

Peer Review File

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Reviewer A

The authors report the radiographic results and complications of magnetically controlled growing rod (MCGR) treatment in patients with early-onset scoliosis. Subgroup analyses were performed on primary versus conversion cases and single versus dual rods.

This is a valuable project that is worthy of publication. Feedback includes:

Reviewer A Comment 1:

- The abstract should also include patient age, kyphosis, and primary vs conversion data.

Reply 1: We added patient age, kyphosis, and primary vs conversion data in the abstract.

Changes in the text: line 28-30, line 32-34, 35-36,

Reviewer A Comment 2:

- Throughout the manuscript and in the abstract, the authors should include the risk and/or rate of complications.

Reply 2: The overall complication rate was added in the abstract and results and already discussed in the discussion.

Changes in the text: line 38-40, line 145-153

Reviewer A Comment 3:

- The authors should evaluate complications as per an accepted complication classification such as Smith et al. *J Pediatr Orthop.* 2015 Dec;35(8):798-803 or the modified Clavian Dindo Sink Roye et al. *Spine Deform.* 2022 Sep 2.

Reply 3: This important point has been taken into consideration. However, complications other than implant related were not classified during the review of the patient files and we have been unable to redo the review due to administrative reasons. We have therefore not changed our categorization.

Changes in the text: However, we have added the above as a limitation in the discussion. Line 228.

Reviewer A Comment 4:

- The authors should use the accepted term “growth friendly” rather than “growth sparing” as per the legacy Children’s Spine Study Group, legacy Growing Spine Study Group, the Growing Spine Committee of the Scoliosis Research Society, and the Pediatric Orthopaedic Society of North America. El-Hawary / Akbarnia *Spine Deformity* 3 (2015) 105e106.

Reply 4: We changed “growth sparing” throughout the text and used “growth friendly”.

Changes in the text: Line 28, 51, 59, 166, 187, 204.

Reviewer A Comment 5:

- In the results include the frequency of rod lengthening for the patients.

Reply 5: We included results of age of mean age of MCGR implantation, mean (range) follow-up time and the overall mean (range) number of MCGR lengthening’s.

Changes in the text: Line 118-120.

Reviewer A Comment 6:

- Focus the results / discussion of the growth from post-operative to final. i.e., the change in height from pre-op to immediate post-op is not related to growth.

Reply 6: We changed according to comment 6.

Changes in the text: Line 34-35

Reviewer A Comment 7:

- The conclusions state “after a minimum of 5 years”. As only 12 of the 52 patients had 5 year follow up, it may be more accurate to state “after a minimum of 2 years”.

Reply 7: We changed in line with suggestion

Changes in the text: Line 30, 236

Reviewer A Comment 8:

- The labelling of p values in Figure 1 is confusing. P values should be included for pre-post, post-final, and most importantly for post-final.

Reply 8: We clarified the p-values

Changes in the text: Line 376-379

Reviewer B

The authors present a series of 52 patients treated with MCGRs, analyzing the radiological outcomes at short-to-long follow up time. The sample size and the follow up time are of interest for the evaluation of MCGR treatment performance.

The following are my specific comments:

Reviewer B Comment 1:

Methods:

Lines 84-96: the surgical technique and use of MCGR are well described in multiple manuscripts published in literature, this paragraph does not add any further information to the methods specifically used in this study. I would suggest to summarise it as much as possible and/or take away the entire paragraph, unless the authors use a surgical approach different from the one usually adopted.

Reply 1: We shortened the paragraph

Changes in the text: Line 72-80

Reviewer B Comment 2:

Line 99: How many CTs were available? I can't seem to find details about this in the results. This paragraph would need more details. Why looking at CTs? Was it for the lung height?

Reply 2: We changed the sentence since the measurements were performed on radiographs. CT was performed for preoperative planning but not for use in this study.

Changes in the text: Line 82

Reviewer B Comment 3:

Line 100: Using the initials of the author performing the imaging analysis (FE), without saying "author of the study" or something equivalent, is confusing. I would specify it every time the author is named.

Reply 3: We clarified the initials and added "author of the study".

Changes in the text: Line 83, 85.

Reviewer B Comment 4:

Lines 99-114: Were the measurements taken only once by one author? I would suggest, if possible, to have some repeatability/reproducibility data on the measurements taken. In addition, were the images calibrated? I would suggest specifying this.

Reply 4: We added "All measurements were doublechecked twice on calibrated radiographs by FE (author of the study)" -to clarify the method.

Changes in the text: Line 84-85

Reviewer B Comment 5:

Lines 99-114: What was the time between one scan and the following? There appears to be no data on the time between scans. The whole imaging paragraph needs more details.

Reply 5: We have clarified the follow up time in table 1 and figure 1. We included results of age of mean age of MCGR implantation, mean (range) follow-up time and the overall mean (range) number of MCGR lengthening's.

Changes in the text: Line 118-120.

Results:

Reviewer B Comment 6:

Lines 149-159: It is not clear why creating the subgroups by follow up time. What is the rationale for having these subgroups? It is not specified in the methods. Same goes for the figure associated with the follow up time subgroups. I would very much suggest to avoid using this subgroup. I would also show more graphs with different radiological outcomes, such as major curve angle and kyphosis.

In general, I would prefer to see the results reported as mean (minimum-maximum), for clarity.

Reply 6: We clarified the aim for subgroups in the text.

Changes in the text: Line 24-26, 73-78,

Reviewer B Comment 7:

Table 2:

I would suggest call the "Cause" for scoliosis (neuromuscular, congenital, etc.) "etiology" or "aetiology".

Reply 7: We changed according to the suggestion.

Changes in the text: Line 118, 217, Table 1,

Discussion:

Reviewer B Comment 8:

Lines 209-215: The new indications for MCGR insertion from the notified body indicate a suggested time to removal for MCGR of two years. Longer follow up times might not be possible with prospective patients. I would ask the authors if they could comment on this.

Reply 8: The new indications for MCGR removal after 2years of treatment will have to be taken into considerations in the future for when to insert MCGR and when to choose another method. The positive effects with non-surgical lengthening's is still important to take into considerations.

Changes in the text: We have added a sentence in the discussion regarding this, Line 207-209.

Reviewer B Comment 9:

Lines 241-260: I am quite surprised by the results of the single vs dual rods. The aetiology analysis is interesting and something that might need further assessment in future studies, in single vs dual rod approach. Even if the results did not reach statistical significance, I would still not argue that single rods are as efficient as the dual ones. In a cohort of 28 patients, the authors present a total 22 implant failures, versus 16 in the dual rod construct (and mostly in the dual group were pullouts, so "fixation-related" complications). From the data presented by the authors, I would not conclude single rods are as efficient as the dual ones.

Reply 9: We clarified and added to the sentence: "The rates of complications and unplanned surgeries did not differ significantly between single and dual rods" + but the etiology for EOS varied between the groups.

Changes in the text: Line 40, 216-217.

Reviewer B Comment 10:

There is no comment on the primary vs conversion cases in the discussion, which would be of much interest for several authors.

Reply 10: We added a short comment on primary vs conversion cases in the discussion as well as in the results.

Changes in the text: Line 35-36, 157-163.

Reviewer C

Thank you for the opportunity to review this work which is a review of a series of MAGEC rods from Sweden.

I have a number of concerns over this paper:

Reviewer C Comment 1:

1. Line 68 page 3 states - "Most published studies include small numbers of patients, with heterogenous samples..." It seems to me that this paper is the same and I am struggling to see what it contributes to the literature

Reply 1: We would like to believe that it contributes with the comparison between single and dual rods and to the evaluation of Swedish patients that up to date hasn't been evaluated.

Reviewer C Comment 2:

2. There is no assessment of statistical power to justify the statistical analysis made. This is particularly of concern given that the 52 patients are then in 4 different groups.

Reply 2: The data has been presented according to the overall group and when the individuals were divided into smaller subgroups it was very clearly stated. We understand the concern but believe that the interesting indications that e.t. single rods can be useful in certain EOS groups is of interest for upcoming treatments and studies.

Reviewer C Comment 3:

3. I am concerned over the methods used and the mixing of x-rays and CT scans given the differences this could make, particularly to T1-T12 and T1-S1 height measured in millimeters and where a different technique could materially change the result.

Reply 3: This fact has been clarified under Reviewer B Comment 2 and 4:

- We changed the sentence since the measurements were performed on radiographs. CT was performed for preoperative planning but not for use in this study. Changes in the text: Line 82.
- We added "All measurements were doublechecked twice on calibrated radiographs by FE (author of the study)" -to clarify the method. Changes in the text: Line 84-85.

Reviewer C Comment 4:

4. I struggle to understand why the standard deviation is so much larger than the mean value for change in T1 - T12 height particularly as that suggests that the distribution is one of negative growth. Whilst this might be explained away, it raises concern for me over the accuracy of measurement and I note the weakness highlighted by the authors of a single measurer for all of the data. Is there a measurement error here?

Reply 4: We recalculated the data and there is no error in the measurements or calculations.

Changes in the text: no changes

Reviewer C Comment 5:

5. It is not clear what the conclusion of statistically significant growth at 5 years follow up is being compared to and why the growth a less than 5 years is not significant. Again is this an issue of too small a sample size?

Reply 5: Probably the sample size is too small, but these are all the patients that have gone through the treatment at our two hospitals. A larger sample size will be of value in the future but in the moment the data from these cases are of great value.

Changes in the text: However, we added the above as a limitation in the discussion. Line 232-233.

Reviewer C Comment 6:

6. There are no 95% confidence intervals on the plots which would be a useful addition.

Reply 6: Unfortunately, the plots with confidence intervals would make the diagram unreadable.

Reviewer C Comment 7:

7. There are a number of typos (I accept this may be due to the submission software but this needs addressing - Line 158 p 5).

Reply 7: We have had the manuscript for language review and rechecked it.

Reviewer C Comment 8:

I think this would be a far more powerful paper if the MAGEC group was compared to something else (TGRs for example). I think the source data needs to be more homogeneous (primaries only or only one diagnosis or part of the CEOS classification, for example). I think a power analysis is required to demonstrate the validity of any statistical analysis performed. I think there needs to be a stronger message as to why this series is of interest to the reader.

Reply 8: We will consider this for future studies.