

DIFFERENCES IN DAY-TO-DAY AND SIDE-TO-SIDE STRETCH REFLEX MAGNITUDE IN PATIENTS WITH BRAIN INJURY



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INTRODUCTION

- Due to its frequent use in research and increasing use clinically (1), the test-retest reliability of the short latency stretch reflex (SSR) of the soleus muscle (SOL) in healthy subjects and patient populations is important.
- In stroke patients in the acute/sub-acute (SA) phase, the magnitude of cortical responses are not related to the clinical status of the patients and are fluctuating from day-to-day. The responses stabilize as the patients become chronic (2).
- It is possible that the difference in magnitude between days is due to a fluctuating nervous system in the early stages following a lesion.
- Although day-to-day differences in magnitude have been assessed in the cortical responses of sub-acute patients they have not been investigated at the spinal level.

AIM

- To investigate the day-to-day and side-to-side characteristics of the SOL SSR magnitude in patients with acquired brain injury

MATERIALS AND METHODS

- Thirty one SA patients and 34 healthy controls participated in the study.
- Patients suffered stroke (71%), traumatic brain injury (19%), encephalitis (7%) and arteriovenous malformation (3%).
- Testing occurred on two sessions, 24 hours apart with subjects tested in the same position.
- Dominant and non-dominant/affected and less affected sides were tested. In healthy controls and patients, respectively
- While the subject was seated, the EMG activity of the SSR of the SOL was recorded following thirty 8°, 160°/s dorsiflexion stretches administered every 4–12s while the patient contracted the SOL to 5–15% of the MVC of the dominant/affected SOL.
- The magnitude of the SSR was defined as the area under the curve in the 20ms following the onset of the SSR and expressed as a proportion of baseline.
- The SSR magnitude was variance heterogeneous and best approximated by log-normal distribution. Therefore, the LogG analysis was applied.
- The magnitude of the response was modelled as a ratio between day 1/day 2, dominant/non-dominant and affected/less affected and compared.

RESULTS

- 9% of healthy controls and 13% of patients had different SOL SSR response magnitudes between day and 35% of healthy controls and 29% of patients had differences between side
- 2 patients had extreme differences (5 and 10 times the response magnitude) between the affected leg vs. less-affected leg.
- These extreme differences were not seen in the healthy controls or other patients
- The extreme patients were TACI stroke patients, performed worst in the 10MWT and had an Ashworth score of 3.

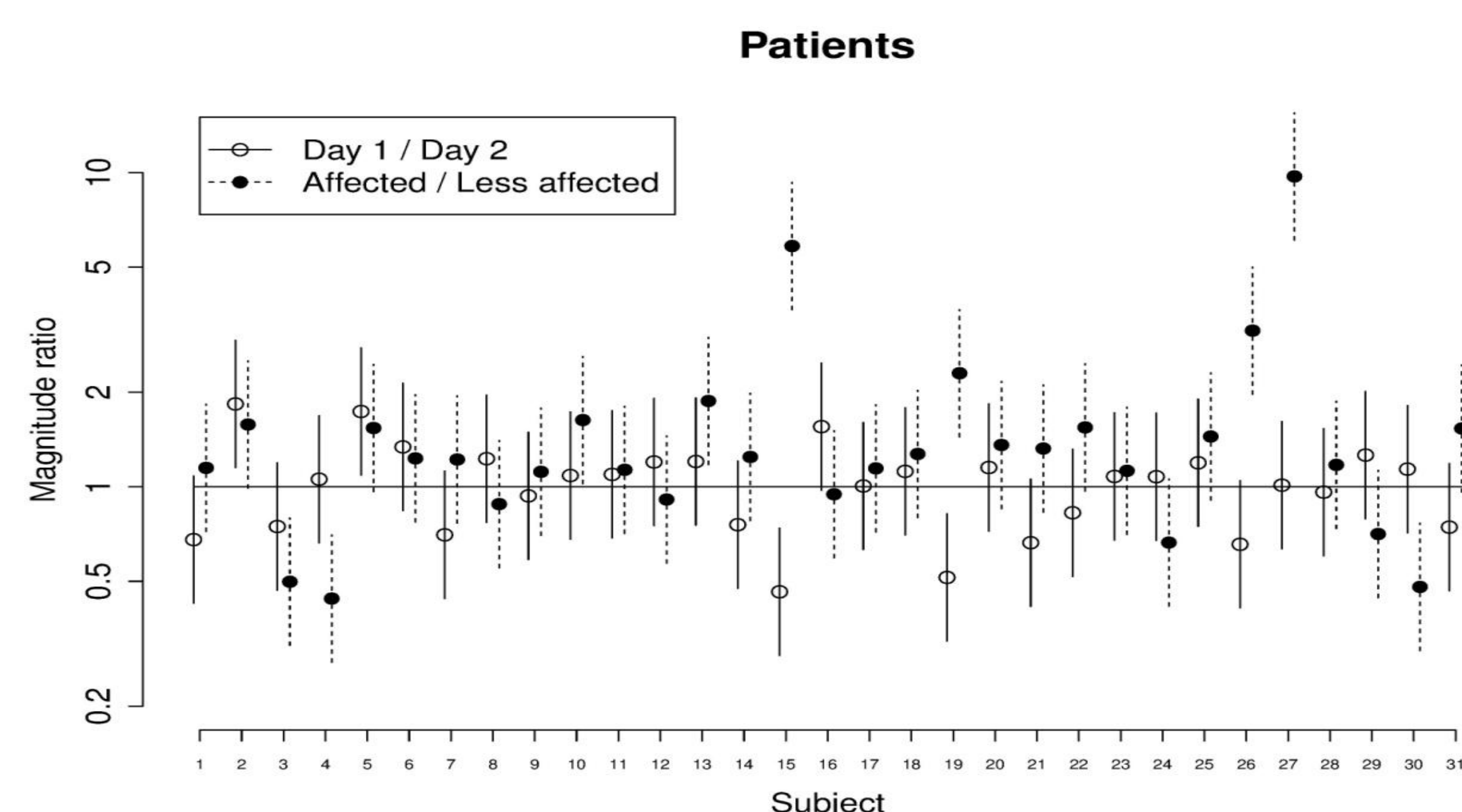


Figure showing the magnitude ratios (and 95% confidence intervals) for day and side for each patient (1–31). Notice the logarithmic vertical scale. The unfilled circles with solid lines represent the magnitude of the response on a log scale for day 1/magnitude of the response on a log scale for day 2 and the filled circles with dashed lines represent the magnitude of response on a log scale for the more-affected limb/magnitude of the response on a log scale for the less-affected limb. The horizontal line represents a magnitude ratio of 1, indicating no difference in the magnitude between day and/or side. Subjects with 95% confidence intervals bisecting the horizontal line had no significant difference between side and/or day

CONCLUSIONS

- A similar percentage of SA patients and healthy controls had differences in magnitude between days and side. Therefore, in general SA patients were not more unstable than healthy controls.
- This contradicts previous reports on cortical responses showing SA patients with variable response magnitudes (2).
- Despite this, two SA patients had extreme ratio differences. Although these patients were the exception, they are seen commonly enough that they should be acknowledged.
- Due to the low number of patients with extreme differences definite conclusions with regard to the type of patient that express large differences between side should be cautioned.

(1) Lorentzen et al. (2010) *Clinical Neurophysiology*, 121: 1939–1951;

(2) Swyane et al. (2008) *Cerebral Cortex*, 18: 1909–1922.