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Differences in Vastus Lateralis muscle thickness and maximum knee extension force between Master athletes, non-athletes and patients undergoing major abdominal surgery

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INTRODUCTION:
An important cause of frailty in old age is sarcopenia, which is associated with poor prognosis in major abdominal surgery1. While muscle mass is important, there is increasing evidence that the force generating capacity is proportionally more reduced during ageing than muscle mass2. The aim of this study is to obtain a measure of muscle size (Vastus Lateralis (VL) thickness), muscle function (maximal voluntary force generating capacity (MVC)) and the ratio between MVC and VL thickness, providing a measure of 'muscle quality'. As a substantial component of the development of frailty is likely to be attributable to low levels of physical activity, we hypothesise that 1) muscle mass and function are lower in patients undergoing a major abdominal surgery compared to age-matched Master athletes (MAs) and non-MAs and 2) poor muscle function is predictive of poor surgical outcomes in patients undergoing major abdominal surgery.
METHODS:
Major abdominal surgery patients (hepatobiliary, MASP) were recruited during a preoperative clinic at MFT (UK). Non-MAs were recruited from the general population of Manchester, presented without any co-morbidities, whilst sprint-trained MAs were recruited from members of Finnish Track and Field Organizations. Ultrasound images of the VL were processed (ImageJ v.1.80) to obtain VL thickness (in mm). A strap placed above the tibial malleolus and attached to a custom dynamometer recorded MVC (in N) during a maximal isometric knee extension while participants were sitting down on a chair with knee and hip at 90°. Surgical outcomes were length of stay in hospital (LOS) (in days) and readmission after surgery. Differences in VL thickness and MVC/VL thickness between groups was assessed with an ANCOVA with age as covariate to assess differences in the age-related decline. Bonferroni post-hoc test assessed differences between groups.
RESULTS:
A total of 98 male participants were included (MASP: N=31, 73±6 yrs, non-MAs: N=20, 73±5 yrs and MAs: N=47, 71±6 yrs). The mean LOS was 6 days (range: 2-12 days) No significant differences were found in VL thickness between groups ($p=0.099$), however MVC/VL thickness was lower in MASP compared with MAs and non-MAs ($p<0.01$). VL thickness and MVC/VL thickness declined similarly with age between groups ($p>0.05$). In the patient group, no significant relationship was found between VL thickness or MVC/VL thickness with LOS, and no difference was found in VL thickness and MVC/VL thickness between readmitted and non-readmitted patients ($p>0.05$).
CONCLUSION:
Muscle quality, but not muscle thickness, appears to be negatively affected in MASP when compared to age matched controls. Future work should explore the impact of muscle quality on long-term surgical outcomes (1-year and 3-year survival rate) as similarly to our previous work, we found no relationship between any muscle parameter and short-term surgical outcomes3. A limitation of this study is that only male was included.

Topic: Health and Fitness

Presentation form: Poster