**Reviewer’s report**

**Title:** How to avoid unintended valgus alignment in distal femoral derotational osteotomy for treatment of femoral torsional malalignment - a concept study

**Version:** 1  **Date:** 04 Dec 2017

**Reviewer:** Arne Venjakob

**Reviewer's report:**

Thank you very much for the opportunity to review this manuscript.

This study introduces the Pillar-Crane-Model in distal femoral derotational osteotomy. Hereby the proximal femur represents the crane jib: antetorsion of the proximal femur thus will lead to distal derotation.

As generally known, derotational osteotomy is a complex intervention with potential effects of the frontal and sagittal plane due to femoral anatomy including femoral midshaft bowing. Therefore reproducibility of correction without repercussions of the frontal and sagittal axis would be worthwhile.

The authors suggest to perform osteotomy perpendicular to the anatomical shaft axis preventing unintended valgus malalignment.

The authors use two human cadaver femora assessing eight different torsion angles (before and after derotation of 0°, 10°, 20° and 30°). Distal femur osteotomy was performed perpendicular to a „virtual anatomical shaft“ axis. Frontal plane alignment was radiologically controlled after rotation revealing a slight increase of varus alignment with increase of AMA and mL DFA and no changes of aLDFA. The authors conclude that unintended valgus malalignment therefore can be avoided by performing osteotomy perpendicular to the virtual anatomical shaft axis.

This manuscript is of high interest in the field of malalignment limb correction. The Pillar-Crane-Model may help to illustrate derotational malalignment procedure and its effects of connected joints. Nevertheless osteotomy perpendicular to a „virtual anatomic shaft axis" is not the only way to prevent unintended valgus malalignment: In our own approach distal femoral derotational osteotomy perpendicular to the mechanical axis is performed not having any effect of the mechanical axis as described by Delgado et al.
It would be of high interest to take a stand on the possibility of simultaneous varus-/valgus correction. Do the authors have any experience concerning concomitant correction of the frontal plane?

Furthermore it is of high interest if derotational osteotomy perpendicular to a „virtual anatomical shaft axis” effects the sagittal axis? Please state.

Please also state how to reproducible identify the anatomical shaft axis (Trochanter major to lateral epicondyle of the femur?). Did the authors use an alignment rod?

Please explain „AMA at cutting" more extensive. What does „AMA at cutting" tell us about the amount of correction?

Title: Not all patients with increased antetorsion suffer from patellofemoral instability: so better change patellofemoral instability to femoral malalignment.

Introduction: Line 74: Quotation 4 is listed with Delgado 1996 and in the text the authors designate Dickschas. Please correct.

Methods: Please comment to repercussions of the Pillar-Crane-Model of the sagital plane.

Discussion: Please state that osteotomy perpendicular to the mechanical axis also offers femoral derotation without interference of the frontal plane.

Please transfer your findings into daily practice: For example: Derotation of 20° and varisation of 5 degrees needed. How to proceed?

Figure 2: Why do the authors show two anatomical shaft axis? Which one would be more important? Probably during surgery the „sagital anatomical shaft axis" would be easier to assess. Please state?

Despite its limitations I would accept this concept study for publication in BMC. The study provides new data in terms of distal femoral derotational osteotomy. Distal femoral osteotomy perpendicular to a „virtual anatomical shaft axis" represents a new technique to simultaneously address rotational malalignment and additional frontal plane malalignment e.g. valgus deformity.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

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

Unable to assess

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

Yes

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.

Not relevant to this manuscript

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Please indicate the quality of language in the manuscript:

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