

ANSWERING REVIEWERS

July 14, 2013

Dear Editor:



Please find enclosed the edited manuscript in Microsoft Word format (file name: ESPS Manuscript 3703-review).

Title: Feasibility of progressive strength training commenced shortly after hip fracture surgery.

Author: Jan Overgaard, Morten Tange Kristensen

Name of Journal: *World Journal of Orthopedics*

ESPS Manuscript No.: 3703

Dear editor and reviewers:

We would like to thank you for your positive consideration of our manuscript.

We have addressed our responses, in red, in the following section, and important changes made to the manuscript have been highlighted using the Microsoft Word editor function.

We believe that the manuscript has been improved according to the suggestions of the editor and of the reviewers.

Editor:

Authors' reply: We have provided a language certificate by the English language editing company American Journal Experts. Further, we have updated the format and typesetting and have included the DOI and PMID codes for the references where possible. On one occasion, it was not possible to retrieve a PMID (ref. no. 23), so we have uploaded a printout of the first page instead. The figures have been changed. More words have been included in the abstract (Results section), and a "comments section" has been included.

Reviewer 1(2444715) comments:

The title: too long and not easy language to understand for many readers.

Authors' response: We have shortened the title to "**Feasibility of progressive strength training commenced shortly after hip fracture surgery**".

Introduction: I assume maybe the main question would be answered better if comparison between the early rehabilitation technique and other techniques, but the authors compared with the normal side (comparative study not a cohort)

Authors' response: The primary aim of the study was to examine the feasibility of early progressive strength training and not to compare different techniques, which would have required a design other than the one used in the present study. Thus, our study aimed to address whether it is possible to implement a progressive strength-training programme at this early time point after hip fracture surgery. A hip fracture is an acute event, and it was therefore not possible to assess muscle strength before fracture. We therefore compared the muscle strength of the fractured limb before and after the 6-week program with the non-fractured limb to evaluate strength deficits (expressing the strength of

the fractured limb as a percentage of the strength of the non-fractured limb). We also compared our results to those of a previous study, which presented strength deficits > 50% (ref. 2). Nonetheless, the aim of the present study was to evaluate the strength-training programme and not to compare the previously fractured limb with the non-fractured side.

M&M: type of fracture fixation or arthroplasty need to be mentioned, because it can affect the stability of the fracture and the feasibility of application of a rehabilitation program or another and the timing of application. Reason for re- surgery can be related to rehabilitation (that needs to be clear).

Authors' response: We agree that information about the type of surgery should have been clarified, and we have included the type of surgery for cervical (intracapsular) and trochanteric (extracapsular) fractures in the revised manuscript on page 4, lines 110-115.

The national guidelines for mobilisation after hip fracture surgery in the study country are as follows: immediate weight bearing as tolerated from the day of surgery and no exercise restrictions.

Two patients underwent a second surgery. One patient, a 73-year-old woman with a dislocated cervical fracture (Garden 3), experienced severe luxation of her hemi-arthroplasty in her own home before participating in any of the training sessions. The other patient, a 63-year-old woman with a dislocated cervical fracture (Garden 4), who underwent surgery with hip pins (due to her younger age), participated in three training sessions. However, she represented only one out of the 13 patients (8%) with intra-capsular fractures who underwent surgery with hip pins or screws; therefore, we believe that the need for a second surgery cannot be correlated with the rehabilitation programme.

That is, we are not aware of specific studies that have demonstrated an association between the need for re-surgery and the type of rehabilitation provided, but we are aware that the literature in general reports the highest reoperation rates for this type of hip fracture surgery.

Palm H et al. A new algorithm for hip fracture surgery. Reoperation rate reduced from 18 % to 12 % in 2,000 consecutive patients followed for 1 year. Acta Orthop. 2012 Feb;83(1):26-30. doi: 10.3109/17453674.2011.652887. Epub 2012 Jan 17.

Conclusion: need to make clear conclusion.

Authors' response: A clearer conclusion to the study has been provided.

Reviewer 2(503631) comments:

The rehabilitation programme must be described in more details to be decidable whether it meets the demands of professional guidelines!

Authors' response: The aim of the study was specifically to examine the feasibility of a standardised progressive strength-training programme shortly after hip fracture surgery in community-dwelling patients. The other components, which are part of the rehabilitation commonly provided for these patients, were not standardised. We believe that the strength training described fully meets the professional guidelines.

Materials and methods is too long, which suggested be shortened.

Authors' response: It is always a question whether one should include merely a reference to a test or the score system used in another study, but we chose to describe the tests used in greater detail, as it enabled others to use them immediately in the same manner as in the present study, instead of having to access the paper of origin. We believe that this inclusion is important because tests are frequently modified from the original tests as described. Furthermore, the strength training is described in detail because it is the main focus of the study.

In the description I miss the type of surgical interventions, which may influence the starting time and type of the rehabilitation programme to be used. Usually different excercises are recommended and inappropriate in the 0-6th weeks and the 6-12th weeks periods. TEP is referred in the line 205, whose

set of exercises also differs from the ones used following other surgical techniques (Gamma nailing, screw fixation, DHS). What kind of primary surgical methods were applied in the hip fracture patients in this study? Why have the authors not differentiated the surgical methods and fracture type at all (for example: intracapsular displaced fracture)?

Authors' response: We agree that information about the surgical methods should have been included. Please see our response to Reviewer 1.

With regard to the exercises, no restrictions were given for any type surgery other than ROM restrictions for patients who underwent arthroplasty, which is consistent with the national guidelines in the study country.

More detailed description of rehabilitation programme is needed. Questions: Practice of balance training must be written in weekly break-up, the present description is too general and misunderstandable. (how can an elder patient do exercises, standing with both legs on different instable surfaces (ankle disk, trampoline, airex pillow) 2-3 weeks after the operation?)

Authors' response: The main purpose of this study was to investigate the feasibility of a 6-week progressive strength-training programme commenced shortly after hip fracture in community-dwelling patients. To our knowledge, this is the first study of its kind at this early time point after hip fracture surgery and is therefore described in detail.

Thus, the other training components of the programme were not monitored as detailed, e.g., balance training, given that the significantly different functional levels at different time points after hip fracture surgery were not standardised as the strength programme was (other than the approximate time used per session) and that some patients did perform balance training on an ankle disc within 2-3 weeks of surgery. The suggestions in the manuscript can be used as an idea catalogue of exercises, whereas the type of exercise and progression must rely on the physiotherapists' evaluation of the individual patient's level of performance at a given time point.

We have added a few sentences about the choice and progression of the exercises on page 6 lines 200-204.

Description of progressive strength-training is OK. My questions: The same exercises were used up to the 6th week? Exercises in sitting position on the 2-3rd and the 6-9th weeks following a primary hip surgery?

Authors' response: It is correct that the same two exercises were used for the strength training, but importantly, the weight loads were adjusted on a set-to-set basis, and the demands were increased by having the patients train at higher intensities (lower RM). However, as part of the programme, the patients also completed walking and standing balance exercises, which were also modified throughout the 6-week programme.

Frequent complication is the flexion contracture of the hip; have you applied stretching exercises to avoid it?

Authors' response: The rehabilitation programme did not involve specific stretching exercises, as there is very little evidence of a long-term effect of stretching on human tissue. This lack of effect is due to creep and viscoelastic deformation of the tissue, which results in a transient short-term effect (ref. Weppeler CH, Magnusson SP. Increasing muscle extensibility: a matter of increasing length or modifying sensation? Phys Ther. 2010 Mar;90(3):438-49. doi: 10.2522/ptj.20090012). Suggestions in the literature have been made that individuals performing stretching will experience a modification in their sensation, which will enable them to tolerate stretching.

However, if physiotherapists observed ROM problems in a specific patient, the physiotherapists focused on improving hip extension with walking exercises.

Have you trained muscles other than knee extensors? Training of m. gluteus maximus and medius is inevitable, crucial.

Authors' response: We agree that the strength of the muscle groups mentioned is crucial for this patient group and for elderly people in general. The gluteus maximus muscle is among the major muscle groups trained in the bilateral leg press exercise. Thus, gluteus maximus muscle progressive strength training was part of the program, but we did not include specific strength-training exercises for this muscle. Furthermore, the gluteus maximus was trained during the sit-to-stand and stair-climbing exercises, whereas the gluteus medius muscle was trained to some extent during the sideways walking exercises. Nevertheless, the primary focus during the fractured knee-extension strength training was based on a number of studies demonstrating large deficits in this muscle group after hip fracture, and knee extension strength in general is a primary determinant of function in the elderly.

Discussion is too long, which suggested to be shortened.

Authors' response: We have shortened the discussion somewhat.

References generally are relevant, but the authors have cited papers that are more than twenty years old, and seemed not appropriate in the context of this publication, for example No 38.

Authors' response: The use of references older than 20 years old is, with a few exceptions, was necessary to cite the studies that originally described the specific scores/tests used in the study. Otherwise, the references are from this century and are considered among the newest with regard to the topic of the study.

The exercises carried out in slippers are dangerous based on 1A and 1B figures.

Authors' response: We agree with the reviewer. The pictures in Figures 1A and 1B were part of a larger photo shoot. We have replaced the pictures with a person performing the exercises in appropriate footwear. The new photographs are Figures 1 and 2 in the revised manuscript.

Thank you again for publishing our manuscript in the *World Journal of Orthopedics*.

Sincerely yours,

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