Reviewer’s report

Title: Is vertebral rotation correction maintained after thoracoscopic anterior scoliosis surgery? A low dose computed tomography study

Version: 0 Date: 15 Dec 2016

Reviewer: Ian Stokes

Reviewer’s report:

This is a report of CT measurements of axial rotation in patients after anterior surgery to fuse the spine of patients with AIS >45 Cobb degrees.

The purpose was to determine "whether any loss of rotational or Cobb angle correction occurred in the 6 to 24 month post-operative period, either within the instrumented fusion construct or at the adjacent uninstrumented levels above and below the construct."

The study is evidently very thoroughly conducted and the paper is generally very clear. There are two substantial sources of confusion for this reviewer:

1. The title states "Is vertebral rotation correction maintained after…?" In fact, they do not report the correction in the sense of pre-post surgery differences, and include only post-surgery values at two time points. For ethical reasons they did not make pre-surgery CT scans, but evidently they do have pre- and post operative PA plane radiographs. Values are given for coronal plane (Cobb angle) measures at page 10 along with rib hump values, and these should be noted in the Methods, while noting that the plane radiographic standing measures are not directly comparable to supine values (as now only stated at page 9, line 6). It is recommended to change the title to something like "Does vertebral rotation progress after …". The context as given by the pre-post Cobb values and rib humps should be declared in the Introduction and Methods as well as Results and Discussion. In principle also they could use the PA radiographs to estimate the pre-post axial rotation correction. This would help put the small post-surgery changes (the focus of the paper) into context.

2. The Introduction and Methods provide little detail of their interest in the relationship between rib hump and skeletal rotation. The Introduction (review) addresses rib hump, so the subsequent focus on skeletal measurements does not follow logically. Only in the Discussion, page 13, line 17: "When the inter- and intra-vertebral rotation changes between 6 and 24 months post-surgery were compared with these clinical measures, no correlation was clearly apparent" does the issue of the possible relationship and contribution to mechanism emerge. The possible mechanistic and empirical relationships between clinical and spinal rotation should be identified in the Introduction, perhaps including the known magnitude differences.

Also:
The paragraph spanning pages 3-4 is very long and includes a survey of numerous studies of post surgery rib hump changes, as well as stating that the mechanism has only been speculative, and radiographic (skeletal) studies are limited. Much of the detailed data values should be excluded in order to focus on these two key points that motivate the present study.

Minor suggestions:

Introduction, line 3: "can progress *most rapidly* during periods of growth". Of course some slow progression has been reported after skeletal maturity.

The inclusion criterion "Lenke Type 1 main thoracic Cobb angle > 45 degrees" should be included in the Abstract to provide context.

"et al" -> "et al." throughout.

Page 5, line 9: "were chosen to include the end vertebrae of the major scoliotic curve." It would be helpful to state how far (above and below) the fusion extended beyond the end vertebrae.

Authors are commended on the detail provided concerning radiation dose. It might be helpful to include (briefly) that "effective dose" is the tissue-weighted sum of the equivalent doses in all specified tissues and organs of the human body and represents the stochastic health risk to the whole body. The radiation that patients received here was collimated to a region of the trunk, though probably included at risk organs of these (predominantly female) human subjects.

It would be helpful to define the meaning of negative and positive values as given on page 10 and in the Table's legend.

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