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Revisited pathophysiology of equinus gait in children with cerebral palsy
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Keywords: Locomotion; Equinus; Kinetics; Adaptation; Motor control;
Cerebral palsy

Introduction.– Children with cerebral palsy (CP) usually land their foot on the
ground, flat or by forefoot, in equinus when walking. The associated early
braking of ankle dorsiflexion might be an adaptive function instead of being
imposed by triceps surae dysfunction. Thus, wearing negative heel shoes (NHS),
allowing in dorsiflexion flat landing and braking, would induce quick adaptation
decreasing equinus at initial contact.

Methods.– Eleven children with CP (8.5 ± 2.5 years of age, 5 diplegics and 3
hemiplegics) with spastic triceps that were not or a bit contracted and walking
without aids underwent tridimensional gait analysis when walking barefoot, with
standard shoes and with NHS of 10◦.

Results.– Within 2 to 5 gait cycles, the NHS touched the ground roughly as the
barefoot did (flat or by the forefoot) but in dorsiflexion (7◦ ± 6◦) and not in
plantar flexion (−6◦ ± 6◦), without alteration of knee flexion and walking speed
and with maintained elevated early braking of dorsiflexion.

Discussion.– The early deceleration of dorsiflexion might play a functional role
such as contributing to dynamic balance during gait. Thus it might be
a primary regulated biomechanical variable explaining the quick adaptation of
foot kinematics according to the shoe design.

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Sagittal radiological analysis of spine in walking children with cerebral palsy
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Keywords: Spine; Cerebral palsy; Child

Introduction.– We have performed a radiological evaluation of static data of
spine-pelvis-femur complex in walking children with cerebral palsy (CP). The
data are discussed about GMFCS and after about radiological data in asym-

metric subjects.

Material and method.– The CP population is comprised of 119 children and the
asymptomatic population of 652 children.

Results.– There is no significant difference concerning the form parameter (pelvic incidence = PI), on the other hand there is a significant difference on position parameters (pelvic tilt = PT and sacral slope = SS). There is a correlation between GMFCS and PI (P = 0.013) and between GMFCS and PT (P = 0.021).

Discussion.– The PC population is not structurally different than the asym-

metric population. It will be the growth, in pathologic context, which disturbs
parameters. A lumbar lordosis which is not correlated with PI has to be
considered like a result of the disease (postural troubles, neuro-motor disor-
ders related with growth...) and requires a specific and early evaluation and
treatment.

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Is gait kinematics in children with cerebral palsy correlated with their lower limbs’ bone
deforrmities?

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Keywords: Kinematics; Gait; Bone deformities; Cerebral palsy; Correlations

Introduction.– Children with cerebral palsy (CP) develop abnormal walking pat-
terns and bone deformities of the lower limbs. It is important to establish whether
any relationship exists between these troubles, in order to better understand the
evolution of these children.

Patients and methods.– Fifteen 3D bone morphological parameters and 58 spa-
tiotemporal and kinematic 3D parameters were collected respectively with the
EoS system and an optoelectronic system in 38 CP children. Correlations
between bone morphology and walking characteristics of each limb were studied
by calculating the Pearson correlation coefficients and multiple regression
analysis.

Results.– Height and weight development were the main determinants of bone
morphology, and were more correlated with gait parameters (0.57).

Discussion.– In general, correlations between structural bone deformities and
kinematics in CP children were low to moderate (Carriero et al., 2009). The
flexum and varus/valgus of the knee were the deformities that most affected the
walking patterns of these children. These original data are relevant for therapeutic
decision in CP children.

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Modulation of muscle activity of typically
developing children changing direction
during walking
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Objective.– The aim of this study was to investigate the modulation of lower
limb muscle activity during turning in typically developing (TD) children.

Patients and methods.– Fourteen TD children performed gait analysis with
dynamic EMG recordings of 5 muscles in each lower limb. Participants had
to walk straightforward and to perform a curved walking by changing their
direction angles of 45◦, 90◦, 135◦, and 180◦, either to the right or to the left.

Results.– EMG changes occurred during curved walking with respect to straight
walking. Changes varied according to the muscle, the position of the limb relative
to the turn (inner or outer) and the direction of the turn (towards the left or right).
No difference was found between the different angles. Asymmetry was found
between the right and left limbs, with changes being more pronounced in the
right limb.

Discussion.– Our findings differ in part from those in adults. This indicates that
maturity of this motor behaviour could be achieved only late during childhood.
Moreover, turning was not symmetrical in our population of TD children. There-
fore, including turning tasks in gait analysis protocols in children is challenging
despite the relevance of curved walking to community and in-home ambulation.

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Analysis of the medical causes of death in
cerebral palsy
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