ASYMMETRICAL STRENGTH DEFICIT AND RESISTANCE TRAINING EFFECTS ON MOBILITY FUNCTION IN PEOPLE WITH A HIP FRACTURE

Portegijs Erja¹, Kallinen Mauri², Rantanen Taina¹, Heinonen Ari¹, Sihvonen Sanna³, Alen Markku¹, Kiviranta Ilkka², Sipilä Sarianna¹
(University of Jyväskylä¹, Central Finland Healthcare District², National Public Health Institute³, Finland)

INTRODUCTION
Resistance training improving muscle strength and power usually consists of bilateral exercises. Hip fracture patients often have a persistent (asymmetrical) deficit of strength and power in the fractured limb, which may further complicate mobility and balance (1,2). Training may be more effective when the deficit is taken into account. We explored the effects of an intensive strength-power training aiming to reduce the asymmetrical deficit on mobility function.

METHODS
60-85-year-old patients operated on a hip fracture at the Central Finland Central Hospital 1-7 years earlier were recruited (n=452). Those with neurological or progressive severe illnesses and inability to walk outdoors independently were excluded. After clinical examination (N=79), persons without contraindications and willing to participate were randomized into the training (n=24) and control group (n=22). Maximal isometric knee extension strength (KES) and leg extension power (LEP) were measured in both legs and the asymmetrical deficit ((weaker leg/sum both legs)*100%) was calculated. Mobility function was assessed by habitual walking speed, dynamic balance assessing lateral stability, and a self-report questionnaire. The 12-week progressive strength-power training was organized twice a week and the weaker leg was trained more intensively.

RESULTS
In the training group, KES increased by 19% in the weaker leg (control group: 1%; repeated measures ANOVA group-time interaction p=0.011) and 12% in the stronger leg (control group: -3%; p=0.002). Training did not affect asymmetrical KES deficit (p=0.774). LEP increased by 16% in the weaker leg (control group: 5%; p=0.068). LEP of the stronger leg increased in both groups by 13-16% (p=0.980). The asymmetrical LEP deficit decreased in the training group compared to the control group (p=0.009). When compared to the control group, the training effect was not significant (p=0.516), however, using within-group T-test, the laboratory tests of mobility function improved in the training group (p=0.025). Self-reported outdoor mobility improved in the training group only (McNemar p=0.063) and a significantly larger proportion of participants in the training group reported an improvement in outdoor mobility (Chi-square p=0.016).

DISCUSSION
Training improved muscle strength and power in both legs, but had little effect on asymmetrical deficit. Mobility function seemed to improve more in the training group. The self-reports, additionally, indicated beneficial effects for their daily lives. Larger sample size and a more marked distinction in training protocol for the stronger and weaker leg may be needed to effectively reduce asymmetrical deficit and improve mobility. Also the time since hip fracture and duration of the training need to be considered. Asymmetrical deficit and potential ways to reverse it need further study.

REFERENCES

Keywords: Strength Training, Walking, Rehabilitation