Author’s response to reviews

Title: Radiographic and clinical outcome of lumbar lateral interbody fusion for extreme lumbar spinal stenosis of Schizas grade D: a retrospective study

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Dear Editors and Reviewers:

Thank you for your letter and for the reviewers’ comments concerning our manuscript entitled “Radiographic and clinical outcome of lumbar lateral interbody fusion for severe degenerative lumbar spinal stenosis of Schizas grade D: a retrospective study”. Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and have made correction which we hope meet with approval. The main corrections in the paper and the responds to the reviewer’s comments are as following:

Responds to the reviewer’s comments:

Reviewer #1:

Comments: The authors mentioned that they compared the radiographic outcomes of LLIF for stenosis of Schizas grades A, B, C and D. How about the results of A, B and C? Please clarify.
Response: The radiographic outcomes of LLIF for stenosis of Schizas grades A, B and C are shown in Tables 3 and 4, and in Figure 3. We did not evaluate the clinical outcomes of those patients. There were 92 patients with Schizas grades A, B and C. Some patients treated by multi-level surgery had a mixed grade. Clinical follow-up of these patients involved a huge amount of work, which we could not finish in the short term, especially during the time of the coronavirus (COVID-19) pandemic. In fact, there have been many published papers describing the clinical outcome of LLIF for those patients with Schizas grades A, B and C, which we can refer to if required. In addition, the primary outcomes of the current study were the radiographic outcomes. Thus, we had decided not to carry out clinical follow-up of those patients.

Comments: Usually Schizas A and B patients do not need surgical intervention, the authors should state what are the indications for Schizas A and B patients underwent surgical treatment.

Response: Schizas’ lumbar stenosis classification has its limitations. It is based on the morphological appearance of the dural sac in the central canal of the lumbar spine. In some cases, the axial central canal area was small, but the morphological appearance of the dural sac was relatively good (Figures 1 and 2). In addition, patients with either foraminal or lateral recess stenosis were also included in the current study, who did not have significant central canal stenosis (Figure 1). Further, we have checked our data, and confirm that some patients with grade 1 spondylolisthesis had radiographic stenosis (Figure 3), while others did not (Figure 4), whose stenotic symptoms probably were caused by instability. Based on this, we decided to remove 11 patients without radiographic stenosis. Moreover, we found that we mistakenly included two patients with a main diagnosis of degenerative lumbar scoliosis. We have deleted those data also. Consequently, we have revised our data in Table 2–4.

(Figures are shown in the supplementary materials.)

Comment: My major concern for the design of the study is how were the patients selected as the candidate for second stage procedure? To me, the surgeon’s preference is not a criteria.

Response: Generally, the indication of posterior decompression is inadequate resolution of stenotic symptoms or radicular leg pain, and a positive straight leg raise test or femoral nerve stretch test at one week after the first surgery. When we wrote “surgeon's preference”, we meant that we had not established a strict indication for additional direct posterior decompression. Sometimes, we performed second-stage decompression, but were not quite sure that it was necessary. For patients with grade C, although their symptoms were mostly relieved after LLIF surgery, we were not sure whether their symptoms would recur if we did not perform posterior decompression. After reading relevant papers, we found that because there was no well-accepted indication of second-stage decompression surgery, the rate of additional decompression surgery varied a lot, being variously reported as 9.0%(11/122)[1], 9.5%(2/21)[2], 29%(13/45) [3], 43%(26/60)[4], 72.1%(62/86)[5]. Thus, we are carrying out an RCT study (ClinicalTrials.gov: NCT04094220) to explore the radiographic predictors of failed indirect decompression of LLIF, and the indication for second-stage decompression. Revisions were made at line 136–139.


Comment: This is a preliminary study based on short term (6 months) follow-up data, the authors should state this as one of the limitations.

Response: We had stated it in the discussion part (Line 293).

Comment: Is there any complication related to the implant?

Response: There was one case of intraoperative lumbar fracture (L5), which spontaneously healed and no implant-related complication occurred at the last follow-up (15 months post-surgery) (Figure 5). There were several cases with intraoperative endplate injury, and most of them did not experience further subsidence during follow-up. One patient who was treated with single-level stand-alone LLIF had cage subsidence at 2 months post-operatively (Figure 6). However, we did not collect all their radiographic data during follow-up. These results are thus incomplete.

(Figures are shown in the supplementary materials.)

Comment: I strongly recommend the authors tune down the stating of ‘first to evaluate the indirect neural decompression effect in patients with extreme lumbar spinal stenosis’, as it's hard to evaluate whether there is any similar study reported or going on.

Response: Revisions were made according to this comment at line 81–82.
Comments:

Minor comments:

Page 5, Line 103, 'indexes' should be 'index'.

Page 2, Line 40: "the average changes of disc height" needs to be 'the average change of disc height'.

Page 6, Line 96-97: "In grade D, in addition to no rootlets being recognizable there is no epidural fat posteriorly" needs a comma before "there is".

Response: Revisions were made according to these comments.

Jun Qiao, Ph.D., M.D. (Reviewer 2): This study is to analyze the radiographic and clinical outcome of LLIF for extreme lumbar spinal stenosis of Schizas grade D. As you said, extreme lumbar spinal stenosis of Schizas grade D is a relative contradiction of LLIF. Please, state in detail, why you choose LLIF for these patients. At complication section (Page 9, Line 175-182), description of pain severity (such as VAS scores) and neurological grades are also needed. Pre- and postoperative X-rays are also needed.

Response:

Twelve of the 18 patients underwent surgery during 2017. We started to perform LLIF in our department at the end of 2016. During 2017, many of our attending surgeons were in the initial learning phase. At that time, we knew that severe lumbar stenosis is a relative contradiction for LLIF, but not an absolute contraindication. In our institution, LLIFs were routinely performed in a two-stage strategy. We performed LLIF at the first stage. One week later, we performed posterior instrumentation. If there were inadequate resolution of stenotic symptoms or radicular leg pain, additional direct posterior decompression was performed. Thus, some of our surgeons performed LLIF in selected patients with severe lumbar stenosis but mild neurological symptoms at that time. Nowadays, we do not perform LLIF for single-level severe lumbar stenosis.

Eleven of the 18 patients underwent multi-level surgery, namely two or three levels. For those patients, we considered that, although posterior direct decompression was needed at one level, it was still less invasive than a traditional two- or three-level PLIF/TLIF.

There was one patient who underwent single-level stand-alone surgery. That was because her symptoms were significantly relieved after the LLIF surgery without posterior instrumentation. The patient was 63 years old and she preferred not to undergo a second-stage surgery. At the last follow-up, although she complained about back pain, her VAS scores of both back and leg pain
had decreased from 6 preoperatively to 4. Her ODI score was slightly decreased from 51.11% to 40%. Still, she refused to undergo a posterior decompression procedure.

As for the seven patients with surgery-related complications, details and their pre- and postoperative X-rays are shown below. We looked up their medical records. Their VAS scores for leg were evaluated every day postoperatively, and the mean VAS score for leg was 3.20 + 0.84 (range: 2–4 points) immediately postoperatively, and the pain was gone 2–3 months later. In the two patients with hip flexion weakness, the strength of the psoas muscle was grade 3 and 4 respectively immediately postoperatively, but it recovered to grade 4 and 5 respectively 3 months later. Usually we did not ask the patients to fill out ODI questionnaires immediately after surgery. We only do this before surgery and at the follow-up visit. Revision made at lines 196–215.

English writing of this paper has been edited by International Science Editing (http://www.internationalscienceediting.com).

(Figures are shown in the supplementary materials.)