

Sacroiliac joint fusion – update 2021

Background

Sacroiliac joint fusion is a surgical treatment sometimes used to address pain that may be originating from the joint between bones in the spine and hip (sacrum and ilium). The sacroiliac joint (SIJ) is a diarthrodial joint with two surfaces and a fibrous capsule containing synovial fluid.^{1,2} Functionally, the SIJ supports the upper body and dampens forces related to walking; numerous ligaments support the joint and provide it with strength but also limit its mobility. The clinical presentation of SIJ pain varies from patient to patient but buttock pain extending into the posterolateral thigh is the most common pattern.¹ The etiology of SIJ pain is thought to be related to axial loading and rotation, but studies suggest the entire SIJ complex (i.e., capsule, ligaments, subchondral bone) is innervated with nociceptors providing multiple locations for pain.¹⁻³ Aside from major trauma events resulting in serious pelvic injury, several predisposing factors for SIJ pain and dysfunction exist, including leg length discrepancies, gait abnormalities, persistent strain/low-grade trauma (i.e., running), scoliosis, pregnancy, and prior spine surgery (particularly spinal fusion).¹

SIJ pain is thought to be the primary source of pain for between 10 to 30 percent of cases of mechanical low back pain.^{3,4} However, estimating an accurate prevalence of SIJ pain is challenging because no universally accepted gold standard for diagnosis exists. Debate exists about the accuracy of history and physical exam for establishing a diagnosis of SIJ pain; thus, the current reference standard for diagnosis is anesthetic and provocative SIJ injections.³ However, this diagnostic standard is invasive, expensive, and may not be widely available as a primary diagnostic modality. Thus, provocative physical exam tests (e.g., distraction, FABER, etc.) may have a role as part of a step-wise approach to diagnosis.⁴ Imaging is generally not helpful in establishing a diagnosis, but may be helpful in ruling out other etiologies of low back pain.³

Several treatments for SIJ pain and dysfunction are available: pelvic belts and girdles; analgesics and anti-inflammatory medication; physical therapy to address strength, flexibility, or biomechanical deficits; manual manipulation; therapeutic joint injection; prolotherapy; radiofrequency denervation or ablation; and fusion surgery.^{2,4-6} Surgery, specifically SIJ fusion, is typically reserved for persons who fail conservative and less invasive treatments. The goal of SIJ fusion is to relieve excessive motion at the joint, which is hypothesized to then minimize pain and improve function.

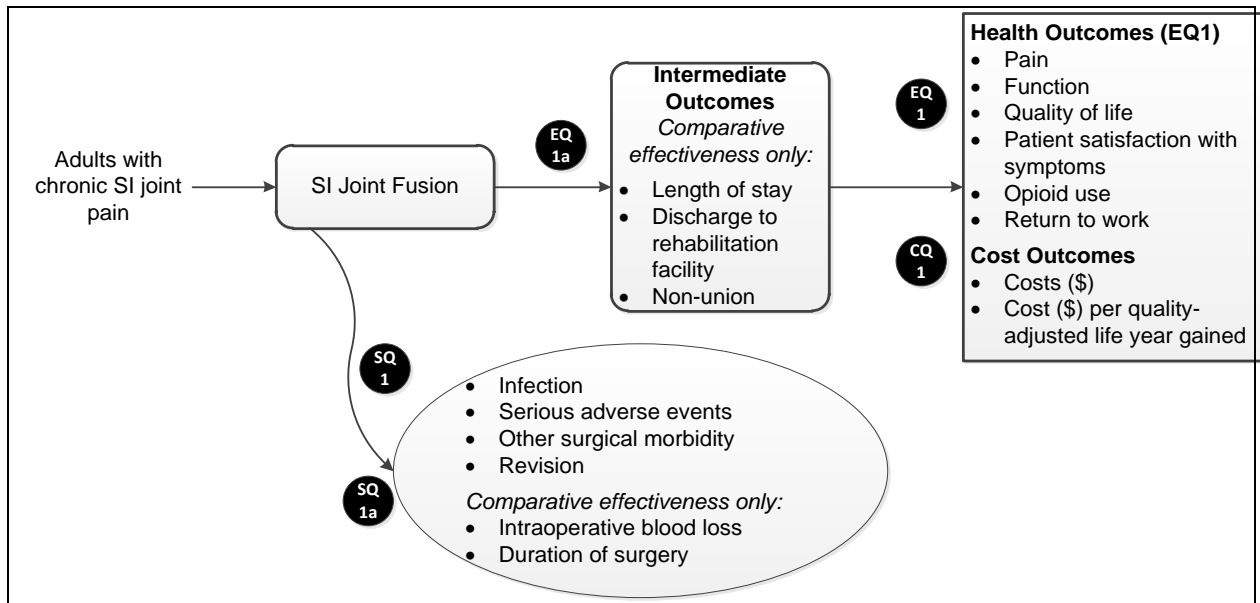
Policy context

The State of Washington Health Care Authority selected SIJ Fusion, which was reviewed in 2019 (<https://www.hca.wa.gov/assets/program/si-fusion-final-rpt-20181130.pdf>), for a re-review based on a signal search report conducted in 2020 ([si-joint-fusion-signal-search-20201110.pdf](https://www.hca.wa.gov/assets/program/si-joint-fusion-signal-search-20201110.pdf) ([wa.gov](https://www.wa.gov))), petition, and public comments received on the topic.

Scope of this HTA

The analytic framework (**Figure 1**), research questions, and key study selection criteria (**Table 1**) are listed in this section.

Figure 1. Analytic Framework Depicting Scope of this Health Technology Assessment



Abbreviations: CQ = cost question; EQ = efficacy question; SI = sacroiliac; SQ = safety questions

Research Questions

Effectiveness Question 1 (EQ1): What is the effectiveness and comparative effectiveness of sacroiliac joint fusion surgery on health outcomes?

Effectiveness Question (EQ1a): What is the comparative effectiveness of various sacroiliac joint fusion surgeries on intermediate efficacy outcomes?

Safety Question 1 (SQ1): What is the safety of sacroiliac joint fusion surgery?

Safety Question 1a (SQ1a): What is the comparative effectiveness of various sacroiliac joint fusion surgeries on intermediate safety outcomes?

Cost Question 1 (CQ1): What is the cost and cost-effectiveness of sacroiliac joint fusion surgery?

In addition, we will address the following contextual question:

Contextual Question:

1. What are the recommended ways to diagnose SIJ pain or disruption and what is the accuracy of various diagnostic tests?

The contextual question will not be systematically reviewed and is not shown in the analytic framework.

Study Selection Criteria

Table 1 provides the study selection criteria we will use to include studies in the HTA and are organized by population, intervention, comparator, outcomes, timing, setting, and study design criteria.

Table 1. Proposed Population, Intervention, Comparator, Outcome, Timing, and Setting for Health Technology Assessment

Domain	Included	Excluded
Population	<ul style="list-style-type: none"> Adults age 18 years and over with chronic (≥ 3 months) SIJ pain related to degenerative sacroiliitis and/or SIJ disruption Diagnosis based on positive findings on provocative physical exam tests and reduction/amelioration of pain after local SIJ injection or leakage of contrast from joint. 	<ul style="list-style-type: none"> Younger than 18 years old Low back pain of other etiology (e.g., radiculopathy, neurogenic claudication) SIJ pain related to recent major trauma or fracture, infection, cancer, or sacroiliitis associated with inflammatory arthropathies Patients without clear diagnosis of SIJ pain/disruption or diagnosis based on criteria other than those listed in the inclusion column
Intervention	<ul style="list-style-type: none"> Open SIJ fusion Minimally invasive SIJ fusion 	Other spine surgeries, nonsurgical interventions to treat SIJ pain (e.g., radiofrequency ablation)
Comparator	<p>EQ1 and 1a:</p> <ul style="list-style-type: none"> Active treatment <ul style="list-style-type: none"> Physical therapy Chiropractic therapy Acupuncture Analgesic and anti-inflammatory medication Orthotics (e.g., pelvic girdles, belts) Therapeutic joint injection Neurotomy (e.g., radiofrequency ablation) Fusion surgery Placebo or sham surgery No treatment 	<i>EQ1 and 1a:</i> No comparator group
Outcomes	<p><i>EQ1:</i></p> <ul style="list-style-type: none"> Pain Physical functioning Quality of life Patient satisfaction with symptoms Opioid use Return to work <p><i>EQ1a only:</i></p> <ul style="list-style-type: none"> Length of stay Non-union Discharge to acute or sub-acute rehabilitation facility <p><i>SQ1:</i></p> <ul style="list-style-type: none"> Infection 	<p>Other outcomes not specifically listed as eligible.</p> <p>Pain, quality of life, and functional outcomes not measured using valid and reliable instruments or scales.^{7,8}</p>

Domain	Included	Excluded
	<ul style="list-style-type: none"> • Serious adverse events (e.g., cardiovascular events, thromboembolism, etc.) • Other surgical morbidity • Revision surgery SQ1a: <ul style="list-style-type: none"> • Intraoperative blood loss • Duration of surgery CQ1: <ul style="list-style-type: none"> • Costs • Cost per quality-adjusted life year gained • Cost per disability-adjusted life year gained 	
Study Design and Risk of Bias Rating	<p><i>EQ1 and 1a and SQ1a:</i> RCTs, CCTs, CCSs, and SRs of RCTs, CCTs, or CCSs with similar scope as this HTA</p> <p><i>SQ1:</i> RCTs, CCTs, CCSs, uncontrolled studies (e.g., case series, single-arm clinical trials or cohort studies), and SRs of any study type with similar scope as this HTA</p> <p><i>CQ1:</i> CCA, CEA, CUA, or CBA performed from the societal or payer perspective</p> <p>Any risk of bias rating</p>	<p>Editorials, comments, letters, narrative reviews, case reports.</p> <p><i>EQ1 and 1a and SQ1a only:</i> uncontrolled studies (e.g., case series, single-arm clinical trials or cohort studies)</p>
Setting	Inpatient or outpatient settings in countries categorized as “very high” on the 2020 UN Human Development Index. ^{a,9}	Studies conducted in countries not categorized as “very high” on the 2020 UN Human Development index. ⁹

Abbreviations: CBA= cost-benefit analysis; CCS = controlled cohort study, CCT=controlled clinical trial; CEA=cost-effectiveness analysis; CUA=cost-utility analysis; HTA=health technology assessment; RCT=randomized controlled trial; SR=systematic review.

^a Andorra, Argentina, Australia, Austria, Bahamas, Bahrain, Barbados, Belarus, Belgium, Brunei Darussalam, Bulgaria, Canada, Chile, Costa Rica, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hong Kong China (SAR), Hungary, Iceland, Ireland, Israel, Italy, Japan, Kazakhstan, Korea (Republic of), Kuwait, Latvia, Liechtenstein, Lithuania, Luxembourg, Malaysia, Malta, Mauritius, Montenegro, Netherlands, New Zealand, Norway, Oman, Palau, Panama, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Arab Emirates, United Kingdom, United States, Uruguay

References

1. Cohen SP, Chen Y, Neufeld NJ. Sacroiliac joint pain: A comprehensive review of epidemiology, diagnosis and treatment. *Expert Rev Neurother.* 2013;13(1):99-116. PMID: <https://www.ncbi.nlm.nih.gov/pubmed/23253394>. doi: 10.1586/ern.12.148
2. Ou-Yang DC, York PJ, Kleck CJ, Patel VV. Diagnosis and management of sacroiliac joint dysfunction. *Journal of Bone and Joint Surgery - American Volume.* 2017;99(23):2027-2036. doi: 10.2106/jbjs.17.00245
3. Simopoulos TT, Manchikanti L, Singh V, et al. A systematic evaluation of prevalence and diagnostic accuracy of sacroiliac joint interventions. *Pain Physician.* 2012;15(3):E305-344. PMID: <https://www.ncbi.nlm.nih.gov/pubmed/22622915>.

4. Bina RW, Hurlbert RJ. Sacroiliac fusion: another "magic bullet" destined for disrepute. *Neurosurg Clin N Am*. 2017;28(3):313-320. PMID: <https://www.ncbi.nlm.nih.gov/pubmed/28600005>. doi: 10.1016/j.nec.2017.02.001
5. Barrick EF, O'Mara JW, Lane HE, 3rd. Iliosacral screw insertion using computer-assisted CT image guidance: a laboratory study. *Comput Aided Surg*. 1998;3(6):289-296. PMID: <https://www.ncbi.nlm.nih.gov/pubmed/10379978>. doi: 10.1002/(sici)1097-0150(1998)3:6<289::aid-igs2>3.0.co;2-6
6. Cher D. Rates reported by Schoell et al. are of questionable validity. *Spine Journal*. 2017;17(1):158-158. PMID: <https://www.ncbi.nlm.nih.gov/pubmed/WOS:000396451800023>. doi: 10.1016/j.spinee.2016.09.006
7. Vavken P, Ganai-Antonio AK, Quidde J, Shen FH, Chapman JR, Samartzis D. Fundamentals of clinical outcomes assessment for spinal disorders: clinical outcome instruments and applications. *Global Spine J*. 2015;5(4):329-338. PMID: <https://www.ncbi.nlm.nih.gov/pubmed/26225283>. doi: 10.1055/s-0034-1396046
8. Department of Health and Human Services. Patient-Reported Outcomes Measurement Information System (PROMIS). <http://www.healthmeasures.net/explore-measurement-systems/promis>. Published 2017. Accessed November 8,, 2017.
9. United Nations Development Programme. *Human development report 2020*. New York City, NY; 2020.