Botulinum toxin A injections In Patients with Cerebral Palsy
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What is Cerebral Palsy?
- Caused by a non-progressive brain injury or malformation
- Occurs while child’s brain is under development
- Primarily affects body movement and muscle coordination

How do botulinum toxin A injections work?
- Produce muscle weakness or paralysis
- Prevents presynaptic release of ACH from the nerve terminal
- Degree of paralysis dependent on dose and number of synapses affected
- Clinical spasticity reduction lasts 12-16 weeks; every 3 month treatments typical

Significance of Physical Therapy and Botox
- Preparation before BtA
- Goal-setting
- Patient education
- Post BtA treatment
  - New specific motor training
  - Posture/Active muscle control
  - Stretching/ROM
  - Prolonging muscle length
  - Make functional progress
  - Muscle strength
  - Evaluate effectiveness

Pico Question:
In patients with cerebral palsy, does botulinum toxin A injections with physical therapy improve lower extremity gross motor function particular for functional gait activities?

Graph I. Mean gross motor function for the first injection compared to final injection

Gross Motor Function
- A study used GMFM scores to evaluate the long term effect of repeated injections for management of spasticity
- Muscles used for injection sites included gastroc/soleus and hamstrings
- Doses no more than 6 U/kg body weight per muscle & did not exceed max dose of 12 U/kg per body weight
- Children had a higher GMFM score before the final injection compared with the score before receiving the first injection although their muscle tone, measured by the Ashworth scale, was the same
- Motor function showed to persist for at least 19 months

Functional Gait
- Physician Rating scale improved scores
- Improved mean peak ankle dorsiflexion in stance and swing phases
- High doses: increase in mean gait speed and mean improved stride length compared to lower doses
- Overall reduction of spasticity assists with limiting deviations and limitations
- Improved independence, gait speed, stride length

Be Aware
- Botox only approved in the US to treat children with blepharospasm or strabismus (12+) and cervical dystonia (16+)
- Off-label use for CP
- Possible side effects and risks include vision deficits, fatigue, loss of strength/muscle weakness, nausea and respiratory problems
- Recent lawsuits regarding deaths

Conclusion
- BtA has been shown to produce long term effects on gross motor function in children with CP, even though the effect on muscle tone is short term
- Although studies have been shown to support the use of BtA injections in children with cerebral palsy the use of BtA needs to be determined on a case by case basis dependent on that patient/scenario
- Is the reward worth the risk?

Future Research
- Identifying children (agree groups, types of CP) who are most likely or least likely to benefit from BtA
- Optimal dosage
- Additional research on long-term effects
- Optimal rehabilitation measures
- Benefits and satisfaction of patients and their families
- Risk vs. Reward

References