

Sacroiliac Joint Arthrography and Intra-articular Injection as a Guide to Planning Surgical Arthrodesis

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Prior to the identification of lumbar disc herniation as a verifiable cause of sciatica in 1934 by Mixter and Barr, the cause of buttock and thigh pain was often ascribed to sacroiliitis. In a publication eight years before Mixter and Barr described sciatica from HNP, the famous orthopaedic surgeon, Dr. M. N. Smith-Petersen, reported on twenty-six patients fused for traumatic arthritis of the sacroiliac joint. He reported that x-rays were not much help in making a diagnosis. He did however produce a table of symptoms and signs that together, strongly suggested the sacroiliac joint as the source of pain. Further, he said that if a sacroiliac belt helped reduce pain, then he didn't think patients needed the fusion operation. In his publication, he reported two total failures in his series, however, twenty-two of the twenty-six patients were reported able to resume full activity. This was considered a great success, as it would be by today's standards as well. Yet, in spite of his success, many surgeons of his day still believed that there was no such condition as traumatic sacroiliac arthritis. Based on my experience, 75 years later this opinion still holds firm in the opinion of medical science in many places.

What we have learned, with the rapid development in last twenty years of superlative imaging, is that many patients whose symptoms resemble HNP have normal lumbar imaging studies. So once again the issue of symptoms emanating from the SI joint is being revisited, only now, using arthrography to validate our clinical findings.

Even before the recent resurgence of interest, there have been some good clinicians like Professor William Kirkaldy-Willis who have reminded us to consider the sacroiliac joint in the differential diagnosis of back and buttock pain. Careful history taking provides clues to the interested examiner. Some of these include, buttock pain while turning over in bed, the need to sit on the opposite buttock to keep pressure off the affected side, and stabbing pain in the sulcus of the SI joint. These are not typical symptoms of lumbar herniated discs. Additionally, many patients state that the leg or knee of the affected side feels unstable. Many will report it has already given way causing some patients to have fallen and suffered other injuries. This of course can further complicate making a differential diagnosis because of new symptoms and complaints.

The pain patterns from an injured SI joint can also be confusing. Pain radiation into the groin or anterior thigh is quite common and it has led some practitioners to be suspicious of calculi or inguinal hernia as possible etiology. Intermittent symptoms of mild sciatica can occur all the way to the toes usually affecting the S1 distribution. The origin of such symptoms may be direct trauma to the buttock region, such as a fall off a ladder and landing on one side, or being rear-ended in

an automobile accident. Heavy lifting and twisting the trunk with the foot locked – indeed all the incidents that may cause disc injury – may damage the SI joint.

The search for a pathognomonic physical sign has occupied senior members of ISIS who have published their negative findings. I have found that the following signs are helpful when considering injury of the SI Joint.

1. Finding the patient sitting on the opposite buttock with the leg extended is note worthy.
2. Almost all patients will point to the PSIS or the SI sulcus as the location of their pain.
3. Tests such as side bending with extension stress all the posterior elements so this will also be positive in facet syndrome.
4. While all lumbar movements may be reduced, flexion will not cause sciatica as it does in HNP.
5. The patient will often be reluctant either to stand independently on the affected side or to hop on that leg feeling that they will fall. This feature of the history often does not come out until this examination is performed. Therefore, single leg standing should always be carried out during the examination of the low back. Some patients will attribute this to what they think is a knee problem, but examination of the knee will be normal (unless they have already fallen and injured their knee).
6. Unlike the examination for a suspected herniated disc, the sitting examination will show no motor, sensory or reflex abnormalities in the lower extremities, and the straight leg raise test will be normal.
7. With the patient supine, the flexed hip is examined first for signs of acetabular disease. The hip is flexed, abducted, externally rotated (Patrick's test) and then internally rotated. The end of the range will frequently stress the SI joint and will be painful if injured.
8. The pelvic thrust test also stresses the SI joint. It is preformed by quickly applying force to the bent knee towards the pelvis while the hip is flexed at ninety degrees.
9. With the patient lying prone over a pillow compare the discomfort from pressure over the lumbosacral supraspinous ligament to pressure over the SI joint. If they are both painful, there may be dual pathology.

Differential Diagnosis

There are many problems that can cause pain complaints in the region of the buttock, hip, groin and leg, which is why careful clinical examination is so important. These are some other causes of pain that can strongly mimic pain from the SI joint.

1. Buttock pain has spinal causes that include facet joint injury, lateral fissure in a lumbar disc, and in older patients, lateral recess stenosis and degenerative spondylolisthesis.
2. Hip and groin pain can arise from a degenerative hip joint. Examination of

the hip joint is crucial, and in young, active patients one must consider avascular necrosis.

3. Myofascial trigger points in piriformis, quadratus lumborum, lumbar multifidi, gluteus maximus and gluteus medius refer pain to the SI joint, gluteal and hip region.

The definitive test is the sacroiliac iliac intra-articular injection. Under fluoroscopic control, using a 25-gauge needle, contrast is introduced through the "sweet spot" of the inferior pole of the joint. Noteworthy is that sometimes during the contrast injection the patient will report reproduction of their primary pain complaint. Then, once the dye has been seen to spread throughout the joint space, producing an arthrogram, local anesthetic and intra-articular steroid is injected into the joint. We typically use marcaine because it produces a longer lasting analgesic effect. Next, a CT scan is then done to review the tracking of extravasated contrast. If the patient is a candidate for surgical intervention, CT scan is used as an operative planning tool as well, which was the original reason for ordering post arthrogram CTs. Sometimes the contrast can be seen to leak through the fibrous portion of the SI joint into the S1 dorsal foramen. The contrast may track down surrounding the S1 nerve. Other images have shown the dye tracking anteriorly to contact the sciatic nerve as it lies over the front of the sacrum.

The effect of the injection is recorded during and after the procedure in the x-ray department. The patients may advise the radiologist that their pain was reproduced during the procedure. After the arthrogram and block, the patients are asked to get off the x-ray table and walk, bend, and stand on the leg of the affected side, or do an activity that commonly causes pain. Amelioration of symptoms varies from instantaneous to an hour or two later which the patient records in a pain diary. When instantaneous, patients report no pain in their buttock and are able to do all provoking activities painlessly. If the dye and then medication leaks out significantly, a lesser therapeutic response is inevitable. Other factors have to be considered when using arthrograms diagnostically. Thirty-five percent of the patients selected for arthrography had inter-current spinal conditions, so reduction in buttock pain is all that can be expected. Some patients have difficulty discerning two pain generators and report little improvement in their pain. However when questioned, the buttock pain was greatly relieved. Even in those with normal spines, the longevity of sacroiliac symptoms often leads to wide spread myofascial pain affecting buttock and paraspinal muscles. We have had a few patients for whom the trip to the imaging center aggravated their myofascial pain symptoms so severely that they noted no benefit from the injection. By making arrangements for the therapist to treat the secondary myofascial pain and spasm prior to the block, the patient was aware of the loss of all buttock symptoms following the injection.

Local anesthetic effects last only two to six hours. The steroid may give relief for several days to weeks, allowing patients to take long walks and have unbroken nights sleep, activities they report that have been impossible for the

preceding months and years. Many patients also report that the buttock pain and spasm completely subsides. Others have ascribed these symptoms to piriformis syndrome. As the piriformis sometimes attaches to the capsule of the SI joint, perhaps the piriformis syndrome, so often resistant to therapy, is in fact the result of undiagnosed sacroiliac joint injury. The failure to recognize the SI joint as a pain generator means that the diagnosis is frequently delayed and in the series of patients to be described, the longest interval, from injury to diagnosis, was nine years.

As a result of positive identification of pain coming from the sacroiliac joint fifty-two patients were selected to undergo sacroiliac joint fusion. The selection criteria were similar to those for patients undergoing lumbar spinal fusion, namely patients who are not smoking and have been through psychological screening to show that they are able to be compliant and will benefit from the operation. A small number of patients, due to the length of the symptoms have become habituated to narcotic medication such as Oxycontin and Methadone. While it was difficult to provide good postoperative analgesia for these patients, successful outcome led to withdrawal of these medications satisfactorily as their level of pain reduced. There were eighteen male patients and thirty-four female and two patients underwent bilateral procedures making a total of fifty-four operations. They all had their diagnosis confirmed by SI joint intra-articular injection that in the early cases was always repeated, but more recently in patients with dramatic relief of symptoms, only one injection has been given. One interventional radiologist, Dr. Clifford Spohr, who consistently produced quality arthrograms, has carried out the majority of our work. He has shared his expertise with two colleagues who also performed arthrograms for our series of fifty-two patients. The etiology of most cases was traumatic. Forty-one percent were injured in a fall and twenty-one percent in motor vehicle accidents, often being rear-ended. Eighteen percent were injured doing heavy lifting. Of the fifty-two patients eighteen were found to have lumbar spine pathology requiring surgery. A few patients had already had a spinal fusion and were referred to us for sacroiliac investigation as they had failed to be relieved of all of their symptoms following their primary spinal operation. In others we diagnosed an annular tear by discography as well as a sacroiliac joint injury by arthrogram. Quite a lot of patients underwent discography if their MRI studies suggested annular pathology.

We have used three different operative procedures to fuse the sacroiliac joint. The first procedure was that described by Smith-Petersen, which was performed on six patients. In three of these the joint fused and three developed non-unions and had to be repaired. Following this two different posterior approach procedures were performed in which the PSIS was removed giving access to the joint and it was then used for the bone graft. In one group we used the operation that we learned from Dr. Jeffrey Donner in Colorado. PSIS bone was morcellated and the bone chips were packed into the joint which was then stabilized using two cancellous screws passing from the pelvis across the joint into the sacrum. Fluoroscopic imaging is used preoperatively to help the surgeon

avoid the course of the S-1 nerve traversing the foramen. Fifteen had this procedure of whom thirteen healed and two had non-unions. The second posterior approach procedure used the PSIS as a single bone block which was fashioned to fit the slot created by curettage of the joint. This was similarly stabilized with pedicle screws. Thirty-three patients had this procedure, twenty-four healed and nine had non-unions. Because of this high non-union rate we have now returned to Dr. Donner's procedure and have added the implantation of a PEMF bone growth stimulator. In our last six cases, using this method, all have healed.

Despite using fluoroscopic control to place the screws into the S1 and S2 pedicles we still had six cases in which screws caused S1 nerve irritation and had to be repositioned. While there were no cases of infection we did have three patients with whom there was an established seroma which had to be drained. No patient developed a complication that made their condition worse and several of the patients with fibrous non-union were relieved of a lot of discomfort and have returned to their regular work.

All patients completed VAS scores before surgery and at the time that the joint was considered to be healed. The average VAS score preoperatively was 7.5 and the average at the time of healing was 3.1. These results suggest that in a carefully selected group of patients, similar fusion rates can be achieved for the sacroiliac joint as can be in lumbar spine arthrodesis. By the same token similar reduction in the level of pain can be achieved by sacroiliac joint arthrodesis as can occur in carefully documented series of lumbar spine fusions.

This is an ongoing study and inevitably relatively small numbers of patients are considered for operative treatment. The prevalence of sacroiliac joint pain has been variously estimated to be about twenty percent to thirty percent of patients complaining of chronic low back pain, so in principle one would expect many more lumbar spine fusions performed than sacroiliac joint fusions. In practice since no one else in the community does this kind of work cases tend to be referred to us. In addition we are now receiving a disheartening number of patients with failed sacroiliac joint fusions who have come to us from out of state requesting revision.

As Dr. Charles Aprill has reminded us "You never think about what you don't think about". It is to be hoped that more specialists treating back pain will think about the sacroiliac joint as a possible origin of chronic disabling back and buttock pain.

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