Peroneus longus and the midfoot in children: EMG normative data


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Introduction.– The EMG overactivity of peroneus longus (PL) is described [1] as the major deforming force in spastic midfoot break in adult after stroke. Before to test this hypothesis in children with cerebral palsy (CP), it was necessary to provide the normal EMG activity of PL in children without neuromuscular disorders. These data are not studied in literature. It was necessary to provide the normal EMG activity of PL in children without neuromuscular disorders before to study its overactivity in CP especially in the midfoot break.

Materials and methods.– One thousand and four hundred strides of 21 children (age 6.5±1) without neuromuscular disorders were examined using surface EMG during walking. The PL activity was normalized as a percentage during strides. A software selected the more repeatable strides. The onset, offset activity of rectified raw EMG signal was detected by a manual selection: the threshold was 20 μV [3].

Results.– Resulting in 1104 normal strides: the mean toe off was at 62.8%, the TA amplitude decreases from 0 to 10% of the cycle, the TA amplitude decreases from −20° (P < 0.01). From −10° of dorsiflexion, the HA activation significantly increase from 0 to 10% of the cycle. The DA activation decrease from 0–10% cycle (P < 0.05) and like the VL, a muscular activation appear in the middle of stance phase −20° (VL 20–30%; P < 0.05). The contralateral limb, SOL activated earlier from 87–100% and 0–10% at MP (P < 0.01).

Discussion.– Equinus gait secondary to the orthosis induced changes in muscle activation both in terms of timing and in terms of signal amplitude. The premature activity of SOL, the TA-SOL coactivation and the reduce TA amplitude are frequently observed during cerebral palsy gait. These findings in healthy children show that a foot deformation without neurological disturbance induce primary changes in muscle activation, which must be taken into account during interpretation in motion analysis.

Further reading


Keywords: Mid foot; Children; Peroneus longus; Dynamic EMG; Gait

Impairment profile of shoulder muscle strength in children with brachial plexus palsy at birth

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Introduction.– Brachial plexus palsy (BPP) at birth can lead to severe functional limitations of the whole upper-limb. Although shoulder muscle strength loss and imbalance are central to the loss of upper-limb function associated with BPP, biomechanical and clinical assessments of muscle strength are rarely reported for this population. Thus, the aim of this study was to quantitatively evaluate the muscle strength impairment profile in a group of children with unilateral BPP. In addition, the validity and reliability of the current methodologies was tested.

Methods.– Ten children with unilateral BPP (mean age = 12.31, SD = 3.28) underwent the following assessments in both shoulders: (1) three trials of maximal isometric contractions in flexion/extension, internal/external rotation, and abduction/adduction using a hand held dynamometer, (2) maximal isometric contractions of flexion/extension using a Biodex. The maximal values of the involved shoulder were compared to the non-involved one.

Results.– The concurrent validity between the hand held dynamometer and Biodex measures was excellent (r² = 0.81). The inter-trial reliability was also excellent (ICC between 0.94 and 0.98), regardless of the direction and side. The comparison between sides showed significant differences in all directions (P-values ranged from 0.036–0.0009), except for flexion. External rotation and extension were the most impaired directions, with average strength impaired/non impaired shoulder ratios of 30% and 40%.

Discussion.– This study provides the first comprehensive quantitative measurement of shoulder muscle strength using a hand held and motorized dynamometer in children with BPP. Future work will relate specific patterns of weakness to resultant bony and muscle deformity and functional limitations.

References


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T-score computer-calculation in Goal Attainment Scales does not provide further information than hand-calculation of simple mean scores: Analysis of 537 GAS scales

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Goal Attainment Scoring (GAS) is a method of measuring progress towards individual goals. GAS is originally a 5-points scale, that represent baseline and different levels of goal attainment. It is possible to calculate by an Excel calculation sheet a T-score that gives the overall result of the different scales of one patient using Kiresuk’s formulae. The aim of this study was to compare T-scores and simple means of GAS raw scores.

For 2 years all patients, aged 2–20 presenting a motor handicap that needed botulinum toxin treatment were included. One to seven GAS scales were written per patients and results were assessed 8 weeks after treatment. T-scores were