MUSCLE FUNCTION AFTER MODIFIED SURGICAL TREATMENT OF COMPLETE HAMSTRING AVULSIONS IN AN ELDERLY POPULATION

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Introduction

The literature suggests an operative refixation of the ruptured tendons after complete hamstring avulsion onto the anatomical origin of the ischial tuberosity [1]. A modified surgical technique uses a refixation more proximally and laterally [2] to address an often reported postoperative complaint of pain in sitting [3]. The aim of this study was to determine hamstring muscle function after this modified surgical technique by assessing side-to-side differences in muscle strength and activation patterns during overground walking.

Methods

Thirteen patients (8 female, 5 males) with a median age of 64.2 (range, 52.1–80.4) years were followed up at a median of 46.2 (range, 11.2–75.0) months after surgery. Maximal isokinetic muscle strength of knee flexors (work [J/kg]) and the hamstrings to quadriceps (H:Q) ratio [4] was measured bilaterally using a dynamometer (60°/s, 240°/s). Muscle activation (Root Mean Square (RMS) [%MVC]) of vastus lateralis (VL) and medialis (VM), semitendinosus (ST) and biceps femoris (BF) as well as coactivation indices (CI) (VM-ST; VL-BF) [5] were analyzed for the stance phase. Statistical differences between the injured and non-injured leg were calculated using paired t-test ($\alpha<0.05$).

Results

Total work for the knee flexors (0.92 vs. 1.00 J/kg (60°/s); 0.48 vs. 0.52 J/kg (240°/s)) were comparable between the injured and non-injured leg ($p>0.05$). H:Q did not differ between sides ($p>0.05$) (Fig. 1). There were no significant side-to-side differences in RMS and CI during walking in any of the muscles (Figs. 2 and 3).

Discussion

The comparable results between sides demonstrate that both muscle strength and muscle activity can be restored with this modified surgical technique. While the strength ratios of the thigh are within the normal range of a comparable healthy population [6], coactivation tends to be higher compared to healthy elderly [7]. The latter may represent a compensatory mechanism for improving stability. The promising functional results shown here represent evidence that the modified surgical technique appears to be a good alternative to conventional methods.

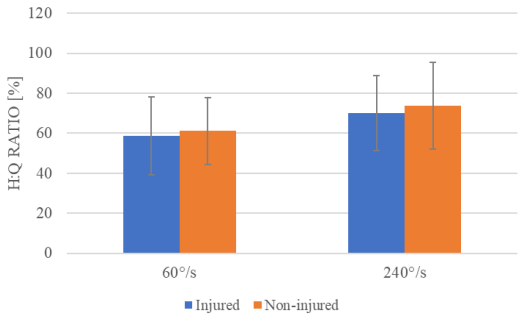

Figure 1: Strength – H:Q Ratio (%) between injured and non-injured leg for 60°/s and 240°/s.

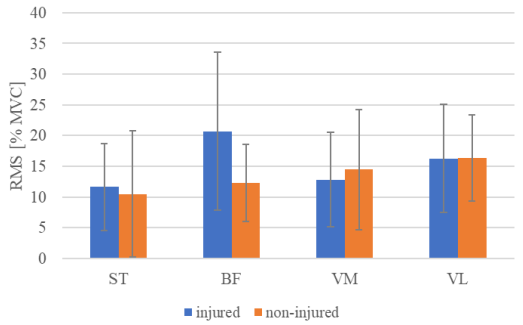

Figure 2: Muscle activation – RMS [%MVC] during stance phase of injured and non-injured leg for ST, BF, VM, VL.

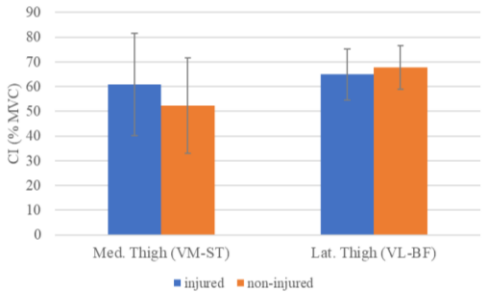

Figure 3: Coactivation [%MVC] during stance phase of injured and non-injured leg for VM-ST and VL-BF.

References

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