Reviewer’s report

Title: RESULTS OF ULTRASOUND-ASSISTED BRACE CASTING FOR ADOLESCENT IDIOPATHIC SCOLIOSIS

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Reviewer: Yong-Ping Zheng

Reviewer's report:

This paper presented a method of using 3D ultrasound imaging to increase the effectiveness of brace fitting for patients with scoliosis, which can avoid radiation exposed by the patients during traditional X-ray evaluation. From the results of the study, the assistance of ultrasound during the brace fitting and readjustment does reduce the need of repeated X-ray evaluation and the time needed for brace adjustment, in addition with a better improvement of curve correction. The followings comments can be considered for improving the manuscript:

Background

* The potential of using 3D ultrasound imaging has recently been reported by different groups. It is suggested to include some published papers most relevant to the content of this paper so that readers can have a better understanding about the feasibility of 3D ultrasound imaging, such as followings:


* It is a little bit surprised that the above mentioned paper, Li et al (2012) about the brace fitting using 3D ultrasound, has not been included in the background, as this the best
reference for the current paper. Proper description about the difference between the present study and Li et al. (2012) may better be given to give reader a clearer view about the motivation of the present study.

Methods

* Since the two groups of subject were not recruited during the same period (control group, retrospectively; intervention group, prospectively), there are a number questions readers can ask: what is the time interval between the recruitment of the two groups? are the types of scoliosis matched? what is the range as well as mean (SD) of the Cobb angles of the two groups, any difference? how to make sure the bracing techniques of the clinic and the staff are consistent during the two period of the recruitment time, i.e. whether any techniques, practice, or awareness (such as the use of X-ray) improved? The authors should give more information about these.

* Page 6 line 57: should be (2M, 15F; age 13.2 ± 1.4 years)

* Page 7 Line 8: Since females have their puberty ages started earlier than males, will generalizing the inclusion age the same amount them affect the results?

* Page 8 line 27: "The air bag was attached on the surface to measure the interface pressure applied between the bolster and body." As bolsters were applied in different region at the trunk, thus the pressure distribution of the air bags attached on them will vary between regions. Is there any related concern of the pressure difference during the placement of the bolster?

* Page 9 line 3: As mentioned in the text, 2nd ultrasound image was overlapped with the in-brace radiograph. It seems that the lamina positions do not always appear in line with the lateral contour of the vertebral body. Is it the reason that causes the approximately 2 degrees discrepancies between the lamina method and the Cobb's method? If so, is it solvable?

Results

* Again, are both groups having the same distribution of the primary curves? As mentioned below in the discussion session, the region of interest of the spine might have correlation with the amount of curve correction improvement.

* Page 10 line 23: should be 0.02 to 0.22
Discussion

* In figure 3, lamina seems to be less observable in the lumbar region. Hence readers may want to know whether the difference of the anatomic shape of the thoracic and lumbar vertebrae has an effect of the accuracy on the brace correction. For instance, in Page 11 line 8, 7/17 patients in the intervention group were benefitted after the US-assisted adjustment, are the improved regions happen most likely in a certain region, or the improvements are randomized in different regions of the spine? More detailed discussion is needed.

* In general, the discussion is too superficial, and the authors should discuss their findings in related to available knowledge so that readers can understand better what additional knowledge the paper adds to the literature. Since Li et al (2012) has reported that 3D ultrasound imaging can help bracing, the authors need to enhance the discussion.

* In addition, any potential drawbacks in using the new approach? Any limitations in the current study, which can be improved along this research direction?

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Quality of written English
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Acceptable

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I am an inventor of patents related to 3D ultrasound imaging for scoliosis assessment, Scolioscan, licensed to Telefield Medical Imaging Ltd through the Hong Kong Polytechnic University. I currently has a consultancy arrangement with this company through the Hong Kong Polytechnic University.

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