Botulinum Toxin Convergence on Skills for Movement Disorders and Spasticity
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GUIDES ON CHEMODENERVATION IN LOWER LIMB SPASTICITY IN ADULTS

Mary Jeanne Oporto- Flordelis, MD
FPARM, DPBRM
PSNR

Objectives :

- Guides to assessment of patient with LE spasticity
- Correlate spasticity to functional deficit
- Select muscle ; the agent and its dose
- Guides to injection
- Management approaches after Chemodenervation

Key Points :

- Education of Patient on realistic goals and expectations
- Use the optimum dose of agent
- Optimum Dilution or volume
- Approximation of motor end plates
- Judicious use of adjuvant therapies
  - Stretch exercises
  - Serial casting/ bracing
  - Strengthening ex. and gait

Spasticity Related Limitations:

- **Joint Contractures**
- **Impaired movement**
- **Muscle atrophy**
- **Pain particularly with movement**

Evaluation:

Positive Signs

Spasticity

Flexor and extensor spasms

Spastic co-contractions

Clonus

Associated reactions

Negative Signs

- **Weakness**
- **Loss of dexterity**
- **Fatigue**

Essentials to Normal Gait:

- Strong and efficient muscles
  - Hip extensors; and abdominals
  - Ankle dorsiflexors and evertors (Tib. Anterior; Peroneals)
- Synergistic contraction relaxation of:
  - Hip flexors vs. hip extensors
  - Quadricps vs. Hamstrings
  - Peroneals vs. Tibialis posterior

Patterns of Spasticity:

- Adducted hip
- Extended knee
- Plantar flexed ankle

HIP KNEE AND ANKLE DYSYNERGIES:

Hip Synergy Patterns

- Hip adduction, Knee extended and ankle plantar flexed.
- Hip and knee extended , ankle plantar flexed and foot inverted
- Hip adducted; knee flexed and ankle plantar flexed.

Gait Abnormalities with Muscle Hyperactivity:

- Scissoring gait
  - (hip adductor spasticity)
  - Narrowed base of support on gait
- Stiff Hip :
  - weak ileopsoas . Spastic hamstrings
  - Limited hip flexion on swing phase
- Stiff Knee
  - Quad or Hamstring spasticity)
- Equinovarus ankle
  - Spastic Gastrocsoleus and tibialis posterior

The Stiff Knee and Genu Recurvatum :

Spastic:

- Knee is stiff at swing phase
- Quads
- Hamstring

Examine:

Stand- flex hip

check knee angle at rest

Lying on side, hip neutral –

flex knee passively

Flexed Knee Gait:

Spastic:

- Hamstrings
  - Gastrocsoleus

Weak:

- Quadriceps

Examine:

- seated- extend knee
- Supine- Do SLR

Equinovarus Ankle

Spastic :

- Gastrocsoleus
- Tibialis posterior
- Flex Dig Longus

Weak:

tibialis ant.

Ext. Dig. Longus

Peroneus

Scissor gait:

- Spastic
  - hip adductors
  - Narrowed base of support on gait
- Weak:
  - Hip Abductors
- Examine :
  - Supine
  - Standing

Stiff Hip:

- Limited hip flexion on Swing phase
- Circumducted gait
  - Weak hip flexors
  - Spastic- Quadriceps
- Hip Hiking/ Vaulting:
  - Weak – Hip Flexors , Glutes

Spastic Plantar flexors/ ankle invertors:

- Insufficient foot clearance on swing
- Ankle inversion , instability and falling
- Lateral bunioning with inverted gait.

Spastic Quadriceps vs. spastic hamstring:

- Strong Hamstring co contraction on heel strike assists in knee extension.
- Quadriceps spasticity may further prevent knee flexion in the swing phase.

WHEN AND WHERE TO INJECT ?

LE Spasticity Problems:

Problem	Spastic Motion	SPASTIC MUSCLE
Legs clipped together, Poor Balance Poor hygiene	Hip Adduction	**Adductor longus brevis & magnus**
Straight leg walk Hip Hiking, Circumduction	Knee extension	**Quadriceps (all)**
Foot Drop, Trips, Difficult walking	Plantar flexion, knee FLEXED	**Soleus**
Foot Drop, ankle contracture	Plantar flexion w/ Knee EXTENDED	**Gastrocnemius**
Foot turns in on walking	Ankle Inversion	**Tibialis Posterior**
Same	Same	**Tibialis Anterior**
Knee Bent , contracture	Knee Flexion	**Hamstrings**

Muscle Selection:

- Assess gait (live and video)
- Determine of severity of spasticity
- Assess synergy and co-contracting muscles
- Which muscle causes the most impairment to the patient's gait

Botulinum Chemodeneveration

Factors Determining Decisions on Chemodenervation

- Etiology
- Chronicity
- Prognosis
- Distribution
- Location
- Severity of spasticity
- Co-Morbidities

- Functional status
- Patient Goals
- Care- giver Goals

Suggested Dose (adult):

Clinical Pattern	Muscle	Ona Btx 6-12 /kBW	Abo Btx 10-30 u/kBW
Flexed hip	Ileopsoas (US /CT	200 u	250 -300 u
	Rectus Femoris	100-200 u	200 u
Adducted hip	Adductors	200 u/l Ex	300-400 u/Ex
Stiff knee	Quadriceps group	100-300 u	250--300 u
Flexed Knee	Med /lat Hams	60-100 per limb total	250-350 u total
	Gastrocsoleus	50-150 u	150-200 u
Equinovarus inject most disabling muscle	Gastrocsoleus Tibialis post	100-150 u 80- 100 u	200-250 u 150-250 u
Striatal Toe	Ext.Hal Longus	5o-100 u	100-150 u

Techniques for Localization:

- Anatomic localization
- Assisted:
  - EMG
  - Ultrasound Guided
  - EMG- signal amplification
  - Electrical Stimulation
  -
- Inexpensive, minimum hardware
- Painful -double injection
- Additional expense

Injection Key Points:

- Inject in the end plate zones
- End Plate zones lie in a band or a region
- Inject in multiple points.

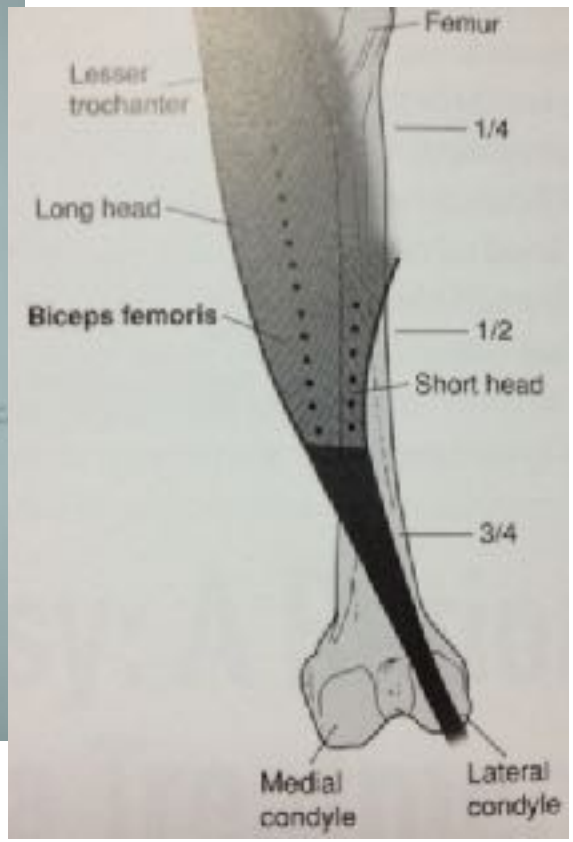
Technique for Injection:

Inject in Motor end plate

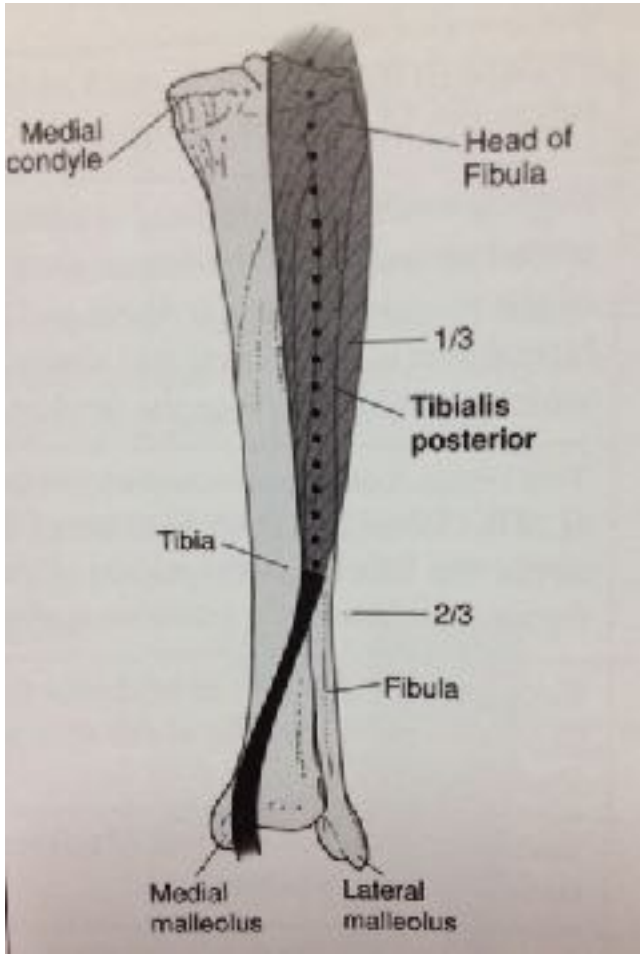
Uni pennate

- fusiform muscles;
  - In a straight line, horizontally across midpoint of belly,
  - Or a straight line longitudinally on middle fibers

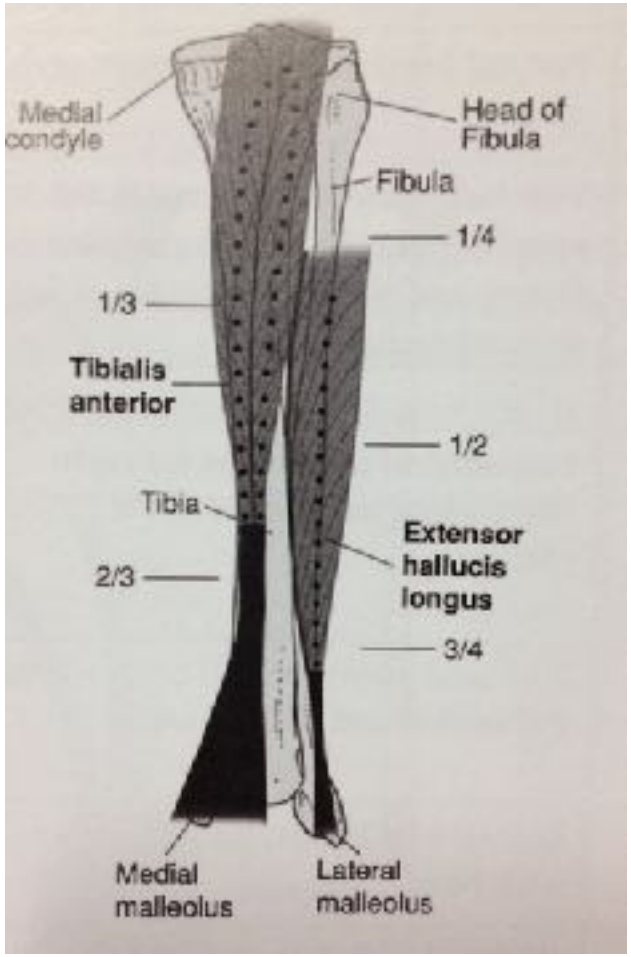
Biceps femoris



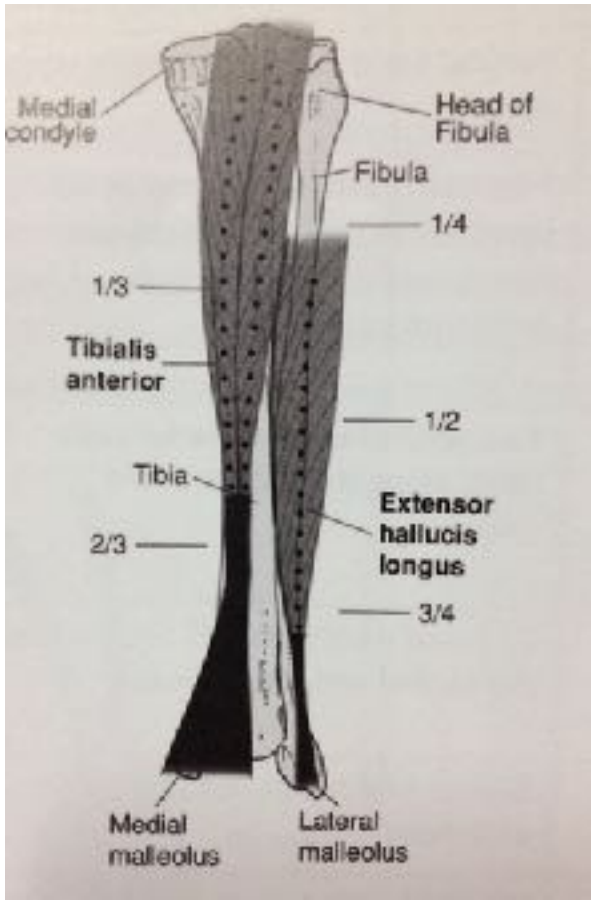
Tibialis Posterior: Unipennate



Ext Hal Longus : Unipennate



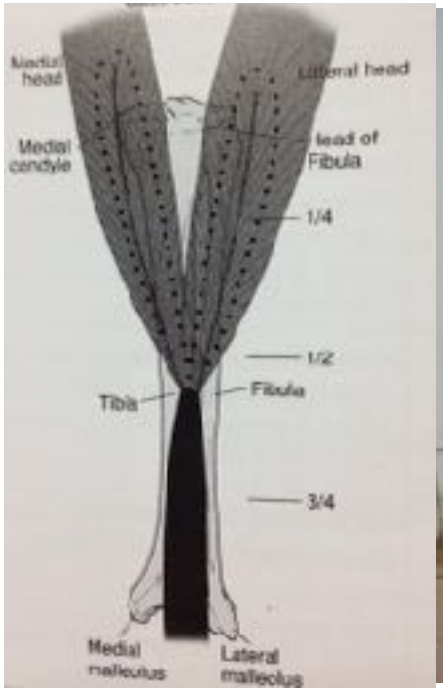
Tibialis Anterior -Bipennate



Technique For Injection: Bipennate

Gastrocnemius:

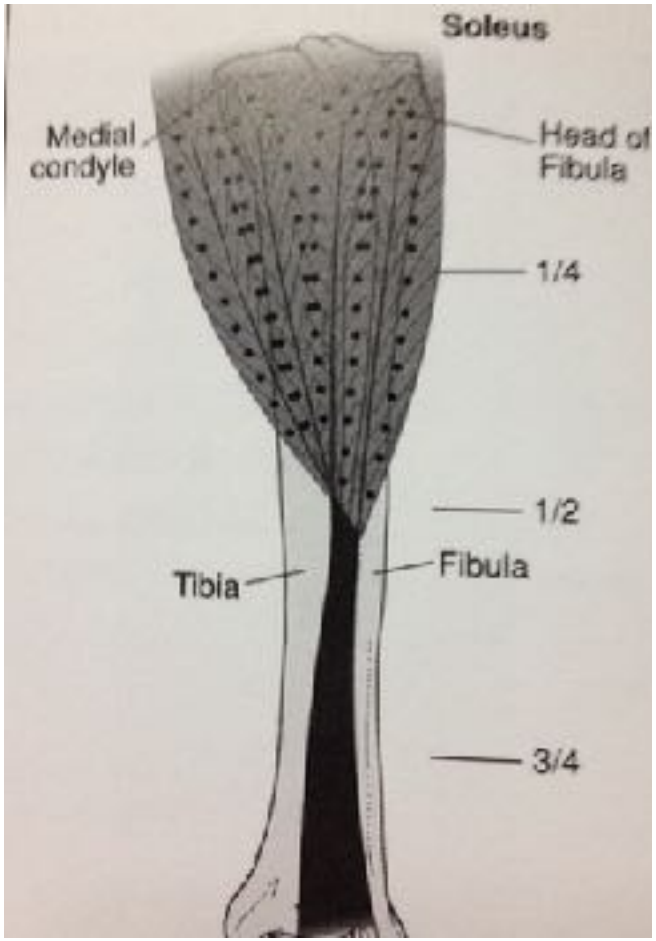
- Fibers converge from a central tendon
- End plates in an inverted oval around tendon



Injection Technique: Multipennate

- Several muscle heads
- Multiple end plate zones
- Inject in several sites

Soleus



BOTULINUM TOXIN FOR LOWER LIMB SPASTICITY

Thank you

References:

"Spasticity and Other Forms of Muscle Hyperactivity in the Upper Motor Neurone Syndrome". Brashear,Allison , et al.

- Journal of PM & R. Vol 2, Issue 9, 2009.
- Journal of PM& R, Vol 2, Issue 9,2010
- Marchese et al. Treatment in the European Union: Botulinum Toxin Type A (Dysport) Dosing and Reconstitution techniques