

Post-operative Guidelines for Sacroiliac Joint Fusion

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This white paper, authored by Bruce E. Dall, MD, is a discussion of the method of and the logic for the rehabilitation of the post-operative sacroiliac joint fusion patient having a dysfunctional sacroiliac joint used for over a decade by Dr. Dall at the Borgess Brain and Spine Institute, Kalamazoo, Michigan. This is not to be construed as the standard for rehabilitation for these patients. No standard currently exists. Any clinician using and recommending this method does so at their own risk. The author and the institution claim no responsibility for patient outcomes resulting from this method.

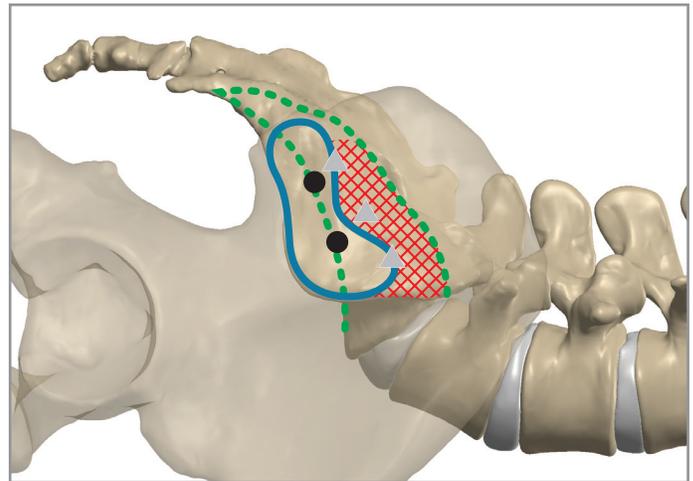
Introduction

Currently in the United States the primary approach used for fusing the sacroiliac joint is the lateral minimally invasive technique. The reason for this is that industries are allowed to obtain a 510 (k) designation for devices and instrumentation utilizing this approach. This has resulted in the creation of two distinctly different methods for fixating the sacroiliac joint using this approach. For the purposes of this White Paper they will be identified as the “Out-of-joint approach” and the “In-joint approach”. The differences, in terms of the points of fixation with each of these approaches, will be briefly explained. The areas of concern for rehabilitation after the fusion surgery are pain control, stabilizing the injured area, early ambulation, tissue healing, stretching, stabilization, balance, strengthening and function. For physical therapists wanting a more in-depth discussion on this subject please see Dr. Michael Rahl’s excellent review in Chapter 14 of *Surgery for the Painful, Dysfunctional Sacroiliac Joint: a Clinical Guide*, Springer Publishing¹.

The basic premise in orthopedics is that fixation with instrumentation, when performing a fusion across two bones, must be rigid and hold the two bones solid until the fusion has become strong enough to provide all the necessary support. At that point, the instrumentation becomes inconsequential, unless the hardware itself becomes a pain producing entity. The area defined as the “true joint” is that part of the SIJ complex where the actual articulating joint is located consisting of synovium, hyaline cartilage, and subcondral bone on both the iliac and the sacral sides. Here the two bones are closest together with no intervening ligament structures, and the adjacent subchondral bone is the densest. The “false joint” is that part of the SIJ complex surrounding the “true joint”, primarily being dorsal and cephalad to it, containing the transverse ligament structures spanning the space between the ilium and the sacrum. The gap between the ilium and the sacrum in this “false joint” location can be from a few millimeters to over a centimeter depending on the exact location and the individual patient.

Out-of-joint Approach

In this approach: one, two or three screws or rods of different designs are placed from the lateral ilium across the sacroiliac joint into the sacrum. The defining element for this approach is that the bulk of the instrumentation crosses the “false joint” and not the “true joint”.



SI joint anatomy as it relates to implant placement

- True joint, or articulating region
- ⊗ False joint, or ligamentous region
- - - Midline of sacrum
- In-joint approach
- ▲ Out-of-joint approach

In-joint Approach

In this case, the same screws or rods are placed in the same manner from lateral to medial across the SIJ, but with this approach the bulk of the instrumentation crosses the “truejoint”.

Post-operative Ramifications for Each Approach

(The following discussion is based on scientific logic and the author’s experience as there has been to date no independent study performed to test these principles.)

The logic of wanting to engage the “true joint” with the lateral to medial instrumentation has three major advantages. The first is that the fixation is crossing the actual joint to be fused. If a fusion procedure is combined with the placement of this fixation device that fusion will occur actually within the joint. The second advantage is that the most dense subchondral bone is present on both the iliac and sacral sides directly adjacent to the “true joint”. This has been our experience during hundreds of cases of approaching the joint directly using the posterior and posterior-lateral approach². The third advantage is that instrumentation placed in this location is much more rigid and much less likely to become loose prematurely. As we proceed into the post-operative guidelines these approach and fixation differences, in specific circumstances, will necessitate different guidelines.

Considering all Aspects of Rehabilitation

The following paragraphs will discuss important aspects of each of the areas of concern during the entire rehabilitation process after a sacroiliac joint fusion.

Pain Control

Controlling pain is the most important beginning to the rehabilitation process. In a patient with a dysfunctional sacroiliac joint this can be challenging. Our review of 99 consecutive sacroiliac joint fusion cases found that pre-operatively a large portion of these patients were attached to a chronic pain clinic, and that the majority were either heavily reliant on or addicted to narcotics. The importance of knowing this fact about a pre-operative sacroiliac joint fusion patient is that, although the fusion may indeed help with their sacroiliac joint pain, the likelihood of the surgery getting them off of the narcotics in a short, timely fashion may be minimal. This is due to the fact that most of these patients have been on them so long that narcotic use should be considered a separate pre-operative diagnosis. It is our recommendation, with any patient appearing to be on long-term narcotics prior to their sacroiliac joint fusion, that their prescribing doctor (frequently their pain doctor or primary care physician) should be contacted and asked to remain in charge of that patient's narcotics post-operatively. The purpose of this is to keep the prescribing doctor in control not only continuing to treat any remaining pain issues that the patient may continue to have after surgery, but to begin the process of weaning should the surgery be successful. This has been met with resistance from prescribing pain doctors as they were expecting that the surgery would cure their patients of the pain. If the prescribing doctor refused to remain in charge of narcotics post-operatively we then put the burden on the patient to change their prescriber's mind before surgery would take place. 99% of the time this is exactly what occurred. In the 1% where this did not work, directly contacting the prescribing doctor successfully initiated the change once they fully understood the dynamics involved.

Stabilizing the Injured Area

The painful dysfunctional sacroiliac joint is, in general, a very stable joint. Even in bench research on cadavers after sectioning all the posterior supporting ligaments, the resulting range of motion for flexion/extension using 8N of force was rarely greater than 2 degrees. With most modern

devices being currently used in lateral minimally invasive sacroiliac joint fusions the resulting stabilization is strong enough to allow for the use of only a sacral belt when up. While the need for mechanical stabilization is minimal, our experience has shown that bracing can also be very effective as a psychological tool. As patients begin to feel better, they are reminded that they have undergone surgery and should limit activity as their fusion progresses. Patients are to be instructed that the sacral belt is not to be worn like a lumbosacral corset. The bottom or caudal portion of the belt should rest gently on the upper thighs when sitting in the upright position. If it rides higher it actually turns into a mechanism acting like a lumbosacral brace, generating increasing forces on the sacroiliac joint. Ideally the brace is applied and removed while standing erect, and patients are allowed to shower without the brace. Obese patients do not use a sacral belt as it is ineffective. In these cases they are instructed to use a walker whenever up. Occasionally a lumbosacral fusion is performed at the same setting as the sacroiliac joint fusion. In these cases the bracing is totally determined by the protocol for the lumbosacral fusion. If a TLSO or an LSO is used, it is important to add a pantaloon attachment to the side of the sacroiliac joint fusion. If not the TLSO or LSO will actually increase the force vectors across the sacroiliac joint and fusion area with possible increased pain and early loosening of hardware.

Early Ambulation

The importance of early ambulation cannot be over-emphasized! Being upright is the best deterrent for early DVT and pulmonary embolism. Here is where the importance of type of approach and fixation play a role. If the surgical technique was an "In-joint" approach (more stable), then a walker or crutches are used and the foot of the ipsilateral leg can be placed on the floor with approximately 20 pounds of weight-bearing. This is essentially approximating the weight of the leg. The arms and upper trunk must carry the rest of the weight while the contralateral leg is brought into position to bear weight. After 3 weeks full weight-bearing is allowed with or without an ambulation device depending on the size and strength of each patient at that time. If the approach was "Out-of-joint" (less stable), then less weight-bearing is allowed. These patients use a walker or crutches and "toe-touch" only while the upper extremities and trunk carry the weight of the body as the contralateral leg swings back into the weight-bearing position. This should continue for the full six week period. For the obese patient, regardless of approach, use of the walker and putting the whole foot on the floor,

attempting to bear only up to 20 pounds, is frequently the best possible scenario for these patients. They will do this for 6 weeks.

Tissue Healing

The soft tissues that need to heal are the skin, gluteus maximus, gluteus medius, and the gluteus minimus. The functional muscle groups being affected, depending on exact approach techniques, are hip abduction and hip extension. One should allow 10-14 days of healing time before these muscles are stressed other than by mild active stretching. As rehabilitation continues hip abduction and extension will require extra effort to balance and strengthen to allow the patient to become fully functional. The other tissue that needs to heal is the bone fusion. Fusions take a minimum of 6 weeks to heal given the progression of the biochemistry involved. This event is strongly influenced by the approach and device used to perform the sacroiliac joint fusion. The farther away from the “true joint” that the device crosses from the ilium to the sacrum the wider the ligamentous gap. This means that if bone graft is also put into that gap it has a greater distance to bridge to obtain a fusion. If no bone graft is put into the gap this means that simply by placing the device across the joint the bone from the ilium and the sacrum is expected to fill the gap through a “creeping” effect. If this does indeed occur it can take a long time. If it does not occur then the expectation is that the device will loosen with time. This is one of the reasons that for the “Out-of-joint” approach toe-touch and walker or crutch use is so lengthy.

Stretching, Stabilization & Balance

We know from EMG studies of patients with a chronic dysfunctional sacroiliac joint that before surgery these patients frequently demonstrate abnormal activation in the gluteus maximus (hip extensor), biceps femoris (hip extensor), deep abdominals (hip flexors, pelvic stabilizers), and epiaxial (pelvic stabilizers) muscles. There can also be changes in the ventral pelvic and thigh muscles resulting in hip flexion contractures. The hip abductors on the ipsilateral side may be weak, and the entire contralateral pelvic, hip and thigh musculature is frequently over-worked. All this results in the patient having a weak ipsilateral side, a compensating contralateral side and a very biomechanically dysfunctional gait. During the rehabilitation period all these aspects must be addressed in appropriate timely fashions to return the patient to maximum useful function.

Strengthening

It is obvious that muscle strengthening begins with the patient’s initial attempts to ambulate. It is important to understand that strengthening should be gradual and progressive and should occur in unison with stretching, stabilization and balancing as the patient continues to heal (both soft tissue and bony fusion), and as they progressively take on more active ADLs. There are major differences between isolating, for instance, the deep abdominal core muscles with isometric exercises and the all-out strengthening of the large back, pelvic and hip/thigh muscle with vigorous resistance exercise. A good physical therapist will start the patient post-operatively with core exercises performed against the patient’s own resistance and slowly proceed to more active exercise of the larger muscles against resistance.

Function

Increasing function is a desired goal for the patient having a sacroiliac joint fusion after rehabilitation is complete. This is where the surgeon performing the surgery needs to understand the type of patient with which they might be working. Thus far the literature describing follow-up results for sacroiliac joint fusion patients dwells more on pain relief than improvement in function. It has been consistently shown that an appropriate sacroiliac joint fusion in the appropriate patient provides significant pain relief³. The increasing of function has not been a notably discussed result for sacroiliac joint fusion patients. There are some significant reasons for this, which will most likely change for the better as surgeon awareness and early diagnosis and treatment increase during the next decade. Currently a majority of patients in our experience presenting for fusion surgery of the sacroiliac joint have been in conservative treatment averaging four years. During this time many have become semi-permanent residents of pain clinics, have been taking daily narcotics for at least two years, and have become either officially disabled or on a type of medical retirement despite their average age being in the mid-fifties. Most of these patients have not been given an official diagnosis of a dysfunctional sacroiliac joint despite many having had routine sacroiliac joint injections, with each one having good short-term results. The result of all this is that, if the patient has a good or excellent result concerning pain relief from the surgery, they may not want to risk losing their disability by demonstrating more function. This is certainly not true for everyone, but for the majority it has been our experience when reviewing long-term results for

99 consecutive patients operated over a five year period and followed for an average of four years⁴.

A Word about Water Therapy

Our standard rehabilitation treatment for all sacroiliac joint fusion patients, with or without an associated lumbosacral fusion, was to prescribe six weeks of water therapy. This was performed with a physical therapist in chest high warm water during which the instructions were to use the resistance of the water to slowly increase core muscle strength. Chest high warm water has the mechanical advantage of significantly unloading the spine and pelvis while the core muscles are being gently stretched and strengthened. The water therapy was instituted by us in response to patients being injured by over-aggressive land therapy too early. Instituting water therapy for the first six weeks eliminated that problem. We either started land therapy at the six week mark, or let the therapist gradually begin land therapy as they felt was appropriate. As the core muscles became intrinsically stronger the patient was more able and capable of moving into strengthening the major muscle groups responsible for ambulation, lifting and ADLs.

About the Algorithm

The algorithm is meant to be simple and straightforward addressing the major issues surrounding the average sacroiliac joint fusion patient. There will be instances where alterations will need to be made based on a patient's individual circumstances. In general this method has worked well for hundreds of sacroiliac joint fusion patients over the course of many years. The majority of patients will be fully rehabilitated by the 12 week mark. It is at this time that we routinely sent people back to full work, if they were able, without restrictions. If individual patients still had significant pain or continuing muscle weakness, they were kept in therapy. This therapy was then individualized for them according to what they required. If pain continued to be an issue then steps were taken to find the cause and deal with it before moving on. This again becomes an individual matter that no longer fits into the algorithm. We only performed bilateral sacroiliac joint fusions using an "In-joint" approach. One decision that had to be made

in those patients was to allow full weight-bearing with a short stride immediately after surgery. We did not incur any hardware issues in our patients using this method, but did realize that there was an increased risk of hardware failure with this method. If a lumbosacral fusion was performed at the same setting, then only the bracing changed by adding a pantaloon attachment to the ipsilateral side. If a bilateral sacroiliac joint fusion was performed along with a lumbosacral fusion then the pantaloon attachment was added only to the left side keeping the right leg and foot free for potential driving. In this circumstance full weight-bearing was allowed immediately as stated above concerning bilateral sacroiliac joint fusions.

Algorithm for Post-operative Rehabilitation of the Sacroiliac Joint fusion Patient

0-6 Weeks

	Bracing	Amb assist	Weight-bearing	Lifting	Therapy	Avoid
In-joint Approach	SI Belt when up. Not needed in shower	Crutches or walker for 3 weeks, then discard	Can set foot on floor bearing up to 20#. After 3 weeks, full weight-bearing using short stride.	Up to 15#	Aquatic: Core muscle strengthening and gait and/or Land: Core muscle strengthening, active (only) muscle stretching, ambulation and ADLs (all using biomechanically correct techniques)	Bending or twisting at the waist at all times
Out-of-joint Approach		Crutches or walker	Toe touch only			
Obese, Either Approach	Ineffective	Walker	Can set foot on floor bearing up to 20#			

Suggested PT prescription for 0-6 weeks post-op:

Water therapy for gradual active muscle stretching and core muscle strengthening. Work on balance, gait and essential ADLs. Use only biomechanically appropriate bending at the waist. No lifting more than 15#. Avoid manual pressure techniques. Can use modalities PRN. May transition to land during this time if patient demonstrates appropriate capability.

6-12 Weeks

	Bracing	Amb assist	Weight-bearing	Lifting	Therapy	Avoid
In-joint Approach	No brace needed	None	Full weight-bearing using shorter stride	From 15# to full (slow increase with increasing strength of associated musculature)	Land: Core muscle strengthening, stabilizing, strengthening and balancing long and large pelvic, trunk and associated extremity musculature.	Bending or twisting at the waist at all times
Out-of-joint Approach						
Obese, Either Approach		Walker				

Suggested PT prescription for 6-12 weeks post-op:

Core strengthening. Stabilization, strengthening and balancing of the major and long muscle groups involving the pelvic, trunk and associated extremities. Use modalities PRN. Perfect gait and abilities to perform all ADLs using biomechanically correct techniques. Teach home exercise and stretching program reinforcing above. Avoid inappropriate bending and twisting at waist. Slowly progress to patient's full lifting capacity.

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