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

Version: 5 Date: 30 June 2014

Reviewer: Ian Stokes

Reviewer's report:

Re-review of this manuscript is again difficult since the authors have again not provided a cover letter addressing how they have addressed (or not) prior reviewer concerns and suggestions.

The main point raised by this reviewer, and not addressed in previous revisions, was the likelihood that the CT method is over-sensitive - i.e. identifies false-positive instances of screw loosening. In Table 3 there are 15 cases of loosening by CT, no loosening by plain x-ray. Also, in Table 2 there are 28% of cases of apparent loosening (by CT) but no pain, all suggestive of false positives by CT. This points to over-sensitivity of CT (i.e. false positive identification of loosening and thus low specificity).

The manuscript now provides a conclusion "Low-dose CT should be considered as the method of choice to evaluate the evidence of screw loosening" based on (1) evidence of greater sensitivity of the CT method and (2) the lower dose relative to plain radiography. This is a questionable conclusion of the present study, since high sensitivity but low specificity of CT is not a sound basis for recommending its use.

In the Discussion they mention that the artifacts around metallic pins might produce false positive evidence of loosening. However, this is the only mention of the possibility that high sensitivity of CT might result from erroneous false positive observations of loosening. The Discussion and Conclusions state that CT is more sensitive than plain radiography in detecting evidence of implant loosening. The reader is left unclear as to whether this additional sensitivity provides greater accuracy, or whether it provides false positive information - therefore it is unclear which radiological method is preferable.

Minor Essential Revisions (from previous review, but not addressed in the revision):

Abstract, Results, Line 10: "1 patients" -> "1 patient"

Introduction, paragraph 1, line 3: explain 'weight bearing forces' (with respect to failure of pedicle screw fixation). Probably the muscular forces are more important than gravitational forces.
Page 5, penultimate paragraph, line 2: this would be reports of pain, not occurrence of pain in medical records, presumably.

Page 7, first full paragraph: 'Among patients with evidence of loosening,' Authors should clarify that this is evidence of loosening by CT.

Page 7, first full paragraph: 'The misplacement rate for the whole amount of screw was 11.8 %' - delete 'for the whole amount of screw'.

Throughout the manuscript use the abbreviation 'et al.' for 'et alia' as is the normal convention.

Page 10, Conclusions, line 3: 'Evidence of loosening *occurred* in one third of patients'.

Other Minor Essential Revisions

(1) The Abstract should mention use of plain radiography (as well as CT) in the Methods.

(2) The Discussion provides comparisons between the present findings and those in the literature without adequate explanation of (1) whether comparisons are being made between CT and plain radiography (whose agreement is shown here to be poor), and (2) whether the clinical series referred to are for pedicle screw usage in adolescent patients with scoliosis (as in the present study) or adult patients with degenerative or other conditions.

(3) Page 4, line 10: 'evaluated by *an* experienced senior neuroradiologist'.

(4) Page 9, line 5: 'with lower *sensitivity* of plain radiography.'

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

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