Author's response to reviews

Title: Adolescent idiopathic scoliosis (AIS) treated with arthrodesis and posterior titanium instrumentation: 8 to 12 years follow up without late infection.

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Author's response to reviews: see over
Cover letter

Referee 1:

Reviewer: Matthew Dobbs

Thank you very much for your review!

Your comment:

..My only suggestion is that the conclusions be tempered to match the results. Despite the fact that there were no late infections the number of patients is relatively small and one can't conclude that the system is better in terms of less infection risk.

Authors comment:

This is absolutely correct, it cannot be concluded, that the system is better in term of less infection rate. However, in the manuscript we never used the term: .. the system is better.. . Refer to your suggestion we changed the conclusion in the abstract and in the main text at the revised manuscript following:

Abstract Conclusion

Posterior titanium instrumentation is a safe and effective procedure in the surgical correction of AIS. In this retrospective study with small patient number, it shows favourable long-term results; in particular, the loss of correction is low, no late infection occurred and there was a very high survival rate of the implant itself.

Article Conclusion

In summery, the study presents the first long- term results with a posterior titanium instrumentation for the treatment of adolescent idiopathic scoliosis. The results are encouraging: the implant is safe and effective with a high level of patients satisfaction; in particular, no late infection occurred and there was a very high survival rate of the implant itself. However the study design was retrospective and the patient number small.
Referee 2:

Reviewer: Hitesh N. Modi

Thank you very much for your review!

Your comment:

Results:

Authors need to provide the details of sagittal balance in short. Whether thoracic kyphosis and lumbar lordosis were maintained at final follow-up.

Authors comment:

The results for thoracic kyphosis and lumbar lordosis are given by table 1:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline</th>
<th>Post-OP</th>
<th>Correction rate</th>
<th>Follow up</th>
<th>Correction rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracic curve (°)</td>
<td>62.4±14.1</td>
<td>26.9±9.8</td>
<td>56.9%</td>
<td>31.0±11.2</td>
<td>50.3%</td>
</tr>
<tr>
<td>Lumbar curve (°)</td>
<td>43.5±14.9</td>
<td>16.3±9.9</td>
<td>62.5%</td>
<td>21.3±13.3</td>
<td>51.0%</td>
</tr>
<tr>
<td>Apical translation (mm)</td>
<td>51.7±26.2</td>
<td>18.7±14.7</td>
<td>63.8%</td>
<td>25.3±11.9</td>
<td>51.1%</td>
</tr>
<tr>
<td>Frontal balance (mm)</td>
<td>15.4±12.4</td>
<td>13.8±1.5</td>
<td></td>
<td>10.8±9.7</td>
<td></td>
</tr>
<tr>
<td>Thoracic kyphosis angle curve (°)</td>
<td>19.1±14.5</td>
<td>22.1±11.1</td>
<td></td>
<td>25.8±12.3</td>
<td></td>
</tr>
<tr>
<td>Lumbar lordosis angle curve (°)</td>
<td>56.1±12.8</td>
<td>55.9±10.2</td>
<td></td>
<td>57.9±9.9</td>
<td></td>
</tr>
</tbody>
</table>

Your comment:

Material and Method: 4 patients could not be classified according to these system- what are they, please explain.
Authors comment:

We have changed the text following:

4 patients could not be classified according to King (3x thoracolumbar, 1x left lumbar).

Your comment:

*Surgical technique:* Nearly all operative procedures were performed by the senior author (H.G.) himself. *- suggestion. Delete word ‘nearly’.

Authors comment:

We have changed the text following:

All operative procedures were performed by the senior author (H.G.).

Your comment:

*Posterior fusion with the titanium implant was performed in all cases. - Sentence needs correction. Titanium implants cannot perform fusion.*

Authors comment:

This is correct, we have changed the text in the revised manuscript following: Instrumentation with the titanium implant was performed in all cases.

Your comment:

The blood loss was 1980 ml on average (range 600 to 4500ml), and the operation time was 270 min on average (range 140 to 410 min). Fusion with the implant included 10.0 (range 6 to 13) vertebrae on average. The average cephalic level of fusion was T 5.2 and the average caudal level of fusion was L 2.3. The two rods were fixed with a combination of hooks and pedicle screws only, with an average of 8.9 hooks and 4.2 screws per patient. A total of 424
hooks and 209 pedicle screws were inserted in 50 patients.

should be in results and discussion.

Authors comment:
In the revised manuscript we have changed the text into the section “results”

Your comment:
Baseline evaluation: using Cobb's method - using the Cobb method.

Authors comment:
This is correct, we have changed the text: .. using the Cobb method..

Your comment:
Attention was also paid to radiological complications such as rod fracture, pedicle screw fracture or hook dislocation. - Keeping in mind that this is one of the longest follow-up with titanium implants - special attention should also be paid to pseudarthrosis and related back pain.

Authors comment:
This is correct, however we have had special attention to back pain, too – within the SRS 24 questionnaire:

Please see results: 42 of 49 patients (86%) reported to suffer never or rarely from back pain at rest.
Your comment:

Result: Write statistical analysis part for frontal and sagittal balances of all patients preoperative, postoperative and at final follow-up time.

Authors comment:

We have changed the text in the revised manuscript:

SPSS Version 8 software for Window was used for the statistical analysis, part for frontal and sagittal balances of all patients pre-, postoperative and at final follow-up time and p values of ≤ 0.05 were considered significant.

Your comment:

There was one patient dissatisfied with the treatment- kindly evaluate the details of this patient whether hook fixation or any other problem- what are the reasons.

Authors comment:

We have changed the text in the revised manuscript:

only one female patient was somewhat dissatisfied – however we saw no objective (e.g. loss of correction) signs concerning this result.

(This female patient -number 45 of study- has had a thoracolumbar scoliosis, with a instrumentation/ fusion from T10 to L3 (6 hooks, 5 screws) with good correction and no loss of correction at follow up. She has had 68 out of 120 points at SRS).

Your comment:

Discussion: Full form of LOSP should be written
Authors comment:

It is now written in the revised manuscript:

The indications were late operative site pain (LOSP)

Your comment:

Discussion is entirely based on infection. However, I think functional and satisfaction results should also be discussed. A long follow-up study should not only be based on presence or absence of infection.

Authors comment:

This is absolutely correct, however the discussion included different subjects e.g. correction rate, overall complication and satisfaction.

For example:

Although the Harrington rod (developed originally for patients with poliomyelitis) was used most frequently throughout the world for operative correction of AIS for over 40 years [10], overall long-term results are scarcely examined and often refer only to specific questions [10]. This might be due to the fact that many of these implants were removed after only a few years, routinely or because of complications [14].

For the implants with pedicle screws and hooks fixation very few long-term results have been published too, although these systems has been available as an implant for over 20 years:

Helenius et al. [15] investigated 57 patients with AIS and CD instrumentation a mean of 13.0 years post-operatively. Pre-operatively the average frontal thoracic Cobb angle had been 55°. Upon follow up, the average thoracic curve was 32°, resulting in a 42% correction. The frontal lumbar curve showed an average correction of 32% at the time of follow up. The documented complications were one case of acute (1.7%) and three cases (5.3%) of late deep
infection, but prophylactic antibiotics (single shot) had not been administered. **Clinically, the**
average SRS score was 97 points, and 6 patients (10.5%) reported back pain often or very often.

Authors further comment:

Unfortunately, there are exist no further original datas in the field of subjective long term results due to this topic (10 years postoperatively, minimum 50 patients).