Is Clinical Gait Analysis useful in guiding rehabilitation therapy decisions in patients with spinal cord damage?

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Aim:

Walking is a priority for patients following incomplete spinal cord damage (ISCD) due to trauma or non-traumatic conditions. Approx. 80% of patients with ISCD (AIS grade C or D) are walking at discharge. Rehabilitation directed at improving walking requires outcome measures that are valid, reliable and timely in order to optimize patient management and resource utilization. Despite three-dimensional gait analysis (3DGA) being considered the "gold standard" in evaluating walking and guiding intervention, there is still a substantial lack of knowledge or understanding of how clinical gait analysis (CGA) can be utilised to guide specific intervention in incomplete SCI to optimise ambulation.

The aim of this study was to evaluate how the 3DGA findings for patients with ISCD guided clinical management directed at optimizing walking.

Method:

This was a retrospective open cohort case series, including 3DGA data collected on 40 adults (26 males; 19-83 years) with ISCD, no other significant lower limb pathology, and referred from July 2006 – December 2014. All participants underwent a full 3DGA, including clinical assessment, video, placement of 18 retroflective markers using Plug-In Gait for data capture, walking barefoot at preferred speed along a 10m walkway with five trials for both left and right limbs. Participants were classified according to the American Spinal Injuries Association (ASIA) Impairment Scale, with etiology (traumatic or non-traumatic) and years post injury noted. All CGA data were presented to the multi-disciplinary team with team interpretation and recommendations recorded.

Extracted information included, reason for referral, clinical question, considered intervention and recommendations based on CGA. Data were collated and summary statistics calculated.

Results and Discussion:

Reason for Referral	Count
Identify management options	14
Identify cause of poor gait & optimise management	5
AFO or anti-spasticity management	3
Suitability of ITB management	2
Optimise muscle selection for BoNT-A	7
Identify impact of spasticity &/or weakness on gait	6
Review impact of AFO on gait	2
Orthopaedic surgery planning	1

Table 1: Reasons for referral

Recommendation	Count
AFO Prescription	15
AFO Prescription + BoNT-A	6
Regional anti-spasticity management	7
Rehabilitation program	6
BoNT-A only with muscles identified	3
No intervention	3

Table 2: Recommendations

3DGA data suggests gait deviations in ISCD mostly occur in the sagittal plane at the knee and ankle joints, with compensations occurring at the hip joint in the sagittal plane and at the pelvis in both the sagittal and transverse planes. Reasons for referral for 3DGA were predominantly to assist with management decisions (51.5% of patients – refer to Table 1). The prescription of an ankle foot orthosis was recommended for 52.5% of patients. On 7 occasions a recommendation was made where it was incongruent to the referrer's proposed intervention, predominantly associated with use of Botulinum Toxin-A (BoNT-A) (see Table 2).

Significance of the findings to allied health: This study demonstrates the clinical utility of 3DGA in guiding clinicians in their decision making regarding management options for gait dysfunction in ISCD. Identifying the most suitable treatment option may minimise the risk of inappropriate management of walking impairments