**Author’s response to reviews**

**Title:** Comparison of serum markers for muscle damage, postoperative recovery, and surgical site pain after extreme lateral interbody fusion with percutaneous pedicle screws or traditional open posterior lumbar interbody fusion

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**Author’s response to reviews:**

Thank you very much for the excellent reviews. We have addressed each comment, criticism, and suggestion individually below. We believe that the changes suggested by the reviewers have improved this manuscript.

We hereby resubmit this document with point-by-point responses to all of the reviewers’ comments along with the updated version of our manuscript, which has been revised in accordance with the comments from the reviewers.

Reviewer reports:

Christoph Laux (Reviewer 1): Dear author,

You present a well-elaborated approach to that interesting topic. The manuscript is well written and arranged. However, I have some conceptional queries:

**INTRODUCTION**

- While explaining the downsides of open posterior fusion and the benefits of XLIF procedure you withhold well-known complications of the XLIF procedure like femoral neuropathy.

- We have added information regarding the comparatively high complication rate of XLIF including postoperative thigh symptoms (range 1–60.1%) in the Introduction section. (P3, line 00)
- You define the study goal as establishing the effectiveness of XLIF with PPS versus PLIF. However, the effectiveness of a surgical procedure is the capability of achieving a predefined goals. In case of lumbar interbody fusion these are pain relief, correction of alignment and fusion. You only partially assess these parameters. In my opinion, this study evaluates the invasiveness and tolerability of the respective procedures, not their effectiveness.

  • Based on these comments, we have revised sentences in the Introduction section, Discussion and Abstract to reflect the study objectives more accurately. (P2, line 00; P4, line 00; P9, line 00)

MATERIAL & METHODS

- For the sake of completeness, please specify on "full course of conservative treatment"

  • We have now added specific information regarding the conservative treatment. (P4, line 00)

- When assessing the effectiveness of XLIF vs PLIF: What are the fusion rates 1 year postoperatively?

  • Bony fusion was assessed using CT at 1 year postoperatively, using the grading of fusion classification system described by Bridwell (Table 1). There were no cases of nonunion (grades 3 or 4) in either group and there were no significant differences in fusion grading with CT between groups at 1 year follow-up (Table 3). These results are presented in the revised manuscript (Table 3; P8, lines 14–16).

- Please elaborate on the full perioperative analgesic regiment. It seems exceptional that celecoxib is the only analgesic administered.

  • Use of any analgesic regimens except celecoxib was an exclusion criterion for this study. This information is now presented in the revised manuscript. (P5, lines 16–17)

- Please explain how the nursing staff was blinded during postoperative surgical wound care.

  • All personnel involved with the study patients during admission, including the nursing staff and physiotherapists, were blinded to the approach used and objectives of the study. This information is presented in the revised manuscript. (P5 lines 23–26, line 1)
RESULTS

- Any data on preoperative coronar or sagittal alignment in the respective groups would be desirable as this might affect the postoperative pain and performance scores.

- Based on this suggestion, preoperative slip (%) of fused levels was evaluated using lateral radiographs obtained with the patient in a free-standing posture. There was no significant difference in slip (%) of fused level between the respective groups. This result is presented in the revised manuscript. (Table 1; P6, lines 21–22)

DISCUSSION

- Unfortunately, you do not discuss the higher complication rate of XLIF versus PLIF procedures in your series.

- We have revised the manuscript to discuss the higher complication rate of the XLIF/PPS group versus the PLIF group. (P9, lines 13–16)

CONCLUSION

- You state, that the XLIF/PPS procedure is advantageous for less blood loss. This seems reasonable. However, in my opinion, this conclusion cannot be drawn based on the information given. How did you quantify blood loss in a minimally invasive procedure? Did you ascertain drainage output or hemoglobin levels? Please specify.

- We estimated blood loss as the total of the intraoperative record and drainage output. Current data is presented as “estimated blood loss” (Figure 1) and in the revised manuscript we discussed the difficulty of quantifying blood loss precisely in a minimally invasive procedure. (P9, lines 16–19)

Even though recognising the structured approach when preparing this manuscript there are weaknesses that might be rectifiable. Especially, more objectivity towards both procedures evaluated is desirable.

- Based on these suggestions, we have additionally demonstrated radiographic evaluations with X-ray images and CT. Preoperative slip (%) and fusion grading at 1 year postoperatively are presented in the revised manuscript (Tables 2 and 3).
Kai Sprengel (Reviewer 2):

1) The procedure performing the 1 year follow up and the time range of the follow ups should be presented. Are there any additional parameters looking for bony healing, revision surgery or implant failures after 1 year (e.g. X-Ray, CT-Scan). No drop outs?

• Bony fusion was assessed using CT at 1 year postoperatively, using the grading of fusion classification system described by Bridwell (Table 1). There were no cases of nonunion (grades 3 or 4) in either group and there were no significant differences in fusion grading using CT between groups at 1 year follow-up (Table 3). These results are presented in the revised manuscript (Table 3; P8, lines 14–16). The length of follow up is also presented in Table 3. There were no drop out cases and no revision surgery was needed because of implant failures or adjacent segment disease in either group at 1 year follow-up. This information is presented in the revised manuscript. (P6, lines 17–18)

2) ANOVA instead of the t-test is indicated for ordinal scaled variables, like the NRS (not VAS), ECOG and probably some scores.

• With respect to this suggestion, we have revised the statistical analysis for these data using a nonparametric test that does not require the assumption of normal distributions. (Mann–Whitney U) for NRS and performance status. We found the same level of significance as presented in the originally submitted manuscript for the t test.

3) It should be clarified, that the surgeons were familiar with the XLIF procedure at the beginning of the study, so that there was no learning curve.

• To clarify this point, we have added information regarding the experience of the surgeons to the revised manuscript. (P4, lines 19–20)

4) In my opinion blood loss is a crucial parameter, because it is difficult to measure and mostly an estimation. This should critically be discussed.

• We estimated blood loss as the total of the intraoperative record and drainage output. Current data is presented as “estimated blood loss” (Figure 1) and in the revised manuscript we discussed the difficulty of quantifying surgical blood loss precisely in a minimally invasive procedure. (P9, lines 16–19)
5) Page 4, Row 21: Using allograft bone instead of autologous bone indicates that there was no rib resection in the XLIF group performed. This should be clarified.

- We have clarified this information in the revised Methods section. (P5, lines 4–5)

6) Table 1: Range of fused level will be interesting also as the smoking status.

- We agree this point is interesting and we have now added this information as part of the section on the demographics of patients. However, we did not find any significant difference in number of fused levels or the proportion of current smokers between the groups. (Table 2; P6, lines 21–22)

I thank the authors for this interesting study and wish them all the best for a successful publication.