with reduced pelvic obliquity and rotations post SDR for this subject. At T1 stride length was increased with increased contact area under the foot during the stance phase. Speed was reduced at T1 compared to T0 as a result of improved stability through better lower limb alignment and foot posture. 

Discussion and conclusions: These preliminary results showed gait pattern with less restriction due to spasticity after SDR, which highlights the effectiveness of SDR in the management of children with spastic CP. Analysis extended to more subjects being recruited highlights the effectiveness of SDR in the management of children with spastic CP. Analysis extended to more subjects being recruited is necessary to confirm our preliminary results and more extensive data will be collected at 12 and 24 months post SDR to further assess the long term efficacy of interventions.

Reference


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P33

The consistency of knee kinematic, kinetic, and ground reaction force variables collected during running and cutting manoeuvres


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Introduction: Abnormal biomechanics during sports activities can lead to increased joint-reaction forces, an increased valgus angle and increased load at the knee. The majority of studies that assess lower-limb biomechanics commonly use 3D motion analysis techniques, which allow clinicians and researchers to quantify all three planes of joint motion during complex tasks. The purpose of this study, however, was to compare the within-day and between-days reliability of discrete kinematic, kinetic and ground reaction force (GRF) data for the knee joint collected during running and changing direction tasks.

Methods: Sixteen uninjured recreational athletes, eight males and eight females, took part in three testing sessions. Their mean ± standard deviation age, height and mass was 26.2 ± 5.1 years, 1.67 ± 0.7 m, 67.1 ± 10.5 kg, respectively. Each participant underwent two sessions on the same day and another session one week later. A ten-camera motion analysis system (Qualisys, sampled at 240 Hz) and a force platform (AMTI, sampled at 1200 Hz) embedded into the floor, was used to collect kinematic and kinetic data during the support phase. For the running trials, subjects were required to touch the force platform with their right leg while running along a 10 m runway. For the cutting task, they were required to contact the force platform and immediately turn 90◦ to the left and run 3 metres in that direction. Approach speeds for both tasks were required to fall between 3.5 and 5.5 m s⁻¹.

Results: Tables 1 and 2 shows that between-day ICCs were lower as compared to within-day ICCs. Specifically, seven of 12 between-day measures fell below an ICC value of 0.75 compared to two of 12 within-day measures.

Transverse plane ICCs ranged from 0.40 to 0.80, whereas frontal and sagittal planes ranged from 0.42 to 97. GRF data were more reliable within day than between days as compared to kinematic and kinetic data.

Discussion and conclusion: In the first comparison, between-day and kinetic ICC values were lower than within-day values, which is in agreement with previous studies [1,2,4]. Several factors may contribute to the reduced consistency during repeated measurements, such as errors in marker reapplication, static alignment and tasks difficulty [4]. As expected, GRF data were more consistent than kinematic data, since GRF data are representative of the sum of all the segmental masses and accelerations [3], and less variability will be seen as compared to individual joint kinetic or kinematic patterns. Also, no markers are necessary to collect GRF data and will therefore be more consistent [2]. These kinds of investigations should be performed before undertaking studies which involve repeated measurements of the same participant over time.

Reference

Step length after discrete perturbation predicts accidental falls and fall-related injury in elderly people with a range of peripheral neuropathy

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Introduction and aim: Distal symmetric polyneuropathy, a common complication of Type 2 diabetes mellitus, causes lower limb sensorimotor impairments. These impairments markedly increase fall risk due to inability to cope with perturbations [1–3]. We aimed to (1) identify the specific frontal plane lower limb sensorimotor functions which are necessary for robustness to discrete, underfoot perturbation during gait; and (2) determine whether post-perturbation step parameter changes could distinguish those who sustained falls and fall-related injuries, and those who did not.

Patients/materials and methods: Forty-two subjects (26 with diabetic neuropathy and 16 without diabetes) participated. Frontal plane lower limb sensorimotor functions at the ankle and hip were determined using established laboratory-based techniques. Each subject realized 60, 8-m gait trials with a specifically designed shoe. This shoe randomly produced either a medial or a lateral perturbation under the left or right foot. These perturbation trials were randomized among 44 additional unperturbed dummy trials [4]. Following these baseline procedures falls and fall-related injuries were prospectively recorded for one year.

The ideal response to a discrete perturbation was defined as per Reeves et al. [5], who argue that a robust biologic system changes its behavior minimally in response to a perturbation. This means that for a robust subject the error between the disturbed and undisturbed motions should be minimal following a perturbation. Therefore, the subjects’ alterations in step width and step length in response to a discrete underfoot perturbation were measured and compared to the mean step width and step length of the unperturbed steps.

The relationships between the most extreme post-perturbation steps measures and subject lower limb sensorimotor function were assessed with bivariate correlations. Multivariate analyses of lower limb sensorimotor functions that significantly correlated with relevant post-perturbation gait measures were used to determine relative strengths and independence of effects. Significant fall group and fall-injury group differences in post-perturbation extreme step measures were identified using one way ANOVA.

Results: Ankle proprioceptive threshold (APrT; B = 1.835; p = .025) and hip abduction rate of torque generation (RTG; −14.987; p = .041) independently predicted extreme step length after medial perturbation, with precise APrT and greater hip RTG allowing maintenance of step length. Subjects who sustained a fall/fall-related injury demonstrated greater extreme step length changes after medial perturbation than those who did not fall/did not sustain an injury (percent change = 16.4 ± 4.8 vs 11.0 ± 5.0; p = .06 and 18.5 ± 9.2 vs 11.3 ± p = .01, respectively).

Discussion and conclusions: The inability to rapidly generate frontal plane hip strength and/or precisely perceive motion at the ankle prevents maintenance of normal step length after perturbation, which in turn appears to identify older diabetic subjects at increased risk for fall/fall-related injury.

Reference

The effect of patellofemoral bracing and taping on knee joint kinematics and kinetics

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Introduction and aim: Bracing and patellar taping are commonly used interventions for patellofemoral pain (PFP) and clinical data suggests that both have an effect on reducing pain by between 56% for brace [1] and 80% for tape [2]. The mechanism for pain relief is still unclear although it has been proposed that the effect of the intervention maybe due altered lower limb biomechanics [3]. To date there have been no investigations comparing patellar taping and patellar bracing on knee mechanics during ambulation. This study compared a patellar brace and patellar taping to investigate changes in knee joint kinematics and kinetics. It was our hypothesis that bracing or taping would equally alter knee joint kinematics or kinetics in a healthy population during gait.

Patients/materials and methods: Three-dimensional movement analysis was performed on twelve healthy subjects during walking under three distinct experimental conditions; control (no intervention), brace (Bioskin™patellar tracking Q-Brace) and patellar tape conditions.

Results: The subjects walked with increased knee flexion following the application of the knee brace. This observation was found to be significant during heel strike (p < 0.001) when