

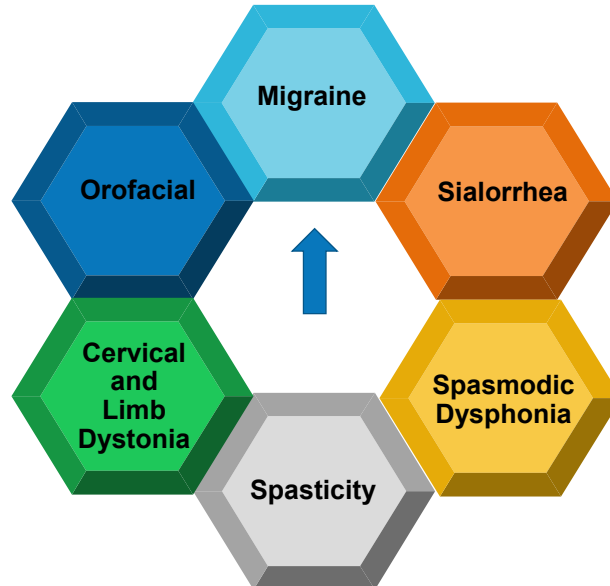


Before We Start



- 1 Have everything handy**
--30 gauge (face) and 27 gauge needles; EMG (with extra battery);
alcohol swabs; gauze; sharps container; lidocaine cream
- 2 Be on the same page with your neurotoxin nurse/assistant**
--Dilution labeling; toxin brand
- 3 Be consistent; be careful**
--right and left side in your note; performing a frontalis test
--do the math
- 4 Adjusting dose requires keeping what worked and modifying what did not**
--careful with hypertrophy; timing of pain is important

Neurotoxin Indications



Chronic Migraine



CASE

- Patient LD / Dr. Mays
- 61year-old female
- Migraine without aura onset in early adulthood
- Occipital, right side, involves neck, sharp, N/V, blurred vision, photo/phonophobia,
- Prior treatments: Imitrex, Excedrin, Motrin
- Prior to BTX: 15 migraine/mo; after: 4/month
- First treatment: 5/2020

Type of Neurotoxin: OnaBTX-A
Total amount injected: 155 units

	Right	Left
Corrugator	5	5
Procerus	5 (midline)	
Frontalis	10	10
Temporalis	20	20
Occipitalis	15	15
Cervical PSP	10	10
Trapezius	15	15

Chronic Migraine



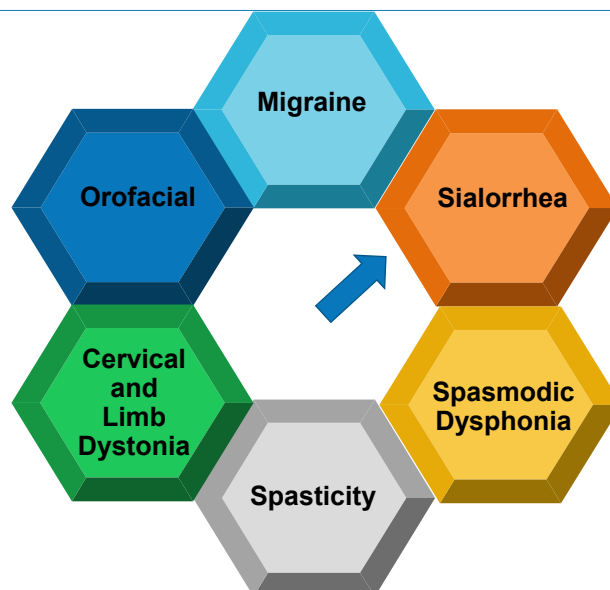
CASE

- Patient SF / Dr. Mays
- 73-year-old female
- Migraine without aura onset 17 years
- Severe, sharp, burning, photo/phonophobia, nausea, confusion
- Treatment: Imitrex (helps), Maxalt, Elavil, Paxil, Inderal, meloxicam, Zofran, Tylenol
- Before BTX: 30 migraine/mo; after: 1/mo.
- First dose: Around late 2017

Type of Neurotoxin: OnaBTX-A
Total amount injected: 155 units

	Right	Left
Corrugator	5	5
Procerus	5 (midline)	
Frontalis	10	10
Temporalis	20	20
Occipitalis	15	15
Cervical PSP	10	10
Trapezius	15	15

Neurotoxin Indications



Sialorrhea



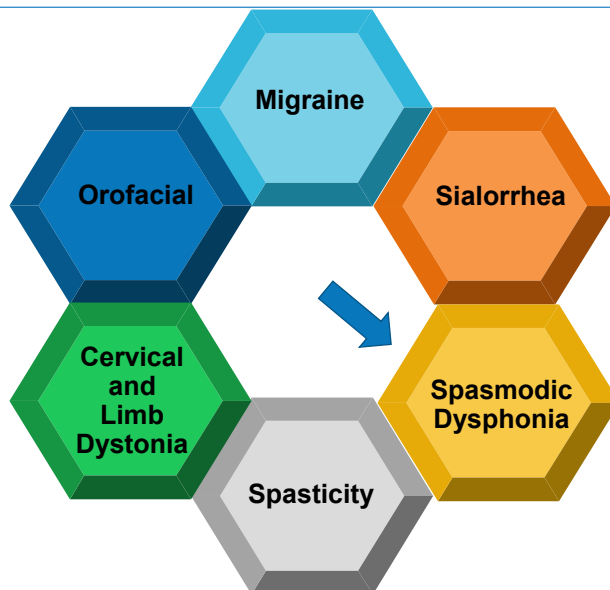
CASE

- Patient PD w/ Dr. Fernandez
- 77-year-old male
- Longstanding PD with sialorrhea
- Started on IncoBTX-A in 2019 and now receiving RimaBTX-B

Type of Neurotoxin: RimaBTX-B
 Total amount injected: 2500 units

	Right	Left
Parotid gland	750	750
Submandibular gland	500	500

Neurotoxin Indications



Adductor Spasmodic Dysphonia



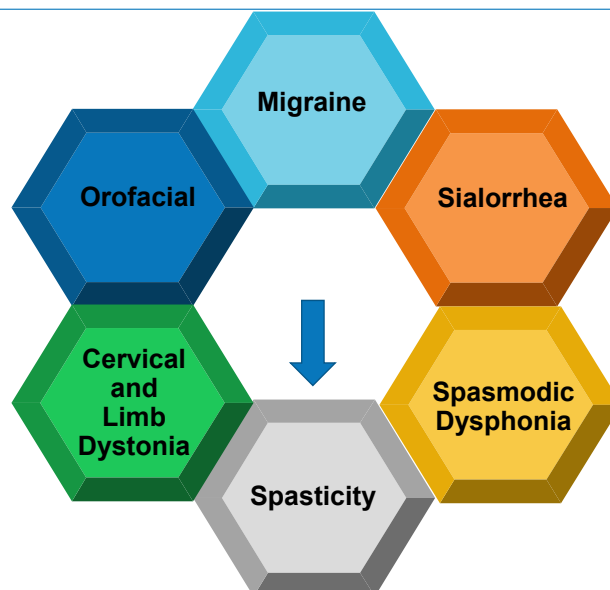
CASE

- Patient JS / Dr. Hrelec
- 57-year-old female with longstanding adductor spasmodic dysphonia controlled with OnaBTX-A injections for over 15 years

Type of Neurotoxin: OnaBTX-A
Total amount injected: 9 units

	Right	Left
Thyroarytenoid	2	2
Strap	2.5	2.5

Neurotoxin Indications



Traumatic Paraplegia



CASE

- Patient MD/ Dr. Bethoux
- 42-year-old male.
- Traumatic SCI in 2011 with T11 burst fracture resulting in paraplegia
- Previous video exam showed no voluntary movement in LLE
- She has been receiving botulinum toxin injections since 2018 with good benefit

Type of Neurotoxin: AboBTX-A
Total amount injected: 2000 units

	Right	Left
Extensor hallucis longus	100	100
Medial gastrocnemius	200	200
Soleus	200	200
Lateral gastrocnemius	200	200
Tibialis posterior	300	300

Post Infarct Spasticity



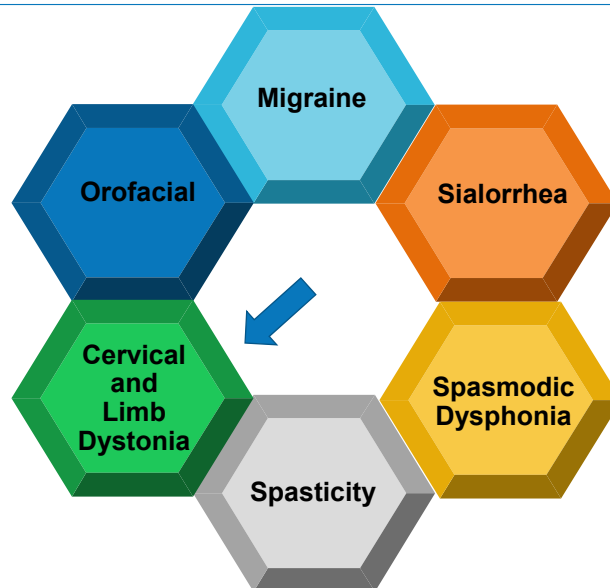
CASE

- Patient RC w/ Dr. Bethoux
- 84-year-old male
- Right cerebral peduncal CVA with LUE spasticity
- No prior treatment
- Response unknown (first treatment was 9/11/2020)

Type of Neurotoxin: AboBTX-A
Total amount injected: 450 units

	Right	Left
Flexor carpi radialis	0	150
Flexor carpi ulnaris	0	150
Flexor digitorum superficialis	0	150

Neurotoxin Indications



Cervical Dystonia



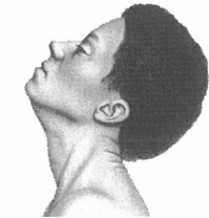
CASE

- Patient TP w/ Dr. **Fernandez**
- 44-year-old female with DYT1 cervical dystonia s/p bilateral GPi DBS in 2006
- Tried and failed anticholinergic medications
- chin deviation to the left; intermittent retrocollis
- Xeomin provides excellent relief

Type of Neurotoxin: IncoBTX-A
Total amount injected: 300 units

	Right	Left
SCM	60	125
S. Capitis	75	40

Basic Injection Patterns



Retrocollis



Anterocollis



Laterocollis

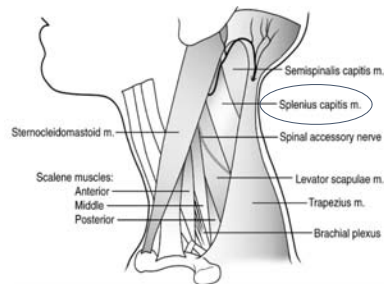
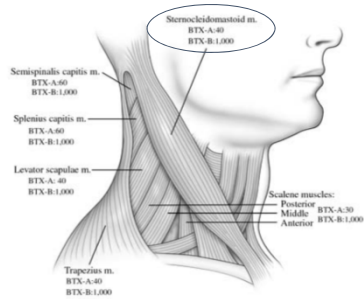


Rotational torticollis

Image adapted from Benecke R, et al. Cervical and axial dystonia. In: Moore P, Naumann M, eds. *Handbook of Botulinum Toxin Treatment*. Malden, MA: Blackwell Science Ltd; 2003:158-194. Reproduced with permission of Blackwell Publishing, Ltd.



Torticollis



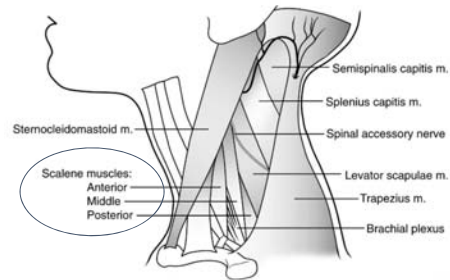
- Contralateral sternocleidomastoid
- Ipsilateral splenius capitis



Laterocollis



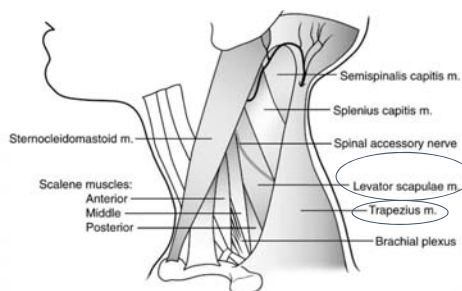
- Ipsilateral scalenes
- Optional:
 - Ipsilateral levator scapulae
 - Ipsilateral splenius capitis
 - Ipsilateral sternocleidomastoid



Shoulder elevation

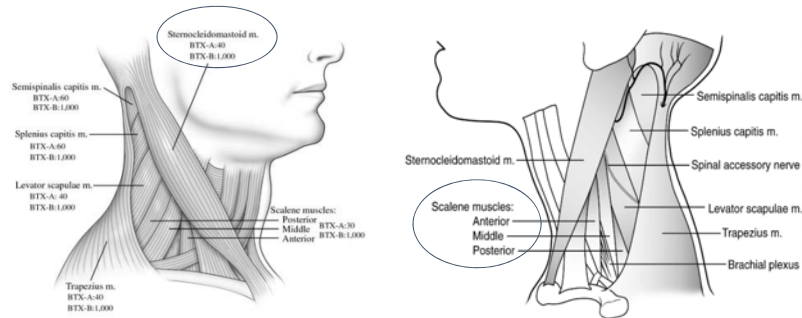


- Ipsilateral levator scapulae
- Ipsilateral upper trapezius





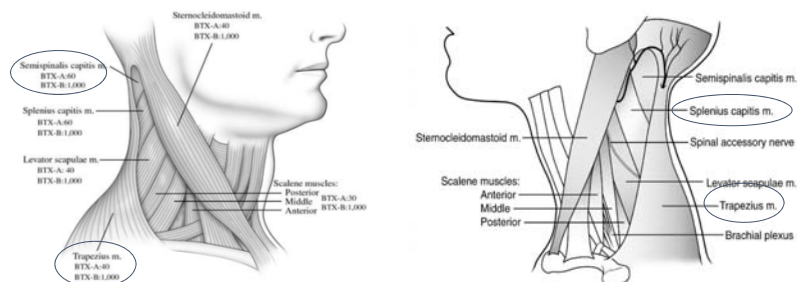
Anterocollis



- Bilateral SCM ?
- Bilateral anterior scalene
- Optional: Bilateral levator scapulae



Retrocollis

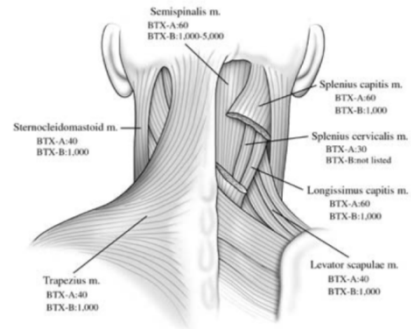


- Bilateral splenius capitis
- Optional: Bilateral trapezius
- Optional: Bilateral semispinalis capitis

Head tremor



- Need to inject both the 'main' and 'compensatory' muscles
- 2-3 : 1 dosing ratio between main and compensatory muscles



Cervical Dystonia



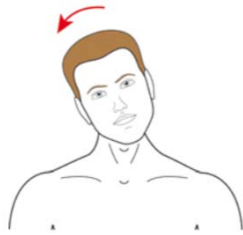
CASE

- Patient KC w/ Dr. Fernandez
- 63-year-old female with cervical dystonia/dystonic tremor
- Tried and failed clonazepam
- No-no jerky tremor, null point turning to left. Mild left chin deviation, some difficulty with right head turning
- AboTX-A provides excellent relief

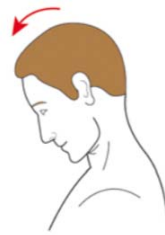
Type of Neurotoxin: AboBTX-A
Total amount injected: 500 units

	Right	Left
SCM	50	100
S. Capitis	200	100
S. Cervicis	0	25
Trapezius	0	25

Complex Injection Patterns



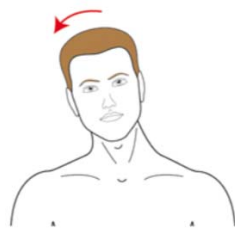
Laterocaput



Antecaput



Retrocaput



Laterocollis

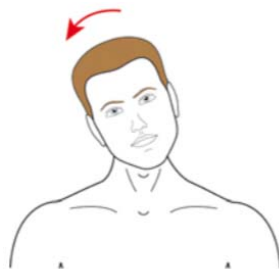


Antecollis



Retrocollis

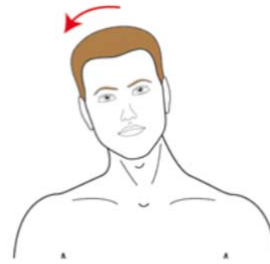
Complex Injection Pattern #1



Laterocaput

Ipsilateral:

- Splenius capitis
- Sternocleidomastoid
- Trapezius pars descendans



Laterocollis

Ipsilateral:

- Scalene
- Splenius cervicis
- Levator

Complex Injection Pattern #2



Antecaput



Antecollis

Bilateral:

1. Sternocleidomastoid ?
2. Submental complex
3. Levator (secondary)

Bilateral:

1. Scalene
2. Levator (secondary)

J. Finsterer et al. / Journal of the Neurological Sciences 355 (2015) 37–43

Complex Injection Pattern #3



Retrocaput



Retrocollis

Bilateral:

- Splenius capitis
- Semispinalis capitis
- Trapezius pars descendans

Bilateral:

- Semispinalis cervicis

Cervical Dystonia



CASE

- Patient MP w/ Dr. Fernandez
- 55-year-old female with cervical dystonia/dystonic tremor
- Tried and failed primidone, EMLA cream
- No-no jerky tremor worsens when looking up and right, left lateral shift, right shoulder elevation, right chin tilt
- AboBTX-A provides excellent relief

Type of Neurotoxin: AboBTX-A
Total amount injected: 800 units

	Right	Left
SCM	150	100
Splenius capitis	200	150
Scalene	0	75
Trapezius	50	25

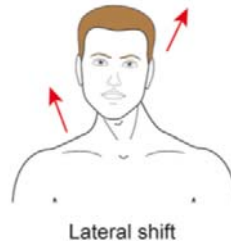
Very Complex Injection Pattern #1: Lateral Shift



Left Laterocaput

Right:

- Scalene
- Splenius cervicis
- Levator



Left

- Splenius capitis
- Sternocleidomastoid
- Trapezius pars descendans

Right Laterocollis

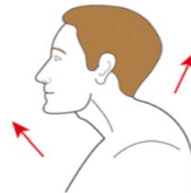
Very Complex Injection Pattern #2: Sagittal Shift



Anterocollis

Bilateral:

1. Scalene
2. Levator



Sagittal shift



Retrocaput

Bilateral:

1. Splenius capitis
2. Semispinalis capitis
3. Trapezius pars descendans

Focal Hand Dystonia



CASE

- Patient JR w/ Dr. Fernandez
- 57-year-old male
- Focal hand dystonia (writer's cramp) diagnosed in 2012
- Failed several medications including levodopa
- Very good response to OnaBTX-A injections

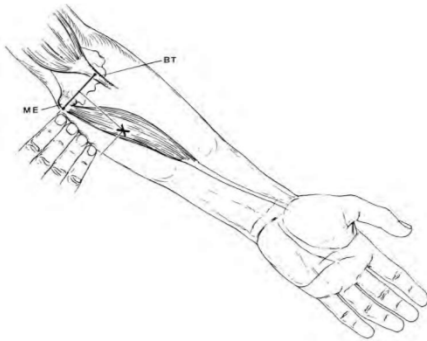
Type of Neurotoxin: OnaBTX-A
Total amount injected: 200 units

	Right	Left
Flexor carpi radialis	100	0
Flexor carpi ulnaris	100	0

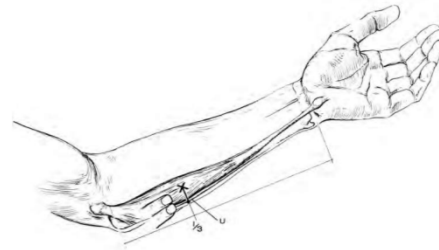
Common muscles for writer's cramp



Flexor Carpi Radialis



Flexor Carpi Ulnaris



Foot Dystonia



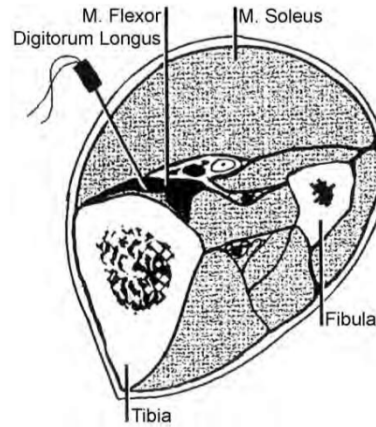
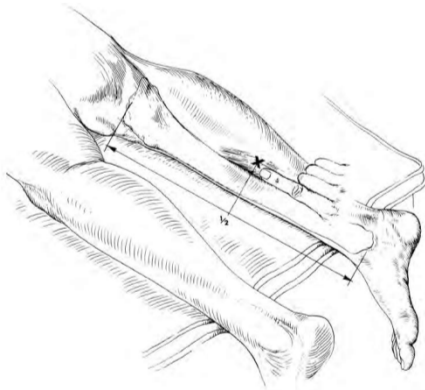
CASE

- **Patient DF/ Dr. Fernandez**
- 66-year-old female
- Right foot dystonia diagnosed in Jan 2020, secondary to PD
- Prior treatments: levodopa, DBS
- First injection: Helped pain significantly, slight improvement in dystonia

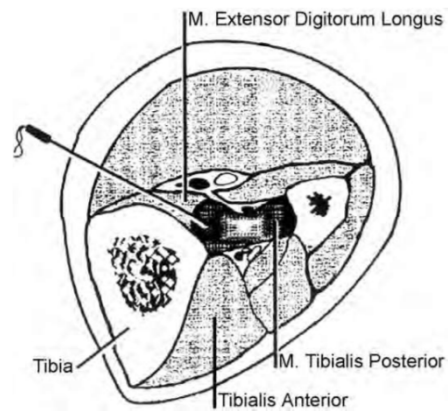
Type of Neurotoxin: OnaBTX-A
Total amount injected: 200 units

	Right	Left
Flexor digitorum longus	50	30
Flexor digitorum brevis	30	30
Tibialis posterior	30	30

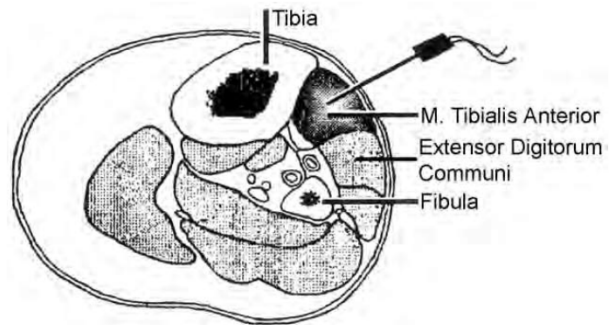
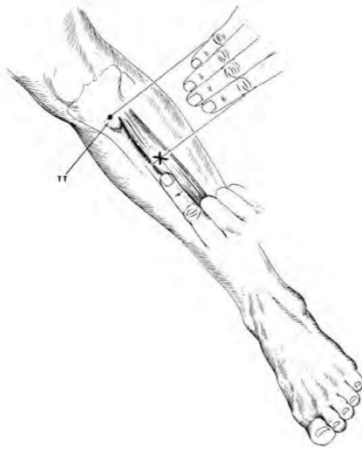
Flexor digitorum longus



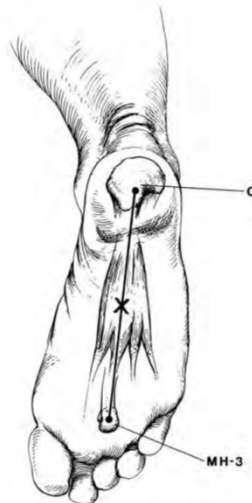
Tibialis posterior



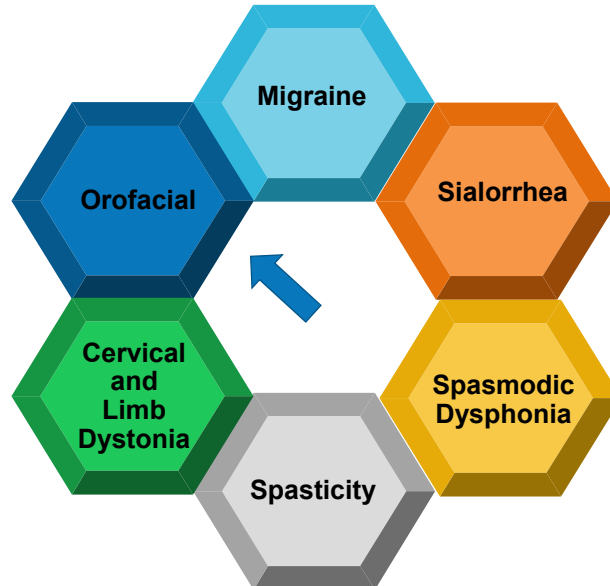
Tibialis Anterior



Flexor Digitorum Brevis



Neurotoxin Indications



Bilateral Hemifacial Spasm



CASE

- **Patient JO w/ Dr. Fernandez**
- 49-year-old female
- Bilateral hemifacial spasm secondary to sarcoidosis, diagnosed in 2018
- Failed antidepressants
- Very good response to OnaBTX-A injections
- Small modifications made to help treat her chronic migraine

Type of Neurotoxin: OnaBTX-A
Total amount injected: 75 units

	Right	Left
Zygomaticus major	5	5
Orbicularis oculi	10	10
Frontalis	5	5
Temporalis	5	5
Occipitalis	5	5
Trapezius	5	5

Blepharospasm and Orofacial Dystonia



CASE

- **Patient JS w/ Dr. Fernandez**
- 60-year-old female
- Blepharospasm and orofacial dystonia diagnosed 2014
- Failed multiple medications
- Very good response to IncoBTX-A injections

Type of Neurotoxin: IncoBTX-A
Total amount injected: 100 units

	Right	Left
Orbicularis oculi		
Lateral upper	10	10
Medial upper	10	10
Lateral lower	5	5
Lateral epicanthus	5	5
Corrugator	10	10
Orbicular oris lower	5	5
Orbicularis oris upper	2.5	2.5
Procerus	5 (midline)	

Blepharospasm



Squinting

frontalis
corrugator supercillii
orbicularis oculi (preseptal and pretarsal)

Increased blink rate

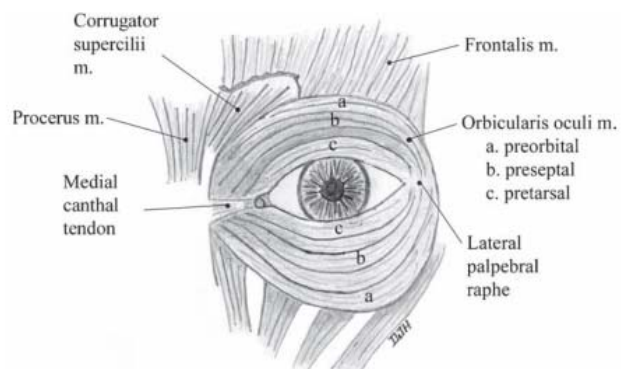
orbicularis oculi (pretarsal)

Involuntary closure of the eyelids

orbicularis oculi (pretarsal)

Apraxia of eyelid opening

orbicularis oculi (preseptal)



Bilateral Hemifacial Spasm



CASE

- **Patient PP / Dr. Fernandez**
- 70-year-old female with right facial involuntary movements since 2007, and left facial movements (predominantly eyelid) since 2011
- The movements, when they occur, are asynchronous
- She was diagnosed with bilateral hemifacial spasm in 2012, and has been receiving botulinum toxin injections since that time

Type of Neurotoxin: OnaBTX-A
Total amount injected: 50 units

	Right	Left
Orbicularis oculi		
Lateral upper	5	5
Medial upper	5	5
Lateral lower	5	5
Lateral epicanthus	5	5
Alaeque Nasi	5	5

Meige's Syndrome



CASE

- **Patient JG w/ Dr. Fernandez**
- 72-year-old male with Meige's syndrome
- Failed multiple medications
- First injection minimally effective
- Right head tilt, laterocollis and shoulder elevation. Bilateral mouth tremor.

Type of Neurotoxin: OnaBTX-A
Total amount injected: 165 units

	Right	Left
Orbicularis oculi	20	20
Procerus	5 (midline)	
Corrugator	5	5
Zygomaticus major	5	5
Nasalis	5	5
Orbicular oris upper	5	5
Orbicular oris lower	5	5
Mentalis	5	5
Rizorius	5	5
Platysma	25	25

Oromandibular dystonia



Jaw closing dystonia

Bilateral masseters, temporalis

Jaw opening dystonia

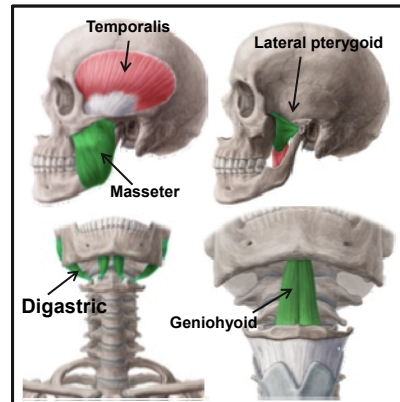
Bilateral lateral pterygoids
Bilateral digastrics, omohyoids,
geniohyoids

Jaw deviation dystonia

Contralateral lateral pterygoids

Tongue protrusion dystonia

genioglossus, hypoglossus



Oromandibular dystonia Injection Technique



Movement Disorders
CLINICAL PRACTICE

How Do I Inject Botulinum Toxin Into the Lateral and Medial Pterygoid Muscles?
Andrew Nathan, MD, PhD



Thank You for Your Kind Attention!



Center for Neurological Restoration
Cleveland Clinic
Cleveland, Ohio, USA

