Reviewer's report

Title: Evaluation of Implant Loosening Following Segmental Pedicle Screw Fixation in Adolescent Idiopathic Scoliosis: A 2 Year Follow-up with Low-Dose CT

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Reviewer: Dietrich Schlernzka

Reviewer's report:

The authors present a retrospective analysis of pedicle screw loosening in AIS patients who underwent posterior instrumentation and fusion according to Shuk. Assessment was performed by an independent radiologist using low-dose CT at six weeks and 2 years after surgery. Clinical data was derived from patients' records. The study group consists of 81 consecutive patients. Screw loosening was detected in 26 of 81 patients (32%) and in 47 out of 1666 screws (2.8%). Screw loosening was significantly more common in males. Patients with screw loosening had significantly more pain symptoms at follow up. Screw malpositioning did not increase the rate of loosening.

This is an important paper. The methods are sound. The size of the study group and the follow-up period are adequate. So far, there is no data in the literature elucidating this aspect of scoliosis surgery. It should be published after minor revision.

- Minor Essential Revisions

Abstract - Results vs. Manuscript - Results 2nd paragraph "junctional kyphosis" 10 or 15 degrees?

Results /Table 1

Percentages of screw loosening and misplacement are presented. It is somewhat difficult for the reader to sort out whether the percentages are related to the number of patients or to the number of screws.

Results 2nd paragraph

"The rate of screw misplacement for the whole study cohort was 12 ± 11 %." Where does the SD come from?

Compared to the literature on pedicle screw placement accuracy, the rate presented by the authors is very low, especially if one takes into consideration the special problems related to scoliotic deformities. Without any doubt, this low rate reflects the surgeon's skills. Some pedicles in scoliosis patients are so narrow that the lumen is not large enough to accept a screw without a breach of the pedicle wall. In other cases, the direction of the pedicle (usually at the th-
junction) forces the surgeon to use the "in-out-in" technique. How did the authors classify these unavoidable but harmless perforations? Or did the surgeon possibly leave some very small pedicles uninstrumented? What was the so-called screw density?

Results 2nd paragraph
What do the authors mean with "remaining curves", residual curves in the fused area or unfused (secondary) curves?

Discussion 1st paragraph
Pedicle screws allow for fixation of the three columns of the spine. Correction is three dimensional.

Discussion general
The authors used titanium constructs. The implant metal may have an influence on the rate of screw loosening. This should be taken into consideration if comparing to data from the literature.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**
'I declare that I have no competing interests'