

The influence of tibial rotations on hamstring muscle groups' coordination during a dynamic knee flexion assessment

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Introduction & Purposes

Hamstring muscles (HM) strength testing is commonly used in practice to help better prevent/rehabilitate any strength's weakness but :

- ⊖ insight into the participation of medial (MH) and lateral (LH) hamstring muscle groups to the strength results itself,
- Imbalance between HM groups = lower performance + higher injury risk (1, 2),
- Underestimation of an abnormal strength or activation deficit (compensation) (3).

Tibial rotations → helpful to target more specifically the MH/LH groups (4) :

- No reference during a dynamic strength assessment of the knee flexion strength and the muscular activity of MH/LH groups.



Methods



MATERIEL / STATISTICS



- 1) SPM in Matlab
2) ANOVA2 + Bonferroni post hoc → difference between lateral and medial rotations for peak strength and muscular activity (Biceps Femoris + Semitendinosus).

Concentric mode at 60°/s

- Warm-up : 3 reps in NP
- Test 1 : 3 reps in MR or LR
- 2 min rest pause interval
- Test 2 : 3 reps in MR or LR

2 min rest pause interval

Concentric mode at 240°/s

- Warm-up : 3 reps in NP
- Test 1 : 5 reps in MR or LR
- 2 min rest pause interval
- Test 2 : 5 reps in MR or LR

2 min rest pause interval

Eccentric mode at 30°/s

- Warm-up : 3 reps in NP
- Test 1 : 3 reps in MR or LR
- 2 min rest pause interval
- Test 2 : 3 reps in MR or LR

2 min rest pause interval

Eccentric mode at 120°/s

- Warm-up : 3 reps in NP
- Test 1 : 4 reps in MR or LR
- 2 min rest pause interval
- Test 2 : 4 reps in MR or LR

Results

ANOVA2 & Bonferroni post-hoc :

Strength :

- Lateral Rotation > Medial Rotation ($p<0,001$) for eccentric 30°/s and 120°/s and concentric 240°/s
- ⊖ ≠ for the concentric contraction mode at 60°/s

Muscular activity :

- Biceps Femoris : LR > MR at every contraction modes and speed ($p<0,05$; MR < LR)
Semitendinosus : ⊖ ≠ between MR and LR at any speed or contraction mode



Conclusions

➢ Tibial rotations: useful to target a specific hamstring muscle group :

- Lateral (BF) or medial (ST)

➢ Further studies : develop the tibial Rotation-tests in a context of injury prevention and/or rehabilitation for :

- Biceps femoris injury
- ACL injury



Biceps Femoris :



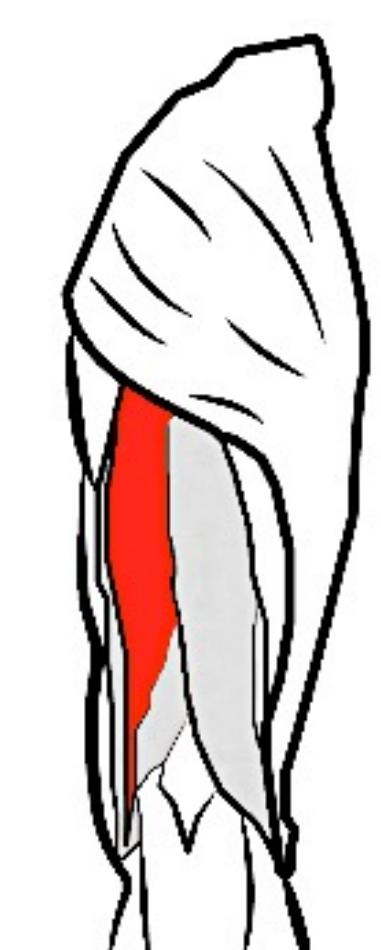
Lateral Rotation



Semitendinosus :



Medial Rotation



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