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# What You Need to Know About Sacroiliac Dysfunction

Deborah B. Riczo

Low back pain is the leading cause of disability worldwide, and sacroiliac dysfunction is estimated to occur in 15%–30% of those with nonspecific low back pain. Nurses are in the unique position to support and provide education to patients who may be experiencing sacroiliac dysfunction or possibly apply this knowledge to themselves, as low back pain is a significant problem experienced by nurses. A patient's clinical presentation, including pain patterns and characteristics, functional limitations, common etiologies and musculoskeletal system involvement, current diagnostic tools, and realm of treatments, are discussed along with their respective efficacy. Distinction is made between specific diagnosis and treatment of joint involvement and that of sacroiliac regional pain, as well as other factors that play a role in diagnosis and treatment for the reader's consideration.

## Introduction

Sacroiliac joint dysfunction (SIJD) is estimated to occur in 15%–30% of patients who have nonspecific low back pain (LBP), has been reported to be as high as 40% (Ramírez et al., 2018; Visser et al., 2013), as well as is underdiagnosed and undertreated (Buchanan et al., 2021; Falowski et al., 2020). LBP is considered globally to be the leading cause of "years lived with a disability" according to the Global Burden of Disease Study 2017 (the Global Burden of Diseases, Injuries, and Risk Factors Study 2017; http://www.healthdata.org/gbd/data; Wu et al., 2020). Pelvic girdle (PG) pain, of which sacroiliac (SI) pain can be a component, is estimated to affect more than 70% of women by their last trimester of pregnancy, with a cohort of women continuing to have pain indefinitely (Clinton et al., 2017). In addition, ongoing musculoskeletal (MS) pain is the most common form of chronic pain and again is often undiagnosed and untreated; LBP and shoulder disorders are the most common and debilitating, especially in occupation and work-related arenas (Briggs et al., 2016).

The nursing profession has an extraordinary incidence of low back (LB) injuries (U.S. Bureau of Labor Statistics, 2018; U.S. Dept of Labor Statistics, 2021), which continues today globally as supported by a 2021 survey conducted in the Czech Republic and the United Kingdom (Gilchrist & Pokorná, 2021).

Accurate diagnosis and treatment of persons with SI and PG pain are vital as treatment is different from that of LBP (Buchanan et al., 2021; Clinton et al., 2017; Gartenberg et al., 2021; Simonds et al., 2022). The sequelae of the untreated or mistreated pain impact the quality of life of many worldwide as evidenced by statistics of the Global Burden of Disease Study 2017 discussed earlier.

There are five objectives of this article: (1) identify what SI dysfunction looks like; (2) discuss the common causes for SI dysfunction; (3) identify how SI dysfunction is diagnosed; (4) provide an overview of the current treatments of SI dysfunction; and (5) discuss other factors influencing successful outcomes of treatment that are in the control of the person experiencing SI pain. The overall goal of this article is to provide education to nursing professionals in order that they may more easily triage cases of SI dysfunction in their patients, colleagues, loved ones, and, importantly, themselves.

## What Does SI Dysfunction Look Like?

Pain patterns, pain characteristics, and functional limitations are important to recognize when putting together a picture of SI dysfunction. As with any diagnosis, mechanism of injury/onset and other pertinent history and clinical findings need to be considered. Appreciating the role of the MS system and its effect on

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other systems in the body are important to understanding the scope of the clinical presentation.

## Pain Patterns and Characteristics

Pain can be either localized to the SI area or referred down the back of the thigh, leg (van der Wurff et al., 2006), and even into the foot: posterior/lateral thigh, 50%; pain distal to the knee, 28%; and pain in the foot, 14% (Slipman et al., 2000). For many years, it was believed that SI joint pain does not refer past the knee; however, this is no longer accepted (Fortin et al., 2003; Visser et al., 2013). It can be confused with pain from lumbar nerve root compression (Fortin et al., 2003; Visser et al., 2013), which must be ruled out (Laslett, 2019). Besides referring pain down the thigh and possibly into the calf, pain can exist concurrently with LB, hip, buttock, and pelvic pain as the muscles, joints, and ligaments are shared (Vleeming et al., 2012). The neighboring joints may or may not have specific anatomical damage in a degenerative or mechanical way and may or may not be the "driver" of the pain.

Pain that is localized occurs in what is known as Fortin's area (Fortin & Falco, 1997; see Figure 1). This is a 3 × 10 cm vertical-oriented rectangular area starting medial to the posterior superior iliac spine. The one-finger pointing test is considered positive if a person identifies the primary pain to be in this rectangular area by pointing with one finger. This is pain thought to be generated by intra-articular and extra-articular structures (Borowsky & Fagen, 2008).

Pain quality and quantity can vary from sharp, shooting, dull or aching, intermittent, or always present. It can vary in intensity with workload, stress, or position change. The pain can even switch sides, especially when the pain results from extra-articular sources. This is commonly seen in women during hormonal shifts as in pregnancy, postpartum, and perimenopause. For this reason, there has been a great deal of research conducted on PG dysfunction in women, especially during their antenatal period (Clinton et al., 2017; Hilde et al., 2016) and postpartum period (Simonds et al., 2022). As mentioned earlier, PG dysfunction includes SI dysfunction (Clinton et al., 2017; Stuge, 2012).

## What the Pain Is Not

Pain that is unrelenting, constant, always worsening, and presenting with other red flags is indicative of a serious spinal pathology, such as infection, malignancy, fracture, or cauda equina (Finucane et al., 2020). These scenarios require prompt medical assessment (Finucane et al., 2020).

## Functional Limitations

The SI joint is the largest axial joint in the body, surrounded by tough ligaments, and is responsible for the dissemination of ground forces connecting the legs, pelvis, spine, head, and arms (Kiapour et al., 2020; Vleeming et al., 2012). Persons with SI dysfunction have what has been called a "failed load transfer" ability when moving their weight or "load" from side to side (Lee, 2004, 2011). This affects the ability to move from one position to another, or transitional movements. Common complaints include the following:

- Difficulty standing from chair or car and returning to seat;
- Pain with weight-bearing activities such as walking and climbing stairs;
- Difficulty sitting without shifting positions; and
- Difficulty rolling in bed.

It is not necessary to have all these aforementioned complaints, but it is common to have more than one. Pain can occur during other functional movements as well, such as lifting, bending, carrying, and standing, but the transitional movements are more notably difficult.


**Figure 1.** Fortin's area. PSIS = posterior superior iliac spine. Reproduced with permission from OPTP, publisher (Riczo, 2018, 2020).

## What Are Common Causes of SI Dysfunction?

### Trauma and Nontraumatic Causes

Trauma or injury to the pelvis is the most obvious and common cause of SI dysfunction (Chou et al., 2004; Matlick & Dressendorfer, 2017). Persons experiencing motor vehicle accidents, falls on the buttock, childbirth, and sports injuries can have symptoms consistent with SI dysfunction that may or may not involve the joint. Other causes of SI dysfunction are cumulative injuries such as those that occur in lifting, running, and when there is an altered gait from a prior orthopaedic injury/problem. Idiopathic reasons are also part of the clinical picture.

SI pain can result from hyper/hypomobility, extraneous compression/shearing forces, micro/macro-fractures, soft-tissue injury, inflammation, pregnancy, adjacent segment disease, leg-length discrepancy, and a prior lumbar fusion (Kiapour et al., 2020). Adjacent segment disease can occur to the segment above or below a spinal fusion due to the natural motion being blocked. Persons with a prior lumbar fusion or multilevel lumbar surgery have a higher risk for SIJD (Guan et al., 2018), as do adolescent athletes with idiopathic scoliosis due to biomechanical impairments in pelvic and gait dynamics (Šarcevic & Tepavcevic, 2019). PG dysfunction, which SI dysfunction is a component, is the largest cause of disability in the postpartum population (Simonds et al., 2022).

### Musculoskeletal System

It is well accepted that the MS system is impaired with traumatic injury, surgeries, and orthopaedic problems including LB and SI/PG dysfunction and forms the basis of rehabilitation services. From a rehabilitation model perspective, the MS system is assessed and imbalances are addressed. It is also well accepted that ongoing imbalances between the sides of the body and current movement patterns can be a source of ongoing inflammation and pain.

The MS system is dynamic and does not interact in a vacuum but affects other systems as well. There are various well-respected exercise-based approaches that utilize motor control and muscle function to address LBP management (Hides et al., 2019). Therefore, it is of value to include a brief review of the MS system and other body systems that are affected in SI dysfunction.

### *Skeletal Overview*

As mentioned earlier, the SI joint is the largest axial joint in the body (Kiapour et al., 2020). The L5/S1, coccygeal, hip, and symphysis pubis joints are the neighboring joints (see Figure 2) that impact the PG function as ligaments, muscles, and other tissues are shared and need to work dynamically for normal function. The SI joint has limited degrees of movement due to the actual anatomy of the joint surfaces, wedging of the sacrum between the innominate (see Figure 3) or hip bones, and its dense ligaments (Goode et al., 2008; Vleeming & Schuenke, 2019).

### *Ligament Overview*

The sacrum is held strongly in place by ligaments that hold it to the ilium, ischium, and lumbar spine (iliosacral, ischiosacral, and iliolumbar ligaments; see Figures 3 and 4). Ligaments in the lower sacrum continue anteriorly and posteriorly to the coccyx and help provide support for the pelvic floor muscles that attach in the coccygeal area (Lirette et al., 2014). There is an abundance of research to support that there is very little movement of the sacrum and that movement decreases with age (Cohen, 2005; Goode et al., 2008; Sturesson et al., 2000). The symphysis pubis joint is less stable due to its anatomical design (Lee, 2011) than the SI joint, with as much as 5 mm of movement noted in normal

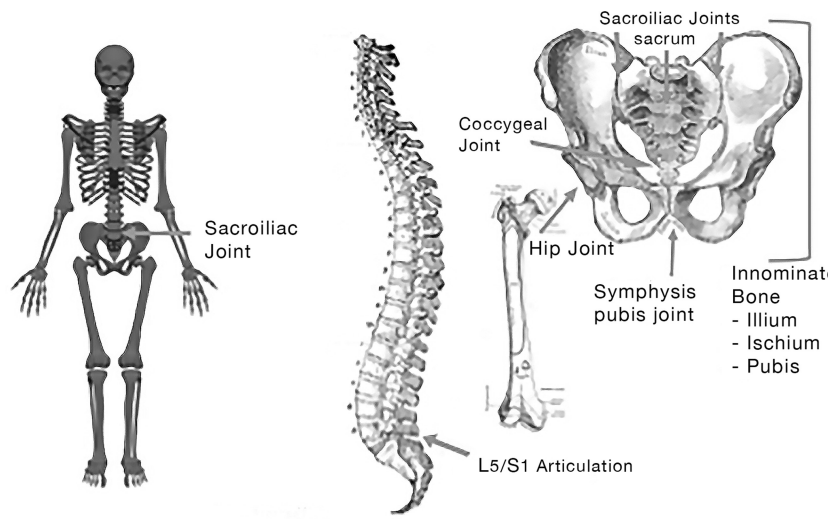


**Figure 2.** Skeletal review of the SI joint. The SI joint is the largest axial joint in the body (Kiapour et al., 2020). The L5/S1, the hip joint, and symphysis pubis joint are the neighboring joints that impact the PG function. PG = pelvic girdle; SI = sacroiliac. (Slide, presentation 2021, Deborah Riczo). Skeleton (https://commons.wikimedia.org/wiki/File:201805_human_skeleton.png), spine (https://commons.wikimedia.org/w/index.php?curid=24827049), pelvis, and femur (https://commons.wikimedia.org/wiki/File:Gray244.png).

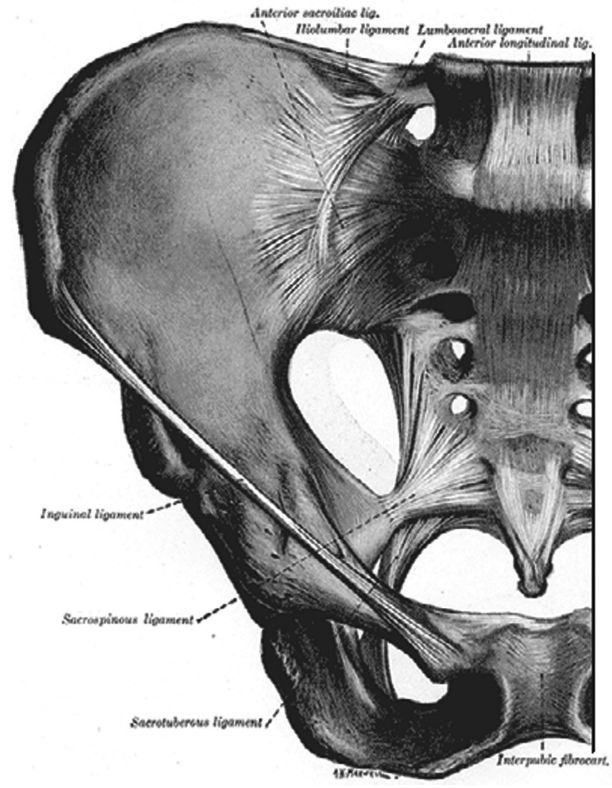


FIGURE 3. Anterior pelvis. Reprinted with permission from OPTP (Riczo, 2018, 2020).

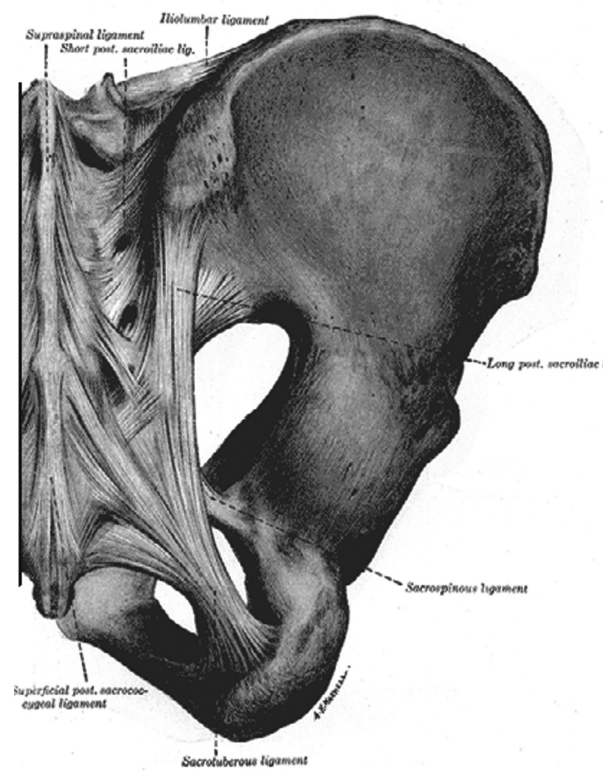


FIGURE 4. Posterior pelvis. Ligaments of the pelvis. The sacrum is held strongly in place by ligaments that hold it to the ilium, ischium, and lumbar spine (iliosacral, ischiosacral, and iliolumbar ligaments). Reprinted with permission from OPTP (Riczo, 2018, 2020).

persons during one-leg standing (Garras et al., 2008). Muscles in the PG have attachments to bone and ligaments (Cohen, 2005; Vleeming et al., 2012).

## *Muscle Overview*

Throughout the body, there are deep and superficial layers of muscle that work in harmony to provide normal functioning and adequate compression to joints, and this is true in the PG (Lee, 2011; Panjabi, 2003). The superficial or global muscle system is largely thought to be responsible for movement, whereas the deep or local muscle system is responsible for postural control (Lee, 2011; Richardson et al., 2002).

The local muscle system includes the multifidus, pelvic floor, diaphragm, and transversus abdominis (Lee, 2011; Richardson et al., 2002; see Figures 5–8). Weakness in these muscles has been linked to LBP and SI pain (Richardson et al., 2002; Vleeming et al., 2008). Even the normal movement of the diaphragm during breathing has a profound effect on the local muscle system including the pelvic floor (Hodges & Gandevia, 2000a, 2000b; Ma et al., 2017). With the current pandemic, comorbidities and a history of COVID-19 should be noted because of this strong connection (Siracusa & Gray, 2020).

Research has shown that there are MS impairments in both the local system and global muscle system in patients who have SI dysfunction (Joseph et al., 2015; Lee, 2011). The resting thickness of the external and internal oblique abdominal muscles has been found to be significantly reduced on the side of the SI dysfunction, and the external oblique and lumbar multifidus are also significantly reduced when compared with controls (Joseph et al., 2015; see Figures 5, 9, and 10).

The global or superficial back muscles include the latissimus dorsi, a strong shoulder and LB muscle (see Figure 11). This muscle contributes through its connection with the thoracolumbar fascia to stabilize the spine (Vleeming et al., 1995) and also works with the opposite gluteus maximus to stabilize the SI joint (Mooney et al., 2001). This pattern speaks to why it is common to have shoulder pain concurrent with problems in the opposite side of the LB and/or lower extremity.

The gluteus maximus is a superficial muscle and the largest stabilizing muscle of the SI joint (see Figure 12) and is often weak on the side of LB/SI/PG pain (Buckthorpe et al., 2019; Lee, 2011). The deep rotators of the hip (see Figure 13) not only help stabilize the head of the femur in the acetabulum but also have an effect on the pelvic floor by its physical and dynamic relationships with the piriformis and obturator internus muscles (Filler & Gilmer-Hill, 2015; Hopayian et al., 2010) This is why imbalance in the deep rotators of the hip, specifically the piriformis (Hopayian et al., 2010), can contribute to problems of pelvic floor and hip dysfunction concurrent with LB, SI, and PG dysfunction.

The posterior thigh muscles, hamstrings (see Figure 12), and hip flexors or iliopsoas (see Figure 14) are powerful muscles that have direct connections and influence the pelvis. These along with the rest of the

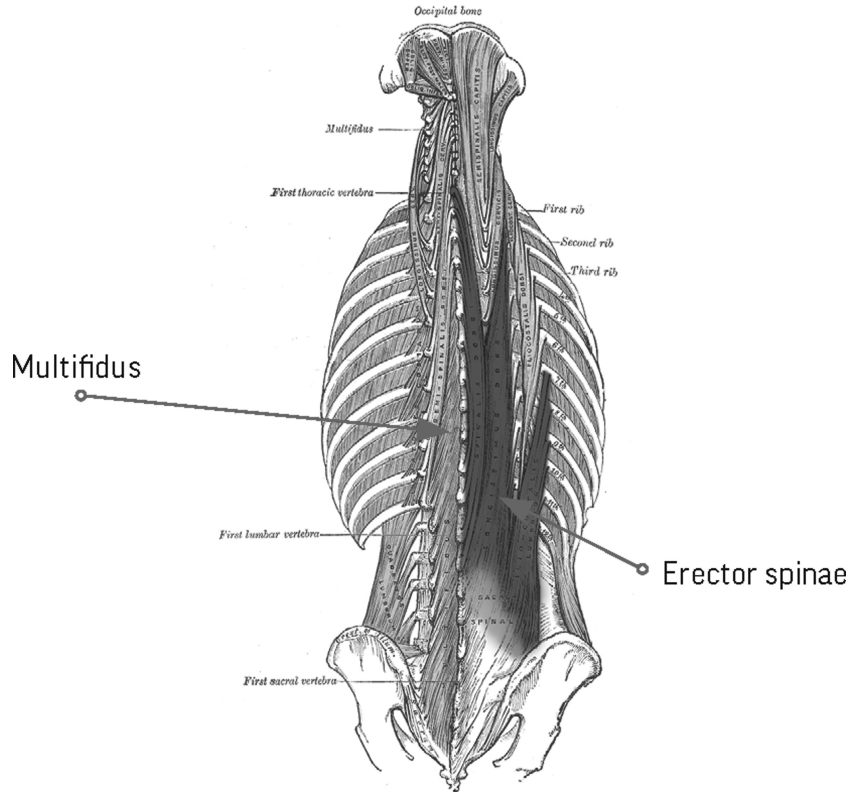


**Figure 5.** Multifidus. Reprinted with permission from OPTP (Riczo, 2018, 2020).

muscles discussed are typically included in rehabilitation for chronic back pain (Massoud Arab et al., 2011). Although not directly connected to the pelvis, the gastrocnemius or calf muscles can have direct effect on back pain (Seif et al., 2015).

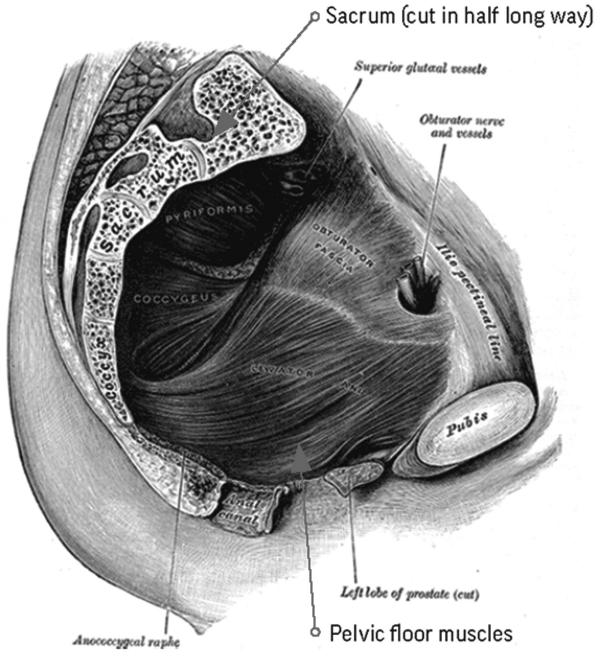


**Figure 6.** Pelvic floor muscles. Reprinted with permission from OPTP (Riczo, 2018, 2020).

## *Involvement of Other Body Systems*

The relationship between the various systems of the body is dynamic. The nervous, cardiovascular, respiratory, and lymph systems in particular are all impacted by MS dysfunction, and vice versa (Buskirk, 1990). Pain triggers the autonomic nervous system (fight or flight), and an emotional roller coaster can affect many body systems including endocrine, digestive, urinary, and even reproductive (as in dyspareunia or painful intercourse) (Wahl et al., 2020).

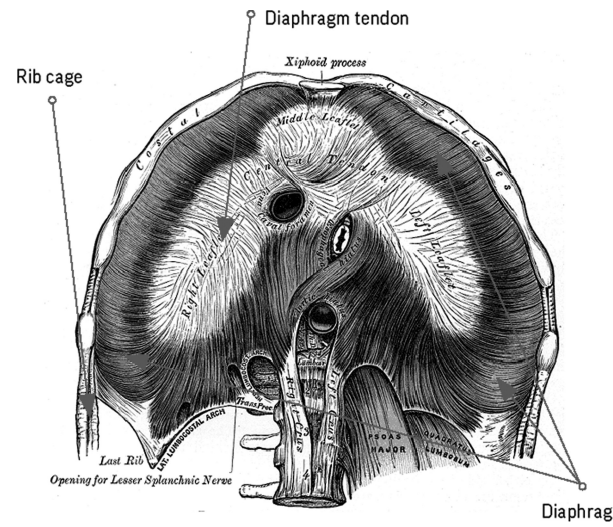


**Figure 7.** Diaphragm, caudal view. Reprinted with permission from OPTP (Riczo, 2018, 2020).

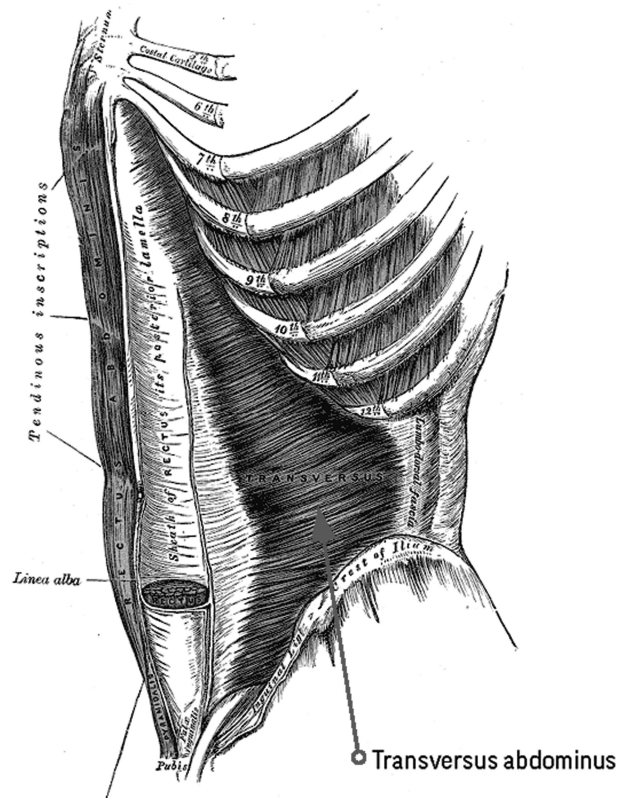


**Figure 8.** Transverse abdominis. Local or deep core muscles. The local muscle system including the multifidus, pelvic floor muscles, diaphragm, and transversus abdominis is often weak in lower back and pelvic girdle/sacroiliac dysfunction. Reprinted with permission from OPTP (Riczo, 2018, 2020).

Nerve compression via tight musculature can result in pain. Nerves are meant to move or "glide" in their neural sheath and require good blood flow for their health. Muscle tightness/spasm results in decreased circulation to the area and physical restriction of the nerve movement (Louw, 2013; Maggi et al., 2003; Millesi et al., 1990).

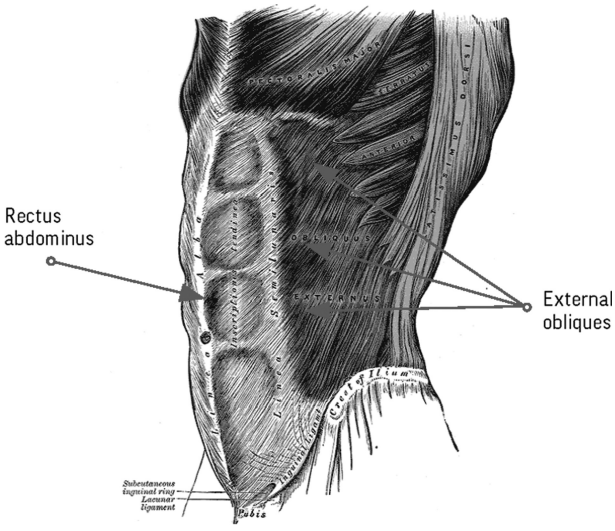


**Figure 9.** Rectus abdominis, external oblique. Reprinted with permission from OPTP (Riczo, 2018, 2020).

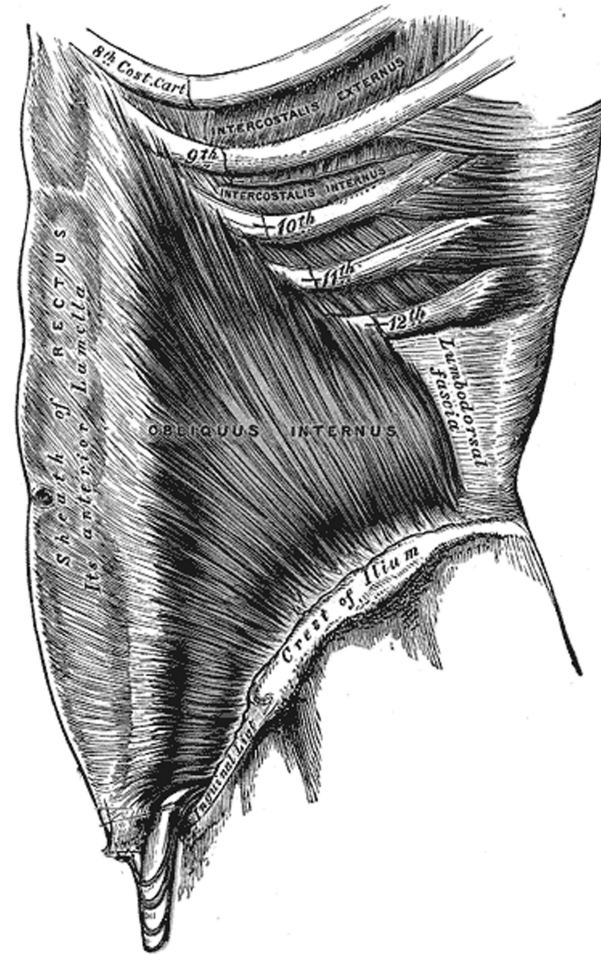


**Figure 10.** Internal oblique. The rectus abdominis, external and internal obliques, and the deepest layer, the transversus abdominis (Figure 9), muscles provide anterior and lateral support for the trunk. Reprinted with permission from OPTP (Riczo, 2018, 2020).

Further compression by prolonged positions, for example, as in sitting and cycling and in powerful contractions in squat-based exercises (Kasitinon et al., 2021), can contribute to nerve compression (pudendal neuralgia) (Ploteau et al., 2016). The lymph system is vital to normal fluid balance and clearing of toxins in the body and can be compromised, resulting in inflammation and edema. Impaired movements of the diaphragm, the major muscle of breathing, not only affect the local muscle system but also affect the cardiorespiratory, digestive, lymph, and urinary systems.

## Adaptation, Harmony, and Pain

The body has a great capacity to adapt and compensates when the harmony between the body systems is not perfect, which allows function that may be impaired to continue and not produce pain. This is evidenced by how a person can have swelling in a knee or ankle long after an injury but not experience pain again until years later. This is the scenario of many individuals seen by physical therapists due to arthritis or other nontraumatic onset of pain (Riczo, clinical experience). Another common

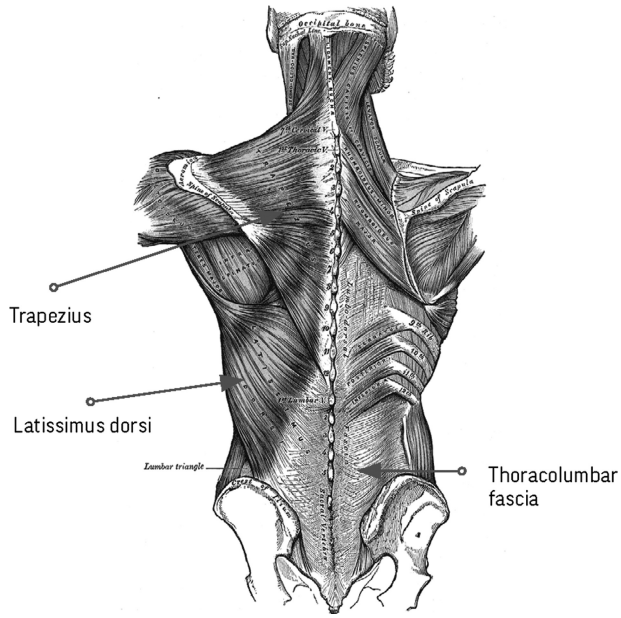


**FIGURE 11.** Superficial muscle/fascia of the back. The superficial and deep layers (Figure 5, the multifidus) of the back work together to stabilize the spine and provide postural control. The deepest layer of the multifidus works with the local or deep core and is often weak with LB and PG pain (which includes SI pain). The latissimus dorsi is a strong shoulder and LB muscle and contributes through its connection with the thoracolumbar fascia to stabilize the spine. The trapezius is an important large muscle affecting neck, shoulder, and thoracic spine movements. LB = lower back; PG = pelvic girdle; SI = sacroiliac. Reprinted with permission from OPTP (Riczo, 2018, 2020).

example is the development of PG pain in women after childbirth. PG pain may occur up to 2 years after giving birth and is one of the most common problems in the postpartum period (Simonds et al., 2022).

At a certain point, the body cannot adapt any longer and pain, inflammation, and impaired functioning can occur. With trauma, this occurrence is imminent. Other times, the driver of the disability is not clear, as it can be multifaceted because of the number of body systems possibly affected. Many studies are being conducted on the mechanism of pain, and it is becoming clear that the interpretation of pain by the brain is multifaceted and affected by cognitive input (Bergin et al., 2021; Caneiro et al., 2021).

## How Is SI Dysfunction Diagnosed?

SI dysfunction is complex and often not diagnosed as previously discussed. The International Association for the Study of Pain (IASP) criteria for diagnosis of SIJD includes pain in the area of SI joint; reproducible with provocative maneuvers (i.e., special tests); and relieved with local anesthetic injection into the SI joint or lateral branch nerves (Buchanan et al., 2021; Laslett, 2019; Merskey et al., 1979). Although cited frequently, some feel there is a need for the IASP guidelines to be updated (Treede, 2018).

There is ongoing variation in the literature on how SIJD is diagnosed. This seems to differ on the basis of

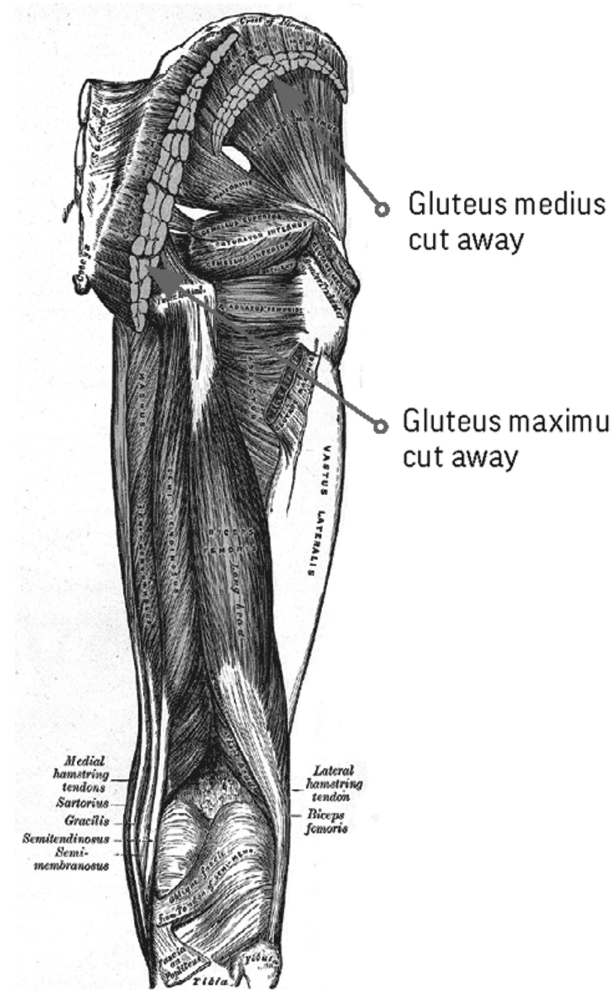


**FIGURE 12.** Gluteus maximus, gluteus medius (cutaway), and hamstrings (posterior thigh). Reprinted with permission from OPTP (Riczo, 2018, 2020).

the professional arena (i.e., pain management, orthopaedics, rehabilitation) and includes various combinations of clinical examination, imaging, image-guided single or double anesthetic SI joint injections, and special tests as discussed later. This results because there is no pathognomonic clinical history, examination, or imaging evidence for SIJD, and other spinal conditions need to be ruled out (Buchanan et al., 2021).

## Special Tests, Imaging, and Injections

### Special Tests

Special tests are manually performed by the healthcare provider to rule in or rule out a particular diagnosis, in this case SIJD, and are part of the clinical examination. Recent and older literature recommends the use of pain-provoking SI joint special tests (Buchanan et al., 2021; Falowski et al., 2020; Laslett, 2019; Saueressig et al., 2021; Vleeming et al., 2008).

Two out of four pain-provoking SI joint special tests need to be positive according to Laslett, who developed the often referred to "Laslett's cluster" (Laslett, 2006,

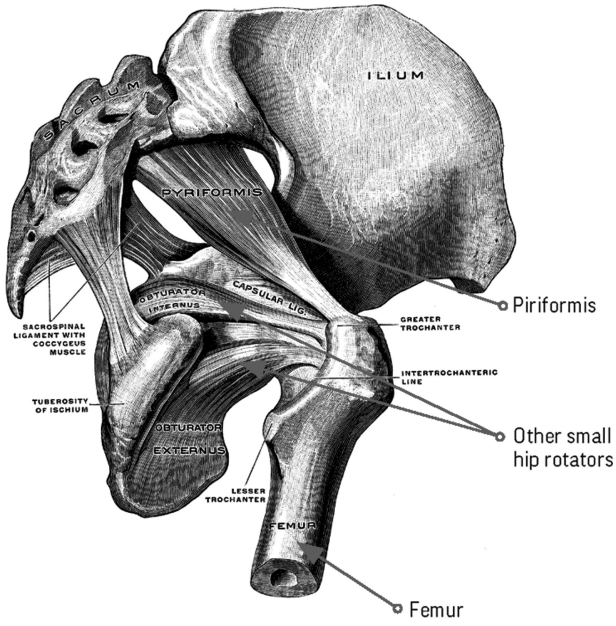


**Figure 13.** Deep hip rotators. Reprinted with permission from OPTP (Riczo, 2018, 2020).

2008, 2019). These include the thigh thrust, compression, distraction, and sacral thrust tests. Other researchers include tests such as FABER, Yeoman test, Gaenslen test, Gaenslen modified test (side-lying), as well as "Laslett's cluster" mentioned earlier (Buchanan et al., 2021). Although some ardently advocate for the use of these tests (Buchanan et al., 2021; Laslett, 2019), a recent systematic review of diagnostic tests found that they are better used to rule out SIJD (93% certainty) rather than rule it in (36% certainty) (Saueressig et al., 2021). Other groupings of special tests are still being used by some healthcare providers (anecdotal) and are the movement-based tests, mobility tests of the SI joint, and the static symmetry tests. These have consistently been found to lack evidence for their use since 1985 (Klerx et al., 2020; Potter & Rothstein, 1985). These tests are based on the construct that the sacrum moves and this movement can be manually palpated, although research is strong that only minimal movement is available at the SI joint and not reliably palpated (Dontigny & Goode, 2008; Goode, 2008; Vleeming & Schuenke, 2019).

## Imaging

Diagnosis based on imaging of particular structures is common, and its use is important to rule out other comorbidities. The validity of treatment based on imaging findings has been questioned as conditions such as herniated lumbar disc and degeneration of the spine have been found to be present in asymptomatic individuals (Brinjikji et al., 2015). In regard to the SI joint, significant magnetic resonance imaging (MRI) abnormalities were found in patients with and without symptoms of spondyloarthropathy (Barnsley et al., 2021). MRI of the SI joint of a postpartum woman can mimic sacroiliitis (inflammation of the SI joint(s) but can actually be postpartum bone marrow edema (Agten et al., 2018).

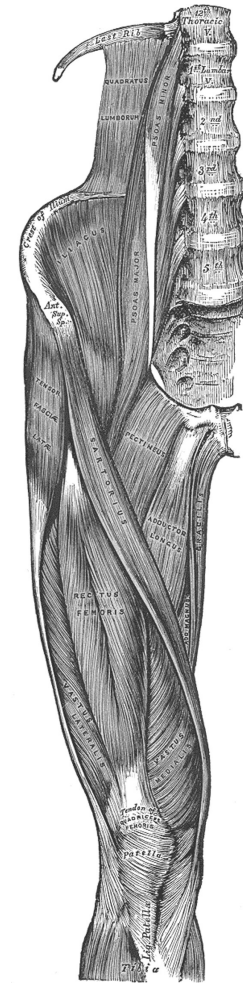


**Figure 14.** Muscles of the hip and anterior thigh regions. The gluteus maximus is the largest stabilizing muscle of the SI joint (Figure 12). The deep rotators of the hip help stabilize the head of the femur in the acetabulum. The piriformis and obturator internus muscles have a physical and dynamic relationship with the pelvic floor muscles (Figure 13). The hamstrings (Figure 12), quadriceps, abductors, adductors, and iliopsoas (Figure 14) are powerful muscles that have direct connections to the pelvis. Reprinted with permission from OPTP (Riczo, 2018, 2020).

## Injections or Nerve Blocks

When an image-guided anesthetic SI joint injection or nerve block relieves pain, then the conclusion is drawn that the pain is coming from the joint. Some researchers indicate that the image-guided anesthetic SI joint injection is the "gold" standard for diagnosing SIJD (Falowski et al., 2020), whereas others indicate that the SI joint injection has only moderate evidence to support its use, therefore not a gold standard, and should be used in combination with clinical examination, imaging, and special tests to confirm SIJD before proceeding to invasive surgical treatments such as SI joint fusions (Buchanan et al., 2021; Laslett, 2019). Besides being diagnostic, this type of injection is used as an intervention for pain relief.

## Distinguishing Between SIJD and SI Region Dysfunction

There is a plethora of research addressing the diagnosis of SI "joint" dysfunction with treatments geared to the actual dysfunction inside the joint (Buchanan et al., 2021; Chuang et al., 2019; Cohen, 2005; Falowski et al., 2020; Gartenberg et al., 2021; Laslett, 2019; Matlick & Dressendorfer, 2017; Saueressig et al., 2021; Thawrani et al., 2019). Joint dysfunction is well accepted to cause pain throughout the body, and rehabilitative approaches are plentiful that address joint pain and either delay or prevent surgical joint replacement.

SI region dysfunction is SI pain that does not solely arise from the joint but can arise from extra-articular structures (Borowsky & Fagen, 2008). In this scenario, treatment geared only toward the joint may be misguided and contribute to inefficiencies that are well documented in treatment of SIJD. In much of the literature reviewed, little recognition is given to SI extra-articular pain or region dysfunction.

## Diagnosis and the Medical Model

Much of this discussion has been based on the medical model, or biomedical model, where diagnosis of the offending structures/systems within the individual is identified (the pathology) and treatment then is targeted to the pathology. This model was first described by Laing (1971).

Other models exist and may be considered, in addition to or instead of the medical model, if deemed appropriate for the individual. One of these is the biopsychosocial model first proposed by Engel and considers the social, psychological, and behavioral dimensions of illness (Engel, 1977).

The study and research of pain have resulted in a great deal of information as to how the brain processes pain. Central nervous system sensitivities, cognitive influence on pain such as pain catastrophizing, fear avoidance behaviors, and other factors such as therapeutic alliance, patient beliefs, therapist confidence, and self-efficacy can have a direct effect on pain and outcomes (Bergin et al., 2021; Bunzli et al., 2017; Caneiro et al., 2017, 2021; Hashmi et al., 2013; O'Sullivan et al., 2016).

## What Are the Current Treatments of SI Dysfunction?

Current treatments vary widely and are largely practitioner-based around current practice patterns, respective fields, body of knowledge, research, and scope of practice. Numerous healthcare providers treat SI dysfunction including chiropractors, physical therapists, physiatrists, interventional pain physicians, orthopaedic physicians, and surgeons.

### Interventions Targeting the SI Joint

Once a diagnosis of SIJD has been confirmed by one of the processes described earlier, treatment options can be broken down into conservative options, minimally invasive SI joint fusion, and open SI joint fusion, with some recommending a trial of conservative options for at least 6 months (Whelan & Duhon, 2019). Conservative options are preferred because of the high complication rates for open SI joint fusion (Gartenberg et al., 2021; Whelan & Duhon, 2019) and include a wide variety of interventions including radio frequency ablation, nerve blocks (or anesthetic SI joint injection with a long-lasting steroid like the diagnostic injection; Gartenberg et al., 2021), and prolotherapy (injection treatment of MS conditions; Hauser et al., 2016). In many patients, conservative treatment fails (Polly et al., 2015; Randers et al., 2022). In general, treatment efficacy has been lacking (Falowski et al., 2020) and there is an inadequate amount of research supporting conservative, nonpharmacological treatments (Laslett, 2019).

Minimally invasive SI joint fusion has better outcomes than an open surgical fusion; however, a recent literature review indicates the studies were often industry funded and with modest overall quality of data (Martin et al., 2020). Another recent study that included a 2-year clinical and radiographic follow-up of 32 patients with positive results revealed a list of conflicts of interest with a manufacturer of SI joint screws (Rappoport et al., 2021). A small study with 19 patients by a single surgeon showed promising results that was sustained at the final 4-year follow-up (Schmidt et al., 2021); again this is one surgeon's work and selection process. Randomized controlled studies are in process that are comparing the minimally invasive SI joint fusion with a sham operation in a double-blinded multicenter design (Randers et al., 2022).

### Interventions Targeting the SI Region

The following interventions are conservative treatments and from a rehabilitation model perspective would be included for those with a diagnosis of SIJD or SI dysfunction (includes extra-articular structures): noninflammatory drugs (NSAIDs), activity modification, use of an SI belt, and physical therapy (Matlick & Dressendorfer, 2017). A pelvic belt or SI belt is a support belt that is worn around the pelvis that gives compression through the SI joints. It is thought that this addresses the lack of compression that occurs when muscles are weak in this region, particularly the gluteus maximus as previously discussed (Lee, 2011) (see the section on "Muscle Overview").

A physical therapy clinical practice guideline addressing PG pain for the antenatal population was developed through a systematic review of published research by Clinton et al. (2017) and encouraged the use of exercise, support belts, and manual therapy, although there was weak or conflicting evidence (Clinton et al., 2017). Patient education, body mechanics/activities of daily living training, pelvic belts, and exercise were strongly supported interventions for physical therapists in a clinical practice guideline for postpartum women with PG pain (Simonds et al., 2022).

## What Do the Experts Say?

An attempt to bring together perspectives of known experts in SIJD and PG pain worldwide (seven countries

and six disciplines) to develop a collaborative model brought little agreement except that biomechanical factors are a component (Hodges et al., 2019). Treatments predicted by the collaborative model (injection, exercise therapy, surgery) were only modestly or not supported at all by clinical trials.

## What Other Factors Can Influence the Successful Outcome of Treatment?

Painful MS conditions are known to lead to lack of physical activity, decreased function, and loss of strength, well-being, and independence and have been associated with depression (Briggs et al., 2016). In addition, clusters of unhealthy lifestyle behaviors such as smoking, alcohol, poor diet, unhealthy weight, decreased physical activity, and even lack of sleep have been shown to be significantly associated with LBP in a dose–response relationship (Yoshimoto et al., 2020). Addressing these unhealthy lifestyle behaviors, which are modifiable risk factors for LBP, would decrease risk. Other psychosocial factors, such as beliefs, expectations, self-efficacy, lifestyle choices, fear avoidance behaviors (George et al., 2006), and pain catastrophizing, have been identified as being crucial to examine and can have a large effect on outcome (Caneiro et al., 2021; O'Sullivan et al., 2016).

There is a great deal a person can do to manage/reduce LB/PG/SI dysfunction. Some examples include exercise (remedial, core, balance, aerobic), healthy sleep habits, breath awareness/mindfulness, avoiding one-sided activities (such as always carrying a toddler on one hip, sleeping only on one side, standing shifted over to the same side), doing stress awareness/management, maintaining a healthy body weight with healthy eating and hydration habits, avoiding repetitive negative thinking (rumination), and seeking professional help as needed (Riczo, 2018, 2020).

## Conclusion

Orthopaedic nurses play a significant role in patient care at many points in the healthcare journey and can also find themselves on this same journey as a patient, particularly involving SI pain. SI pain can be undiagnosed and untreated or at the other end of the spectrum can be diagnosed and overtreated as the diagnostic standards and corresponding treatments are debatable. This can result in undesirable outcomes.

Patients may receive different and mixed communications as they often seek help from various providers. This can be frustrating and confusing to the patient, causing needless anxiety, stress, depression, sleepless nights, relationship issues, loss of income, and increasing pain and even opioid abuse as the patient becomes more fearful of movement, the future, and life in general.

Although there are no clear answers to this very large conundrum of SI dysfunction, understanding the common reasons for developing SI dysfunction, typical clinical presentation, processes for diagnosis, and intervention options provides a knowledge base. From here a conversation between the patient and the healthcare provider(s) can occur for education, support, and critical decision-making.

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