

The Answer is in the Anatomy: How OMM Altered the Course of Recovery from Recurrent Subdural Hemorrhages

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Relevant to the content of this activity, the speakers indicate they have no financial relationships with commercial interest companies to disclose.

Objectives

Review

Review relevant anatomy of the parasympathetic and sympathetic nervous systems.

Identify

Identify anatomy of venous and lymphatic drainage from the head and neck.

Draw

Draw connections between clinical symptoms, somatic dysfunctions, & relevant anatomy.

Identify

Identify how treatment of somatic dysfunctions affected the function of the patient and led to clinical improvement of symptoms.

Outline

- ▶ Initial History and Physical Exam
- ▶ Symptom of **Constipation**
 - ▶ Related OSE (Osteopathic Structural Exam) findings
 - ▶ Applied Anatomy
- ▶ Symptom of **Restlessness**
 - ▶ Related OSE findings
 - ▶ Applied Anatomy
- ▶ Symptoms of **Dysarthria & Behavior change**
 - ▶ Related OSE findings
 - ▶ Applied Anatomy

HPI

- ▶ Male > 50 years old
- ▶ Cc: restlessness (tossing, turning, waking and physically getting up at night) following multiple subdural hematomas after repeated falls
- ▶ 1st fall hit left forehead on concrete
 - ▶ initial CT head negative
 - ▶ Word finding difficulty (Anomic dysphasia), right leg weakness, difficulty speaking in sentences (expressive dysphasia)
 - ▶ Repeat CT 3 weeks later showed new and old subdural bleed
 - ▶ 2 intracranial surgeries to stop bleeding
 - ▶ 1 month ICU, then hospital floor and rehab for total 2.5 months

HPI

- 2nd fall
 - 4 months after first fall
 - Fell out of bed and hit back of head on carpeted floor
 - CT showed more subdural bleeding, in light of being on anticoagulants
 - No Surgery, given plasma
 - Hospital 2 weeks, then skilled nursing facility with rehab, then home PT, OT, and ST

- First office visit 7 months after 1st fall, 3 months after 2nd fall

HPI

- Function
 - LE weakness, UE strong
 - Able to groom self, use bathroom, dress himself, help with bathing
 - Cognition and speech: understands most things, difficulty focusing, speech slow, difficulty forming sentences
 - Memory: difficulty identifying family members, address
 - Difficulty with swallowing (dysphagia)
 - + constipation, no incontinence

HPI

- ▶ Restlessness
 - ▶ Started after 1st fall, worse after 2nd fall
 - ▶ Getting out of bed “dozens” (multiple an hour) of times 3-4 nights a week
 - ▶ Increased fall risk given nighttime darkness, sleepiness, etc
 - ▶ Attendant that watches him at night

Physical Exam: key findings

- Gen: chronically ill appearing, ambulation with walker
- Psychiatric: poor insight, flat affect, confused, unable to articulate history/dysarthria, recent and remote memory abnormal
- MSK: bilat hip flexion weakness (4/5), bilat knee flexion weakness (4/5), ankle dorsiflexion weakness right (4/5) and left (3/5), great toe extension weakness right (4/5) and left (3/5)
- Neuro: shuffling gait, asymmetric left smile (CN VII)

MRI MRA Head w/wo Contrast

completed ~1 month after 1st fall & post craniotomy
6 mos prior to first office visit

MRA brain

80 % stenosis of right posterior cerebral artery

mild medial displacement left middle cerebral artery branches 2/2 LEFT subdural hemorrhage

MRI Brain

-**Large left frontal parietal craniotomy**

-**LEFT SUBDURAL hemorrhage** 6 mm thickness deep to craniotomy over **L temporal pole**

-Simple **subdural fluid** & pneumocephalus (air or gas within the cranial cavity)over **bilateral frontal poles**

-2 mm L to R subfalcine shift at the level of the lateral ventricles

-**Subdural hemorrhage** over **R occipital pole**

-Petechial hemorrhage at L sylvian fissure

- small foci **diffusion restriction left middle frontal gyrus** and left **parietal** cortex, lateral aspect left superior **temporal** gyrus and left **frontal** lobe. No diffusion restriction or acute infarct of the right cerebral hemisphere, brainstem or cerebellum

-Areas of **abnormal signal/subacute infarcts** with brain edema **left frontal** and **parietal lobes**, small focus **lateral left temporal lobe**.

CT brain without contrast

4 mos after 1st fall

<1 mo after 2nd fall

2 months prior to 1st office visit

- ▶ small **right frontal subdural fluid collection**, likely chronic subdural hematoma with tiny foci of new or blood product
- ▶ stable postsurgical changes of **left frontoparietal temporal craniotomy** with stable **underlying dural thickening**
- ▶ old infarct of left frontal lobe

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Constipation

1

Treatment 2:

BM every other day
at best, hard

2

Treatment 4:

Rec stop Metamucil
and only take a
stool softener, BM
are now daily

3

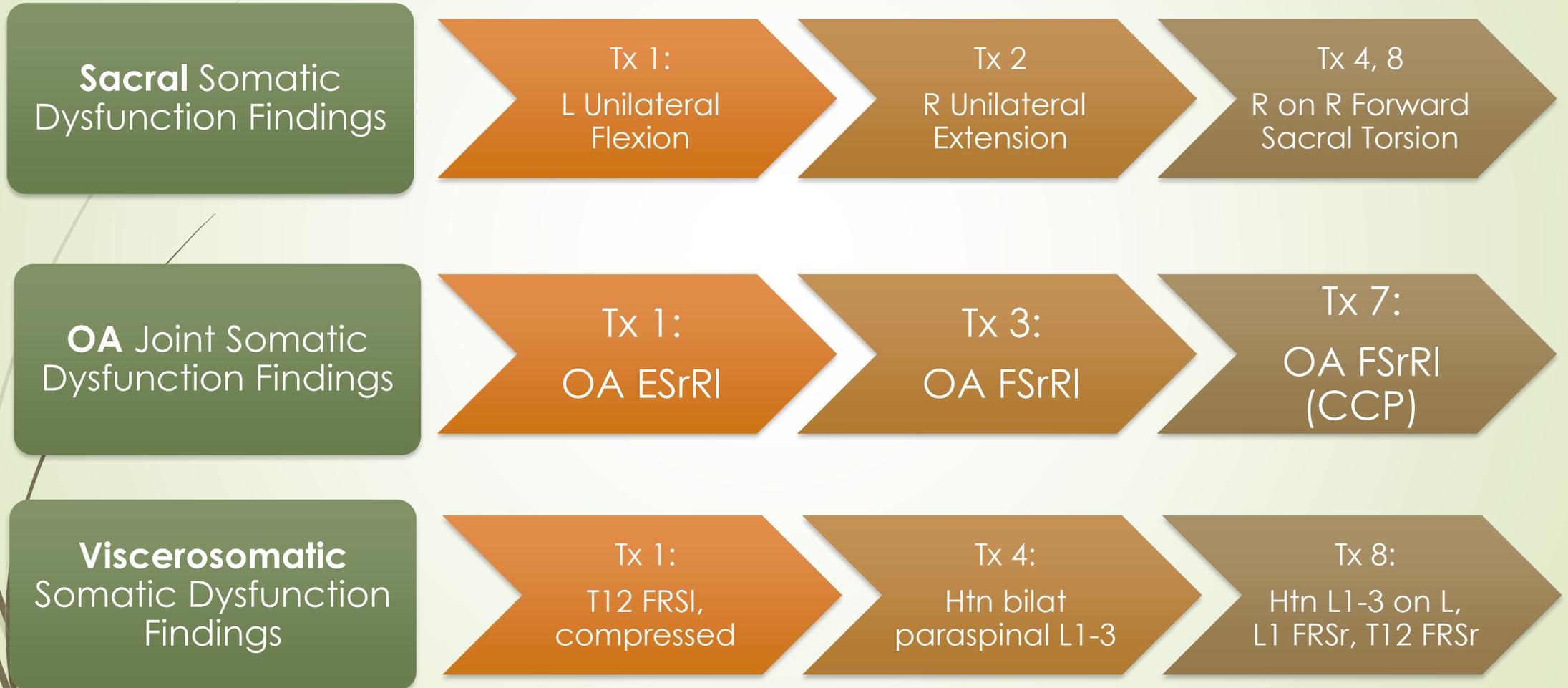
Treatment 9:

BM continued to be
daily only a stool
softener

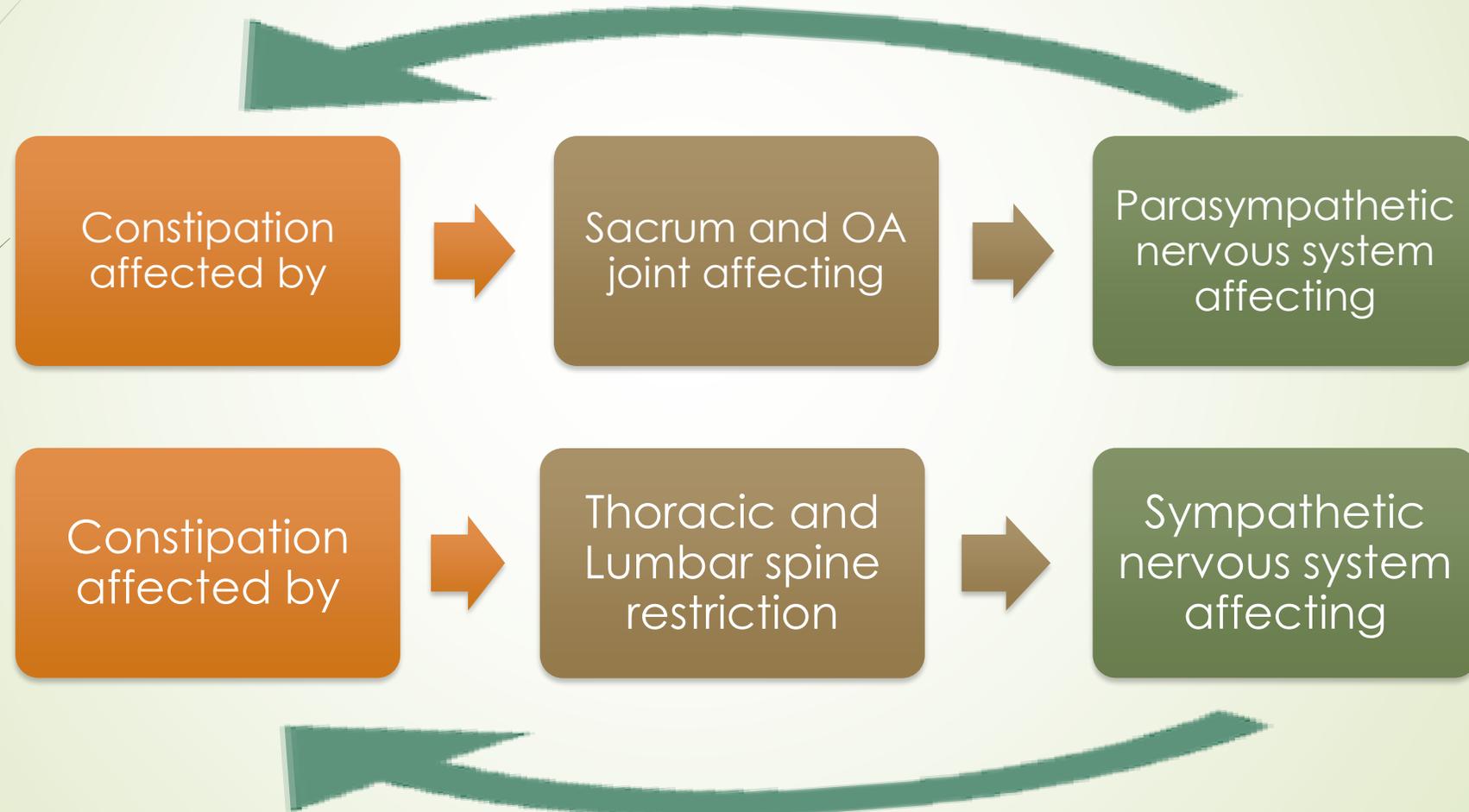
Constipation: OSE (Osteopathic Structural Exam) findings

- Sacral patterns
- OA (Occipito-atlantal) Joint restriction and condylar compression
- Thoracic & Lumbar spine

Constipation: related OSE findings



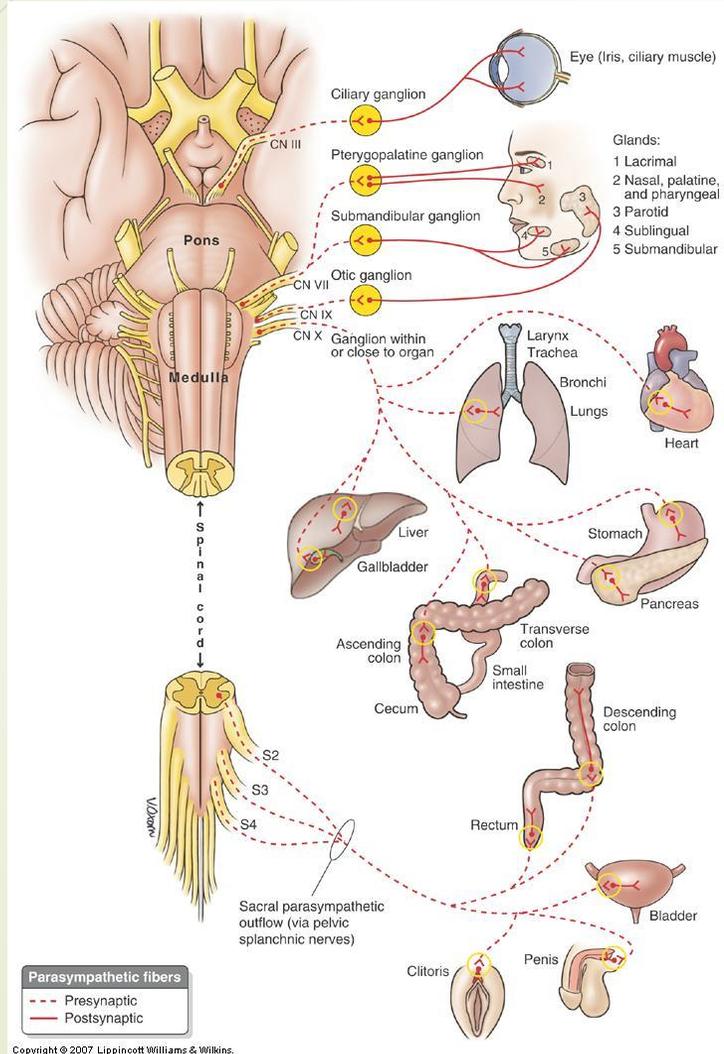
Drawing connections



Anatomy of Parasympathetic and Sympathetic Nervous System & Constipation

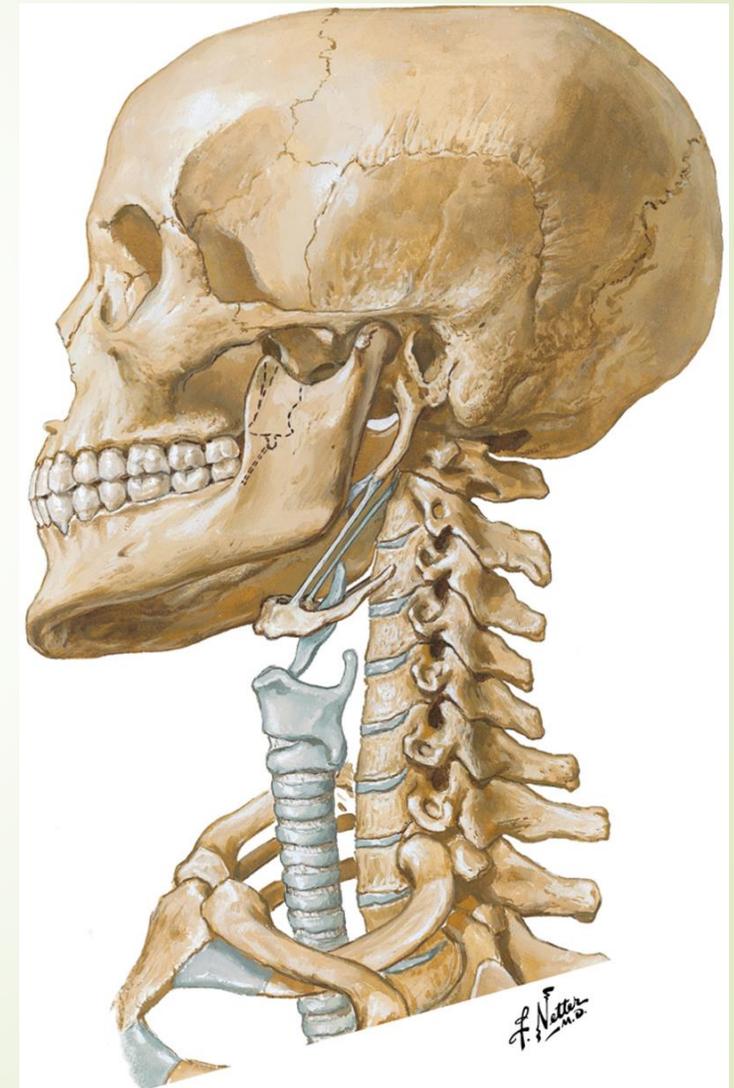
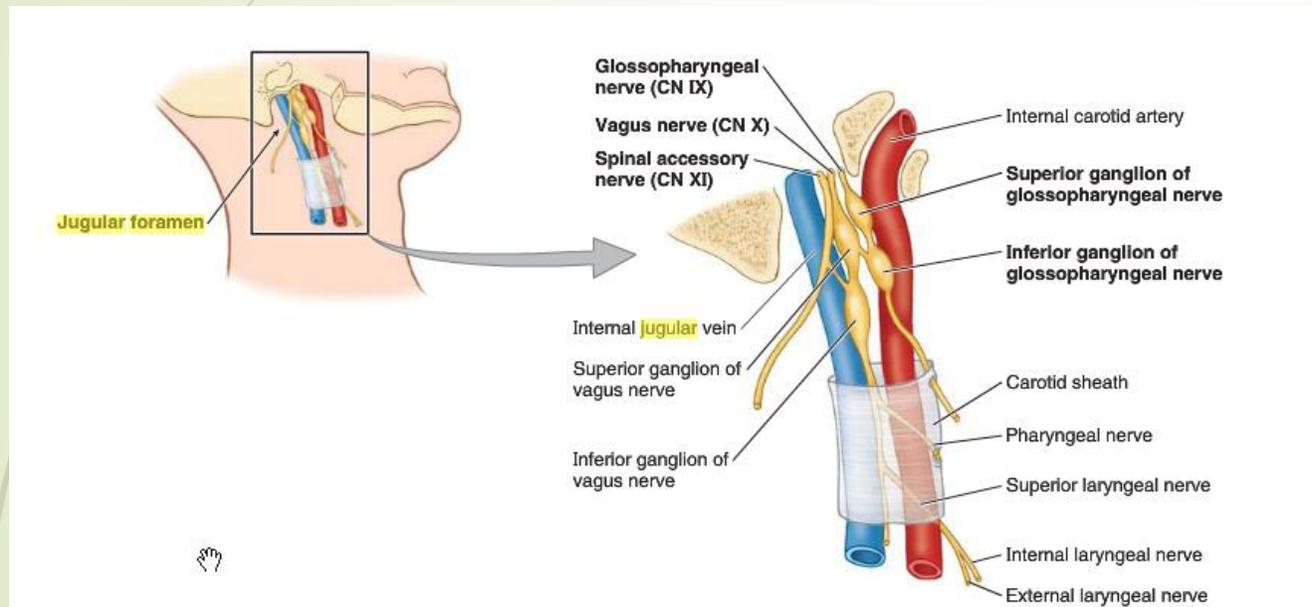
- ▶ Parasympathetics, Craniosacral outflow
 - ▶ What cranial nerves involved with patient symptom?
 - ▶ What spinal nerves involved with patient symptom?
- ▶ Sympathetics, Thoracolumbar outflow
 - ▶ Key finding, hypertonicity in paraspinal muscles L1-L3, how would this affect sympathetics.

Anatomy of Parasympathetic and Sympathetic Nervous System & Constipation: Parasympathetics

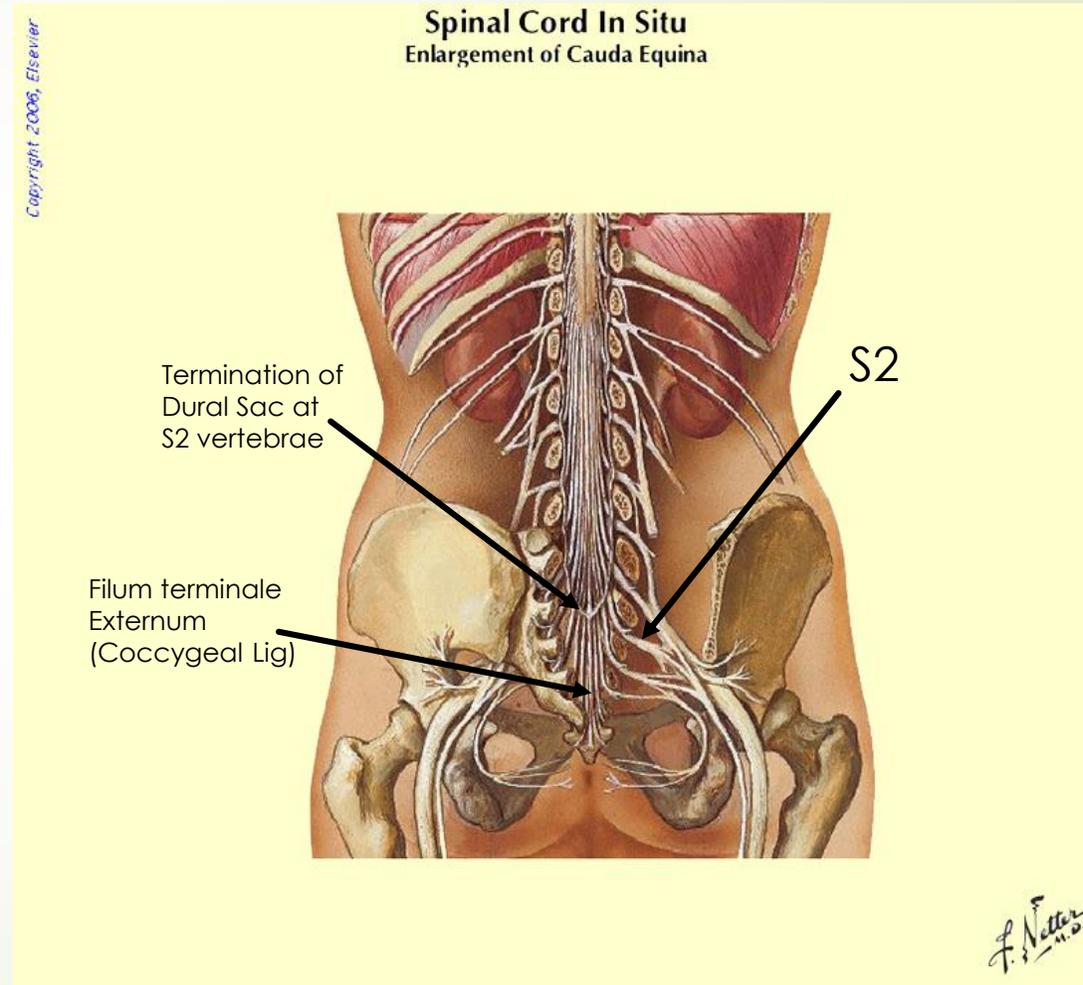
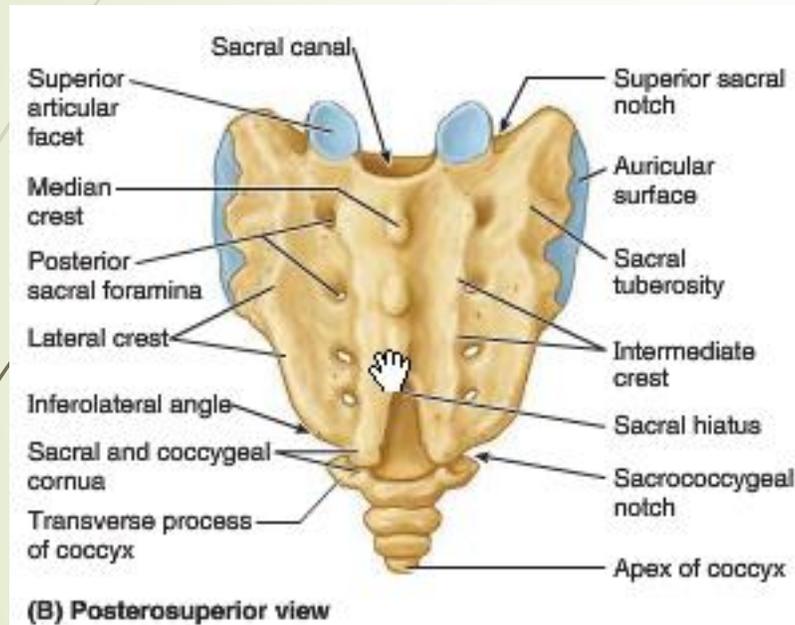


- OA extended, sidebent right, and rotated left
- Pressure on jugular foramen, CN X; Vagus; been a chronic condition, what was the timeframe. See inhibition of Vagus
- Sacral findings, Sacral restriction affect S2, 3, 4 levels carrying parasympathetics, inhibitory?
 - How do parasympathetics affect constipation?

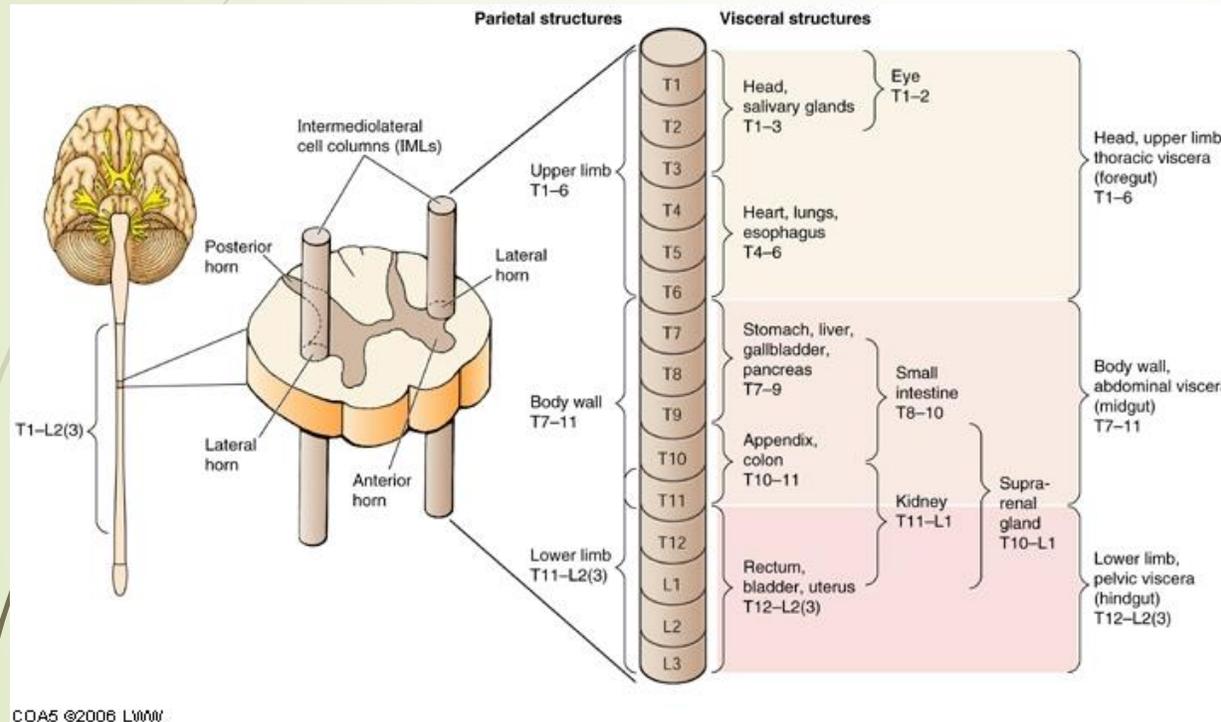
Anatomy of Parasympathetic and Sympathetic Nervous System & Constipation: Parasympathetics, Vagus at OA junction



Anatomy of Parasympathetic and Sympathetic Nervous System & Constipation: Parasympathetics at Sacrum (S2, 3, 4)



Anatomy of Parasympathetic and Sympathetic Nervous System & Constipation: Sympathetics-Thoracolumbar



- Key finding, Constipation and Paraspinal hypertonicity between L1-L3, also T5-9.
- Symptoms may be driving sympathetics! What organs are innervated by these levels?
- Action of the internal anal sphincter, which system contracts it? Sympathetics or Parasympathetics.

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- ▶ Symptoms of **Dysarthria & Behavior change**
 - ▶ Related OSE findings
 - ▶ Applied Anatomy

Restlessness

1

Initial visit:

Wakes up from sleep dozens of times, at least 4 nights per week. Has attendant that watches him sleep.

2

Treatment 3: sleeping well 4 nights a week

Treatment 4: Waking up 1 time per night, sleep is more restful.

3

Treatment 7:

Slept most of the night for the last two weeks, thinking they will no longer need the sitter at night

4

Treatment 9:

No longer needs sitter, wife sleeping in same bed as him again.

Restlessness: OSE findings

- ▶ OA restriction
- ▶ Condylar compression
- ▶ Inlet restriction/scalene, SCM

Restlessness: related OSE findings

OA Joint Somatic Dysfunction Findings

Tx 1:
OA ESrRI

Tx 3:
OA FSrRI

Tx 7:
OA FSrRI

Condylar Somatic Dysfunction Findings

Tx 1:
Right Condylar Compression

Tx 4
Right Condylar Compression

Tx 5-9
No notable dysfunction

Thoracic Inlet Somatic Dysfunction Findings

Tx 1:
T1RSr,
Compressed

Tx 3,4, 5
Right 1st rib elevated, tight
SCM R & scalene b/l

Tx 8
T1FRSI

25

Drawing connections

Restlessness affected by:

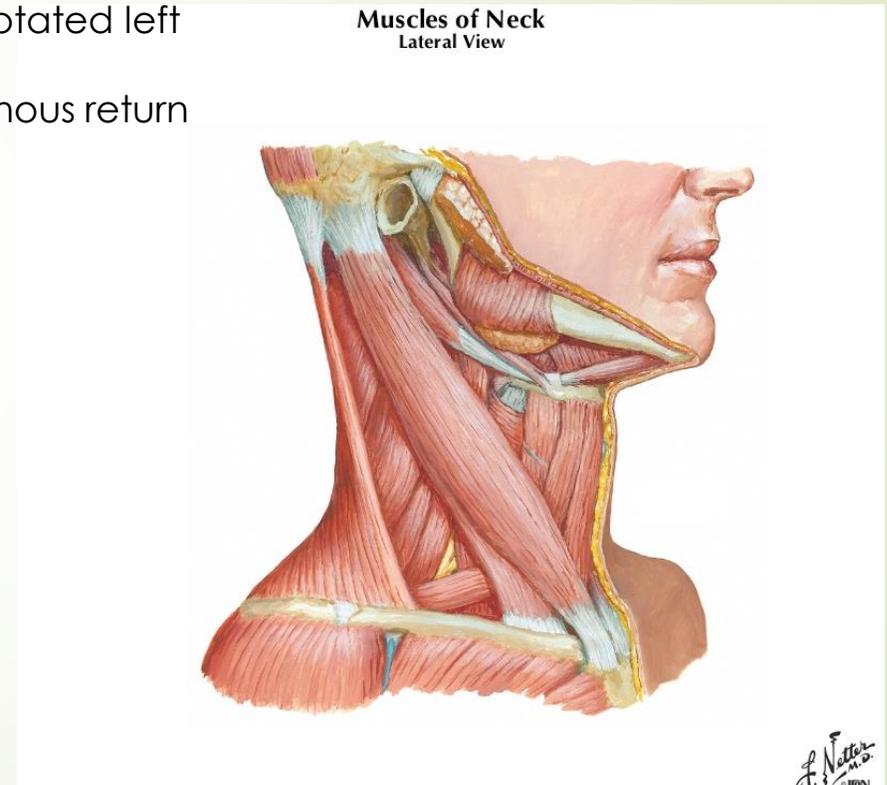
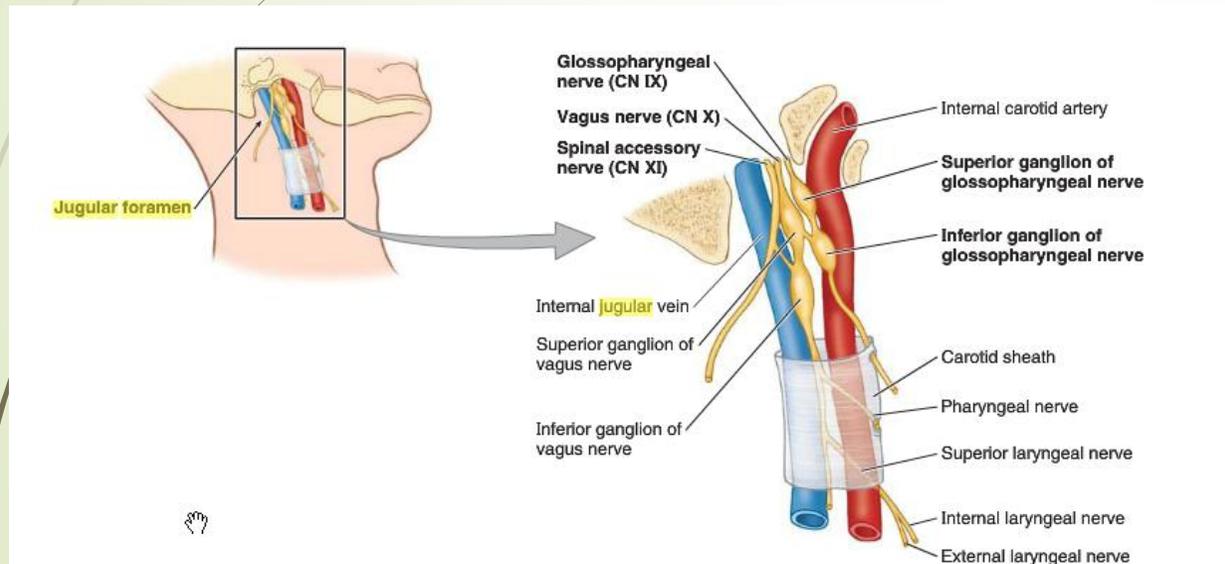
OA joint affecting
Parasympathetic
nervous system

Inlet restriction
impeding
venous and
lymphatic
drainage from
the head



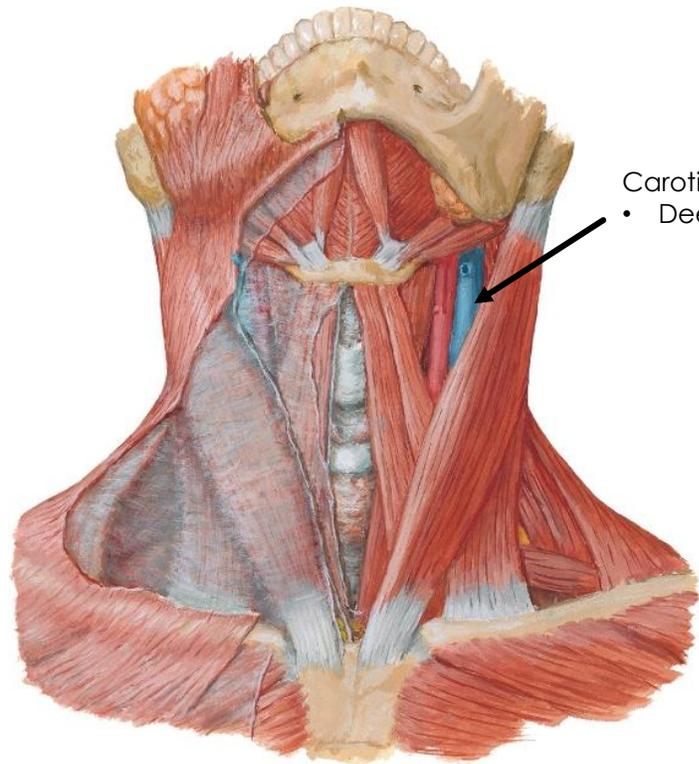
Anatomy of Autonomic Nervous System & Restlessness

- Sympathetic Overdrive due to chronic subdural hemorrhage
- Key finding is at OA Junction and Compression; Sidebent right, rotated left
- Jugular Foramen
 - Dural venous sinuses and internal jugular vein-restricting venous return
 - Compression on Vagus



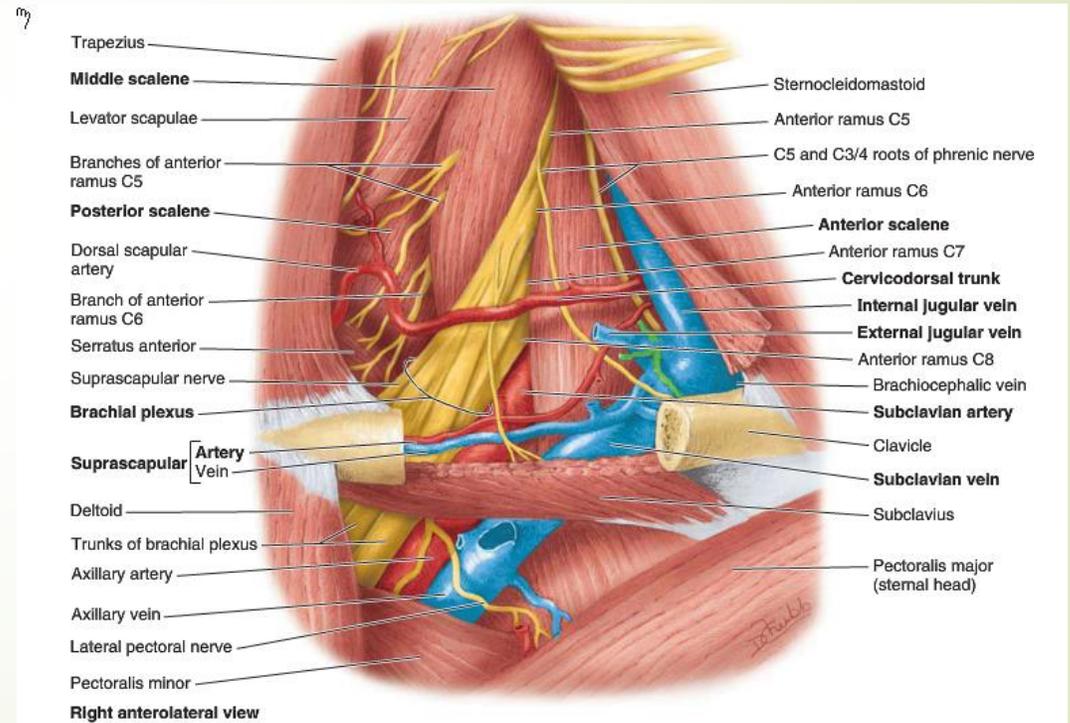
Anatomy of Venous and Lymphatic drainage from the head & Restlessness: Thoracic Inlet Restriction

Muscles of Neck: Anterior View

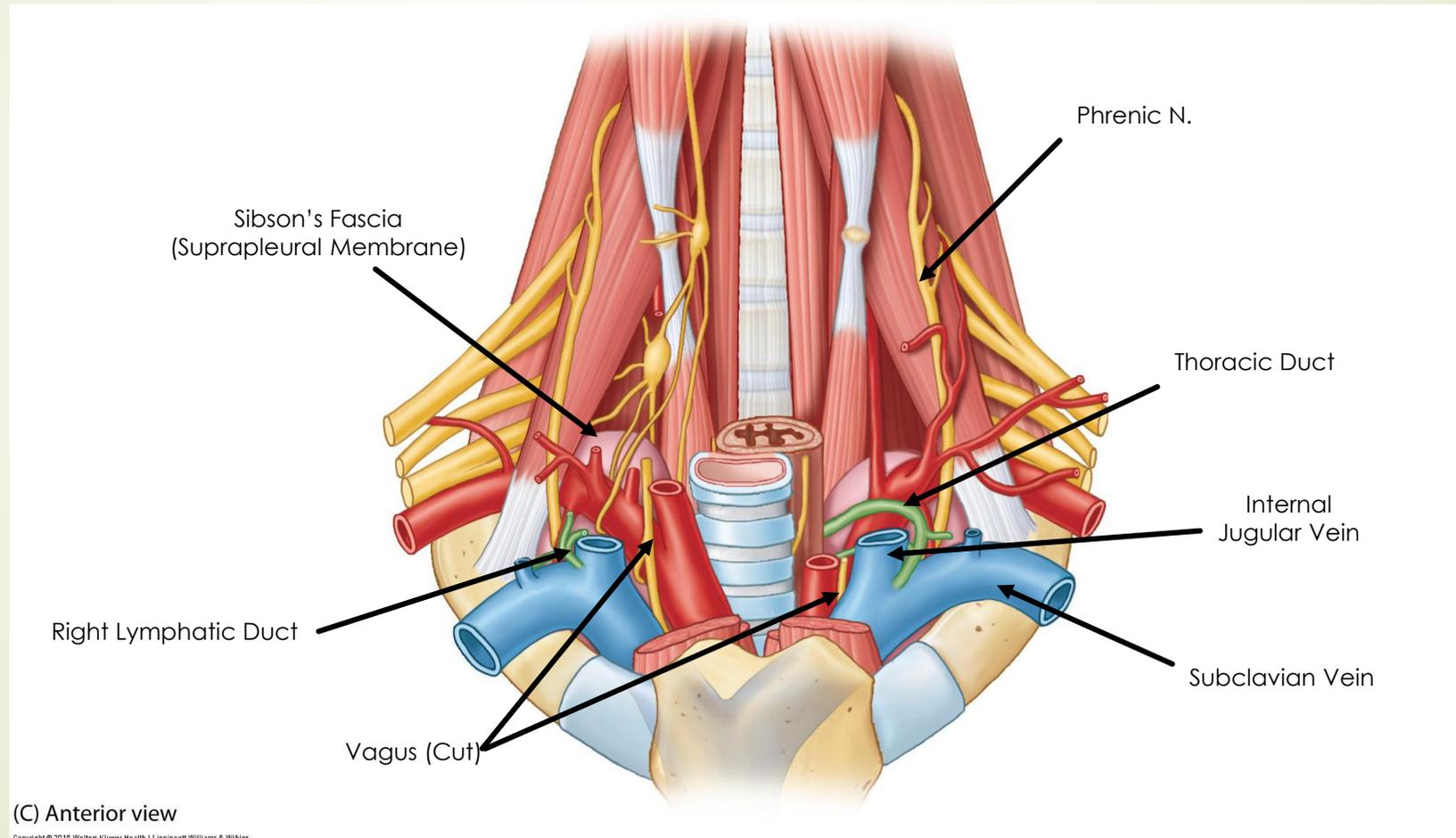


Carotid Sheath
 • Deep to SCM

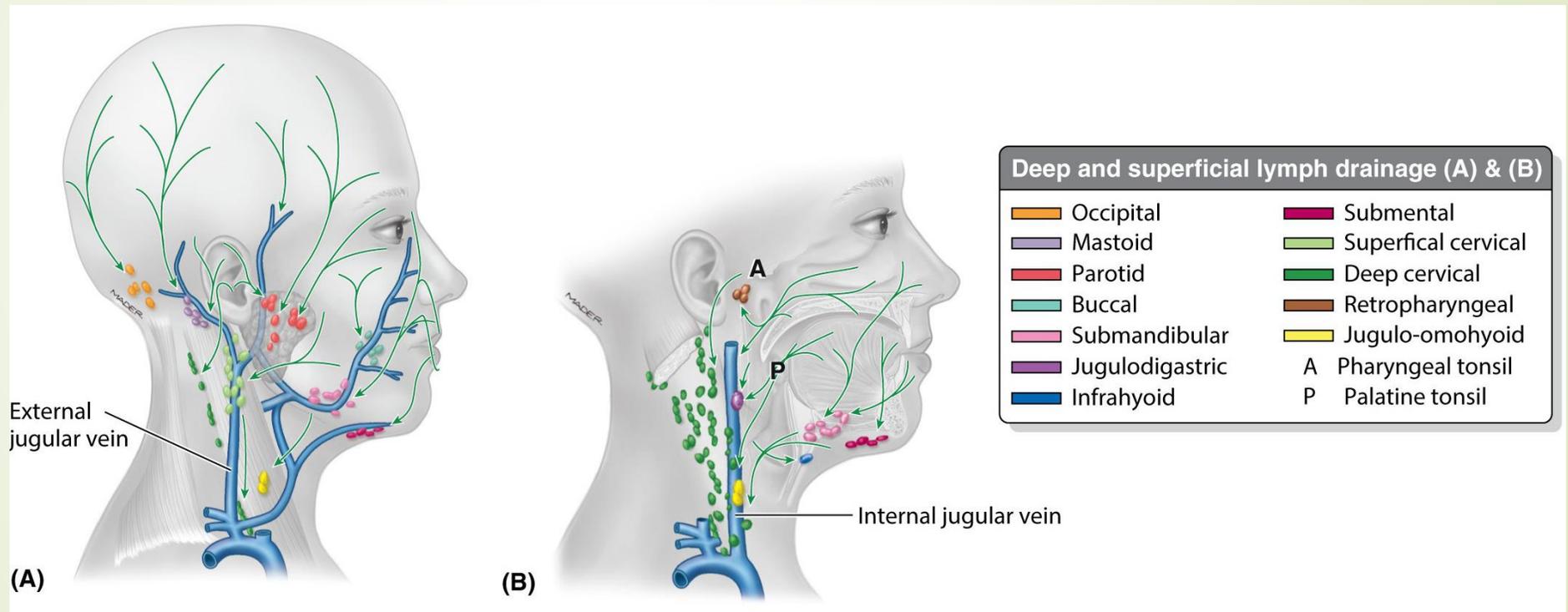
F. Netter M.D. © 1987



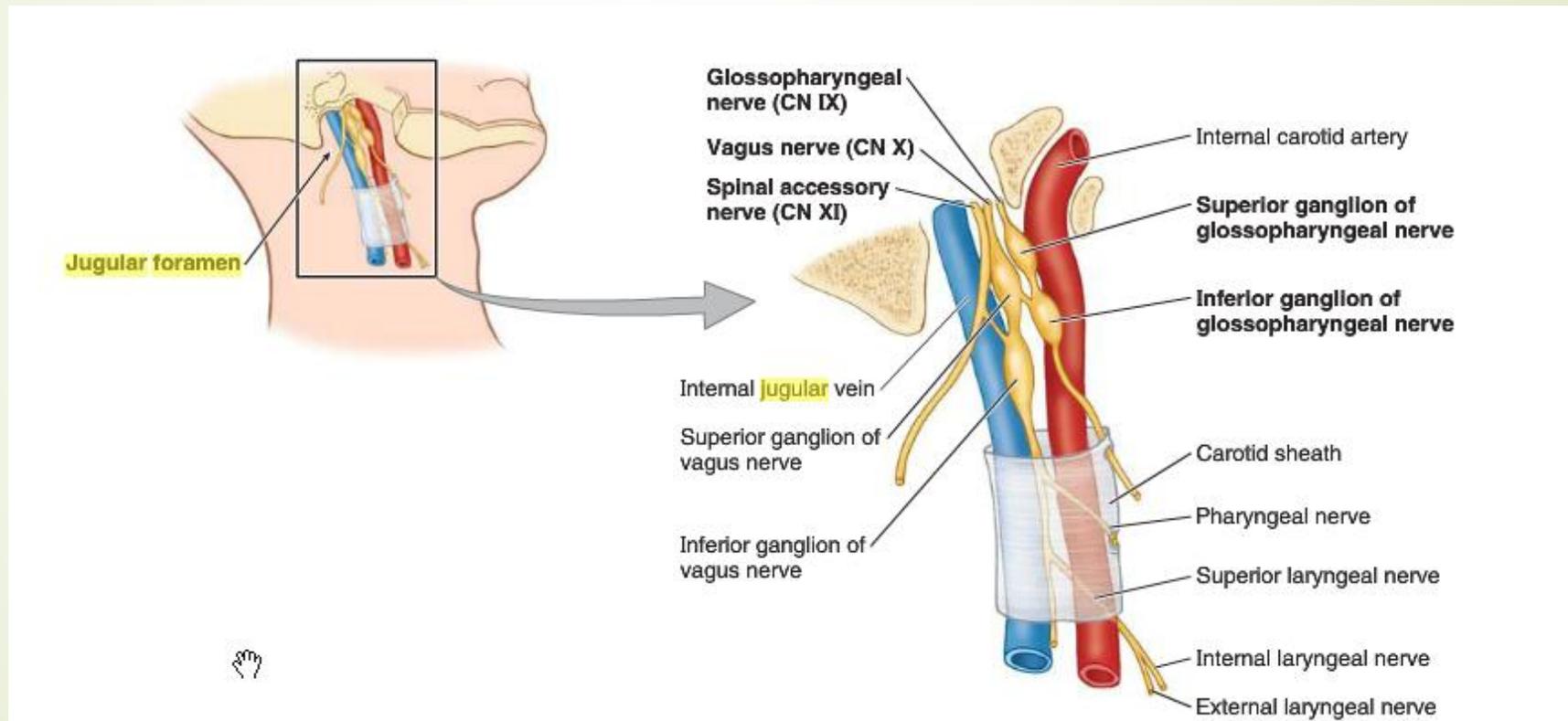
Anatomy of Venous and Lymphatic drainage from the head & Restlessness: Thoracic Inlet Restriction



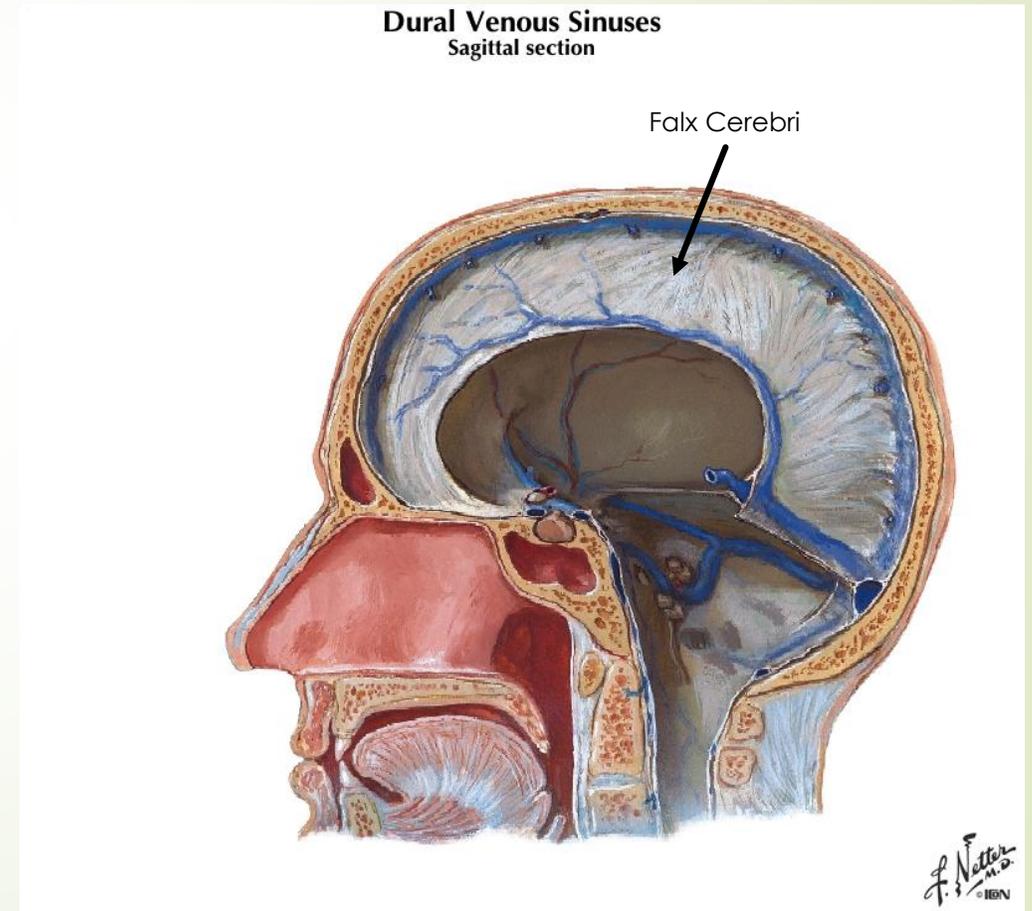
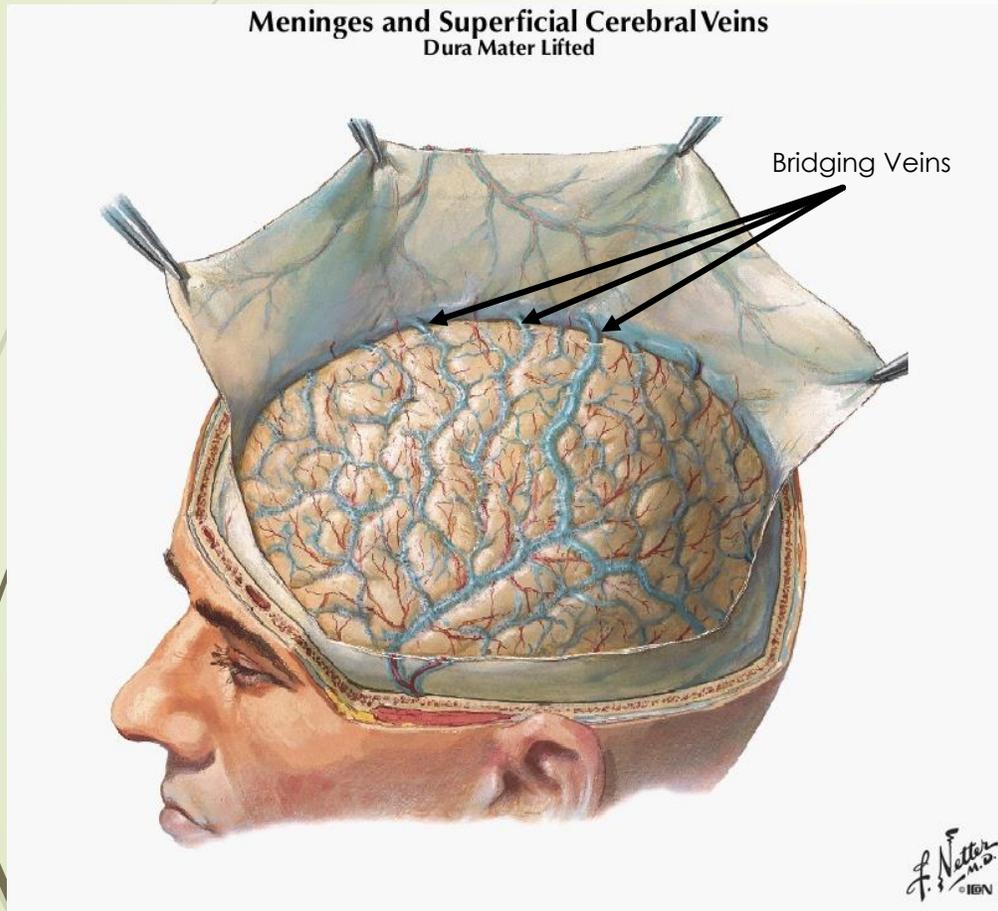
Anatomy of Venous and Lymphatic drainage from the head & Restlessness



Anatomy of Venous and Lymphatic drainage from the head & Restlessness

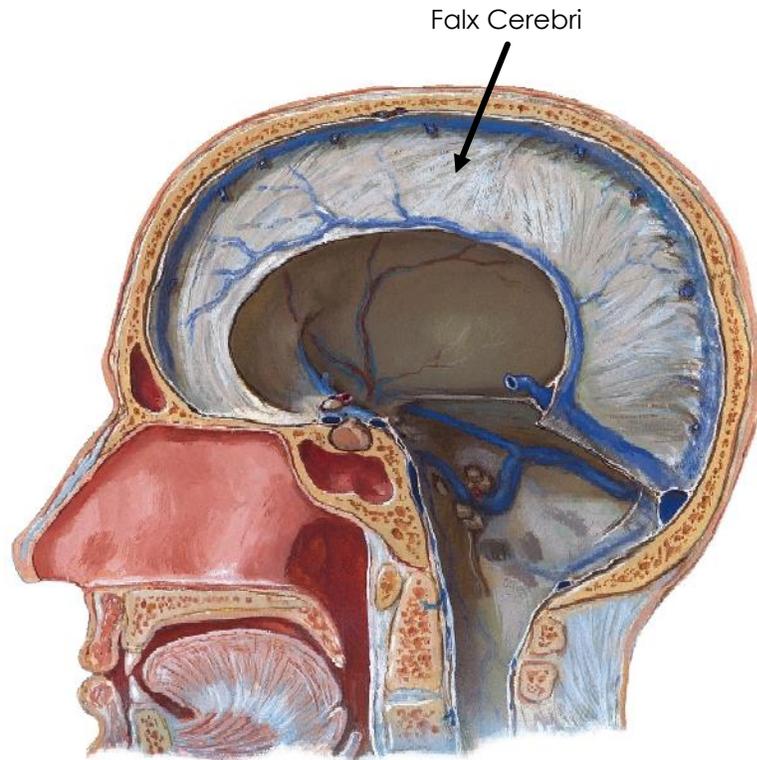


Anatomy of Venous and Lymphatic drainage from the head & Restlessness: Dural Venous Sinuses and Bridging Veins



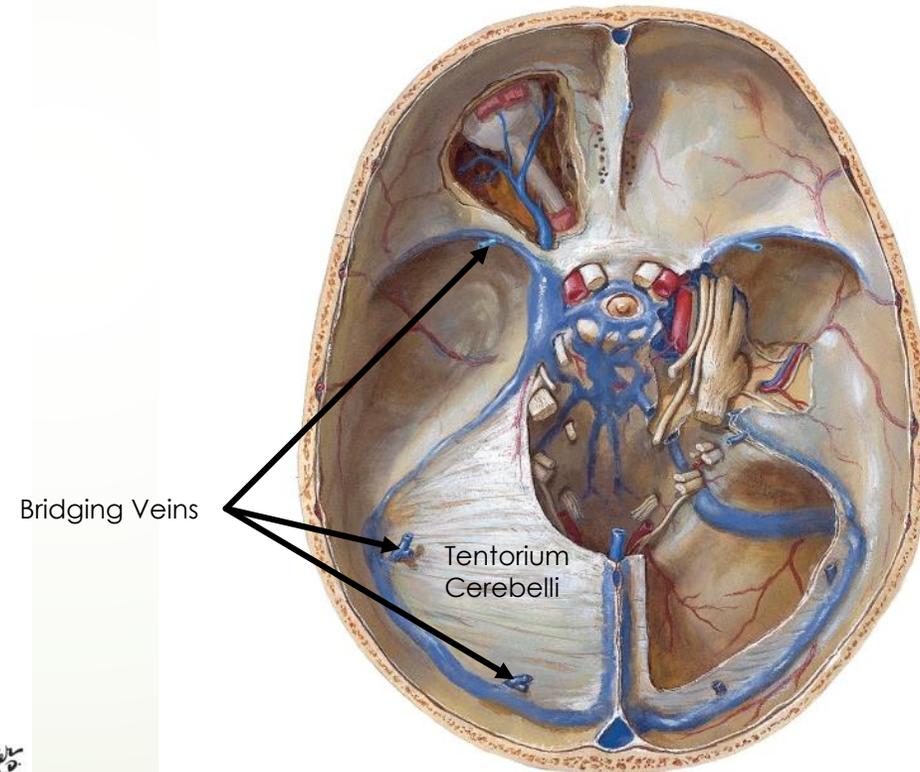
Anatomy of Venous and Lymphatic drainage from the head & Restlessness- Dural Venous Sinuses and Bridging Veins

Dural Venous Sinuses
Sagittal section



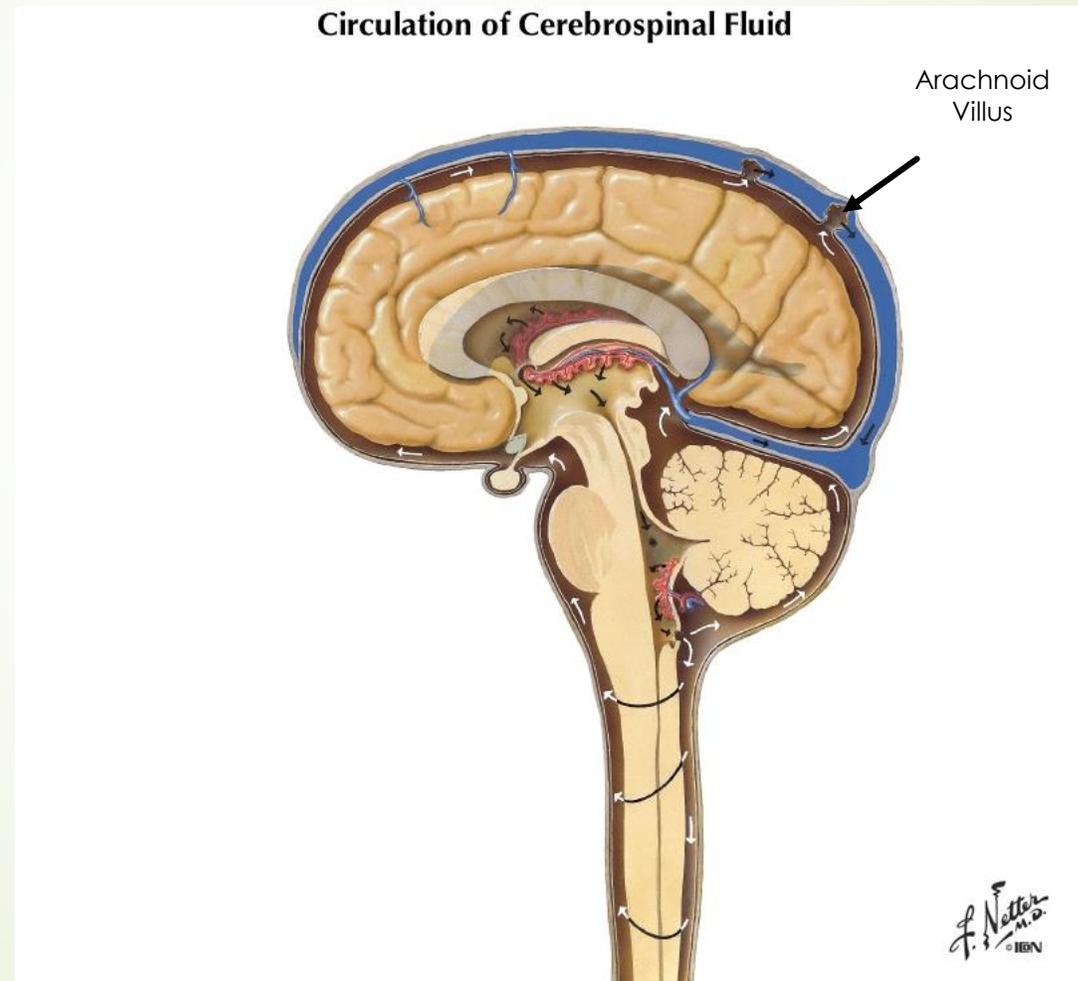
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Dural Venous Sinuses
Cranial Floor - Superior View



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Anatomy of Venous and Lymphatic drainage from the head & Restlessness- CSF circulation reabsorbed into Venous System



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Dysarthria & Behavior

1

Initial Visit:

Patient unable to articulate history (obtained from wife), has issues identifying family members, does not know address. Dysarthria, mumbles. Understands most words.

2

Treatments 3, 4:

Wife notes less mumbling. Patient is able to give history, wife notes that his old self is starting to come back. Writes his name legibly. Less flat affect

3

Treatment 9:

Returning to social engagements (going to church, watching football with friends and family), and engaging as normal self

Dysarthria & Behavior: OSE findings

- OA restriction
- Condylar compression
- Bilat Tentorium Cerebelli restriction

Dysarthria & Behavior: related OSE findings

OA Joint Somatic Dysfunction Findings

Tx 1:
OA ESrRI

Tx 3:
OA FSrRI

Tx 7:
OA FSrRI

Condylar Somatic Dysfunction Findings

Tx 1:
Right Condylar Compression

Tx 4:
Right Condylar Compression

Tx 5-9:
No notable dysfunction

Tentorium Cerebelli Somatic Dysfunction Findings

Tx 1:
Dural strain bilat tent

Tx 4:
Dural strain with inferior pull

Tx 5:
Less dural strain, right tent restricted

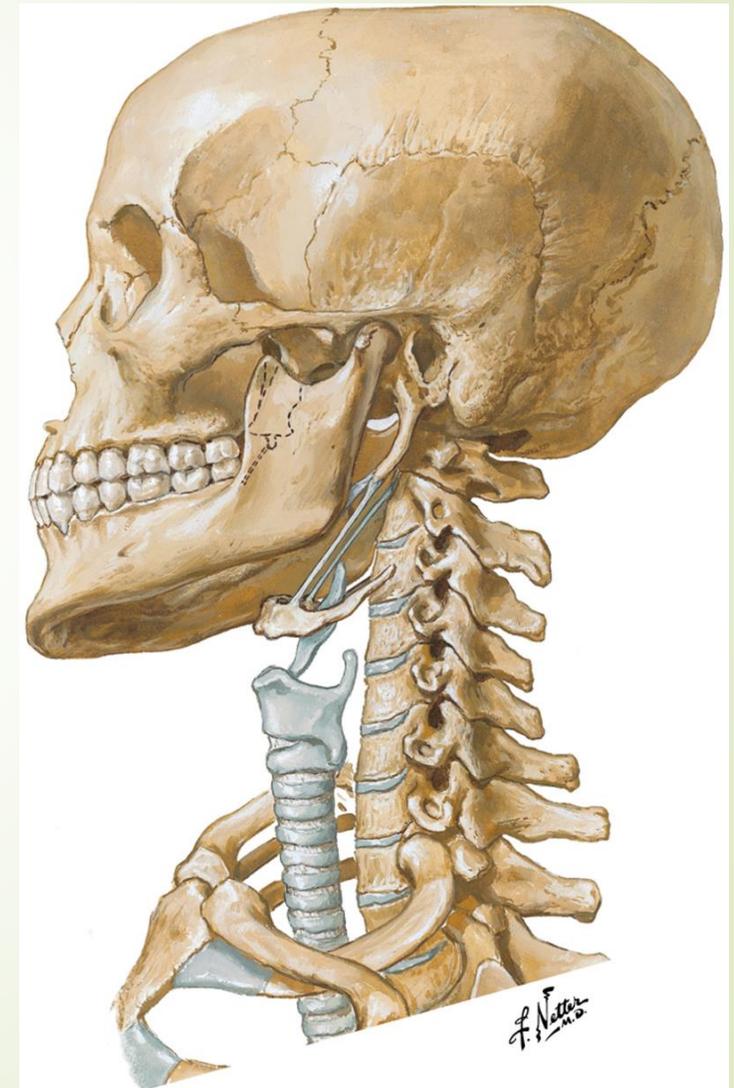
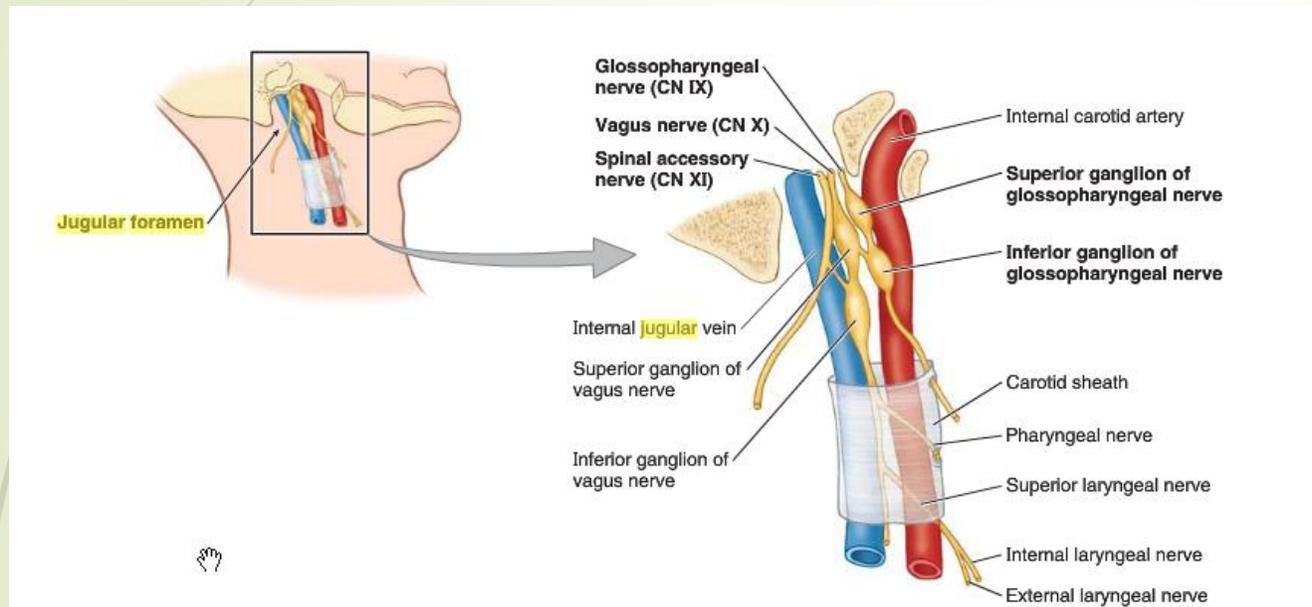
Drawing connections

Dysarthria and behavior affected by:

OA joint restriction affecting jugular foramen,
CN IX, X, XII (hypoglossal foramen)

Tentorium cerebelli restriction impeding venous
drainage from the brain. Decreased venous
drainage=congestion=decreased perfusion of
arterial blood to brain

Anatomy of OA restriction effects on jugular foramen, CN IX, X, XII (hypoglossal foramen) & Speech



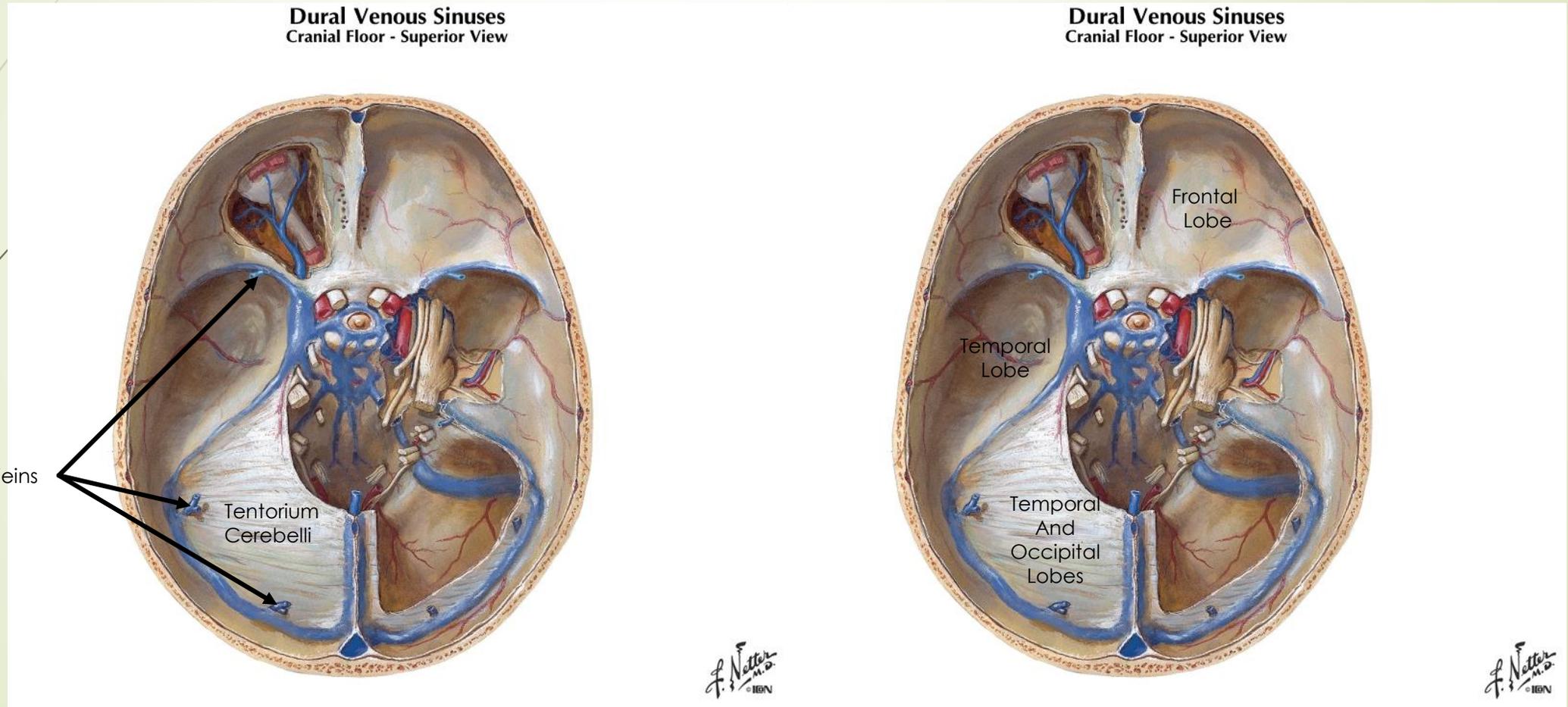
- Reduced congestion at jugular foramen, improve function CNs

Anatomy of tentorium cerebelli & speech/behavior

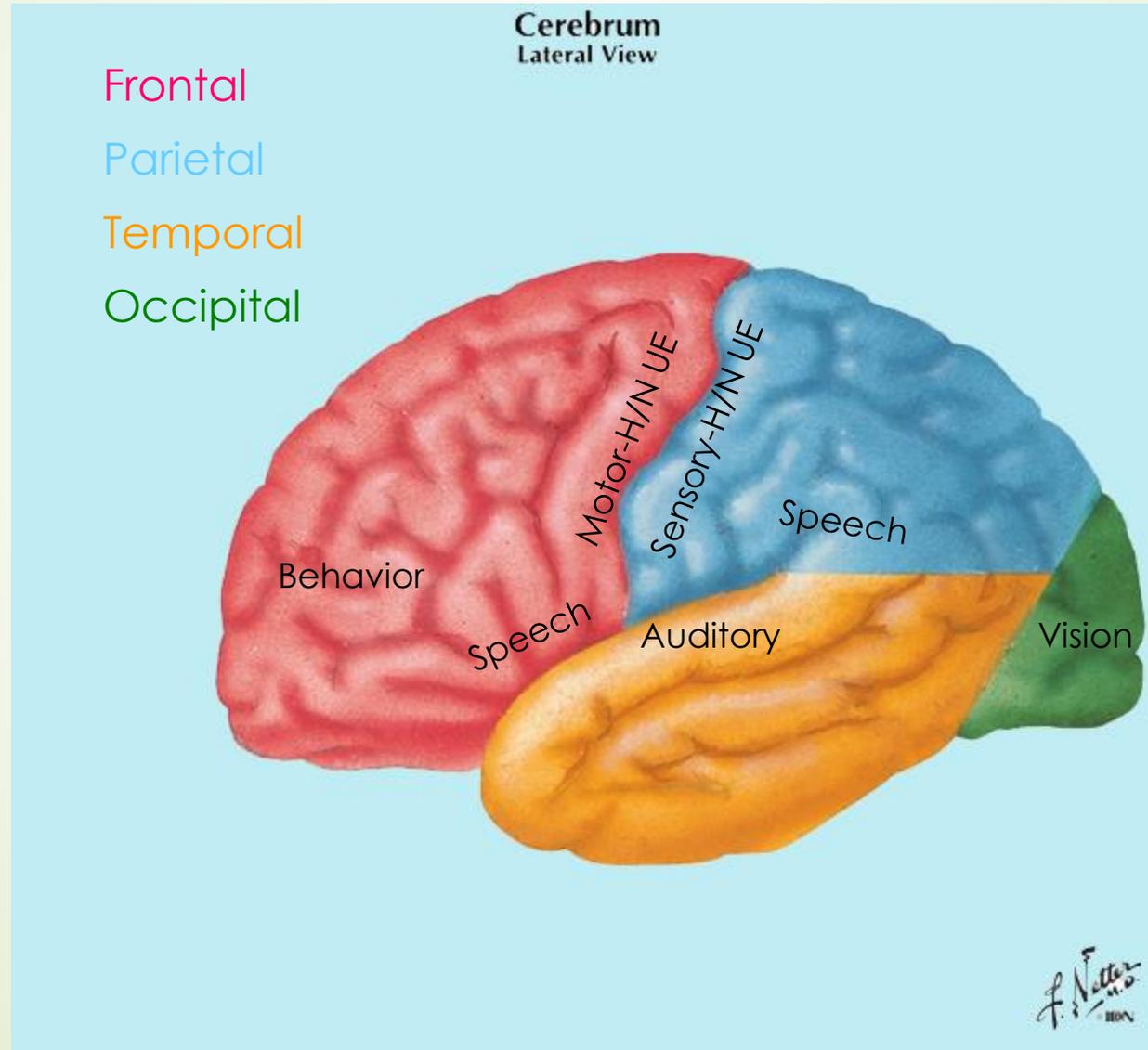
- ▶ Tent restriction impacts venous sinus drainage from the brain
- ▶ Venous congestion affects dysarthria and behavior through
- ▶ Decreased venous drainage=congestion=decreased perfusion of arterial blood to brain



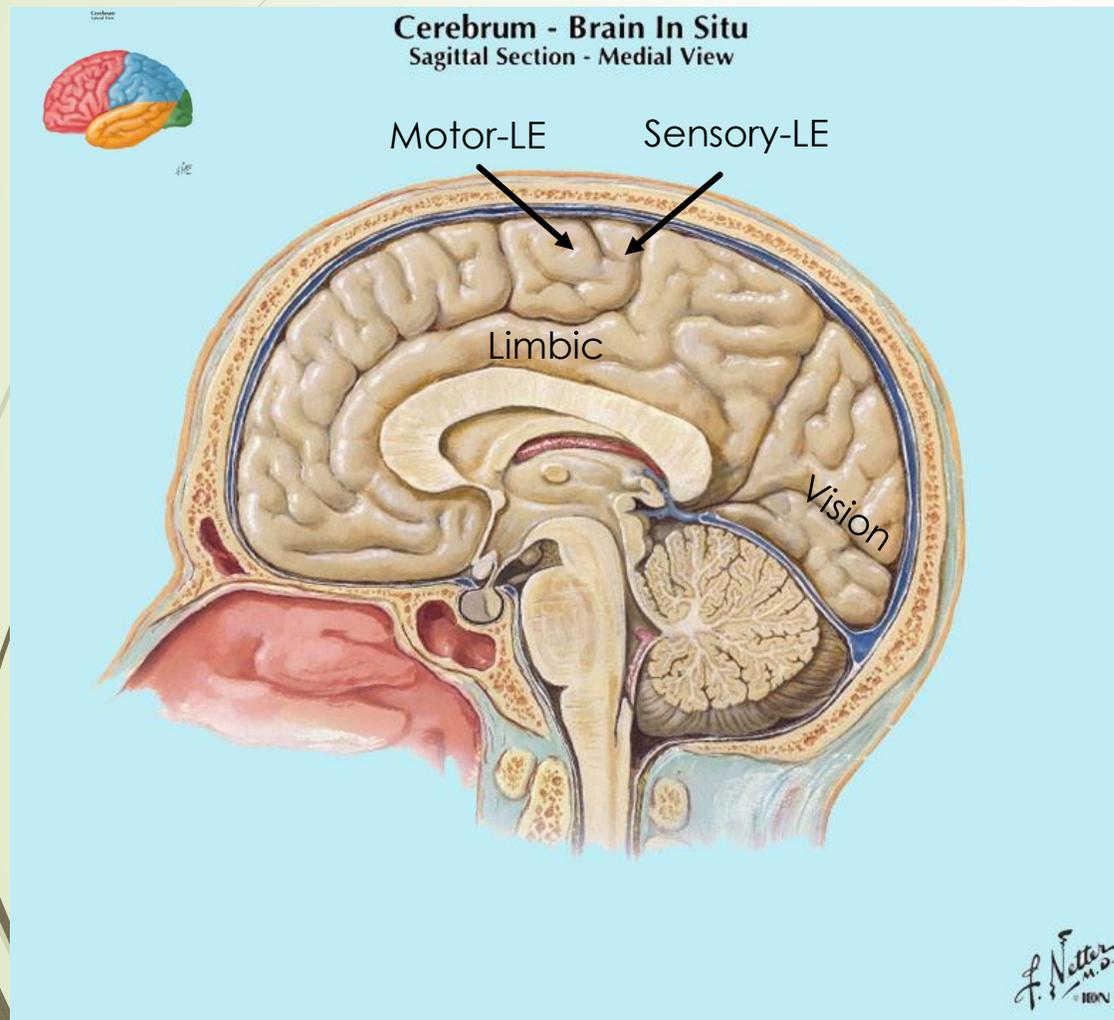
Anatomy of tentorium cerebelli & speech/behavior :



Anatomy of tentorium cerebelli & speech/behavior

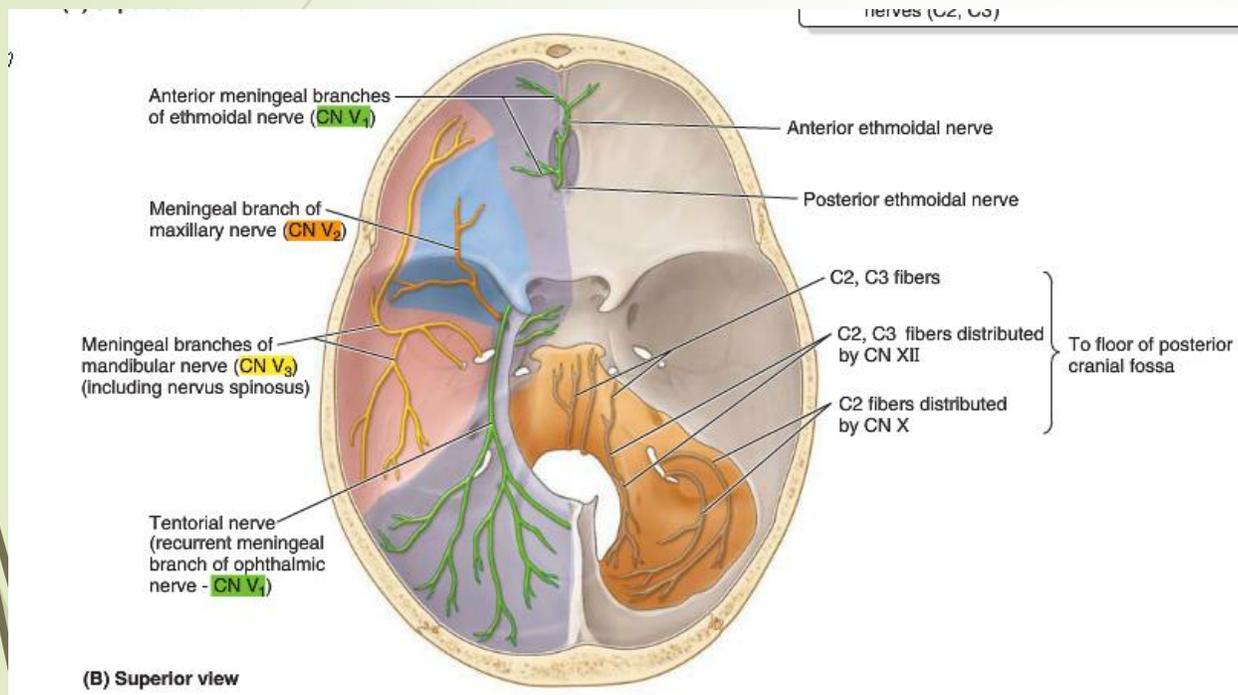


Anatomy of tentorium cerebelli & speech/behavior



- Falx was deviated to the right. Impinge medial surface of the cortex.
- What were reflex findings?
- What were behaviors and memory issues?

Did Tentorium disturbance lead to Sympathetic overdrive? Referred Pain?



- Subdural bleeds and previous surgery stretched and scarred Tentorium?
- CN V, Trigeminal, innervates Tentorium Cerebelli with afferent fibers. Referred back to brainstem.
- Information deemed by body life threatening to drive sympathetics?



Thank you!

Questions?