

Cervical Dystonia

One type of dystonia – Julie Rope

Cervical Dystonia

- Patterned, repetitive, and spasmodic or sustained muscle contractions resulting in abnormal movements and postures of the **head and neck** may affect any combination of neck muscles result in **jerky head movements** or periodic or sustained **unnatural positioning of the head** (dystonic posturing).
- Extrapyramidal system fine tunes to maintain ‘set point’
 - CD set point altered so overactive contraction of push pull balance into ‘new set point’
- Cervical Dystonia > Spasmodic Torticollis
 - as may not be spasmodic and may or may not consist of torticollis (head turning)
- Ostrem J

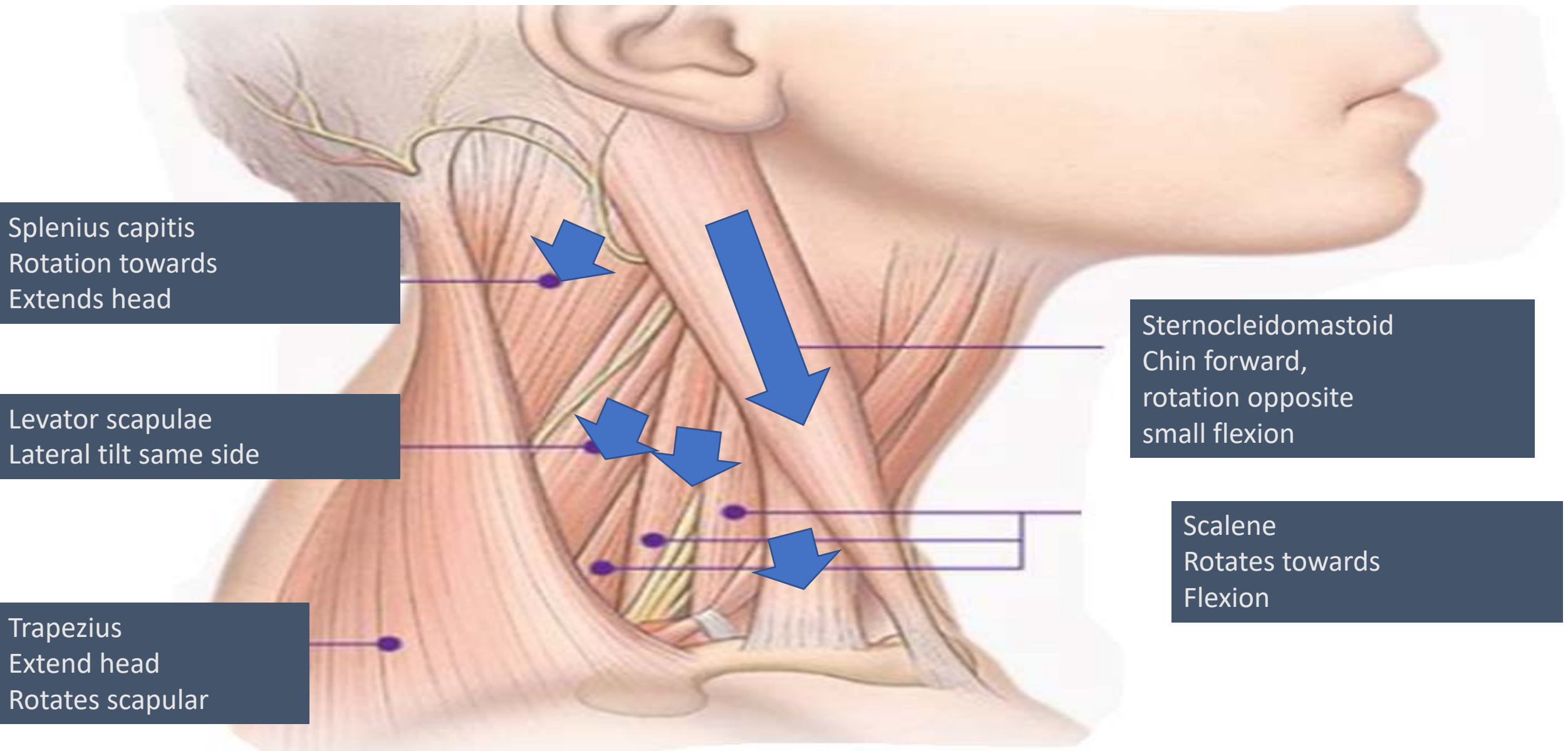
Cervical Dystonia: Characteristics

- Cause is unknown
- Familial history approx 12%
- Neck trauma
- F>M, 30-50yrs
- Neurologic examination normal
- Sensory tricks — partial, temporary relief

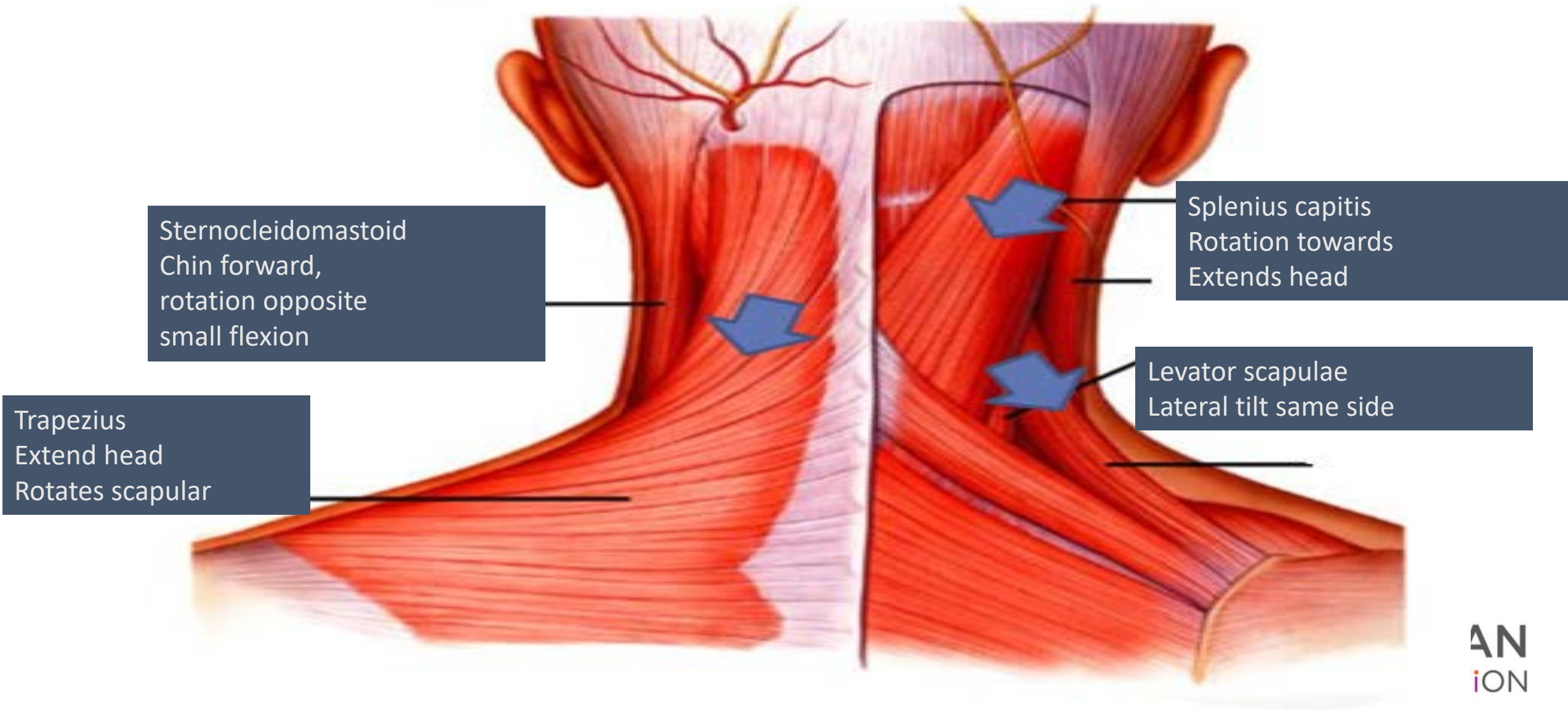
Cervical Dystonia: Characteristics

- Pulling sensation - involuntary twisting or jerking
- Worsen gradually
- Plateaus - 5 years
- Spontaneous remissions rare
- Each subtype activates **different** pattern of muscles resulting in the abnormal neck/head posture combination
- Tremor

Anatomy



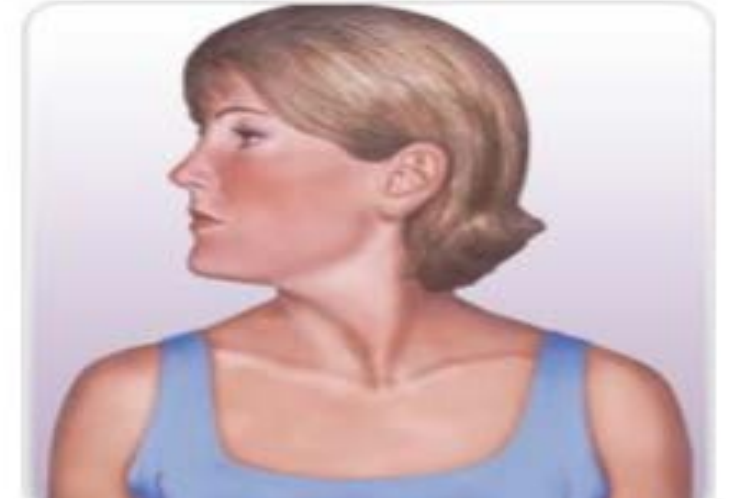
Anatomy



Muscles involved in cervical dystonia

Torticollis

- Contralateral (opposite side) sternocleidomastoid
- Contralateral trapezius
- Ipsilateral (same side) splenius capitis
- Ipsilateral splenius cervicis
- Ipsilateral levator scapulae



Laterocollis

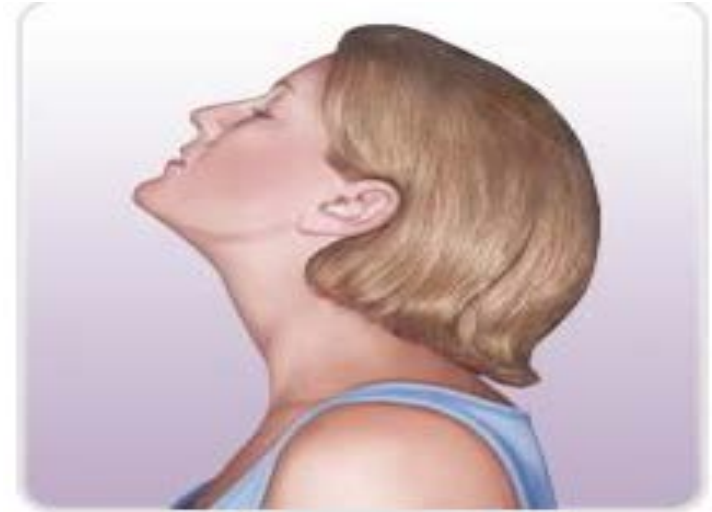
- Sternocleidomastoid
- Ipsilateral splenius capitis
- Ipsilateral scalene complex
- Ipsilateral semispinalis capitis and longissimus
- Ipsilateral levator scapulae
- Trapezius



Muscles involved in cervical dystonia

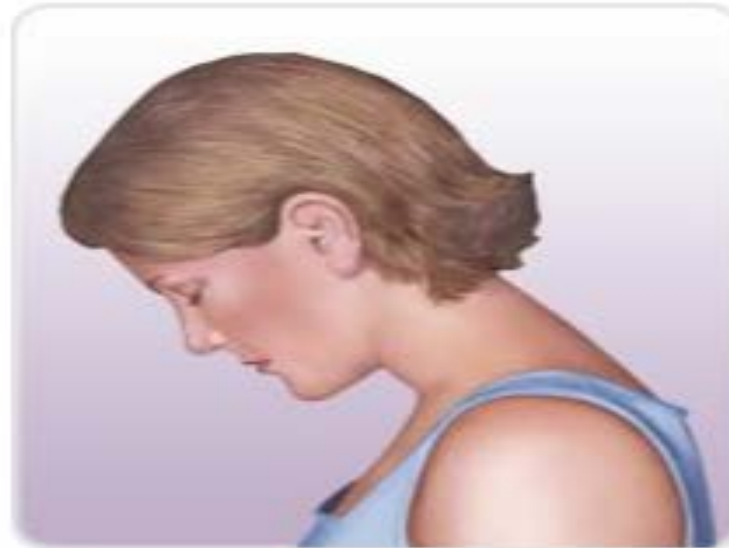
Retrocollis

- Bilateral splenius capitis
- Bilateral levator scapulae
- Posterior vertebral muscles
(semispinalis capitis and longissimus)
- Upper trapezius



Anterocollis

- Bilateral sternocleidomastoid
- Scalene complex



Cervical Dystonia

- VIDEOS
- <https://www.youtube.com/watch?v=mSwo28t5t3k>
- <https://www.youtube.com/watch?v=ZcFPE>
- Includes sensory trick



Treatment

- Pain
- Depression
- Local injection – Botulinum Toxin
- Surgery
- DBS
- Therapy input – upper cervical/ chiropractic – scoliosis management

Treatment theory

Muscular contraction is abnormal - excessive co-contraction, misfiring



- Reduces the speed and force of the movement
- Weakens antagonists

AIM - rebalancing dystonic muscles and under performing antagonistic muscles

Treatment opts

- Pain relief
- Maint ROM
 - Gentle joint mobilisation
 - Postural alignment
 - stretches
- Strengthening antagonist
- Voluntary – automatic control of head position
- Decreasing intensity dystonic
 - Relaxation – direct effect or coping?
- Simple steps in order to re-educate movement patterns.
- Proprioception
 - Adapted to tilt

Treatment challenges

Rare - Evidence is limited on effects of PT

Lack of clinically experienced therapists

The PT = intense motor learning exc (postural control, balance, strengthening axial musc and facilitation of voluntary movement) and mobilisation tech of Cx spine and dystonic mus.

Studies compare Botulinum Toxin (BTX) + PT vs BTX alone

Study intensity -PT = 40 min / session every 2nd day for 6 weeks , 75 mins sessions 5 days/wk for 5 wks, up to 90 min/day for 2 weeks = not feasible

Jean Pierre Bleton

Physiotherapist of the Parkinson's Unit in the Neurology Department at the Rothschild Foundation in France – the Guru!!!

Intervention Goals

- maintain the **flexibility** of the spinal column and the cervical muscles.
- **diminish** the intensity of the spasms
- achieve **voluntary** control, then automatic control of the correct head position
- and, if you have pain, to alleviate **pain**

Requires

- learning to **contract** the muscles that correct your CD.
- **repeating** the contraction of these muscles
- learning how to hold your head in a straight and stable position **voluntarily**
- to succeed in **maintaining** a correct head position in everyday activities

PT intervention

Maintain ROM of the cervical column gentle, manual positioning – to stretch each of the muscles causing CD

Stimulate and guide the contraction of the muscles that correct the position of the head

HEP technique

Modify the program

Identify appropriate position for relaxation of the muscles

Relax localized muscular tension muscle relaxing rolling movements and gentle manual traction

Correct compensatory curvatures of the vertebrae that may exist at the thoracic or lumbar level

Home exercise programme

Effectiveness requires

- **Quality slow** performance - correcting positions held for 6 to 8 secs
- **Quantity** - several times a day - 10 to 15 minutes.
- Between each repetition there must be a period of rest as least as long as the period of exercise.
- **Mirror feedback** to achieve the best possible correction.

ROTATIONAL TORTICOLLIS

Rotation with hands behind your head;

This exercise consists of turning your head completely in the direction **opposite** your CD, fingers crossed behind your head at the occipital bone. Throughout the duration of this exercise, the bust and arms remain immobile. Only your head turns.

Exercise:

Recommended

Not recommended

Rotation to be made to the:

Right

Left



resting position

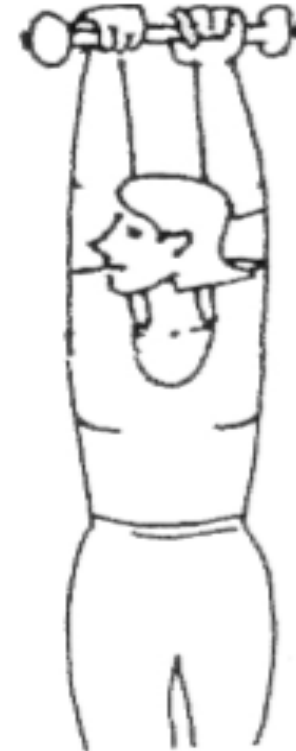


execution of the exercise

Cx Rotation with extension

Raising your arms above your head, your hands holding a light weight about 1kg while at the same time turning your head in the in the correcting direction.

Goal = extension of the whole spinal column, accompanied by a correction of CD.



Flexion with Cx rotation

GOAL; strengthen the sternocleidomastoid muscle (SCM) that corrects your CD. Bring the chin towards the sternum avoiding rotation, then turn your head in the direction away from your CD.

Exercise:

Rotation to be made to the:

Recommended

Not recommended

Right

Left



NOTE can be done with EI Stimulation

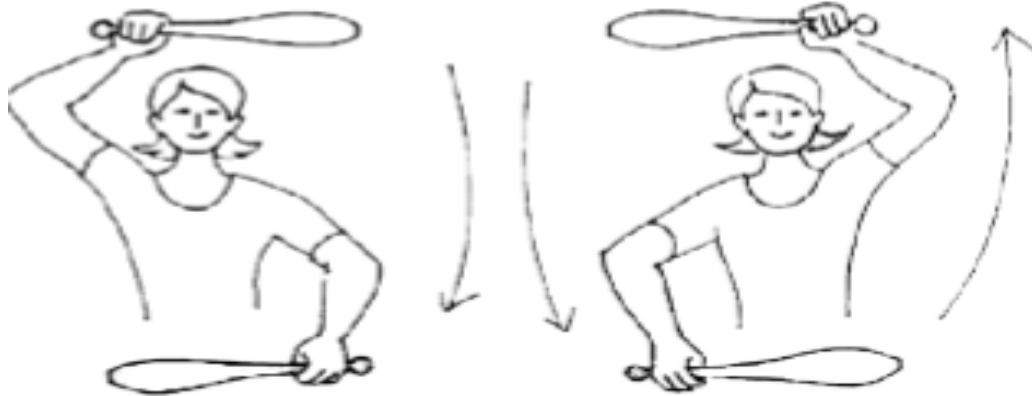
- Electrical Stim on the

Right

Left



Sensory trick carryover training



Arms moving head still

Progression into coordination of head stability with whole body activities – marching/walking

Electrical muscle stimulators

- Low frequency current.
- Contraction - 6 to 8 seconds ; relaxation is approx. double.
- Slow ramp up and down
- Repeat 2 to 3 times, 15 to 20 mins/day.

Generally used on the sternocleidomastoid.

Bleton

Biofeedback

Muscle activity reproduced in beeps or in a visual signal change with contraction of the muscles.

Feedback to train the contractions in e.g. SCM agonist and antagonist

Mirror feedback another option

Biofeedback for cervical dystonia:

- case series (80 adults, 69 with spasmodic cervical dystonia and 11 with focal dystonia) examining auditory and visual EMG biofeedback. It found that clinically significant improvement of dystonia was achieved by 45/80 (56%) of people at 8 to 12 weeks with biofeedback.
 - While it seems a reasonable approach, it needs to be tested using well-designed RCT



Visual biofeedback

- Vestibular function and altered perception of body orientation
 - reliance on vision for head control and maintaining postural stability.
- portable head-lamp - synchronize gaze and head movements and to provide a visual feedback of head position to enhance central sensorimotor integration processes in CD.
- Finding - improves quality of life in cervical dystonia by reducing dystonic posture and neck pain. And that
 - Further studies in larger series are needed to assess long-term practicability and efficacy and to identify whether the efficacy of visual biofeedback varies among certain subtypes of CD (e.g. tonic vs. phasic CD, presence or absence of neck pain).
 - J. Mueller

Dos...



- 30 min +/-day
- Relax –reduce any stress, depression or anxiety
- Perform active corrective exercises
- Keep your head in the correct alignment TV/radio -giving your body lots of support in sitting
- Arrange your work area so correcting position
- Hold the telephone on the corrective side
- Position so talking to people to the corrective side
- Perform retraining exercises in the swimming pool
- Length not stretch

Try to avoid...

- adopting the posture of torticollis
- holding your head with your hand
- shoulder strap bag
- isolation

ineffective or even harmful.

- massage of spasmodic muscles
- mechanical traction or manipulation
- wearing a cervical collar
- analgesic therapies such as infra-red or lasers

The link

<http://dystonia.tripod.com/bleton.pdf>

Other emerging

- Auditory stim different in each ear
- Optokinetic stim lateral
- Laser – post it notes for training

Outcome measures

- Cervical Dystonia Severity Scale (CDSS)
 - method utilizes a protractor and wall chart to grade the
 - severity of the patient's head deviation from neutral in each of 3 planes of motion (axial, coronal, and sagittal).
 - <http://www.wemove.org>
 - Columbia Torticollis Rating Scale
 - Unified Dystonia Rating Scale (UDRS) – focal
 - The Fahn–Marsden dystonia scale - generalized
-
- CD Impact Profile, CDIP-58
 - CDQ-24
 - Short Form-36 Health Survey (SF-36)
 - Tsui score- severity and pain – low correlation with QOL

Joost van der Dool et al

- Effectiveness of a **standardised physical therapy program**: study design and protocol of a single blind randomised controlled trial. [BMC Neurology](#) December 2013, 13:85
 - Bleton
 - motor relearning principles
 - coaching
 - feedback
- modern principles to enhance neuroplastic changes
- tailored, evidence based intervention more effective

Standardised program

- Botox – 2 wks for 1 year standardised
 - functional performance of the exercises adapted to daily life situations, muscle stretching, passive mobilization of the neck and training principles which have found to be relevant for neural rehabilitation and motor learning and will be performed by trained physical therapists.
- A summary of the theoretical basis is displayed in Table [1](#) very detailed – refer to article..

Muscle stretching /relaxation and mobilisations (de Morree[\[43\]](#), Fung[\[44\]](#))

| <i>Principle</i> | <i>Explanation</i> | <i>Application in standardized PT program</i> |
|-------------------------------------|--|---|
| 1. Passive mobilisation of the neck | Passive mobilization techniques of the neck create stress relaxation in the collagen fibers of the cervical facet joints. This helps to increase ROM | Passive mobilisation techniques are applied by PT's |
| 2. Muscle stretching for relaxation | Stretching elongates the dystonic muscle and helps to relax it due to the Golgi tendon reflex. | Passive stretching of dystonic muscles |

Motor learning principles (Kleim & Jones[\[20\]](#))

| <i>Principle</i> | <i>Explanation</i> | <i>Application in standardized PT program</i> |
|--------------------------|---|--|
| 1. Use it or lose it | Failure to drive specific brain functions can lead to functional degradation. | Activation of antagonists |
| 2. Use it and improve it | Training that drives a specific brain function can lead to an enhancement of that function. | Training of antagonists in order to improve voluntary movement of the head |
| 3. Specificity | The nature of the training experience dictates the nature of the plasticity. | Functional training of activities of daily living tailored to the patients needs |
| 4. Repetition matters | Induction of plasticity requires sufficient repetition. | Exercise of newly gained tasks 5–10 times a day for 10–15 minutes |
| 5. Intensity matters | Induction of plasticity requires sufficient training intensity. | Training intensity is tailored for the individual and monitored over time |
| 6. Time matters | Different forms of plasticity occur at different times during training. | 1 year of therapy is divided in 3 stages according the 3 stages model of Fitts & Posner [45] |

Hydrotherapy

- Bouyancy + resistance
- Improvement in flexibility and strength through the use of a supportive medium.
- Hard work out with the added resistance and turbulence of the water.
- Reduced delayed muscle soreness compared with gym.
- On a air mattress or buoyancy aids
- Reverse fixed points – ie turn body not head
- Retrocollis – swim on back – if on front increase ext
- Side stroke – pick correct side

Online resources

- www.dystoniasociety.com
- Dystonia Medical Research Foundation (DMRF)
- www.dystonia-foundation.org info@dystonia-foundation.org
- The Dystonia Society
- <http://www.dystonia.org.uk/> info@dystonia.org.uk
- National Spasmodic Dysphonia Association (NSDA)
- www.dysphonia.org nsda@dysphonia.org
- Benign Essential Blepharospasm Foundation (BEBRF)
- <http://www.blepharospasm.org/> bebrf@sbcglobal.net
- WeMove (Movement disorders)
- <http://www.wemove.org>

Measures

- QUALITY OF LIFE
 - Cranio-cervical Dystonia Questionnaire (CDQ-24) and Short Form 36 (SF-36)
- Disability
 - Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS)
 - Functional Disability Questionnaire (FDQ). The FDQ is a 27 item scale to measures the impact of CD on daily functioning
- RANGE OF MOVEMENT
 - ability to perform voluntary movements, with a cervical range of motion meter (CROM) [\[29\]](#). The CROM is a frame that will be placed on the head with three separate inclinometers to measure AROM in the sagittal, coronal and horizontal planes the psychometric properties of the CROM in patients with CD are unknown, in a healthy population the CROM is a reliable instrument to measure cervical ROM
- PAIN
 - To determine the additional effects of PT on pain, patient are asked to rate their pain on a Numeric Rating Scale (NRS).
- DEPRESSION
 - Beck's Anxiety Index and Beck's Depression Index
- Severity
 - Tsui scale measures different aspects of abnormal posture and movements in CD patients
 - Clinical Global Impressions-Severity of Illness Scale (CGI-S) and the Clinical Global Impression - Improvement scale (CGI-I).
 - ADDS – arm dystonia scale

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Chronicles of a dystonia muse – <https://dystoniamuse.com/>

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Dystonia foundation organisation – living with dystonia physical therapy resource

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