

Monday 26 October 2015

Cerebral Palsy Alliance is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy. Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. Find out more at research.cerebralpalsy.org.au

Professor Nadia Badawi AM

Macquarie Group Foundation Chair of Cerebral Palsy

[Subscribe to CP Research News](#)

Interventions and Management

1. J Pediatr Orthop. 2015 Oct 21. [Epub ahead of print]

Long-term Outcome of External Tibial Derotation Osteotomies in Children With Cerebral Palsy.

Er MS1, Bayhan IA, Rogers KJ, Abousamra O, Church C, Henley J, Miller F.

BACKGROUND: Internal tibial torsion (ITT) is a common bony deformity in children with cerebral palsy (CP). The current recommended treatment is tibial derotation osteotomy (TDO) to improve gait biomechanics. Satisfactory short-term results after TDO have been reported but long-term results have not been studied. The purpose of this study was to evaluate the long-term outcome after external TDO performed to correct ITT in ambulatory children with CP. **METHODS:** Following IRB approval, gait kinematics and passive range of motion measurements were retrospectively evaluated in children with spastic CP who underwent TDO due to ITT comparing preoperative (E0), short-term postoperative (E1; 1 to 3 y post), and long-term postoperative (E2; >5 y post) results. Limbs were categorized as corrected, undercorrected, or overcorrected at both E1 and E2, by comparing the subjects mean tibial rotation (MTR) in gait to a group of typically developing children. Age at surgery, preop MTR (at E0), preop gait velocity (at E0), gross motor function classification system score, and foot deformity were evaluated to determine their influence on long-term results. **RESULTS:** The study sample consisted of 36 legs (with E0 and E2) and 17 legs (with E0, E1, and E2). The mean age at surgery was 7.4 ± 2.8 (range, 4 to 16.6) years. Comparing the changes over time, kinematic MTR improved from 17 ± 11 degrees initially (E0) to -10 ± 14 degrees short term (E1) and progressed to -23 ± 13 degrees long term (E2) ($P < 0.05$ E0/E1/E2; internal rotation is positive). At E2, 16 legs (44%) were found to be in the kinematic corrected group and 20 legs (56%) in the kinematic overcorrected group. There were no significant differences between the corrected and overcorrected groups of children in respect to age of surgery, gross motor function classification system, E0 MTR, gait velocity, or foot deformity. **CONCLUSIONS:** Although external TDO is an accepted form of treatment in children with CP, in the long term a tendency to move into external tibial torsion is common. Therefore, caution is warranted with children who initially present with ITT to avoid overcorrection. **LEVEL OF EVIDENCE:** Level IV-therapeutic study.

[PMID: 26491914](#)

2. J Pediatr Orthop. 2015 Oct 21. [Epub ahead of print]

Long-term Outcome of Internal Tibial Derotation Osteotomies in Children With Cerebral Palsy.

Er MS1, Abousamra O, Rogers KJ, Bayhan IA, Church C, Henley J, Niiler T, Miller F.

BACKGROUND: External tibial torsion (ETT) is a common bony deformity in children with cerebral palsy (CP). The current recommended treatment is tibial derotation osteotomy (TDO) to improve gait biomechanics. Satisfactory short-term results after TDO have been reported but long-term results have not been studied. The purpose of this study was to evaluate the long-term outcome following TDO to correct ETT in ambulatory children with CP.

METHODS: Following IRB approval, gait kinematics and passive range of motion measurements were retrospectively evaluated in children with spastic CP who underwent TDO due to ETT comparing preoperative (E0), short-term postoperative (E1; 1 to 3 y post), and long-term postoperative (E2; >5 y post) results. Limbs were categorized as corrected, undercorrected, or overcorrected at both E1 and E2, by comparing mean tibial rotation (MTR) in gait to a group of typically developing children. Age at surgery, E0 MTR, E0 gait velocity, gross motor function classification system (GMFCS) score, and foot deformity were evaluated to determine their influence on long-term results. **RESULTS:**

The study sample consisted of 43 legs (with E0 and E2) and 22 legs (with E0, E1, and E2). The mean age at surgery was 10.3 ± 3.4 years (range, 6 to 19.2 y). In the group MTR trended toward improvement moving from -26 ± 17 degrees (E0, external negative) to -16 ± 16 degrees (E1) and relapsed to -23 ± 17 degrees at the long term ($P=0.071$, E0/E1; $P=0.589$, E0/E2). Improvement was also seen in the transmalleolar axis ($P=0.074$), mean ankle rotation, and mean foot orientation ($P<0.05$, E0/E2). At the long-term evaluation, 16 legs (37%) were found to be in the kinematic corrected group, 25 legs (58%) in the kinematic undercorrected group, and 2 legs (5%) in the kinematic overcorrected group. There were no significant differences between the corrected and undercorrected groups of children with respect to age at surgery, GMFCS, E0 MTR, gait velocity, or foot deformity.

CONCLUSIONS: Although internal TDO improves ETT in the short term, recurrence is frequent with an apparent developmental trend toward external rotation of the tibia. **LEVELS OF EVIDENCE:**

Level IV-therapeutic study.

[PMID: 26491913](#)

3. Adapt Phys Activ Q. 2015 Oct;32(4):349-70. doi: 10.1123/APAQ.2015-0026.

CAN-flip: A Pilot Gymnastics Program for Children With Cerebral Palsy.

Cook O, Frost G, Twose D, Wallman L, Falk B, Galea V, Adkin A, Klentrou P.

This pilot study examined whether an adapted gymnastics program, CAN-flip, could be a feasible activity for children with cerebral palsy (CP) leading to improvements in muscle fitness, motor performance, and physical self-perception. Four girls and 1 boy (9.8 ± 1.3 yr) with CP participated in this multiple-baseline across-subjects design and were randomly assigned to start either the 6-wk gymnastics or the 6-wk control period. Muscle strength, neuromuscular activation, range of motion, gross motor performance, balance, and physical self-perception were assessed at baseline, after the first 6-wk period, and at the conclusion of the study. The gymnastics program comprised two 1-hr individualized classes per week. All participants were able to complete the gymnastics classes without injury and showed improvement in specific gymnastics skills. In addition, 3 of the 5 participants registered for regular gymnastics classes after the study, demonstrating the program's usability as a link to inclusive gymnastic classes.

[PMID: 26485738](#)

4. Scand J Med Sci Sports. 2015 Oct 23. doi: 10.1111/sms.12575. [Epub ahead of print]

Paralympic athletes with cerebral palsy display altered pacing strategies in distance-deceived shuttle running trials.

Runciman P, Tucker R, Ferreira S, Albertus-Kajee Y, Derman W.

This study investigated performance and physiology to understand pacing strategies in elite Paralympic athletes with cerebral palsy (CP). Six Paralympic athletes with CP and 13 able-bodied (AB) athletes performed two trials of eight sets of 10 shuttles (total 1600m). One trial was distance-deceived (DEC, 1000 m + 600 m) one trial was nondeceived (N-DEC, 1600 m). Time (s), heart rate (HR, bpm), ratings of perceived exertion (RPE, units), and electromyography of five bilateral muscles (EMG) were recorded for each set of both trials. The CP group ran slower than the AB group, and pacing differences were seen in the CP DEC trial, presenting as a flat pacing profile over the trial ($P < 0.05$). HR was higher and RPE was lower in the CP group in both trials ($P < 0.05$). EMG showed small differences between groups, sides, and trials. The present study provides evidence for a possible pacing strategy underlying exercise performance and fatigue in CP. The results of this study show (1) underperformance of the CP group, and (2) altered pacing strategy utilization in the CP group. We proposed that even at high levels of performance, the residual effects of CP may negatively affect performance through selection of conservative pacing strategies during exercise.

[PMID: 26493357](#)

5. Clin Biomech (Bristol, Avon). 2015 Oct 18. pii: S0268-0033(15)00267-3. doi: 10.1016/j.clinbiomech.2015.10.006. [Epub ahead of print]

Use of shear wave ultrasound elastography to quantify muscle properties in cerebral palsy.

Lee SS, Gaebler-Spira D, Zhang LQ, Rymer WZ, Steele KM.

BACKGROUND: Individuals with cerebral palsy tend to have altered muscle architecture and composition, but little is known about the muscle material properties, specifically stiffness. Shear wave ultrasound elastography allows shear wave speed, which is related to stiffness, to be measured in vivo in individual muscles. Our aim was to evaluate the material properties, specifically stiffness, as measured by shear wave speed of the medial gastrocnemius and tibialis anterior muscles in children with hemiplegic cerebral palsy across a range of ankle torques and positions, and fascicle strains. **METHOD:** Shear wave speed was measured bilaterally in the medial gastrocnemius and tibialis anterior over a range of ankle positions and torques using shear wave ultrasound elastography in eight individuals with hemiplegic cerebral palsy. B-mode ultrasound was used to measure muscle thickness and fascicle strain. **RESULTS:** Shear waves traveled faster in the medial gastrocnemius and tibialis anterior of the more-affected limb by 14% ($P=0.024$) and 20% ($P=0.03$), respectively, when the ankle was at 90° . Shear wave speed in the medial gastrocnemius increased as the ankle moved from plantarflexion to dorsiflexion (less affected: $r^2=0.82$, $P<0.001$; more-affected: $r^2=0.69$, $P<0.001$) and as ankle torque increased (less affected: $r^2=0.56$, $P<0.001$; more-affected: $r^2=0.45$, $P<0.001$). In addition, shear wave speed was strongly correlated with fascicle strain (less affected: $r^2=0.63$, $P<0.001$; more-affected: $r^2=0.53$, $P<0.001$). **INTERPRETATION:** The higher shear wave speed in the more-affected limb of individuals with cerebral palsy indicates greater muscle stiffness, and demonstrates the clinical potential of shear wave elastography as a non-invasive tool for investigating mechanisms of altered muscle properties and informing diagnosis and treatment.

[PMID: 26490641](#)

6. Fiziol Cheloveka. 2015 Jul-Aug;41(4):123-31.**[Neurorehabilitation of Patients with Cerebral Palsy]. [Article in Russian]**

Solopova IA, Moshonkina TR, Umnov VV, Vissarionov SV, Baidurashvili AG, Gerasimenko YP.

Cerebral palsy is one of the common diseases that cause significant motor impairments. This review deals with new methods of motor rehabilitation of children with cerebral palsy in terms of modern physiology, as well as with summarized and analyzed results of experimental studies on the effectiveness of these methods.

[PMID: 26485797](#)

7. Brain Dev. 2015 Oct 16. pii: S0387-7604(15)00214-4. doi: 10.1016/j.braindev.2015.10.002. [Epub ahead of print]**Temporal trends in perinatal mortality and cerebral palsy: A regional population-based study in southern Japan.**

Kodama Y, Sameshima H, Ikenoue T.

AIM: The prevalence of cerebral palsy (CP) has not decreased in developed countries over the past 30 years. We examined gestational age-specific trends in the prevalence of CP. METHODS: This unselected, population-based study was conducted in Miyazaki prefecture, Japan (10,000 deliveries annually), where 102,999 deliveries were registered between 2001 and 2010. Of these, 312 were stillbirths (≥ 22 weeks of gestation), 126 were neonatal deaths (< 28 days of birth), and 214 infants were determined to be at risk of CP at peer-review conferences. Survival and neurological damage were compared for two 5-year periods, 2001-2005 and 2006-2010, and infants were classified according to gestational ages. RESULTS: Stillbirths and neonatal deaths decreased significantly during both periods. Likewise, the number of registered high-risk cases of CP decreased by 30.2%, from 126 to 88 cases. After excluding congenital anomalies, the corrected CP prevalence was 1.5 per 1000 (78/51,889) and 1.3 per 1000 (67/51,110), for the two periods, which was not a significant difference. The number of extremely preterm infants (22-25 weeks) did not change over the 10-year period, whereas that of moderately preterm infants (26-36 weeks) increased, and that of term infants significantly decreased ($p < 0.01$). In term infants, asphyxia decreased from 18 to 7 cases ($p < 0.05$). CONCLUSIONS: Perinatal deaths and CP decreased in prevalence during both 5-year periods, and the CP prevalence was 2.1 per 1000 births. Furthermore, fewer term infants were at high risk for CP mainly because of the reduced prevalence of asphyxia.

[PMID: 26482600](#)

8. Pediatrics. 2015 Oct 19. pii: peds.2015-0749. [Epub ahead of print]**Safety of Botulinum Toxin Type A for Children With Nonambulatory Cerebral Palsy.**

Edwards P, Sakzewski L, Copeland L, Gascoigne-Pees L, McLennan K, Thorley M, Kentish M, Ware R, Boyd RN.

OBJECTIVE: To determine safety of intramuscular botulinum toxin A (BoNT-A) injections to reduce spasticity and improve care and comfort of nonambulatory children with cerebral palsy (CP). METHODS: Nonambulatory children with CP were randomly allocated to receive either BoNT-A ($n = 23$) or sham procedure ($n = 18$) in Cycle 1. In Cycle 2, the BoNT-A group received a second episode of BoNT-A ($n = 20$) and sham group received their first episode of BoNT-A ($n = 17$). A pediatric rehabilitation specialist masked to group allocation graded each adverse event (AE) according to system, severity (mild, moderate, serious, sentinel) and causality (unlikely/unrelated; possible; probable/definite). RESULTS: There was no difference for all moderate/serious AEs between the BoNT-A and sham/control groups in either Cycle 1 (incident rate ratio = 1.30, 95% confidence interval = 0.43-4.00; $P = .64$) or Cycle 2 (incident rate ratio = 0.72, 95% confidence interval = 0.30-1.75; $P = .47$). In Cycle 2, 1 serious, 3 moderate

(single-episode group), and 24 mild (single-episode group n = 10; 2 episode group n = 14) AEs were probably/definitely related to BoNT-A. CONCLUSIONS: Children receiving BoNT-A were at no greater risk of moderate/serious AEs compared with a sham control procedure. There was no increased risk of moderate/serious AEs between one and two episodes of BoNT-A.

[PMID: 26482662](#)

Prevention and Cure

No Articles Available