Reviewer's report

Title: Vital capacity evolution in patients treated with the CMCR brace. Statistical analysis among 321 scoliotic patients

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Reviewer: Marian H. Wade

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"Major Compulsory Revisions": It would appear unfitness to place my comments under this heading, because I do not believe that the study is salvageable as an acceptable paper for publication, for the following reasons:

1. While the question posed by the authors may be new, it is not defined well. Because the study lacks controls, the authors are able only to observe respiratory capacity over time in patients wearing the CMCR brace; they are categorically unable to tease apart the effects of the brace from the effects of, e.g., growth or other factors. The conclusion section of the abstract is thus misleading in its assertion that the results "supported our approach in orthosis (sic) conception ... by using braces with mobile pads to preserve thorax and spine mobility."

2. The methods are neither described well nor are they appropriate, and they often appear to be misleading. For example, the age range of the subjects at the start of treatment (2-16) is too wide to be meaningful; the sample should have been limited to patients with AIS. Also, although boys were found to be significantly different from girls in change of respiratory capacity over time, the data from four boys are still apparently averaged into the total, resulting in a magnification of the perceived "effects". Although the abstract ("Summary") section states that the patients underwent "evaluation at the beginning, the middle and the end of treatment", we are later informed only of values taken before treatment, at the start of treatment and at the end of treatment. (That the initial donning of a brace reduces vital capacity is not surprising and does not, in and of itself, make for a finding of sufficient interest to warrant publication.) Also unclear is whether respiratory capacity at the end of treatment was compared to a theoretical value from the end or from the beginning of treatment: on page 11, the authors state that "at the end of treatment ... respiratory capacity has improved compared to the initial theoretical value," which suggests that the larger respiratory capacity values at treatment's end were compared to theoretical values that were taken with regard to the subjects when they were younger, smaller and less well developed. If this is in fact what occurred, the resulting discount of the effect of growth in the analysis would invalidate the comparison and inflate the perceived respiratory outcomes. Hence, the data as presented in the paper are not sound, nor controlled.

If the authors were able to specify that they were comparing the respiratory
capacity at the end of treatment with the corresponding theoretical values based on the size of patients at the end of the study, such comparisons would be appropriate. The remaining (serious) problem would then be the lack of controls, which would have served to account for effects such as growth and development. The factors of growth and development, surprisingly, are not even mentioned as a possibility in connection with the results reported regarding gender, risser sign and age. (It is astounding that, on the top of page 8, the authors suggest that these "results" may be attributable to "when treatment began early.")

Minor Essential Revisions: These would seem to be moot, given an assessment that the study is not worthy of publication. Nevertheless, it is essential for the entire scoliosis community to make an effort to standardize the use of language so as to be both accurate with regard to the nature of the scoliotic condition and respectful of the dignity of scoliosis patients and their families. For example, the use of the word "disease" is not appropriate with respect to scoliosis, which is a condition that is arrived at through multiple and diverse pathways. (The term "disorder" is more appropriate.) Furthermore, in the interest of respect for the dignity of scoliosis patients, I must insist that the phrase "the teen itself" (found on page 4) be changed to "the teen herself"; that all references to "humps" be replaced by the term "prominences"; and that the adjective "scoliotic" be applied only to objects such as curvatures, and never to people. Thus, "scoliotic posture" is acceptable, whereas "scoliotic patient" is not; this usage should be replaced by either "scoliosis patients" or "patients with scoliosis".

Discretionary Revisions: There are some problems with the usage of English in this paper that should be addressed if the paper should be deemed worthy of publication.

**Level of interest:** Reject as not of sufficient priority to merit publishing in this journal

**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.