

# Sacroiliac Fusion Another “Magic Bullet” Destined for Disrepute



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## KEYWORDS

• Back pain • Spinal fusion • Evidence • Quackery

## KEY POINTS

- The sacroiliac (SI) joints are load-bearing synovial-lined joints that can be affected by degenerative change and therefore in some circumstances MAY cause local pain.
- Diagnosis of painful SI joints has NOT been standardized and at the current time is best represented by (1) local pain at the sacral ala, (2) degenerative changes on imaging studies, AND (3) temporary relief from intra-articular injection of topical anesthetic agents and/or steroids.
- Current technology for SI joint fusion mimics first-generation stand-alone lumbar cages, promoting fusion simply by breaching the joint space.
- Evidence of benefit from SI fusion is poor because of imprecise diagnoses, flawed methodology, bias, and limited follow-up.
- SI fusion should be undertaken only with full disclosure to the patient that the indications and long-term results for the technique remain unproven.

## INTRODUCTION

The diagnosis and treatment of low back pain is a complex process. Anatomic components are varied and numerous: bones, discs, ligaments, synovium, joints. Their interactions are even more complex.<sup>1,2</sup> Part and parcel with these moving pieces are complicated biomechanics in which changes in one part of the system affect other parts in clinically relevant ways. This article discusses sacroiliac joint dysfunction, its clinical impact, diagnosis, and nonoperative and operative treatments with a critical appraisal of a growing trend toward SI fusion.

## EPIDEMIOLOGY

Low back pain is a common complaint in health care. In 1998 it is estimated that \$26.3 billion was spent investigating and treating this complaint in the United States alone,<sup>3</sup> more than tripling in

2008 to \$86 billion.<sup>4,5</sup> This dramatic cost escalation has been largely attributed to a significant increase in the number of patients seeking treatment for their low back pain symptoms over that 10-year period. In the current climate of value-based disease treatment, cost has become pivotal to health care policy. The 5-year cost to Medicare, our US federally funded health care system, specifically for treating SI joint dysfunction has already been appraised at \$270 million.<sup>6</sup>

In any given year, the prevalence of low back pain in the adult community is estimated to range from 1.5% to 36.0%.<sup>2</sup> An individual's lifetime risk of suffering low back pain in adulthood severe enough to warrant medical consultation is 80% to 85%.<sup>2,7-9</sup> The vast majority of these episodes are self-limited, with 12-month remission rates of 54% to 90%.<sup>2</sup> The heterogeneity of these data are due to varied inclusion criteria and diverse mechanisms used to identify affected individuals, making them difficult to interpret.

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To effectively treat low back pain, accurate diagnoses and multidisciplinary expertise is necessary. Because of multiple etiologies and interactions, clinical history and examination remain fundamental to providing good outcomes. As an important anatomic structure in lumbo-sacral geography, sacroiliac joint dysfunction deserves at least passing consideration. Differentiation of low back pain from radicular pain is the first branch-point in the diagnostic algorithm.<sup>8</sup> The identification and treatment of nerve-root-mediated discomfort is reasonably objective and structured. Outcomes are predictable. However, the other causes of back pain exist in a twilight zone of low resolution and high noise. Only careful attention to the finer signs and symptoms helps the clinician avoid random diagnoses at the patient's expense. Location (midline or paraspinal), temporal profile, aggravating and relieving circumstances, provocative maneuvers based on anatomic substrates (eg, FABER, flexion vs extension), and psychological overlay (Waddell signs) are the primary tools available to clinicians helping to guide them through the quicksand of misguided intervention.

In those seeking treatment for low back pain, estimates of SI joint involvement range as high as 10% to 30%,<sup>7,10-12</sup> more frequently associated in patients with prior lumbar fusion.<sup>13,14</sup> However, calculating the true prevalence of SI joint dysfunction as the cause of low back pain is rife with difficulty as there are no "gold standard" criteria by which to make the diagnosis. Even the largest prevalence study relied only on clinical findings to establish the diagnosis.<sup>15</sup> This 1987 study of 1293 patients with low back pain from one clinician's practice is of limited utility: the report does not detail the specific manner of diagnosis and it reports a referred pain pattern as descriptive and therefore diagnostic. Of the 336 (23%) patients with "SI joint syndrome," only 66 (5%) were treated with joint injection yielding an amazing good-to-excellent response rate of 95%. Specious diagnostic criteria, selective intervention, and the retrospective nature of this study make its utility questionable.

Other prevalence studies suffer from even smaller sample sizes; for example, 43 patients from a selected low back pain population yielding 7 with SI joint-mediated pain (16% prevalence)<sup>16</sup> and 54 patients of whom 10 responded adequately to the diagnostic interventional treatment (18.5% prevalence).<sup>17</sup> Two smaller studies made use of interventional diagnostic criteria, yielding prevalence estimates of 16% to 30%.<sup>10,15-17</sup> However, these data are again from highly selected, nongeneralizable low back pain populations. The sum total of these studies further confounds the true prevalence of the disease because of inconsistent

inclusion criteria, loose radiographic definitions, nonspecific clinical findings, and varied interventional techniques. Consequently, the true prevalence of SI-related low back pain is unknown.

## ANATOMY

The sacroiliac joints are the largest axial joints in the body connecting the sacrum (and hence the spine) to the ilium of the pelvis. They are diarthrodial, planar, synovial joints lined by hyaline cartilage. As "joints" they are relatively immobile, reciprocally transmitting forces from the upper body to the lower extremities and vice versa (Fig. 1). Motion through these diarthroses is limited by the complex topography of the articular surfaces and by the multitude of strong, adjacent ligaments, including short and long dorsal sacroiliac ligaments, sacrotuberous, sacrospinous, iliolumbar, and interosseous ligaments. These ligaments connect the sacrum and the lumbar spine, dispersing forces and constraining motion, normal or dysfunctional, in the pelvis to the lumbar spine and vice versa.<sup>18</sup> Many of the pelvic muscles are also connected to the joints such as gluteus maximus, biceps femoris, and piriformis also affecting joint mobility and function.<sup>10</sup>

Motion in the sacroiliac joint is limited mainly to rotation around the S2 axis, more specifically called nutation and counter-nutation because of the sinusoidal rather than spherical pattern.<sup>18</sup> A number of studies have measured this motion, making use of a variety of motion-capture and video techniques. The most reliable studies have been performed in cadavers, and demonstrate excursion limited to 2.5° (0.8–3.9°) of rotation and 1.6 mm of translation.<sup>19-21</sup>



**Fig. 1.** 60 year old female with normal joint anatomy. This patient had no complaints of back or hip pain. Compare the anatomy in both of this patient's left and right SI joints with Figs. 2 and 3. (Courtesy of Jennifer Becker, Tucson, Arizona.)

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