

DAY TO DAY IMPROVEMENT AND INTERTRIAL VARIABILITY OF BALANCE PARAMETERS IN ELDERLY PATIENTS SUBMITTED TO AN AQUATIC MOTOR CONTROL INTERVENTION AFTER HIP REPLACEMENT

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1. BACKGROUND

- ↻ **Total hip replacement (THR)** has found to assist patients to attain almost normal control of balance in tasks accounted in activities of daily life (Majewski et al., 2005)
- ↻ Rehabilitation programs after hip replacement aim to improve **balance** and to **reduce weight bearing asymmetry** (Talis et al., 2008)
- ↻ Efforts are made to **reduce the length of hospital stay** and to hasten rehabilitation using new rehabilitation protocols, thus **improving short-term outcome after THR** (Lilikakis et al., 2008)
- ↻ Limited number of studies have suggested that a **combined Aquatic- and Land-Based Therapy (cALBT)** improves functional outcomes after hip or knee replacement (Gibson & Shields, 2015)



AIM OF THE STUDY

To evaluate the **day-to-day improvement and the inter-trial variability of balance parameters in elderly** undergone a THR surgery after the application of an Aquatic Therapy rehabilitation program

2. METHODS

Sample:

Seven (6 F, 1 M) patients (mean age 72.6 ± 10.1 yrs), 2w after THR

Procedure:

Participants were tested in quite stance balance tests (duration = 10s) before (C0: initial measurement) and after an Aquatic Therapy session that were implemented for 6 consecutive days (D1, D2, D3, D4, D5, D6)

Intervention:

- ✓ aquatic motor control rehabilitation program
- ✓ six 70-minute aquatic therapy sessions
- ✓ 20-minute segment based on Clinical Ai Chi was included in each Aquatic Therapy session

Instrumentation:

Zebris FDM-T System (Zebris Medical GmbH, Germany)
Sampling frequency was set to 100 Hz.

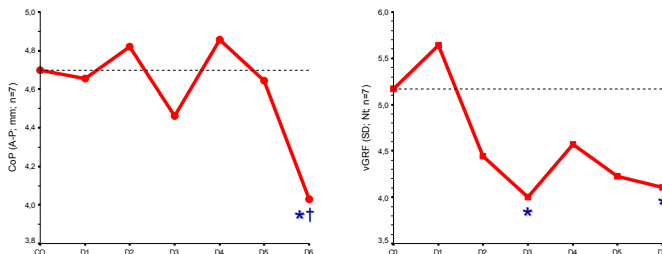
Statistical analysis:

- ↻ The intra-day coefficient of variability (CoV) was calculated
- ↻ The data within each testing session were averaged
- ↻ Day-to-day modifications examined by repeated measures ANOVA
- ↻ Statistical tests were run with SPSS 10.0.1 (SPSS, Chicago, IL)

3. RESULTS

Balance parameters average progression C0 → D6:

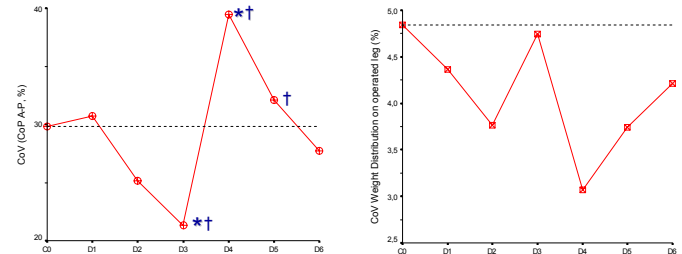
- ↻ medio-lateral CoP displacement: ↓ 12.9%
- ↻ anterior-posterior CoP displacement: ↓ 14.3%
- ↻ vertical ground reaction force fluctuation: ↓ 20.5%
- ↻ larger magnitude of improvement compared to C0: **D3**



*: p < .05 compared to C0; †: p < .05 compared to previous day

Balance parameters CoV progression C0 → D6:

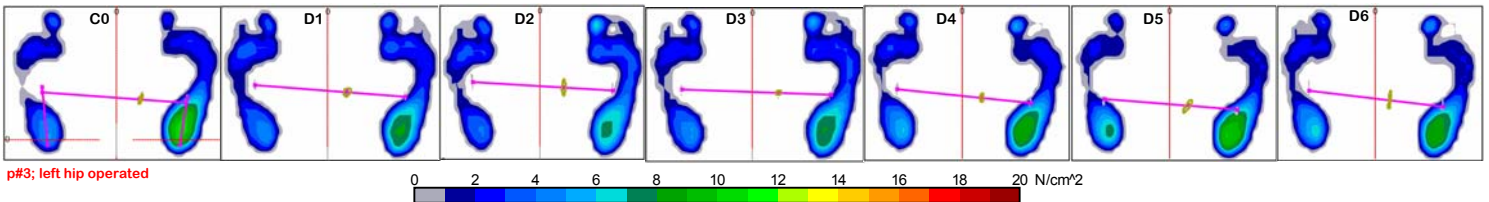
- ↻ medio-lateral CoP displacement: ↔ D1 → D5; ↑ D6
- ↻ anterior-posterior CoP displacement: ↓ D1 → D3; D4 max
- ↻ vertical ground reaction force fluctuation: ↓ D1 → D2; D7 min
- ↻ loading on the operated limb: ↓ D1 → D2; D5 min



*: p < .05 compared to C0; †: p < .05 compared to previous day

Bilateral weight distribution C0 → D6:

- C0 → D4: progressively more symmetrical (from 63.2% load distribution on the healthy lower limb to 61.5%)
- D4 → D6: return to ≈ initial values



4. DISCUSSION

- The Aquatic Therapy intervention improved quite stance balance parameters
- Results in agreement with previous findings (Trudelle-Jackson et al., 2002)
- Day-to-day improvement and inter-trial variability were advanced after the third day of the implementation of the Aquatic Therapy Rehabilitation program
- The reversal of the rate of improvement after the fourth session could be attributed to possible learning effects or fatigue
- Limitations of the study: ① the small number of participants ② lack of variations concerning the duration of the Aquatic Therapy rehabilitation program ③ no follow-up measurement
- Further investigation is needed to establish the optimum Aquatic Therapy rehabilitation protocol in order to improve the short-term outcome after THR

5. CONCLUSION OF THE STUDY

Quite stance balance parameters can be optimally improved after a series of four Aquatic Therapy sessions in elderly patients after hip replacement

References

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