

Peer Review File

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Reviewer #1:

There are several problems.

Comment 1. Grammar or spelling mistakes, unclear terminology

P2 L3 “To study the risk factors · · ·” In this sentence, the subject is missing.

Reply: For a better understanding, we divided the research into 2 objectives.

Changes in the text: Now the objectives of the research looks like this: The objectives of this study were to 1) identify risk factors that were associated with unsatisfactory results of two-level ACDF and one-level ACCF in the treatment of patients with cervical degenerative diseases despite current perioperative management, and 2) develop a clinical and radiological algorithm for personalized surgical tactics (P2 LL4-7; P5 LL5-8).

P3 Key findings: last sentence/P12 L16 “preoperations” may be “reoperarions”.

Reply: We made a mistake. The word preoperations have been corrected to reoperations.

Changes in the text: In key findings (last sentence/P12 L19) “preoperations” has been corrected to “reoperations”.

“Circular spinal stenosis” What means “circular”? The word is not common.

Reply: Here and throughout the text we have corrected “Circular spinal stenosis” to more correct wording “Circumferential spondylotic cervical stenosis”, and in the Introduction section we have added a reference to the mention of this term.

Changes in the text: In abstract, introduction, results, discussion and conclusion sections “Circular spinal stenosis” has been corrected to “Circumferential spondylotic cervical stenosis”. In Introduction section we added reference (Sekhon LH. Posterior cervical decompression and fusion for circumferential spondylotic cervical stenosis: review of 50 consecutive cases. J Clin Neurosci 2006;13(1):23-30.), in which this term is mentioned.

Abbreviations should be clearly stated at the time of the first description such as IVD and FJ.

Reply: We have stated all abbreviations in the **Abstract** and **Key findings**. In the text, abbreviations are deciphered at the first mention.

Changes in the text: In the text of **Abstract** and **Key findings**, abbreviations IVD, FJ, ACDF, ACCF, FSU are deciphered at the first mention.

P11 L13-16 Grammar is not correct. I cannot understand.

Reply: We have paraphrased this paragraph in the text.

Changes in the text: Now in the text it looks like this: Currently, there are contradictions regarding the performance of two-level ACDF and one-level ACCF for two-level cervical degenerative disease. This is due to the lack of objective clinical and radiological indications for the differentiated use of the listed ventral decompressive and stabilizing interventions (P12 LL 1-4).

Comment 2. It should be clearly described what implants or prostheses were used (Name, Company, Country)

Reply 2: We added Name, Company and Country for implants what we used.

Changes in the text: In Methods section P6 LL 16-19 we add: ... (HRC Cervical, Ulrich, Germany, no conflict interest). (AD-plus, Ulrich, Germany, no conflict interest).

Comment 3. If you want to mention the long-term outcomes, the follow-up period of about 24 months will be too short. On page 9, You mentioned ASD a little, however, when did it happen?

In this study, it is an exaggeration to evaluate even long-term results.

Reply 3: We agree with you that 24 months is not enough for long-term outcomes, so we replaced it with at last follow-up outcomes.

Changes in the text: We have changed in the text long-term outcomes to last follow-up outcomes or in the minimum 24 months postoperative period (P2 L 26; P5 L17; P10 L5-6).

We added at Methods section: ...minimum 24 months postoperative period (32 (26;38) months)... (P5 L17; P7 L1).

Comment 4. P8 LL13-19 Are these variables significantly different between preoperation and at discharge? Or at the last follow-up?

Reply 4: In our study, we did not find statistically significant differences in radiological parameters before surgery and at discharge. There was a statistically significantly greater angle of cervical lordosis after single-level ACCF compared to two-level ACDF.

Changes in the text: We added «At discharge and preoperation all radiological parameters were comparable in both groups ($p > 0.05$).» (P8 L22; P9 L1).

We added Note to Table 2: *Note.* * – $p_w < 0,05$ between before operation and discharge, ** – $p_w < 0,05$ between discharge and last follow-up (P19 L1).

Comment 5. P9 LL6-10, Table 4; This is the most incomprehensible from a statistical point of view. The variables are too many for about 80 patients when using logistic regression analysis. I think that this data is statistically unreliable and skeptical.

Reply 5: In this manuscript, statistical analysis was carried out on all 159 patients in the Statistics 13.5 program (Stat Soft Inc., USA), so the number of variables is adequate for logistic regression analysis.

Changes in the text: No changes were made on this comment.

Comment 6. P9 L11 What is the definition of “unsatisfactory clinical outcomes”? JOA? VAS? Radiographical remarks? Complications?

Reply 6: Unsatisfactory outcomes were defined as patients having neck pain and/or upper extremities pain higher than 20 mm according to VAS, NDI more than 20 and mJOA less than 12 points.

Changes in the text: We added into the Results section: Unsatisfactory outcomes were defined as the presence in patients: neck pain and/or upper extremities pain higher than 20 mm according to VAS, NDI more than 20 and mJOA less than 12 points (P9 L 14-16).

Comment 7. P9 L21 Why did you make the cutoff of IH as 4mm?

Reply 7: We studied the relationship between interbody height from 1 mm to 5 mm and unsatisfactory outcomes. According to our data, it has been established that a height of 2 mm or less when performing ACDF and a height of 4 mm or more when performing ACCF are associated with unsatisfactory outcomes.

Changes in the text: No changes were made on this comment.

Comment 8. Conclusions are redundant. The last phrase is not necessary. You are merely repeating phrases by describing the opposite of the middle paragraph.

Reply 8: We have removed the last paragraph from the conclusion and added a new sentence.

Changes in the text: The last sentence in the conclusion now looks like this: In other cases, for two-level cervical degenerative diseases, it is preferable to perform a single-level ACCF (P13 LL16-17).

Comment 9. The most important point: It did not specify what criteria were used to separate patients into ACDF and ACCF in this study. Surgeons preference?

Reply 9: In this study, the patients separation into ACDF and ACCF groups was based on surgeon preference.

Changes in the text: In Methods section we add: Patients were divided into ACDF and ACCF groups based on surgeon preference (P6 L19).

Comment 10. Is your proposed Figure 2 an ideal algorithm? It could be misleading as if patients were assigned based on this criterion. Where is cited for Figure 2 in the manuscript? I cannot find it.

Reply 10: We believe that the developed algorithm is possible for choosing surgical tactics in patients depending on the analyzed radiological parameters. Further research is needed to evaluate the effectiveness of the proposed algorithm. The citation in the last paragraph of the Results section of Figure 1 has been replaced by the citation of Figure 2.

Changes in the text: citation of Figure 1 has been replaced by the citation of Figure 2 (P10 L8).

Reviewer #2: Thank you for the opportunity to revise this fine paper; I share some comments below

Comment 1. We highly suggest to revise English language.

Reply 1: We have revised the manuscript and improved English language.

Comment 2. Introduction

In my experience two - level ACDF and 1 level ACCF have different indications, other than restore regional sagittal balance, for example, it is preferred to perform a 1 level ACCF over 2 level ACDF in patients with spinal stenosis secondary to OPPL. Surgical results are often excellent with 2 level ACDF in patients with two level cervical spondylosis, and few patients need corpectomy for better results. You must separate cases where surgical indication is deformity, which may need corpectomy and osteotomies for good balance correction, but this was not the aim of the study. As surgical indications for both techniques are different, comparative results are difficult to evaluate; I highly suggest to mention this at the introduction.

Reply 2: We have added in the **Introduction** section information about the heterogeneity of indications for the use of ACDF and ACCF, as well as the difficulty in interpreting the results when comparing them.

Changes in the text: We added to Introduction section:

...Of course, for two-level cervical spondylosis, the preferred and less traumatic method of treatment is two-level ACDF, while corpectomy or osteotomy is indicated for patients with severe cervical deformity and imbalance. Also, in patients with cervical spinal stenosis combined with OPLL and local kyphotic deformity, the use of an anterior approach is preferable with a lower incidence of respiratory problems and dysphagia after ACDF compared to ACCF (9) (P4 L5-10).

... Such differences in the results of surgical treatment of patients with two-level cervical degenerative disease according to the literature are mainly due to different indications for the use of one-level ACCF and two-level ACDF. In this regard, it is difficult to compare the clinical and radiological outcomes of such ventral decompression and stabilization interventions (P4 LL19-22).

Comment 3. Methodology

Is this study a case - control - study, or a cohort study; this must be specified in order to justify the statistics and interpretation of the results.

Reply 3: In this case, a cohort study was conducted because surgery was performed first, and then risk factors for poor outcomes were studied.

Changes in the text: We added to the Methods Section: A retrospective cohort study was conducted in 1959 for patients... (P5 L13).

Comment 4. Results

Tables are ambiguous and difficult to read; I recommend re-organize the information using charts and figures.

Reply 4: We have converted table 2 into text.

Changes in the text: Now it looks like this in text: All studied clinical parameters before surgery did not have a statistically significant intergroup difference: neck pain pre-operatively ($p=0.53$), upper limbs pain ($p=0.29$), NDI ($p=0.44$), mJOA ($p=0.61$), SF-36 (PCS) ($p=0.44$), and SF-36 (MCS) ($p=0.26$). The evaluation of clinical efficacy after two-level ACDF and one-level ACCF showed significant decrease of intensity of pain syndrome according to VAS in the cervical spine from 86 (81; 94) mm to 19 (10; 24) mm ($p=0,02$) and from 81 (76; 95) mm to 8 (5; 12) mm ($p=0,01$) respectively, and in upper limbs from 89 (75; 92) mm to 8 (4; 12) mm ($p=0,003$) and from 91 (76; 93) mm to 2 (0; 5) mm ($p=0,007$) respectively; improvement of NDI from 74 (60; 88) to 15 (12;20) ($p=0,01$) and from 72 (60; 84) to 8 (6;10) ($p=0,01$) respectively, and mJOA from 9 (9; 11) to 12 (8; 14) ($p=0,01$) and from 9 (8; 12) to 15 (13; 16) ($p=0,01$) respectively; restoring the quality of live according to SF-36 (PCS) from 26,73 (20,36;35,72) to 46,23 (44,56;49,06) ($p=0,006$) and from 28,72 (19,83;36,54) to 55,29 (51,83;57,29) ($p=0,004$) respectively, and SF-36 (MCS) from 33,19 (19,82;39,81) to 43,24 (41,39;46,81) ($p=0,009$) and from 32,21 (18,28;38,99) to 57,66 (51,25;59,22) ($p=0,002$) respectively. Intragroup analysis registered better last follow-up clinical parameters according to VAS, NDI, mJOA, SF-36 (MCS) and SF-36 (MCS) after one-level ACCF comparing with two-level ACDF ($p=0.02$; $p=0.04$; $p=0.02$; $p=0.03$; $p=0.01$; $p=0.01$, respectively). (P5 LL 7-21)

Comment 5. Discussion

Revise language.

Add information about results with patients with OPPL.

Reply 5: We carefully revise English language.

Changes in the text: We added in Discussion section: It has been found that ACCF in patients with OPLL allows complete decompression behind the vertebral body and cannot be performed using ACDF (Chen Z, Liu B, Dong J, Feng F, Chen R, Xie P, Zhang L, Rong L. Comparison of anterior corpectomy and fusion versus laminoplasty for the treatment of cervical ossification of posterior longitudinal ligament: a meta-analysis. *Neurosurg Focus*. 2016 Jun;40(6):E8. doi: 10.3171/2016.3.FOCUS15596). At the same time, in this cohort of patients, ACDF is associated with a lower risk of postoperative complications, especially with multilevel implantation (Katz AD, Mancini N, Karukonda T, Cote M, Moss IL. Comparative and Predictor Analysis of 30-day Readmission, Reoperation, and Morbidity in Patients Undergoing Multilevel ACDF Versus Single and Multilevel ACCF Using the ACS-NSQIP Dataset. *Spine (Phila Pa 1976)*. 2019 Dec 1;44(23):E1379-E1387. doi: 10.1097/BRS.0000000000003167; Liu Y, Qi M, Chen H, Yang L, Wang X, Shi G, Gao R, Wang C, Yuan W. Comparative analysis of complications of different reconstructive techniques following anterior decompression for multilevel cervical spondylotic myelopathy. *Eur Spine J*. 2012 Dec;21(12):2428-35. doi: 10.1007/s00586-012-2323-y). Such patients were not included in this study, and for analysis we selected a homogeneous cohort of patients with common indications for ACDF and ACCF. (P10 LL21-22; P11 LL1-3).