Reviewer’s report

Title: Alteration in global motor strategy following lateral ankle sprain

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Reviewer: Eamonn Delahunt

Reviewer’s report:

The authors have produced a nice study investigating the neuromuscular deficiencies that exist during performance of the SEBT following discharge from primary care following acute lateral ankle sprain.

Hopefully my comments will help to enhance the manuscript and I look forward to receiving the authors' response to my queries.

SECTION: INTRODUCTION

LINE: The military is the most affected population with a five times greater prevalence than civilians (8;59).

COMMENT: How does this correlate with the work of Doherty et al (2014) who investigated prospective studies on ankle sprain incidence and prevalence in civilian and military populations. The study alluded to is a systematic review and meta-analysis and would be worth considering to include:


LINE: Up to 33% of these individuals experience functional ankle instability even in the absence of persistent ligament laxity around the ankle joint, as well as recurrence of LAS over the years (58)

COMMENT: Please clarify whether this relates to civilian or military populations.

Also if the authors decide to use terms such as persistent ligament laxity and recurrence of LAS they should adhere to those definitions outlined in Delahunt et al (2010) and endorsed by the International Ankle Consortium in Gribble et al (2013, 2014, 2014)


LINE: Deficits in the limb contralateral to the injury have also been reported (14;23;45;61;62) 33.
COMMENT: Outline what is meant by "deficits". What type of deficits persist and how are these linked to overall lower limb motor control.

LINE: Taken together, these deficits suggest that motor control impairments may be at the origin of the relapses.
COMMENT: This is an interesting line and links in with the most recently published literature on sensorimotor control deficits following acute ankle sprain.


LINE: The persistence of alterations in motor control for the injured and uninjured limb strongly supports the hypothesis of a reorganization of central motor commands. LAS causes swelling, pain and other peripheral damage. This leads to altered sensory inputs, which trigger a reorganization in sensorimotor processing leading to long-term central modification in movement planning and execution(41;43;57) . Such a sensorimotor processing deficit could explain the bilateral effects.
COMMENT: Excellent explanation

It would be advisable for the authors to revise the final sentence above to read as follows: Such a sensorimotor processing deficit could explain the bilateral effects observed in participants with chronic ankle instability (CAI). It would be probably best to use the term chronic ankle instability as recommended by the International Ankle Consortium (Gribble et al, 2013, 2014, 2014 - see above).

LINE: In the present study, we were interested in looking at the changes in motor control strategies after LAS during a standardized motor task.
COMMENT: It would be necessary for the authors to outline that the participants with LAS had undergone a rehabilitation programme.

LINE: The Star Excursion Balance Test (SEBT) was therefore selected. It has good metrological properties and has been frequently used to study motor control in athletes\(\text{3;9;15;17;35;42;46;48;56;61} \) \(\text{51} \). During this task, participants have to touch the floor with their feet as far as possible in predetermined directions without falling. Maximal reach distance is the variable usually used to characterize performance and to identify alterations in motor control.

COMMENT: I feel that a better explanation of SEBT performance is warranted. Perhaps the following reference could help, which outlined the procedures for correct performance.


LINE: In the present study, global body strategy was estimated by global body CoM 3D behaviour.

COMMENT: Please revise to read: In the present study, global body strategy was estimated by quantifying global body CoM 3D behaviour.

The authors need to consult the following paper:


The authors should consult with this group to see if this paper has been published in full-paper format.

SECTION: SEBT PROCEDURE

COMMENT: Can the authors justify the use of the AM, M and PM directions. Typically most authors use the ANT, PM and PL directions.

SECTION: DATA ANALYSIS

Could the authors provide some details on reach distance; typically this is traditionally used in studies investigating performance on SEBT.

LINE: Indeed, a smaller lever arm in an inverted pendulum decreases muscle force required to maintain balance. Moreover, a lower body CoMgl position in unipedal stance increases the projection of the reaching limb by a better orientation of the pelvis, and it also increases the effect of the trunk CoM to counteract the perturbation. Thus, by a greater lowering of the CoMgl, the physical performance is optimized but the motor control requirement is much higher as the person needs to simultaneously control more body segments.

COMMENT: Nicely composed.
Indeed, the LAS group showed a more grouped horizontal excursion of CoMgl for different reaching directions. This may be the result of less adaptability of the central nervous system for the group with alterations of motor control (LAS group) as previously observed for static postural control(36).

COMMENT: This is in agreement with the work of Doherty and colleagues (2014 - mentioned above) who observed a decreased fractal dimension of postural control in an acute lateral ankle sprain group compared to controls.

COMMENT: Alterations in SEBT performance (kinematics and reach distance score) have also been observed in ACL reconstructed females and is worthy of mention and may help to support the findings of the current study.


COMMENT: The authors should include a more comprehensive section relating to the clinical implications of the study. For instance all participants in the LAS group under-went rehabilitation. Therefore, why were deficits still present. Can this be explained by inadequate rehabilitation strategies?

Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests