferior and medial direction at a 45-degree angle. A positive test is indicated by pain at either SIJ.

4. Sacroiliac rocking: The patient is supine as the therapist flexes the knee and hip fully followed by adducting the hip. The SIJ is "rocked" by flexion and adduction of the patient's hip. The sacrotuberous ligament may be palpated simultaneously for tenderness. Pain in the SIJ indicates a positive test.

5. Sacral apex pressure (prone springing) test: The patient lies prone on a firm surface while the examiner places the base of the hand at the apex of the patient's sacrum. Pressure is then applied to the apex of the sacrum causing a shear of the sacrum on the ilium. Next, a similar movement is done successively over the spinous processes of the vertebrae from the fifth lumbar vertebra up through the thoracic spine. If pain is produced over the SIJ when pressure is applied there, the test is positive for SIJ dysfunction. While the spring test is being done, the therapist should also look for reflex muscle guarding in the paraspinal musculature as well as the range of movement at the various levels tested. This test causes a rotational shift of the SIJs.\textsuperscript{11,21,27}

6. Femoral shear test: The patient lies supine as the therapist slightly flexes, abducts, and externally rotates the thigh at 45 degrees from midline. The
therapist then applies a graded force through the long axis of the femur, which causes an anterior-to-posterior shear to the SIJ ipsilaterally.

Resisted isometric movements are important when assessing the SIJ because contraction of the adjacent muscles can cause stress at the joint. The following tests are conducted with resisted isometric movements with the patient in the supine position.22

1. Forward flexion of the spine (the abdominals stress the public symphysis).
2. Hip flexion (the iliacus stresses the sacroiliac joint).
3. Hip abduction (the gluteus medius stresses the sacroiliac joint).
4. Hip adduction (the adductors stress the symphysis pubis).
5. Hip extension (the gluteus maximus stresses the SIJs).

There are numerous special tests available to perform on the SIJ.22 However, the physical therapist should only use those special tests that are considered necessary for confirming the diagnosis. The most common special tests performed are as follows:26

1. Straight leg raising (SLR or Lasegue's) test: This is a passive test in which the legs are tested individually, then together. With the patient supine and the knee extended, the examiner flexes the hip until the patient complains of pain or tightness. When the leg is raised, the pull of the hamstrings on the innominate bone causes a posterior torsion strain on the same side. A unilateral SLR test is full at 70 degrees, so pain experienced after that is probably joint pain from the
lumbar area or the SIJ. The examiner should suspect a posterior or vertical complication ipsilaterally. If pain is felt on the contralateral side, the examiner should suspect an anterior dysfunction on the opposite side because rotating one innominate posteriorly may increase anterior dysfunction contralaterally. If a bilateral SLR test is performed and the patient experiences pain before 70 degrees, a SIJ lesion should be expected (Fig 1a and 1b).

2. Piedallu’s sign: The patient is asked to sit on a hard, level surface. This position keeps the hamstrings from affecting the pelvic flexion symmetry. The therapist palpates the PSISs and compares their heights. Usually, the PSIS on the affected side will be lower. The patient is asked to flex forward while remaining seated. If the lower PSIS becomes the higher one, the test is considered positive. This indicates an abnormality in the torsion at the SIJ ipsilaterally (Fig 2a and 2b).

3. Gillet’s test: The level of the PSISs is noted while the patient assumes the standing position. The patient is then asked to stand on one leg while pulling the opposite knee up toward the chest. The test is repeated with the other leg. If the PSIS on the flexed side moves inferiorly, the test is considered negative. If the PSIS on the flexed side moves minimally or not at all, the SIJ on that side is hypomobile or "blocked" indicating a positive test. (See Fig. 3.)
Fig 1a.—Straight leg raising test (unilateral).

Fig 1b.—Straight leg raising test (bilateral).
Fig 2a.- Piedallu's sign - stage 1

Fig 2b.- Piedallu's sign - stage 2
Fig 3.—Gillet’s test
4. Yeoman’s test: With the patient lying prone, the therapist flexes the patient’s knee to 90 degrees and extends the hip. Pain localized on the SIJ indicates pathology in the anterior SIJ ligaments. Lumbar pain indicates lumbar involvement (Fig 4).

5. Prone knee flexion test (Nachles’ test): This test is designed to identify the presence of innominate bone rotation relative to the SIJ. The patient, who would be wearing shoes, lies prone with cervical spine in neutral and hands at side. The therapist stands at the patient’s feet and grasps the heels of the patient’s shoes. The therapist then places his/her index finger just posterior to the lateral malleoli and holds the feet in a neutral position (relative to pronation/supination). The therapist flexes the patient’s knees to 90 degrees of flexion. A change in the relative position of the patient’s heels indicates innominate rotation. An apparent increase in leg length is said to indicate a posterior innominate rotation ipsilaterally. An apparent decrease in leg length is said to indicate an anterior innominate rotation ipsilaterally (Fig 5).

6. Flamingo test: The patient is standing and then asked to stand on one leg. Pain in one of the SIJs or the symphysis pubis indicates a positive test for lesions in whichever structure is painful. The stress may be increased by having the patient hop on one leg (Fig 6).
Fig 4.—Yeoman’s test

Fig 5.—Prone knee flexion test (Nachles’ test)
Fig 6.—Flamingo test
7. **Sign of the buttock test:** With the patient supine, the therapist performs a passive unilateral straight leg raising test as done previously in the SLR test. If restriction is found on one side, the therapist flexes the patient’s knee to see whether flexion of the hip increases. If the problem is in the lumbar spine, hip flexion will increase. This finding indicates a negative sign of the buttock test. If hip flexion does not increase when the knee is flexed, it is a positive sign of the buttock test and indicates pathology in the buttock, such as bursitis, tumor, or abscess. The patient would also exhibit a noncapsular pattern of the hip (Fig 7a and 7b).

8. **Trendelenburg test:** The patient is standing and asked to stand or balance first on one leg and then the other leg. While the patient is balancing on one leg, the therapist watches the movement of the pelvis. If the pelvis on the side of the nonstance leg rises, the test is considered negative. If the pelvis on the side of the nonstance leg falls, the test is considered positive and is an indication of weakness or instability of the hip abductor muscles—primarily the gluteus medius—on the stance side (Fig 8).
Fig 7a.—Sign of the buttock test

Fig 7b.—Sign of the buttock test
Fig 8a.—Trendelenburg test - negative

Fig 8b.—Trendelenburg test - positive
Leg length should also be tested when evaluating the SIJ. The following tests are most commonly used.\textsuperscript{22}

1. Leg length test: Nutation (backward rotation) of the ilium on the sacrum will result in a decrease in leg length, as will counternutation (anterior rotation) on the opposite side. If the iliac bone on one side of the symphysis pubis is lower, the leg on that side will usually be shorter. True leg length is measured by having the patient supine with the anterior superior iliac spines (ASISs) level and the patient's lower limbs perpendicular to the line joining ASISs. Using a flexible tape measure, the therapist obtains the distance from the ASIS to the medial or lateral malleolus on the same side. The measurement is repeated on the other side, and the results are compared. A difference of 1 to 1.3 cm is considered normal.\textsuperscript{22}

2. Functional limb length test: With the patient standing, the therapist palpates the ASISs and the PSISs noting any asymmetry. The patient is then placed in the correct stance (subtalar joint neutral, knees fully extended, and toes facing straight ahead). The ASISs and PSISs are then palpated, with the examiner noting whether the asymmetry has been corrected. If the asymmetry has been corrected, there is a functional leg length difference, and the test is considered positive.

3. Supine to sit test: The patient is supine with the legs straight. The patient is then asked to sit up, and the therapist observes if one leg moves proximally farther than the other leg. A good way of judging this is to palpate the
medial malleoli to ascertain if one of them moves farther than the other. If one leg moves up farther than the other, there is a functional leg length difference resulting from a pelvic torsion.

Sacroiliac joint play movements should also be assessed even though they are normally minimal. These movements are similar to the passive movements in that they are stress tests. To test all of the movements, the patient should be prone and the therapist should "feel" only minimal movement and no pain if the joint is normal. In an affected SIJ, there is usually pain over the joint and little or no movement. The following joint play movements should be performed:\textsuperscript{11,22}

1. Cephalad movement on the sacrum/caudal movement of the ilium (from left to right).

2. Cephalad movement of the ilium/caudal movement of the sacrum (from left to right).

3. Anterior movement of the sacrum on the ilium.

For more information on an in-depth review of palpating the SIJ, refer to Magee.\textsuperscript{22}

As with any evaluation, examination of the lymph nodes, dermatomes, and reflexes is indicated. There are no reflexes to test for the pelvic joints. However, the therapist must be aware of the dermatomes and reflexes from the sacral nerve root segments. Pain may be referred to the SIJs from the lumbar spine and hips. Conversely, the SIJ may refer pain to these same structures or along the courses of the superior gluteal and obturator nerves.
To summarize, assessment of the sacroiliac joint is very important when dealing with patients who complain of low back pain. In addition to evaluating the SIJ, the symphysis pubis, lumbar spine, and hips should also be assessed. Furthermore, as with any evaluation, the patient should always be warned of the possibility of exacerbation of symptoms as a result of the assessment. It is also important to remember that the reliability of many SIJ tests is questionable and that keeping current on research is crucial to ensure quality of care.
CHAPTER V

PATHOLOGY AND TREATMENT

Following the completion of the evaluation, the therapist should give special attention to the sacroiliac joint (SIJ) when one or more of the following are found: 6,28

1. Unilateral pain rather than bilateral or central pain; pain that is not of typical "nerve root" quality.

2. Absence of lumbar articular signs or symptoms with the lumbar spine being clear upon palpation.

3. Absence of signs and symptoms in the lower extremity attributable to the lumbar spine.

4. Asymmetry of PSIS and ASIS levels (frequently but not invariably found).

Dysfunctions of the SIJ may be classified into two groups: 29 primary origin and secondary origin. Primary dysfunction occurs as a result of trauma, such as blows, falls, or childbirth. Secondary dysfunction results from an insidious onset and is usually compensatory from scoliosis, disease, cases of leg length inequality, or maladaptions of the pelvis to extrinsic forces during gait.

There are many different determinates of SIJ dysfunction. The most common form of SIJ dysfunction occurs when leaning forward to perform some
task such as lifting, bending, or lowering which causes the line of gravity to move anteriorly to the acetabula. This subsequently causes an anterior rotation force of the innominate bones around the femoral heads. If the abdominal muscles are active and support the anterior pelvis, stabilization of the trunk to maintain a constant trunk pelvis relationship during anterior rotation is achieved via this self-bracing mechanism; consequently, no dysfunction occurs. Sacroiliac joint dysfunction can also be due to hypermobility. The type of dysfunction which results is the positional fault of torsion. Pregnancy may also be a causative agent as mechanical and hormonal factors contribute to the increase in pelvic joint mobility, sometimes resulting in a painful subluxation. Differences in muscle or leg length can also cause SIJ dysfunction.

In a case study, Cibulka reported that asymmetrical hip rotation contributed to his patient's low back pain in what is commonly referred to as the "sacroiliac joint component of low back pain." The patient habitually sat and slept cross-legged with extreme lateral rotation causing asymmetrical hip rotation by shortening the lateral rotator muscles and lengthening the medial rotator muscles. This muscle imbalance posteriorly rotated the right innominate bone resulting in a concomitant anterior rotation of the left innominate bone. After treating the SIJ and restoring symmetrical hip rotation, the patient no longer complained of low back pain.
Treatment of the SIJ may comprise any combination of the following:

1. Correction of pelvic posture and muscle imbalance via muscle energy techniques.

2. Muscle stretching and strengthening techniques.

3. Mobilization (usually Grades I-IV; appropriate to the degree of pain and irritability).

4. Manipulation (Grade V).

5. Injection of local anesthetic and/or hydrocortisone.

6. Support for mild laxity, or painful weightbearing by a corset.

7. Shoe raise to correct leg length inequalities.

8. Buttock raise when sitting.

9. General measures such as weight reduction and ergonomics.


11. Modalities such as ultrasound, moist heat, and electrical stimulation for musculoskeletal benefits.

Muscle energy techniques (METs) are manipulative techniques which utilize a voluntary contraction against a controlled counterforce from a precise position and in a specific direction. Muscle energy techniques are considered to be "active" techniques with patient participation and are used to lengthen shortened muscles, strengthen weakened muscles, reduce localized edema, and mobilize restricted joints. Muscle energy techniques can employ various types of muscle contractions (isometric, isotonic, or isokinetic). However, the common
type of contraction used with MET is isometric. An isometric contraction is exerted against an unyielding resistance where no joint motion is produced. In other words, the proximal and distal attachments do not move.

When treating with METs, there are important aspects to consider. If a MET causes pain, it is being administered in the wrong direction. The patient should get stronger after two to three contractions. If not, the patient probably isn't benefitting from the MET treatment.

Because of the adjoinment of the lumbar, pelvic, and hip components into an interrelated unit, the clinician should treat dysfunctions in a certain order when multiple lesions exist. The sequence of treatment should occur as follows: (1) pubic, (2) nonadapting lumbar compensations, (3) sacral lesions, and (4) innominate lesions. This treatment order takes advantage of the axes of motion so that the unlocking of one restriction facilitates the unlocking of a restriction in another area. For example, a very common combination of lumbopelvic dysfunctions consists of left superior pubic shear, left on left forward sacral torsion, and left posterior innominate. The lumbar spine is usually adaptive in response to these dysfunctions and does not need correction.

The following are abnormalities of the SIJ complex which respond well to MET treatments.

I. Innominate Lesions
   A. Left posterior innominate (most common)
      1. Physical findings:
a. The ASIS superior and posterior on the left.
b. The left iliac crest is higher than the right.
c. The left PSIS is inferior and posterior.
d. When performing the standing flexion test, the left PSIS moves farthest superiorly.
e. When performing Gillet's test, the left PSIS moves inferiorly and laterally less than the right.
f. The left medial malleolus is proximal to the right and moves distally in its relationship with the right when the patient assumes the long sitting position (long sitting test).
g. The public symphysis may be superior if involved, but is often asymptomatic.
h. The left hip may be externally rotated.
i. The left sulcus is deeper than the right.
j. The right tensor fascia lata is tender and/or tight.
k. Other findings may include tense posterior sacroiliac ligament on the left; decreased lumbar lordosis; pain, usually well defined, in the sulcus; and/or unilateral buttock pain.
2. Treatment--MET for posterior innominate (see Fig. 9):
   a. Position the patient supine with the involved leg hanging over the edge of the table. The non-involved leg is flexed at the hip and the knee.
   b. The stabilizing force is the patient's body weight on the table.
   c. The therapist applies the mobilizing force as resistance is given to the movement of the involved leg by placing his/her hand on the anterior surface of the distal femur (above the knee). Resistance to the non-involved leg is given by holding the anterior surface of the tibia.
   d. The therapist then asks the patient to push the involved leg into his/her hand and hold for 7 to 10 seconds, after which the contraction is relaxed. The therapist then assists the patient in pulling the flexed leg up and pushing the involved leg down farther. This is repeated three times.
Fig 9.–MET--left posterior innominate
e. The purpose of this technique is to contract the hip flexors on the involved side and allow them to anteriorly rotate the innominate.

3. Independent exercises for posterior innominate:
   a. The patient stands facing a wall. Next he/she isometrically "kicks" the involved leg towards the wall and holds for 7 to 10 seconds. This is repeated three times.
   b. The patient stands with the non-involved foot on a chair (flexed at the hip and knee) and gently leans forward while stretching the hip extensors on the involved side. The stretch is held for 7 to 10 seconds and repeated three times.

B. Right posterior innominate

1. Physical findings:
   a. The right ASIS is lower and more posterior than the left.
   b. The right iliac crest is lower than the left.
   c. The right PSIS is more superior and anterior than the left.
d. When the standing flexion test is performed, the right PSIS moves first.

e. The right PSIS moves less inferior and lateral than the left when performing Gillet's test.

f. When performing the long sitting test, the right malleolus moves long to short.

g. The right hip may be in internal rotation.

h. The right sulcus is shallow.

i. The left tensor fascia lata is tender.

j. Other findings that may be noted include increased lumbar lordosis, weak hip extensors, and tight hip flexors.

2. Treatment--MET for anterior innominate (Fig 10):

   a. The patient lies supine with the non-involved leg hanging over the edge of the table. The involved leg is maximally flexed at the hip and the knee.

   b. The stabilizing force is the patient's body weight on the table.

   c. For the mobilizing force, the therapist places the anterior surface of the proximal tibia (involved leg) in his/her axillary area. The
Fig 10.—MET--anterior innominate
therapist grasps the table edge on each side of the patient for stability.

d. The therapist then asks the patient to push the involved leg into his/her axillary area while resisting the movement. It is an isometric hold for 7 to 10 seconds. The patient then relaxes and the therapist assists the patient into further hip flexion. The contraction should be repeated three times.

e. The purpose of the MET is to strengthen the hip extensors on the involved side to foster posterior rotation on the innominate.

3. Independent exercises for posterior innominate:

a. The patient stands with his/her back to the wall, then isometrically "kicks" backwards into the wall. This is held for 7 to 10 seconds and repeated three times.

b. The patient stands with the involved foot on a chair (flexed at the hip and the knee) and he/she gently leans forward over the knee. This will posteriorly rotate the innominate and relax the hip flexors.
C. Left superior innominate shear (upslip)

1. Physical findings:
   a. The ASIS on the left is higher than the right.
   b. The left iliac crest is higher than the right.
   c. The left PSIS is higher than the right.
   d. The standing flexion test is positive on the left.
   e. Gillet's test is positive on the left.
   f. With the long sitting test, the left malleolus moves from short to long.
   g. With the pubic symphysis, it is higher on the left than the right.
   h. There is no change at the hip.
   i. The left sulcus may be shallow.
   j. Other possible findings: the left ischial tuberosity may be higher than the right.

2. Treatment--MET with combined forces of the rectus femoris and the hip adductor muscles (Fig 11).
   a. The patient is supine with the involved leg freely hanging from the edge of the table (the ischial tuberosity still in contact with the table).
Fig 11.—MET—left superior innominate shear (upslip)
b. The therapist is standing on the involved side of the patient. The lower portion of the freely hanging leg is passively extended at the knee and is held in this position via being positioned between the therapist's legs.

c. The therapist then reaches across the patient and places one hand on the ASIS opposite the side of involvement to stabilize it.

d. With the other hand, the therapist gently presses down on the supracondylar area of the freely hanging leg and takes up the available slack at the hip. This is done while maintaining the position of the knee in passive extension.

e. The patient is then instructed as follows: "Squeeze your thigh against the table and push up against my hand." The therapist offers unyielding resistance to the upward contraction as the table offers unyielding resistance to adduction. The knee must be maintained in passive extension as the patient tries to raise the leg. (Note: The forces generated are to be submaximal—probably 10 pounds of force is
sufficient to accomplish this task.) The contraction is held for 7 to 10 seconds, and the patient is then instructed to relax.

f. As the patient relaxes, the slack is taken up into hip extension. Stabilization of the opposite ASIS is important during this step. When the new barrier to movement is reached, step 5 (e) is repeated a total of three to four times.

g. The patient should be re-evaluated regularly to determine if further treatment is warranted.

D. Superior symphysis pubis (on the left)

1. Physical findings:
   a. This is usually found in over 90% of patients with posterior innominate.
   b. The ASIS is superior on the left.
   c. The PSIS is posterior in relation to the pelvic dorsal plane and anterior in relation to the sacral base.
   d. The pubic tubercle is superior on the left.
   e. The sulcus is shallow on the left.
   f. There may be tenderness upon palpation of the pubic symphysis.
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g. The left medial malleolus may be equal or proximal to the right, becoming distal to the right when performing the long sitting test.

2. Treatment--MET (Fig 12)

a. The MET used for superior symphysis pubis on the left is to correct the inferior symphysis pubis on the right.4

b. The patient is positioned at the edge of the table with the right leg hanging off the table.

c. The therapist stands on the right side of the patient and places his/her right hand on the patient’s left hip below and over the left ASIS, maintaining firm yet gentle pressure. The therapist places his/her left hand above the patient’s right knee.

d. Using a direct guiding force with the left hand, the patient is asked to raise his/her right leg with muscular cooperation. The therapist holds the leg and resists to the count of nine. This resisted hip flexion movement is used to realign the public tubercles by contracting the adductors and hip flexors.
Fig 12.—MET—Superior symphysis pubis (left)
e. The patient then relaxes. The therapist takes up the slack, pushing the leg toward the floor. This is repeated three times.

f. The therapist should check the pubic Tubercles to determine if correction is complete.

II. Sacroiliac Lesions

A. Forward sacral torsion (left on left)

1. Physical findings:

a. The ASISs are usually negative (equal).

b. The iliac crests are usually negative (equal).

c. The right PSIS may be posteriorly situation in relation to the sacral dorsal plane.

d. The standing flexion test may be negative.

e. Gillet's test will be negative.

f. With the standing flexion test, the blocked side moves first.

g. There usually is no change at the public symphysis.

h. The left hip usually lies in external rotation when the patient is lying supine.

i. With the prone knee flexion test, the left malleolus is proximal.
j. The right sulcus is deep and the left is shallow.

k. Other findings that may be found: the piriformis and tensor fascia lata are both tender on the right, and there is usually a history of pelvic twist injury. The piriformis is tender because it is contracting in an effort to bring the sacrum back. The tensor fascia lata is tender because the right innominate bone is not stable and it may be used with gait.

2. Treatment--MET (Fig 13)

a. This technique employs reciprocal inhibition of one piriformis by the opposite internal rotators (unlocks the axis), while the other piriformis moves the sacrum from the faulty position. The patient lies on the side that corresponds to the axis of involvement (ie, a patient with a left on left torsion would lie on the left side).

b. The patient lies on the side that corresponds to the axis of involvement (ie, a patient with a left on left torsion would lie on the left side).

c. The therapist stands at the side of the table, facing the patient.

d. The patient should be as close to the edge of the table as possible. The downside arm should rest behind the trunk as it may be used to
Fig 13.—MET--Forward sacral torsion (left on left)
stabilize the patient by having him/her grip the edge of the treatment table behind him/her.

The topside arm hangs over the edge of the table closest to the clinician as the trunk of the patient is rotated forward and the chest approximates the table.

e. The therapist's cephalad hand palpates the lumbosacral junction while the caudad hand flexes the patient's knees and hips to approximately 70 to 90 degrees of until the therapist can feel motion occurring at the lumbosacral junction. This is best achieved by grasping both legs together at the ankles and moving the hips passively into flexion. The patient's knees should be resting in hollow of the therapist's hip as he/she translates his/her body laterally toward the patient's head, thereby, flexing the patient's hips and lumbar spine up to the lumbosacral junction.

f. Next, the therapist moves his/her hand from the lumbosacral junction and places it on the patient's shoulder near the edge of the
treatment table. The patient is instructed to "take a deep breath," and as he exhales to "reach toward the floor." As the patient does this, the therapist assists by pressing downward on the patient's shoulder to help take up the slack. This is repeated two or three times.

g. The therapist returns that hand to the lumbosacral junction and, using the hand holding the ankles, lowers the ankles toward the floor until resistance is met and/or motion is felt at the lumbosacral junction.

h. Next, the therapist instructs the patient to "life both ankles toward the ceiling." This is a submaximal contraction. The therapist must give unyielding resistance to the patient's effort. The contraction is held for 7 to 10 seconds and is then relaxed.

i. As the patient relaxes, the therapist takes up the slack by translating his/her body cephalad (to increase flexion) and lowers the ankles toward the floor until resistance is met or motion is felt at the lumbosacral junction (to
increase side-bending). The patient reaches toward the floor with the hanging arm (to increase rotation).

j. Steps 8 and 9 (h and i) are repeated two or three times, and then the patient is retested to check for any changes in sacral position. The treatment is repeated if necessary.

k. In some cases, the edge of the table is uncomfortable to the patient’s downside thigh during performance of the contract during step 8 (h). The therapist must support the patient’s knees with his/her own thigh or may sit on the treatment table and perform the technique from that position.

B. Backward sacral torsion (right on left)

1. Physical findings:
   a. The right ASIS may be posterior and superior; and the left ASIS may be inferior when in the supine position.
   b. The iliac crests are usually negative (equal).
c. The right PSIS is posterior in relation to the orientation planes but anterior to the sacral base.

d. The standing flexion test may be negative.

e. There is usually no change at the public symphysis.

f. The right leg may lie in slight external rotation.

g. The right sulcus is shallow and the left is deep.

h. With the prone knee flexion test, the left medial malleolus is proximal.

i. Other findings the therapist may see: 90% of all sacroiliac torsions occur on the left oblique axis, and the right piriformis is tender and tight.

2. Treatment--MET (Fig 14a and 14b)

   a. The MET uses the gluteus medius and the gluteus maximus.

   b. The patient lies on the side corresponding to the axis of involvement. In other words, a patient with left on right torsion would lie on his/her right side.
Fig 14a.—MET for backward sacral torsion (right on left)

Fig 14b.—MET for backward sacral torsion (right on left)
c. The patient lies as close as possible to the edge of the table and the clinician stands at that edge facing the patient.

d. The patient's trunk is now rotated so that the back approximates the table surface. This is accomplished by the clinician grasping the patient's downside arm (usually above the elbow) and pulling it out from under the patient. The clinician now flexes the patient's topmost leg somewhat at the hip and the knee. The downside leg is allowed to remain straight for the moment.

e. Next, the therapist palpates the patient's lumbosacral junction with the cephalad hand. With the other hand, the therapist reaches behind the patient's topside flexed knee and passively extends the patient's bottom hip by pushing the leg posteriorly. The therapist does this until motion is perceived occurring at the lumbosacral junction.

f. The therapist now repositions his/her hands so that the caudal hand palpates the lumbosacral
junction and the cephalad hand is moved to the patient's shoulder.

g. The therapist then uses the forearm of his/her caudad arm to stabilize the pelvis and instructs the patient to "take a deep breath." As the patient exhales, the clinician presses downward on the shoulder, causing greater trunk rotation, and further approximating the trunk to the surface of the table. This maneuver is repeated two or three times to take up all the slack. The therapist must be cautious not to allow the pelvis to move and change its alignment.

h. Maintaining trunk rotation and pelvic alignment, the therapist instructs the patient to "straighten the topside knee and allow the leg to hang freely" from the table. Being careful not to change pelvic alignment, the therapist slides the caudad hand down the thigh to the lateral supracondylar area of the patient's knee.

i. Next, the patient is instructed to "life the knee toward the ceiling" while the therapist provides unyielding resistance to the effort. The
contraction is held for 7 to 10 seconds and then the patient relaxes.

j. Slack is taken up by the therapist moving the downside leg back a little (to increase extension), rotating the trunk a little (to increase rotation), and pushing down on the hanging leg until resistance is met (to increase sidebending).

k. Steps 9 and 10 (i and j) are repeated two or three times, and the patient is then retested to check for positional changes of the sacrum. The treatment is repeated if necessary.

C. Sacral flexion unilaterally (on the left)

1. Physical findings
   a. The ASIS is posterior and superior on the left.
   b. The pubic tubercle is unchanged.
   c. The PSIS is posterior in reaction to the sacral base on left.
   d. The medial malleolus is inferior on the left.
   e. The left sulcus is deep.
   f. The tensor fascia is tight on the right and tender to palpation.
2. Treatment--mobilization (Fig 15)

a. With the patient prone, the therapist stands on the left side of the table with the thenar eminence of his/her right hand at the patient’s inferior lateral angle of the sacrum on the left side.

b. Next, with the patient’s feet comfortably apart (to ensure there is no bind in the SIJ), ask the patient to turn the left toe medially. This gaps the SIJs posteriorly.

c. The patient is then asked to inspire deeply, hold the breath in, then take another breath more deeply without exhaling the first breath. While the patient is breathing in deeply, the therapist is exerting a rhythmic pressure along the direction of the left inferior lateral angle of the sacrum. The therapist then asks the patient to exhale; the therapist continues pressure on the inferior, lateral angle until complete exhalation is accomplished.
Fig 15.– MET for sacral flexion unilaterally (on the left)
d. Re-evaluation of the sacral position is recommended and treatment should be repeated if necessary.

In addition to METs and exercise, other factors need to be considered when treatment patients with SIJ dysfunction. The patient may benefit from heel lifts or bracing (especially pregnant women). The therapist should also educate the patient on the importance of the following activity modification: no one-legged standing; avoid stairs and leg crossing; items should be carried bilaterally; when sitting, the patient should position the lower extremities somewhat in abduction to "set the pelvis"; the patient should try to avoid unilateral positions when getting in and out of a car. The patient should be informed that the optimal positioning for the pelvis is in a bilateral position. This bilateral positioning fosters "scarring down" of the ligaments which will support the SIJ.

Besides musculoskeletal disorders, there are many different disease states that manifest changes in the SIJ. Some of the diseases include: ankylosing spondylitis, Reiter's disease, rheumatoid arthritis, osteoarthritis, deposition diseases, hyperparathyroidism, psoriasis, and osteitis condensans II. Most of these diseases are diagnosed radiographically.

To summarize, METs are used as effect treatment tools when dealing with SIJ disorders. The METs illustrated above, in adjunct with the appropriate exercises, have been successfully used with SIJ dysfunctions. As with any
treatment, the therapist should adequately educate the patient on proper activity modification to foster healing of the SIJ ligaments.
CHAPTER VI

CONCLUSION

The sacroiliac joint (SIJ) is a unique joint. It has been reported to be an active participant in the all-too-common "low back pain" syndrome. Lesions of the joint are often brought on insidiously and related to leg length inequality, pelvic obliquity, and pelvic torsion. Complaints of pain are usually magnified with sitting, leaning forward, coughing, sneezing, or pregnancy. The anatomy, coupled with the axes of motion and degrees of freedom of the sacroiliac joint have cause many to categorize the joint a "difficult" joint to evaluate and treat. Because of this, the joint is often overlooked during the physical therapy evaluation. The foundation of effective patient care is a reliable evaluation; and, furthermore, an accurate diagnostic picture harbors effective treatment.

Muscle energy techniques (METs), mobilization, and exercise are common treatment for SIJ dysfunction. METs are active techniques and require patient participation. They are used primarily to strengthen weakened muscles and lengthen shortened muscles by employing isometric muscle contractions. METs are used with more complex SIJ dysfunctions such as torsions. Direct mobilization of the sacrum is indicated with less complex dysfunctions such as nutations.
Physical therapists should keep abreast of the most current sacroiliac joint evaluation reliability studies in order to validate treatments. There are many special tests designed to pinpoint sacroiliac joint lesions with corresponding treatments. Nevertheless, if function of the sacroiliac joint is not restored and maintained, subsequent compensatory problems may be exhibited.
REFERENCES


