Pharmacological and Surgical Procedures for the Treatment of Spasticity

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Spasticity Reduction vs Function

- Spasticity = pathological factor
- Spasticity = tool for function
- Spasticity + Muscle Weakness
«May the force be with you» (Starwars)

Consider muscle strength and weakness (Piccinini)
Aims of Treatment

- Pain reduction
- Functional improvements
- Facilitate use of orthosis
- Prevent secondary problems (muscle & bone deformities) (Early Treatment)
- Facilitate nursing and caring
Treatment Options

- Reversible
  - Oral drugs
  - ITB
  - BTX

- Not reversible
  - SDR
  - Surgery

- General Treatment
- Focal Treatment
Oral Drugs
Oral Drugs

- Diffused spasticity
- Mild/moderate Spasticity
- Too young for other options
Side Effects

- Sedation
- Sleepiness
- Increased sialorrhea
- Excessive hypotonia
- Hypotension
Baclofen (Lioresal)

- 5 mgs/day
- Increase dosage of 5 mgs each 3-4 days
- Max dosage: ???
Questions?
Botulinum Toxin
Botulinum Toxin
Botulinum Toxin

- Identify functional problem
- Measure it
- Intervention
- Outcome measurement
- Maintain improvement
Botulinum Toxin

- Safe
- No anaphylactic reactions reported
- Avoid use during pregnancy
Botulinum Toxin

- Botox
- Dysport
- Xeomin
- ..........
Botulinum Toxin Dilution

- 1 cc
- 2 cc
- 5 cc
- .................
- Reduced or increased diffusion
Primary Non-Responders

- Muscle fixed contractures
- Subclinic previous botulism
- USA Army immunization
Secondary Non-Responders

- Antibodies in 5-10% pts
## Adverse Events

<table>
<thead>
<tr>
<th>Event</th>
<th>BoNTA</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Falls</td>
<td>9.3%</td>
<td>3%</td>
</tr>
<tr>
<td>Pain</td>
<td>2.3%</td>
<td>/</td>
</tr>
<tr>
<td>Local weakness</td>
<td>2.3%</td>
<td>/</td>
</tr>
<tr>
<td>General weakness</td>
<td>1%</td>
<td>/</td>
</tr>
</tbody>
</table>
Therapeutical effect

- Begins in 3-4 days
- Max effect: 2-3 weeks
- Duration: 3-6 months
Action

Adapted from: dePaiva et al. PNAS 1999, 96:3200
Repeat treatment

- Same muscles: 3 months
- Different muscles: 1 month
Until........

- Muscle fixed contracture
- Antibodies
Injection Techniques

- Free?
- EMG guided?
- CT guided?
- US guided?
Sedation

- Midazolam?
- EMLA?
- Spray Ice?
- ???
Combined Therapies

- BoNTA + PT
- BoNTA + orthosis
- BoNTA + casting /serial casting
Casting / Serial Casting

- 1 week after injection
- Remove after 2 weeks
- Possible re-casting with increased dorsiflexion
- After removing, orthosis + PT
Results

- Oxygen Consumption
- HR
- Endurance

- Improvement of kinetic and kinematic parameters
Questions?
Intrathecal Baclofen
Intrathecal Baclofen
ITB Advantages

- Reduced side effects
- Reduced effective dose compared to oral drug
- Telemetric programming
ITB: Effects

- Improvement of ADLs
- Improved compliance for PT
- Reduce pain
- Sleep improving
ITB Management

- Bolus test
- Good response \(\Rightarrow\) pump implantation
- Progressive dose increase until optimal effect
- Effect monitoring
- Refill
ITB Pump Implantation
ITB Pump Programming
ITB Advantages

- High concentration in CSF
- Reduced side effects
- Reduced spasticity only during the day
- Increased walking ability
- Increased compliance during PT
- Reduced pain
- Reversibility
ITB Disadvantages

- Surgery
- Management difficulty
- Periodic surgery
- Complications
Give priority to primary problems
Correct later orthopaedic deformities
You could avoid orthopaedic surgery
Post- Surgery

- Rehabilitation Center
- Progressive increase of drug flow (20%/day)
- Complications monitoring
- Postural assessment
- Evaluation for assistive devices and/or orthosis
- Encourage the achievement of new motor pattern
Complications

- Infections → remove
- Catheter kinking → XRay → surgery
- Catheter collapse → XRay → surgery
- Leaking
Removal Management

- Gradual flow reduction (20%/day)
- Oral drugs
- Pump switch-off / pump removal
What about the other options?
Rhyzotomy

- No experience in HSP (only CP)
- Not reversible
Orthopaedic Surgery

- Not specific for spasticity
- Secondary problems
Aims of Treatment

• Rule # 1: choose THAT treatment for THAT spasticity in THAT patient
Gracias!

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