



# Spasticity Management

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## Spasticity

- Velocity dependent increase in muscle tone
- Not a fixed contracture
- Not a movement disorder (dystonia or athetosis)
- Tends to vary in the individual child during a day
- It tends to increase as the child grows
- It increases with pain or discomfort
- Decreases if the child is very ill

## Spasticity

- Orthosis and seating modifications
  - Should be applied in all children
  - Avoid hyperextension, keep knees flexed
- Surgical muscle and bone surgery
  - Lengthen Hip Adductors and Extensors
  - Hamstrings and Quads
  - Achilles and tib anterior

## CHRONIC EFFECTS

- There are few recognized positive effects
- Many negative effects
  - Causing slow longitudinal muscle growth
  - Causes weakness and decreased muscle bulk
  - Causes muscle stiffness by increasing collagen
  - Causes bone deformity and joint dislocation
  - Seems to cause low level discomfort in some
  - Functionally impairs ADL and seating

## Rhizotomy

1. There is an immediate dramatic decrease in spasticity
2. Some level of spasticity always returns over one year
3. Intensive rehabilitation is required
4. Muscle weakness is always a feature

## Spasticity Management

- Goal is NOT to remove muscle tone
- Muscle tone is GOOD, however
- Too much of any good thing is a problem

## Baclofen Pumps

*Procedure:*

1. Test dose given intrathecally (50, 75, 100 microgram)  
(If patient had spinal fusion no test dose)
2. Pump implanted under general anesthesia
3. Started on 1.5 times test dose over 24 hours
4. Usually in hospital 3-4 days till dose adjusted
5. Return to school, no activity change
6. Monitor spasticity every 2 weeks till stable

## Spasticity

- Oral medications -
  - Benzodiazepine (diazepam) - best medication
- Excellent for post op spasm, safe with morphine
  - Dantrolene, baclofen
- They have short effect
  - Vigabatrin, clonidine, tizanidine, idroclimide - all new and no reported use in children



## Our Experience

Started in January 1997

We see the children in an evaluation clinic

Orthopedist and Rehabilitation Physician

If trial is given, admitted to rehab

After the trial with parents we decide

Pump is implanted by orthopedist

Refill and dosing managed by rehabilitation

## Baclofen Pumps

*Indications:*

1. Severe spasticity in the Quadriplegic
2. Spasticity in ambulatory Diplegic
3. Lower extremity dystonia

*Contra-indications*

1. Athetosis
2. Mainly upper extremity tone
3. Too small (<15-20 Kg)
4. Trunk hypotonia, poor head control

## Managing Spasticity

Where does the Baclofen pump fit in?

1. There are many unknowns, nothing long-term
2. It is a high up keep device - refilling q3 month
3. Technology is not up to date
4. It is very expensive over time

## HOWEVER

This is the only effective adjustable spasticity management tool we have at this time Botulinum Toxin (BOTOX)

- Clostridium botulinum toxin - Anerobic bacteria
- Discovered in 1949
- Purified and used in animals - 1973
- Approved by US FDA - 1989
  - Stabismus, blepharospasm, hemi-facial spasm
  - In individual over age 12

## Botulinum Toxin (BOTOX)

- Use 5 to 10 units/Kg divided to NO more than 2 large muscles
- Inject into NM junction rich part of the muscle
  - Make several sweeps with the needle to spread
  - Diffusion is 2 cm diameter in muscle and fascia
  - Avoid intravascular injection
- Maybe can use lower dose with electrical localization
  - No documented increased effect

## Botulinum Toxin (BOTOX)

- For a localized problem without contracture
- Will give a 3 to 4 month effect
- Typical indications
  - Young child with Gastroc spasticity
  - Occasional young hamstring spasticity
  - Neck extensor posturing
  - Dystonic arm posturing

## Botulinum Toxin (BOTOX)

- With High doses 5 - 10 Units/KG
  - Almost all develop immunity with in 6 injections
  - Most have less response to the second injection
  - No systemic effects noted and few reported
  - NO effect on fixed contracture
  - No long term effect
  - VERY EXPENSIVE

12 year old diplegic

- Complains that stiffness in his legs prevents him learning how to put on his shoes and pants by himself
- He walks with crutches
- Cognitively normal in a regular school



## Conclusion

1. Spasticity management is now more effective
2. It is harder to make definite recommendations:  
  
Must consider - Muscle surgery, Rhizotomy, Baclofen Pumps, Botox, Bracing, Positioning, and NEW oral agents
3. Baclofen Pumps are the new treatment, improved technology will probably make this a major agent for managing spasticity
4. Botox has limited indications but no long term effect
5. Rhizotomy still has an indication but the ideal patient is getting so narrow that almost no child fits - may slowly drop out
6. Spasticity management will be multi-modality now and in the future