

Peer Review File

Article Information: <https://dx.doi.org/10.21037/jss-22-55>

Reviewer A

Comment 1: Introduction, page 3, lines 62-64: The authors stated that “Traditional spine surgery using an open approach requires extensive disruption of important tissue structures that can result in increased morbidity and prolonged recovery times.” How do you quantify extensive? What are the important tissue structures? This statement is too broad and should be deleted.

Reply 1: We agree and have removed the sentence.

Changes in the text: This has been deleted.

Comment 2: The authors stated that the only exclusion criteria was involvement in spinal litigation. This exclusion criteria is unusual in a scientific paper because litigation is uncommon. How many patients were excluded in the authors institution for this reason? What was the reason for the litigation? Is litigation common in the authors practice?

Reply 2: One patient from each group was excluded due to litigation. Both were involved in workers compensation cases, and this is a rare occurrence in my practice.

Changes in the text: The example of workers’ compensation has been added to the Exclusion Criteria (p 5, line 125).

Comment 3: Pages 5 and 6, there are two contradicting statements: The authors stated on page 5 that Pertinent imaging studies that were obtained as part of standard of care preoperative planning, including static radiographs. On page 6, they stated that “Fusion criteria applied to all the patients in the study followed the Millman criteria for fusion, which is the industry and insurance standard, which defines instability and the need for fusion as having a spondylolisthesis and having 3 to 5 millimeters of translation noted on forward bending and backward extension laterals.” Did the authors use static dynamic radiographs in this study?

Reply 3: Thank you for pointing out this inconsistency. Preoperative radiographs were dynamic.

Changes in the text: p5, line 143 has been updated for clarity.

Comment 4: Page 6, line 150: What is the difference between operative and surgical suite reports?

Reply 4: There is no difference between the two, thank you for pointing this out.

Changes in the text: p6, line 150 “and surgical” has been removed for clarification.

Comment 5: Page 7, line 179: What is radiographic decompression?

Reply 5: This should read “radiographic evidence of decompression”

Changes in the text: Page 7, line 179 now reads “Radiographic evidence of decompression, as assessed by the interbody height, foraminal height, segmental lordosis, and fusion rates.”

Comment 6: How many surgeons were involved in this study? What were level of experience?

Reply 6: One surgeon performed all procedures in this study. He has 34 years of spinal experience.

Changes in the text: Page 5, line 128 has been changed to point out that there was a single physician with extensive experience was involved in this study.

Comment 7: How assessed the images? Level of experience?

Reply 7: All images were assessed by one surgeon with 34 years of spinal experience.

Changes in the text: Page 7, line 179-180 “Image assessments were performed by a single surgeon with 34 years of experience” has been added.

Comment 8: How did the authors assess the fusion? What was the protocol? Did they use CT scan to assess the fusion?

Reply 8: Fusion was assessed on radiographs AP, Lateral, and Flexion-Extension laterals obtained at 6 weeks, 3-, 6-, 12-, and 24-months after surgery. The definition of fusion was bridging bone anteriorly with a positive sentinel sign, bone noted in the implant and within the disc space, no lucent lines around the implants, and no evidence of subsidence. If needed, a CT scan (1 mm thin cut) was performed to confirm or deny pseudoarthrosis. This protocol was used for all patients in both study groups.

Changes in the text: The following text was added to Outcome Measures (Page 7, line 180): “Fusion was assessed on anterior-posterior, lateral, and flexion-extension lateral radiographs. The definition of fusion was bridging bone anteriorly with a positive sentinel sign, bone noted in the implant and within the disc space, no lucent lines about the implants, and no evidence of subsidence. If needed, a CT scan (1 mm thin cut) was performed to confirm or deny pseudoarthrosis.”

Comment 9: In the current study, smoker patients were 22 (44%) in the static and 25 (50%) in the expandable, further the nonunion rates were 6 (12%) in the static and 3 (6%) in the expandable. This is a high fusion rate in smokers. What did the authors do to get such high fusion rate? Did they use any biologic? Did they assess their patients for Vitamin D deficiency before surgery and replace if deficient?

Reply 9: This is an excellent observation by the reviewer. In this study, all smokers stopped smoking six weeks prior to the surgery, confirmed through preoperative carboxymethylhemoglobin levels. Our surgical methods included proper preparation of

the disc space with thorough discectomy and removal of all the disc material and preparation of the end plates. Vitamin D levels were not assessed, as this is not standard practice for these procedures unless correcting an osteoporotic compression fracture.

Changes in the text: Page 7, line 203 added text “In this study, all smokers stopped smoking six weeks prior to the surgery, confirmed through preoperative carboxymethylhemoglobin levels” to the results section.

Reviewer B

Comment 10: Was there any significant difference in implant footprint between groups? You noted different sizes were used, but only list the height in Table 1.

Reply 10: There were no differences in implant footprints between groups or patients.

Changes in the text: Page 8, line 212 added text “While implant heights varied per patient, there was no difference in implant footprints between groups or patients.”

Comment 11: Can you note in your Methods how you determined pseudarthrosis at your followup? CT? Dynamic XR?

Reply 11: Thank you for pointing out this oversight, please see our response to Comment 8, above.

Changes in the text: As noted in Comment 8, text was added to Outcome Measures, Page 7, line 180: “Fusion was assessed on anterior-posterior, lateral, and flexion-extension lateral radiographs. The definition of fusion was bridging bone anteriorly with a positive sentinel sign, bone noted in the implant and within the disc space, no lucent lines about the implants, and no evidence of subsidence. If needed, a CT scan (1 mm thin cut) was performed to confirm or deny pseudoarthrosis.”

Comment 12: Was your use of autograft/allograft material ratio and amount similar in each group/was this tracked? Given that one point of expandable cages is the amount one can backfill/prepack vs a static hollow cage.

Reply 12: For each procedure there was a 50/50 mixture of autograft and allograft, with 10 mL placed in the disc space. The amount added for each patient and level in both groups was consistent to help eliminate variability.

Changes in the text: Page 6, line 162, text was added to the Study Interventions section: “In both groups, a 50/50 mixture of autograft and allograft was used.”

Comment 13: Do you have information on reason for revision (wound issue, pseudarthrosis, implant failure, adjacent level etc) Whether at same and/or adjacent level? Also were the pseudarthrosis cases revised? Higher rates at L4-5 or L5-S1?

Reply 13: In the static cage group there were four patients with revisions due to lucent lines and slight subsidence of the implants and persistent pain with no posterior

hardware failure. In the expandable cage group, two patients had subsidence due to end plate violation of the implants that necessitated revision with no posterior hardware failure noted. No patients to date have had additional surgery for adjacent segment instability or pathology, and we did not break down the data at L4-5 versus L5-S1.

Changes in the text: Page 8, line 235, text was added: “In the Static group, revisions were due to lucent lines and slight subsidence of the implants and persistent pain. In the Expandable cage group, two patients had subsidence due to end plate violation of the implants that necessitated revision. Posterior hardware failure was not noted in either group.”

Comment 14: Would include figure of radiograph on how these measurements were obtained (ant disc height, post disc height, foraminal height, average disc height), particularly average disc height (was this just in the concavity in the middle of the disc space?)

Reply 14: A new figure (Figure 2) has been generated to show how the different parameters are measured. The average disc height is the summation of the anterior and posterior disc heights divided by two.

Changes in the text: Figure 2, a schematic of radiograph measurements has been added, and referenced in the Methods section (Page 7, line 180).

Comment 15: Was this a consecutive case series of 50 static followed by 50 expandable? What are potential confounding factors in surgeon decision-making for selecting one implant over the other in this retrospective study?

Reply 15: There were 50 consecutive patients undergoing surgery using the static implants prior to the development of the expandable implants. The expandable implants were then used in the subsequent 50 patients.

Changes in the text: Page 5, line 129: we have added the text, “Patients undergoing surgery using the static implants were chosen prior to the development of the expandable implant. The expandable implants were then used in the subsequent 50 patients.”