Botulinum Toxin Convergence on Skills for Movement Disorders and Spasticity (ABCs-MDS)

Manila, Philippines | November 25-26, 2025

International Parkinson and Movement Disorder Society Asian & Oceanian Section

Cervical Dystonia: Selection of Muscles

Sanjay Pandey, MD, DM

Amrita Institute of Medical Sciences, Faridabad

Delhi National Capital Region, India

Learning objectives

To discuss

- The muscles involved in cervical dystonia
- Selection of muscles for injecting botulinum toxin in cervical dystonia
- Use of EMG and USG for injecting botulinum toxin in cervical dystonia

No disclosures

Cervical dystonia

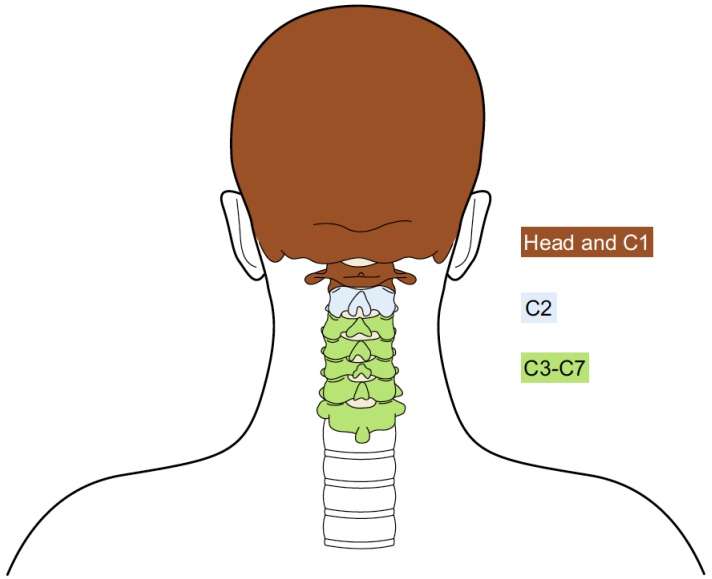
Torticollis

Laterocollis

Retrocollis

Anterocollis

The “collis caput concept”



Frequency of different subtypes of cervical dystonia: a prospective multicenter study according to Col–Cap concept

Wolfgang H. Jost, Laurent Tatu, Sanjay Pandey, Jaroslaw Sławek, Artur Drużdż, Bo Biering-Sørensen, Christian F. Altmann, et al.

Journal of Neural Transmission
Translational Neuroscience, Neurology and Preclinical Neurological Studies, Psychiatry and Preclinical Psychiatric Studies

ISSN 0300-9564
Volume 127
Number 1

J Neural Transm (2020) 127:45-50
DOI 10.1007/s00702-019-02116-7

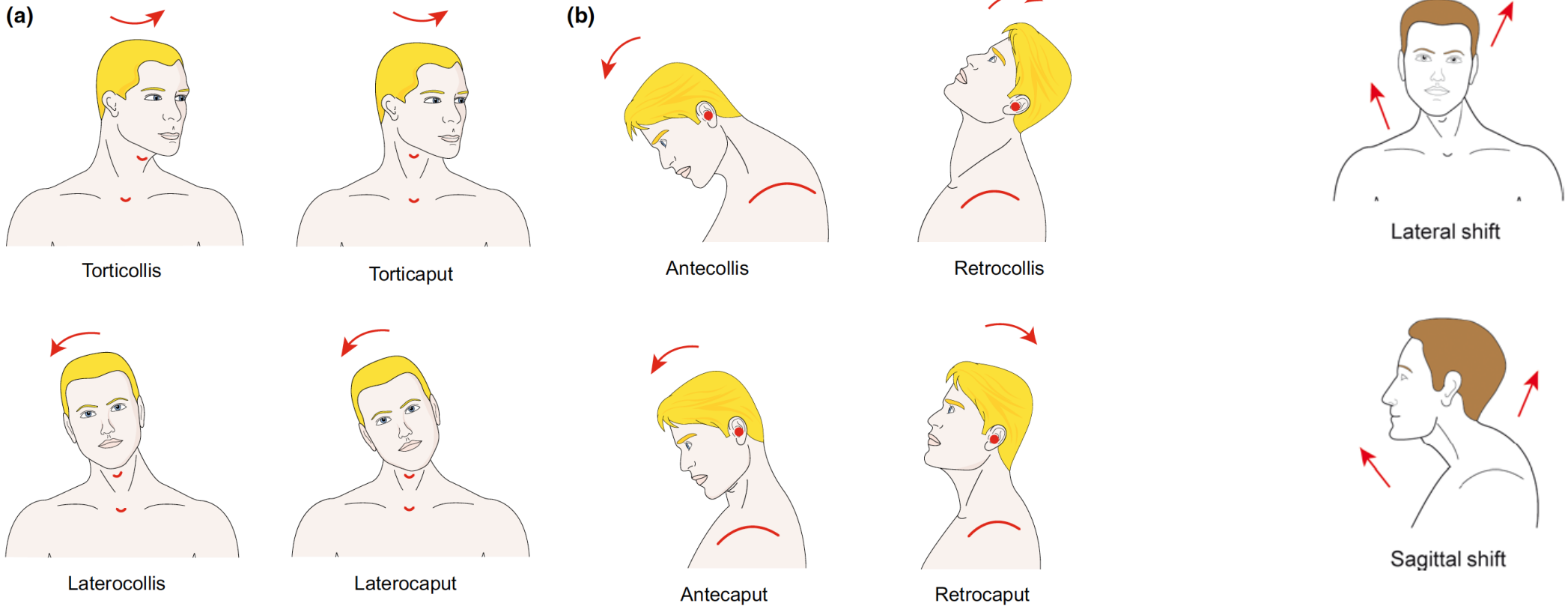
COL-CAP classification

- Identifying cervical postures involving the atlanto-occipital joints or caput and the cervical spine [collum]
- Dystonic postures (slow postural component) and not for dystonic movements (fast, jerky component)

COL-CAP classification

- In majority of the cases patients have a combination of both conditions

Features	Caput	Collum
Lateral tilt	Laterocaput	Laterocollis
Rotation	Torticcaput	Torticollis
Anteflexion	Anterocaput	Anterocollis
Retroflexion	Retrocaput	Retrocollis



Note: In many patients there is a combination of caput and collis

Cervical muscles involved in head and neck movement/posture

Head extension

- Splenius capitis
- Semispinalis capitis
- Trapezius

Neck extension

- Levator scapulae
- Splenius cervicis
- Semispinalis cervicis

Head flexion

Sternocleidomastoid

Neck flexion

Scalenus group

Longus colli

Head rotation

Contralateral SCM

Lateral head tilt

Splenius capitis

Trapezius

Sternocleidomastoid

Lateral neck tilt

Semispinalis cervicis

Scalenus group

Longus colli

Clinical assessment

Inspection

- Dystonic postures
- Dystonic movements
- Muscles hypertrophy

Protocol

- Standing at rest. Eyes open and shut
- Standing with arm outstretched in different directions
- Walking naturally
- Walking with arm outstretched
- Sitting
- Letting the movement go without opposition

Palpation

- Muscle hypertrophy
- Passive range of motion
- Evoked pain

Cervical dystonia: subtypes

Posture dominant subtype:

- Rotation of the head to the left,
- Extension and tilt to the right
- Elevation of left shoulder
- Prominent rt SCM

The muscles involved are right sternocleidomastoid, left splenius and left levator scapulae

Tremor dominant subtype:

- Tremulous mostly no-no phenotype
- Jerky component varying in frequency and direction
- Head position: mild retrocollis

Muscles: no-no tremor: bilateral SPC, OCI

If round-round tremor: bilateral LS

Cervical dystonia: subtypes

Mobile postural subtype

- Prevalent phenotype: a variety of mobile posture (slow or fast)
- Prevalent posture: retrocollis with left head rotation

The muscles involved are mainly bilateral SC and rt scm

Jerky and postural subtype:

- Prevalent phenotype: predominant jerks at rest while she attempts to bring her neck to left

The muscles involved are left SCM, RT SC, RT LS

Instrumental assessment

EMG

- Activity at rest
- Voluntary activation
- Compensatory activation
- Co-activation
- Lack of activation
- Tremulous activation

USG

- Anatomical localization
- Muscle morphology
- Muscle size
- Needle trajectory

Short list target muscles:

Choose primary dystonic muscles
Exclude antagonistic and compensatory muscles
Compare with previous injection sessions

Three neck muscle layers

- Superficial: Platysma, SCM, Trapezius
- Intermediate: Splenius capitis and cervicis, Scalene muscles, LS, Rhomboides
- Deep: Semispinalis capitis and cervicis, longissimus capitis and cervicis, multifidus, suboccipital muscles [Rectus capitis posterior major and minor, OCI and OCS] and anterior flexor muscles [longus capitis and coli, rectus capitis anterior and lateral]

Identify the muscles based on phenomenology involved in abnormal movements and postures

Identify the muscles based on morphology [USG] and muscle activity [EMG]

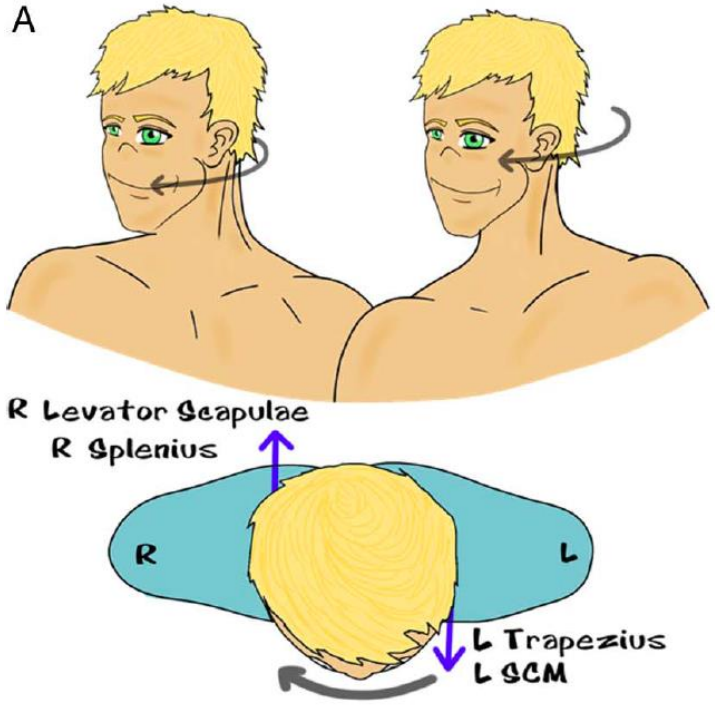
Finalize the muscle

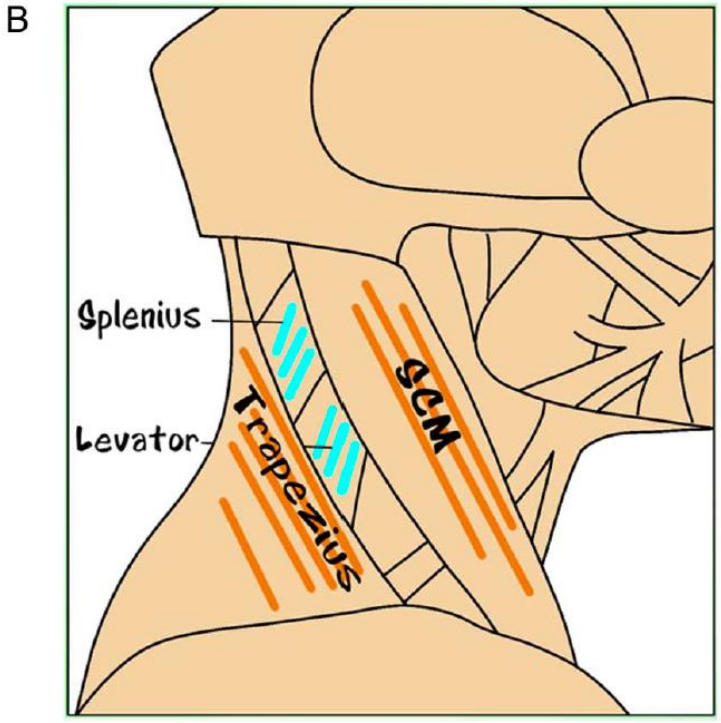
Calculate the doses

Challenges?

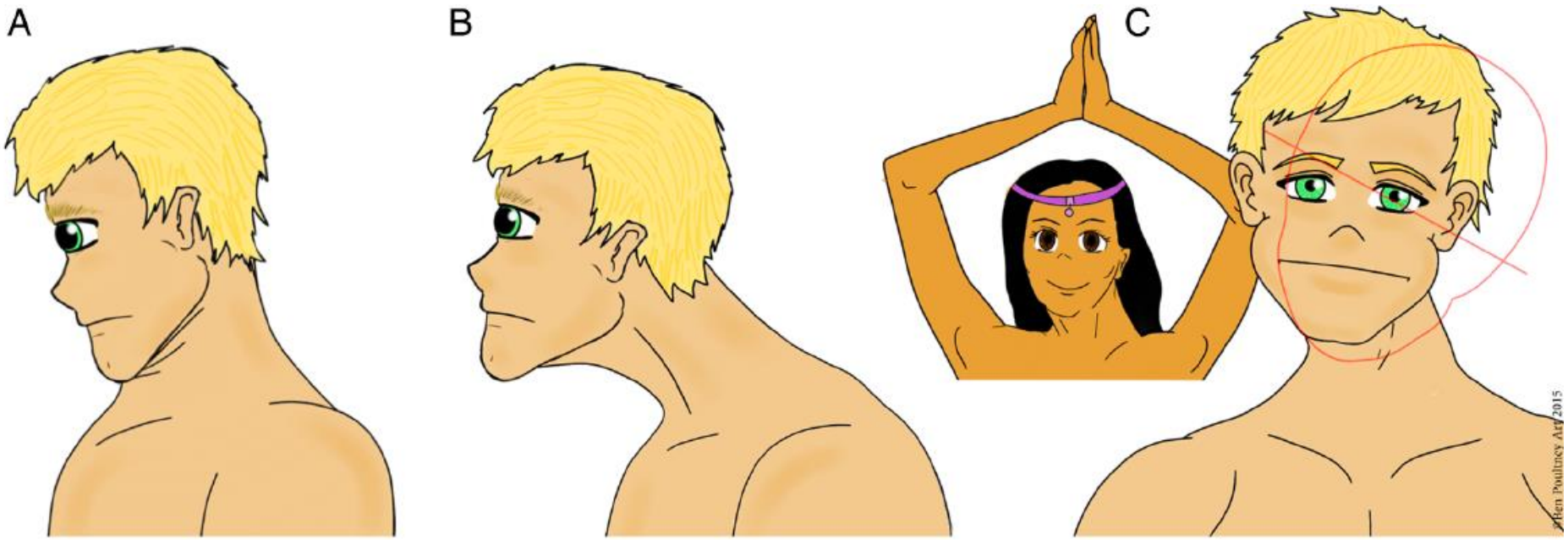
- Shoulder elevation
- Mixed dystonic head posture
- Sagittal and lateral shift
- Changing posture

Shoulder elevation



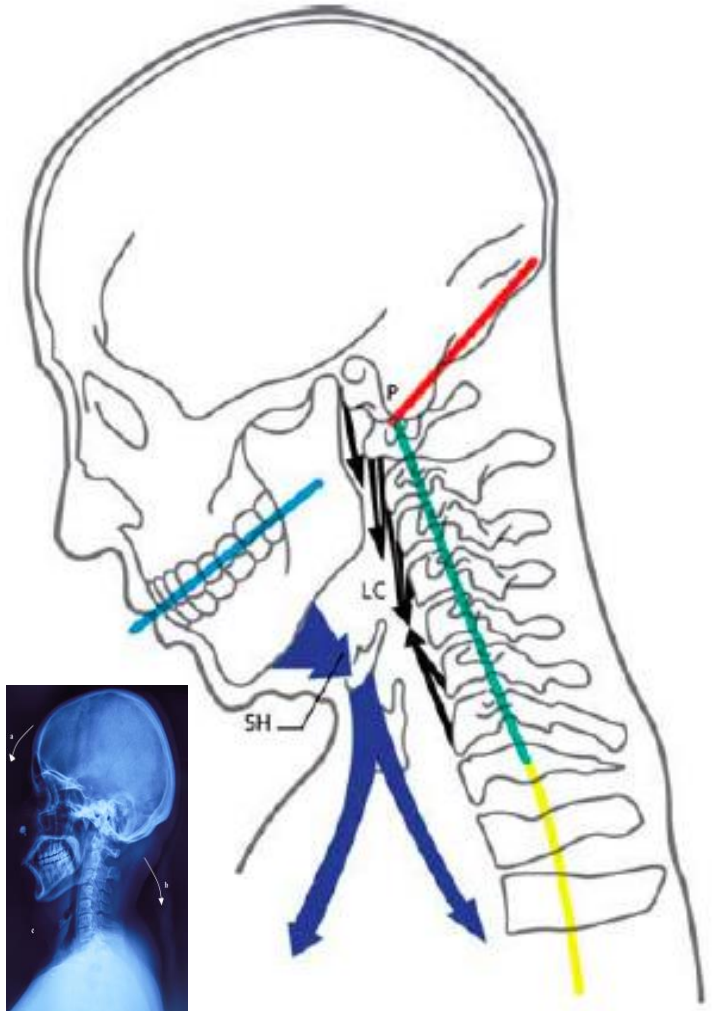


Sagittal and lateral shift

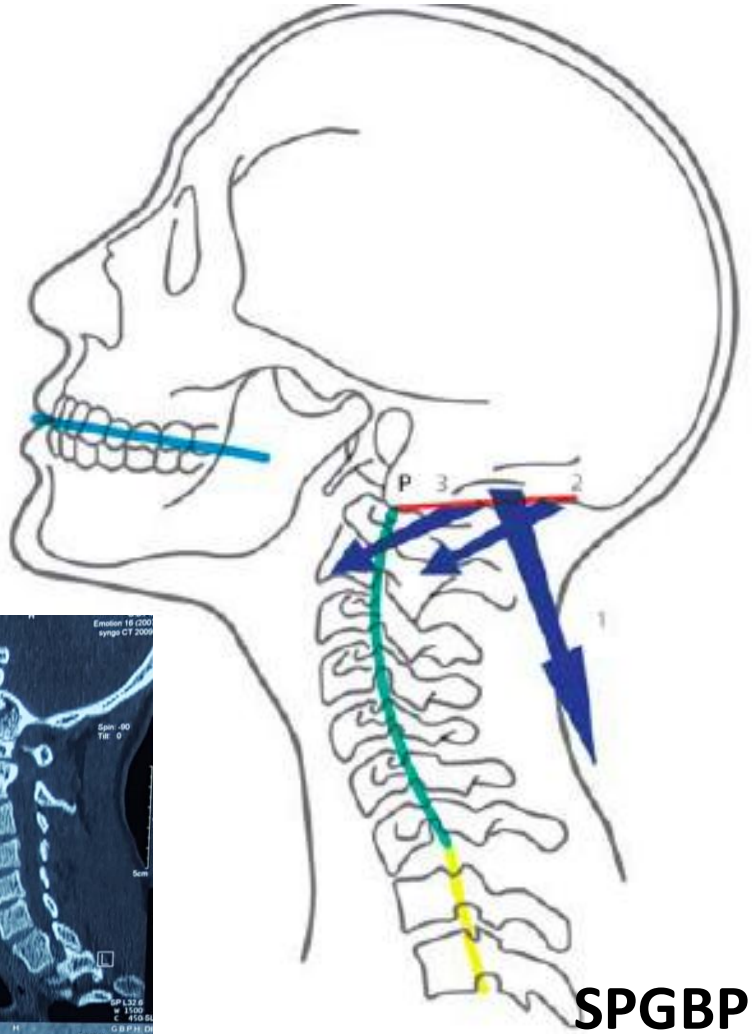


Flower 2011

Posterior sagittal shift: Double chin



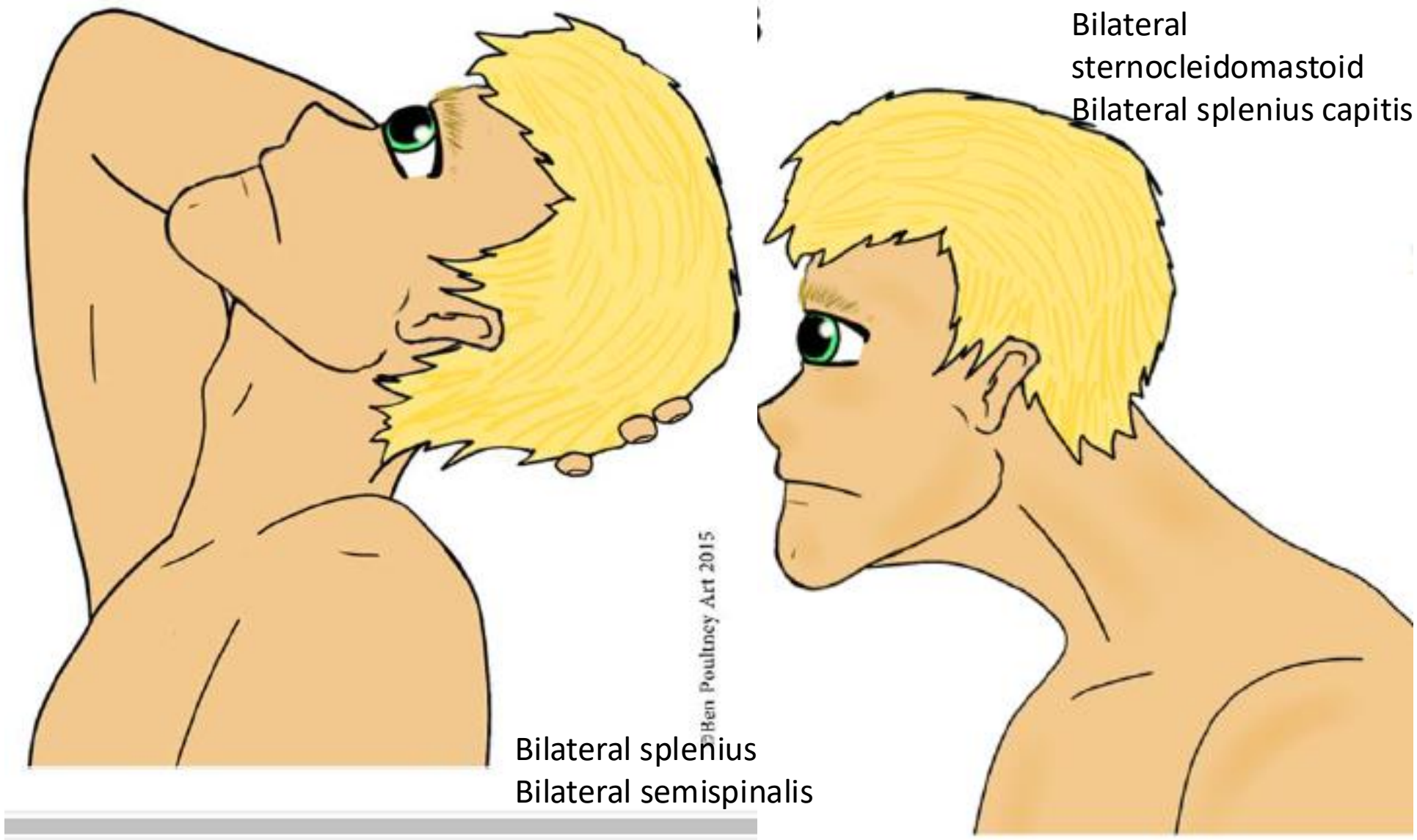
Anterior sagittal shift : Goose neck



SPGBPH

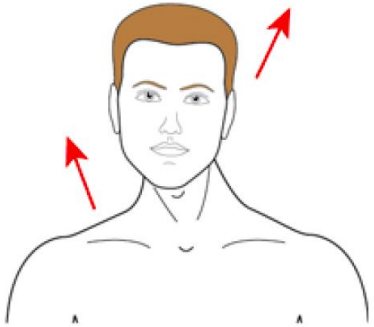
Anterocollis versus Posterior sagittal shift/Double chin

Retrocollis versus anterior sagittal shift/Goose neck

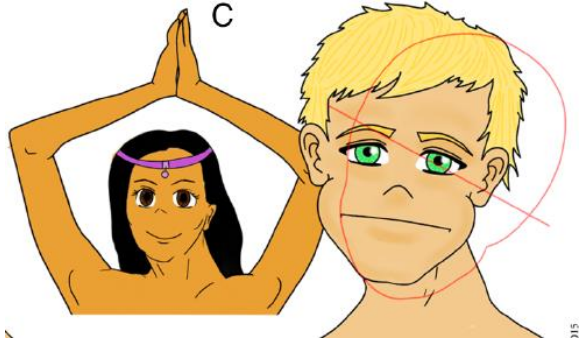


Bilateral splenius
Bilateral semispinalis

Bilateral sternocleidomastoid
Bilateral splenius capitis



Lateral shift



Muscles involved in lateral shift of the head, also known as ‘Bali dancer’s posture’

	Tilt of head to one side	Tilt of the neck to the contralateral side
Head attachment muscles	Ipsilateral sternocleidomastoid Ipsilateral splenius capitis Ipsilateral trapezius Ipsilateral semispinalis capitis	
Cervical spine attachment muscles		Contralateral levator scapulae Contralateral scalenus

Treatment success: Selection of muscles is key

Day of injection

One month after injection

Changing posture

0

1

2

3

Summary

- Inspection and palpation of the cervical region helps in understanding the clinical aspects of cervical dystonia
- COL-CAP is an useful starting point to identify cervical postures
- Knowing the motor phenomenology allows to identify the first group of involved muscles
- For the BTX injection broad groups are: mobile postural, posture predominant, tremor predominant, and jerky/postural
- Although there is a long tradition of using EMG for performing BoNT injections the combined use of EMG and US guidance is a recent practice

Department of Neurology and Stroke Medicine
Amrita Institute of Medical Sciences
Faridabad, Delhi NCR, India

Mark Hallett

Dirk Dressler

Hyder A. Jinnah

Wolfgang Jost

DYSTONIA COALITION

Collis-Caput-Collaboration

Thanks

DEPARTMENT OF BIOTECHNOLOGY
MINISTRY OF SCIENCE & TECHNOLOGY , GOVERNMENT OF INDIA
सत्यमेव जयते