Peer Review File

Article information: https://dx.doi.org/10.21037/jss-23-43

Reviewer A

1. Need to eliminate/reduce the amount of branded naming in this manuscript. Branding throughout the manuscript should be limited to only when its absolutely necessary. While the information is relevant, the branding takes away from information that the case series is presenting.
Reply 1: We agree and thank you for this recommendation. We made the changes throughout the article.

2. The cases would benefit from additional details. Post-procedure examination findings that would indicate the need for revision SIJ fusion.
Reply 2: We included additional details per your recommendation.
Changes in the text: see Page 9, line 17-20; Page 10 line 4-8 and line 15-19.

3. Lines 241-245 needs a reference if this is true (and again the same statement in the conclusion, lines 274-76). The sentence seems highly presumptuous. To date there are a few biomechanical studies for both compared approaches suggesting adequate fixation. This paper is suggesting that the posterolateral fusion approach is superior, but I do not believe there is a biomechanical study to date which compares these head-to-head.
Reply 3: Lines 241-245 were edited to "Procedures such as the direct lateral approach are aimed at stabilizing the large SIJ directly at or in close proximity to the instantaneous axis of rotation (IAR) are likely to face a mechanical disadvantage compared to techniques that block motion further away from the IAR such as the lateral oblique approach".
In the conclusion (274-276), we have updated the sentence to "This trajectory has a favorable mechanical advantage when considering the anterior location of the IAR within the synovial portion of the joint."
Changes in the text: see Page 12, line 14-17; Page 13, line 12-14.

Reviewer B

1) Line 94:
You write:
"Randomized clinical trials have shown superior pain improvement and quality of life in patients who 96 underwent SI-BONE TTI fusion versus non-operative treatment [9]."
- Reference 9 is incorrect here. The randomized trials are refs 19 and 20. Please correct.
Reply 1A: Thank you, we have corrected the randomized trials references.
Changes in the text: see Page 6, line 15.
- Ref 9 is on revisions. Please find the correct place for ref 9.
Reply 1B: We have cited "reference 9" (updated to 14). "The revision rate for SIJ using a direct lateral approach ranged from 5.7% to 30.8%"

Changes in the text: see Page 6, line 18-19.

Reviewer C

Sacroiliac joint mediated pain is becoming an accepted condition with SI joint fusion becoming a viable option when non-operative management fails. With increasing numbers of SIJFs, there are likely to be increasing numbers of failures and subsequent revisions. As we continue to develop treatment algorithms and surgical options, it is important to report emerging techniques and implants to advance our understanding of options as a medical field.

With this, I feel that there is some merit to this paper as it presents a novel implant and technique. However, major revisions are required to make it suitable for publication.

1.Lines 92-94:
It is implied that surgery is indicated when non-operative treatments have failed. This may read better if it simplify stated as part of a treatment algorithm. The wording here is confusing as well. Perhaps rephrase to the following or something similar: With the popularization of titanium triangular implants (SI Bone iFuse), surgeons have utilized a percutaneous lateral approach to perform sacroiliac joint fusion.
Reply 1: Thank you, we made the following changes per your recommendations. "With the popularization of the triangular titanium implant (TTI) wedges (iFuse Implant System, SI-BONE, Inc., Santa Clara, CA, USA) surgeons have utilized a percutaneous direct lateral approach to perform sacroiliac joint fusion."
Changes in text: See Page 6, line 11-13.

2. Line 97: Substitute "required" for "recommended"
Reply 2: We made this substitution.

3. Lines 98-99: Three devices are recommended for rotational stability. I don't follow your rationale when you state "three devices creates the probability that one or more may not achieve fusion and thus have the likelihood for pain." Reword or further explain this rationale.
Reply 3: We agreed and edited the sentences, "The TTI is designed for SIJ fusion based on bone adherence to the surface and three devices are recommended for rotational stability. One or more may not achieve fusion and thus have the likelihood for pain."
Changes in text: See Page 6, line 15-17.

4. Lines 101-103: Wound infection and root impingement are not relevant complications to this paper (pseudoarthrosis, hardware failure). This reference can be removed or replaced with a reference reporting incidence of hardware failure/pseudoarthrosis complications to make the paper stronger.
Reply 4: We added the following: "The revision rate for SIJ using a direct lateral approach ranged from 5.7% to 30.8% [14]. Faced with a pseudoarthrosis, the differential diagnosis may include infection although rare."

Changes in text: Page 6, line 18-20.

5. Line 106: substitute "requires" with "has traditionally required"
Reply 5: The substitute was made.
Changes in text: see Page 7, line 1.

6. Line 117: Hypothesis is not stated. Please state the hypothesis or remove.
Reply 6: We stated the hypothesis “Our hypothesis was that a lateral oblique technique to place two variable threaded screws could be used to fixate the SIJ without the need to remove the failed implants.”
Changes in text: see Page 7, line 10-11.

7. Line 117 - 119: "and used three illustrative cases performed by two surgeons in separate facilities who were trained by the surgeon (primary author) and inventor of SacroFuse® and the technique."
- this phrasing is wordy and difficult to follow. Please rephrase.
Reply 7: We rephrased the sentence to “Our objective was to describe the technique and used three illustrative cases performed by two surgeons in separate facilities who were trained by the surgeon (primary author).”
Changes in text: see Page 7, line 11-13.

8. Line 132-133: Please explicitly describe the signs you used for radiographic failure (i.e. implant halo, broken implant, implant migration, etc.). Did you investigate further with CT scan to confirm "probable loosening"
Reply 8: We made the changes, “On plain radiographs and/or CT scans, there were signs of halo and implant migration suggestive of probable loosening”.
Changes in text: see Page 7, line 21-22.

9. Line 133: add "at least" three out of five provocative...
Reply 9: We made this addition to the paper.
Changes in text: see Page 7, line 22.

10. Line 172: Please clarify if "an operating orthopedic surgeon" is the surgeon that performed the cases.
Reply: Yes, we updated the sentence. “An independent radiologist and the operating orthopedic spine surgeon evaluated the preoperative and postoperative plain radiographs”.
Changes in text: see Page 9, line 14-15.

11. Lines 180-182: Cases would be stronger if you included specific workup (injections, previous treatments, time interval from index SIJF) as well as postoperative course (timing or follow-up, preop vs. immediate post-op vs. last follow-up pain scores).
Reply 11: We agree and all 3 cases satisfied the inclusion criteria for workup. “The inclusion criteria for surgery included a history of lower back and buttock pain, painful physical examination, unassisted ambulation, positive diagnostic intra-articular SIJ injections, positive imaging for pseudoarthrosis, and failed conservative management (such as medication and activity

modification)". Postoperative score were noted as "There was an 89% decrease in pain from the mean preoperative VAS score of 9.5 to the mean postoperative VAS score of 1 at the latest follow up".
Changes in text: see Page 7, line 17-21; Page 11, line 1-3.

12. Line 182, 190, 197: Is there any further confirmation of fusion other than correct implant positioning? If so, please include
Reply 12: Follow up x-ray scans. All 3 cases reported improved pain on postoperative VAS scoring. "There was an 89% decrease in pain from the mean preoperative VAS score of 9.5 to the mean postoperative VAS score of 1 at the latest follow up"
Changes in text: see Page 11, line 1-3.

13. Lines 218 - 222: This is technique paper for a novel technique. Stating that there is no previously reported cases of this exact technique does not add strength to the paper. Additionally, other studies have reported salvage of failed SIJF without implant removal. For example,

Sayed D, Khatri N, Rupp A, Bovinet C, Azeem N, Li S, et al. Salvage of Failed Lateral Sacroiliac Joint Fusion with a Novel Posterior Sacroiliac Fusion Device: Diagnostic Approach, Surgical Technique, and Multicenter Case Series. J Pain Res. 2022;15:1411-20.

Reply 13: We agree and added the following, "While this is the first article to detail a lateral oblique approach with variable-threaded screws, Sayed et al reported the utilization of a posteriorly placed cortical allograft within the sacroiliac joint to salvage a failed direct lateral SIJ fusion".
Changes in the text: see Page 12, line 5-8.

Grammatical errors throughout.

Good description of the technique with representative images.

Overall, I agree that, as we continue to develop treatment algorithms and surgical options, it is important to report emerging techniques and implants to advance our understanding of SI joint mediated pain and its surgical options. However, we as a surgeons must critically assess the indications, workup, and outcomes of these procedures. You have presented a novel technique that may add to our knowledge and options for treating failed SIJF. However, the description of indication, workup, and postoperative outcomes is lacking.
Thank you for the feedback, we have made improvements by answering other reviewers.

I feel that there is merit to this paper as a publication, but this should come with major revisions.

Reviewer D

This paper reports on three cases in which revison surgery was performed on cases in which SI-BONE's iFUSE implants were inserted because of recurrent symptoms. This is a valuable report

because until now there has been no answer as to how reconstructive surgery could be performed in cases after iFUSE placement. However, there are several problems with the paper as a scientific paper.
If the following points can be corrected, this report should be accepted for publication.

1. It is not usual to mention the specific company name SI-BONE in the abstract of a paper.
Reply 1: Thank you. We made the following changes. "The direct lateral trans-gluteal muscle splitting transiliac approach was popularized to fixate the SIJ using three cannulated triangular titanium implants (TTI) wedges"
Changes in the text: see Page 3, see line 3-4.

Readers will recognize SI-BONE's iFUSE when you mention Triangular titanium implants.
2. How did you prove that the iFUSE implant was loose, often it cannot be determined by Xp alone, CT images may be necessary? Also, how did you make the definitive diagnosis that the recurrent pain was originating from the fixed sacroiliac joint? Is it a sacroiliac joint intra-articular injection? Or a well-controlled peri- articular injection?
Reply 2. The patients presented with recurrent SIJ symptoms, positive physical examination findings, positive response to diagnostic to sacroiliac joint intra-articular injections per the inclusion criteria. We updated the imaging findings to "On plain radiographs and/or CT scans, there were signs of halo and implant migration suggestive of probable loosening".
Changes in the text: see Page 7, line 17-22.

3. For cases 1 and 3, how long after the initial surgery did you perform the revision surgery? Please specify.
4. Where is the actual Sacrix® screw placed, and did you check the bone fusion with CT?
Reply 4. The following sentences were added, "The screws were placed along the outer border of the iliac crest posteriorly and advanced obliquely and anteriorly across the SI joint into the sacral alar at the S1 and S2 levels, allowing for cancellous bone self-harvest and purchase. Screw placement was confirmed with intraoperative fluoroscopy using multiple views." "Coronal CT scan shows implant migration and lucency around the tip of the TTI (Figure 4A)." We also updated Figure 4A to show the CT scan illustration.
Changes in the text: see Page 9, line 5-; Page 10, line 9-10.

5. The names "Sacrix® view" and "Sacrix® line" are not appropriate for a scientific paper. Please use a name that is anatomically clear.
Reply 5: We removed the terms.
Changes in the text: see Page 8, line 11-13.

6. It is difficult to distinguish between a Sacrix ®screw and a SacroFuse® screw. Please unify the terms. It is also difficult to understand because there are two "®"s attached as the Sacrix®SacroFuse®.
Reply 6: We reworded the sentence, "and described a revision technique using a new percutaneous lateral-oblique transfixation Sacrix® technique with two variable-threaded SacroFuse® screws while preserving the original implants"

Changes in text: see Page 3, line 10-12.

7. Do you perform a functional evaluation before and after surgery? Since the patient can go home on the day of surgery, does this mean that this surgery is being performed on a patient with a sacroiliac joint disorder that is mild enough to allow walking and that the results are good? Please indicate the extent to which the patient's activities of daily living were impaired prior to surgery, and what was the preoperative condition that led to your decision to perform revision surgery.
Reply 7: We outlined this in the inclusion criteria, "The inclusion criteria for surgery included a history of lower back and buttock pain, painful physical examination, unassisted ambulation, positive diagnostic intra-articular SIJ injections, positive imaging for pseudoarthrosis, and failed conservative management (such as medication and activity modification)." All the patients were able to ambulate without assistance device pre and postoperatively. The patients ability to walk and stand were affected by their pain.
Changes in text: see Page 7, line 17-21; Page 9, line 18-19; Page 10, line7.

Reviewer E

1. This is an interesting paper that goes over a relatively new technique of lateral oblique placement of SI joint implants. This is important with the increasing amount of SI joint implants being placed given the increasing recognition of SI joint disease. One thing that would be interesting to compare is other SI joint fusion products to address the pseudoarthrosis problem. Can other companies products be used - example Medtronic's posterior approach implant?
Reply 1. Yes, we believe so but we don't have any data. We will leave it up to the readers to make the determination.
Otherwise, the authors are able to demonstrate a product to solve a pseudoarthrosis problem without causing increasing harm and risk to patient.