

One week of hospital admission following elective hip surgery induces substantial muscle atrophy in older patients

I.W.K. Kouw,¹ B.B.L. Groen,¹ J.S.J. Smeets,¹ J. van Kranenburg,¹ M. Poeze,² J.A. Geurts,³ R.H.M. ten Broeke,³ L.B. Verdijk¹ and L.J.C. van Loon,¹ ¹Department of Human Biology, School of NUTRIM, Maastricht University Medical Centre+, Maastricht, The Netherlands, ²Department of Surgery, School of NUTRIM, Maastricht University Medical Centre+, Maastricht, The Netherlands and ³Department of Orthopedic Surgery, CAPHRI Research Institute, Maastricht University Medical Centre+, Maastricht, The Netherlands.

Rationale: It has been suggested that short successive periods of muscle disuse, due to injury or illness, contribute substantially to the observed loss of muscle mass over the lifespan. Hospitalization of older individuals due to acute illness, injury or (elective) surgery generally results in a mean hospital stay of 5-7 days during which the level of physical activity is strongly reduced. We hypothesized that hospital admission following elective hip arthroplasty is accompanied by substantial muscle atrophy in older men and women.

Methods: Twenty-six older patients (75 ± 1 y) undergoing elective total hip replacement surgery participated in this observational study. Upon hospital admission and on the day of discharge CT scans were performed to assess muscle cross-sectional area (CSA) of both legs. During surgery and on the day of hospital discharge a muscle biopsy was taken from the M. *vastus lateralis* of the operated leg to assess muscle fibre type-specific CSA. Repeated measures ANOVA with time and leg or fibre type as within-subjects factor were used, with separated T-tests being performed for each leg when interaction was observed. All data are expressed as means \pm SEM.

Results: An average of 5.6 ± 0.3 days of hospital admission resulted in a significant decline in *quadriceps* ($-3.4 \pm 1.0\%$), and total leg muscle CSA ($-4.2 \pm 1.1\%$) in the non-operated control leg ($P < 0.05$). Oedema resulted in an $10.3 \pm 1.7\%$ increase in total leg CSA in the operated leg ($P < 0.05$). At baseline, muscle fibre CSA was smaller in the type II vs type I fibres (3326 ± 253 vs 4075 ± 279 μm^2 , respectively; $P < 0.05$). During hospitalization, muscle fibre CSA tended to increase due to oedema of the operation in both type I and type II muscle fibres ($P = 0.10$).

Conclusions: Six days of hospitalization following elective hip arthroplasty leads to substantial leg muscle atrophy in older patients. Effective intervention strategies are warranted to prevent the loss of muscle mass and strength induced by short periods of muscle disuse during hospital admission.

Email: imre.kouw@maastrichtuniversity.nl