

## INDICATIONS FOR SACROILIAC JOINT FUSION

Christopher A. Iobst, MD and John A. Glaser, MD

### Abstract

Sacroiliac joint fusion remains a useful piece of the surgical armamentarium. Newer percutaneous techniques for fusion supplement the older established procedures.

The sacroiliac joint functions in the transmission of forces from the spine to the lower extremities and vice versa. It is a diarthrodial synovial joint that connects the sacrum to the ilium. The sacroiliac joint is unusual in that the articular surface of the sacrum is covered with a layer of hyaline cartilage while the articular surface of the ilium is covered with fibrocartilage. Both surfaces are coarse-textured and contain ridges and depressions that give the joint a high coefficient of friction (0.4), with only a narrow joint space in between. The joint's stability is a result of a combination of this bony interdigitation, the strong sacroiliac, sacrotuberous and sacrospinous ligaments, and the many muscles that act upon the region. Because of its anatomical location, the sacroiliac joint is difficult to examine. Many of the provocative tests also stress the hip joints and lumbar spine.<sup>10</sup> In addition, there are other well-recognized pain sensitive structures such as the posterior facet joints, lumbar discs, or nerve roots that may refer pain to the sacroiliac joint region.<sup>10</sup> The various factors can make it difficult to determine when fusion of the sacroiliac joint is appropriate.

Historically, sacroiliac joint fusion was commonly performed as the treatment for tubercular arthritis of the joint. This is still probably the treatment of choice for this entity, but with the decreasing prevalence of tuberculosis in this country today, it is rarely necessary. Currently, sacroiliac joint fusion is most commonly advocated as a surgical treatment for degenerative sacroiliitis, inflammatory sacroiliitis, iatrogenic instability of the sacroiliac joint, osteitis condensans ilii (OCI), and traumatic fracture dislocation of the pelvis.

### Degenerative Sacroiliitis

The sacroiliac joint is commonly affected by degenerative changes that can be seen on a standard pelvic ray. The joint can be best imaged by a 30-degree cephalad view which projects the radiographic beam at a right angle to the sacrum allowing good visualization of the anterior and posterior sacroiliac joint lines. In this condition, the joint space is narrow, with bone spur formations around it. Patients may complain of low back pain, tenderness over the sacroiliac joint, or buttock pain. Because clinical and radiologic diagnoses can be problematic, one may utilize local anesthetic blocks to determine if the true source of the pain is derived from the sacroiliac joint. When using this technique, the sacroiliac joint block should be performed under fluoroscopic control, or at least under fluoroscopy, in order to verify the injection site. Because symptomatic disc and joint degenerative arthritis are much more common entities than sacroiliac joint pathology, many physicians

facing these clinical symptoms simply treat for the more common problems and will look for sacroiliac joint pathology only after the first treatment fails.<sup>2</sup> If, however, an anesthetic block of the sacroiliac joint is successful in removing the pain, fusion may be indicated. A second method for differentiating pelvic degenerative instability from low back pain was described by Whalheim.<sup>8</sup> He applied a temporary external fixator to the pelvis of patients suspected to have sacroiliac joint pain. In 11 of 12 patients, the fixator had a positive clinical effect, which disappeared following its removal. This was taken as indication that severe degenerative instability would benefit from sacroiliac joint fusion for symptomatic sacroiliac joint instability.<sup>2</sup> Although neither the injection nor the external fixator is a perfect screening test for sacroiliac joint pain, each test can help identify patients that would benefit from a sacroiliac joint fusion for sacroiliac joint pain secondary to degenerative sacroiliitis.

### **Infection of the sacroiliac joint**

Pyogenic infection of the sacroiliac joint is a rare and frequently misdiagnosed form of septic arthritis.<sup>2</sup> Ankylosing spondylitis and other inflammatory, noninfective spondyloarthropathies are relatively more common than infection of the sacroiliac joint. Thus, in cases of inflammation, it is important to keep in mind that infection is not necessarily involved. Clinical findings may be obscure, but usually include buttock symptoms and limping. In severe cases, the patient may be unable to find a comfortable position in bed and demonstrates a positive Faber test of the hip joint that dramatically aggravates the pain. In general, all signs of infection are present, including fever, high white blood count, and high erythrocyte sedimentation rate. Plain X-ray is usually negative, but CT, MRI, or radionuclide bone scan may help in the diagnosis. Antibiotic treatment is often sufficient to combat infection, but because the bacteria are often atypical, such as *Mycobacterium tuberculosis*, or *Brucella* spp., aspiration for bacteriologic diagnosis and decompression are recommended. In rare cases, arthrotomy and fusion are indicated.<sup>2</sup>

### **Iatrogenic**

Bone grafting is a frequently used surgical procedure, particularly in reconstructive orthopaedic surgery, and autologous bone from the iliac crest has been commonly used since the turn of the century.<sup>7</sup> However, bone grafting operations requiring removal of iliac bone from the posterior iliac crests may compromise the posterior-superior supporting ligaments of the sacroiliac joint and, in some patients, may render the pelvic ring unstable. This may be clinically seen as instability of the sacroiliac joint, with resulting stress fractures of the pubic rami, or, more commonly, subluxation of the symphysis pubis. The instability of the sacroiliac joint or of the symphysis pubis also may be manifested by a degenerative form of arthritis affecting these joints. The fact that sacroiliac instability is not produced more often is because fibrous or bony ankylosis may be present in the joint, and because of the formation of the sacrum as a true keystone, with interlocking eminences and depressions. Multiparous women, with lax ligaments might be expected to have more instability than others.<sup>4</sup> If the diagnosis of pelvic instability is suspected after removal of bone grafts, the patient should be closely examined using both clinical and roentgenographic techniques. If instability is indeed demonstrated, and symptoms persist, the patient may require a sacroiliac joint fusion to relieve her pain.

### **Osteitis Condensans Ilii**

OCI generally occurs in young, multiparous women. This condition is usually identified on radiographs following pregnancy. There is well defined triangular sclerosis bilaterally and symmetrically on the iliac of the sacroiliac joint. This condition has been proposed to be the aftermath of ligamentous disruption during pregnancy or parturition. A "low back" syndrome consisting of morning pain, stiffness, and limitation of motion may be seen in patients with this disease.<sup>9</sup> OCI is usually a self limiting problem, but can lead to chronic sacroiliac joint pain. In this case, a sacroiliac joint fusion may be necessary.

## Trauma

Pelvic trauma can involve fractures of the sacrum and fracture dislocations of the sacroiliac joint. These injuries may require operative stabilization if they are unstable. Traumatic arthrosis can develop following sacroiliac joint injury. Fusion is indicated for pain persisting for 18 to 24 months after old fracture-dislocations of the sacroiliac joint.<sup>1</sup>

## Technique

Fusion of the sacroiliac joint can be accomplished by several different methods including: (a) an anterior approach, (b) a posterior approach, or (c) percutaneous screw fixation. The anterior approach involves an incision along the iliac crest to the anterior superior iliac spine followed by stripping the iliacus muscle from the iliac wing to allow access to the anterior portion of the sacroiliac joint. This approach provides better visualization of the joint than the posterior approach and allows access to the ilium which can be used as source of bone graft to fuse the joint. Because the anterior approach uses the supine position, multiple trauma patients can have other surgical procedures performed simultaneously, if necessary. The danger of the anterior approach is damage to the L5 nerve root which lies approximately 2 cm medial to the sacroiliac joint.

The posterior approach can use any of several different skin incisions, but most follow the posterior iliac crest down to the posterior inferior spine. The gluteus maximus is then stripped subperiosteally off the ilium to gain access to the sacroiliac joint. This approach gives good exposure, especially for patients with sacral fractures, and is relatively simple. The main disadvantages are the higher incidence of post-operative pressure sores, wound infection, and skin breakdown from the posterior location of the incision and the fact that the prone position cannot be used in multiple trauma patients.

Percutaneous sacroiliac joint fusion can be accomplished using either fluoroscopic guidance or computerized tomography guidance (Fig. 1). These methods demand careful technique and require anatomic reduction of the sacroiliac joint prior to fixation. Using radiographic guidance allows percutaneous fusion to have the enormous advantage of decreasing potential blood loss, reducing operative time and preventing extensive surgery.



**Figure 1.** Postoperative radiograph of percutaneous SI joint fusion.

## Summary

Sacroiliac joint fusion is not performed today as commonly as in the 1970s. It is, however, still indicated in certain clinical situations such as degenerative sacroiliitis, inflammatory sacroiliitis, iatrogenic instability of the sacroiliac joint, OCI, and traumatic dislocation of the pelvis. Traditional methods via an anterior or posterior approach are still reliable, but new techniques such as percutaneous sacroiliac joint fusion are promising.

## References

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