Equinus gait pattern

What to do............
The optimal treatment for equinus of the ankle in ambulatory patients with cerebral palsy is not known.
Spasticity of the gastrosoleus muscle is related to the development of reduced passive dorsiflexion of the ankle in children with cerebral palsy: a registry analysis of 2,796 examinations in 355 children.

Hägglund G, Wagner P.
Department of Orthopedics, Lund University, Lund University Hospital, Sweden. gunnar.hagglund@med.lu.se

Abstract

BACKGROUND AND PURPOSE: Spasticity and muscle contracture are two common manifestations of cerebral palsy (CP). A spastic muscle may inhibit growth in length of the muscle, but the importance of this relationship is not known. In 1994, a register and a healthcare program for children with CP in southern Sweden were initiated. The child's muscle tone according to the Ashworth scale and the ankle range of motion (ROM) is measured annually during the entire growth period. We have used these data to analyze the relationship between spasticity and ROM of the gastrosoleus muscle.

PATIENTS AND METHODS: All measurements in the total population of children with CP aged 0-18 years during the period January 1995 through June 2008 were analyzed. The study was based on 2,796 examinations in 355 children. In the statistical analysis, the effect of muscle tone on ROM was estimated using a random effects model.

RESULTS: The range of dorsiflexion of the ankle joint decreased in the total material by mean 19 (95% CI: 14-24) degrees during the first 18 years of life. There was a statistically significant association between the ROM and the child's level of spasticity during the year preceding the ROM measurement.

INTERPRETATION: Spasticity is related to the development of muscle contracture. In the treatment of children with CP, the spasticity, contracture, and strength of the gastrosoleus muscle must be considered together.
What are the options????

• Physiotherapy
• AFO
  • Dynamic
  • Stiff
• Botulinum toxin
  • Injection technique
  • Dose
  • Frequency
  • Aftertreatment
• Serial casting
• Surgery
  • Achilles tendon elongation
  • Gastrocnemius fascial recession
Equinus

STAGE 1
dynamic
correctable

Rx brace

STAGE 2
fixed
uncorrectable

Rx operation
lengthen tendon

STAGE 3
fixed + joint instability

Rx lengthen tendon
+ joint operation
Achilles tendon lengthening results in a high rate of over weakening of the triceps surae as defined by the need for a floor reaction brace. Alternative treatment such as gastronemius fascial lengthening may be optimal treatment of ambulatory patients with spastic diplegia.
Equinus

Silfverskiöld’s test

Contracted gastrocnemius or triceps surae
Percutaneous Achilles elongation
Vulpius Gastrocnemius elongation
A systematic review of the effects of casting on equinus in children with cerebral palsy: an evidence report of the AACPDMD

A M Blackmore PhD*; E Boettcher-Hunt BSc; M Jordan BSc; M D Y Chan MApSc, The Centre for Cerebral Palsy, Mount Lawley, Western Australia, Australia.
This systematic review examines the effects of casting, either alone or in combination with botulinum toxin type A (BTX-A), on equinus in children with cerebral palsy (CP). Comparisons are made between casting alone and no treatment, between casting alone and BTX-A alone, between combined casting and BTX-A and each treatment by itself, and between casting followed by BTX-A and BTX-A followed by casting. A search of PUBMED, CINAHL, Proquest Health and Medical Complete, Cochrane Database of Systematic reviews, Physiotherapy Evidence Database (PEDro), OTseeker, Database of Reviews of Effectiveness (DARE), and Infotrieve yielded 184 citations. Articles were included in the review if they reported the effects of an intervention using casting for equinus in participants with CP aged 20 or less, if they appeared in a peer-reviewed scholarly journal in 1970 or later, with no language restriction, and if casting was not used in conjunction with surgery. Twenty-two articles were selected, including seven randomized controlled trials (RCTs). There is little evidence that casting is superior to no casting, but the protocols of casting in current use have not been compared with no treatment in any RCT. There is no strong and consistent evidence that combining casting and BTX-A is superior to using either intervention alone, or that either casting or BTX-A is superior to the other immediately after treatment. Finally, there is no evidence that order of treatment (casting before BTX-A versus BTX-A before casting) affects outcome. Much of the evidence both for and against differences is weak, and results may be explained by methodological limitations. Future research needs to use adequate sample sizes, long-term follow-ups, and broader and more global measures.

There is little evidence that casting is superior to no casting (significant improvement only in stride length), but the protocols of casting in current use have not been compared with no treatment in any RCT

.........there is still no strong and consistent evidence that combining casting and BTX-A is superior to using either intervention alone........

Other animal experimental models exposed to incrementally applied static stretch over several weeks resulted in an increase in weight, muscle length, number of sarcomeres in series, and cross-sectional area of the type 1 fibres.
Botulinum Toxin A Compared with Stretching Casts in the Treatment of Spastic Equinus: A Randomised Prospective Trial


Abstract

Conservative therapies for equinus in cerebral palsy may help to postpone calf surgery in younger children. This study reports a prospective randomised trial of intramuscular botulinum toxin A (BtA) as an alternative to serial casting in 20 children with a dynamic component to calf equinus. Outcome was assessed in the short term to show the effect of one treatment cycle. Assessments were by clinical examination, video gait analysis, and three-dimensional gait analysis. BtA was of efficacy similar to that of serial casting. Tone reduction in the BtA group allowed a more prolonged improvement in passive dorsiflexion, which may allow more opportunity for increase in muscle length. Gait analysis showed an improved mean ankle kinematic pattern in a subsection of both groups, which was maintained at 12 weeks in the BtA group, whereas the cast group relapsed. There were fewer side effects in the BtA group. Median time to reintervention was similar.