THE FORGOTTEN SIDE OF STROKE

Stroke And Spasticity

Kathleen Woschkolup, MD
Stroke Symposium 2013
STROKE AND SPASTICITY

- **30%** OF STROKE SURVIVORS WILL DEVELOP SPASTICITY. SOME STUDIES REPORT AS HIGH AS **65%**.

- **24.5%** DEVELOP SPASTICITY IN THE FIRST 2 WEEKS; **25%** DEVELOP IT IN THE FIRST 6 WEEKS. BUT IT CAN HAPPEN AT ANY TIME FROM THE FIRST FEW DAYS, WEEKS OR MONTHS POST-STROKE.

(Wessel et al. 2010)
Spasticity, WHAT IS IT?

- Multiple definitions......
- “Velocity-dependent increase in resistance to passive limb movement in people with UMN syndrome.” (Lance 1980)
- 2 Main factors contributing to resistance to movement in context of limb spasticity due to brain or spinal cord lesion
  1) Neurogenic component
  2) Biomechanical component

Simply put.......Increase tightness in affected muscles.
UPPER EXTREMITY SPASTICITY

- **Chest wall** → Difficulty raising arm to the side, putting on clothing, feeding themselves.

- **Elbow flexors** → Difficulty straightening arm to reach for items, dressing, propelling wheelchair.

- **Wrist flexors** → Difficulty straightening hand to optimal position.

- **Finger flexors** → Difficulty opening hand voluntarily or passively (releasing items, hand hygiene, grasping a walker or cane.)
LOWER EXTREMITY SPASTICITY

- **Hamstrings** → Difficulty straightening leg, knees are flexed.

- **Quadriceps** → Stiff-knee gait. Can not flex the knee.

- **Gastrocnemius** → Difficulty clearing toes when walking (tripping), foot turns in when walking

- **Adductors** → Legs cross over each other when walking, difficulty pulling legs apart for hygiene

*(REMEMBER: SOMETIMES THE SPASTICITY IS WHAT IS KEEPING THEM ON THEIR FEET)*
**Bent wrist**
Wrist is bent with the fingers pointing down and back toward the forearm.

**Closed fist**
Fingers are tightly clasped into the palm of the hand.

**Flexed elbow**
Elbow is bent with the hand at the shoulder.
Identifying gait abnormalities

Spastic gait

Scissors gait
# GOALS OF TREATMENT

# 1: Maintain the length of the muscle
# 2: Allow for normal positioning of limbs to avoid secondary soft tissue shortening.

- Improvements in position
- Mobility
- Pain
- Contracture prevention
- Helping the care of patient easier for caretakers. (ex. hygiene)
<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>No increase in muscle tone</td>
</tr>
<tr>
<td>1</td>
<td>Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end range of motion when the affected parties moved in flexion or extension</td>
</tr>
<tr>
<td>1+</td>
<td>Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the range of motion</td>
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<tr>
<td>2</td>
<td>More marked increase in muscle tone through most of the range of motion, but the affected part is easily moved</td>
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<tr>
<td>3</td>
<td>Considerable increase in muscle tone, passive movement is difficult</td>
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<tr>
<td>4</td>
<td>Affected part is rigid in flexion or extension</td>
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ORAL MEDICATIONS

- **TIZANIDINE**: causes dizziness, nausea, lethargy

- **BACLOFEN**: Ataxia, sedation, hypotonia, confusion, decrease seizure threshold. Sudden withdrawal can cause seizures, hallucinations, rebound spasticity.

- **Neurontin**: Weight gain, lethargy

- **Dantrolene**: Weakness of respiratory muscles, lethargy, dizziness, nausea, diarrhea, liver toxicity
Botulinum Toxin (BoNT)

- Biological product of bacterium *Clostridium botulinum*
- 7 serotypes (A-G)
- Only types A and B are available for clinical use.
- All toxins work presynaptically to block release of Ach
- Different serotypes have different intracellular targets, complex size of molecule, amount of protein, duration of effect and “potency”.

⭐ This is because all preparations use different strains of *C. Botulinum* in the manufacturing process and purification and formulation methods differ as well.
Toxin type A
Botox®; Allergan; Inc
Dysport®; Ipsen Pharmaceuticals
Xeomin®; Merz

Toxin type B
Myobloc/neurobloc®; Solstice neurosciences

All are U.S. formulations.
### Table 1: Indications for phenol injections

<table>
<thead>
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<tbody>
<tr>
<td>Sensitivity, or previous reaction, to Botulinum toxin</td>
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<tr>
<td>Unsuccessful treatment with Botulinum Toxin</td>
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<tr>
<td>Long duration of effect sought</td>
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<tr>
<td>To supplement Botulinum treatment where total dose required would be excessive</td>
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<tr>
<td>Cost reduction</td>
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</table>
1) Tendon lengthening
2) Neurosurgical procedures:

The primary neurosurgical procedures to treat spasticity are intrathecal baclofen (ITB) pumps and selective dorsal rhizotomy (SDR).
INTRATHECAL BACLOFEN PUMP

- Small doses of baclofen delivered directly to the spinal canal
- Fewer side effects, better relief of spasticity
- Usually more effective for spasticity in the lower extremities
- Requires committed patient and family, pump must be refilled every 3 months.
RHIZOTOMY
TAKE HOME POINTS

Spasticity is common after stroke, and is manifested as muscle tightness in the affected arm and/or leg. Always look for it!

It is the number one reason for nursing home admissions and loss of independence post stroke.

Several different treatment options are available. Therapies, oral medications, injections, and surgery or a combination of these.