Reviewer’s report

Title: The effect of different screw-rod design on the anti-rotational torque: a biomechanical comparison of three conventional screw-rod constructs

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Reviewer: Amin Mohamadi

Reviewer's report:

This is a novel study that addresses rotational stability of different instrumentations for corrective surgery of scoliosis. The maximum torque of three pedicle screw-rod systems was measured in torsional test. Among tested constructs, Legacy rod and screws provided greatest torque.

1. Groups A (Legacy, Medtronic Inc) , Group B (USSII), and Group C (RF-F-10) are used inconsistently. For example in figure 4, torque of group B is larger than group C but in the results it is said group C had larger torque. It reads better if the construct names are used for reporting results instead of defining groups A to C.

2. Including an image from tested constructs outside of the jig would be helpful to understand how constructs are built.

3. The maximum torque was measured while rod is twisted. However, it is not clear at which level the failure of rotational stability has happened. It could have happened at the junction of rod inside MTS mechanical testing machine, rod inside the groove of screws, or screws and PMMA fixation material, or any combination of those.

4. Why for tightening cap of the screws in groups B and C the torque is measured and not for group A? Is 12 N.m torque enough to tighten the cap completely? The friction between rod and groove of the screws, presumably determines the rotational stability of rod inside groove of screws. Therefore, if the caps of the screws are not tightened enough, the friction is not large enough to keep the rod inside the groove steady. This may be the reason for the observed higher maximum torque for group A—for which the cap is twisted off without measuring the torque.

5. The experiments using only one screw and fixating screws on PMMA does not mimic surgical technique for AIS corrective surgery. Data from experiments on cadaveric vertebrae and employing more screws can provide better insight for the clinic.

6. The name of post-hoc test should be mentioned in the methods.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

No

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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