Maintenance of straight running among unilateral transfemoral amputees

Highlights

- Result showed that unilateral transfemoral amputees (uTFA) adopted asymmetric , limb specific strategy to maintain a consistent mediolateral ground reaction impulse (M-L GRI), which is an indication of the ability to maintain straight running path
- Lower M-L GRI at faster running speeds also implied that it might be easier to maintain running direction, which is important in designing rehabilitation protocols

Background

- Structural differences between affected and unaffected limbs of the lower extremity amputees caused a high level of mechanical asymmetry between them during locomotion [1].
- A symmetrical M-L GRI between both limbs can be a good indication of the ability to maintain a straight running path in an individual [2].
- **Research purpose**: to examine the mediolateral ground reaction force (M-L GRF) production across a range of running speeds in uTFA

Methods

- Nine participants were recruited
- Trials performed on instrumented treadmill (FTMH-1244WA; Tec Gihan, Kyoto, Japan)
- 6 x running trials (30 – 80% maximum speed)
- Maximum speed = average speed of fastest 100m recorded in competitions

Fig 1: Retrieved from [3]. Illustration of the experimental setup

Data Analysis and Result

Variables of interests: M-L GRF, M-L GRI, Step width (SW),Contact time(t_c)

- GRF data collected at 1000Hz and filtered at 25Hz
- 14 steps extracted (7 affected, 7 unaffected)
- GRF threshold for touchdown and toeoff at 40N

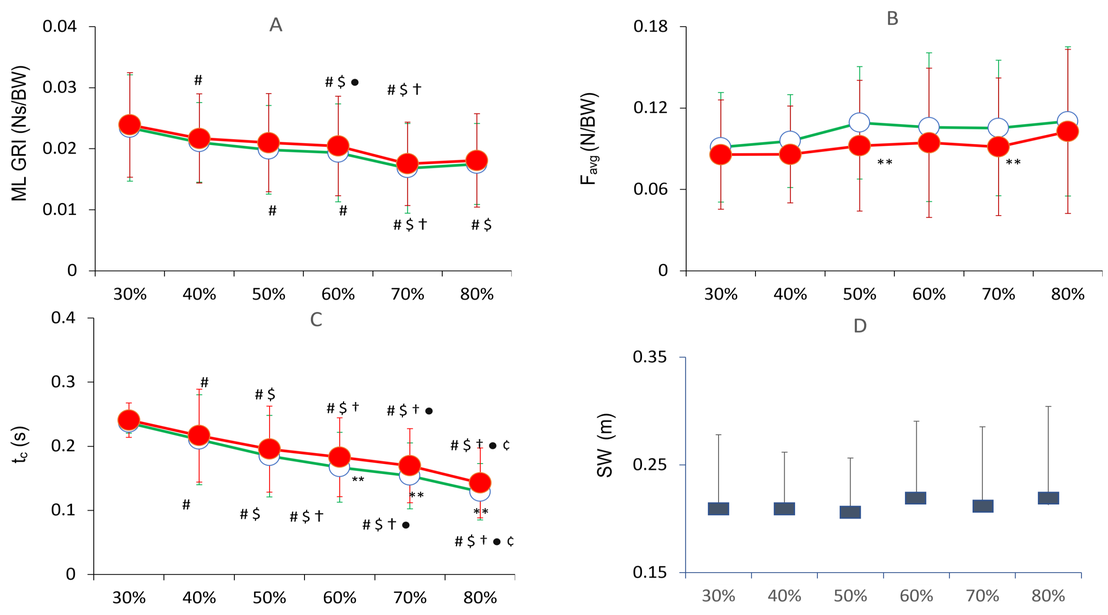

Fig 2: M-L GRI (A), Favg (B), t_c (C) and SW (D) of the unaffected (white circles) and affected (red circles) limbs across 6 different running speeds. . ** represents significant differences between limbs at each speed at $p < 0.05$. #, $, †, ●, ¢ represent significant differences from 30%, 40%, 50%, 60% and 70% speed trials at $p < 0.05$ respectively

Discussion & Conclusion

- M-L GRI was similar between both affected and unaffected limbs throughout the running cycle
  - *Implied the ability to maintain straight running path*
- Participants showed similar SW across running speeds
  - *Reduced range of motion of the lower extremities might have restricted TFAs ability to mediate SW* [4]
  - Inability to mediate SW
- M-L GRF & t_c were significantly different between limbs
  - *Suggests limb-specific strategy to maintain straight running*

References:

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