Reviewer’s report

Title: The role of the paravertebral muscles in adolescent idiopathic scoliosis evaluated by temporary paralysis.

Version: 0 Date: 05 Jun 2017

Reviewer: Lok Kan Connie CHENG

Reviewer's report:

The role of para-psinal muscles in the etiology or natural history of idiopathic scoliosis has been discussed for many years. Various studies have investigated different properties of para-spinal muscles in IS patients including histology, biomechanics, EMG and morphology but still they are unable to conclude whether the changes observed in para-spinal muscles indicate a progressive or corrective effect to IS. This study attempted to understand the role of para-spinal muscle by paralyzing one group of muscle and observe the response of IS. The reviewer found this method innovative.

After reading the manuscript, questions and comments based on the study design and the presentation style are summarized as follows.

1. Keywords are missing in the Abstract part.

2. Botulinum toxin A (BTA) was injected to patients' iliopsoas muscle on the concave side of the curve as described in Abstract and Methods (Line 88). What was the reason to put the focus in this muscle group? The rationale or the importance of iliopsoas muscle should be thoroughly elaborated in Introduction or Discussion.

3. It was noted that in many places of this manuscript, the presentation is inconsistent with the common presentation in most journal articles as in Line 30 "idiopathic adolescent scoliosis", Line 53 "prossessus transversi" (should be transverse process) , Line 100 "Nash and Moe's classification", Line 109 the citation of equipment's company, Line 131 "corset" (should be brace) and Line 156 "5 to ten degrees".

4. In Line 40, reference 7 is missing from the reference list.

5. In Line 48, "trophy" means hypotrophy or atrophy?

6. In Line 49 and 50, the difference of muscle size asymmetry was not presented in reference 14.

7. In Line 55, the reference paper was describing psoas major but not iliopsoas.
8. In Line 56, the muscle attachment site should be femur instead of hip.

9. In Line 58, what does "hypnotized role" means?

10. From Line 58 to Line 61, if this statement "the hypnotized role of … secondary and compensatory" is a hypothesis of iliopsoas muscle activities being associated with IS lumbar curvature the statement, should this study only focused on IS patients with major lumbar curve (type 5 or 6 in Lenke classification)? What kind of curve type to be included should be explained in Methods. Also the statement is better to be supported by reference(s).

11. In Line 71, the authors cited reference 17 to support the positive effect of ITB in neuromuscular scoliosis. However, it seemed to have contradicted with the conclusion of the original reference. Inappropriate use of citation was found in a number of places. For example, reference 20 in Line 92 was a commentary on ultrasound guided injection which a reference which can serve as a guideline is suggested for Methods. Similar problems were also found in reference 19 in Line 98, reference 20 and 21 in Line 156.

12. In Line 83, the authors mentioned the recruited patients were being treated for AIS and later reported in Line 125 that the treatments were maintained throughout the study. How to eliminate the effect of treatment in these patients from the effect of BTA?

13. Were there any exclusion criteria for this study?

14. In Line 88, the authors stated the injections were made on the psoas in concave side of the curve. More elaborations should be given to support this choice in the Introduction. Also, it is better for the authors to explain the mechanism of psoas in concave side in regulating IS curvature in Discussion.

15. In Line 91, the use of "electric needle guided identification" is mentioned. It may be better to cite related references or insert images, so that readers not in the field of anesthesiology can have better understanding.

16. In Line 102, it was noted that 3 experienced doctors carried out measurements on radiographs for this study. However the authors didn't mention weather the results presented in this paper were an average of the 3 doctor's or not. If the results in table 2.1 were mean values, SD should be included as well. Was there standardization between doctors during the measurement?

17. In Line 109 and Line 162 the name of statistical test "Wilcoxon's rang sign test" is incorrect.

18. In Line 111, the use of one sample bionomial test is mentioned. However, what was the test value used in the analysis. Also the level for statistical significance should be noted.
19. In Line 116, what is off label medicine referring to? If it means "the medication is being used in a manner not specified in the FDA's approved packaging label, or insert", then what was the reason for using it?

20. In Line 142, the authors mentioned a non-significant thoracic and significant lumbar de-rotation were observed. However which parameter indicated the change in rotation, this result was not mentioned in Results.

21. In Line 182, the authors claimed ITB treatment might be able to alleviate AIS in girls. Why only girls?

22. In Line 189, the authors summarized no convincing radiological corrective effect but wrote significant corrective effect in Abstract. This appears contradicting.

23. In Line 191, the abbreviation "TS" was not mentioned in previous section.

24. In general, the authors should address more on the reasons for a general spinal curvature change after paralyzing muscle in the concave side. This result can be compared with previous studies on other para-spinal muscles properties to answer the hypothesis in Introduction. Instead, the Discussion focused and repeated similar arguments made in Introduction. More reference should be included as well.

25. Detailed proofreading should be done on the presentation format and language. Some sentences and use of words were confusing to readers. Many statements lacked linkage with the rest of the paragraph. This problem is very obvious in Discussion.

26. In table 1, the author presented patients characteristics. What was the patients' age when recruited in this study? The reviewer is curious to know why patient 1 and 2, who already had other medical conditions and still being recruited as subjects? Would the procedures in this study induce stress or any physical harm to them? The review suggest to change all indication with common English terms such as left, right, pre and post in table 2.1 for easier interpretation.

27. Consistent formatting of table 2.1 and table 2.2 is suggested.

28. In table 2.1, some patients showed increase of Cobb angle after the injection. Were the measurements affected by inter-rater reliability? This was not explained clearly in Discussion. Also the mean Cobb angle and SD before and after injection should be indicated in the tables.

29. For figure 2, it would be clearer to the readers to see the change after the injection by comparing the radiographs before and after injection in parallel.

30. In table 3, the meanings of TCorI and TCorT are not very clear and why did patient 5 receive a negative number for months of treatment (TCorI and TInj)? Why patient 4 was
injected with more BTA than specified in Methods? Also why patient 9 was injected in other muscle groups not targeted in this study?

31. The authors recorded some patient underwent subsequent spinal corrective surgery and one patient developed into eating disorder in many years after the study has completed. Was there any linkage between the two events?

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An article whose findings are important to those with closely related research interests

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