Author’s response to reviews

Title: Cementless short-stem total hip arthroplasty in the elderly patient. Is it a safe option? A prospective multicentre observational study

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Author’s response to reviews:

Dear Editors,

Dear Reviewers,

we herewith submit our revision of the manuscript for renewed review and kind consideration for publication in your Journal BMC Geriatrics.

Thank you very much for your valuable feedback and suggestions, which improve the content of our manuscript markedly.

We revised the manuscript thoroughly and made the changes and adjustments, as you proposed.

The track change function in Word was used, so you can easily find the adjustments in the text.
Also a „clean“ version is provided, so it is more easy to read it.

Our responses to each of your comments are appended below.

We hope you will appreciate our improvements and kindly ask again for consideration for publication in your journal.

Sincerely,

The Authors

Reviewer reports:

Seung-Jae Lim, M.D., Ph.D (Reviewer 1): This is a prospective multicenter observational study comparing the clinical and radiological outcomes as well as perioperative complications of a calcar-guided short stem between a young (<60 years) and a geriatric (>75 years) population.

This manuscript may include some interesting points. However, authors need for clarify several points for more consideration.

1. The clinical follow-up period is too short to validate their conclusion, 'advanced age and potentially reduced bone quality should not necessarily be considered as contra-indications for calcar-guided short stem THA'. Group A has a mean follow-up of 52.0 months (SD 17.9) and group B has only a mean follow-up of 43.3 months (SD 21.3).

The authors: You are right. The short-term follow-up does not allow a validation of this conclusion. Thus we changed the conclusion to one that we believe is appropriate to make. Further follow-up is needed and will be obtained. However, at present, only short-term follow-up is available for this multi-center study. As you will see, we adjusted the text in the manuscript accordingly.
2. Total hip arthroplasty with a proximally coated single-wedge cementless stem had been generally considered not to be suitable for Dorr Type C femurs. In a recent publication (Kim SM et al. Int Orthop. 2018 Sep;42(9):2069-2076.), advanced age, higher American Society of Anesthesiologist grade, femur morphology of Dorr type C, and the use of a calcar-loading short stem stem increased the risk for periprosthetic femoral fracture. Did you check the type of femurs according to Dorr's criteria?

The authors: Thank you very much for this valuable comment. We have now analyzed Dorr’s criteria as you proposed. In conformity to the mentioned publication it seems like also with the investigated stem Dorr type C femurs are associated with increased risk for periprosthetic fractures. Naturally in the elderly group the incidence of Dorr type C femurs is higher compared to the young group. As you will see in the manuscript, due to these findings, we adjusted our discussion and our conclusion accordingly.

3. In this study, postoperative periprosthetic femoral fractures during follow-up were observed in 0.4% in group A and 3.6% in group B respectively, the difference being statistically significant ($p = 0.02$). And, a high incidence (3.6%) of postoperative periprosthetic femoral fractures in group B only in a mean follow-up of 43.3 months (SD 21.3) may be an alarming issue. Further follow-up is necessary to draw safe conclusion regarding postoperative periprosthetic femoral fractures in elderly patients using this femoral stem.

The authors: You are right. Although overall the revision rate does not differ between the two investigated groups, the rate of periprosthetic fractures in the elderly group may be an alarming issue. As described above, most likely the reason for those fractures can be found in femur morphology and reduced bone quality. Therefore, we adjusted the discussion thoroughly (as well as the conclusion), however, it remains unknown if those mainly traumatic fractures could have been prevented using cemented THA. Also definitely further follow-up is necessary.

4. I believe that the findings of this study must be interpreted with caution because this study may introduce a new design of femoral stem. One of the critical weaknesses of this study included the lack of randomized controlled trial. Additionally, the authors studied only one design of prosthesis and therefore cannot generalize their findings to all cementless short-stem total hip arthroplasties.
H. D. Veldman (Reviewer 2): An interesting study comparing the clinical and radiological results of short stem total hip arthroplasty (THA) between elderly (>75 years) and middle-aged (<65 years) subjects. Although I am overall positive about this well-written work, I have a few comments/ questions for the authors:

* Firstly, I would suggest to use terms like the 'middle-aged' (i.e. <65yrs) and 'elderly' (i.e. >75 years) subjects (or synonyms) instead of group A and B. This will improve the readability of the article.

The authors: We do agree to your comment regarding the readability of the manuscript. However, we prefer the terms “young” and “elderly”. The range of age in the young group is 24.3 – 59.9 years. This to us, regarding the indication for THA, is to be considered quite young. We actually actively decided before conducting this study to leave out the “middle-aged” group in order to be able to obtain clear differences. Therefore we adjusted the manuscript and used the terms “young” and “elderly” instead of “group A” and “group B”.

* Since the follow-up time of the elderly and middle-aged subjects are quite short (mean: 43 and 52 months respectively) and the accompanied standard deviations are relatively high (17.9 and 21.3 months respectively), I was wondering whether the authors could also provide the range of follow-up time for both groups.

The authors: Thank you for this comment. We have added the range of follow-up to the manuscript. We are aware of the short-term follow-up. However, at present a longer follow-up is not available. We strongly believe, that undesirable results regarding the research question will mostly arise early after implantation. Thus, although mid-term or long-term results can not be presented at present, the obtained results are very valuable in order to find the right indications in short-stem THA.
As a reader I am wondering whether the comparison the authors make is fair. The authors namely compare the results after short stem THA between elderly and middle-aged subjects, but explain the higher number of postoperative fractures by 'the higher risk of accidental falls' in elderly and the lower Harris Hip Score by the fact that elderly patients 'usually have more comorbidities that affect normal gait and are generally less active than younger patients'. I understand that these explanations also play an important role, but is the comparison in their study fair in that case? It might be more relevant to compare short stems with cementless or cemented conventional stems in per specific age group.

The authors: We agree to your comment. As you will find in the manuscript we have adjusted the results, the discussion and based on this also the conclusion. We believe that the research question, comparing young and elderly patients with short-stem THA, is of great interest. A comparison of short stems to cementless and cemented conventional stems in per age group would be also very interesting, however, we had not obtained this data.

The number of postoperative periprosthetic fractures reported in this study in the elderly group is 5 and in the middle-aged group is 1. Percentagewise, the incidence of postoperative periprosthetic fractures therefore is 9-times higher in the elderly group, even with the elderly group having a shorter follow-up time than the middle-aged group. In my opinion, this suggests that the worsened bone quality in elderly subjects indeed results in more implant related complications. Based on this result, is it than even worth considering these type of short stem implants in the elderly subpopulation?

The authors: Thank you for this comment. As described above, also answering reviewer no 1, we have obtained data on Dorr’s criteria and came to the conclusion that in Dorr type C femurs indeed the investigated implant should not be considered and surgeons should be cautious. However, age alone is not necessarily to be considered a contraindication. There are a lot of elderly patients with Dorr type A or Dorr type B femurs, short-stem THA seems to be a safe indication. As discussed in the manuscript generally elderly patients show an increased risk for periprosthetic fractures regardless of the implant used.

This study indicates that old age alone not necessarily determines a bad outcome after short stem THA. By careful selection of elderly patients with bone morphotypes eligible for short stem THA, results comparable to that of middle-aged patients might be obtained. Unfortunately, the authors do not describe the used eligibility criteria for short stem THA. Especially in the elderly
group, selection of eligible cases for short stem THA based on bone morphology is expected. Could the authors provide extra information on which cases were considered eligible for short stem THA (based on what criteria)?

The authors: In the present multi-center observational study unfortunately no documented eligibility criteria was used, but mostly the surgeons preference. However, we have now obtained preoperative Dorr’s classification. This provides valuable information on the indications that were included. We have added another table including this information. Since only a total of 9 patients were operated with Dorr type C femur morphology, indications were in conformity with the present literature. Our conclusion now supports the procedure of not recommending short-stem THA with the investigated implant in Dorr type C femurs.

* Additionally, measurements describing the femoral canal morphology and the bone quality such as the cortical index or canal flare index could provide valuable extra information on the femora in which the stems were implanted. It would be interesting to assess whether differences between groups (A vs B) exist, which is expected.

The authors: Thank you for this valuable comment. As you will see in the manuscript we have obtained the Dorr’s criteria and provided the data on differences between the two groups.

* Finally, sub-analyses of the morphology of the proximal femur of the elderly patients with good clinical and radiological results could help identifying future cases of elderly patients potentially eligible for short stem THA.

The authors: You are right. As described above we have obtained this data and were now able to help identifying future cases potentially eligible for short-stem THA and those who should not be considered.