Author’s response to reviews

Title: Curve progression after long term brace treatment in adolescent idiopathic scoliosis: comparative results between over and under 30 Cobb degrees. SOSORT 2017 Award Winner.

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Author’s response to reviews:

Dear editor and reviewers, thanks for examining our paper. We hope you found it interesting.

We carefully read the comments of reviewers and followed their instructions in making some changes to the text. Additionally, a native English speaker revised the original text.

Reviewer reports:

Reviewer #1: I enjoyed reading the manuscript. The outcomes of their treatment were very good.

Reviewer #2: This is a very interesting study showing that the initial curve angle is not relevant, instead what really matters is the result at the end of treatment.

- For this reason, I would suggest the authors to make a further subgroup analysis, comparing those who finished with more than 30° and those with less. I would expect those with less than 30° to be more stable.

- This type of sub-analysis would not change our results but we did add it to the text for context:
“To compare the outcomes of sub-group patients: (1) Over and under 30 Cobb degrees at start of treatment, to determine whether the initial curve’s gravity could influence long-term results; and (2) over and under 30 Cobb degrees at end of weaning.”

And

“The patients were divided in sub-groups based on Cobb degrees. Those with curves ≤ 30 Cobb degrees and those with curves > 30 Cobb degrees at the beginning of treatment and at end of treatment.”

And

“Seventy-five patients (81%) had curve angle ≤30°, whereas 18 patients (19%) had a curve angle >30° at the end of conservative treatment.

The group greater than 30° showed a pre-brace scoliotic mean curve of 43.94°, at the end of weaning it was reduced to 34.89° and it increased to 38.39° at long term follow-up; instead the group <30° showed a pre-brace scoliotic mean curve of 29.35°, at the end of weaning it was reduced to 15.05° and it increased to 18.21° at long term follow-up. No significant differences were determined for CM between end of weaning and long term follow up period.

Long term follow-up revealed a moderate increase in the Cobb angle in both groups. The mean Cobb angle increase was 3.16° in the group with Cobb angles ≤30° and 3.50° in the group with Cobb angles >30°. Difference between groups was not statistically significant.”

- The details of the samples are reported twice. It’s enough to have them in the results.

It's not clear at the end of methods if the author consider the 30° cut off at the end of treatment or at the beginning while it's reported in the aims.

- We add in the text: "The patients were divided in sub-groups based on Cobb degrees. Those with curves ≤ 30 Cobb degrees and those with curves > 30 Cobb degrees at the beginning of treatment and at end of treatment.”

- It's not clear the duration of follow up, sometimes it's 10 years, others 15.

- The minimum follow up was 10 years but the mean of follow-up was 15 years.

- I would compare the results also with the natural history described in the Iowa Study (Weinstein et al).

“Past studies on the natural histories of AIS showed a progression of the curve also at the end of the growth, but the degree of progression was not clear. Weinstein reported that “even in progressive curves it cannot be predicted, for example, whether a progressive 30° curve’s natural history would be to progress to 38° or to 78°”(15). Instead Bjerkreim reported in his paper about the Progression in Untreated Idiopathic Scoliosis that the progression was 3 degrees per year
before 20 of age and 1 degree per year after 20 years. Curves below 40 degrees increased significantly less than bigger curves and curves measuring from 60-80 degrees increased the most (16).”

Reviewer #3: The authors should be thanked for sharing these long-term results of conservative orthopedic treatment with PASB or Lyon brace. Indeed all braces are not identical and the rigor of the treatment is a guarantor of outcomes.

• In addition, the natural course of untreated scoliosis should be emphasized, and I advise the authors to cite Bjerkreim (Ingjald Bjerkreim & Ibrahim Hassan (1982) Progression in Untreated Idiopathic Scoliosis After end of Growth, Acta Orthopedica Scandinavica, 53: 6, 897-900] Conclusions are clear and statistically significant: Double curve below 40°: 0.6°/an and after 20 years: 0.5°/year. Between 40°-60°: 1.5°/an. For Single curve: below 40°: 0.9°/an after 20 years: 0.5° / year and between 40° - 60°: 2° / year.

- We add in the discussion: “The studies on the natural histories of AIS showed a progression of the curve also at the end of the growth, but the degree of progression were not clear. In fact Weinstein reported that “even in progressive curves it cannot be predicted, for example, whether a progressive 30° curve’s natural history would be to progress to 38° or to 78°”(15) instead Bjerkreim reported in his paper about the Progression in Untreated Idiopathic Scoliosis that the progression was 3 degrees per year before 20 of age and 1 degree per year after 20 years. Curves below 40 degrees increased significantly less than bigger curves and curves from 60-80 degrees increased the most.(16)”

• Tan's article (20) is interesting because he suggests an initial Cobb angle of 25 degrees as an important threshold magnitude for long-term curve progression. The reason for this stability can also be discussed. The rigorous conservative orthopedic treatment stiffens the curvature. However, we know that, in adulthood, the curvatures of more than 70° are less progressive due to the rigidity.

- We add in the discussion: The major stability of the curve after the brace treatment is not clarify from the results but probably is related to stiffness of the treated curves.