Reviewer’s report

Title: Function of ankle ligaments for subtalar and talocrural joint stability during an inversion movement – an in vitro study

Version: 0 Date: 30 Oct 2018

Reviewer: Luke Kelly

Reviewer’s report:

Thank you to for the opportunity to review this manuscript. The authors describe a study where they seek to determine the specific influence of the three lateral ankle ligaments in stabilisation of the talo-crural and sub-talar joints, in neutral, plantar flexed and dorsiflexed orientations. This study extends from previous literature that have only reported the role of the lateral ankle ligaments in stabilisation of the entire ankle joint complex. The authors should be commended for their effort to undertake this technically difficult study. The manuscript is generally well written and clearly structured. I have a number of general and specific comments that are listed below.

General comments

1. Unfortunately I don't believe the authors can make conclusions about the mechanical role of specific ligaments acting about the sub-talar or talo-crural joints with the experimental approach employed here. The authors sequentially resected the ATFL, CFL and PTFL and measured changes in ankle joint kinematics for a given torque (stiffness). The order of resection was always constant. Unfortunately a major confounding limitation of this approach is the number of intact ligaments when testing each individual ligament. For the ATFL tests, there was still two lateral ankle ligaments intact, whereas for the PTFL tests, there were no lateral ankle ligaments intact. In order to determine the role of each ligament, the order of resection would need to be counter-balanced. This would enable a two way type analysis. The authors have addressed this in the limitations and I understand that this would take a much larger sample size. I also acknowledge the difficulty in obtaining suitable cadaveric specimens. However, this is a considerable limitation that confounds the primary findings of the study.

2. Statistics - It is unclear how the statistical approach was undertaken. Was this a two way analysis (Eg Ankle joint position x number of intact ligaments)? Was the non-parametric approach implemented due to lack of normality in data? How were effect sizes calculated?

3. Discussion - It might be appropriate to have some discussion as to the ecological validity of these findings. Are the torques and loading rates similar to this that may be experienced during walking, running or cutting?
Specific comments

Abstract
Line 28 - I don't think "kinematical" is a word. Perhaps change to "a motion capture system recorded kinematic data from"

Introduction
Line 48 - please remove the 's' from 'inversions'
Line 61 - 'precisely' seems out of place here.
Line 87 - Please change 'Second' to 'secondly'

Methods
Line 122 - change 'applying' to 'application of'
Line 140 - Was only 1 motion capture camera used? I presume this is an error?
Line 185 - Please clearly outline the statistics - Was this a two way approach? How was effect size calculated?

Discussion
Line 268 - The magnitudes of angular rotations are very small. Are the authors confident that the measures are within the resolution of the motion capture system?
Line 287 - 'Locked' is a poorly defined term. Perhaps 'stiffened' would be more mechanically appropriate?
Line 290-294 - This suggestion highlights the potential importance of a well defined bone coordinate system. Did the authors calculate a mean or instantaneous helical axis for these bones or joints? This may help to shed some light on changes in kinematics with ligament resection

Level of interest
Please indicate how interesting you found the manuscript:

An article whose findings are important to those with closely related research interests

Quality of written English
Please indicate the quality of language in the manuscript:
Acceptable

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