International Parkinson and Movement Disorder Society European Section

ean the home of neurology

5th Congress of the European Academy of Neurology

Oslo, Norway, June 29 - July 2, 2019

Hands-on Course 11

EAN/MDS-ES: Clinical neurophysiology for assessment of patients with movement disorders (Level 2)

Polymyography for dystonia

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Clinical Neurophysiology for Assessment of Patients with Movement Disorders

OSLO

June 29,2019

Polymyography for Dystonia

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Amsterdam
University Medical Centers

Disclosure

Contributions for research	Ipsen
Contributions for educational activities	Allergan, Merz, Ipsen

Dystonia

Sustained or intermittent muscle contractions causing abnormal, often repetitive, movements, postures or both.

- typically patterned
- twisting
- may be tremulous
- worsened by voluntary action
- overflow muscle activation

Albanese et al. 2013

Classification

Axis I. clinical characteristics

- age at onset
- body distribution
- temporal pattern
- associated features

Axis II. Etiology

- Nervous system pathology
- Inherited or aquired
  - inherited
  - acquired
  - idiopathic

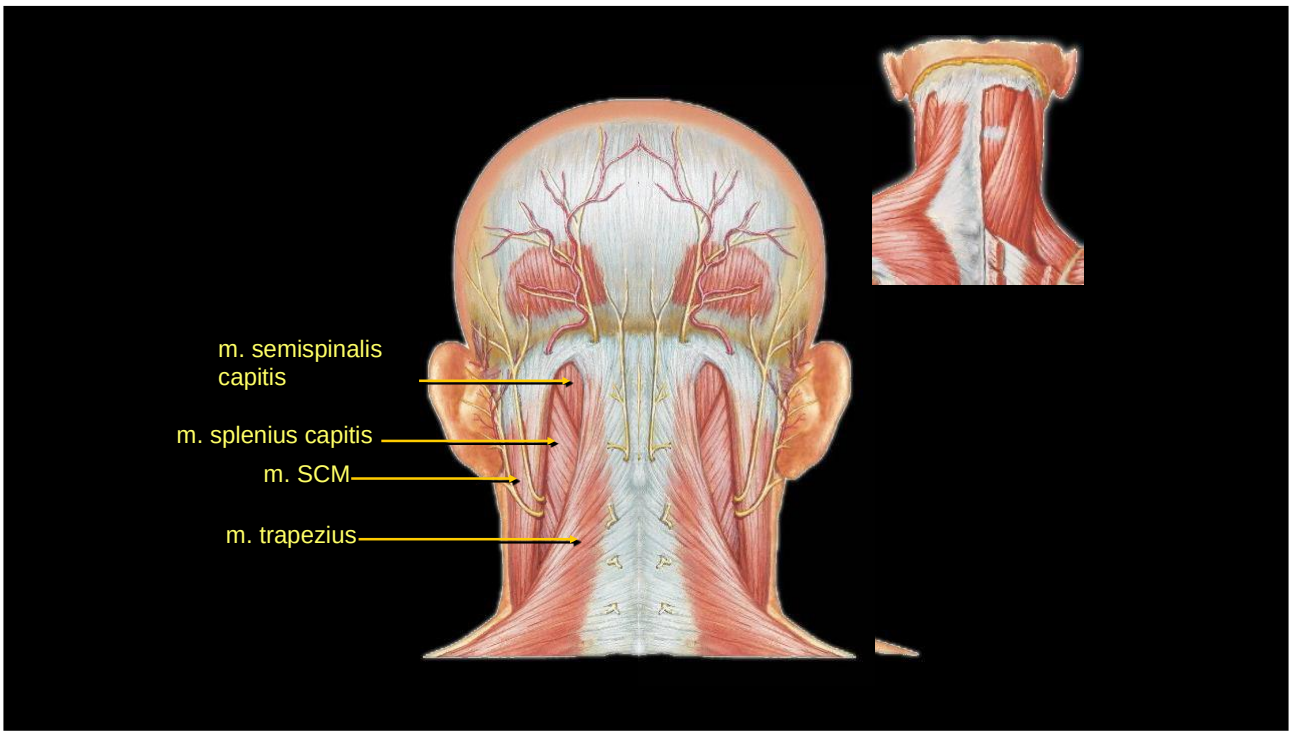
Albanese et al. 2013

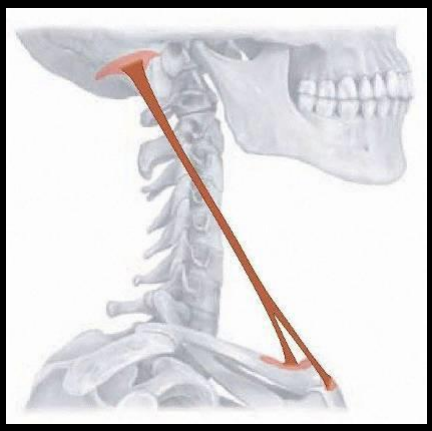
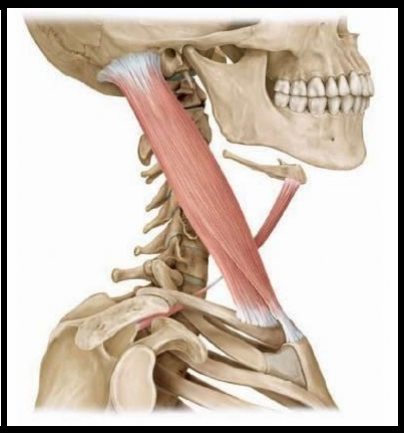
Most common forms

- Cervical dystonia
- Blepharospasm

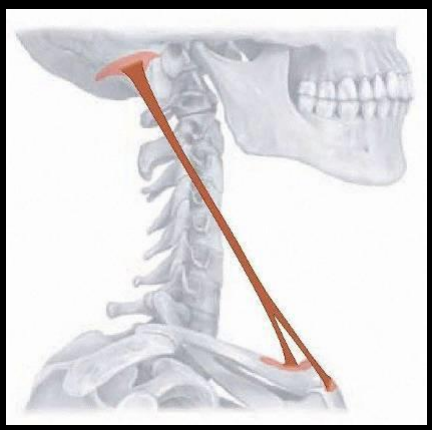
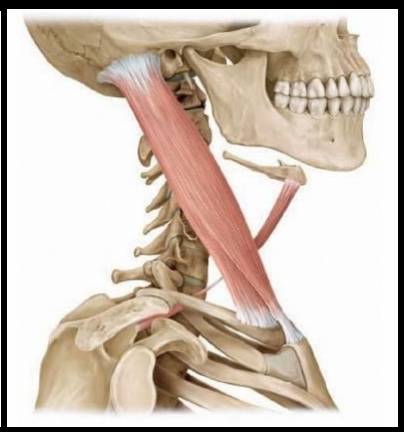
Botulinumtoxin for Cervical dystonia

- Blocks neuromuscular junction
- evidence class I
- > 70% effective
- 8 – 16 weeks
- in dystonic muscles

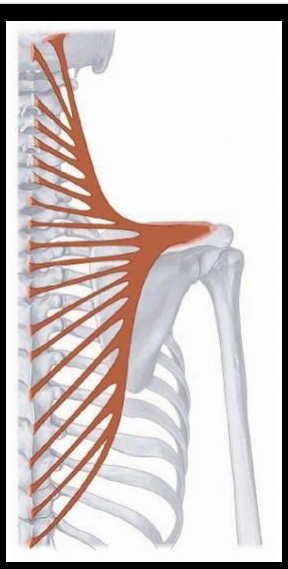

m. semispinalis capitis
m. splenius capitis
m. SCM
m. trapezius

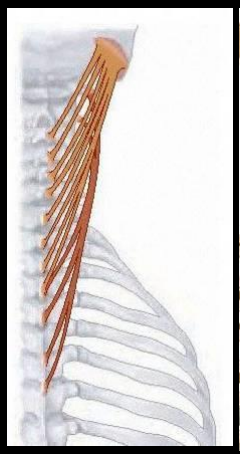
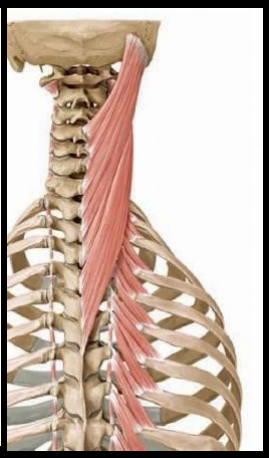
Sternocleidomastoid muscle
o: manubrium and medial portion of the clavicle
I: mastoid process of the temporal bone, superior nuchal line
a: unilateral:
bilateral:

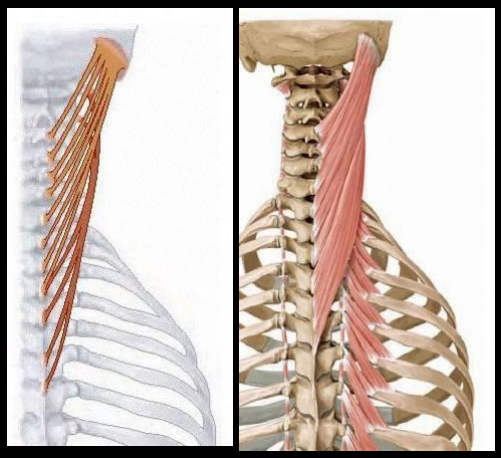
Sternocleidomastoid muscle
o: manubrium and medial portion of the clavicle
I: mastoid process of the temporal bone, superior nuchal line
a: unilateral: contralateral rotation head, ipsilateral flexion
bilateral: cervical flexion



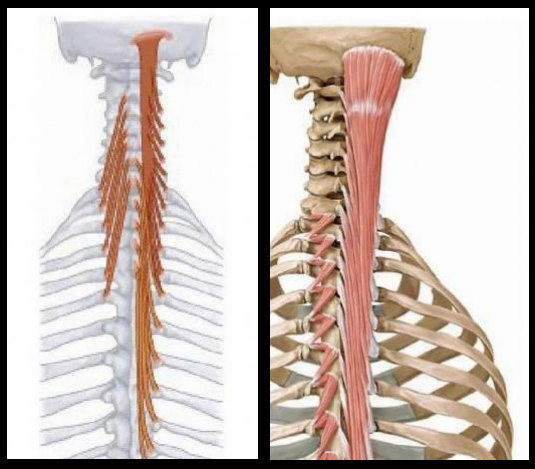

Trapezius muscle
o: pars descendens: occipital bone
i: acromial 1/3 part clavicle, spine of scapula
f: elevation, laterorotation scapula
bilatereral: extension cervical spine

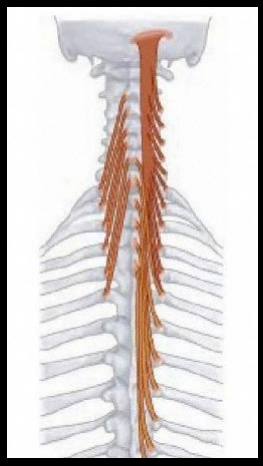
splenius capitis muscle
o: spinous processes C3-C7 and nuchal ligament
i: mastoid process and occipital bone
f: unilateral:
bilateral:



splenius capitis muscle
o: spinous processus C3-C7 and nuchal ligament
i: mastoid process and occipital bone
f: unilateral: ipsilateral rotation and flexion of the head
bilateral: extension of the head and cervical spine

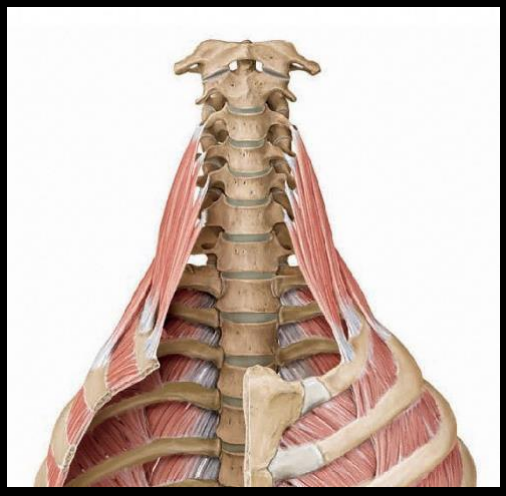


semispinalis capitis muscle
o: transverse processes Th7-C3
i: between nuchal lines occipital bone
f: unilateral:
bilateral:



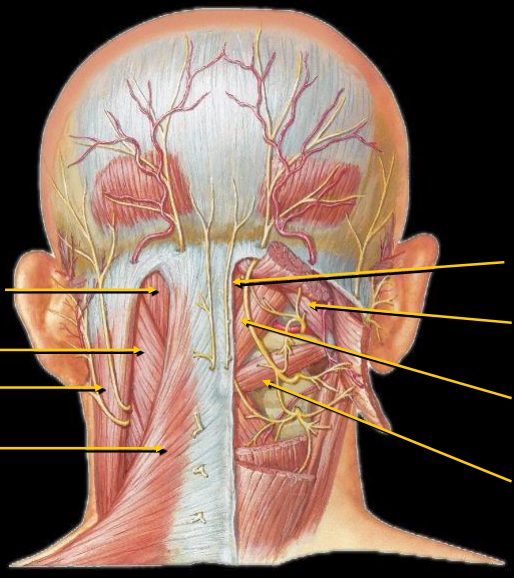

semispinalis capitis muscle
o: transverse processes Th7-C3
i: between nuchal lines occipital bone
f: unilateral: contralateral rotation of the head
bilateral: extension


levator scapulae muscle
o: transverse processes C1-C4
i: superior part medial border scapula
f: elevates scapula



scalene muscles
o: cervical vertebrae
i: first and second ribs
f: spine: laterorotation
bilateral: elevates ribs

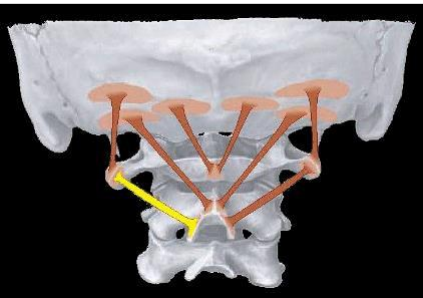
Deep muscles

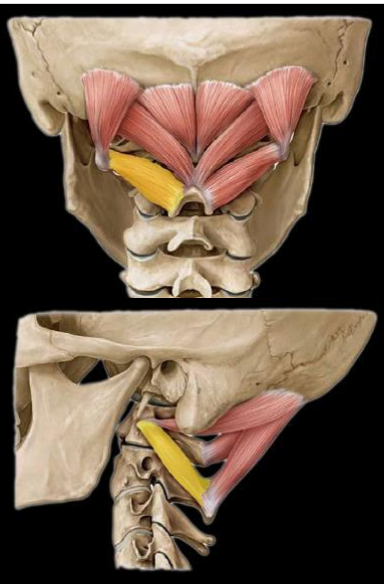


m. semispinalis capitis
m. splenius capitis
m. SCM
m. trapezius

Short neck muscles:

m. rectus capitis posterior minor
m. obliquus capitis superior
m. rectus capitis posterior major
m. obliquus capitis inferior



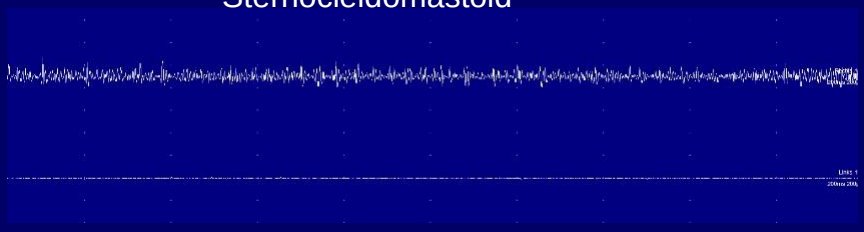


obliquus capitis inferior muscle
o: Spinous process of the axis (C2)
i: lateral mass atlas
f: unilateral: ipsilateral rotation head and neck
bilateral: extension

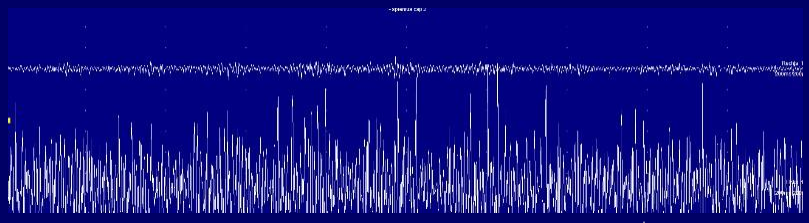
Normal

Normal

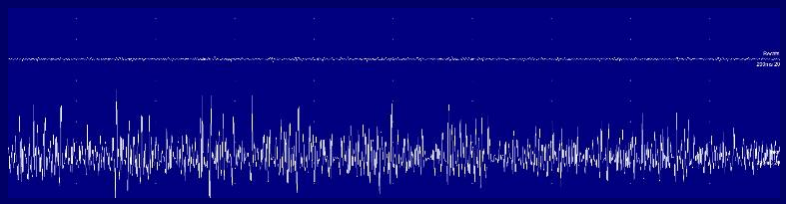
Sternocleidomastoid



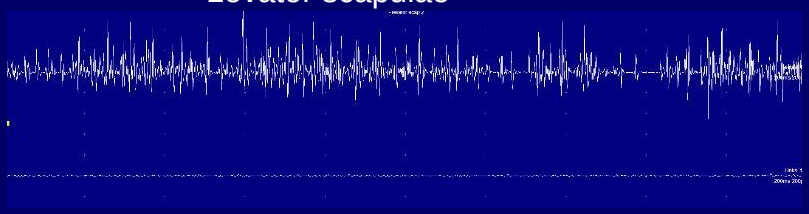
Splenius Capitis

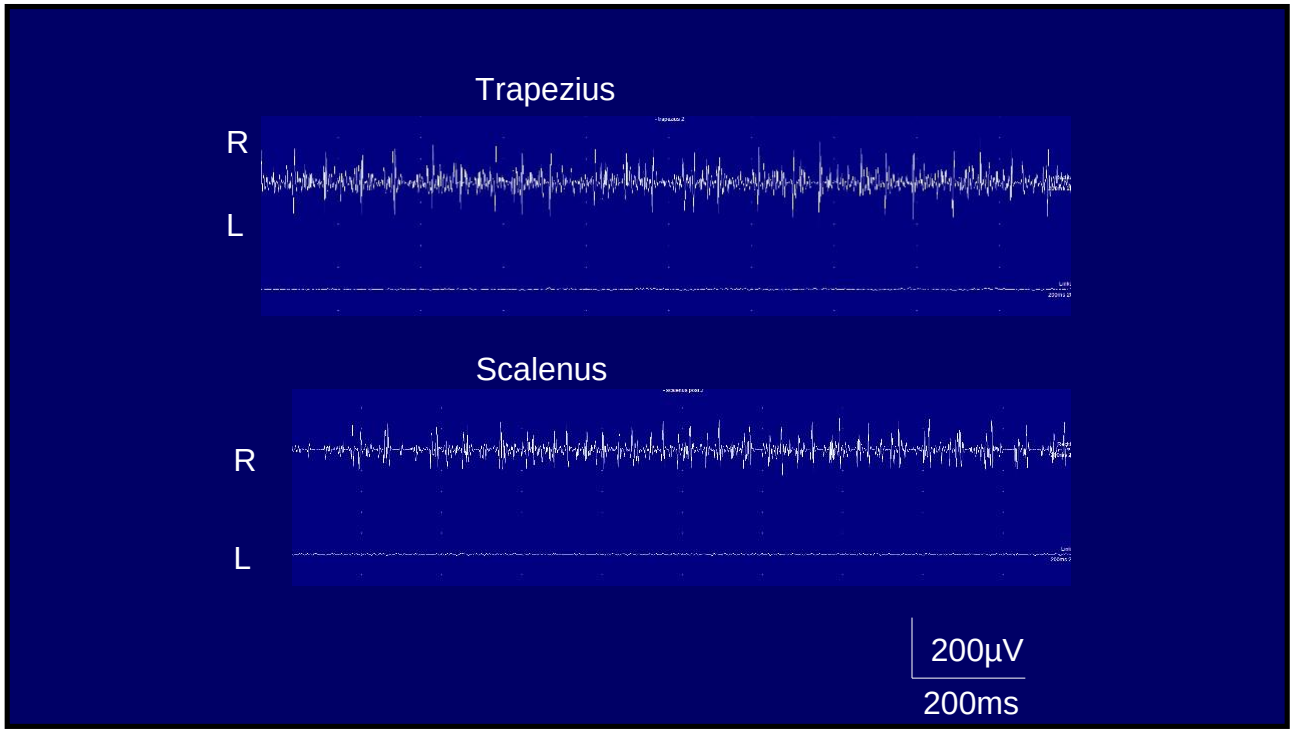


Semispinalis



Levator scapulae

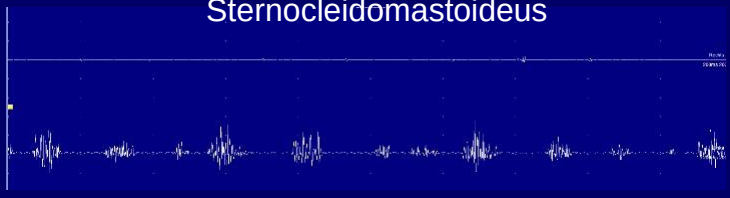



Trapezius
R
L
Scalenus
R
L
200µV
200ms

Sternocleidomastoideus

R

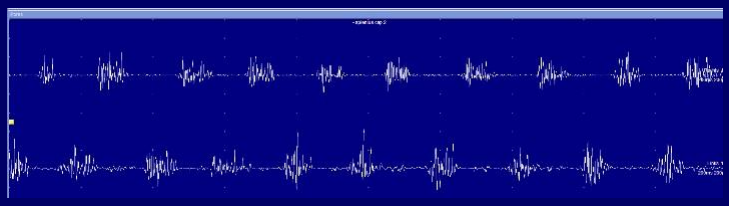
L



Splenius Capitis

R

L



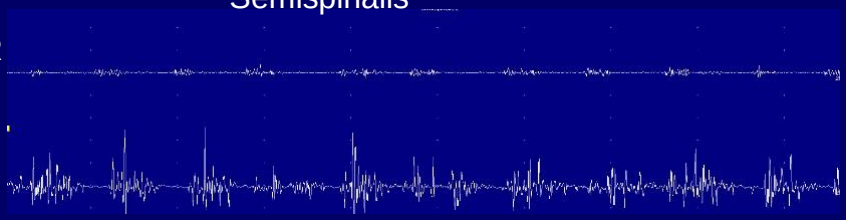
200µV

200ms

Semispinalis

R

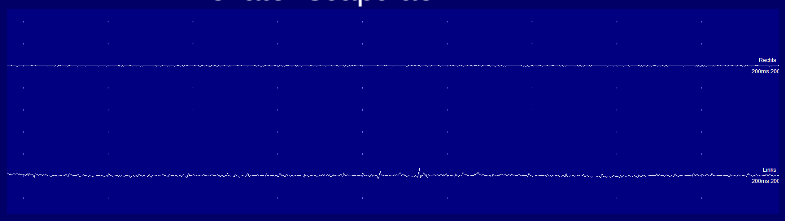
L



Levator scapulae

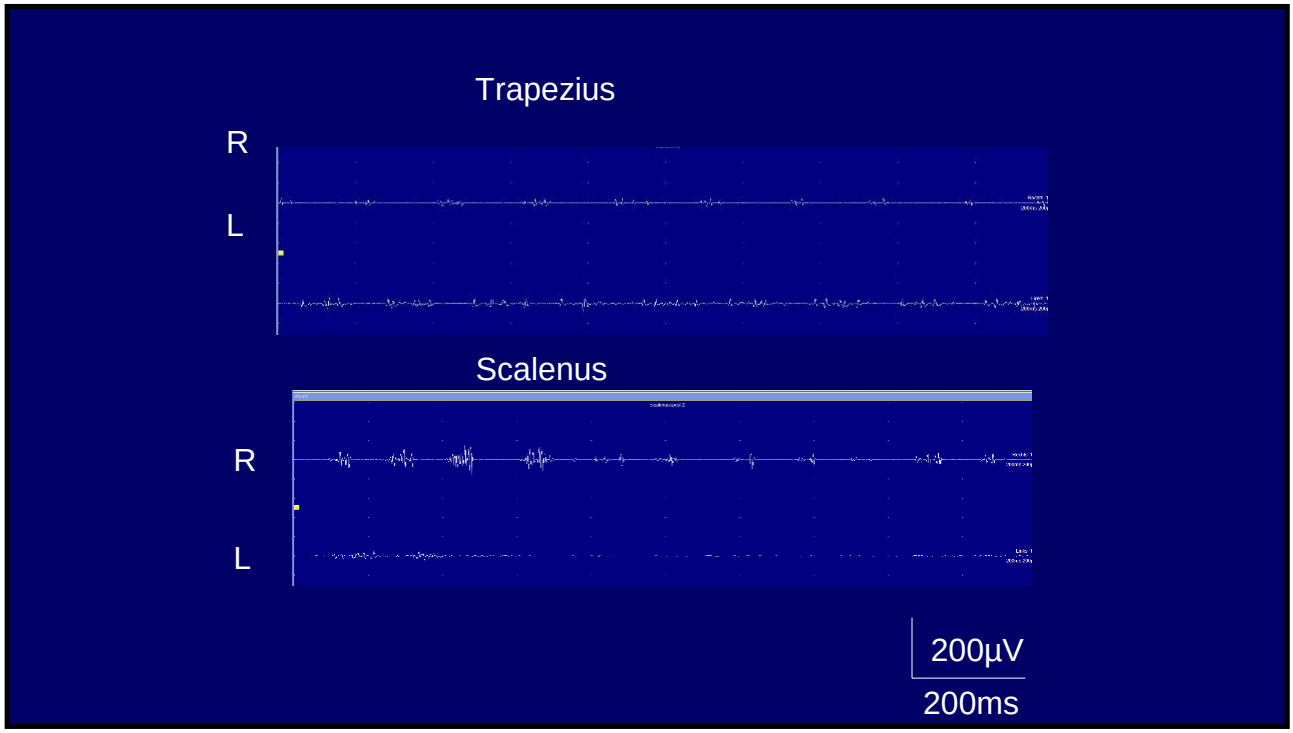
R

L

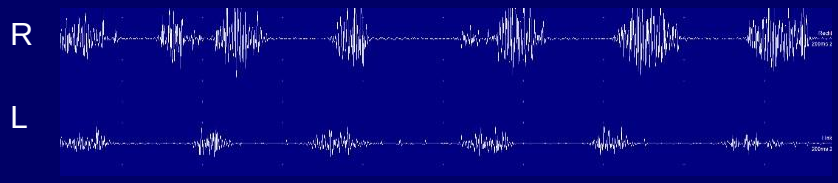


200µV

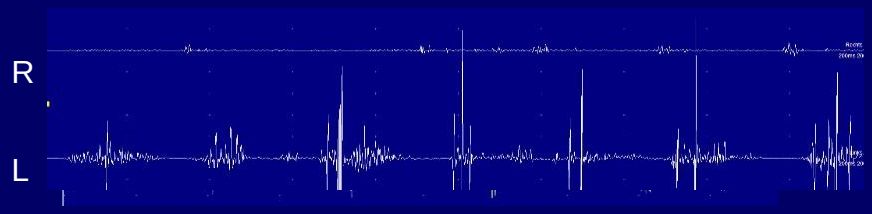
200ms


Trapezius
R
L
Scalenus
R
L
200µV
200ms

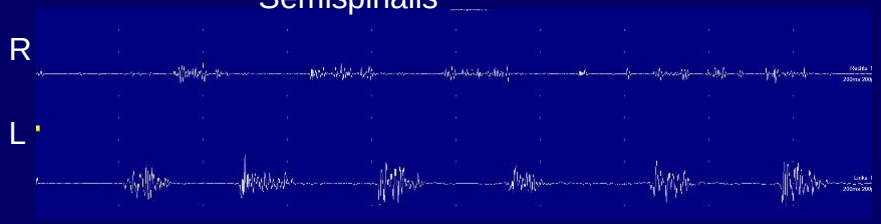
Sternocleidomastoideus



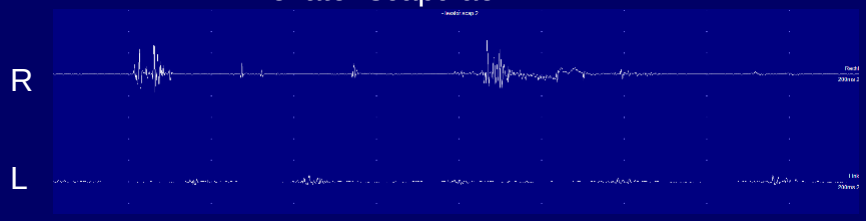
Splenius Capitis

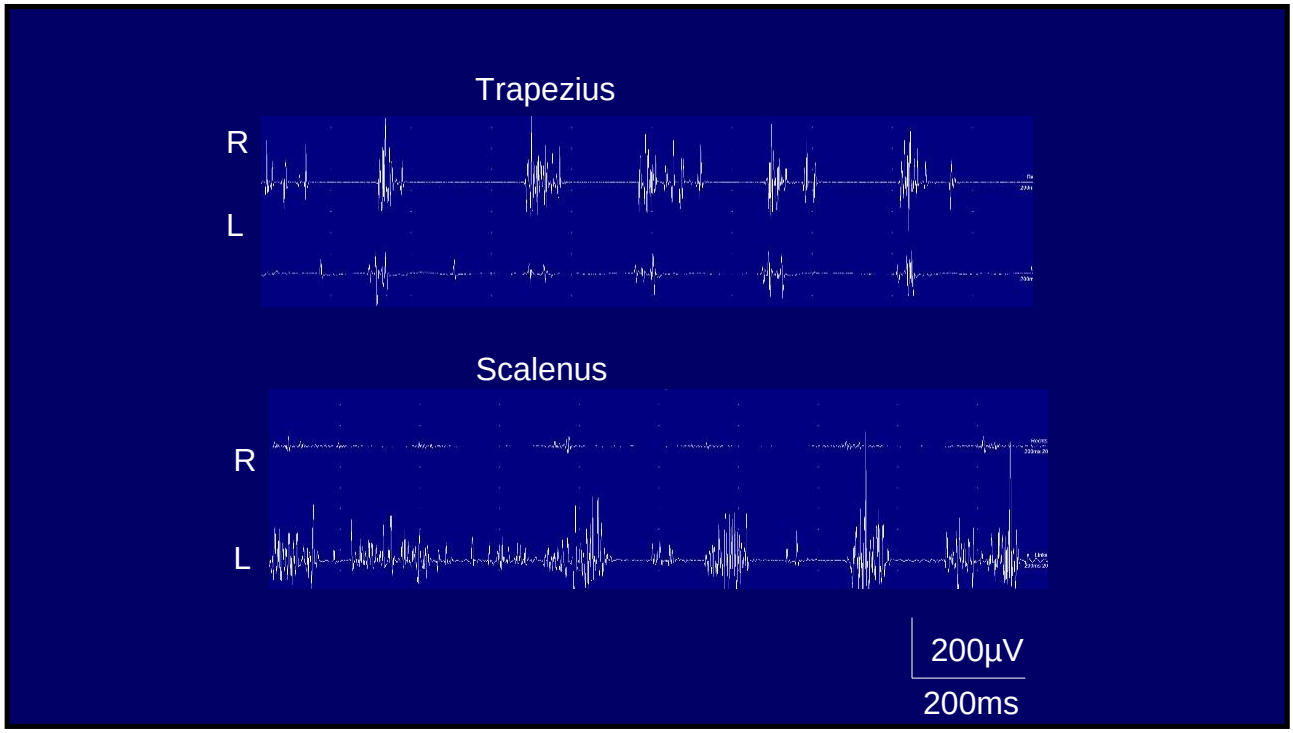


Semispinalis



Levator scapulae





Polymyography

- Identification (involved) muscles
- Document (starting) situation
- Increases knowledge of anatomy
- Patient gets used to situation
- Better results?
- Stressfull
- Compensatory muscles also active!!!

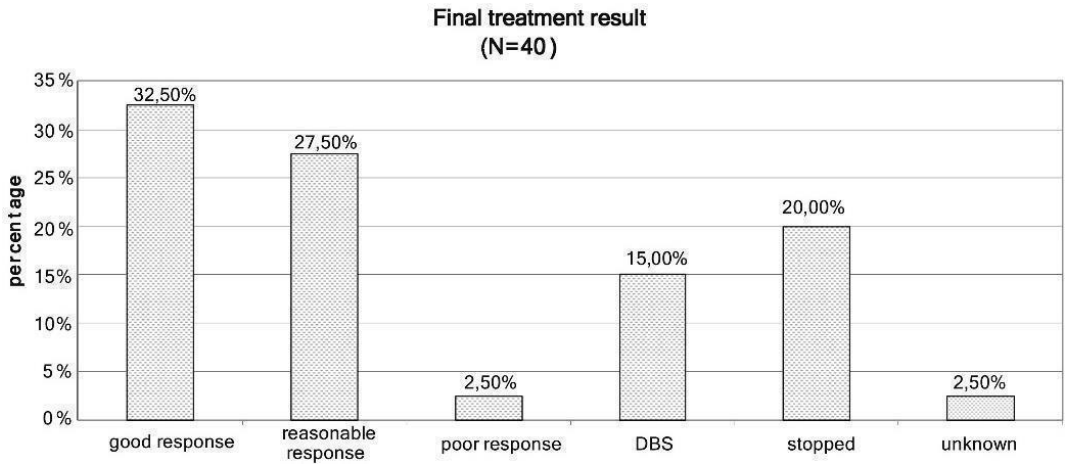
Referral tertiary center

40 consecutive cervical dystonia patients with treatment failure

Retrospective

- Age 56 y
- Duration dystonia 7.5 y
- 5 treatments
- VAS 8,2
- 375 EH BoNT Abobotulinumtoxin A
- 69% primary non-responder

Nijmeijer et al. 2013

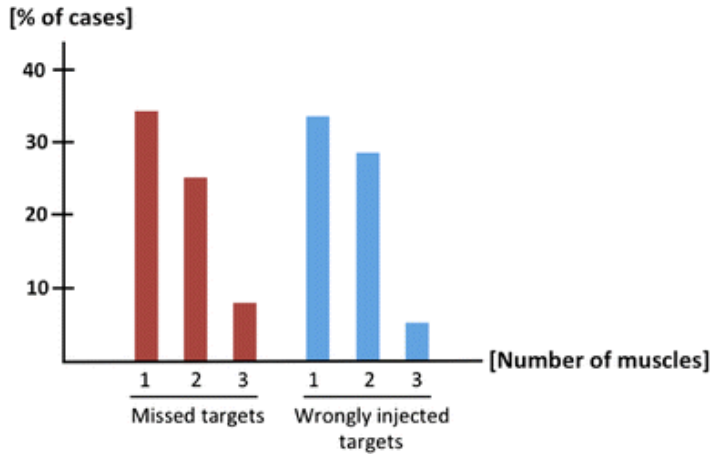


Nijmeijer et al. 2013

Referral tertiary center

Improvement caused by?

- Polymyography?
- Treatment of obliquus capitis inferior?
- Placebo?
- Natural course?



29 patients

Erro et al. 2016

Does polymyography help to improve results?

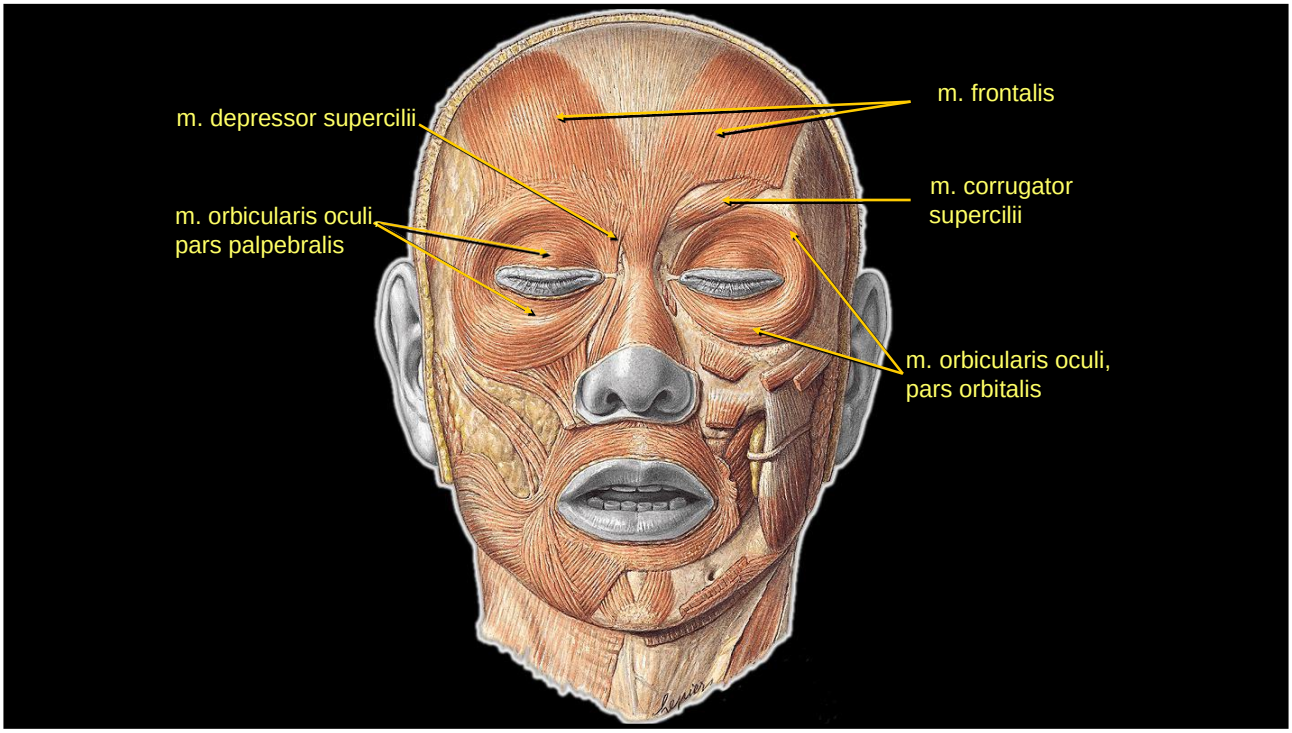
”A more rigorously designed scientific study is required before we can recommend that EMG become a routine part of botulinum toxin procedures for cervical dystonia.”

Jinnah et al. 2016

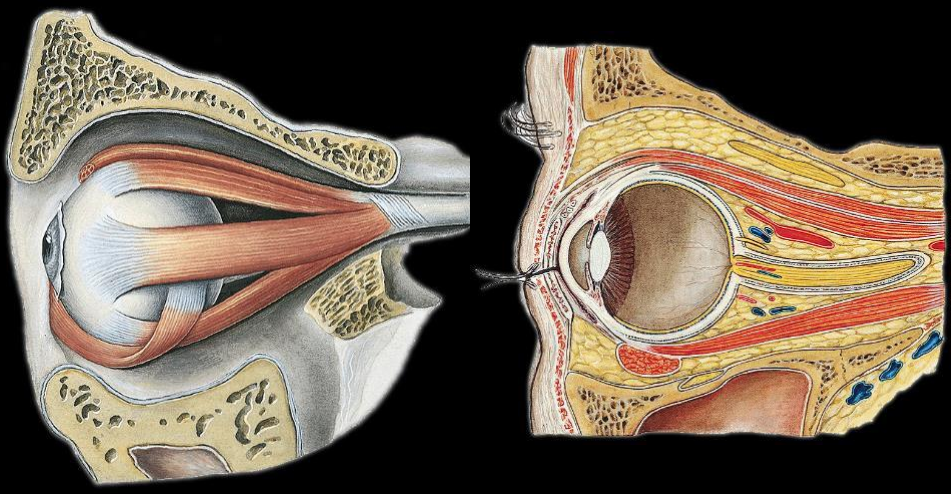
“Here, we wished to highlight the importance of the polymyography in the management of CD patients, apparently not responding to BoNT.”

Erro et al. 2016

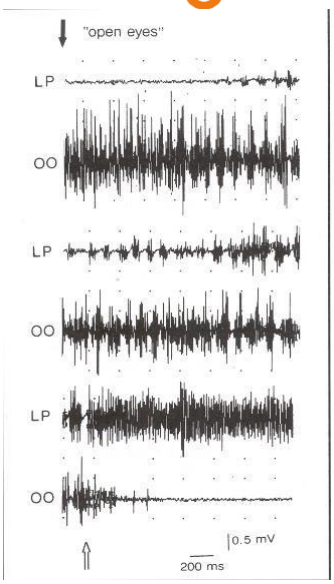
Blepharospasm



M. levator palpebrae superioris

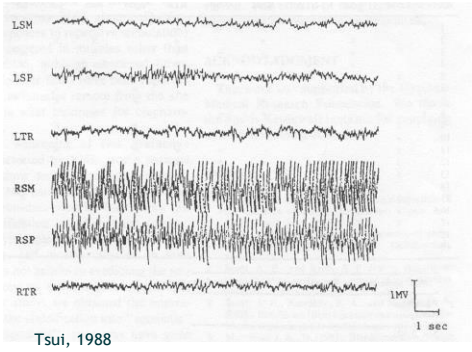


n. oculomotorius / n. III



Aramideh et al. 1995

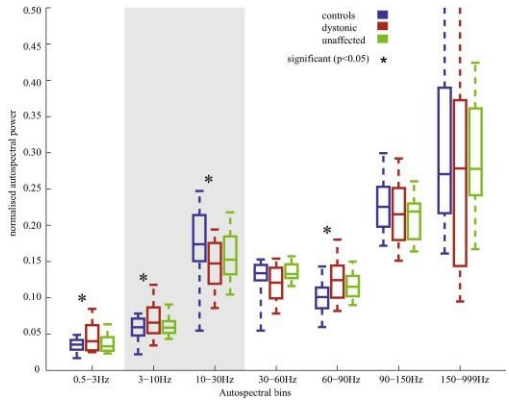
pathophysiology



Tsui, 1988

- Abnormal drive in muscle activation?

Spectral analysis



De Bruijn et al. 2017

Questions?

How to perform polymyography