Reviewer’s report

Title: The new Lyon brace: ARTbrace. New concepts based on scoliosis detorsion. Prospective study of the first 225 early radiological results of in-brace correction

Version: 2 Date: 29 July 2014

Reviewer: M S Wong

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Minor Essential Revisions

ARTbrace is a relatively new orthosis to the field and authors have put a lot of effort to design and study its clinical efficacy. The following suggestions would be useful to improve the orthosis description and measurement of clinical outcome of the captioned orthosis:

- Further improvements in English writing would be beneficial for the presentation of the whole manuscript.

- The five innovative concepts of ARTbrace seem not new and some tended to be repeated.

- The first, third and fourth concepts are very close and repetitive explanations of de-rotational effect for correction of scoliotic spine via lumbar and thoracic segments. The authors may consider streamlining and combining into one concept.

- For the second concept, squeezing action via spreading over the entire cylinder surface may not work in the actual situation. In the correction of 3D deformities of the scoliotic spine, rooms should be provided for migration of lateral curvature, rotated vertebrae and breathing exercise. In this design, actually various 3-point pressure systems are provided to correct the lateral curvature and vertebral rotation from different anatomical planes.

- The fifth concept is an explanation of de-coupling effect between lateral curvature and vertebral rotation which has been discussed and emphasized in the literature.

- The 4D global correction of ARTbrace should further be explained as it has been generally accepted that balancing among the three anatomical planes are very important for harmonic growth and functioning of the spine.

- The proposed concept should be verified with mathematical model and advanced imaging technique (referred to the changes of bony geometry).

- In the procedure of CAD/CAM scanning, it would be useful to quantify and document the amount of axial elongation, lumbar and thoracic shift, de-rotation...
and lateral tilting; and how close would be in comparison between the corrected posture captured by CAD/CAM and the final in-orthosis situation.

Discretionary Revisions
- The current clinical outcomes of ARTbrace look quite promising but are limited to short-term (3 days follow-up). Long-term results are expected.
- The suggested seating posture for the patients using ARTbrace may lead to early tiredness of the back and lower limbs because no back rest is provided to the patients who may need to sit a prolonged period of time for reading and writing.
- The patients’ compliance of ARTbrace should also be studied.

Level of interest: An article of outstanding merit and interest in its field

Quality of written English: Needs some language corrections before being published

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

'I declare that I have no competing interests'