Enhanced biomechanical closed kinetic chain therapy intervention in the rehabilitation of patients after Total Hip Arthroplasty

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Introduction

90% survivorship 10 years following THA

Reduced pain, better function than pre-operative state
Introduction

However:

- Pain level & quality of life - less than general population
- 25% unable to return to pre-operative sports
- Limp, periarticular discomfort

Complaints may be attributed to muscle weakness
Introduction

- Muscle weakness ➔ motor function deficit ➔ impairments in daily living activities

- Major goal in THA rehabilitation - muscle strengthening and coordination

- No evidence-based guideline for rehabilitation is available
Study Objectives

Effect of closed kinetic chain (CKC) exercise on gait parameters and clinical measures following THA
Materials and Methods

- **Prospective analysis**
  - Primary OA
  - 3 months Post THA
- **Exclusion criteria**
  - Infection
  - Instability / loosening
  - Previous Hip Surgeries
  - Other Arthroplasties
Materials and Methods

- Patients underwent a computerized spatio-temporal gait test at three time points:
  - Pre-treatment
  - Post 15 min
  - Post 3 months
- WOMAC and SF-36 questionnaires before and after 3 months of treatment
Treatment

- The Closed Kinematic Chain enhancer
  - Biomechanical device
  - Modular elements attached to foot-worn platforms
Study Design

- 35 patients,
- 21F : 14M (60%/40%)
- Mean age: 65.3 y , Range: 50y - 84y
- BMI: 27.7
The graph shows the velocity (cm/sec) over time, with three data points:

- Baseline: 70.7 cm/sec
- 15 Min.: 88.3 cm/sec
- 3 Mo.: 100.2 cm/sec

The data points are labeled with asterisks (*), indicating statistical significance at p<0.05. The graph compares the velocity after single and 3-month treatments, with the latter showing a significant increase compared to the baseline.
Patients' Distribution (%) among Gait Velocity Groups

- **30-80 cm/s**
- **80-110 cm/s**
- **>110 cm/s**

**Gait velocity groups**

- **Pre-treatment**
- **15 minutes**
- **3 Months**

- **poor**
- **fair**
- **normal**
Step Length

![Graph showing step length over time with significant differences marked with * p<0.05.]

- **Baseline**: Op. hip: 47.2 cm, Non-Op. hip: 45.0 cm
- **15 Min.**: Op. hip: 51.8 cm, Non-Op. hip: 50.6 cm
- **3 Mo.**: Op. hip: 55.7 cm, Non-Op. hip: 54.4 cm

* p<0.05
Single limb support

* p<0.05
55% decrease in pain
47% decrease in stiffness
64% decrease in functional limitation

* p<0.05
28% increase in Physical Score
14% increase in Mental Score

* p<0.05
Study Limitations

- Small Cohort
- No control group
- Data from a single center
Discussion

↑ Gait patterns after one session
  □ Enhanced following 3 months of therapy

↓ Pain

↑ Function

↑ QoL
Conclusions

Overall functional improvement after CKC therapy

- Subjective (SF-36/WOMAC)
- Objective (Gait parameters)

CKC therapy may be valuable in rehabilitation after THA