The Sacroiliac Joint: An Underappreciated Pain Generator

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ABSTRACT

The sacroiliac joint itself and the specific diagnosis of sacroiliac dysfunction are both underappreciated causes of pain in the low back, the pelvis, and the proximal lower extremities. An anatomically atypical synovial joint, its extensive innervation accounts for multiple modes of pain presentation. The joint and its associated ligament complex are subjected to rather constant and significant stresses. These combined factors contribute to the body of patients who present with low-back, buttock, proximal-thigh, and groin pain. Physical examination usually is an attempt to assess for presumed abnormal motion of the sacroiliac or to provoke discomfort by stressing that joint. Nonoperative treatment is usually physical therapy, and both diagnostic and therapeutic injection of the sacroiliac joint may be employed. Surgery is a treatment of last resort. There is a lack of long-term studies that address the natural history of this problem and its treatment.

Prior to 1934, a relatively large portion of the medical literature that addressed the problem of low-back pain and sciatica was dedicated to conditions of the sacroiliac joint[1-3]; since then, coverage of the topic seems to have lessened considerably.[4] This may well be accounted for by Mixter and Barr's[4,5] publication in 1934 regarding the diagnosis and treatment of herniated intervertebral discs. Henceforth, surgeons would have an operative rather than nonoperative diagnosis to pique their clinical interest and attention. Of late, interest in the sacroiliac joint as a source of back pain or sciatica seems to be undergoing a recrudescence.

This renewed interest is likely a consequence of advancements in the art of spinal imaging, which enable physicians to eliminate pathologic conditions of the discs or canal from the differential diagnoses with some assurance. Other diagnoses are sought to explain the seemingly ever-increasing number of patients with chronic back pain and proximal lower-extremity pain.

Clinical practice has led my colleagues and I to concur that sacroiliac pathology has been underappreciated as a cause of patients' back pain or sciatic-type pain.[4,6-8] A review of our office records at a tertiary care center showed that the presumptive diagnoses of as many as 40% of patients who presented with back complaints included sacroiliac joint disease.

Diagnoses of sacroiliac conditions may include infectious, metabolic, inflammatory, neoplastic, and degenerative disease; however, the most common source of low-back pain is sacroiliac dysfunction, a condition presumed to be caused by acquired mechanical instability, with no history of major trauma, which leads to either fixed subluxation or hypermobility of the joint.[6,9-11] Data that relate to the etiology, the natural history, and whether objective instability and subluxation do occur in the clinical situation are few. Although sacroiliac dysfunction undoubtedly exists as a syndrome, its cause, its natural history, and its response to treatment remain to be more accurately defined.[4,9]

In this paper, the pertinent anatomy, mechanics, and clinical presentations and treatments of sacroiliac disease are briefly reviewed. Specifically emphasized is the diagnosis of sacroiliac dysfunction.

ANATOMIC CONSIDERATIONS

The sacroiliac joint is in a unique and precarious position, both anatomically and teleologically. It is either the end of the spine or the beginning of the lower extremity. It is called upon to bear significant forces but has little intrinsic articular stability.

Only recently have anatomists uniformly agreed that the sacroiliac is a true diarthrodial (synovial) joint and not an amphiarthrodial or synarthrodial joint.[9,12] Several of its features are atypical for synovial joints and have led to that confusion.

First, the joint is small in relation to the amount of force across it. The articular surfaces may have rather course contours, with more resemblance to

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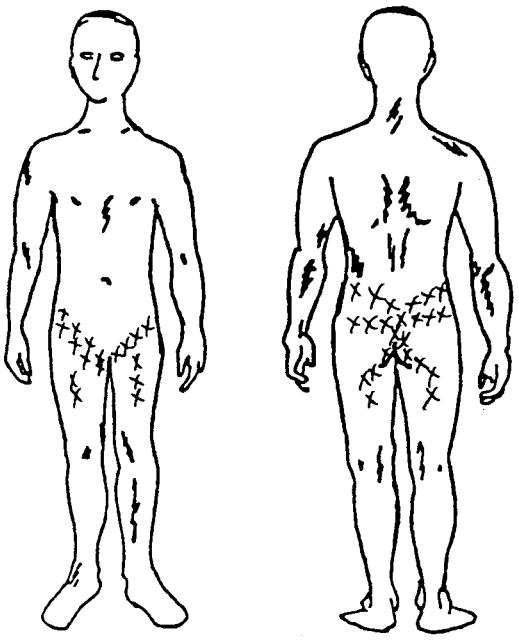

Figure. A patient's pain diagram supports bilateral sacroiliac dysfunction.

a topographic map than to a hyaline articular surface.[7,13] Second, when the articular cartilage is examined histologically, particularly on the iliac side, it has the appearance of thin fibrocartilage rather than of robust hyaline cartilage.[9,14]

Examination of aging specimens—both cadaveric and anthropologic—seems to indicate that the natural history of the joint is to undergo arthrofibrosis as a person ages, rather than to maintain itself as an active motion segment.[9,12] Although most synovial joints have opposing surfaces that become compressed or at least maintain stability through a range-of-motion, a coronal section through the joint shows that the joint undergoes shearing stresses when loaded. Stability is maintained only by a significant complex of ligaments that are thicker posteriorly and function like the various cables of a suspension bridge. Considering these anatomic facts, it is not remarkable that syndromes of clinical dysfunction exist.

INNERVATION

The sacroiliac joint has extensive sensory innervation. Hilton's law states that a joint may receive innervation from any nerve that crosses it. Thus the sacroiliac may be innervated from as cephalad as L2 to as caudad as L3 or L4.[9,12] In addition, both anterior and posterior primary rami are involved. This extensive source of innervation explains the multiple manifestations of sacroiliac pain, including groin pain.[6,9]

BIOMECHANICS

Examination of a skeletal specimen of the pelvis demonstrates that although the sacrum fits like a wedge into the pelvic ring, it is loaded in shear.[7] Considering the magnitude of the forces involved, other anatomic contributions to stability are necessary. The irregularity of the articular surfaces and the rather extensive capsular and ligamentous complex afford that stability.[7,9,12] The posterior ligament complex, including the sacrospinous and sacrotuberous ligaments are major contributors to that stability. Microscopic failure of these ligaments associated with the degenerative process or with repetitive trauma is most likely a component in the presentation of sacroiliac dysfunction. This tenuous loading configuration is a consequence of the development of bipedal gait.[4]

CLINICAL PRESENTATION

A high index of suspicion that the sacroiliac may be a source of pain is of prime importance. It is most important to have patients complete pain drawings to demonstrate the location of their pain. In addition, requesting that patients point to the areas of their discomfort during physical examination is helpful. A typical pain drawing rendered by a patient with sacroiliac dysfunction is shown in the Figure.

Most frequently, patients will have pain or tenderness directly over the posterior sacroiliac joint. In addition, some discomfort usually radiates into the buttock as well as diffusely into the posterior proximal thigh region.[6,15] Discomfort rarely extends below the knee. This pattern is sometimes indistinguishable from the discomfort of lumbar facet syndrome. The key point is that it does not follow a true radicular pattern. The pattern of joint innervation also leads to presentations of groin, anterior pelvis, or anterior proximal thigh pain, which may mimic hip-joint disease.

The typical patient with sacroiliac dysfunction is a middle-aged woman with no history of specific inciting trauma.[6,9] Pregnant women also seem particularly prone to this condition, and I also have observed it in adolescents. In a subset of patients, the problem is the consequence of a traumatic event of intermediate intensity, often in an industrial setting. The typical events include a fall onto the buttocks or a slip while pushing a heavy object, which produces hyperextension of the hip. The former generally produces an impact to the ischial tuberosity that results in a rotatory or shear injury to the sacroiliac joint. The latter produces a hyperextension rotational strain to the hemipelvis. These situations generally produce a hypermobile joint.

The symptoms of sacroiliac dysfunction are generally exacerbated by the activities of daily living that tend to preferentially load the pelvis asymmetrically. For example, stair climbing or bicycle riding tend to exacerbate symptoms. During sitting, patients usually show no generalized sitting intolerance, but symptomatic patients frequently favor the uninvolved side. The valsalva maneuver does not exacerbate symptoms, as is typical with a herniated nucleus pulposus.

Physical examination for sacroiliac dysfunction should include evaluation of pelvic alignment when patients are standing. The exam is begun by palpation of the posterior sacroiliac joints for tenderness. Both posterosuperior iliac spines are palpated. Patients are then asked to maximally flex each thigh with the knee bent. With a normal sacroiliac, some inferior translation of the posterior iliac spine should occur on the tested side compared with the contralateral side. Sacroiliac dysfunction, however, results in joint fixation, eliminating the possibility for inferior translation of the iliac spine on the affected side. This maneuver is referred to as Gillett's test. Asymmetry from one hemipelvis to the other can be noted. This may be indicative of the various pelvic torsions that have been described.[7,9,11] Apparent or true leg-length discrepancy may be a cause or a manifestation of sacroiliac dysfunction.

Physical examination continues with the patient supine, after which various maneuvers are employed that apply stress to the sacroiliac. Reproduction of discomfort with these maneuvers that stress the joint is suggestive of general sacroiliac disease and not specific to the diagnosis of sacroiliac dysfunction. Pressure is applied to both anterior iliac spines. This will stress the sacroiliac joints and produce discomfort if there is a pathologic condition in the joints. The lower extremity is then used as a lever to stress first the hemipelvis and then the sacroiliac.

First, with the patient still in the supine position, the thigh is flexed, abducted, and externally rotated (FABER test). Also known as the Patrick test, this maneuver produces discomfort in the abnormal sacroiliac joint. Next, with the ipsilateral thigh draped over the edge of the examining table, the patient's thigh and hip are hyperextended (Gaenslen's test). This produces an anterior rotational moment on the hemipelvis and sacroiliac joint and produces discomfort if a pathologic condition is present. Results of these tests ought not to be abnormal secondary to lumbar radiculopathy. Obtaining a history and performing a physical examination along the lines described here should lead the examiner to the diagnosis of sacroiliac disease if it exists.

Plain radiographs will likely demonstrate obvious changes if the sacroiliac disease is the result of major trauma, inflammation, infection, neoplasm, or degenerative arthritis. Although the syndrome of sacroiliac dysfunction typically displays no abnormalities on plain radiograph, it may demonstrate an area of increased uptake on bone scan.[16]

Occasionally, despite a well-obtained history and physical examination and in the face of negative imaging-study results, the diagnosis of sacroiliac dysfunction is still in question. Under these circumstances, a diagnostic or therapeutic injection into the sacroiliac joint under fluoroscopic control may be done with a combination of a local anesthetic and a steroid preparation.[17,18] Typically, with a sacroiliac dysfunction, the initial volume of the injection will reproduce the symptoms. Then the anesthetic and steroid will gradually produce relief.

DIFFERENTIAL DIAGNOSIS

If the clinical setting involves a patient with back, groin, or pseudoradicular pain, whose history and physical examination include abnormalities as described above, then the most likely diagnosis is sacroiliac dysfunction. Other sacroiliac causes are possible, however.

Although ankylosing spondylitis is the most common inflammatory condition that affects the sacroiliac joint, most of the inflammatory arthritides can occur there. A febrile course in a patient with sacroiliac signs may be indicative of septic arthritis. Septic arthritis of the joint seems to occur more frequently in intravenous drug users.[9] Primary or metastatic disease to the region of the sacroiliac will generally have a typical radiographic manifestation.

The sacroiliac is a synovial joint and may be affected by metabolic conditions such as gout. This possibility should be kept in mind in patients affected with podagra who complain of back pain. Osteoarthritis may affect the sacroiliac joint and has a typical appearance on radiographs; but this is generally coincidental, as the discomfort produced by osteoarthritis is generally far less impressive than are the radiographs. This may be because of the stabilization of the joint that the arthritic process is affording.

TREATMENT

As previously noted, although one may be confident in making the diagnosis of sacroiliac dysfunction, many questions concerning that condition

remain to be answered. First and foremost is whether or not measurable mechanical instability or subluxation actually occur. The formulation of a rational treatment plan depends on that knowledge. Although most clinical studies discuss subluxations and means of detecting them,[7,9,11] engineering-based, in vivo studies cast some doubt on its occurrence.[19] Also to be answered is the question of the natural history of the problem.[9] Our clinical experience leads us to believe that it is frequently self-limited or at least responds to conservative treatment; however, we are aware of no long-term, longitudinal study that either addresses the natural history of the untreated condition or evaluates the response to a complete conservative treatment protocol in a controlled fashion.

Current treatment protocols generally include limitation of those activities that, in fact or in theory, exacerbate the S-I forces. If there are no contraindications, a nonsteroidal anti-inflammatory agent is added. The purpose of physical therapy is to plan a series of mobilizations and manipulations combined with pelvic-muscle strengthening, which will both reduce and stabilize the presumptive instability or subluxation. Failure of this type of conservative treatment (usually determined in 6 weeks) may then be followed with injections of anesthetics and steroids as already described. Injections of sclerosing agents (prolotherapy) have been done; however, we are aware of no controlled studies employing this technique in the mainstream musculoskeletal literature.

Various pelvic bands and orthoses have also been prescribed. In cases recalcitrant to other treatment, surgical fusion of the joint has been recommended. Several older studies and a few more recent ones have addressed the use of surgery. Inconsistent results are reported.[2,20,21] It should be considered only after all other therapeutic modalities have failed.

SUMMARY

We have called attention to conditions of the sacroiliac joint that we feel have, in the past, been too frequently overlooked. These conditions may cause patients to present with complaints that may mimic low-back, hip, or radicular disease.

Generally, there is no history of significant trauma. Patients should be questioned regarding the specific site of pain. This will frequently point to the posterior sacroiliac region but may also include the posterior-buttock, posterior proximal-thigh, anterior pelvic or groin pain. The physical examination of this region seeks to evaluate alignment of one hemipelvis compared with the other. In addition, various maneuvers attempt to provoke pain by mechanically stressing the sacroiliac via the thigh and hip joints. Treatment is primarily conservative in the syndrome of dysfunction. Physical therapy is the keystone and is directed at stabilizing the perceived instability.

A need exists for studies that define the exact nature of the pathologic anatomy and the efficacy of various treatment protocols.

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