Does Gait Kinematic Parameters Change as Functional Outcome Scales in Total Hip Arthroplasty Subjects after Rehabilitation?

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Introduction

Total hip arthroplasty (THA), is a routine, common surgical intervention; following surgery is usual practice a period of rehabilitation to recover strength, range of motion and walking ability of the operated limb. Many outcome scales (OS) have been developed to assess the improvements of the patients, but gait parameters have not been studied as possible outcome[1].

Research Question

This study aims to evaluate the effectiveness of rehabilitation through OS and gait analysis (GA) parameters, secondary to compare if the improvements detected by OS are related with GA parameters.

Methods

Subjects were recruited in a rehabilitation unit after receiving THA. Inclusion criteria were stable clinical conditions, and no other neurological or rheumatic pathologies or previous surgeries at the lower limbs. For the GA, a BTS® DX-400 system with 8 optoelectronic cameras and 2 force platforms were used. The analysis was assessed by an expert operator.

Outcomes considered:

- Merle D'Aubigne
- Barthel Index
- Pain NRS

Gait analysis parameters considered:

- Spatio-Temporal parameters
- Gait Variable Score (GVS) [2]
- Gait Profile Score (GPS) [2]
- Gait Deviation Index (GDI) [3]

The use of Gait Analysis is primary to tailor the rehabilitation treatment also in an orthopedic rehabilitation context

Functional Outcome Scales	Admission (T0)	Discharge (T1)	pValue
BI	66.58±8.96	94.25±6.30	<0.001
MDA	7.75±1.22	12.25±1.54	<0.001
NRS	1.17±1.75	0±0	0.036

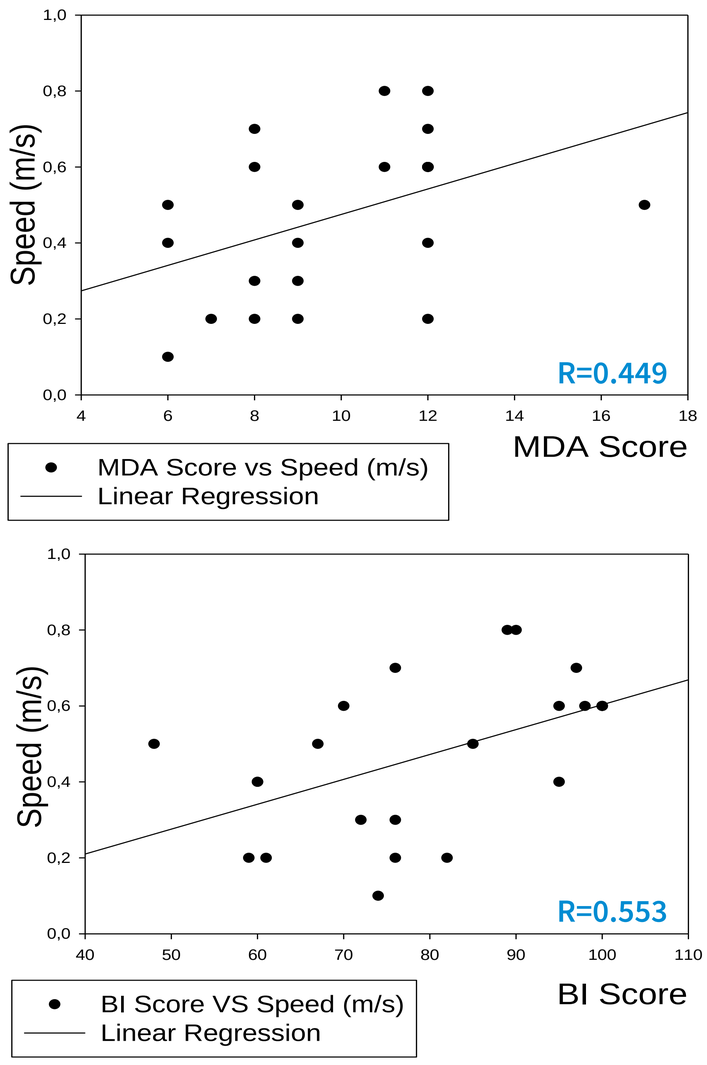
Spatio-Temporal Parameters	Admission (T0)	Discharge (T1)	pValue
Speed (m/s)	0.37±0.18	0.58±0.16	0.006
Cadence (step/min)	60.81±19.20	78.53±12.88	0.014
Step Length (m)	0.61±0.24	0.71±0.28	0.355
Stride Length (m)	0.50±0.23	0.61±0.25	0.266
Stance phase	70.29±8.03	64.02±4.46	0.027
Swing phase	32.48±9.48	37.55±3.93	0.101
Single-Stance Phase	32.31±9.58	38.43±4.75	0.060
Double-Stance Phase	15.22±4.70	13.52±3.70	0.336

Kinematic Indexes	Admission (T0)	Discharge (T1)	pValue
GVS Pelvic Tilt	8.34±5.08	6.79±3.92	0.176
GVS Pelvic Rot	5.49±2.64	4.76±2.32	0.426
GVS Pelvic Obl	3.91±2.08	3.41±1.58	0.204
GVS Hip FE	26.38±43.79	20.93±37.28	0.027
GVS Hip Abd-Add	9.57±10.94	9.15±10.34	0.519
GVS Hip IE	15.10±23.91	20.73±24.57	0.042
GVS Knee FE	24.48±30.84	21.43±30.72	0.042
GVS Ankle FE	12.43±2.09	10.08±3.27	0.003
GVS Ankle IE	6.78±2.11	6.63±3.76	0.470
GPS	15.81±19.07	14.70±17.55	0.380
GDI	67.01±30.81	72.42±27.16	0.977

For the statistical analysis a Student T and Wilcoxon signed ranks test were performed to test the variation between T0 and T1. Spearman's Rho and Pearson's R were calculated to investigate a possible relationship between BI and MDA, with the gait analysis parameters.

Results

12 subjects (4 females, 9 left hips) mean age 68±8 were included, the length of recovery was 17±6 days.



Discussion

Both OS and temporal and spatial GA parameters showed meaningful improvements between T0 and T1; these improvements have been clearly detected also with GA, that has rarely been performed before in such an acute phase[4]. The correlation between the OS and the aforementioned GA parameters, may suggest a wider use of GA in this clinical context, as a useful tool to assess the function and improvements of this kind of population. In particular to tailor the rehabilitation treatment.

References

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