Reviewer's report

Title: Self-reported knee joint instability is related to passive mechanical stiffness in medial knee osteoarthritis

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Reviewer: JONATHAN JEFFERS

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All comments are Minor Essential Revisions

This paper presents a varus valgus laxity and stiffness measurement of the knee using a dynamometer. Stiffness is measured as the measured varus valgus torque divided by the angular displacement. A significant relationship is found between stiffness at small varus/valgus angles/moments and instability, but not at large angles of varus/valgus angles or moments. Neither is significance found between laxity (angular displacement at maximum torque applied) and instability. This finding is of interest as prior work has mainly focussed on laxity only. Overall this is a well written paper that presents interesting findings that will be of interest to the field as the topic of instability is current. I have some queries and clarifications as outlined below, perhaps the authors could be asked to comment on these relatively minor points?

ABSTRACT: Line 2: I would say all knee instability compromises function, not just that which is self reported, suggest deleting first two words of this sentence. Otherwise fine.

INTRODUCTION: p3 line 2. Same comment as above. P4 line 14: Why only the laxity in varus/valgus? Some justification could be added here why the study omits AP and rotational instability, also commonly reported e.g. if ACL is deficient in OA knee. Patient reported instability is a sum of all possible modes of instability unlikely to be fully characterised by analysing only one potential mode. Only a sentence or two to justify is needed. Otherwise good introduction to study.

METHODS: p6 line 14: A photograph of the dynamometer identifying the position of the load cell and lever arm would be useful to readers who are not familiar with the device. P6 line 17. Why was only 20deg flexion considered? Needs to be justified else could be missing mid flexion instability at other flexion angles. P6 line 25: Can authors briefly justify 25Nm? It seems low to stress the full laxity of the joint, assuming lever arm of 0.5m to ankle is a load of 50N (0.5kg). But understand may be ethical concern about hurting patients at higher load. Similarly at 1deg for mid range stiffness moment is 1.5Nm making load of 15N (0.15kg) at the ankle is very low, roughly the weight of an apple, can authors comment on this very small load being resisted by the passive structures in the knee and not very small involuntary muscle contraction, the clothes/socks the patient may be wearing (even a stiff pair of jeans might partially resist this small moment) and the ability of the dynamometer to apply and record (through the
load cell) this small load/moment? What kind of hysteresis exists in the knee/dynamometer system, the small load/moment may reside in the hysteresis of system (looking briefly at Figure 1 in reference 7 it looks like this is the case). In short, some data on the methodology being capable of this resolution of measurement would address this issue, maybe has been addressed in previous work? All could be answered with a sentence or two in this section.

p7 line 8: is there a reference for defining the mid range stiffness as +/-1deg from neutral? I.e. if mid range stiffness was defined as +/- 2degrees would significant relationship with instability still be found? How many repeat measures were taken per knee?

P7 line 16: include the name of the test used to check for normal dist and the result of this test. P7 line 22: I’ve recommended to editor the stats are reviewed by statistician due to relating parametric to non parametric data.

RESULTS: P9, line 3-13: this paragraph may be better in the methods as more a justification of methodology rather than results.

DISCUSSION: Good and interesting discussion, nice comparison to literature. Would also be nice to see study on knee post treatment, e.g. pre/post ACL repair or pre/post UKR surgery. P 10 line 1: The stress radiography methodology differs from the presented methods as the x-ray ensures the measure of laxity under fixed torque is measured at the joint, thus eliminating any contribution that may be made by patient’s clothing, muscle contraction, machine hysteresis etc, the authors could comment on the advantages and disadvantages of the different methods (radiation dose etc)

**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