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Sacroiliac Joint: An Overview

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SACROILIAC JOINT: AN OVERVIEW

by

Cheryl Walker
Bachelor of Science in Physical Therapy
University of North Dakota, 1995

An Independent Study

submitted to the Graduate Faculty of the

Department of Physical Therapy

School of Medicine

University of North Dakota

in partial fulfillment of the requirements


for the degree of

Master of Physical Therapy


Grand Forks, North Dakota
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1996



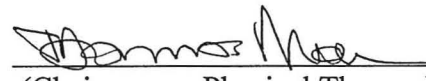
This Independent Study, submitted by Cheryl Walker in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.



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ABSTRACT

Low back pain is a common cause of limitation in daily activities. Sacroiliac joint (SIJ) dysfunction is often an overlooked cause of low back pain. The biomechanics of the SIJ is not well understood. There is controversy about how much movement is in the joint, but it is generally agreed that movement does occur. There are six ligaments in the SIJ that add to its stability and no muscles that act directly on the joint. SIJ dysfunction can be caused by direct trauma, indirect trauma, pregnancy, or muscle imbalances. Evaluation of the SIJ should include subjective and objective information. The objective evaluation consists of two types of special tests; palpation and provocation. Palpation tests have poor intertester reliability while provocation tests have good intertester reliability. Physical therapists should use a combination of tests to increase reliability. Treatment includes rest, medications, modalities, stretching and strengthening, mobilizations, muscle energy techniques (METs), and manipulations. Mobilizations and METs are usually combined to increase the success of treatment. Manipulation is the most successful treatment but it requires special skill and can aggravate low back pain.

CHAPTER 1

INTRODUCTION

Low back pain is a common cause of limitation in daily activities.¹ Although, the cause of the low back pain is often unknown, sacroiliac joint (SIJ) dysfunction may be a commonly overlooked cause of low back pain.

The SIJ has been studied in live subjects, cadavers, and radiographically.^{2,3} The results of these studies suggest that the SIJ is capable of movement.^{2,4-5} However, there is controversy about how much movement there is in the joint and if it can contribute to dysfunction and low back pain. Several authors state SIJ dysfunction as a cause of low back pain,^{3,6-10} therefore physical therapists need to be aware of SIJ dysfunction as a possible cause of low back pain.

SIJ dysfunction is difficult to evaluate and physical therapists must rely on good palpation and observational skills. There are many tests for evaluating SIJ dysfunction and combining three or four tests is recommended in order to have good reliability.¹ Physical therapists need to be aware of the tests for evaluating SIJ dysfunction and the correct procedure for performing SIJ tests in order to make the tests reliable.

There are as many options for treating SIJ dysfunction as there are tests for evaluation of the joint. Possible treatments range from bed rest, heat, and medications for acute pain to muscle stretching and strengthening and mobilization or manipulation in

physical therapy. Following an evaluation with a diagnosis of SIJ dysfunction, the physical therapist should know the best treatment methods. Therefore, the purpose of this paper is threefold 1) to provide physical therapists with a review of basic SIJ anatomy and biomechanics, 2)SIJ evaluation, and 3) SIJ treatment.

CHAPTER 2

ANATOMY

There are three joints in the pelvis, two SI joints and the symphysis pubis. The right and left SI joints are articulations between the right and left innominate bones (fused ilium, ischium, and pubis) and the sacrum.¹¹ The SIJ is 'L-shaped' with cranial and caudal segments.¹² The SI joints are synovial,^{4,10} and therefore, are lubricated for movement. The joint is smooth and flat until puberty when the joint surfaces become irregular.^{2,3,13} The irregularities become more prominent and less congruent with age adding to the stability while decreasing the mobility in the SIJ. The loss of SIJ mobility occurs between 40-50 years in males and in the late 50's in females.

There are six ligaments that cross the sacroiliac joint which add to its stability.^{5,14} These ligaments include the iliolumbar, anterior SI, posterior SI, interosseous SI, sacrotuberous, and sacrospinous ligaments (Fig. 1). The iliolumbar ligament is made up of a superior band and an inferior band. The superior band runs from T4 to the iliac crest and the inferior band runs from L5 to the iliac crest and anterior surface of the SIJ. The anterior SI ligament connects the sacrum and ilium anteriorly and resists sacral flexion. The posterior SI ligament has a deep and superficial segment. Both segments limit sacral flexion and the superficial segment also limits upslips and downslips of the ilium. The interosseous SI ligament is the strongest bond between the innominate bones and sacrum.

The sacrotuberous ligament runs from the posterior inferior iliac spine (PIIS) and the posterior superior iliac spine (PSIS) to the ischial tuberosity. The sacrospinous ligament originates on the sacrum and ends at the ischial spine. The sacrotuberous and sacrospinous ligaments restrict sacral flexion.

Some of the strongest muscles in the body surround the SIJ but none are intrinsic to the joint.^{3,5} The movement that occurs in the joint is a result of forces exerted on it by the surrounding musculature.¹⁵ The hip muscles exert forces on the pelvis during closed-chain activities and the abdominal muscles play a role in the amount of sacral flexion and extension.

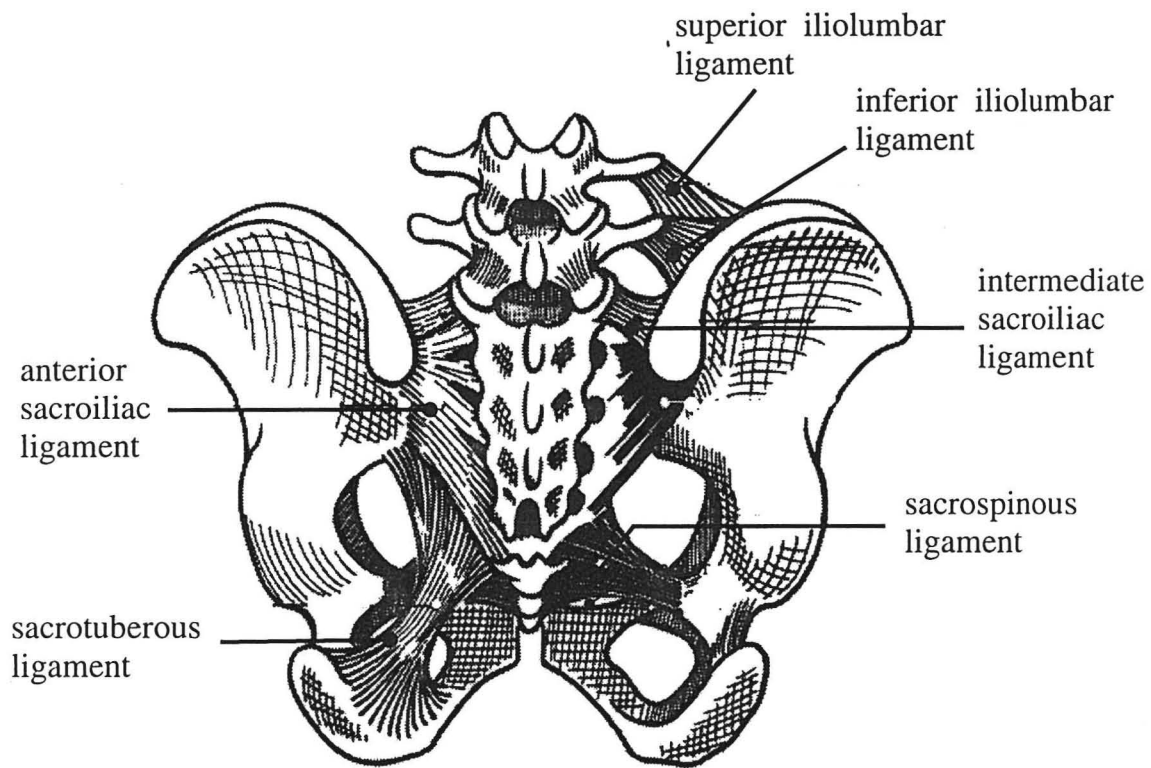


Figure 1. The sacroiliac joint and ligaments (Reproduced by permission from Kapandji IA: The Physiology of the Joints, Vol 3, 2nd ed. Churchill Livingstone)

CHAPTER 3

MOVEMENT

Biomechanics

The sacroiliac joint can be thought of as having two types of movement; iliosacral movement and sacroiliac movement.¹⁵⁻¹⁷ Iliosacral movement refers to movement of the innominates on the sacrum and sacroiliac movement refers to movement of the sacrum on the innominates. Iliosacral movement is produced via lower extremity forces. Iliosacral motions that occur are anterior and posterior innominate rotation, upslips, downslips, inflares, and outflares (Table 1). Sacroiliac movement is produced via spinal forces. Sacroiliac motions that occur are nutation (sacral flexion), counternutation (sacral extension) and sacral torsions.

Movement of the SIJ demonstrates six degrees of freedom about multiple axes.¹⁴ The middle transverse axis is the main axis for motion. Nutation and counternutation occur about this axis. The superior transverse axis (respiratory axis) is the fulcrum formed at the attachments of the posterior sacroiliac ligaments and the thoracodorsal fascia. The sacrum flexes about the axis with exhalation and extends with inhalation. The other two axes are the right and left oblique axes. Sacral torsions occur about these axes.

Table 1. Definitions of iliosacral and sacroiliac motions.

Motion	Definition ^{14,16}
Upslip	One innominate moves up relative to the other; iliac crest, ASIS, and PSIS are high on same side
Downslip	One innominate moves down relative to the other; iliac crest, ASIS and PSIS are high on same side
Inflare	ASIS moves toward midline and PSIS moves away from midline
Outflare	ASIS moves away from midline and PSIS moves toward midline
Nutation	Sacral promontory moves anterior and inferior; coccyx moves posterior
Counternutation	Sacral promontory moves posterior and superior
Sacral torsions	Fixations on the oblique axes

The lower extremities exert forces up to the ilium to produce iliosacral movements. During walking, the innominate progresses from a position of posterior rotation at initial contact to anterior rotation at terminal stance. If one leg is shorter, the SIJ is more susceptible to dysfunction. The pelvis must drop the distance of the leg length discrepancy resulting in increased compressive forces at the SIJ on the side of the shorter leg.^{15,17} The difference in compressive forces can cause adaptive changes in the lumbosacral area and increase the occurrence of soft tissue injury. The most extreme iliosacral motion occurs when a person moves from sitting to standing.¹⁷

The bony attachment of the sacrum and muscular influences of the abdominals produce sacroiliac movement.^{15,17} Movements of the spine influence the sacrum because

of the attachment of the sacrum to the fifth lumbar vertebra.¹⁵ The sacrum follows the lumbar spine during movement (ie. the sacrum flexes as the lumbar spine flexes). Weak abdominal muscles allow an increase in lumbar lordosis with anterior rotation of the innominates.

Dysfunction

SIJ dysfunction can be categorized as hypermobility or hypomobility.⁴

Hypermobility is the result of damaged ligaments, and hypomobility is age-related. Age-related hypomobility does not produce symptoms in the normal joint. There are instances when the joint appears hypomobile but is hypermobile. The joint is actually loose, has moved out of its normal range, and become stuck in an area where the ridges and depressions are not complimentary.

There are three events that typically cause SIJ dysfunction; direct trauma, indirect trauma, and pregnancy.¹⁵ Direct trauma occurs when a person falls on the ischial tuberosity. The force generated from the fall pushes the innominate posteriorly and produces anterior stress on the sacrum. Indirect trauma occurs from asymmetry or stress on the joint while it is in an extreme range. Pregnancy can also be the cause of SIJ dysfunction. There is additional stress on the joint from the altered placement of the weight line, and the ligaments increase in elasticity due to the hormone relaxin. More movement is available and dysfunction becomes more common.^{2,15}

Muscle imbalances also contribute to the development of SIJ dysfunction.⁶

Muscles involved in SIJ dysfunction include the hip flexors and extensors, and the medial and lateral rotators of the hip. Weak (long) muscles will allow the innominate to tilt in

the opposite direction, while strong (short) muscles pull the innominate in the same direction. Muscle imbalances are related to postural habits such as sitting with legs crossed or standing on one leg. Other authors¹⁸ state that SIJ dysfunction may be the cause of muscle imbalances. If the innominate is tilted anteriorly, the hamstrings will be stretched and the rectus femoris will shorten.

Specific SIJ dysfunctions include innominate rotations, superior and inferior innominate shear, inflare and outflare of the innominates, sacral torsions, and unilateral sacral flexion.

Anterior and posterior innominate rotations - occur through the transverse axis.¹⁶ Left posterior innominate rotation is the most common dysfunction and right anterior rotation is the second most common dysfunction.

Posterior innominate rotation can be due to:

- ◆ Repeated unilateral standing
- ◆ Fall onto ischial tuberosity
- ◆ Vertical thrust onto extended leg
- ◆ Lifting in flexed position with knees locked
- ◆ Intercourse positions in females

Anterior innominate rotation can be due to:

- ◆ Golf or baseball swing
- ◆ Horizontal thrust of knee (into dashboard)
- ◆ Any forceful lower extremity movement on diagonal pattern

Superior and inferior innominate shear - (upslip and downslip) are iliosacral dysfunctions. Superior innominate shear occurs when the innominate slides up relative to the other and inferior innominate shear occurs when the innominate slides down. These dysfunctions are usually due to trauma.¹⁶

Innominate inflare and outflare - These are rare by themselves and usually result from muscle imbalances.¹⁶ Inflare occurs when the anterior superior iliac spine (ASIS) moves toward the midline and the posterior superior iliac spine (PSIS) moves away from midline. The ASIS moves away from midline and the PSIS moves toward midline with an innominate outflare.

Sacral torsions - are fixations on the oblique axes that occur during gait and are held there by the piriformis muscle.¹⁶ Forward sacral torsions are left rotation on the left oblique axis (left on left) and right rotation on the right oblique axis (right on right). Backward sacral torsions are left rotation on the right oblique axis (left on right) and right rotation on the left oblique axis (right on left). The dysfunctions can be visualized by using a matchbook cover with the oblique axes drawn from one corner to the opposite corner (Figs. 2-5).

Unilateral sacral flexion - occurs when one side of the sacrum fails to counter-nutate (extend) from a nutated (flexed) position.¹⁶

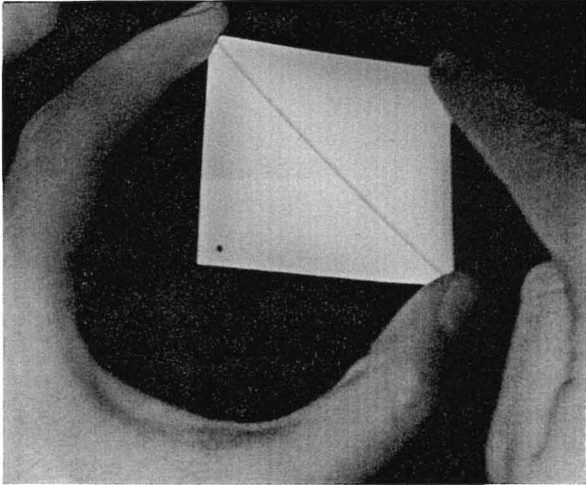


Figure 2. Left on left forward sacral torsion.

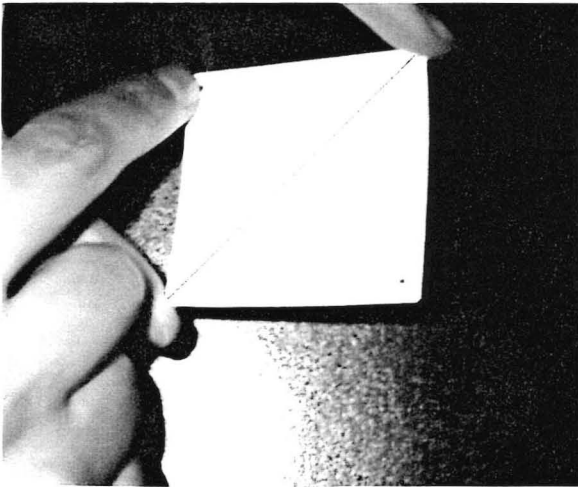


Figure 3. Right on right forward sacral torsion.

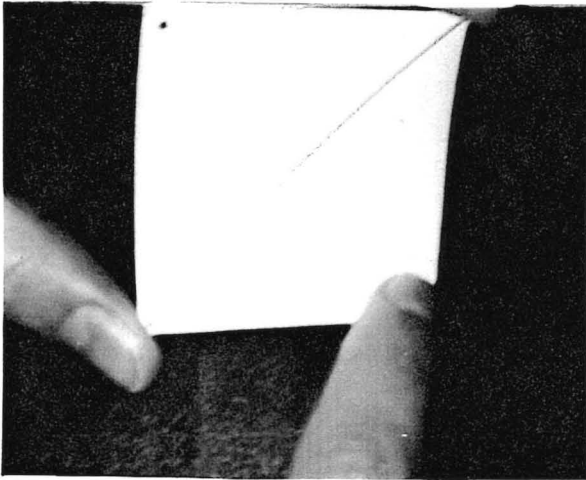


Figure 4. Left on right backward sacral torsion

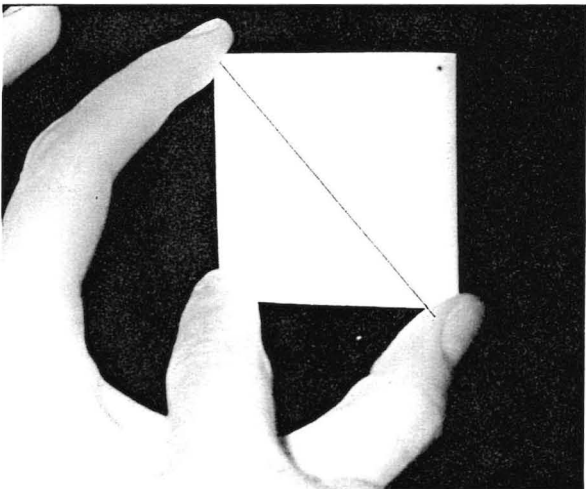


Figure 5. Right on left backward sacral torsion

CHAPTER 4

EVALUATION

Evaluation of the SIJ is like any other joint. It consists of a subjective evaluation, observation, and physical examination. The evaluation should not be limited to the SIJ. It should also include a screening of the lumbar spine and hip in order to rule out dysfunction in these joints. The primary criteria for diagnosing SIJ dysfunction are pain in the buttock or SIJ, pain elicited in the SIJ by provocation, and absence of other factors such as disc lesions, sciatica, and radiating pain.¹²

Subjective

The subjective exam should include past medical history, nature and area of symptoms, occupation, and any precipitating events. Specific questions to include in the history are listed in Table 2.

Objective

The next step in evaluating a patient for SIJ dysfunctions is the objective examination. The first thing the therapist must do is observe the patient.¹⁹ What is their posture like? Do they stand on one leg or is their weight equally distributed? The therapist should check the level of the ASISs, PSISs, and iliac crest for symmetry.^{7,16,19,20} When nutation occurs at the SIJ, the ASIS is higher and the PSIS is lower on the affected side. Counternutation (forward rotation of the innominate) results in the ASIS being

lower and the PSIS being higher on the affected side.¹⁹

Table 2. Subjective questions.^{5,19}

-
1. What are the patient's usual activities or sports?
 2. What is the location of the pain and does it radiate? SI pain is usually unilateral and can be referred to the posterior thigh, groin, iliac fossa, or buttock.
 3. When does the pain occur? SI pain usually occurs with turning in bed, getting out of bed, stepping up on the affected leg, and getting on the plinth. Patients also experience morning stiffness that decreases with weight bearing.
 4. Has the patient noticed any weakness in the lower extremities?
 5. Has the patient gone through a recent pregnancy?
 6. Has the patient experienced any recent falls, twists, or stains?
 7. What is the patient's occupation? Do they have a habitual working posture or twisted sitting posture? Some postures make a person more susceptible to SIJ dysfunction. (ie. standing on one leg or sitting with legs crossed)
 8. What activities or positions make the pain worse? SIJ pain is aggravated with climbing and descending stairs, walking, coming to stand, prolonged postures, and sitting or standing on the affected side.^{5,15,19}
 9. What is the patient's past medical history? Rheumatoid arthritis, Reiter's disease and ankylosing spondylitis can involve the SIJ.
-

After the therapist has observed the patient, they can proceed to the physical examination. Cibulka and Koldehoff⁶ recommended four steps in the process of evaluation for SIJ dysfunction. The therapist should 1) determine if SIJ dysfunction is present, 2) determine the direction of tilt, 3) test all major muscle groups around the pelvis for muscle length and strength, and 4) check for leg length equality.

In order to determine if SIJ dysfunction is present, the therapist must go through a variety of tests specific to the SI joint. These tests can be broken down into two categories: palpation tests and pain provocation tests.²¹ Palpation tests assess movement or position through palpation whereas pain provocation tests stress the joint to reproduce the patient's symptoms. A study by Potter and Rothstein²⁰ shows that palpation tests have poor intertester reliability. Specific tests included in the study are iliac crest levels, ASIS levels, PSIS levels, standing and sitting flexion tests, Gillet's test, supine-long sitting test, and prone knee flexion. Pain provocation tests have been shown to have substantial intertester reliability.^{20,21} Tests included in this study were iliac gapping, compression, posterior shear and pelvic torsion tests. Cibulka, Delitto, and Koldehoff¹⁸ recommend discussing sources of disagreement between therapists and combining the results of four tests to increase reliability. The four tests used were the standing flexion test, prone knee flexion, supine-long sitting, and palpation of PSIS heights in sitting. Palpation tests should be performed with the therapist at eye level of the landmarks being palpated. Bony landmarks should be located only through feeling.⁵ If the therapist looks while they are feeling for the landmark, it may cause confusion. The therapist should wait to observe the landmarks until after the landmark has been located.

As stated earlier, a combination of tests should be used when evaluating the SIJ. However, not all of the tests described here need to be performed during a single evaluation.

Standing Flexion Test is a test of iliosacral motion. This test is performed with the patient standing. The therapist palpates both PSISs with his thumbs. The patient

slowly bends forward while the therapist monitors the movement of the PSISs. A positive test occurs when one PSIS moves first or further cranially. This test determines if SIJ dysfunction is present.^{1,16} (Fig. 6)

Piedallu's Sign (sitting flexion test)^{16,19} The patient sits on a flat, firm surface with their feet flat on the floor. The therapist palpates the PSISs and compares their heights. If one PSIS is lower than the other, the patient is asked to bend forward. A positive test occurs if the lower PSIS becomes the higher one with flexion. The PSIS that becomes higher is on the affected side. This test indicates that a sacral torsion is present. (Fig. 7)

Gillet's Test.^{16,19} The patient stands and the therapist palpates the PSISs. The patient is asked to stand on one leg and then the other while flexing the opposite knee up to the chest. The spinous process of S2 can be used as a fixed reference point for the movement of the PSIS. If the PSIS on the side with the knee flexed moves too little, the joint is blocked and it indicates a positive test on that side. The PSIS on the uninvolved side will move more inferiorly. This is a test of iliosacral motion. (Fig. 8)

Prone Knee Flexion Test.¹⁶ The patient lies prone and the therapist stands at their feet. The therapist holds the patient's shoes with his thumbs passing over the heels. The relative length of the lower extremities is noted by comparing the soles of the shoes. If one leg appears short, it is the positive side. Then, the therapist flexes the patient's knees to 90 degrees and notes the length of the lower extremities. If the same leg appears shorter, then an anterior innominate rotation is present. If the leg now seem longer, it indicates a posteriorly rotated innominate. (Fig. 8)

Supine-Long Sitting Test.^{16,10} The patient begins in the supine position. The therapist examines the level of the malleoli. The patient is asked to sit up while keeping his legs straight. The malleoli are observed for any change in level. If the affected leg (side of positive Gillet's test) appears to lengthen when the patient sits up, it indicates a posterior innominate. If an anterior innominate is present, the affected leg will appear to shorten as the patient sits up. (Fig. 10)

Straight Leg Raising Test.^{16,19} (Fig. 11) The patient lies supine and the therapist passively raises one leg. The range in which pain occurs indicates the type of pathology present.

0 - 30 degrees: hip pathology or inflamed nerve root

30 - 50 degrees: sciatic nerve involvement

50 - 70 degrees: hamstring involvement

70 - 90 degrees: SIJ involvement

Passive bilateral straight leg raising stresses the SIJ before 70 degrees. A positive test for SIJ involvement suggests a unilateral torsion.

Gapping Test.¹⁹ The patient lies supine and the therapist pushes down and out on the ASISs with arms crossed. This test is positive with unilateral gluteal or posterior leg pain. A positive test indicates a sprain to the anterior sacroiliac ligament. (Fig. 12)

Approximation Test.¹⁹ The patient is positioned in side lying. The therapist places his hands on the upper iliac crests with pressure exerted toward the floor. An increased feeling of pressure in the SIJ indicates a positive test. This test stressed the posterior sacroiliac ligaments. (Fig. 13)

FABERE (Patrick's) Test.¹⁶ This test is used to differentiate between hip pathology and SIJ dysfunction. The patient is supine with the hip flexed, abducted and externally rotated with the ankle resting above the opposite knee. The therapist stabilizes the opposite ASIS and applies pressure to the knee. Pain in the groin or anterior thigh indicates hip pathology, and pain in the SIJ indicates SIJ involvement. (Fig. 14)

Sacral Apex Pressure Test.¹⁹ The patient lies prone and the therapist applies a downward pressure at the apex of the sacrum with the heel of the hands. This test causes a shear between the sacrum and the ilium and a rotational shift of the SIJs. SIJ dysfunction exists if pain is produced in the joint. This is an important test to perform because it is the most localized.⁵ (Fig. 15)

An evaluation of the major muscle groups surrounding the SIJ should accompany these special tests. Muscle groups that should be included are the hamstrings, quadriceps, hip flexors, hip extensors, hip external rotators, and hip internal rotators.⁶ An evaluation of the muscles will help in diagnosing muscle imbalances that may cause SIJ dysfunction.



Figure 6. Standing Flexion Test



Figure 7. Piedallu's Sign

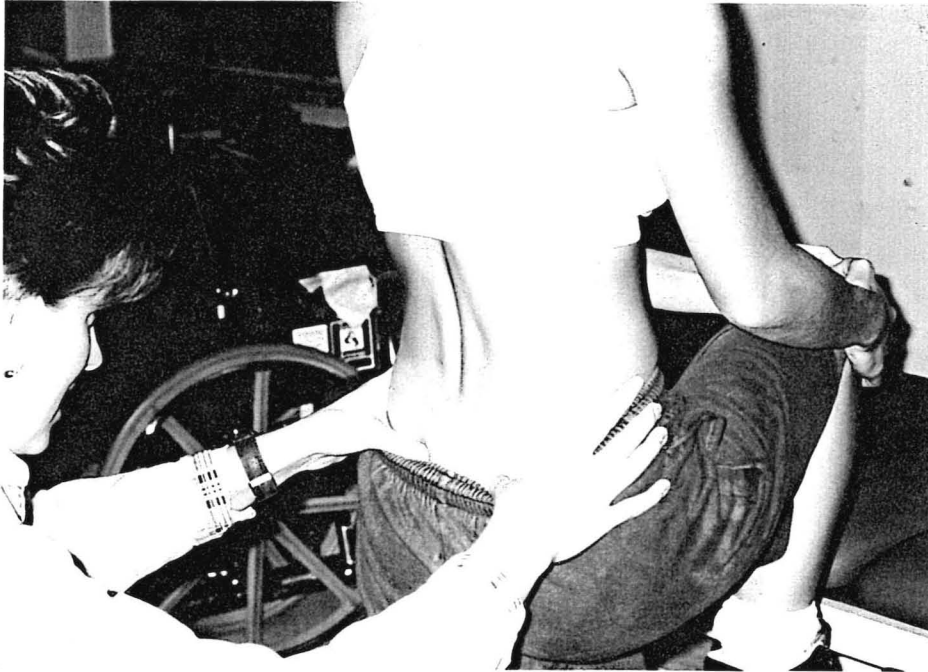


Figure 8. Gillet's Test

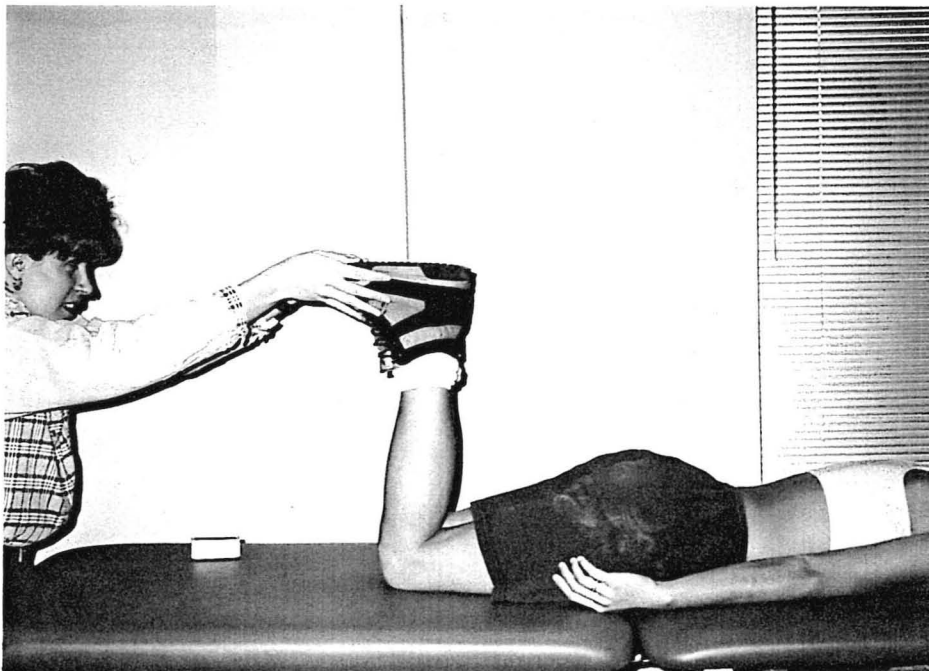


Figure 9. Prone Knee Flexion Test

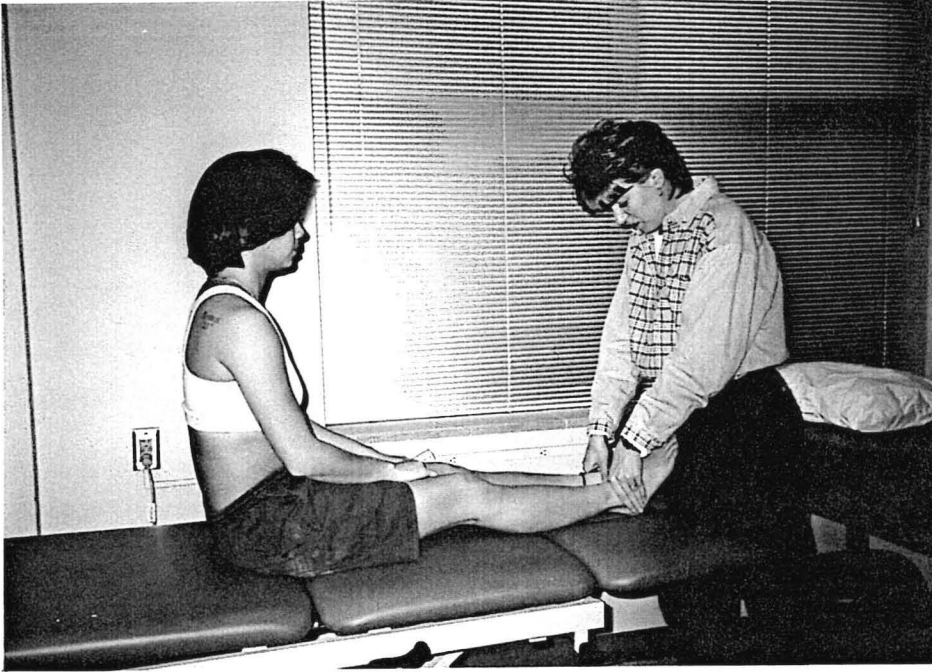


Figure 10. Supine - Long Sitting Test

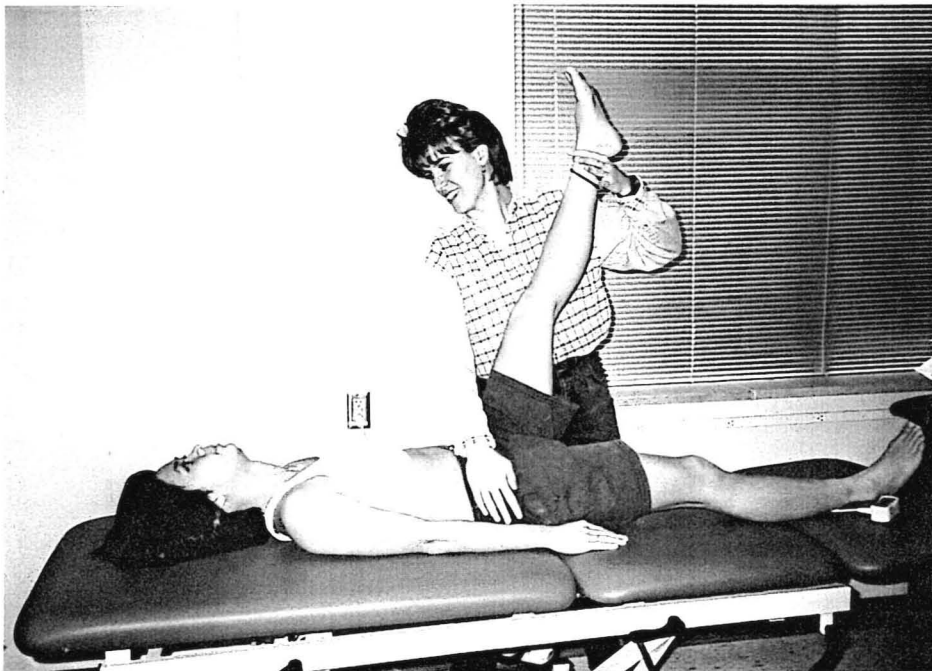


Figure 11. Straight Leg Raising Test

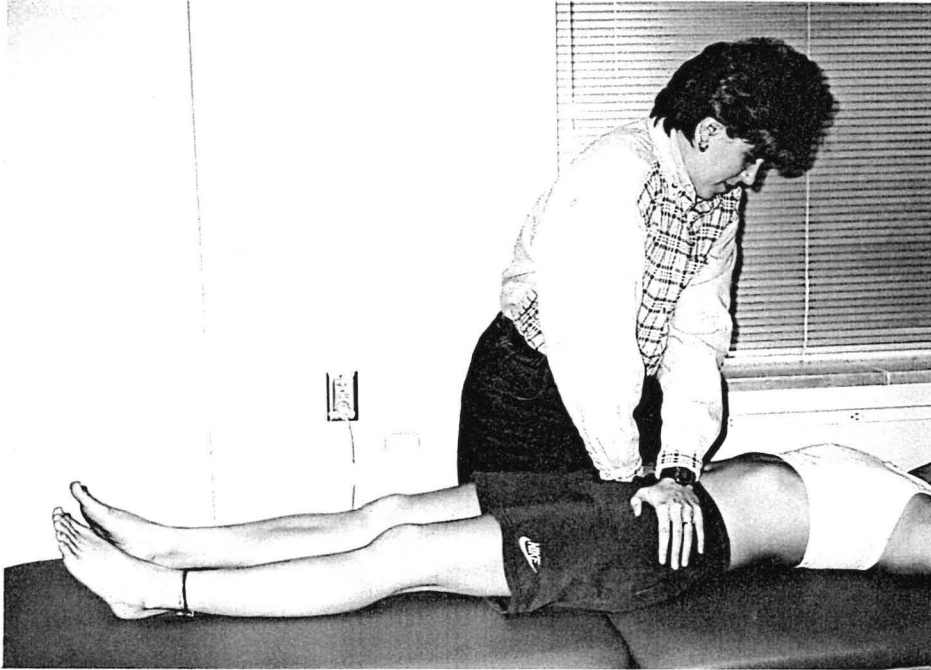


Figure 12. Gapping Test



Figure 13. Approximation Test

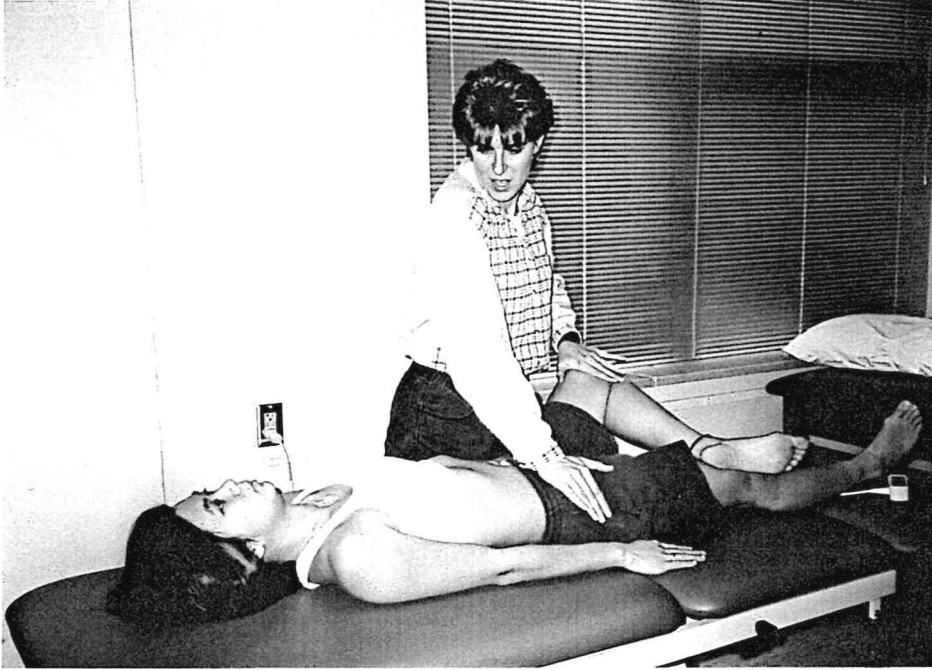


Figure 14. FABERE (Patrick's) Test



Figure 15. Sacral Apex Pressure Test

CHAPTER 5

TREATMENT

There is a wide variety of treatment options for SIJ dysfunction ranging from heat and rest to manipulation. There are three major goals of treatment: 1) to decrease the patient's pain, 2) eliminate SIJ dysfunction, and 3) prevent recurrence of SIJ dysfunction.¹ Treatment requires active participation by the patient and education in biomechanics.¹⁵

The goal during the acute phase is to decrease SIJ pain. Treatment during this stage includes rest, heat, and medications.^{5,22} Medications used to treat SIJ dysfunction include NSAIDS (nonsteroidal anti-inflammatory drugs), muscle relaxants, and injection of a local anaesthetic or hydrocortisone.

Manipulation of the SIJ is the most effective treatment technique.¹ The disadvantages of manipulation are that they require advanced skill and can aggravate low back pain if not done correctly.¹ Treatment of dysfunctions should be performed in a certain sequence to take advantage of the axes of motion: 1)pubic lesions, 2)nonadapting lumbar compensations, 3)sacral lesions, and 4)innominate lesions.¹⁶

The second phase of treatment focuses on eliminating SIJ dysfunction. Dysfunction can be decreased or eliminated with the use of mobilizations, muscle energy techniques (MET), and manipulations.¹ METs are active techniques that mobilize and

eliminate SIJ restrictions and muscle imbalances through isometric contractions.^{1,16}

METs are the safest and easiest techniques to perform, but they do not always eliminate SIJ dysfunction. The success of MET treatments can be increased by combining them with mobilizations.

As METs are applicable for both in-patient programs and home programs, this paper will describe METs for anterior and posterior innominate rotations and forward and backward sacral torsions. Information on other correction techniques can be found in a variety of texts.

Anterior innominate rotation (Fig. 16) - This technique utilizes the gluteus maximus to rotate the innominate posteriorly.¹⁶

1. The patient lies supine with the uninvolved leg hanging over the edge of the table.
2. The hip and knee on the involved side are flexed until the uninvolved leg starts to elevate.
3. The therapist stabilizes the flexed knee in his/her axillary area or the patient can hold it with his/her hands.
4. The patient is asked to push the involved leg into the therapist's axillary area and hold for seven to ten seconds.
5. The patient flexes the involved hip further until the opposite leg starts to come up.
6. Repeat steps 4 and 5 three to four times.

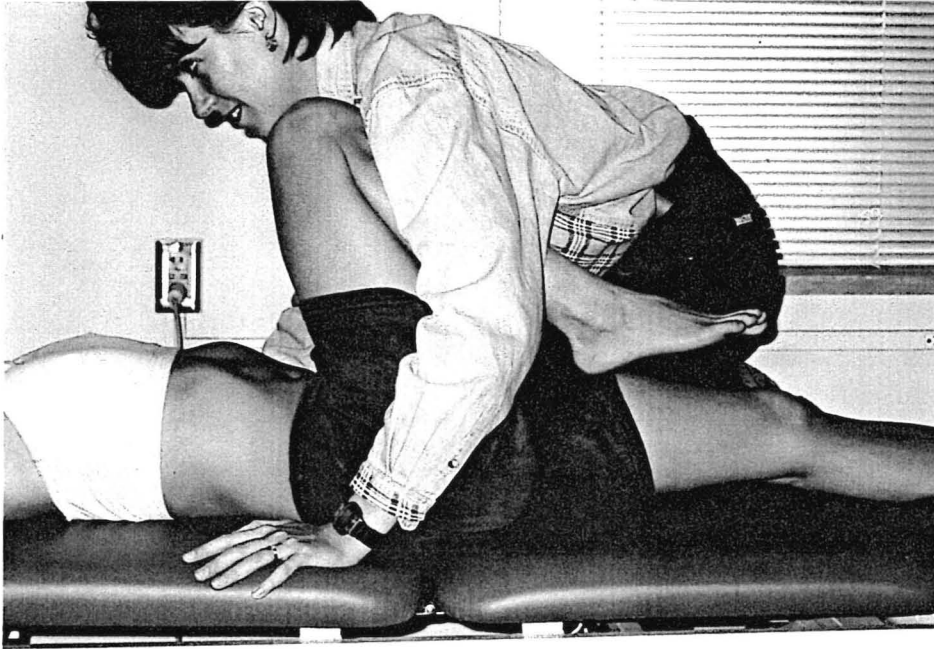


Figure 16. MET for anterior innominate rotation



Figure 17. MET for posterior innominate rotation

Posterior innominate rotation (Fig. 17) - The rectus femoris is used to rotate the innominate anteriorly.¹⁶

1. The patient is positioned supine with the involved leg hanging over the edge with the hip extended and knee flexed.
2. The patient flexes the uninvolved hip and knee until the opposite leg starts to come up and holds the knee with his/her hands. The therapist can help stabilize the leg.
3. The therapist places his/her hand on the involved leg just above the knee and pushes down to take up the slack.
4. The patient is asked to push the involved leg up into the therapist's hand and hold for seven to ten seconds.
5. The therapist takes up the slack in the involved leg and the patient repeats the contraction.
6. Repeat three to four times.

Forward sacral torsion - left on left or right on right (Figs. 18a and 18b)

This technique uses reciprocal inhibition of one piriformis by the opposite internal hip rotators while the other piriformis corrects the position of the sacrum.¹⁶

1. The patient lies on the side that corresponds to the axis of involvement. (ie. patient with left on left rotation would lie on the left side)
2. The therapist stands facing the patient.
3. The patient should be close to the edge of the table with the arm on the table

behind him/her and the top arm hanging off the edge of the table (shoulders are rotated toward the table).

4. The therapist palpates the lumbosacral junction while he/she flexes the patient's knees and hips to 70-90 degrees or until movement is felt at the lumbosacral junction. The patient's knees should rest in the hollow of the therapist's hips so the patient's hips can be flexed when the therapist moves sideways.
5. The therapist moves his hand from the lumbosacral junction to the patient's shoulder near the edge of the table. The patient is instructed to take a deep breath and reach for the floor as he/she exhales. The therapist helps by pressing down on the patient's shoulder. Repeat two to three times.
6. The therapist palpates at the lumbosacral junction while lowering the patient's ankles toward the floor until resistance is met or motion is felt at the lumbosacral junction.
7. The patient is instructed to lift both ankles toward the ceiling against resistance from the therapist for seven to ten seconds.
8. When the patient relaxes, the therapist takes up the slack by moving cephalad (to increase flexion) and lowers the ankles toward the floor (to increase sidebending) until resistance is met or motion is felt at the lumbosacral junction. The patient reaches toward the floor with the arm hanging off the edge (to increase rotation).
9. Repeat steps 7 and 8 two or three times.



Figure 18a. MET for forward sacral torsion

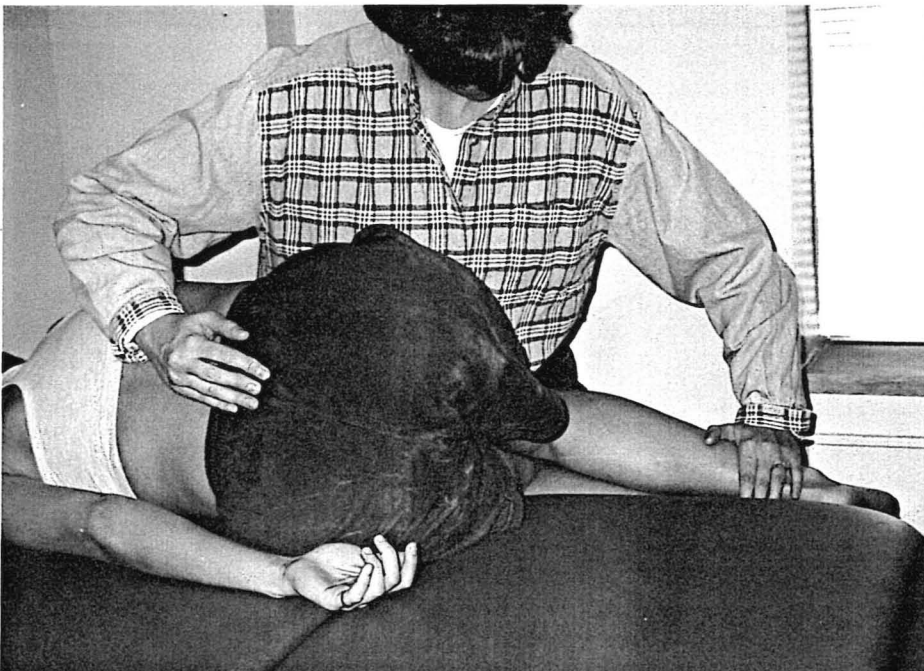


Figure 18b. MET for forward sacral torsion



Figure 19a. MET for backward sacral torsion



Figure 19b. MET for backward sacral torsion

Backward sacral torsions - left on right or right on left (Figs. 19a and 19b)

Contraction of the gluteus medius and gluteus maximus will help pull the sacrum forward on the oblique axis.¹⁶

1. The patient lies on the side corresponding to the axis of involvement (ie. patient with left on right rotation would lie on the right side).
2. The patient lies close to the edge of the table with the therapist standing at the edge facing the patient.
3. The patient's trunk is rotated so the back approximates the table. The therapist flexes the patient's top leg slightly and maintains extension of the bottom leg.
4. The therapist palpates the lumbosacral junction and extends the patient's bottom hip until movement is felt in the lumbosacral junction.
5. The therapist moves his caudad hand to the lumbosacral junction and the cephalad hand is moved to the patient's shoulder.
6. The therapist uses the forearm of the caudad arm to stabilize the pelvis and asks the patient to take a deep breath. As the patient exhales, the therapist pushes down on the shoulder. Repeat this two or three time to take up the slack while making sure the patient does not move.
7. The patient is instructed to straighten the top knee and let it hang off the side of the table while maintaining trunk rotation and pelvic alignment.
8. The patient is asked to lift the knee toward the ceiling against resistance provided to the lateral knee and hold the contraction for seven to ten seconds.

9. The therapist takes up the slack by moving the back leg back, rotating the trunk, and pushing down on the top leg until resistance is felt.
10. Repeat steps 8 and 9 two or three times.

The patient should be re-examined after each technique to assess for any changes in SIJ dysfunction.

Home Exercise Programs

The next step in treating SIJ dysfunction is to prevent recurrence. Recurrence of SIJ dysfunction can be accomplished by eliminating muscle imbalances through strengthening and stretching, eliminating structural or functional leg length discrepancies, and by following some basic precautions.^{6,15} Four basic precautions to follow are:¹⁵

1. Take stairs one at a time
2. When standing up, unload the affected leg; once standing, lean over the unaffected leg
3. Avoid squatting on the affected leg or full hip extension during weight-bearing
4. Avoid hip flexion, abduction, and external rotation

Muscle imbalances should be addressed with an exercise program. It is important to note that when doing abdominal strengthening the knees should be bent to prevent the anterior pull of the hip flexors on the innominates.⁷ Leg raises are contraindicated for the same reason.

The patient can also be instructed in self-correction techniques for anterior and posterior rotated innominates.¹⁴ The following exercises can be included in a home program.

To Correct Anterior innominate rotation:

1. The patient stands with his/her back to the wall and isometrically holds the involved leg backward into the wall for seven to ten seconds. Repeat three times.
2. While standing, the patient places the involved foot on a chair and gently leans forward over the knee. This will rotate the innominate posteriorly and relax the hip flexors.

To Correct Posterior innominate rotation:

1. The patient stands facing the wall and isometrically holds the involved leg into the wall for seven to ten seconds. Repeat three times.
2. While standing, the patient places the uninvolved foot on a chair and gently leans forward over the knee. Hold for seven to ten seconds and repeat three times. This relaxes and stretches the hip extensors on the involved side.

CHAPTER 6

CONCLUSION

The amount of SIJ movement that occurs is controversial, but it is generally agreed that movement does occur. The joint surfaces become more irregular as a person ages. These irregularities may cause the joints to become “stuck” when they move further than their normal range. The stability of the joint comes from six ligaments that cross it. Although, there are no muscles that directly act upon the joint, muscles surrounding the joint indirectly cause movement.

Dysfunctions of the SIJs are caused by direct trauma, indirect trauma, and pregnancy. Muscle imbalances also play a role in dysfunction as they can either cause or result from a dysfunction. Two types of special tests, palpation and provocation, are used to gather the objective data for the evaluation of the SIJs. Palpation tests have been shown to have low intertester reliability while provocation tests have a high intertester reliability. It is suggested that a combination of three or four tests be used to increase the reliability.

Treatment of the SIJ is directed toward decreasing the patient's pain, eliminating SIJ dysfunction, and preventing recurrence of SIJ dysfunction. Treatment may include rest, heat, medications, stretching and strengthening, mobilizations, METs, and manipulations. Mobilizations and METs are combined to increase the success of

treatment. Manipulation is the most effective treatment technique, but it requires advanced skill and may aggravate low back pain.

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