Author’s response to reviews

Title: The Posterior-Anterior-flexed View is essential for the Evaluation of Valgus Osteoarthritis. A prospective study on 134 valgus knees

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Author’s response to reviews:

Dear Dr. Mockridge, dear Dr. Hayashi,

On behalf of my co-authors, I am submitting the enclosed manuscript to consider it for publication in BMC Musculoskeletal Disorders

An IRB approval has been received for the submitted research project.
Sincerely,

Kilian Rueckl, M.D.
9/2/2019

Reviewer reports:
Kent Carlson (Reviewer 1): This manuscript is a statistical evaluation of the effectiveness of the radiographic PA-flexed view compared to the commonly used AP view to evaluate the degree of OA in valgus knees. Using radiographs of 134 valgus knees assessed prior to TKA, the authors present convincing statistical evidence that the PA-flexed view more accurately captures the extent of lateral compartment arthritis for patients with up to 15 degrees of valgus deformity. Thank you for your encouraging review.

Overall, this is interesting work, and a compelling case is made for the use of the PA-flexed view in valgus knees. Before publication, however, I strongly recommend having someone who is a native English-speaker read through this for general grammar and typos.

We carefully reviewed the manuscript and checked for typing errors and spelling by a native English-speaker.

In addition, I have several minor comments below that should be addressed:

In several places in the manuscript, you use the word 'extend' when you mean 'extent'. Please correct.

We corrected all typing errors throughout the manuscript.

P.4, line 90: change 'determinate' to 'determined' thank you, this was corrected.

P.6, line 125: is it 68 knees with mild to moderate OA on AP view? Fig. 1 says 66.
Accidently, we attached a preliminary version of Fig.1 based on patients. We updated the manuscript with the correct Figure using knees.
Lines 130-135 analysis further subgroups based on minimal joint space width. These subgroups are not represented in any figure.

P.6, lines 128 - 130: you are talking about 53 knees, and state this is 62.4%. 62.4% of what? 53 is 62.4% of 85—so what subgroup does this 85 represent? You refer to Fig. 1, but I don't see how the figure is related to this sentence. Please clarify.
We updated Fig. 1. We also modified the manuscript:
Lines 123-125: In 53 (62.4%) of 85 knees with mild to moderate OA on AP radiographs (K/L-score ≤3), the minJSW on the PA-flexed view decreased compared to the AP view and resulted in an increased K/L-score of 4 (Fig. 1).

The figure legend for Fig. 1 does not describe Fig. 1. Please correct.
We updated Fig. 1.

The figure legend for Fig. 3 says the figure shows difference in median, but the y-axis label on the plot says difference in mean. Please correct.
Fig. 3 shows differences in mean. We corrected the figure legend and added statistical significances.

The figure legend for Fig. 4 has a typo (‘grey filed’ instead of ‘grey field’), and a repeated phrase "of knees of knees". Please correct.

We corrected the figure legend:

Lines 258-263: Fig. 4: Lateral minJSW in AP- and PA-flexed view for different severity of valgus deformity (<5.0 deg., 5.0-9.9 deg., 10.0-14.9 deg., ≥15.0 deg.). The grey field mark the section where minJSW is more than 2mm less in PA-flexed-view compared to the AP view. The numbers in the upper-left display the percentages of knees in this grey field. Especially in knees with zero to ten degrees of valgus there is a substantial number of knees (37.8% or 26.0%) that had more than 2mm minJSW in AP-view but showed bone-on-bone arthritis on the PA-flexed-view (red circle).

You make reference to Figs. 1 - 4, but you don't actually describe these results in the Results section. You list a few results in the figure captions, but you need to write a few paragraphs to present your results to readers!

We modified the figure captions for Figs. 1-4 and improved presentation of the results to the reader.

Lines 246-266:

Fig. 1: lateral minJSW in mm for the AP- and PA-flexed-radiographs in 134 valgus knees. 76.1% of the knee showed bone on bone joint space narrowing on the PA-flexed-view compared to only 36.6% on the AP-view. The additional use of a PA-flexed view increased the OA grading level in 53 of 85 knees (62.4%).

Fig. 2: Lateral minJSW in mm on AP- and PA-flexed-radiographs in relation to the degree of mechanical alignment. Knees were grouped by the extent of mechanical valgus deformity (<5.0 deg., 5.0-9.9 deg., 10.0-14.9 deg., ≥15.0 deg.). The most significant benefit for the PA-flexed view was in patients with less mechanical deformity. Significance-levels are marked as “*” for p < 0.05 and “**” for p < 0.01.

Fig. 3: Difference in means between lateral minJSW on the AP- and PA-flexed-view for different groups of valgus deformity. There was a relevant and highly significant difference of minJSW in knees with mild or moderate deformity. For knees with more than 10 deg. valgus deformities the difference was significant but small (0.5mm) or not significant at all (≥15 deg.). Significance-levels are marked as “*” for p < 0.05 and “**” for p < 0.01.

Fig. 4: Lateral minJSW in AP- and PA-flexed view for different severity of valgus deformity (<5.0 deg., 5.0-9.9 deg., 10.0-14.9 deg., ≥15.0 deg.). The grey field mark the section where minJSW is more than 2mm less in PA-flexed-view compared to the AP view. The numbers in the upper-left display the percentages of knees in this grey field. Especially in knees with zero to ten degrees of valgus there is a substantial number of knees (37.8% or 26.0%) that had more than 2mm minJSW in AP-view but showed bone-on-bone arthritis on the PA-flexed-view (red circle).

Fig. 5: Medial minJSW in mm for AP- and PA-flexed-radiographs for different groups of mechanical valgus deformity (<5.0 deg., 5.0-9.9 deg., 10.0 - 14.9 deg., ≥15.0 deg.). There was no significant difference in medial minJSW for different valgus deformities.
Anastasios D. Georgoulis (Reviewer 2): IT IS A VERY INTERESTING AND CLINICAL USEFULL PAPER PUBLISHING WORTHY. IT WILL HELP SURGEONS FOR A BETTER DECISION CONCERNING CONSERVATIVE OR OPERATIVE TREATMENT OF ANLATERAL OSTEOARTHRITIS OF THE KNEE. THE BIGEST ADVANTAGE IS THE CLEAR MESSAGE THAT KNEES WITH LESS VALGUS DEFORMITY NEED THE PA FLEXED X RAY PICTURE TO SEE THE CARTILAGE DAMAGE OF THE POSTERIOR ASPECT OF THE LATERAL FEMORAL CONDYLE. THE STUDY WOULD BE MORE ACCURATE IF THERE WERE A COMPARISON HEALTHY GROUP TO FIND OUT HOW IT IS IN A HEALTHY POPULATION. BECAUSE THIS IS NOT POSSIBLE TO PERFORM IT IS A VERY INTERESTING AND CLINICAL USEFULL PAPER PUBLISHING WORTHY. IT WILL HELP SURGEONS FOR A BETTER DECISION CONCERNING CONSERVATIVE OR OPERATIVE TREATMENT OF A LATERAL OSTEOARTHRITIS OF THE KNEE. THE BIGEST ADVANTAGE IS THE CLEAR MESSAGE THAT KNEES WITH LESS VALGUS DEFORMITY NEED THE PA FLEXED X RAY PICTURE TO SEE THE CARTILAGE DAMAGE OF THE POSTERIOR ASPECT OF THE LATERAL FEMORAL CONDYLE. THE STUDY WOULD BE MORE ACCURATE IF THERE WERE A COMPARISON HEALTHY GROUP TO FIND OUT HOW IT IS IN A HEALTHY POPULATION. BECAUSE THIS IS NOT POSSIBLE TO PERFORM HAVE THE CLINICAL EVALUATION OF THESE PATIENTS USING A SCORE. IN THIS WAY WE WILL HAVE AN IDEA WHEN WE HAVE TO ORDER AN ADDITIONAL X-RAY PICTURE IN THESE GROUP OF PATIENT AND MUCH MORE IF THIS CARTILAGE NARROWING IS REALY IMPORTANT FOR THE COMPLAINTS OF THE PATIENTS AND THE DECISION FOR AN OPERATIVE TREATMENT.

We thank the Reviewer for this positive review.
VERY INTERESTING WOULD BE A STATISTICAL ANALYSIS OF THE CLINICAL ASSESSMENT AND THE RADIOLOGICAL ONE. ANOTHER QUESTION IS IF THEY HAVE AN EXPLANATION HOW IT IS POSSIBLE TO HAVE A VALGUS DEFORMITY IN AP X RAY PICTURES WITHOUT CARTILAGE DAMAGE. THE CLARIFICATION OF THESE QUESTION WOULD IMPROVE THE CLINICAL USEFULNESS OF THE PAPER.

To investigate the inter-observer correlation and the inter-observer correlation for the minJSW-measurement and Kellgren/Lawrence classification, two investigators repeated randomly chosen knees. Intraclass correlation coefficient was 0.79 to 0.94 and inter-observer correlation was 0.77 to 0.95. We report these results in the Methods-section (lines 97 to 100).

Various reasons can cause valgus deformity. Beside cartilage loss, a hypoplastic lateral condyle or bony deformities are common causes for valgus alignment and can be found on ap view x rays of the knee. We revised the manuscript to improve the clinical usefulness (lines 94 to 96).