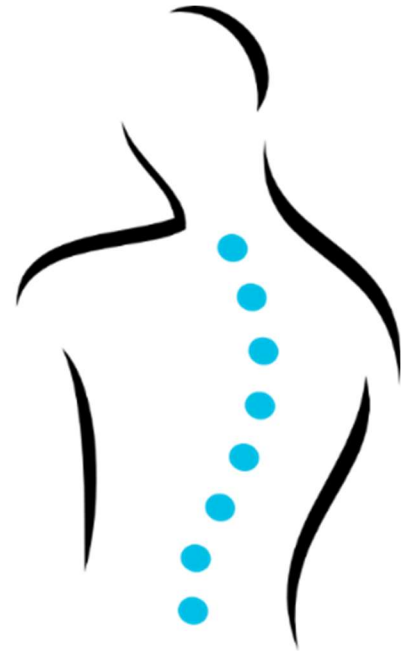


SMART PT



**PHYSICAL THERAPY MANAGEMENT
OF CRANIOFACIAL PAIN &
TEMPOROMANDIBULAR JOINT
DYSFUNCTION**

Information compiled and presented by Jonathan Reimer & Nadine Fennig.

First Edition

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MEET JONATHAN



BScPT, BPE, FCAMPT, IMC, GUNN IMS

UNIVERSITY OF ALBERTA

1997 Bachelor of Science in Physical Therapy (with distinction)

1993 Bachelor of Physical Education Route Athletic Therapy (with distinction)

CANADIAN ACADEMY OF MANIPULATIVE THERAPISTS (CAMPT)

2007 Advanced Diploma of Manual & Manipulative Therapy

Other Certifications

Gunn IMS Certified

Graston Technique Certified

Diagnostic Imaging Certified

Injury Management Consultant

Special interest in concussion management

Special interest in vestibular rehabilitation

Special interest in TMJ dysfunction management

CAREER HIGHLIGHTS

Member of national Bobsleigh Canada Skeleton medical team from 2008 - 2014

Treated Canadian, Irish, Australian & America national team athletes participating in the 2010 Vancouver & 2014 Sochi Olympics.

University of Alberta teaching assistant

University of Alberta clinical instructor 1998-Present

Named as one of the Top 3 Physical Therapists in Calgary in 2018 - 2022

OWNERSHIP

Co-owner and clinical team manager of Lifemark Physiotherapy Aspen

Co-owner 360 Physiotherapy & Training Inc.

Calgary Satellite Instructor for Physiotherapy Guild

Co-owner and instructor of SMART PT.

MEET NADINE



BScPT, CERT MT, GUNN IMS, CCTT, CAFCI, RMSK

UNIVERSITY OF ALBERTA

1997 Bachelor of Science in Physical Therapy (with distinction)

2010 – Present Clinical Lecturer

PHYSICAL THERAPY BOARD OF CRANIOFACIAL AND CERVICAL THERAPEUTICS

Certificate in Cervical and Temporomandibular Therapeutics

OTHER CERTIFICATIONS

Certificate in Manual Therapy from Curtin University

Certificate in Gunn Intramuscular Stimulation (IMS)

Certificate in Acupuncture from the Acupuncture Foundation of Canada Institute

Registered Musculoskeletal Sonographer (RMSK)

CAREER HIGHLIGHTS

Current Director of Operations of Body Restoration

Lecturing and teaching at the University of Alberta in the Department of Dentistry

Lecturing and teaching at the University of Alberta in the Department of Rehabilitation Medicine

OWNERSHIP

Co-founder of Body Restoration

PREVALENCE AND CLASSIFICATION

TEMPOROMANDIBULAR DISORDERS (TMD): "A collective term embracing a number of clinical problems that involve the masticatory muscles, temporomandibular joint and associated structures or both."

PREVALENCE:

Research suggests that around half of the population has at least one sign of TMD.

Individuals aged 20 to 40 years report TMD more frequently

Women are more likely to experience TMD than men (with a ratio of around 3:1)

In the general population:

9.7 percent of individuals had muscular pain associated with TMD

11.4 percent had disc displacement

2.6 percent had joint disorders

Of those patients that have TMD:

45 percent of TMD patients have muscular pain

41 percent have disc derangement

34 percent have joint pain

MOST COMMON TMD DISORDERS:

Disc displacement disorders

Degenerative joint disease

Subluxation

Headache attributed to TMD

Arthralgia

Myalgia

Local myalgia

Myofascial pain

Myofascial pain with referral

CLASSIFICATION

Axis I diagnostic criteria for TMD pain-related disorders

Have acceptable validity

Provide definitive diagnoses for pain involving the temporomandibular joint (TMJ) and masticatory muscles.

Diagnostic criteria for the most common TMJ intra-articular disorders are appropriate for screening purposes only.

A definitive diagnosis for TMJ intra-articular disorders requires computed tomography or magnetic resonance imaging.

Axis II questionnaires provide valid assessment of psychosocial and behavioral factors that can affect management of TMD.

AXIS 1 – ASSESSMENT

Axis I Screening Questionnaire

The TMD Pain Screener is a reliable and valid 6-item questionnaire to assess for pain-related TMD

This questionnaire assesses the report of pain and factors that may affect the pain, including jaw movement, function, and parafunction

For early diagnosis and prevention of chronicity

Axis I Physical diagnoses

Present the validated history and examination criteria for Axis I diagnoses and estimates of the criterion validity (sensitivity, specificity) for the most common TMD

Acceptable diagnostic accuracy is sensitivity $\geq 70\%$ and specificity $\geq 95\%$

AXIS 2 - ASSESSMENT

Five Axis II questionnaires are recommended as screening tools for routine assessment of psychosocial and behavioral factors that may impact on patients' response to treatment:

Graded Chronic Pain Scale (GCPS)

Pain Drawing

Jaw Functional Limitation Scale (JFLS)

Patient Health Questionnaire-4 (PHQ-4)

Oral Behaviors Checklist (OBC)

ANATOMY OF THE TEMPOROMANDIBULAR JOINT

MANDIBULAR CONDYLE AND TEMPORAL FOSSAE

1. Mandibular Condyle

Convex in all directions

The condyle faces anteriorly, superiorly and medially (Covered by hyaline cartilage)

2. Temporal Fossae

Inversely shaped to the condyle (concave)

Very congruent with disc

Faces posteriorly, inferiorly and laterally

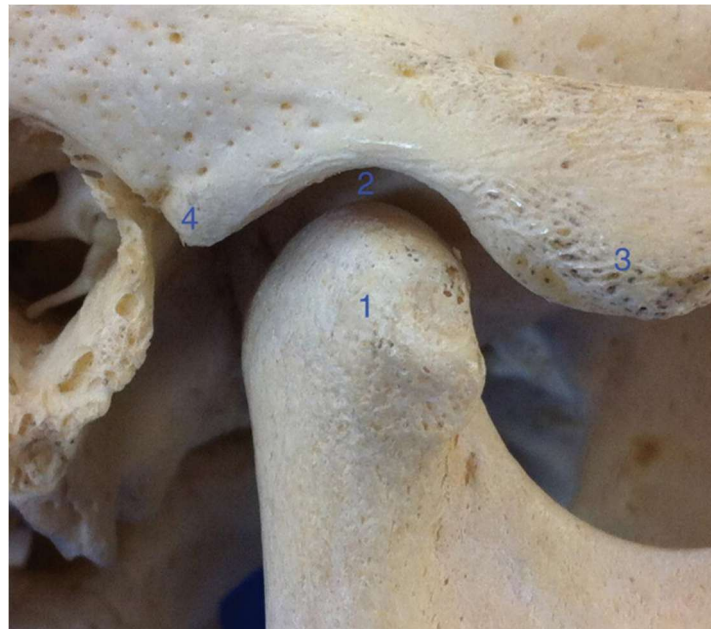
3. Articular Eminence

Inclination of articular eminence varies among people

It dictates the path of condylar movement as well as the degree of rotation of the disc over the condyle

4. Postglenoid Process

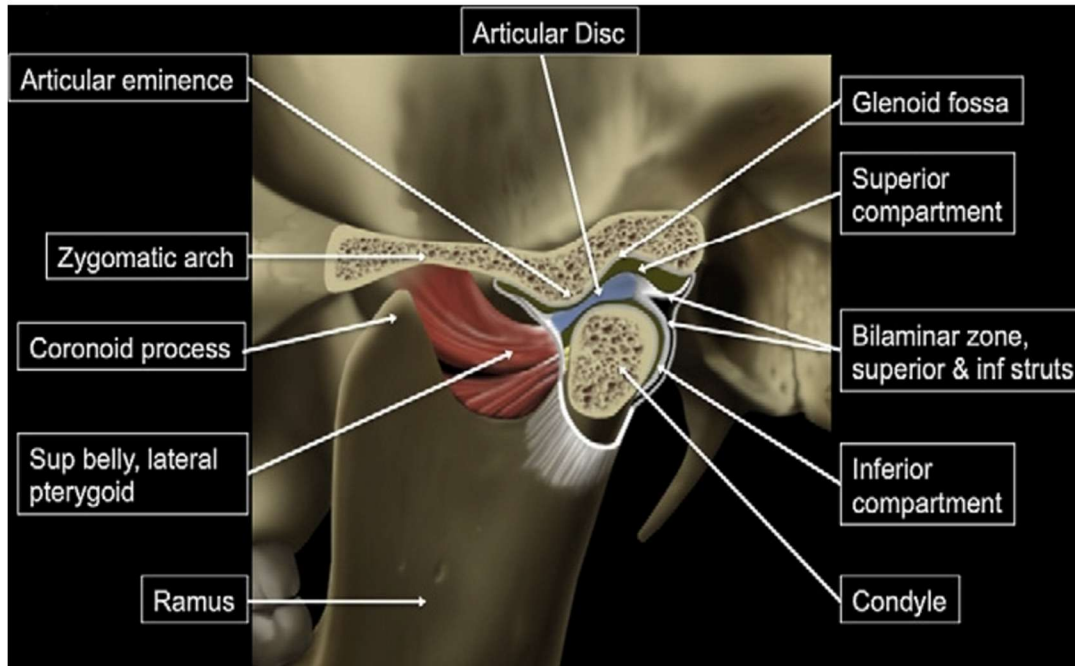
Descends behind the condyle of the mandible and prevents its backward displacement



INTRA-ARTICULAR DISC

Fibrocartilagenous – aneural and avascular centrally

Biconcave and divides the joint into 2 separate compartments



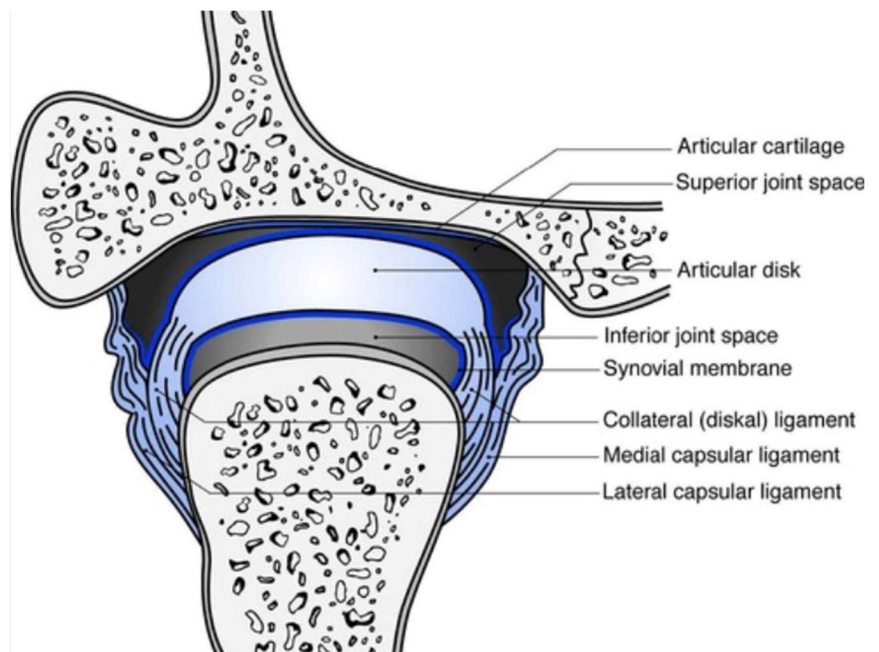
Attaches anteriorly to the superior head of the lateral pterygoid

Attaches posteriorly to a thick layer of loose vascularized elastic connective tissue (retrodiscal tissue) which extends to attach to the temporal fossae and head of the mandible.

SYNOVIUM AND CAPSULE

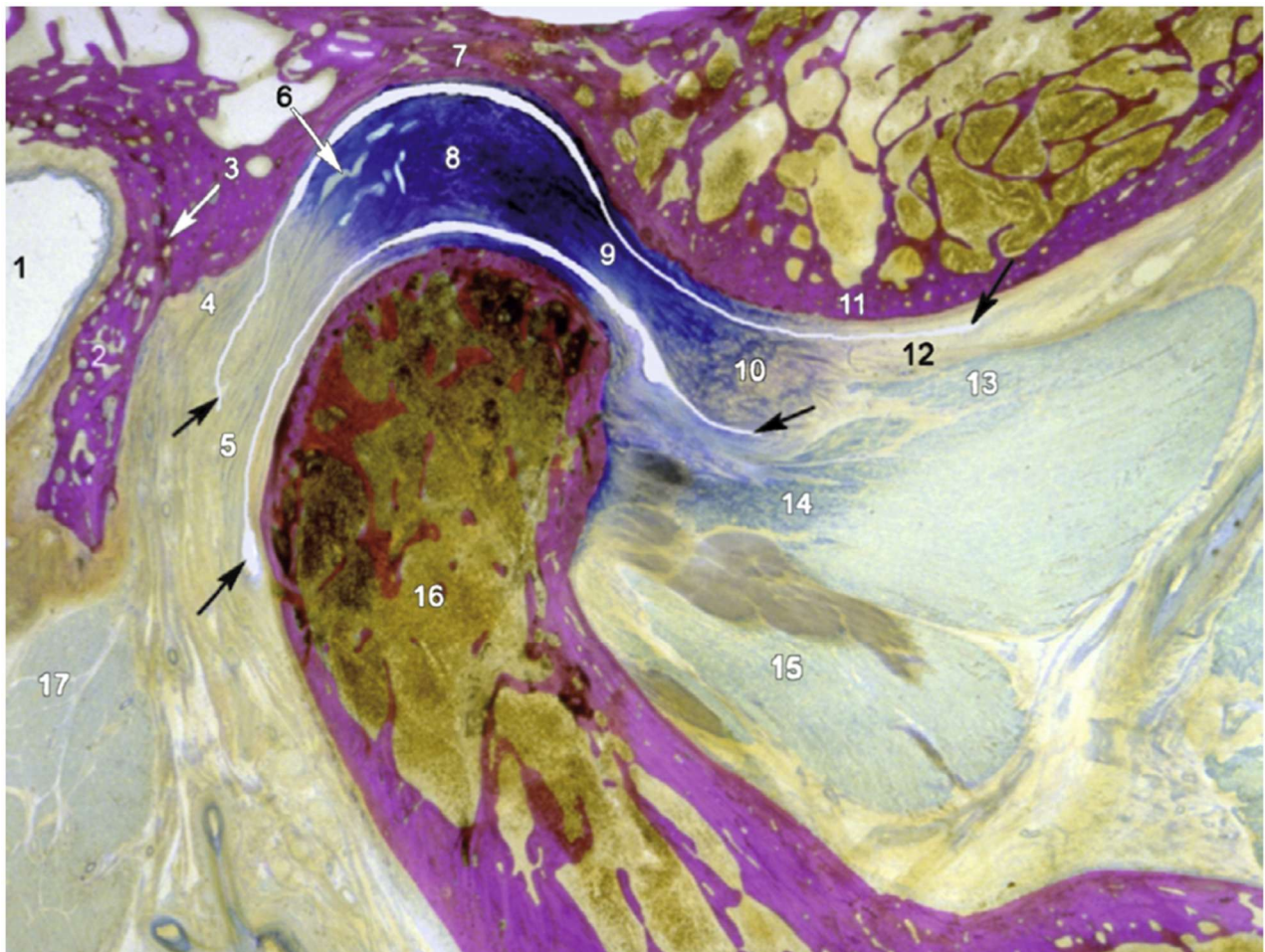
There are 2 synovial membranes in the joint: one lines the capsule above the disc and the other lines the capsule below the disc.

The loose articular capsule is attached to the disc around its entire circumference, superiorly to the temporal fossae, inferiorly to the mandibular neck.



SAGITTAL SECTION OF THE RIGHT TMJ IN CLOSED MOUTH POSITION

1. External auditory meatus
2. Tympanic bone
3. Tympanosquamous fissure
4. Upper fibers of the bilaminar zone
5. Lower fibers of the bilaminar zone
6. Retrodiscal venous plexus
7. Mandibular fossa
8. Posterior band
9. Intermediate zone
10. Anterior band
11. Temporal eminence
12. Prediscal tendinous sheet
13. Disc fibers of the superior head of the lateral pterygoid muscle
14. Bone fibers of the superior head of the lateral pterygoid muscle
15. Inferior head of the lateral pterygoid muscle
16. Neck of the mandibular condyle
17. Parotid gland



LIGAMENTS

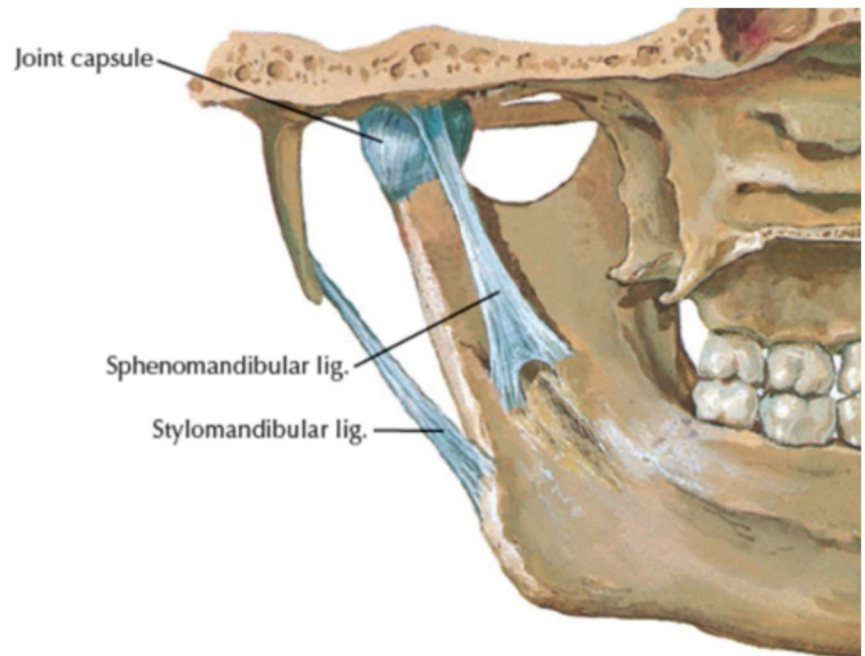
Lateral (Temporomandibular)
Ligament (2 parts)

Oblique portion

Restricts dropping
of the mandibular
head on opening

Horizontal portion

Restricts posterior
displacement of
mandibular
condyle on the
disc

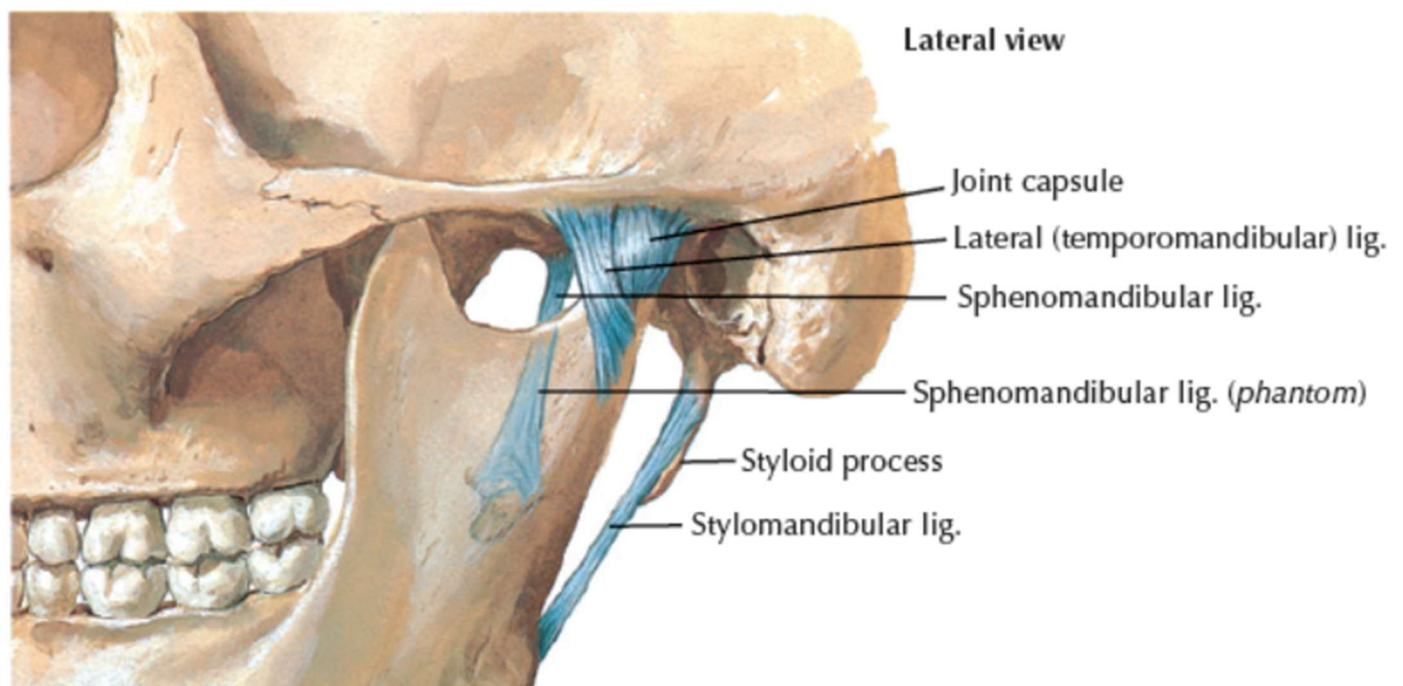


Medial view

Accessory Ligaments

Sphenomandibular Ligament and Stylomandibular Ligament

Restrict anterior displacement of mandible during translation



Lateral view

MUSCLES

Temporalis

Masseter

Medial Pterygoid

Lateral Pterygoid

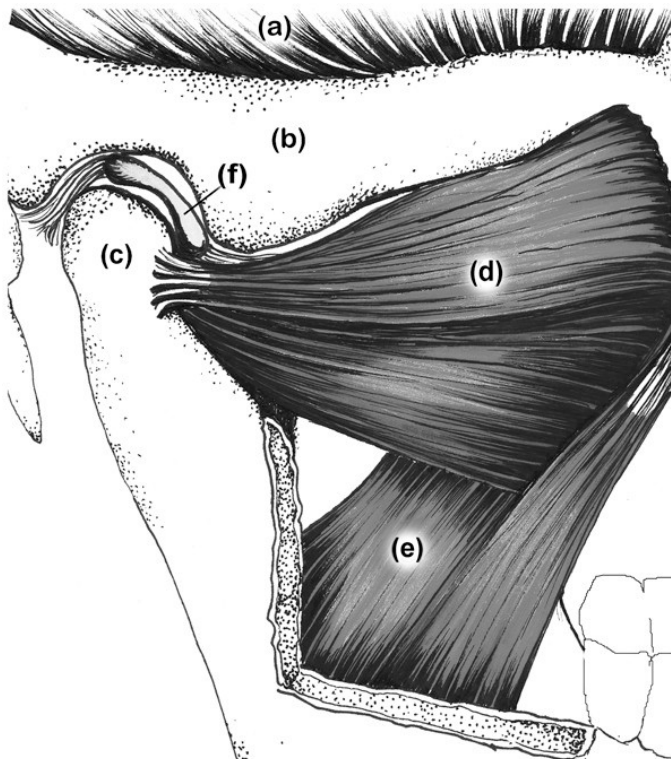
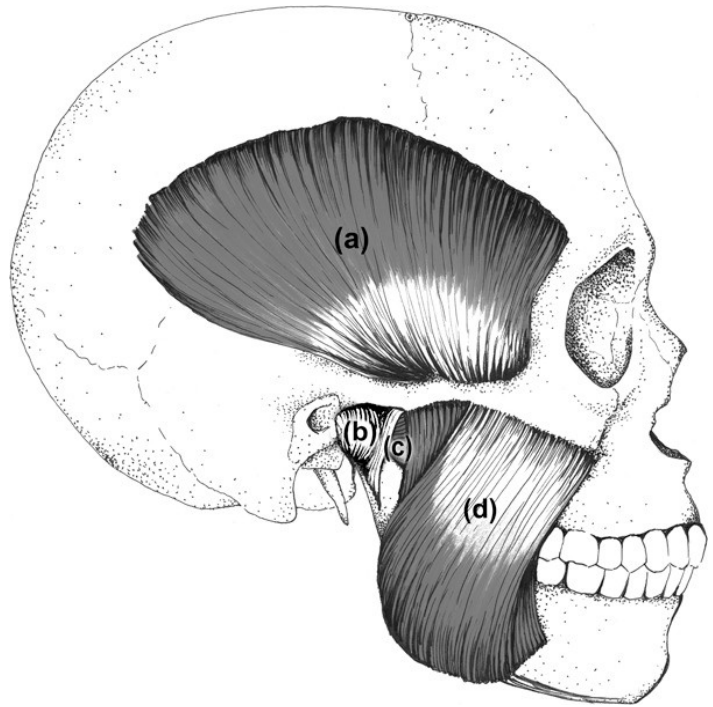
Digastric

Hyoids

TMJ ANATOMY (SUPERFICIAL)

Superficial View of TMJ Anatomy

- a. *Temporalis muscle*
- b. *Temporomandibular ligament*
- c. *Lateral pterygoid muscle*
- d. *Masseter muscle*



TMJ ANATOMY (DEEP)

Deep View of TMJ Anatomy

- a. *Temporalis muscle*
- b. *Temporal bone*
- c. *Mandibular Condyle*
- d. *Lateral pterygoid muscle*
- e. *Medial pterygoid muscle*
- f. *Intra-articular disc*

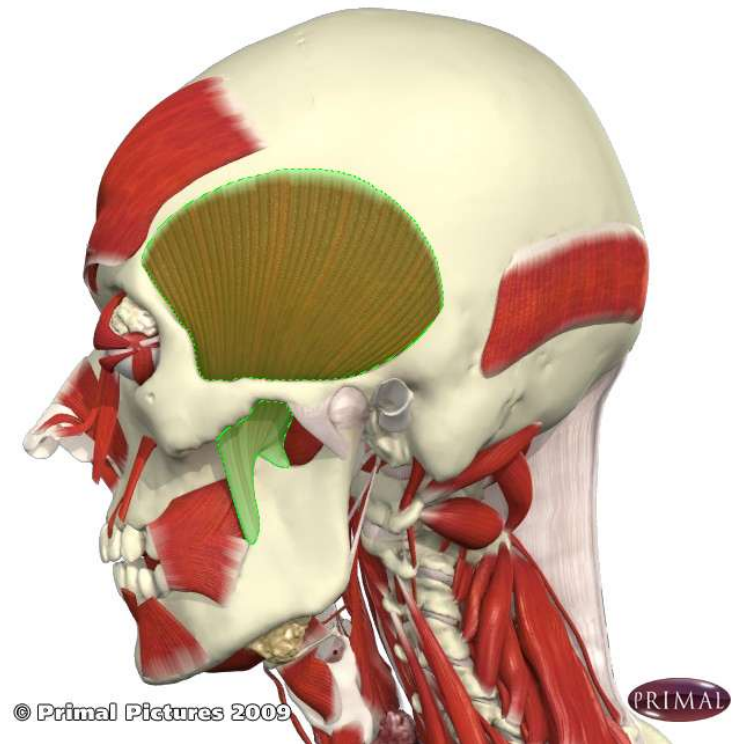
TEMPORALIS MUSCLE

O: temporal lines on the parietal bone

I: coronoid process of the mandible

N: trigeminal nerve

A: elevation and retraction of the mandible



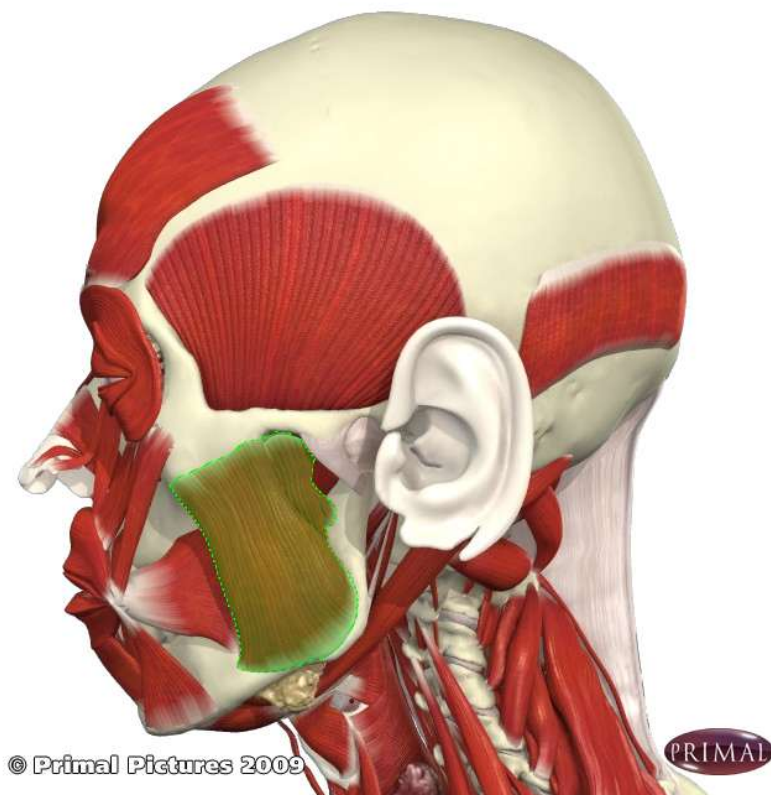
MASSETER MUSCLE

O: zygomatic arch and maxilla

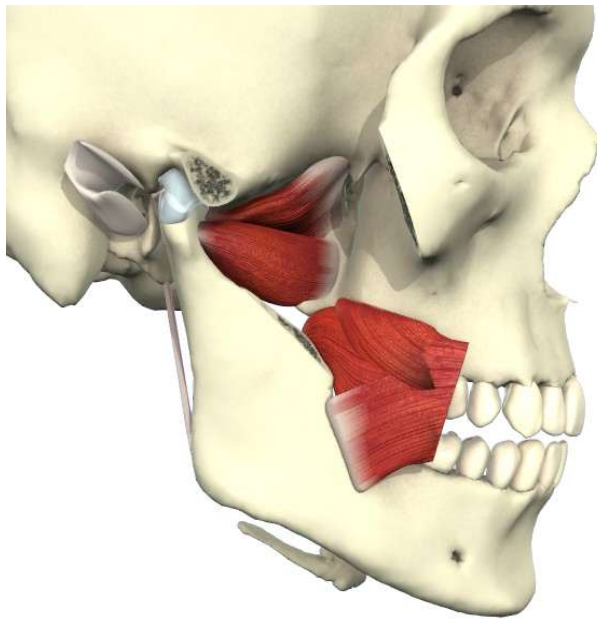
I: coronoid process and ramus of the mandible

N: trigeminal nerve

A: elevation and retraction of the mandible



LATERAL PTERYGOID MUSCLE



O: greater wing of the sphenoid and pterygoid plate

I: condyle of the mandible and the disc

N: trigeminal nerve

A: protraction, contralateral deviation and pulls disc anterior on mandibular head

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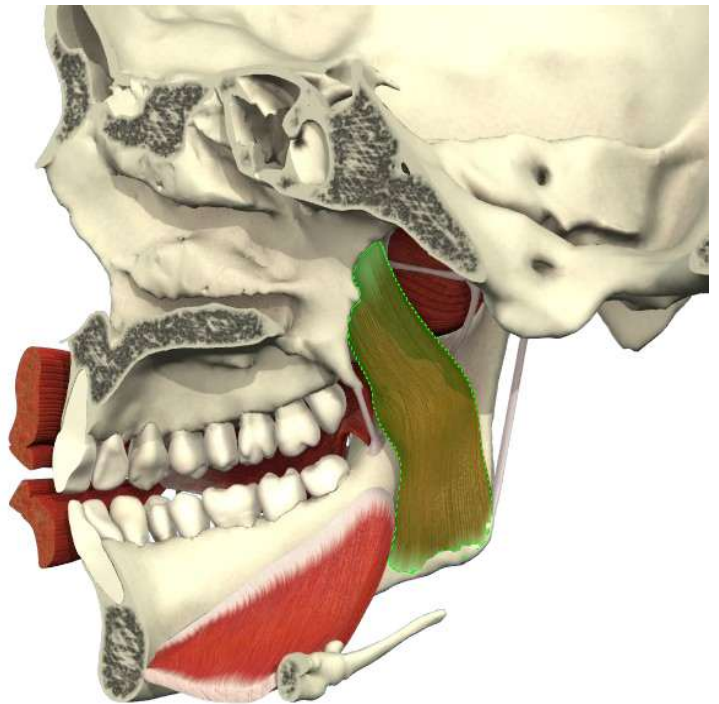
MEDIAL PTERYGOID MUSCLE

O: greater wing of sphenoid and palatine bone

I: medial aspect of the mandible

N: trigeminal nerve

A: elevation and contralateral deviation



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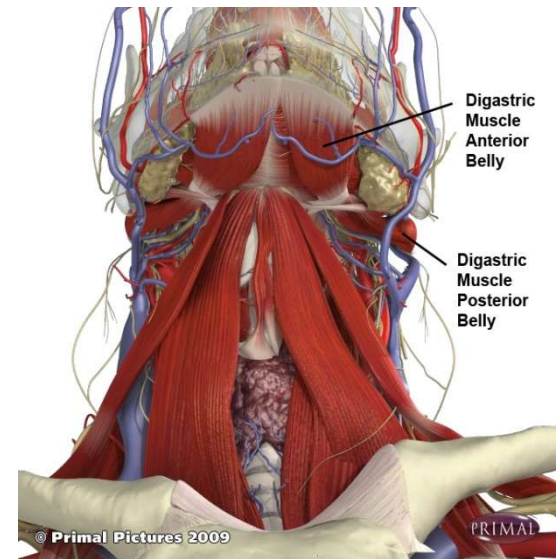
DIGASTRIC MUSCLE

O: anterior belly – digastric fossa (mandible)
 posterior belly – mastoid process of temporal bone

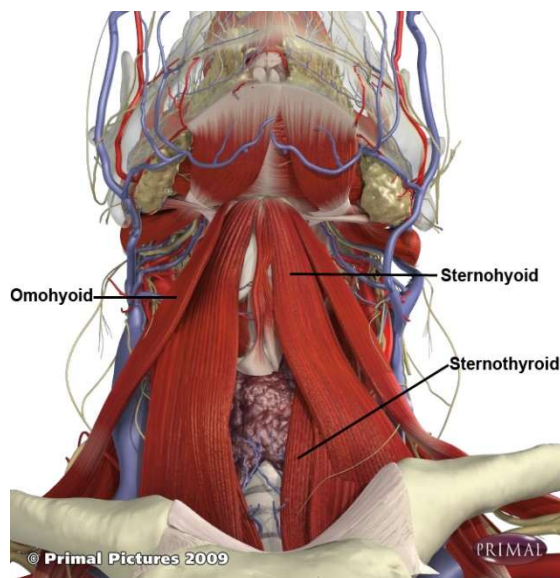
I: intermediate tendon (hyoid bone)

N: anterior belly – trigeminal nerve
 posterior belly – facial nerve

A: opens jaw wide when masseter and temporalis are relaxed



HYOID MUSCLES



Suprahyoid muscles

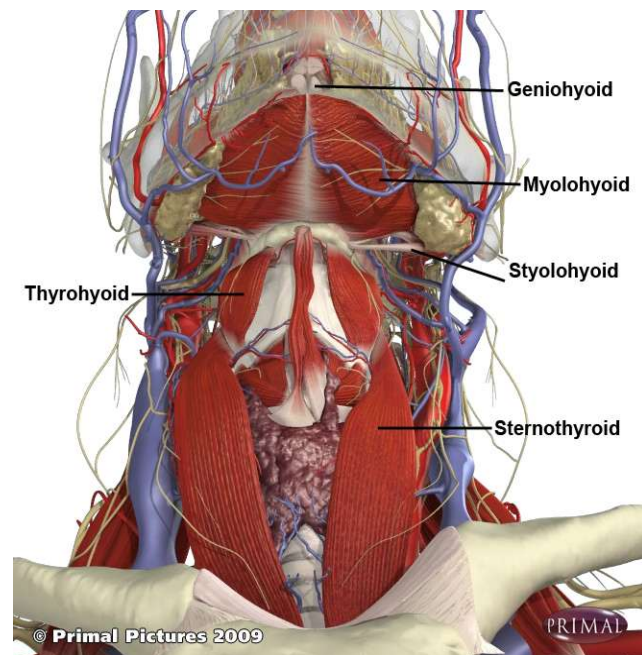
Digastric, stylohyoid, mylohyoid and geniohyoid muscles

General function for depression of the mandible

Infrahyoid muscles

Sternohyoid, sternothyroid, thyrohyoid and omohyoid muscles

General function for lowering the hyoid bone during swallowing and fixation of the hyoid during jaw movements



NERVE SUPPLY

Primary Innervation

Trigeminal Nerve (CN V)

Related Innervation

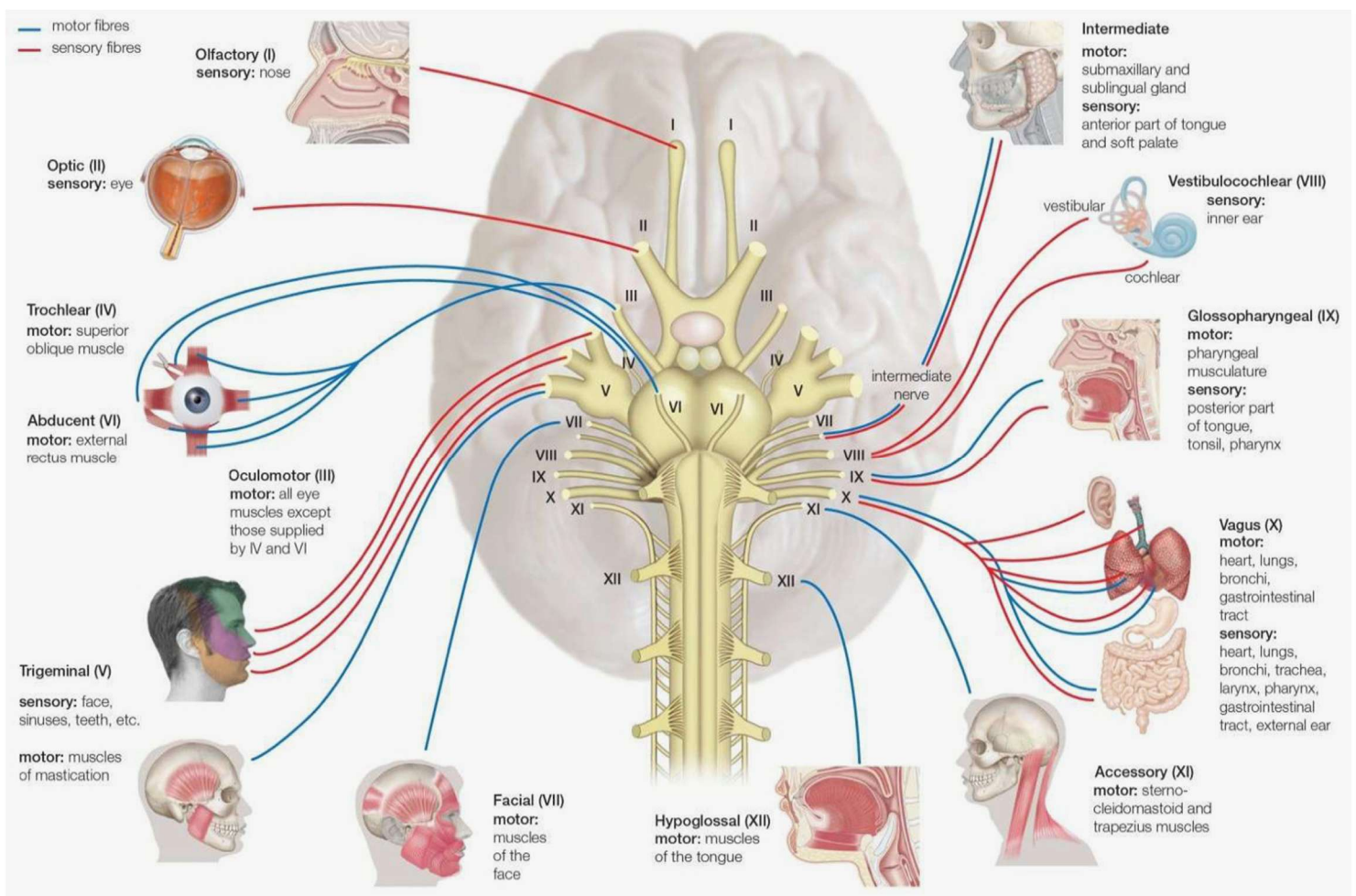
Facial Nerve (CN VII)

Glossopharyngeal Nerve (CN IX)

Vagus Nerve (X)

Spinal Accessory Nerve (CN XI)

Hypoglossal Nerve (CN XII)



TRIGEMINAL CERVICAL PATHWAYS

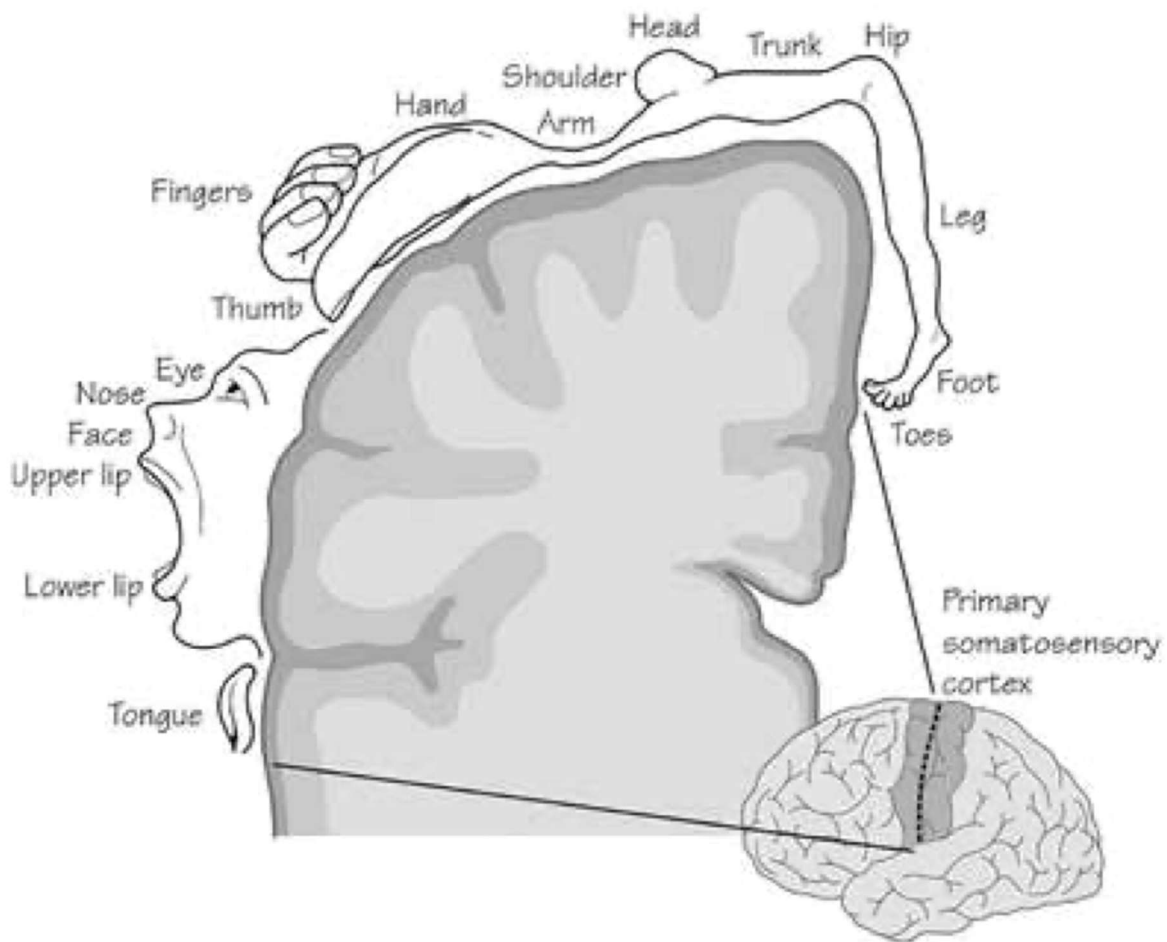
UNIQUE NATURE OF CN V

The 'great protector' of the most important region of our body.

It is the largest sensory nerve of the body and over half of the sensory cortex is responsive to any stimulation within this system.

Its function to protect the brain, sight, smell, airway, hearing and taste, underpinning our very existence.

The brain's reaction to pain within the trigeminal system has a significant and larger reaction to the threat of, and actual, pain compared with other sensory nerves.



CN V DIVISIONS

Ophthalmic division (V1)

Lacrimal

Frontal

Nasociliary

Maxillary division (V2)

cranial branch

Middle meningeal branch

4 exocranial branches:

orbital branch

branches of the sphenopalatine ganglion

posterior alveolar (dental) branches

anterior superior alveolar (dental) branches.

Mandibular division (V3)

Main trunk

Meningeal

Motor branch

Anterior Division

Masseteric Nerve

Deep Temporal
Nerves

Buccal Nerve

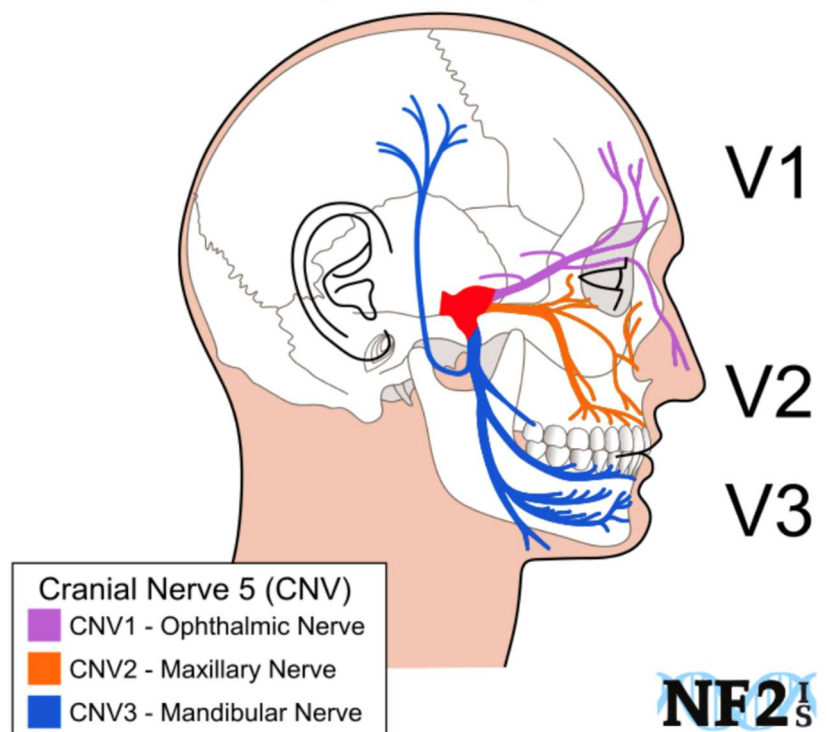
Lateral Pterygoid
Nerve

Posterior Division

Auriculotemporal
Nerve

Lingual Nerve

Inferior alveolar nerve



CN V DIVISIONS

Ophthalmic division (V1)

Controls the muscles of the eyelids, eyebrow, forehead, and nose

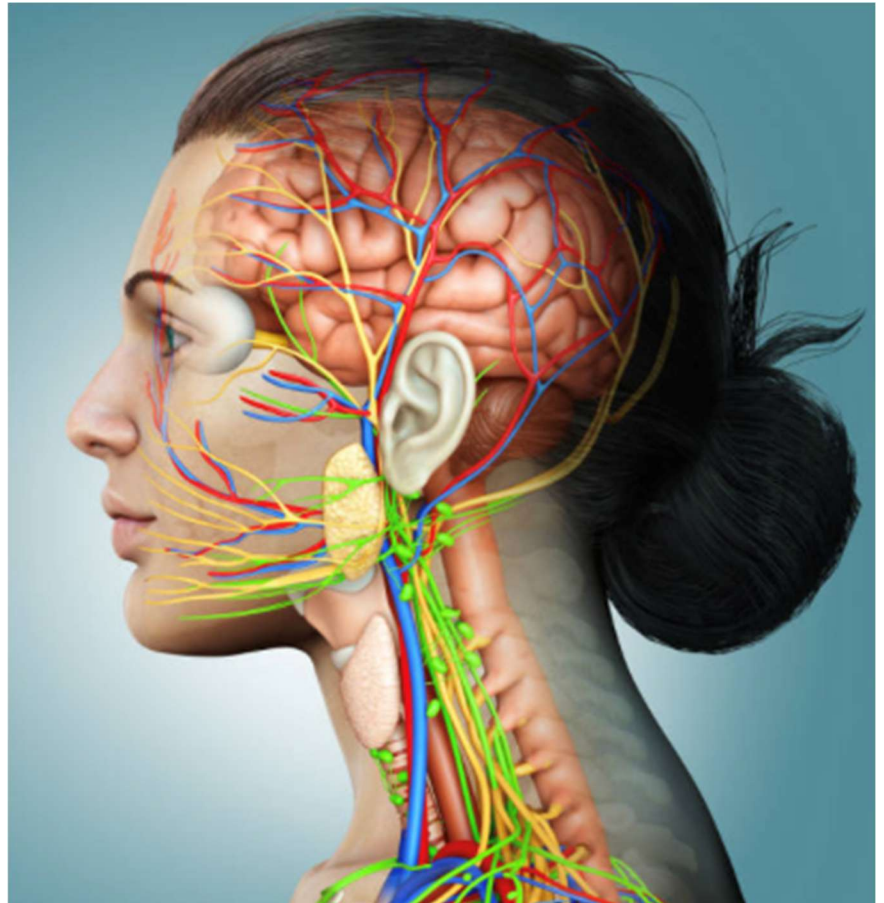
Affect the glands for
tear production and
mucous membrane of
the nasal cavity

Maxillary division (V2)

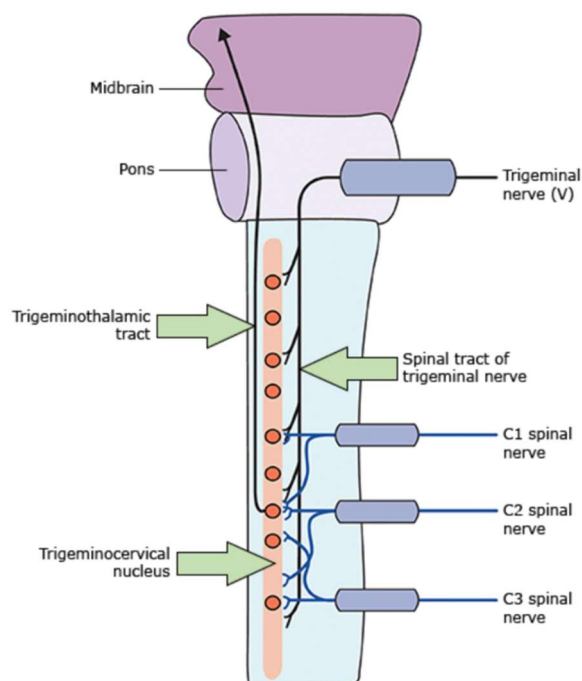
Controls sensation from the maxillary, nasal cavity, sinuses and taste

Mandibular division (V3)

Controls face sensations and muscles for biting, chewing, and swallowing



Mechanism of pain referral from the cervical spine to the head



TRIGEMINAL CERVICAL NUCLEUS

Is an elongated structure, located from the bottom of the pons extending to the upper segments of cervical spinal cord

The axons of the trigeminocervical nucleus are densely connected with axons of spinal ganglia of C₁–C₃ spinal nerves, via interneurons of the trigeminocervical nucleus known as **trigeminocervical functional convergence**

TRIGEMINOCERVICAL FUNCTIONAL CONVERGENCE

Trigemincervical Functional Convergence

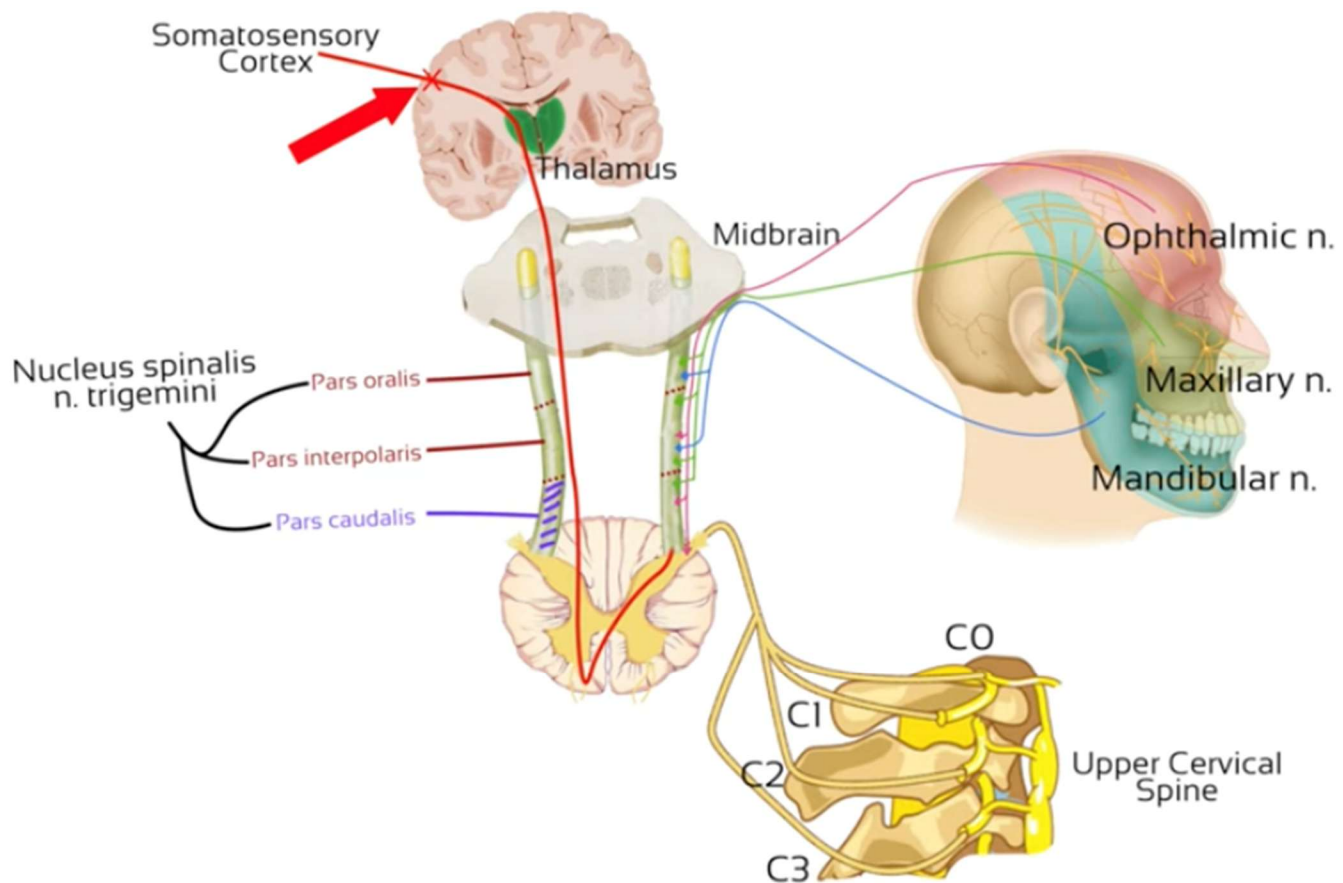
It is important to realize that all sensory supply to the head and upper cervical region comes through the trigeminal cervical nucleus

Potentially, 1° dysfunction of one component can cause 2° dysfunction in one or all of the other components.

Referral of sensations is bi-directional

There is a possibility of referred pain transfer between the C1–C3 and trigeminal innervation areas

Pain originating from the teeth, jaws, or TMJ could thus project into the cervical area



TRIGEMINAL NERVE SYMPTOMS

From a sensory perspective, CN V supplies the following structures:

The skin of the face

All teeth

Nasal, and paranasal mucosa and sinuses

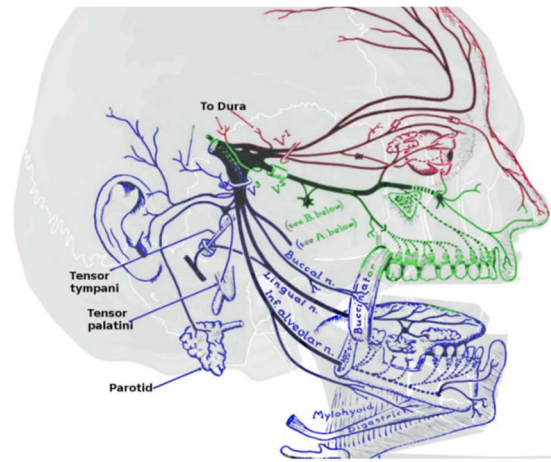
Anterior two-thirds of the tongue

Orbit

Temporomandibular joint (TMJ)

Majority of the dura mater and cranial sutures

Lateral part of the tympanic membrane



Trigeminal nerve. Image courtesy S Bhimji MD

From and motor perspective, CNV supplies the following structures:

Masseter

Temporalis

Medial and Lateral pterygoids

Mylohyoid

Anterior Belly of Digastric

Tensor Tympani

Tensor Veli Palatini

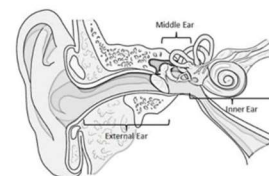
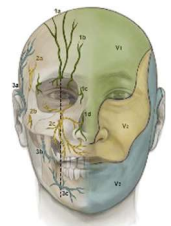
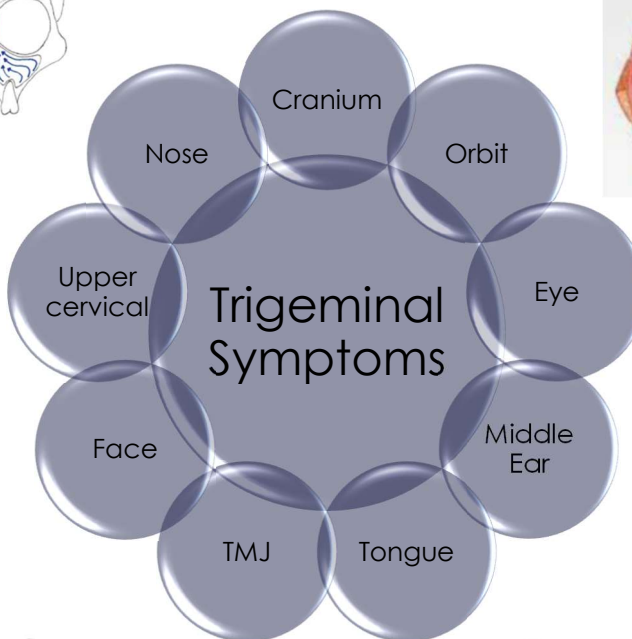
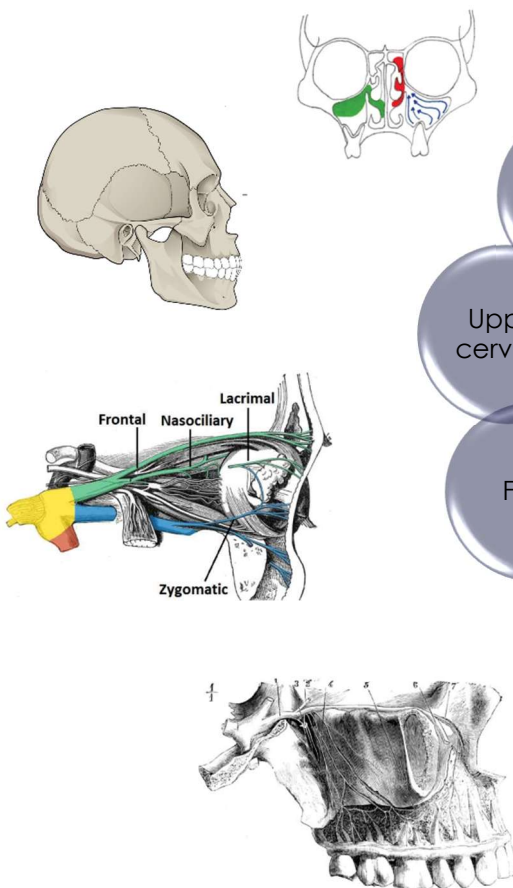
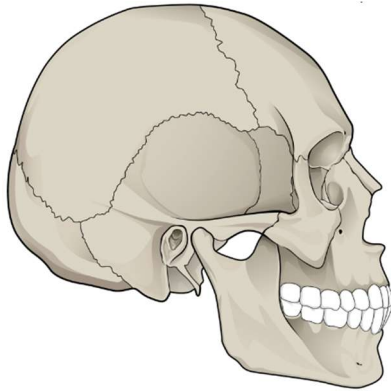


Fig. 1 The Ear



THE CRANIUM

Dense innervation of the cranial dura and sutures

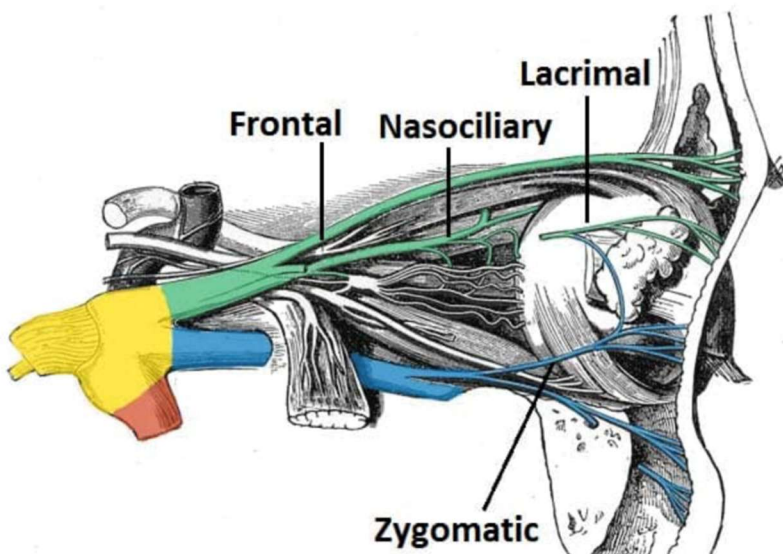
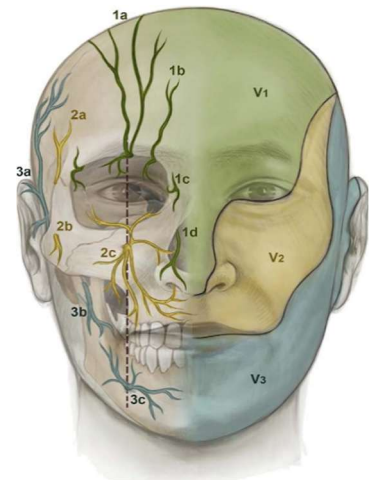
- Pain fibers in cranial sutures originate from dural nociceptors of trigeminal origin

May lead to a diffuse headache from occiput to frontal bones or pain along suture lines.

THE ORBIT

The ophthalmic division of the trigeminal nerve supplies the orbit

This can lead to retro-orbital pain.



THE EYE

Cornea and conjunctiva innervated by CN V

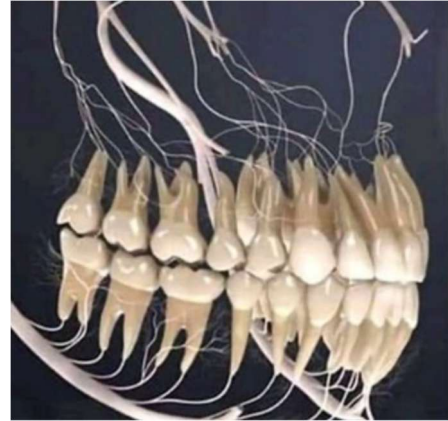
May lead to an absent corneal reflex

May lead to symptoms resembling conjunctivitis, with notable absence of the red-eye

THE TEETH

The ligaments of the gomphoses (teeth joints) innervated by CN V

May lead to hyper-sensitivity and significant toothache.



THE FACE

Facial pain, paresthesias and anesthesia can be present in V1, V2, V3 regions.

Pain may reach such an intensity that it resembles trigeminal (post-herpetic) neuralgia (The main difference is the absence of a history of herpetic sore and an absence of the distressing 'wind up' effect)

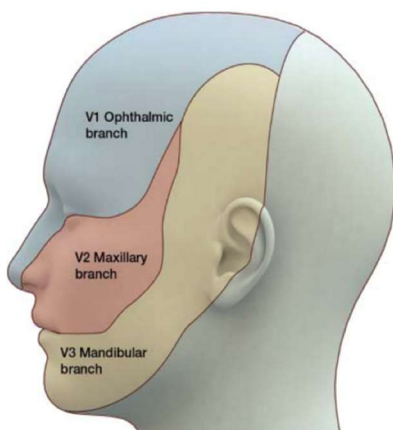


Figure 27-3 The trigeminal nerve has three divisions: Ophthalmic (V1), maxillary (V2), and mandibular (V3).

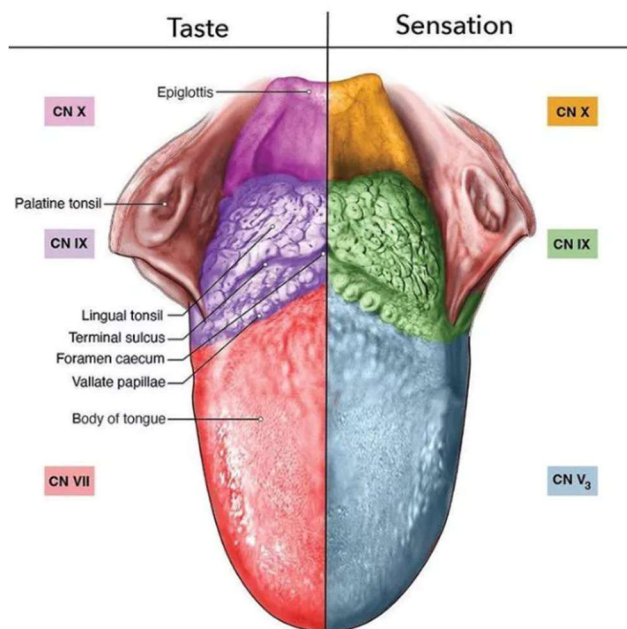
THE TONGUE

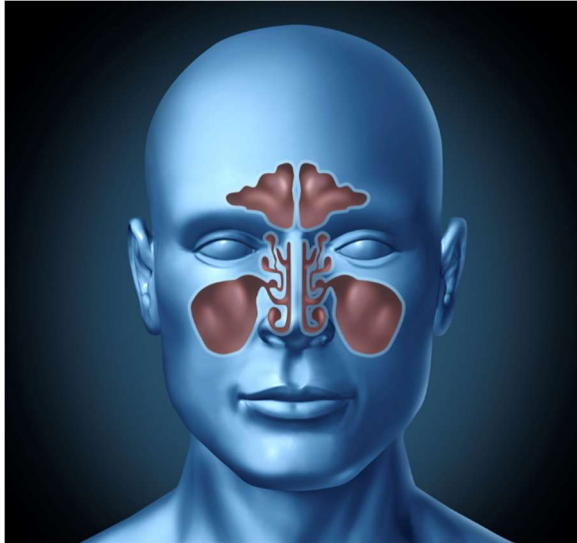
2/3 of the sensory innervation of the tongue is derived from the trigeminal nerve

Sensitization may lead to tingling or even alterations in taste perception

Possible that it can lead to changes in taste discrimination?

Tongue Innervation





SINUSES

Sinuses are innervated by trigeminal afferents

Can feel the same as a sinusitis type pain

Facial pain-fullness, nasal congestion and rhinorrhea

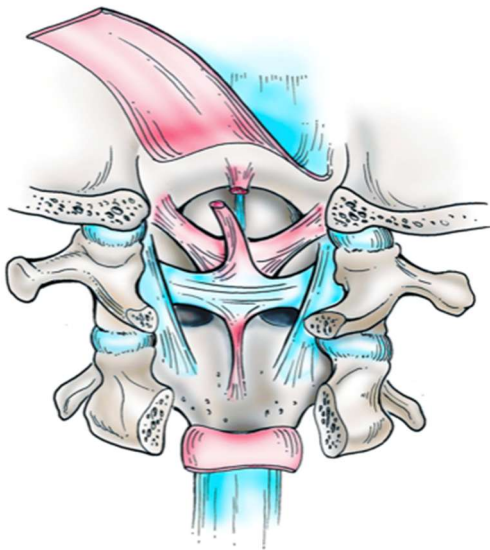
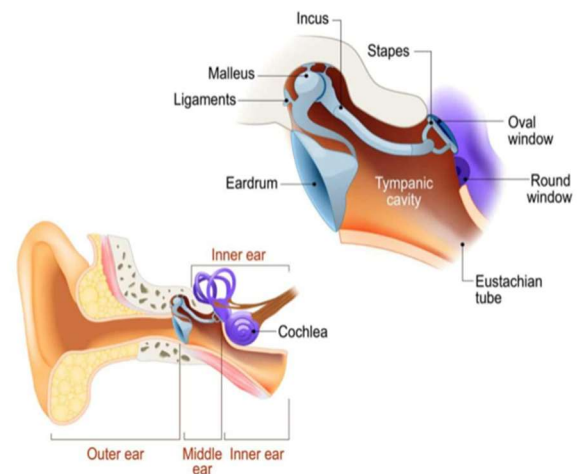
THE EAR

Hypertonicity of the tensor tympani muscle can lead to tinnitus.

Localized earache may also occur if the tensor tympani and tensor veli palatini are involved.

A sensation of fullness in the ear or feeling like they need to "pop" their ear.

MIDDLE EAR



CRANIOVERTEBRAL REGIONS

Pain from the C₁–C₃ innervation area can be the upper cervical spine joints, muscles and related nerves

It can arise from poor posture, C₁/C₂ vertebra rotation, cervical trauma

Pain can project from these areas to the orofacial region

Particularly probably with central sensitization

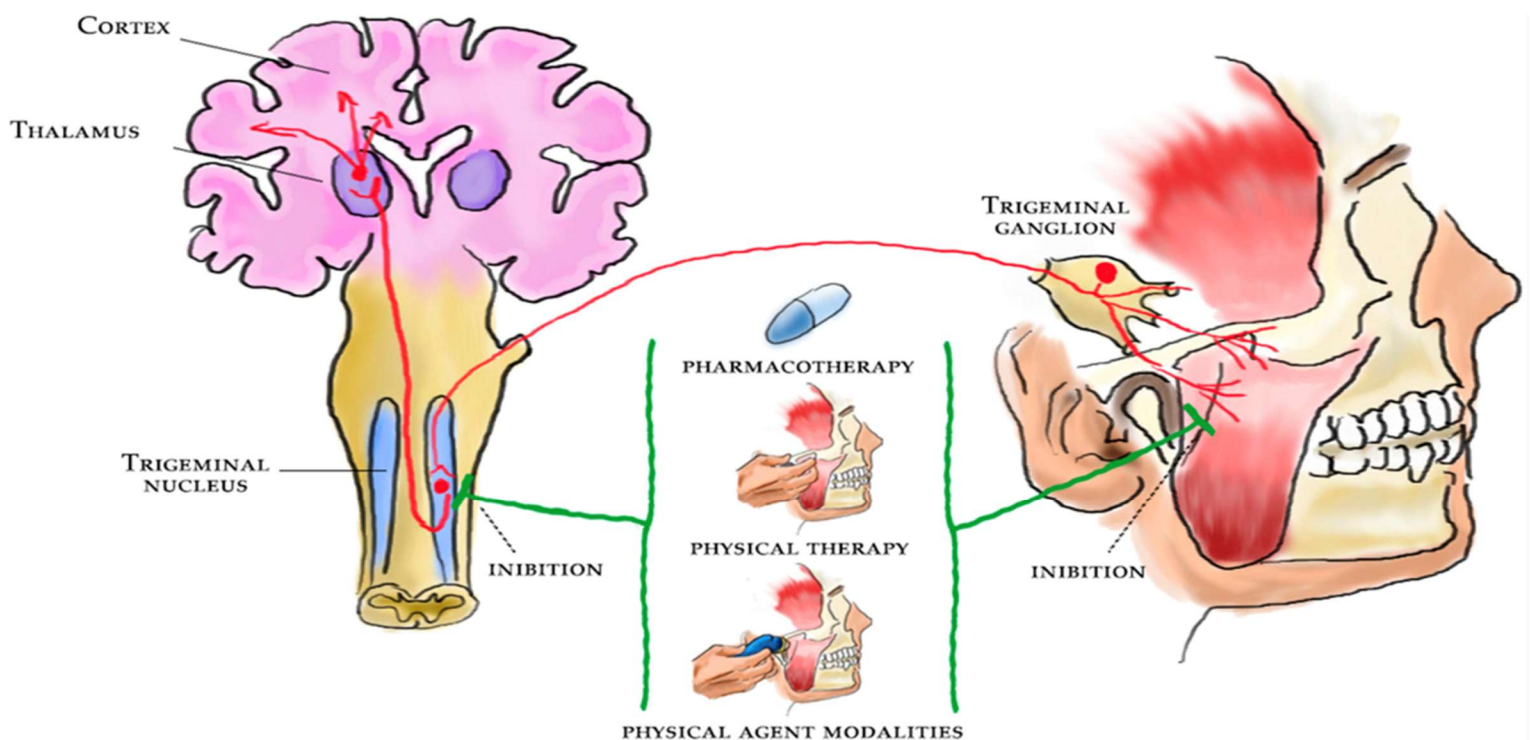
PERIPHERAL NOCICEPTION

Localized symptoms of the temporomandibular joint are confined to pains felt over the joint itself, perhaps spreading to the jaw and lateral face.

CENTRAL SENSITIZATION

Chronic or severe dysfunction resulting in referral of pain to other structures or regions sharing the same innervation (Cervicogenic Orofacial Pain)

MANAGEMENT OF CENTRAL SENSITIZATION



BIOMECHANICS OF THE TEMPOROMANDIBULAR JOINT

CLASSIFICATION

Type

Synovial, condylar, and hinge type joint with fibrocartilaginous surfaces and an articular disc

Resting position

Mouth slightly open, lips together, teeth not in contact

Closed Pack position

Teeth tightly clenched

Capsular Pattern

Limitation of mouth opening

Motions

Opening, Closing, Protrusion, Retrusion and Lateral Excursion

BIOMECHANICS

Opening (40-45mm)

In the 1st 20mm of opening, an anterior rolling or rotation occurs between the condyle and disc (inferior joint)

From 20mm to end range opening, both heads slide forwards down the articular eminence with a slight lateral glide bilaterally (superior joint)

Closing (approximation of the teeth)

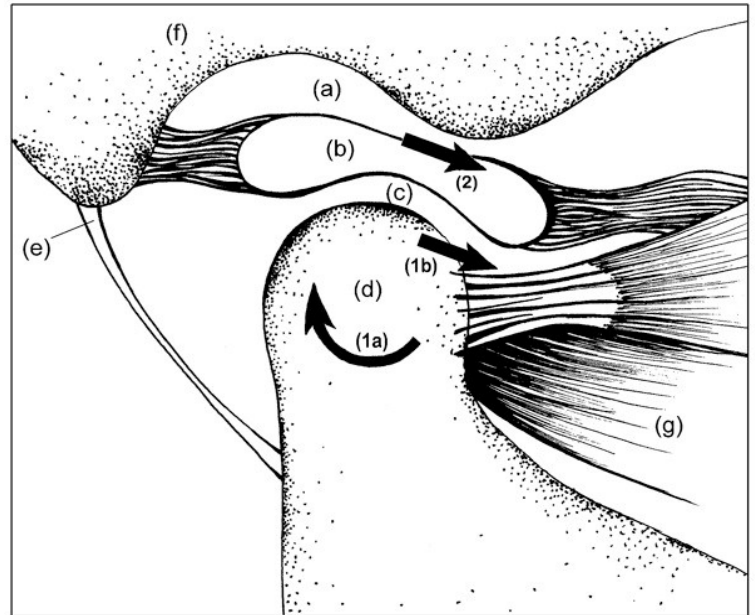
Both heads slide backwards up the articular eminence with a medial glide bilaterally.

Lateral Excursion

Ipsilateral side "closes" while contralateral side "opens"

BIOMECHANICS

- a. Superior joint space
 - b. Intra-articular disc
 - c. Inferior joint space
 - d. Mandibular condyle
 - e. Temporomandibular capsule
 - f. Temporal fossae
 - g. Lateral pterygoid muscle
- 1a. Anterior rotation
 - 1b. Anterior translation condyle
 - 2. Anterior translation disc



ARTHROKINEMATICS/JOINT GLIDES

JOINT GLIDES:

Rolling/Rotation

Early opening

Distraction glide

Opening

Glide anterior, inferior and lateral

Closing

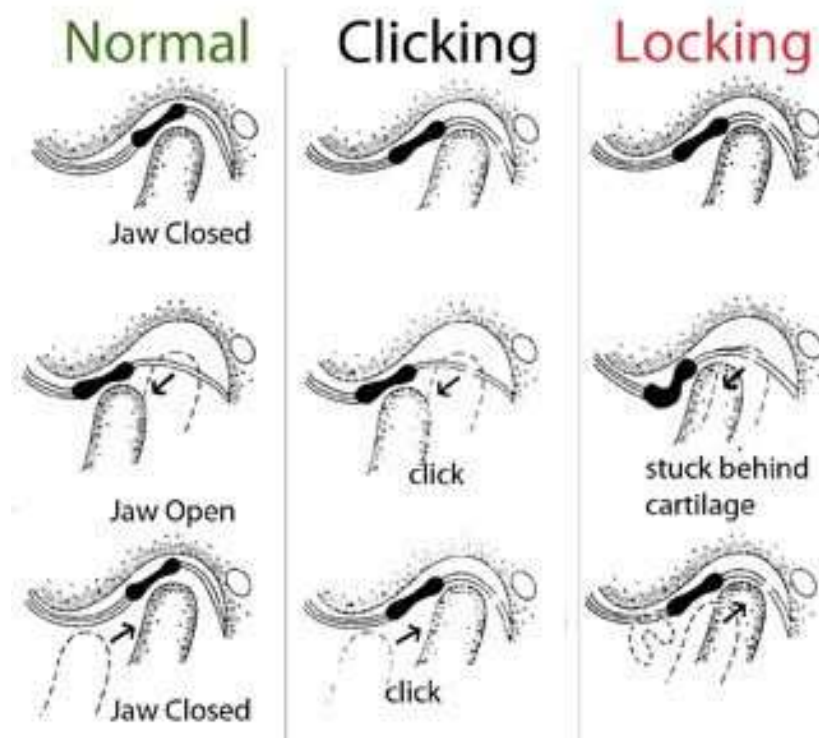
Glide posterior, superior and medial

Lateral Excursion

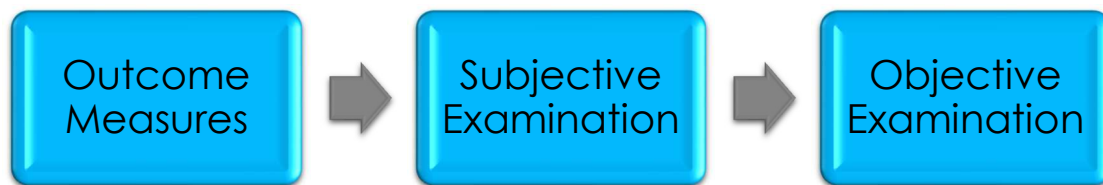
Ipsilateral side – Glide posterior, superior and medial

Contralateral side - Glide anterior, inferior and lateral

DISC DISPLACEMENTS/DERANGEMENTS



TMJ ASSESSMENT



AXIS 1 – OUTCOME MEASURE

Axis I Screening Questionnaire

The TMD Pain Screener is a reliable and valid 6-item questionnaire to assess for pain-related TMD

This questionnaire assesses the report of pain and factors that may affect the pain, including jaw movement, function, and parafunction

For early diagnosis and prevention of chronicity

AXIS 1 – TMD PAIN SCREEN

1. In the last 30 days, how long did any pain last in your jaw or temple area on either side?
 - a. *No pain*
 - b. *Pain comes and goes*
 - c. *Pain is always present*
2. In the last 30 days, have you had pain or stiffness in your jaw on awakening?
 - a. *No*
 - b. *Yes*
3. In the last 30 days did the following activities change any pain (that is, make it better or make it worse) in your jaw or temple area on either side?
 - A. *Chewing hard or tough food*
 - a. *No*
 - b. *Yes*
 - B. *Opening your mouth or moving your jaw forward or to the side?*
 - a. *No*
 - b. *Yes*
 - C. *Jaw habits such as holding teeth together, clenching, grinding or chewing gum*
 - a. *No*
 - b. *Yes*
 - D. *Other jaw activities, such as talking, kissing or yawning*
 - a. *No*
 - b. *Yes*

AXIS 2 – OUTCOME MEASURES

Five Axis II questionnaires are recommended as screening tools for routine assessment of psychosocial and behavioral factors that may impact on patients' response to treatment:

Graded Chronic Pain Scale (GCPS)

Pain Drawing

Jaw Functional Limitation Scale (JFLS)

Patient Health Questionnaire-4 (PHQ-4)

Oral Behaviors Checklist (OBC)

AXIS 2 - GRADED CHRONIC PAIN SCALE

1. In the **past 3 months**, how often did you have pain?

Never

Some days

Most days

Everyday

If you never had pain in the past 3 months, skip following questions

2. Over the past 3 months, how often did pain limit your life or work activities?

Never

Some days

Most days

Everyday

Now, think about pain you have had in the past 7 days.

3. What number best describes **your pain on average**?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10
No pain									Pain as bad as you can imagine

4. During the past 7 days, what number best describes how **pain has interfered with your enjoyment of life**?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10
Does not interfere									Completely Interferes

5. During the past 7 days, what number best describes how **pain has interfered with your general activity**?

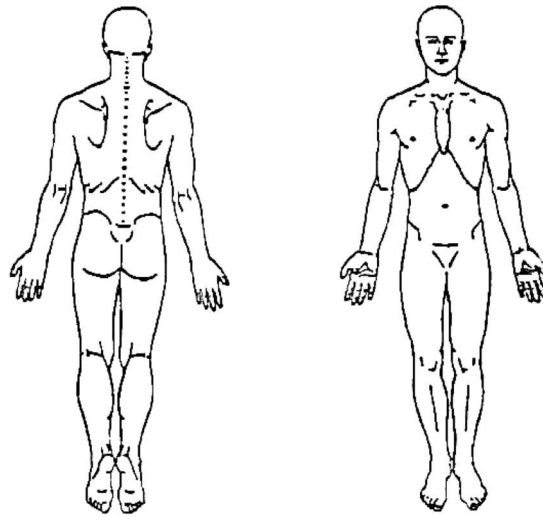
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10
Does not interfere									Completely Interferes

6. Are you **not working or unable to work** due to pain or a pain condition?

Yes

No

AXIS 2 - PAIN DRAWING



AXIS 2 - PATIENT HEALTH QUESTIONNAIRE-4 (PHQ-4)

PHQ-4: The four-item patient health questionnaire for anxiety and depression

Over the past two weeks how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious or on edge	0	1	2	3
Not being able to stop or control worrying	0	1	2	3
Feeling down, depressed or hopeless	0	1	2	3
Little interest or pleasure in doing things	0	1	2	3
TOTALS				

Total score is determined by adding together the score of each of the 4 items.

Scores are rated as normal (0-2), mild (3-5), moderate (6-8), and severe (9-12)

Total scores ≥ 3 for the first 2 questions suggests anxiety.

Total scores ≥ 3 for the last 2 questions suggests depression.

AXIS 2 - JAW FUNCTIONAL LIMITATION SCALE (JFLS)

Jaw Functional Limitation Scale – 20

For each of the items below, please indicate the level of limitation **during the last month**. If the activity has been completely avoided because it is too difficult, then circle '10'. If you avoid an activity for reasons other than pain or difficulty, leave the item blank.

		No limitation										Severe limitation
1.	Chew tough food	0	1	2	3	4	5	6	7	8	9	10
2.	Chew hard bread	0	1	2	3	4	5	6	7	8	9	10
3.	Chew chicken (e.g., prepared in oven)	0	1	2	3	4	5	6	7	8	9	10
4.	Chew crackers	0	1	2	3	4	5	6	7	8	9	10
5.	Chew soft food (e.g., macaroni, canned or soft fruits, cooked vegetables, fish)	0	1	2	3	4	5	6	7	8	9	10
6.	Eat soft food requiring no chewing (e.g., mashed potatoes, apple sauce, pudding, pureed food)	0	1	2	3	4	5	6	7	8	9	10
7.	Open wide enough to bite from a whole apple	0	1	2	3	4	5	6	7	8	9	10
8.	Open wide enough to bite into a sandwich	0	1	2	3	4	5	6	7	8	9	10
9.	Open wide enough to talk	0	1	2	3	4	5	6	7	8	9	10
10.	Open wide enough to drink from a cup	0	1	2	3	4	5	6	7	8	9	10
11.	Swallow	0	1	2	3	4	5	6	7	8	9	10
12.	Yawn	0	1	2	3	4	5	6	7	8	9	10
13.	Talk	0	1	2	3	4	5	6	7	8	9	10
14.	Sing	0	1	2	3	4	5	6	7	8	9	10
15.	Putting on a happy face	0	1	2	3	4	5	6	7	8	9	10
16.	Putting on an angry face	0	1	2	3	4	5	6	7	8	9	10
17.	Frown	0	1	2	3	4	5	6	7	8	9	10
18.	Kiss	0	1	2	3	4	5	6	7	8	9	10
19.	Smile	0	1	2	3	4	5	6	7	8	9	10
20.	Laugh	0	1	2	3	4	5	6	7	8	9	10

AXIS 2 - ORAL BEHAVIORS CHECKLIST (OBC)

The Oral Behavior Checklist

How often do you do each of the following activities, based on **the last month**? If the frequency of the activity varies, choose the higher option. Please place a (✓) response for each item and do not skip any items.

Activities During Sleep		None of the time	< 1 Night /Month	1-3 Nights /Month	1-3 Nights /Week	4-7 Nights/ Week
1	Clench or grind teeth when asleep , based on any information you may have	☐	☐	☐	☐	☐
2	Sleep in a position that puts pressure on the jaw (for example, on stomach, on the side)	☐	☐	☐	☐	☐
Activities During Waking Hours		None of the time	A little of the time	Some of the time	Most of the time	All of the time
3	Grind teeth together during waking hours	☐	☐	☐	☐	☐
4	Clench teeth together during waking hours	☐	☐	☐	☐	☐
5	Press, touch, or hold teeth together other than while eating (that is, contact between upper and lower teeth)	☐	☐	☐	☐	☐
6	Hold, tighten, or tense muscles without clenching or bringing teeth together	☐	☐	☐	☐	☐
7	Hold or jut jaw forward or to the side	☐	☐	☐	☐	☐
8	Press tongue forcibly against teeth	☐	☐	☐	☐	☐
9	Place tongue between teeth	☐	☐	☐	☐	☐
10	Bite, chew, or play with your tongue, cheeks or lips	☐	☐	☐	☐	☐
11	Hold jaw in rigid or tense position, such as to brace or protect the jaw	☐	☐	☐	☐	☐
12	Hold between the teeth or bite objects such as hair, pipe, pencil, pens, fingers, fingernails, etc	☐	☐	☐	☐	☐
13	Use chewing gum	☐	☐	☐	☐	☐
14	Play musical instrument that involves use of mouth or jaw (for example, woodwind, brass, string instruments)	☐	☐	☐	☐	☐
15	Lean with your hand on the jaw, such as cupping or resting the chin in the hand	☐	☐	☐	☐	☐
16	Chew food on one side only	☐	☐	☐	☐	☐
17	Eating between meals (that is, food that requires chewing)	☐	☐	☐	☐	☐
18	Sustained talking (for example, teaching, sales, customer service)	☐	☐	☐	☐	☐
19	Singing	☐	☐	☐	☐	☐
20	Yawning	☐	☐	☐	☐	☐
21	Hold telephone between your head and shoulders	☐	☐	☐	☐	☐

SUBJECTIVE EXAMINATION

Onset

Mechanism of injury

Dental history

Personal habits/stress level/functional status

Location

Pain pattern

Ear symptoms – tinnitus, blockage, fullness

Quality

Aching

Sharp

Radiation

Associated Symptoms

Headaches/migraines

Numbness/paraesthesia

Tinnitus

Eye Symptoms

Occlusion/Teeth

*Dizziness, light-headedness,
nausea*

Aggravating Factors

Posture

Eating

Talking

Movement

Sleeping

Stress

Easing Factors

Position

Heat/Ice

Relaxation

Prior Treatments

Splint

PT/Massage/Chiro

Injections

Medications

Past Medical History

Autoimmune Disorders

Degenerative Arthritis

Diabetes

Hypothyroid

Fibromyalgia

Sleep Apnea

Cardiac Disease

Migraines/Headaches

Past Psychiatric History

Depression/Anxiety

Stress

OBJECTIVE EXAMINATION

Observation:

Postural

Forward head posture

Imbalances

Breathing Pattern

Mouth breather

Apical breather

Types of Occlusion (Magee pg. 191)

Overbite

Underbite

Crossbite

Facial asymmetry/facial profile

Vertical Dimension of the face (Magee pg. 190)

Orthognathic, Prognathic, and Retrognathic (Magee pg. 192)

Trigeminal nerve facilitation pattern

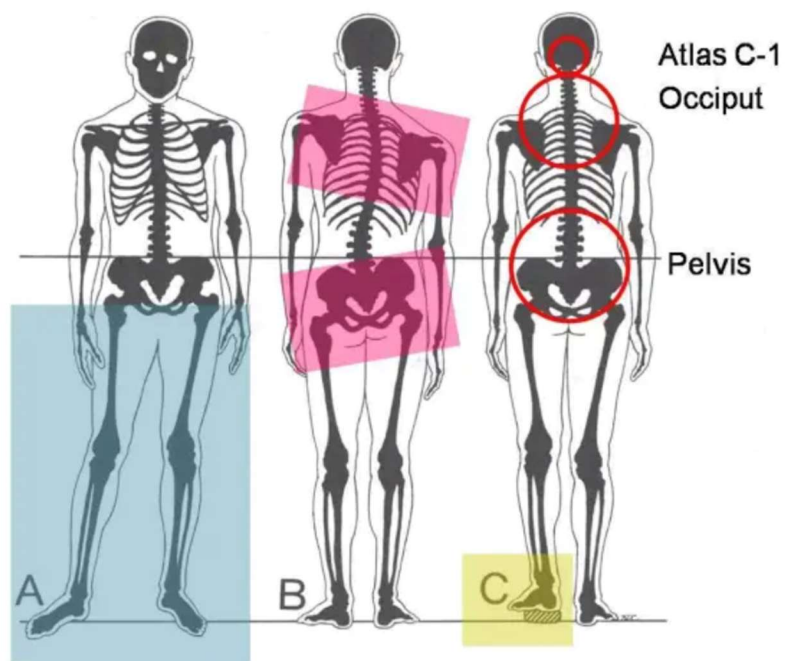
Mandibular deviation

Teeth Examination

Dental work

Missing teeth

False teeth



RANGE OF MOTION

Movements

Depression (opening)

Elevation (closing)

Protrusion

Retrusion

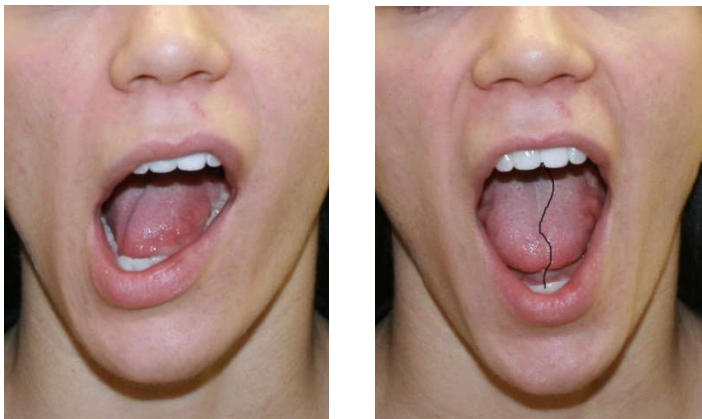
Lateral Excursion

Observe quality of movement

Measure movement

Add overpressure

RANGE OF MOTION - QUALITY OF MOVEMENT



RANGE OF MOTION – MEASURING



RANGE OF MOTION WITH OVERPRESSURE

Depression



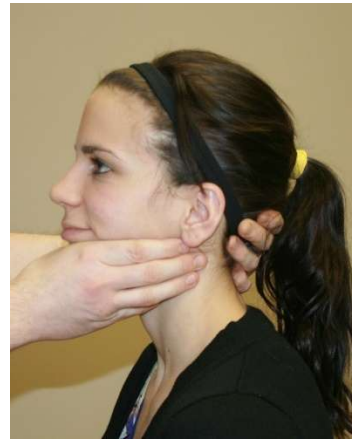
Elevation



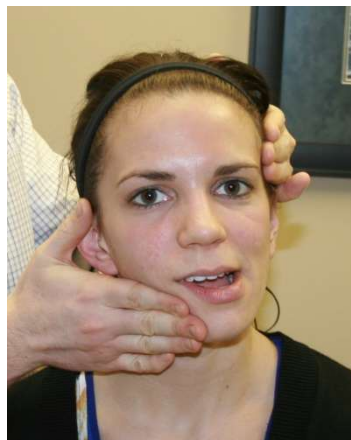
Protrusion



Retrusion



Lateral Excursion



OBJECTIVE TESTS

Strength

Resisted isometric testing

Depression

Elevation

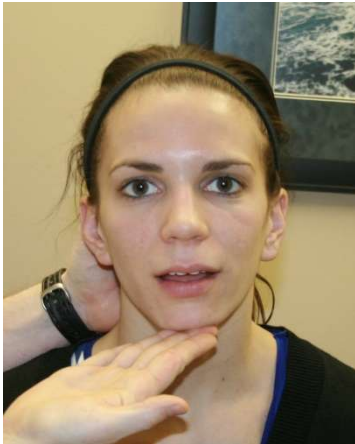
Protrusion

Retrusion

Lateral Excursion

RESISTED ISOMETRICS

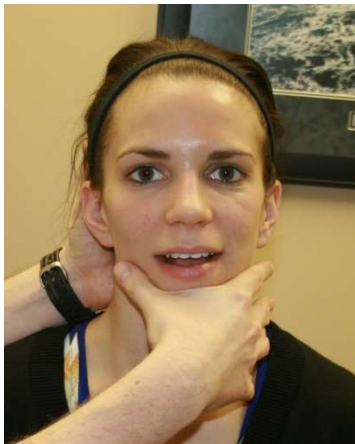
Depression



Elevation



Protrusion



Retrusion



Lateral Excursion



SPECIAL TESTS

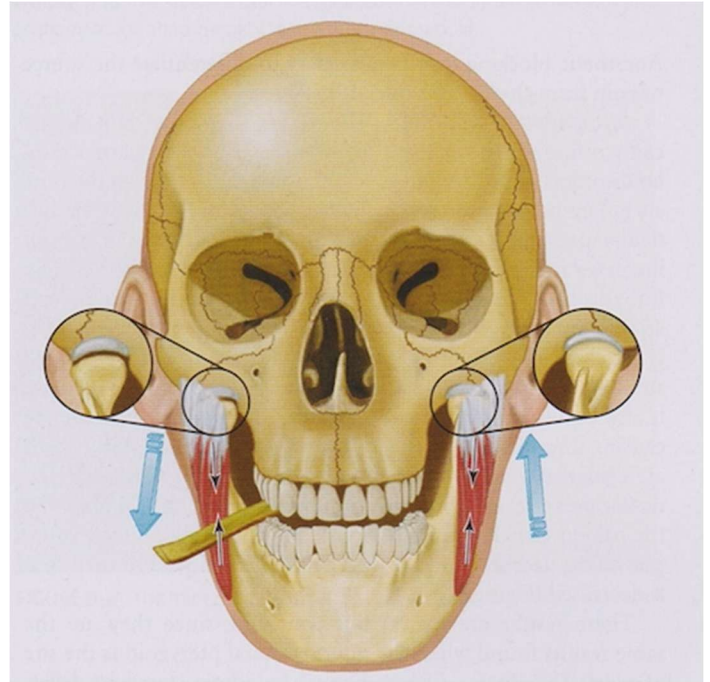
LOADING TEST

Patient to clench teeth, if there is pain:

Patient to bite down on a tongue depressor on the side of pain

If the pain persists, likely one of the elevator muscles is pain generator

If the pain relents, the joint is likely the source of the pain



PALPATION TEST

Examiner stands in front of the patient, with his/her fifth digits in the patient's ears.

Patient opens and close the mouth while the therapist provides pressure anteriorly with pads of the fifth digit bilaterally

If pain or discomfort is noted, the posterior aspect of the joint is the source of the pain



LIGAMENT STRESS TESTS

Lateral (Temporomandibular) Ligament

Open mouth to end range

Stabilize the head and palpate temporomandibular joint with top hand

Place thumb on top of bottom molars

Glide mandible in caudal direction

Technique may be performed sitting, side lye or supine

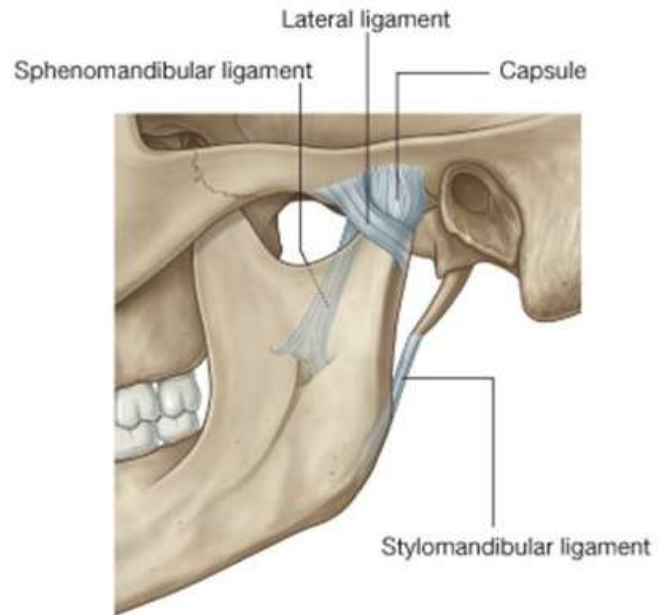
Stylomandibular and Sphenomandibular Ligaments

Stabilize the head and palpate temporomandibular joint with top hand

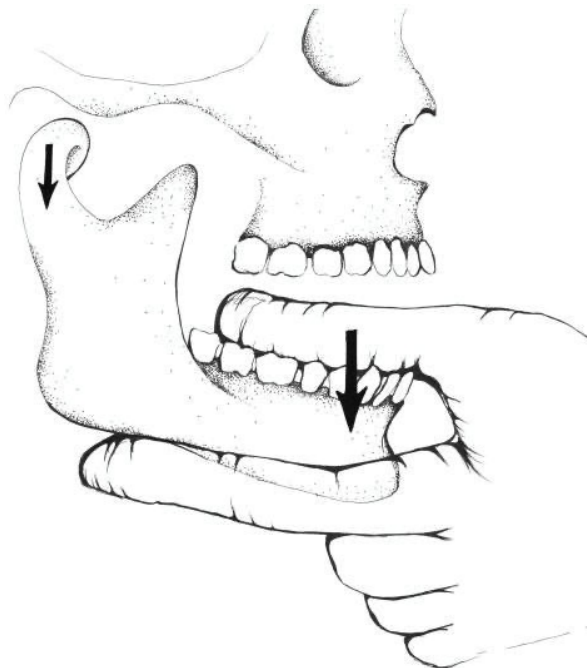
Place thumb on top of bottom molars

Glide direction along line of the mandible

Technique may be performed sitting, side lye or supine

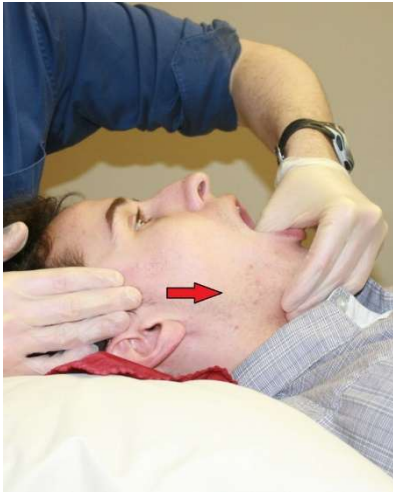


HAND POSITIONING FOR LIGAMENT TESTING/GLIDE TECHNIQUES



LIGAMENT STRESS TESTS

Lateral/Temporomandibular Ligament



Stylo/Sphenomandibular Ligaments



PASSIVE ACCESSORY GLIDES

Distraction

Rolling/Rotation in early opening

Testing inferior joint space

Distraction + Anterior Glide

Opening glide

Testing superior joint space

Posterior Superior Glide

Closing glide

Compressing retro-discal tissues

PASSIVE ACCESSORY GLIDES – DISTRACTION

Stabilize the head and palpate temporomandibular joint with top hand

Place thumb on top of bottom molars

Glide mandible in caudal direction

Technique may be performed sitting, side lye or supine



PASSIVE ACCESSORY GLIDES - DISTRACTION + ANTERIOR GLIDE



Stabilize the head and palpate temporomandibular joint with top hand

Place thumb on top of bottom molars

Glide mandible in caudal direction first and then add anterior glide

Technique may be performed sitting, side lye or supine

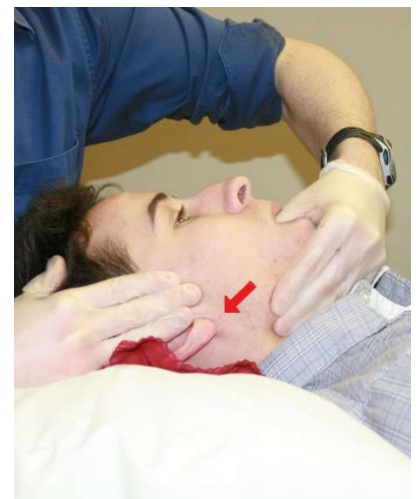
PASSIVE ACCESSORY GLIDES - POSTERIOR SUPERIOR GLIDE

Stabilize the head and palpate temporomandibular joint with top hand

Place thumb on top of bottom molars

Glide mandible in caudal direction first and then add posterior glide

Technique may be performed sitting, side lye or supine



NEUROLOGICAL TESTING

Sensation testing

Reflexes

Clonus

Cranial nerve testing

NEUROLOGICAL TESTING

Sensation



Reflexes



Clonus



CRANIAL NERVE TESTING (MAGEE)

- I** smell with eyes closed
- II** read something with one eye closed
- III** eye movements; note any ptosis
- IV** eye movements; note any ptosis
- V** contract muscles of mastication
- VI** eye movements; note any ptosis
- VII** move eyebrows ↑/↓, purse lips, show teeth
- VIII** eyes closed; talk to the patient and have them repeat what is said
- IX** have patient swallow
- X** have patient swallow
- XI** have patient contract SCM
- XII** have patient stick out tongue and move it right and left

PALPATION

Superior and posterior aspect of the mandibular condyle

Intra-oral and/or extra oral palpation of muscles of mastication

Masseter

Temporalis

Medial Pterygoid

Lateral Pterygoid

Digastric

Facial Muscles

Procerus

Corrugator Supercilli

Zygomatic

PRESSURE PAIN THRESHOLD



TREATMENT TECHNIQUES - MOBILIZATION

MOBILIZATION TECHNIQUES

Distraction

to improve rolling (early opening)

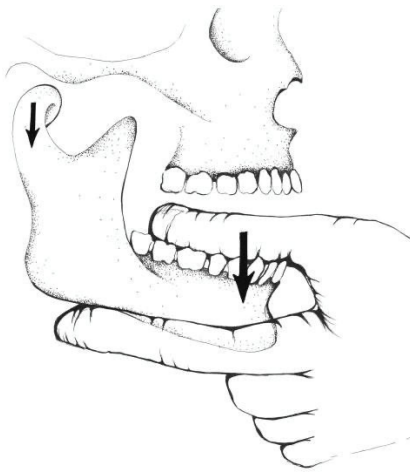
Distraction + Anterior Translation

To improve opening

Distraction + Anterior Translation + Lateral Glide

To improve opening +/- contralateral lateral excursion

HAND POSITIONING FOR MOBILIZATIONS



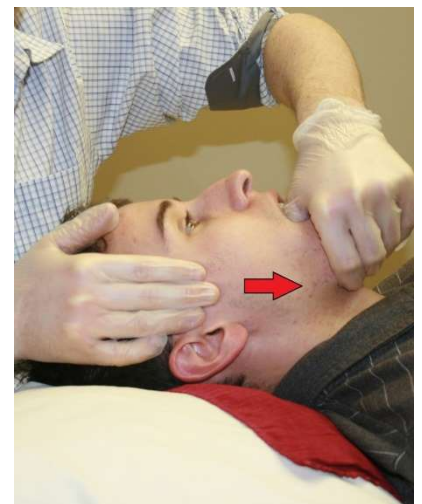
DISTRACTION

Stabilize the head and palpate temporomandibular joint with top hand

Place thumb on top of bottom molars

Glide mandible in caudal direction

Technique may be performed sitting, side lye or supine



DISTRACTION + ANTERIOR GLIDE

Stabilize the head and palpate temporomandibular joint with top hand

Place thumb on top of bottom molars

Glide mandible in caudal direction first and then add anterior glide

Technique may be performed sitting, side lye or supine



DISTRACTION + ANTERIOR + LATERAL GLIDE



Stabilize the head and palpate temporomandibular joint with top hand

Place thumb on top of bottom molars

Glide mandible in caudal direction first and then add anterior glide. You can then add a lateral force (from contact point on inner teeth)

Technique may be performed sitting, side lye or supine

TREATMENT TECHNIQUES - SOFT TISSUE RELEASE

EXTRA-ORAL SOFT TISSUE RELEASE TECHNIQUES

Active Muscle Release and Trigger Point Release Techniques

Masseter

Locate a trigger point in the masseter muscle

Use your index and/or middle fingers to palpate to the depth of the trigger point

Apply a cranial force while patient opens their mouth as wide as they can

Temporalis

Locate a trigger point in the temporalis muscle

Use your index and/or middle fingers to palpate to the depth of the trigger point

Apply a cranial force while patient opens their mouth as wide as they can

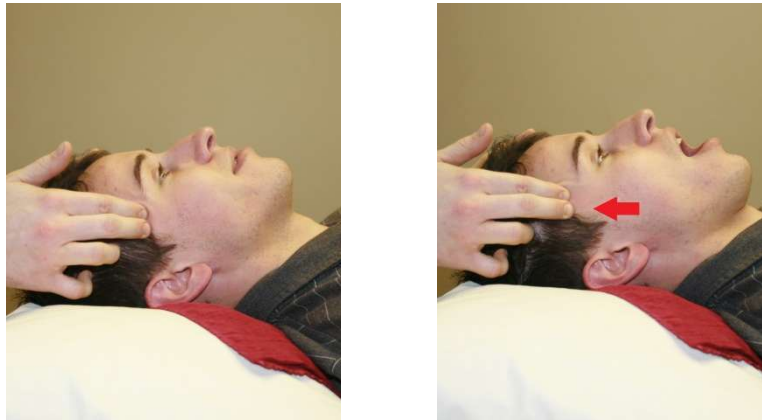
Medial Pterygoid

Palpate the angle of the mandible then with your index or middle finger, slip medial and posterior into the medial pterygoid trigger point. Hold on trigger point until pain subsides for the patient.

MASSETER ACTIVE MUSCLE RELEASE TECHNIQUE



TEMPORALIS ACTIVE MUSCLE RELEASE TECHNIQUE



MEDIAL PTERYGOID MUSCLE RELEASE TECHNIQUE



INTRA-ORAL SOFT TISSUE RELEASE TECHNIQUES

Muscle Release Techniques

Masseter

Palpate masseter muscle intra-orally using a pincher grasp

Find Trigger point and "squeeze" between thumb and index finger

Stripping technique

Temporalis

Locate tendon of temporalis with your thumb intra-orally

Use pincher grasp to stabilize

Use other hand to strip through the fibers of temporalis muscle extra-oral

Lateral Pterygoid

Gently follow the upper molars with the dorsal aspect of the thumb posteriorly until your thumb "falls off" the upper molars.

Gently push posteriorly until resistance is met.

INTRA-ORAL RELEASE TECHNIQUE



HYOID SOFT TISSUE RELEASE TECHNIQUES

Muscle Release Techniques

Suprahyoid Muscles

Palpate the hyoid bone. Apply a gentle caudal load to the hyoid as you gently strip the suprahyoid muscles in a superior direction.

Perform technique unilaterally

Infrahyoid Muscles

Palpate the hyoid bone. Apply a gentle cranial load to the hyoid as you gently strip the infrahyoid muscles in an inferior direction.

Perform technique unilaterally

Suprahyoid Release



Infrahyoid Release



TREATMENT TECHNIQUES - DRY NEEDLING

CORRUGATOR SUPERCILLI

Anatomy



Referred Pain

It is projected over the forehead and deep into the head inducing frontal headaches

Supine

Pincer palpation

Needle inserted perpendicular to the skin from either the medial or lateral aspect of the muscle, directed towards its mid-portion

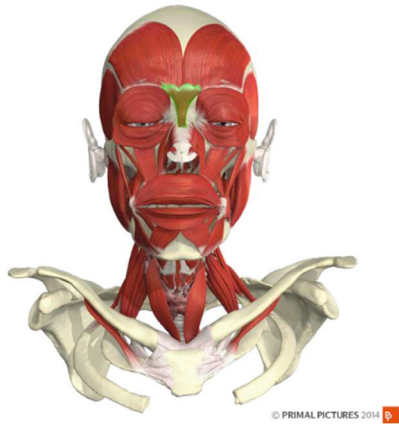
Needle is inserted through the skin at a shallow angle and advanced into the muscle belly

Precautions: None



PROCERUS MUSCLE

Anatomy



Referred Pain

It is projected over the forehead and deep into the head inducing frontal headaches

Supine

Pincer Palpation

Needle inserted perpendicular to the skin from superior to inferior, coming from the forehead toward the nose

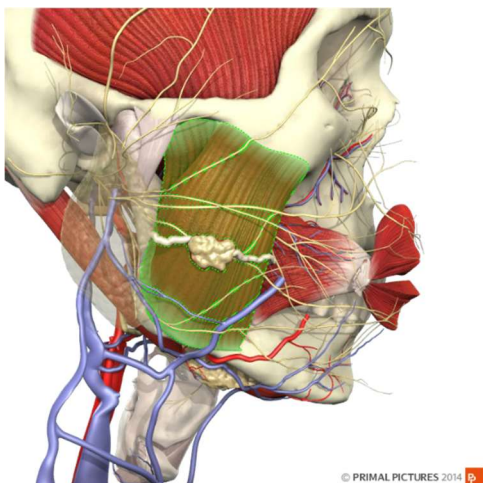
Needle inserted through the skin at a shallow angle and advanced into the muscle belly

Precautions: None

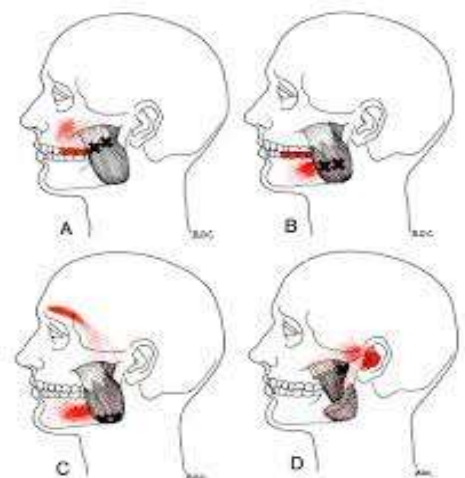


MASSETER MUSCLE

Anatomy



Referred Pain



Supine

Flat Palpation

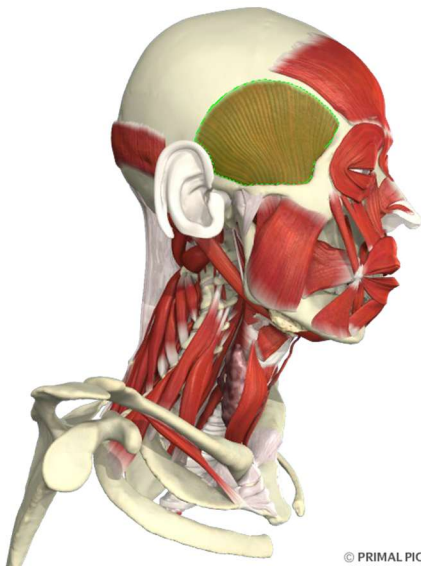
Needle inserted perpendicular to the skin
towards the muscle belly

Precautions: None

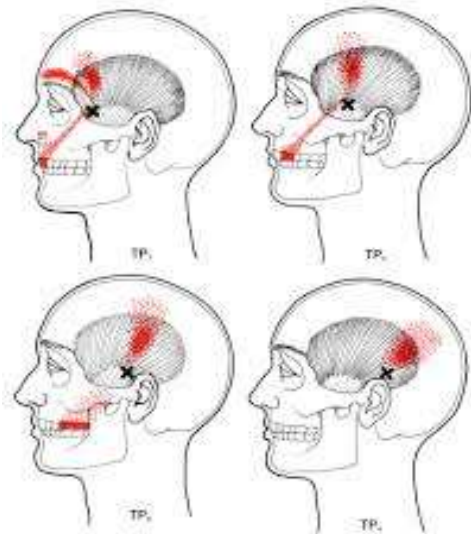


TEMPORALIS MUSCLE

Anatomy



Referred Pain



Supine

Flat Palpation

Needle inserted perpendicular to the skin
towards temporal fossae

Precautions: Superficial temporal artery
should be identified and avoided



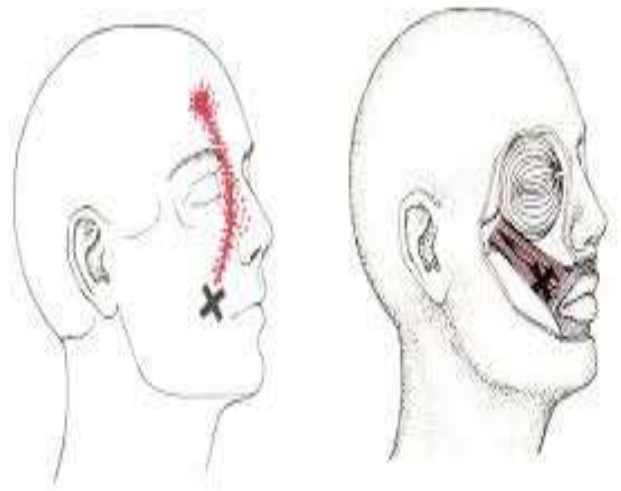
ZYGOMATIC MUSCLES

Anatomy



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Referred Pain



Supine

Pincer or Flat Palpation

With pincer palpation, one digit is inside the mouth against buccal mucosa and one digit is on the external surface of the skin

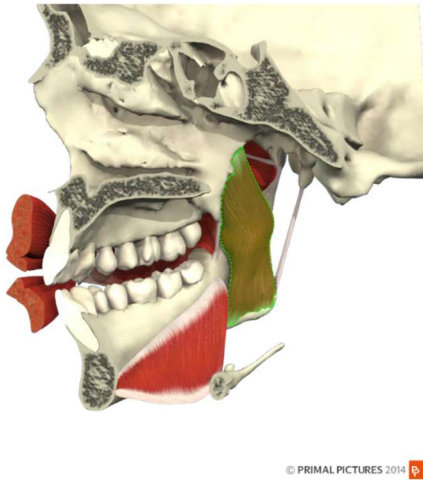
With flat palpation, needle inserted perpendicular to the skin toward the zygomatic bone

Precautions: None

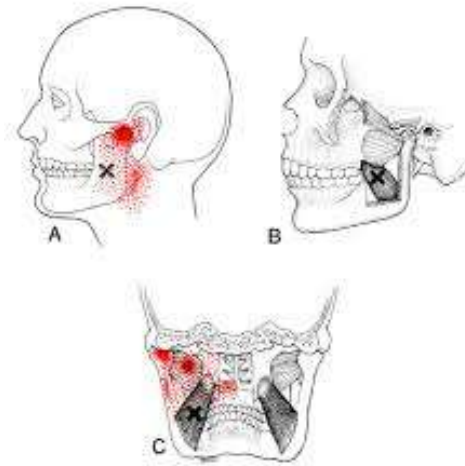


MEDIAL PTERYGOID MUSCLE

Anatomy



Referred Pain



Supine (with neck extended)

Flat palpation

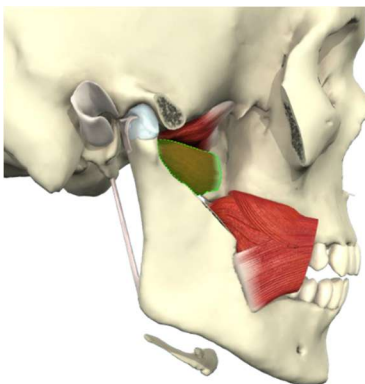
Needle inserted through the skin at a shallow angle toward the medial surface of the ramus and angle of the mandible

Precautions: None

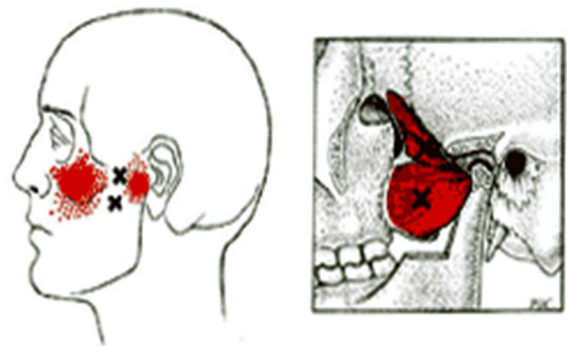


LATERAL PTERYGOID MUSCLES

Anatomy



Referred Pain

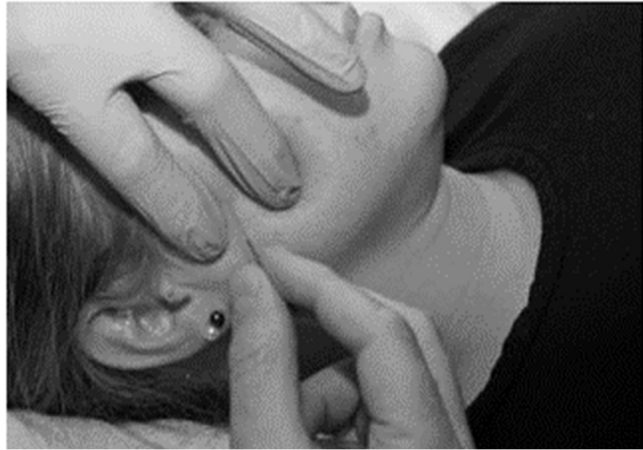


Supine

Flat Palpation

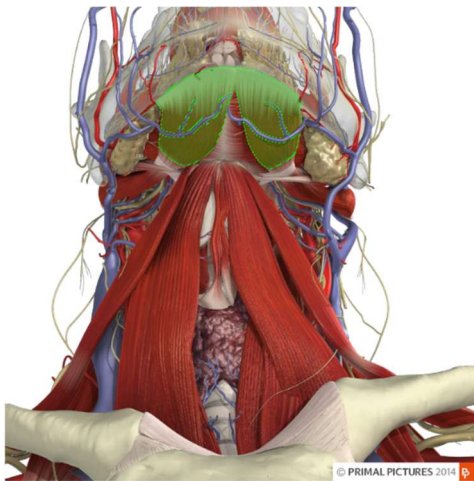
Needle inserted perpendicular to the skin through the mandibular fossa which is located anterior to the temporomandibular joint

Precautions: None. Needling of the temporomandibular joint can be avoided by accurately locating the mandibular fossa.

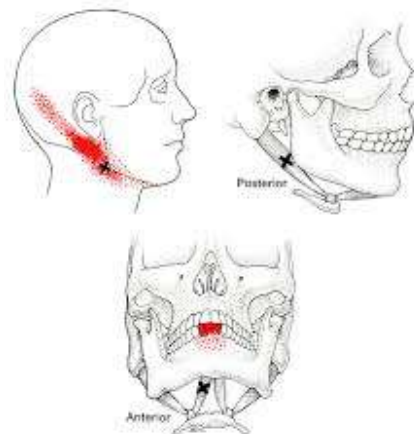


DIGASTRIC MUSCLE (ANTERIOR BELLY)

Anatomy



Referred Pain



Supine with head and neck slightly extended

Flat palpation

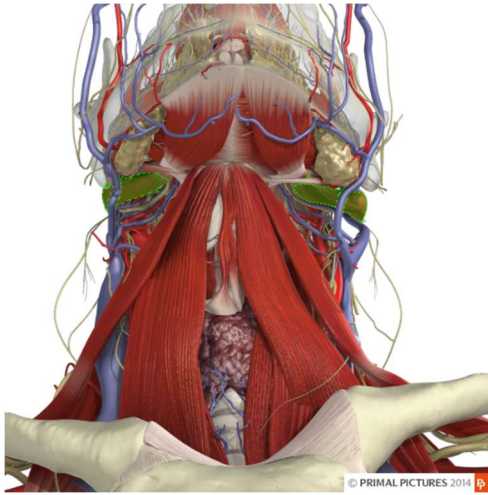
Needle inserted perpendicular to the skin toward the lower part of the mandible

Precautions: Shallow technique to avoid needling through the muscle

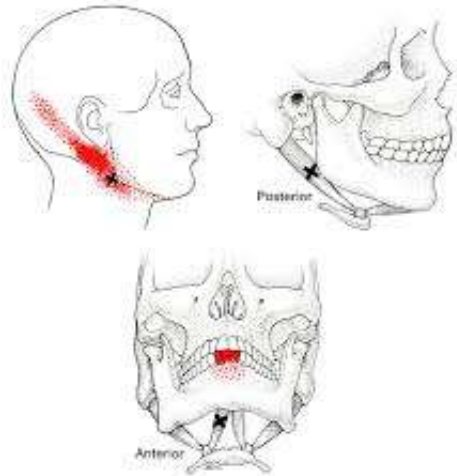


DIGASTRIC MUSCLE (POSTERIOR BELLY)

Anatomy



Referred Pain



Supine

Flat palpation

Needle inserted perpendicularly to the mastoid process towards the transverse process of the atlas. It can also be needled mid-belly using a flat palpation technique.

Precautions: Shallow depth to avoid needling through the muscle. Caution to avoid the external jugular vein



TREATMENT TECHNIQUE – EXERCISE

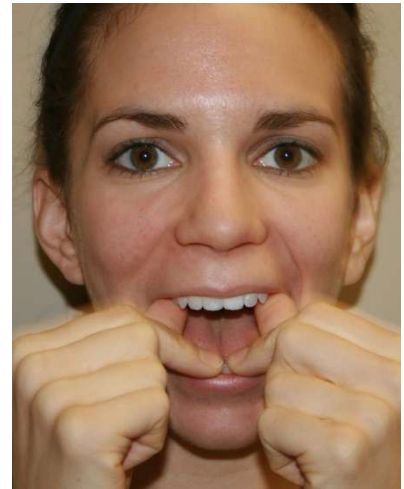
ROM - OPENING STRETCH

Position thumbs on upper teeth and index fingers on lower teeth as show.

Push open mouth until you feel resistance. A mild to moderate discomfort should be felt.

Hold 10 seconds, 5 repetitions.

Repeat 2-3 times per day.



ROM - OPENING STRETCH (THERABITE DEVICE)



ROM - OPENING STRETCH (TONGUE DEPRESSORS)



ROM - PROTRUSION STRETCH



Move one or both sides of lower jaw forward (lower teeth move ahead of upper teeth).

Position index finger on cheek bones and thumb behind jaw bone.

Push forward with the thumb to feel overpressure in the direction of the movement.

Repeat other side as required

Hold 10 seconds, 5 repetitions.

Repeat 2-3 times per day.

ROM - RETRUSION STRETCH

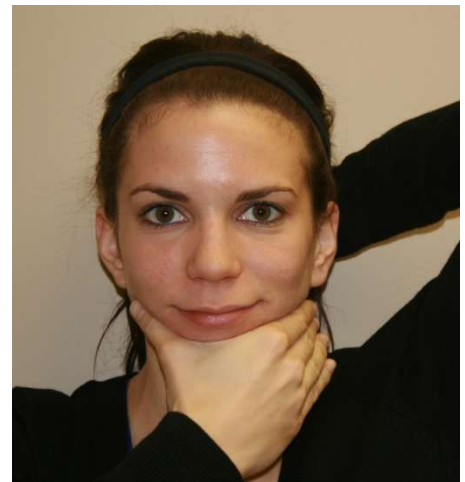
Move one or both sides of jaw backwards (upper teeth move behind lower teeth).

Use the base of the hand on chin to direct the force towards the back of your head

Repeat on other side as required

Hold 10 seconds, 5 repetitions.

Repeat 2-3 times per day.



ROM - LATERAL EXCURSION STRETCH

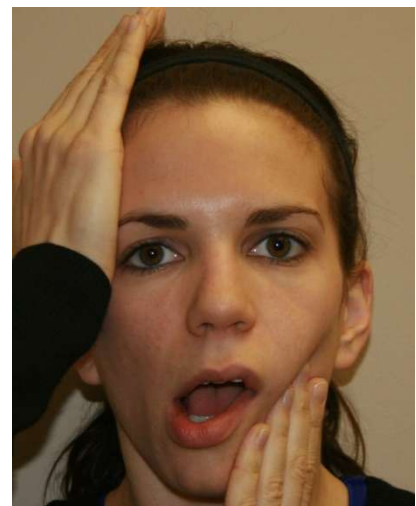
Move jaw to the right side and provide gentle overpressure in the direction of the movement.

Stabilize the temple with the base of the hand and use the opposite hand to move the lower part of the jaw to the side.

Repeat on other side as required

Hold 10 seconds, 5 repetitions.

Repeat 2-3 times per day.



NEUROMUSCULAR CONTROL - CONTROLLED OPENING

Press the tongue to the roof of the mouth just behind the teeth

Open the mouth and maintain tongue position

Repeat 10 times



NEUROMUSCULAR CONTROL EXERCISES – FACIAL MOTOR TRAINING (MIRROR)

Mouth opening exercise with lingual guide. Mouth opening movement with the tongue towards the palate. One set/eight repetitions.

Lateral jaw movement. Lateral jaw movement with a tongue depressor between the incisors to guide the movement. One set/eight repetitions each side.

Lateral tongue strengthening. Extrabuccal tongue lateral isometric force towards a tongue depressor placed (held vertically). One set/10 repetitions holding 10 s each. Ten-second rest in between.

Lateral jaw mobilization exercise with lingual guide. Jaw lateral movement with a lateral protrusion of the tongue to guide the movement to the same side. One set/eight reps.

Tongue strengthening exercise. With an anterior protrusion of the tongue a depressor placed on the tongue, an isometric force upwards and against the depressor. One set/10 repetitions holding 10 s each. Ten-second rest in between.

Lateral jaw movement strengthening. Jaw lateral movement with a slight external resistance to permit resisted movement. One set/eight repetitions each side.

Tongue protrusion strengthening. Isometric force with a tongue protrusion towards a tongue depressor (held vertically). One set/10 repetitions holding 10 s each. Ten-second rest in between.

Lip strength exercise.
Isometric exercise holding the lips in a closed and thigh position with a tongue depressor between them. One set/10 repetitions holding 10 s each. Ten-second rest.



STRENGTHENING – ISOMETRIC OPENING



Open mouth approximately 1 finger width, with the tongue on the roof of the mouth

Resist movement of your jaw with your hand with minimal to moderate pressure

Hold for 5 seconds and repeat 10 times

Do 2-3 times per day

STRENGTHENING - ISOMETRIC PROTRUSION

Open mouth approximately 1 finger width, with the tongue on the roof of the mouth

Resist movement of your jaw with your hand with minimal to moderate pressure

Hold for 5 seconds and repeat 10 times

Do 2-3 times per day



STRENGTHENING - ISOMETRIC CLOSING



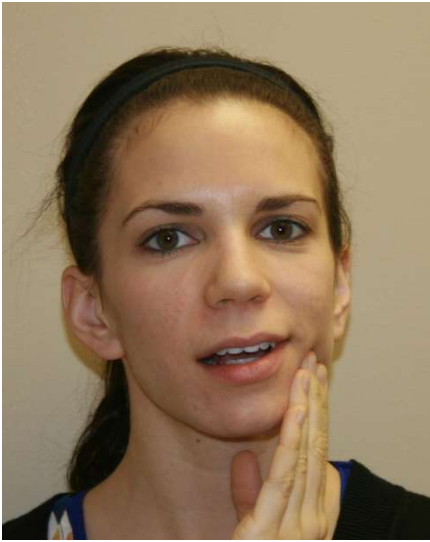
Open mouth approximately 1 finger width, with the tongue on the roof of the mouth

Resist movement of your jaw with your hand with minimal to moderate pressure

Hold for 5 seconds and repeat 10 times

Do 2-3 times per day

STRENGTHENING - ISOMETRIC LATERAL EXCURSION



Open mouth approximately 1 finger width, with the tongue on the roof of the mouth

Resist movement of your jaw with your hand with minimal to moderate pressure

Hold for 5 seconds and repeat 10 times

Do 2-3 times per day

STRENGTHENING - ISOMETRIC RETRUSION

Open mouth approximately 1 finger width, with the tongue on the roof of the mouth

Resist movement of your jaw with your hand with minimal to moderate pressure

Hold for 5 seconds and repeat 10 times

Do 2-3 times per day



POSTURAL CONTROL - DEEP NECK FLEXORS



Lay flat on your back

Tuck your chin in

Hold for 10 seconds and repeat 10 times

Do 2-3 times per day

POSTURAL CONTROL - SCAPULAR SETTING

Start sitting with your arms at your side

Keeping shoulders down, squeeze your shoulder blades together

Hold for 10 seconds and repeat 10 times

Do 2-3 times per day



Table 1 Rocabado's 6X6 exercise program

Name	Exercise description/purpose
Rest position of the tongue	The anterior 1/3 of the tongue is placed at the palate with mild pressure, which rests the tongue and jaw musculature and promotes diaphragmatic breathing
Control of TMJ rotation	The jaw is repeatedly opened and closed with the anterior 1/3 of the tongue on the palate, which decreases initiating jaw movements (e.g. protrusive movement in opening, talking, or chewing)
Rhythmic stabilization technique	Gentle isometrics in the resting position are performed for jaw opening, closing, and lateral deviation to promote muscular relaxation via reciprocal inhibition, which promotes an improved resting position of the jaw through proprioceptive input
Axial extension of the neck	Combined upper cervical flexion with lower cervical extension, allowing reduction of tension in the cervical musculature
Shoulder posture	Shoulder girdle retraction and depression to facilitate postural corrections
Stabilized head flexion	Upper cervical spine distraction via chin tuck (without additional cervical flexion), during which it is recommended that the fingers be laced behind the neck to stabilize C2-7 while the head nods

CLASSIFICATION OF TMJ DISORDERS

EVIDENCE BASED CLASSIFICATION

Arthralgia

Myalgia

Local myalgia

Myofascial pain

Myofascial pain with referral

Disc Displacement Disorders

Disc displacement with reduction

Disc displacement with reduction with intermittent locking

Disc displacement without reduction with limited opening

Disc displacement without reduction without limited opening

Degenerative Joint Disease

Subluxation

Headaches attributed to TMJ dysfunction

MOST COMMON CLINICAL PATTERNS

Arthrogenic

Hypomobility

Hypermobility

Myogenic

Myofascial pain

Disc Displacement Disorders

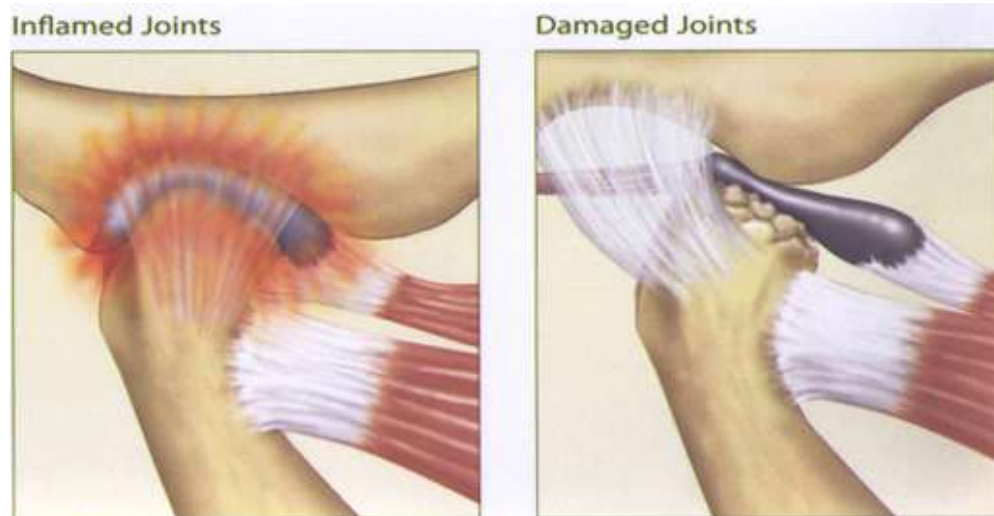
Disc displacement with reduction

Disc displacement without reduction

Degenerative Joint Disease

Headaches attributed to TMJ dysfunction

HYPOMOBILITY



SUBJECTIVE:

History of trauma, surgery, bruxism

+/- joint noises

Often found in the elderly

Reports of stiffness +/- pain

Often unilateral and often localized to the TMJ

OBJECTIVE:

Signs of ankylosis/contractures

Decreased opening ($n < 40\text{mm}$) and reduced lateral movements

Deviation towards the affected side on opening

Lateral excursion limited to the contra lateral side

May be combined with other syndromes

TREATMENT:

Muscular Release Techniques

AMRT, Intra-oral release techniques, massage, contract/relax, IMS

Mobilization to improve opening on hypomobile side

Distraction + Anterior glide

Therabite or Jaw Jack

Pain relieving modalities (TNS, Acupuncture)

Exercises (often)

Postural Correction, Stretching (opening, protrusion and lateral excursion), self-massage, controlled opening

Education

Postural Correction and HEP often (hourly)

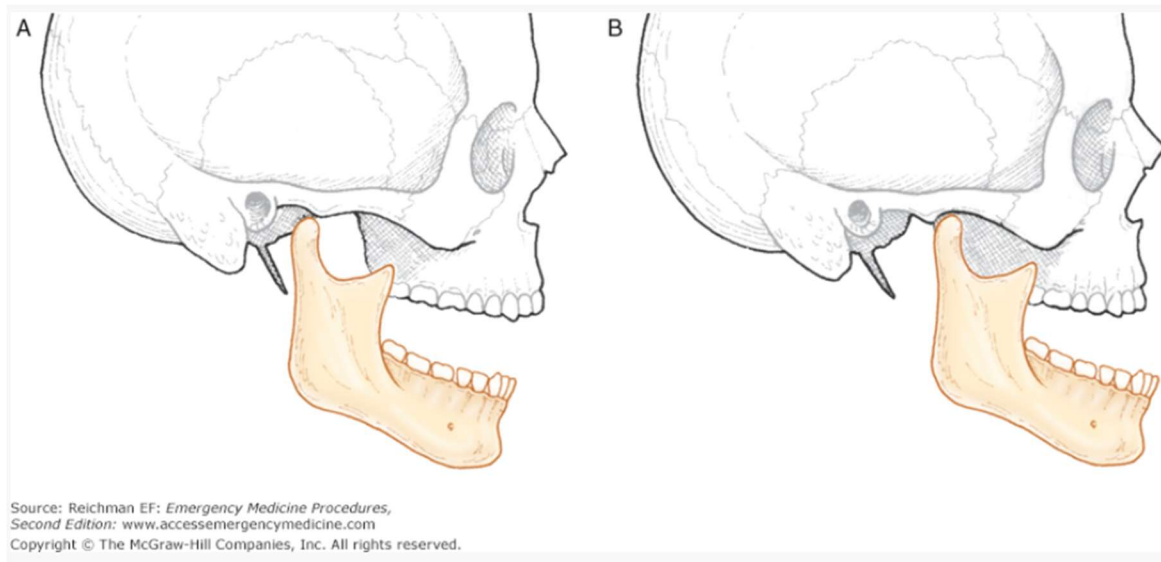
Splint Therapy

Injections

Arthrocentesis

Cortisone

HYPERMOBILITY/INSTABILITY (OPEN LOCK)



SUBJECTIVE:

History or trauma (ie. dental work/MVA) or habitually bad posture

+/- pain which can be related to the joint which tends to be localized

+/- myofascial pain which tends to be more diffuse and radiating

Often reports of a loud clunk at end of excessive opening

Possible lock in open position (anterior subluxation of condyle outside eminence)

General laxity of the joints

OBJECTIVE:

Atrophy and/or hypertrophy of masticatory muscles

ROM of opening in excess of 50mm

Excursion towards the non-affected side on opening

Incoordination and weakness of the jaw muscles

Excessive anterior translation and too little rotation

TREATMENT:

Muscular techniques

AMRT, intra-oral release techniques, massage, IMS

Mobilization of TMJ to improve opening only if unaffected side is hypomobile

Pain relieving modalities (TNS, Acupuncture)

Exercises

Postural correction, self-massage, controlled opening, isometric strengthening all movements

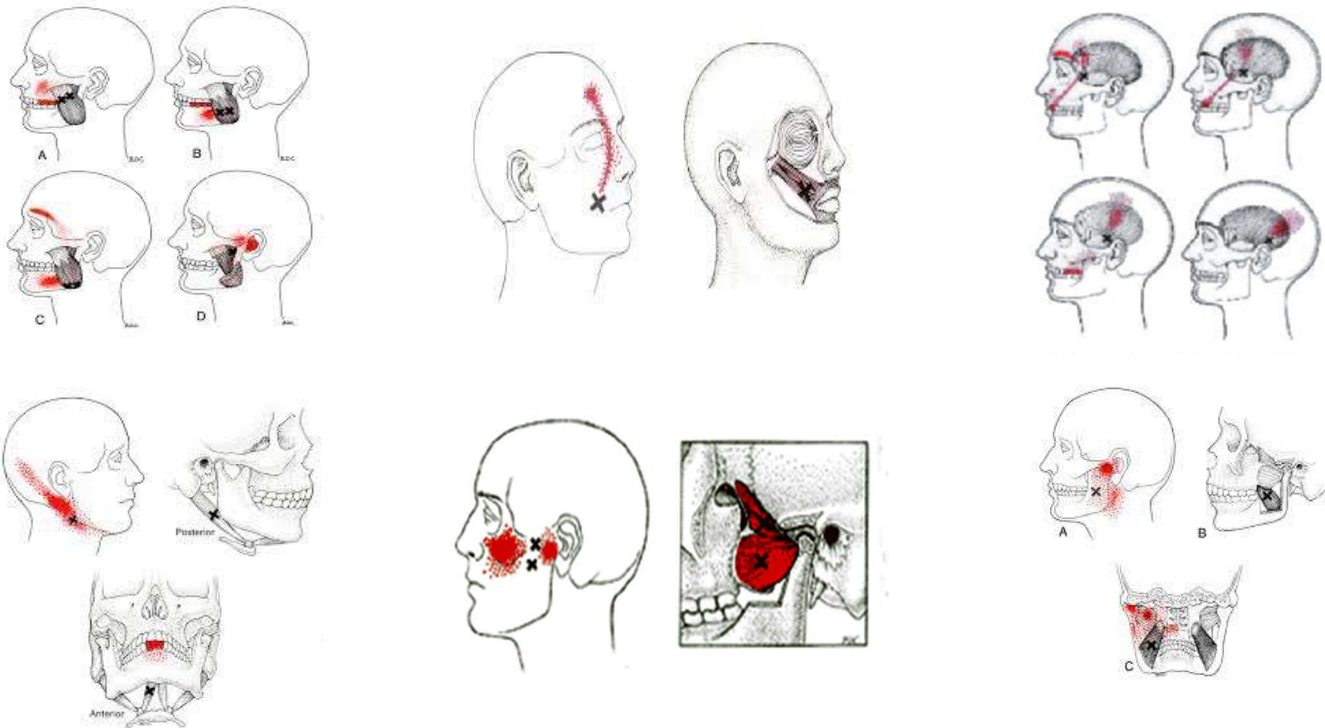
Education

Avoid full opening, yawning with cervical spine flexion, strengthening hyoids

Injections

Prolotherapy

MYOFASCIAL PAIN



SUBJECTIVE:

Usually gradual onset but sometimes trauma involved (ie. MVA)

Bruxism, parafunctional habits (stress)

Rarely joint noises

Facial pain, head pain, headache, referred pain patterns (teeth, ear, upper c/spine)

Postural syndrome, ergonomic contributing factors, repetitive postures

OBJECTIVE:

ROM often normal

No intra-articular dysfunction

Uncoordinated muscle function and reduced strength

Atrophy/hypertrophy

Signs and symptoms of c-spine dysfunction or cranial dysfunction

Trigger points +/- referred pain

TREATMENT:

Usually need to address cervical spine dysfunction as well as posture

Muscular techniques

AMRT, massage, contract/relax, IMS

Pain relieving modalities (TNS, Acupuncture)

Exercises (often)

Postural Correction, self-massage, controlled opening, isometrics, aerobic exercise

Education

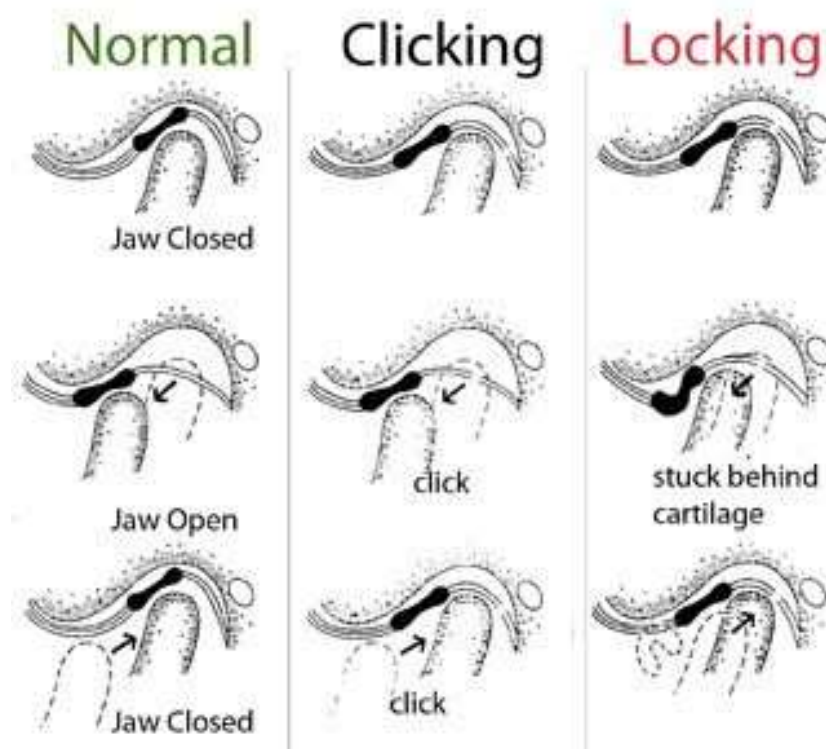
Eating soft food, posture correction

Splint Therapy

Injections

Trigger point injections

Botox

ANTERIOR DISC DISPLACEMENT (WITH REDUCTION)

SUBJECTIVE:

May be acute or chronic onset

+/- pain

Often with history of headache or c-spine problems (90%)

History of clicking and sometimes locking

OBJECTIVE:

Opening ROM often normal with a reciprocal click on opening and closing

Audible click with deflection during opening towards affected side

Usually unilateral problem

Often associated with intra-articular hypomobility in the inferior joint

TREATMENT: GET TO THE ROOT OF THE PROBLEM!!!

Usually need to address cervical spine dysfunction as well as posture 1st

Recapture the disc

Mobilization the inferior joint space

Distraction

Release tension in the masticatory muscles

AMRT, massage, contract/relax, IMS

Pain relieving modalities (TNS, Acupuncture)

Exercises

Postural correction, self-massage, controlled opening, clucking, isometric strengthening all movements, strengthen hyoids (Repeated swallowing)

Education

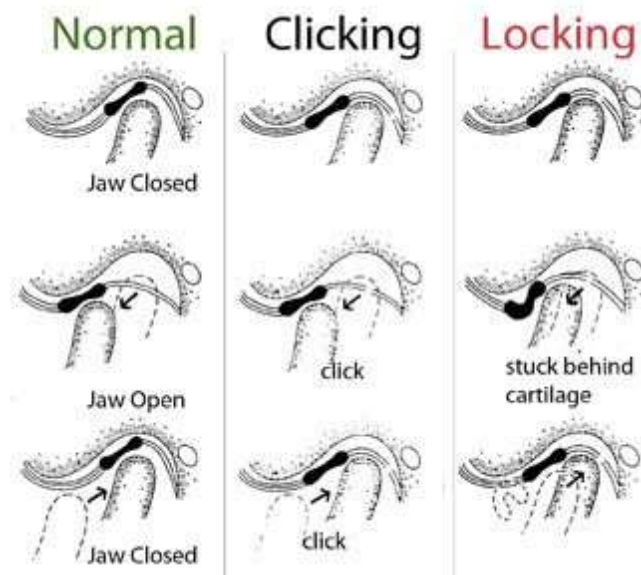
Eating softer foods, posture

Splint Therapy

Injections

Prolotherapy

ANTERIOR DISC DISPLACEMENT (WITHOUT REDUCTION) – CLOSED LOCK



SUBJECTIVE:

Often acute onset with history of trauma (ie. MVA, getting punched)

Subacute onset with long history of clicking and occasional locking

+/- pain

Decreased function (ie. opening and ability to chew)

OBJECTIVE

Severe limitation of opening (5-30mm)

Lack of anterior glide of the condyle (because disc is blocking movement)

Severe deviation of the jaw on opening towards the affected side

Limited lateral excursion away from the effected side

TREATMENT:

Muscular Release Techniques

AMRT, massage, contract/relax, IMS

Reduce the blockage with mobilization

Distraction and anterior glide

If disc does not reduce, mobilization to improve opening

Distraction and anterior glide

Therabite or Jaw jack

Pain relieving modalities (TNS, Acupuncture)

Exercises (often)

Postural Correction, self-massage, stretching (opening, contra lateral lateral excursion and protrusion), controlled opening

Splint Therapy

Anterior positioning splint used temporarily to recapture the disc

DEGENERATIVE JOINT DISEASE

SUBJECTIVE:

+/- joint noises

Often found in the elderly

Reports of stiffness +/- pain

Often bilateral but can be unilateral

OBJECTIVE:

Signs of ankylosis/contractures

Decreased opening (n<40mm) and reduced lateral movements

Deviation towards the affected side on opening (if unilateral)

Lateral excursion limited to the contra lateral side (if unilateral)

Decreased distraction as well as anterior glide

TREATMENT:

Muscular Release Techniques

AMRT, massage, contract/relax, IMS

Mobilization

Distraction and anterior glide

Pain relieving modalities (TNS, Acupuncture)

Exercises (often)

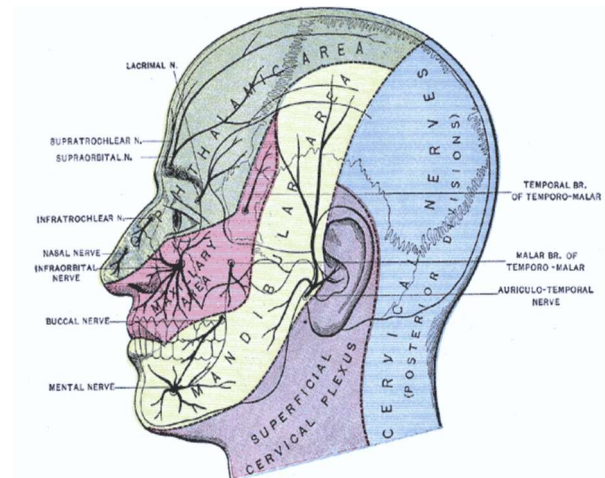
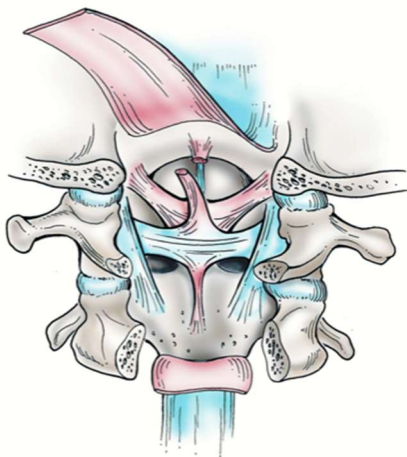
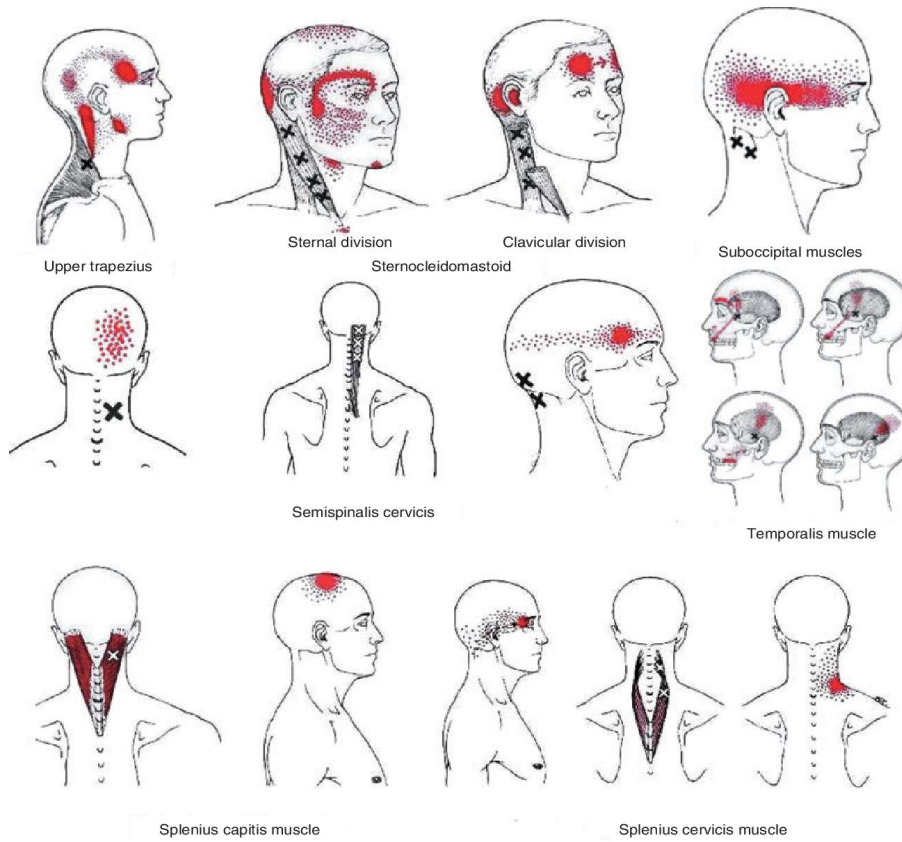
Postural Correction, self-massage, stretching (opening, contra lateral lateral excursion and protrusion), controlled opening

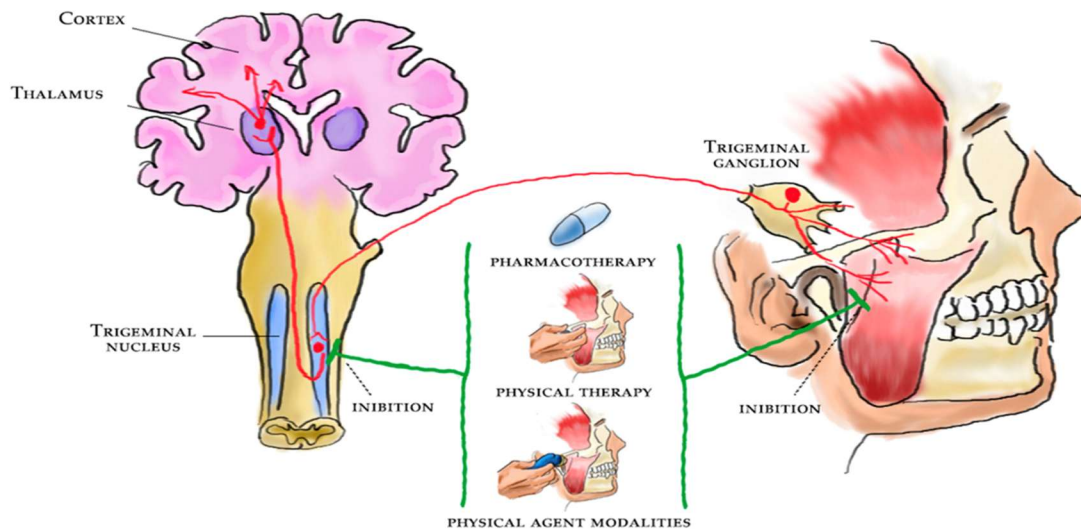
Splint Therapy

Injections

Cortisone, HA, PRP (for the treatment of pain)

HEADACHES +/-TMD





INTERNATIONAL CLASSIFICATION OF HEADACHE DISORDERS ICHD-3

PRIMARY HEADACHE	SECONDARY HEADACHE	PAINFUL CRANIAL HEADACHE
• Migraines • TTH • Trigeminal Autonomic Cephalalgias (Cluster, SUNCT, Short-lasting unilateral neuralgiform headache with conjunctival injection and tearing).	• Trauma to head or neck (whiplash) • Cranial or cervical vascular disorders (SAH, GCA, CA, VBI) • Non-vascular – CSF pressure, Neoplasia • Substance withdrawal (MOH, Alcohol induced) • Infection (Meningitis) • Disorders of Homeostasis (altitude) • Craniom, Cervical spine, Face, Teeth, Nose	• Trigeminal Neuralgia • Occipital Neuralgia • Other HA disorders not otherwise clarified.

RED FLAGS

VASCULAR/ANATOMICAL

- Raised BP
- Bloodshot eyes, blurred vision, double vision, temporarily loss of vision
- BMI/Lifestyle
- Headache on exertion – Chiari Malformation

METASTASES

- PMHx of Cancer
- Vomitting – Raised intracranial pressure
- Increased pain in supine

AUTOIMMUNE

- Scalp tenderness (Giant Cell Arteritis)
- Arm Tenderness (Polymyalgia Reumatica, Temporal arteritis)
- Age (>50 females>males)

INFECTION

- Fever
- New Photophobia

SUBJECTIVE:

Can be pain anywhere in the head

May be associated with neck postures and movements

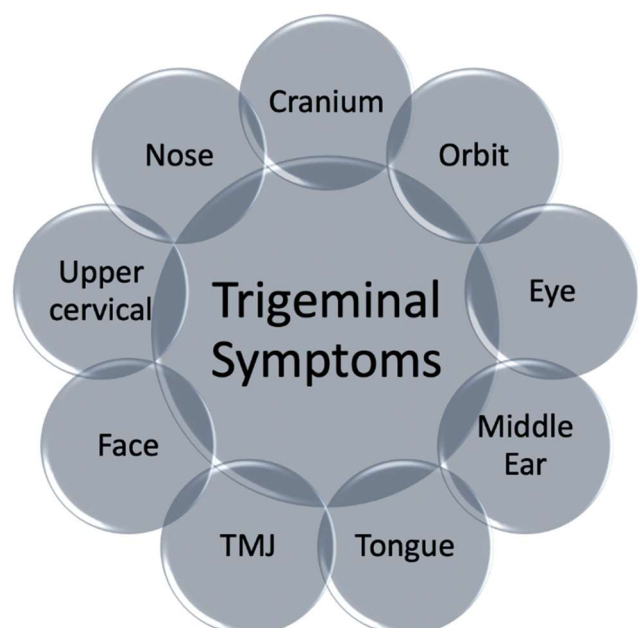
May be associated with jaw movements

Often unilateral

May have trigeminal cervical sensitization

Not usually throbbing pain

Not usually associated with paresthesias



OBJECTIVE:

Often poor postural and parafunctional habits
May be reduced range of motion in neck and jaw
Often weakness of deep neck flexor and scapular stabilizer muscles
Often scapular and TMJ dyskinesia
Atrophy/hypertrophy
May be signs of c-spine dysfunction or cranial dysfunction
May be signs of TMJ biomechanical dysfunction
Rarely joint noises
CN exam negative and red flags ruled out

TREATMENT:

Usually need to address cervical spine dysfunction as well as posture
Muscular techniques

AMRT, massage, Intra-oral release techniques, contract/relax, IMS

Pain relieving modalities (TNS, Acupuncture)

Exercises (often)

Postural Correction, self-massage, controlled opening, isometrics, aerobic exercise

Education

Eating soft food, posture correction

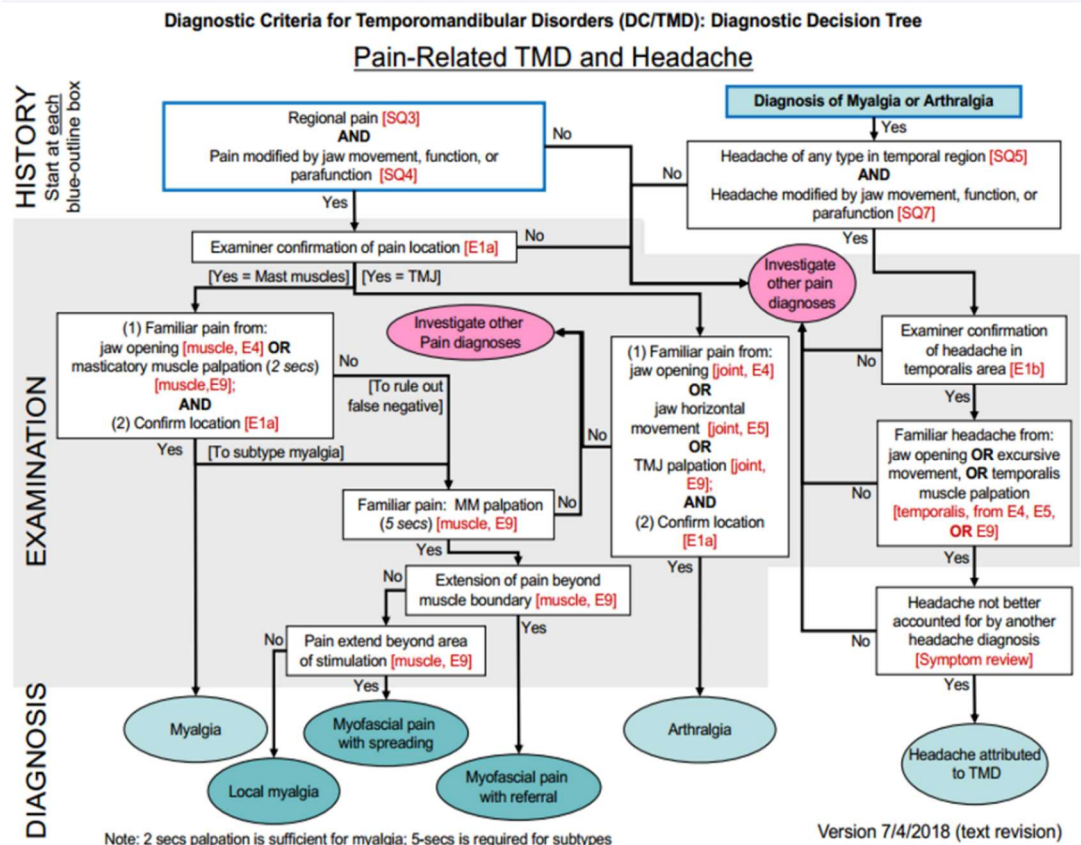
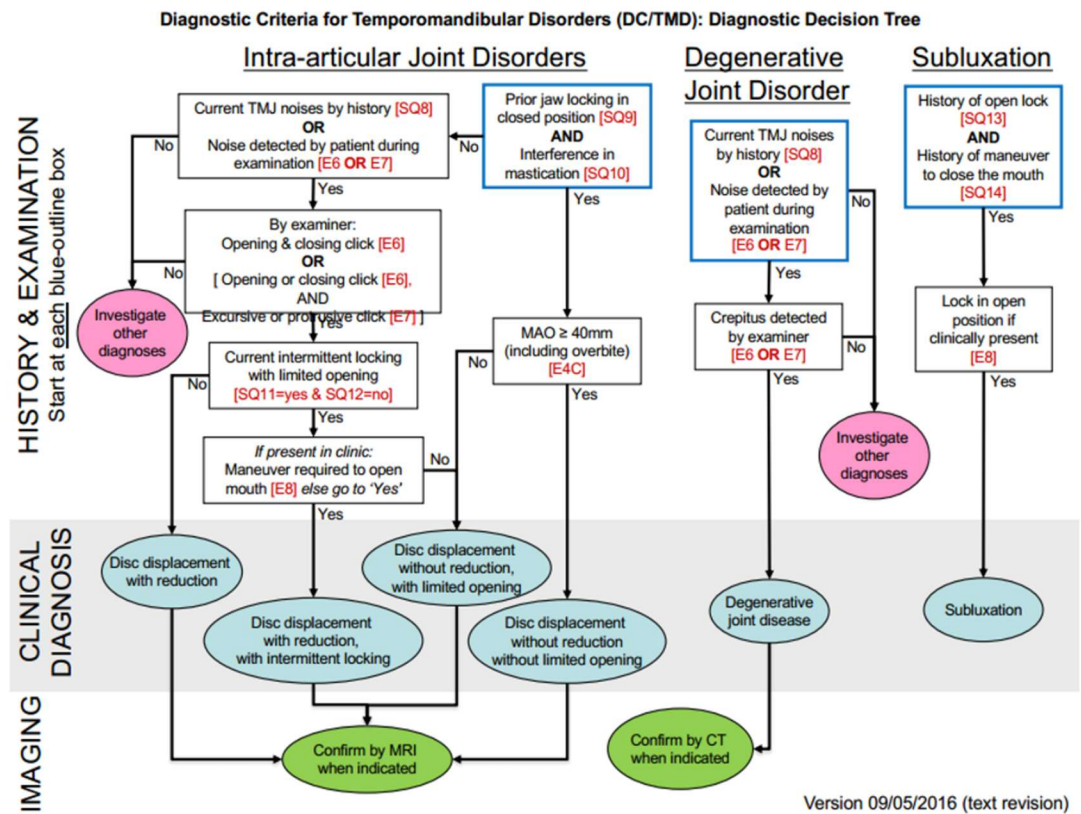
Splint Therapy

Medication Management

Injections

Trigger point injections

Botox



ADJUNCT TREATMENTS

Splint Therapy

Medications

Injections

Surgery

SPLINT THERAPY

Hard stabilization appliances

Referred to as flat plane splints

Usually full coverage appliances that cover the maxillary or mandibular teeth

There is reasonable evidence for the use of these appliances for pain improvement in TMJD.

Preferable to softer appliances and patients can have the tendency to chew on a soft appliance.

Few detrimental effects of these appliances.

Anterior positioning devices

Are used for painful anterior disc displacements with reduction or intermittent closed locking patients.

Should be used for a short time only as they can lead to a posterior open bite.

Anterior bite appliances

Proposed use for these is for reducing TMJ pain and headaches.

Can have detrimental effects as it can cause anterior open bites, tooth mobility and accidental aspiration or ingestion.

MEDICATIONS

NSAIDS

Beta-Blockers

Anti-Depressants

Anti-Seizure Medications

Opioids

Muscle Relaxants

INJECTIONS

Nerve Blocks

GON, TON, Auriculotemporal N, V1, V2, V3, MBB

Botox

Cortisone Injections

C2/3, TMJ, C1/2?

HA injections

TMJ

Trigger Point Injections

C-Spine and TMJ muscles

Prolotherapy

TMJ

PRP

C2/3, TMJ, C1/2?

SURGERY

Replacement

Discectomy

Arthrocentesis

Disc Repair

PSYCHOLOGICAL THERAPIES

Cognitive behaviour therapy (CBT)

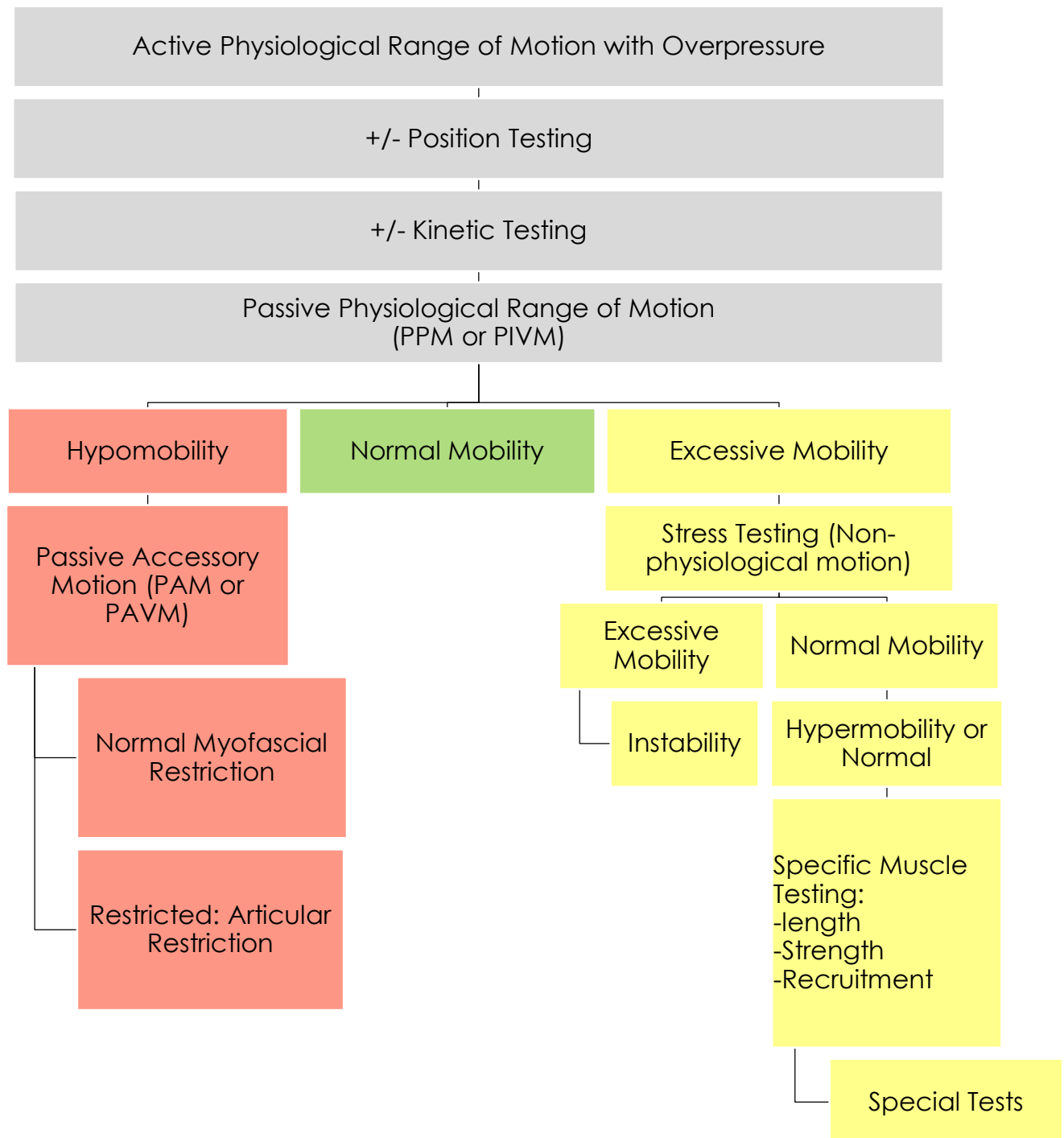
Behaviour therapy (BT)

Eye Movement Desensitization and Reprocessing (EMDR)

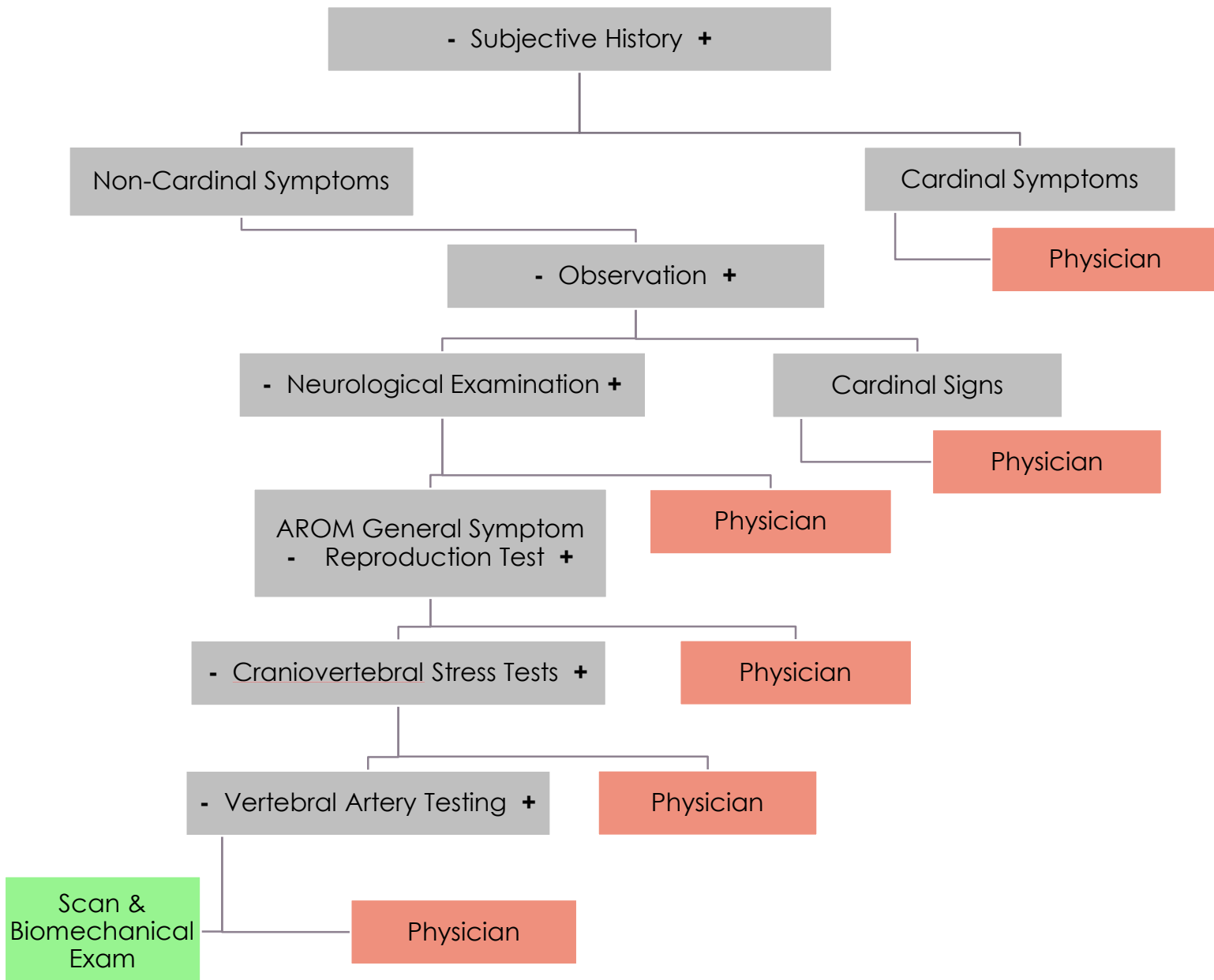
Acceptance and commitment therapy (ACT)

Mindfulness

BIOMECHANICAL EXAMINATION



POST TRAUMATIC EXAMINATION



SUMMARY OF CRANIAL NERVES

NERVE	FUNCTION	TEST	POSITIVE
1. Olfactory	Sensory – smell	Use soap, coffee	Anosmia / Parosmia
2. Optic	Sensory – vision	Consensual light reflex, Accommodation, Confrontation – test visual quadrants	Hemi / Quadrantopia
3. Oculomotor	Motor – elevates eyelids, moves eyes, constricts pupil, focus lenses	Consensual light reflex, Visual tracking, Convergence	Altered constriction Anisocoria, Diplopia, Paresis / Paralysis, Nystagmus
4. Trochlear	Motor – moves eyes	Visual tracking, Convergence	Diplopia, Paresis / Paralysis, Nystagmus
5. Trigeminal - Ophthalmic -Maxillary -Mandibular	Mixed Motor & Sensory: Sensory to eyes, tear glands, scalp, forehead, eyelids. Sensory to upper teeth, gums and lip, palate & face. Sensory to scalp, skin of jaw, lower teeth, gums and lip. Motor to muscles of mastication & floor of mouth.	Facial sensation, Jaw DTR, Taste	Hypo / Anaesthesia, Hyper-Reflexia, Clonus, Taste disturbance
6. Abducens	Motor function of the lateral rectus of the eye	Visual tracking	Diplopia, Paresis / Paralysis, Nystagmus
7. Facial	Mixed Motor & Sensory	Muscles of facial expression, Taste of anterior tongue	Facial paresis or droop, Taste disturbance
8. Vestibulocochlear	Sensory	Finger rustle, Humming, Equilibrium tests (Rhombberg's, Tilt, Dix-Hallpike)	Tinnitus, Deafness, Hypo-Acusia, Disequilibrium, Dizziness, Nystagmus

NERVE	FUNCTION	TEST	POSITIVE
9. Glossopharyngeal	Mixed Motor & Sensory: Sensory to pharynx, tonsils, posterior tongue & carotid artery Motor to muscles of pharynx & salivary glands	Gag reflex & Swallowing	Dysphagia, Dysarthria
10. Vagus	Mixed Sensory to pharynx, larynx and organs Motor to muscles of speech, swallowing, heart, smooth muscles of visceral organs	Uvula position	Dysphonia, Nausea, Uvula displaced to strong side
11. Accessory	Motor to muscles of palate, pharynx, larynx, UFT & SCM	Strength & DTR of SCM, Trapezius	Weakness, Hyper-Reflexia, Clonus
12. Hypoglossal	Motor function of the tongue	Tongue strength	Paresis - deviates to weak side, Dysarthria

CRANIOVERTEBRAL INSTABILITY

Manifested in 2 ways

1. Transient spinal cord or brain stem compression – bilateral or quadrilateral paresthesia, hyper-reflexia associated with movement.
2. Vertebral or basilar artery compromise – drop attacks, nystagmus, facial paresthesia, dysarthria, diplopia, dysphagia, dysphasia.

ASSESSMENT OF VERTEBROBASILAR SYSTEM

DO NOT: Test if cardinal signs and symptoms are present on subjective exam.

DO: Proceed with graduated and cautious testing if non-cardinal signs/symptoms and trauma less than 6 weeks.

JOINT INSTABILITY

DEFINITION: A pathological increase in translational movement that interferes with joint function and may produce pain. It occurs as a result of disease, repetitive strain or traumatic injury that causes disruption of the normal anatomical barrier(s) to a particular plane(s) of movement.

SIGNS & SYMPTOMS

Traumatic history

Repeated unprovoked episode(s) following minor provocation

A feeling of instability

Giving way

Inconsistent symptomatology

Minor aching for a few days after a sensation of giving way

Consistent clicking or clunking noises

Inability to recover normally from a full-range motion

Excessive active range of motion and passive overpressure

Hypermobility – End feel is normal, however later than expected

Recurrent fixations (articular locking)

No constant pattern of dysfunction

Positive stability tests – no, or abnormal end feel detected

Instability may result in joint fixation, therefore stability needs to be tested after manipulation to correct said fixation

Management plan may require manipulation to correct a fixation or abnormal joint alignment. Manipulation should be used as little as possible with a greater focus on strengthening, proprioception, bracing, taping and other supportive strategies. Education should help the client gain awareness of how to protect against movements that will load the unstable structures, methods they can employ to enhance protection and timelines to expect to regain stability. If instability is severe involving multiple structures, with significant loss of function and limited response to conservative management, then referral should be considered. It's good practice to always give the client the options early in their management.

CAUSES OF CRANIOVERTEBRAL INSTABILITY

TRAUMATIC: MVA, Falls, Concussions

AUTOIMMUNE: RA, AKS, Psoriatic

OTHER SYSTEMIC INFLAMMATORY CONDITIONS

INFECTIONS

Grisel's syndrome secondary to upper respiratory tract infection in youth

ONCOLOGIC

Primary tumors are rare in this area

CONGENITAL

Generalized laxity (e.g. Down's syndrome)

ANATOMICAL ANOMALIES: *common in junctional areas*

Abnormalities of the dens

Os odontoideum

Ossiculum terminale

Hypoplastic dens

Other joint abnormalities

O/A fusion, C2/3 fusion (can accompany each other, leaving the A/A joint free to move)

Posterior arch of the atlas defects: absence of the posterior arch/bipartite atlas

Chiari malformation: cerebellum and brainstem descend through the foramen magnum

Basilar invagination: upward protrusion of the margins of the foramen magnum, which reduces the volume of the posterior cranial fossa

Klippel-Feil fusion: cervical joints associated with a short neck and low hairline

STEROIDS

AGE LESS THAN 7 YEARS

CARDINAL SIGNS/SYMPTOMS

Facial, Peri-oral paresthesia/ anesthesia/ causalgia

Bilateral, Quadrilateral, Hemilateral paresthesia/ anesthesia/ causalgia

Periodic consciousness loss (syncope)

Post-traumatic pulsatile tinnitus

Sudden profound deafness, Sensorineural hypoacusia

Non-acute visual field deficits

Dysphasia, Diplopia, Drop Attacks, Dysarthria, Dysphagia, Dysphonia

Horner's signs (ptosis, endophthalmos, anhydrosis, miosis, facial flushing)

Ataxia, Babinski, Hoffman, Oppenheimer, Clonus, Hyperreflexia

Anisocoria (asymmetrical pupils)

Abnormal pupil light reflexes

Nystagmus (especially up or downbeat)

Facial muscle weakness

Trapezius/SCM atrophy and weakness

Tongue atrophy and weakness

Paralysis in a non-peripheral nerve distribution

NON CARDINAL SIGNS/SYMPTOMS OF CONCERN

PROCEED WITH CAUTION

Dizziness / Vertigo

Nausea / Vomiting

Headaches

Tinnitus

Isolated Trigeminal Nerve Symptoms (absent of objective signs)

Lump in Throat

ANATOMY REVIEW

VERTEBRAL ARTERY & SPINAL CIRCULATION

ARTERY DIVISIONS PROXIMAL (OSTIAL)

Typically from subclavian artery to C6 transverse foramen

Can have alternate point of entry between C3-C7 and differences side to side

TRANSVERSE

From point of entry to transverse foramen of C2.

SUBOCCIPITAL

From C2 transverse foramen to point of penetration of foramen magnum.

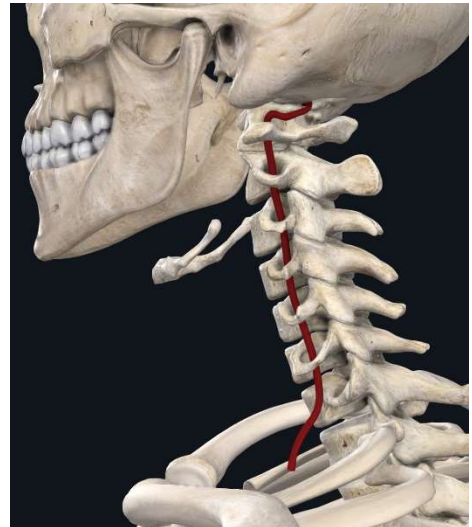
Divided into 4 parts:

Part 1 – within transverse foramen of C2 which is curved within the bone from vertical to horizontal and lateral.

Part 2 – from exit of C2 to transverse foramen of C1. Covered by levator scapula and oblique capitis muscles.

Part 3 – within transverse foramen of C1 which bends back and medially.

Part 4 – from exit of C1 it passes behind superior articular process of C1 and crossing the posterior arch held in place by a restraining ligament. It then runs forward, inward and upward to pierce the posterior occipitoatlantal membrane. It continues and pierces the duramater on the lateral aspect of foramen magnum. The extracranial part on is covered by trapezius, semispinalis and rectus capitis muscles. With bone behind and muscle overlying it is vulnerable to trauma. Anomaly is ponticulus posticus – ossification of the restraining ligament.



INTRACRANIAL PORTIONS

From penetration of dura to lower border of pons where it unites with its counterpart to form the basilar artery.

BRANCHES OF THE VERTEBRAL ARTERY

EXTRACRANIAL

Spinal Branch – supplies dural sleeve and nerve roots, spinal cord and meninges, bone, ligaments and periosteum of posterior vertebral body region.

Muscular Branch – supplies deep suboccipital muscles.

INTRACRANIAL

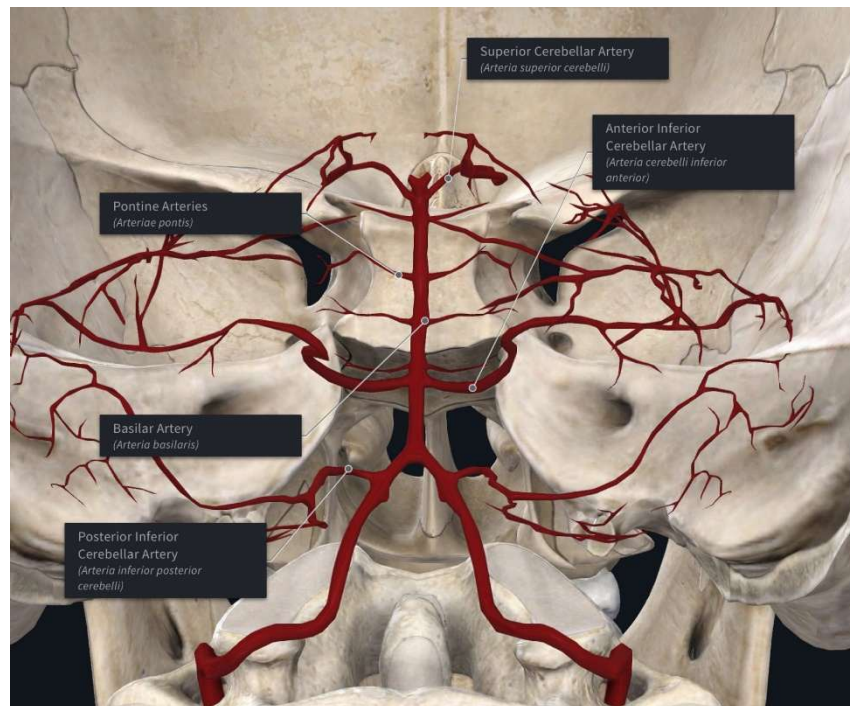
Meningeal Branches – bone and dural of cerebellar fossa.

Anterior Spinal Branches – receives reinforcement as it descends to supply the anterior spinal cord and cauda equina.

Posterior Inferior Cerebellar Artery (PICA) – largest branch of vertebral artery and supplies the medulla, cerebellum, posterior cord.

Posterior Spinal Branches – arise from PICA and receives reinforcement as it descends to supply the posterior spinal cord and cauda equina.

Basilar Artery – directly and indirectly supplies pons, visual area of occipital lobe, Labyrinth, medulla, temporal lobe, posterior thalamus and cerebellum.



ARTERIAL ANOMALIES

Variability in caliber from side to side with one side occasionally being so small it plays no functional role and is referred to as a hypoplastic artery.

Atretic artery is when a portion may inject into the PICA versus the basilar artery.

CRANIOVERTEBRAL ANATOMY

ALAR LIGAMENTS

Arise from either side of odontoid traveling obliquely and laterally to inner condyles of occipital bone.

Variable alignment depending on height of dens and is taut in CV flexion most commonly.

The primary function of the alar ligaments is to restrict rotation of the cranium.

In side flexion contralateral occipital portion ligament limits further side flexion. This portion in combination with ipsilateral atlantal portion force C2 to rotate in same direction as side flexion. (Spinous process will move contralaterally)

When testing, examiner should feel an abrupt ligamentous restriction in side flexion if rotation blocked. Needs to be lax in all 3 positions of CV alignment to be considered positive.



TRANSVERSE LIGAMENT (CRUCIATE)

Connects lateral masses of neural arch passing behind odontoid.

Secondary branch from occipital bone to posterior body of C2 (cruciate portion). Also from occiput to body of axis.

Protects spinal cord (mid-brain) from dens pressure and limits flexion. Constrains dens within 3mm of the anterior ring of the atlas.

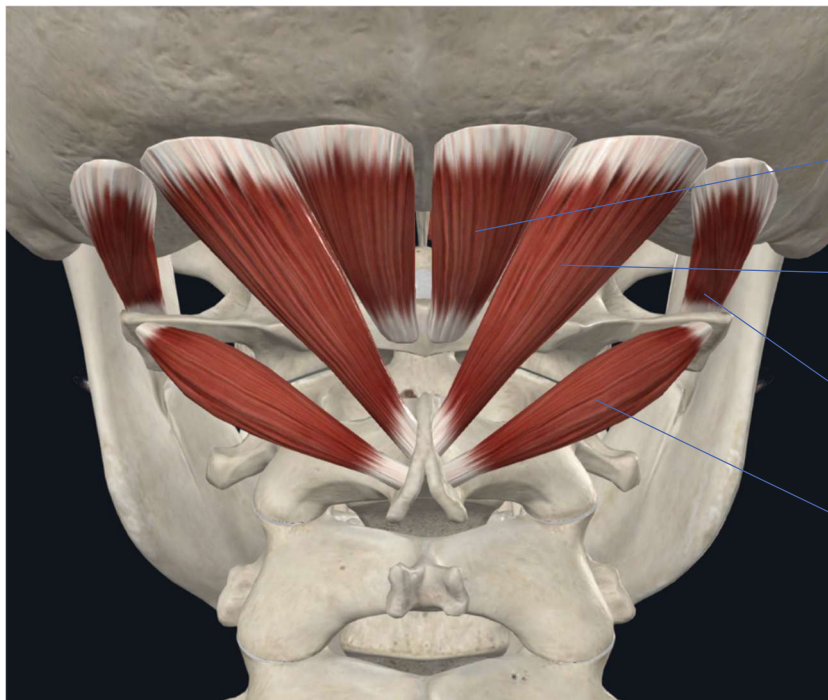
If intact atlas glides posterior on axis in flexion.

When testing, examiner should feel abrupt ligamentous restriction to anterior translation of C1 on C2.



SUBOCCIPITAL AND CERVICAL MUSCULATURE

POSTERIOR



Rectus Capitis Posterior Minor

Rectus Capitis Posterior Major

Obliquus Capitis Superior

Obliquus Capitis Inferior

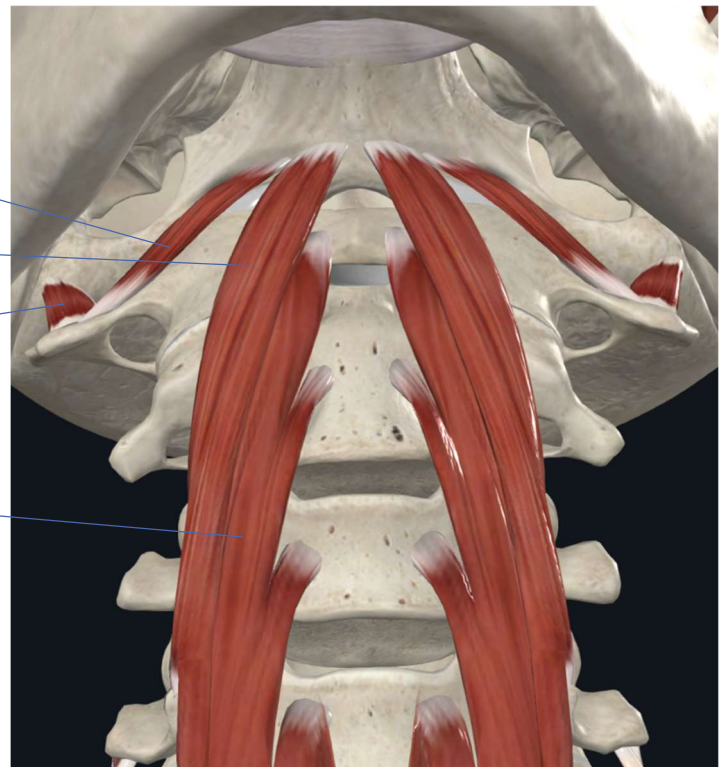
ANTERIOR

Rectus Capitis Anterior

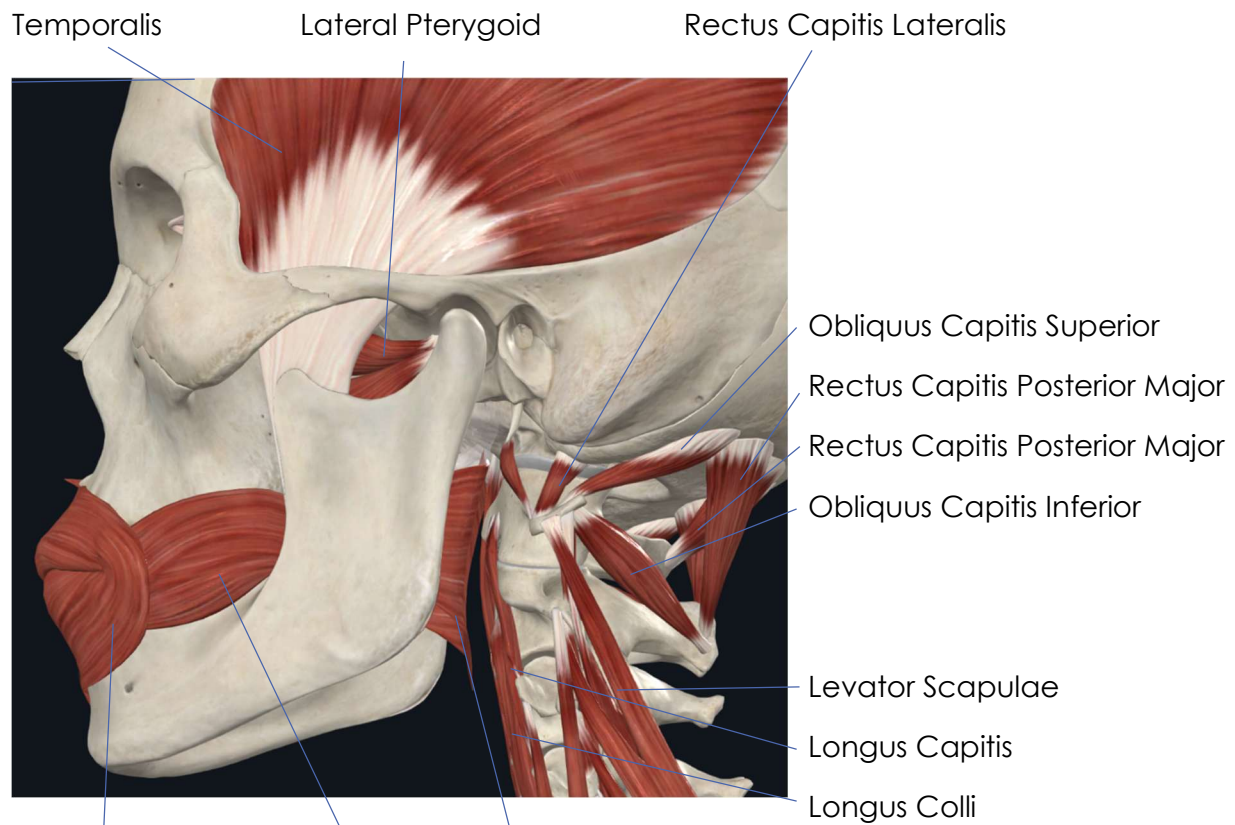
Longus Capitis

Rectus Capitis Lateralis

Longus Colli



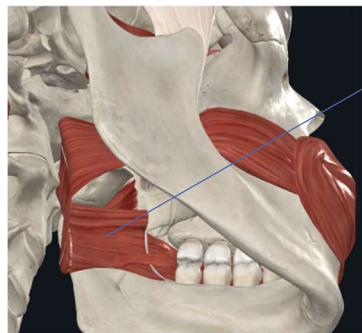
LATERAL



Orbicularis Oris

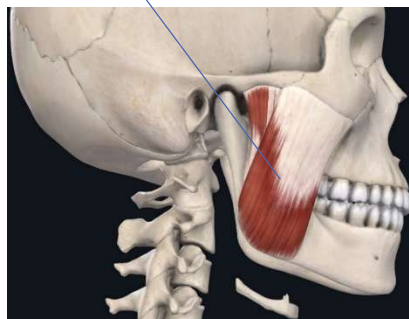
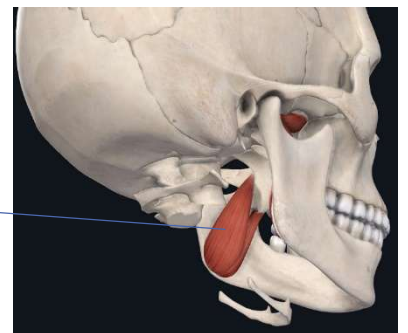
Buccinator

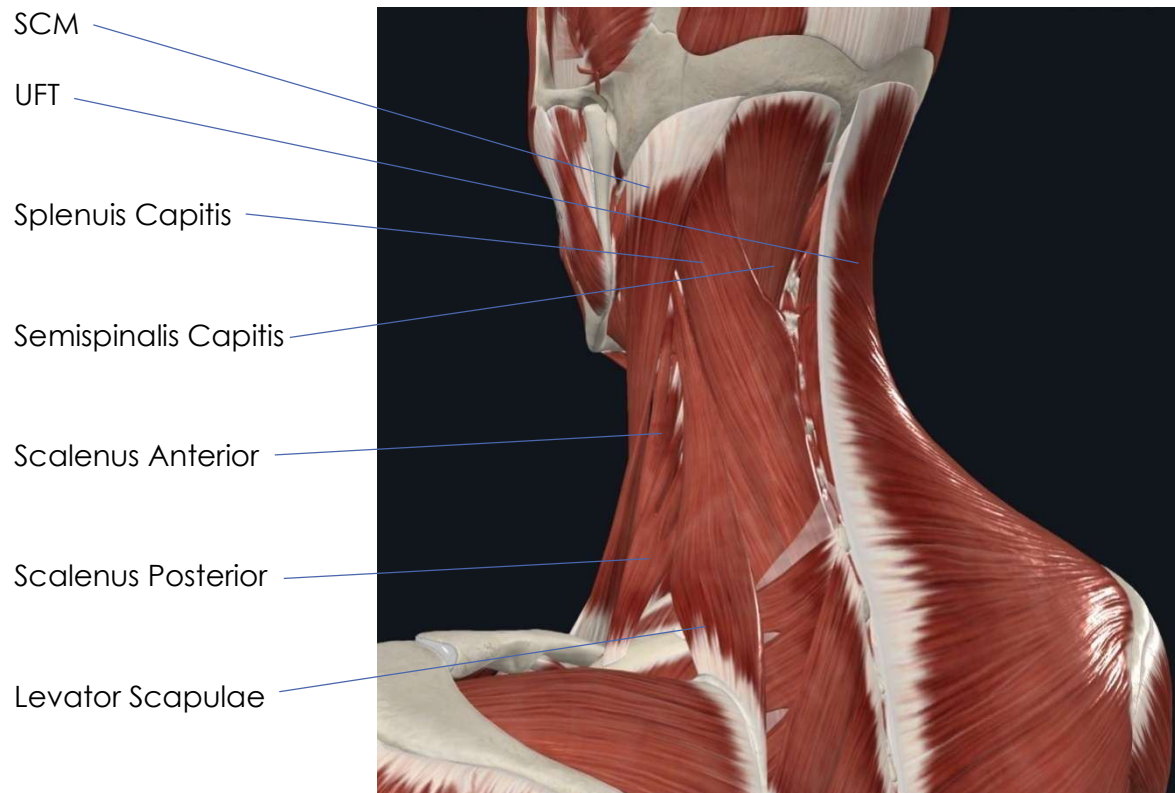
Superior Pharyngeal Constrictor



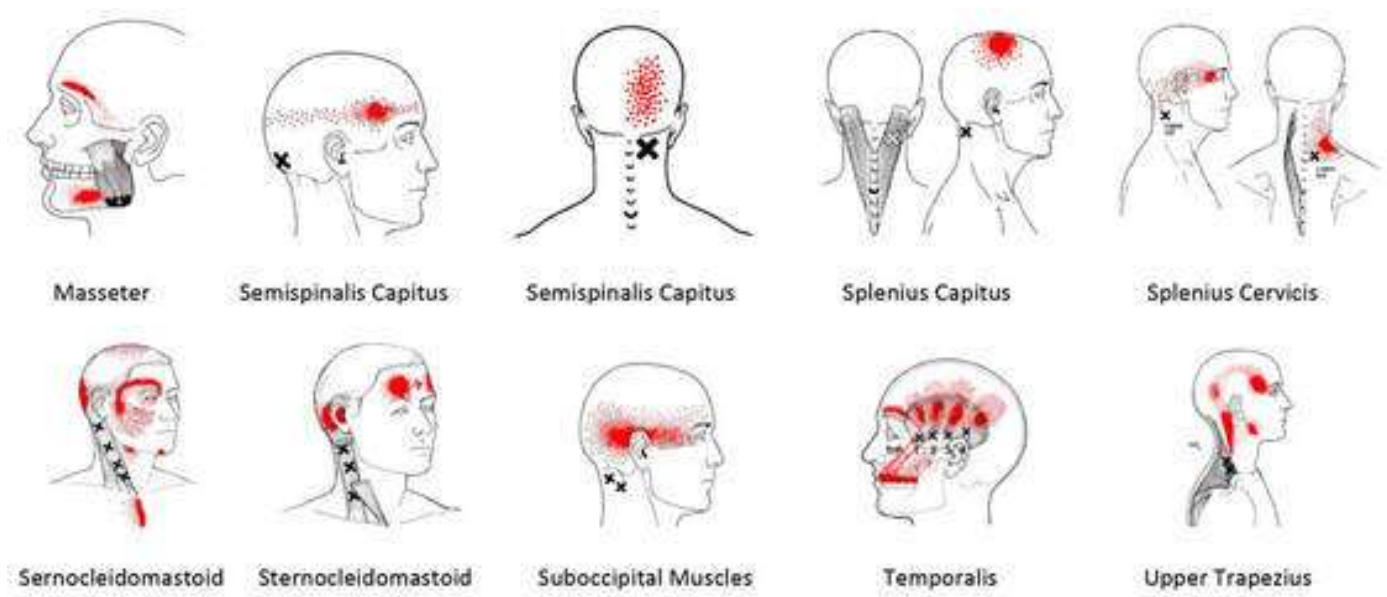
Masseter

Medial Pterygoid





COMMON TRIGGER CRANIOFACIAL POINTS



OCCIPITOATLANTAL JOINT

OCCIPUT

Convex Condyles – directed from posterior lateral to anterior medial converging towards eyes

ATLAS

Concave superior facets

Joint surface face forward and medial

Shape resists pure side flexion and rotation

Inferior surface is convex due to cartilage

CLASSIFICATION

Bicondylar, Compound, Modified Ovoid

2 degrees of freedom Flex-Ext and SF-Conjunct Rot



FLEXION

10° cardinal swing

Axis is transverse through external auditory meatus

Anterior rotation of head with posterior glide of occipital condyles

Atlas moving forward and cranially

Produced by longus capitis and rectus capitis anterior

Limited by bony contact, posterior OA membrane and capsule, tectorial membrane, SO muscles

EXTENSION

20° cardinal swing

Posterior rotation of head with anterior glide of occipital condyles

Produced by RCPM, SO, Bilateral action of Splenius and Semispinalis Capitis

Limited by Anterolateral capsule and Anterior AO membrane

SIDE FLEXION

8-10° of ROM each direction

Axis is oblique Sagittal through nose

Arcuate swing with opposite conjunct rotation

OAA mechanics – RSF OA = LR at OA due to articular factors and AA due to alar ligament

Produced by RCPM, SO, SCM

Limited by Alar (contralateral occipital and ipsilateral atlantal portion), capsule

ROTATION

Axis vertical through dens 5-7° each direction

Occurs as conjunct contralateral motion to direction of side flexion

Limited by contralateral Alar, capsule and tectorial membrane

ATLANTOAXIAL JOINT

AXIS

Superior Convex due to cartilage (AA is biconvex)

Median joint osteoligamentous between anterior transverse ligament and dens

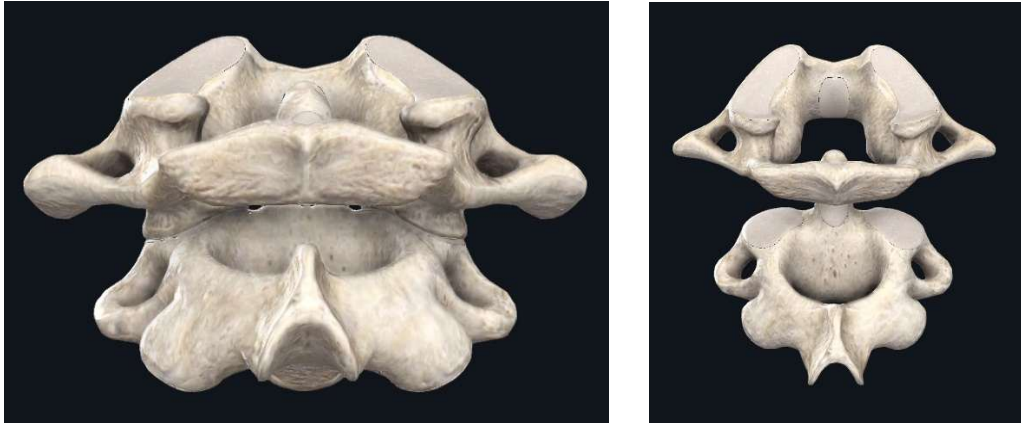
AA joint capsule supplies rich innervation into the vestibular system and trigeminal nucleus region

CLASSIFICATION

Seller, biconvex, 2 degrees of freedom into flex-extension and rotation-SF

Flex-Ext total ROM 10-30°

Axis is the transverse centre of odontoid



FLEXION

Produced by Longus capitis and Rectus Capitis Anterior

Limited by Tectorial membrane, posterior capsule and AA membrane

EXTENSION

Produced by RCPM, SO, Bilateral Splenius and Semispinalis Capitis

Extension limited by bony contact, posterior arch of atlas on axis, Tectorial membrane

ROTATION

40-45° each direction with axis vertical through dens

Rot and SF occur simultaneously and if not there must be a disruption

Produced by Oblique Capitis Inferior and Oblique Capitis Superior

Limited by contralateral Alar and joint capsule

AA ARTHROKINEMATICS

Rotation causes ipsilateral joint posterior and contralateral anterior glide

Lateral translation contralateral to direction of rotation

Conjunct side flexion

Limited by occipital portion of Alar, Joint capsule and posterior AA ligament

OAA BIOMECHANICS

With RSF of occiput the occiput translates and rotates to left and C1 translates to the right. C2 rotates to the right due to influence of Alar ligaments and produces a relative left C1-2 rotation as C2 rotates to a greater degree than C1.

OTHER CRANIOVERTEBRAL LIGAMENTS

ANTERIOR OA MEMBRANE

Extension of Anterior Longitudinal Ligament

Inferior aspect of occiput to anterior arch of atlas

APICAL LIGAMENT

Thin suspensory ligament from tip of odontoid to anterior foramen magnum

TECTORIAL MEMBRANE

Arises from PLL from C2 to occiput

Functions to limit flexion and distraction of OA-AA and rotation of OA

POSTERIOR AND LATERAL OA MEMBRANE

Limits flexion and rotation

LIGAMENTUM NUCHAE

In neck continuation of Supraspinous and Interspinous ligaments

From occiput to C7 spinous process

Functions as muscle attachment, stressed in flexion and maintains axial extension

POSTERIOR AA MEMBRANE

Important in rotational stability of AA

Functionally Stability of the OAA region is as follows:

The upper cervical region (C0-1-2) is capable of 90° of rotation (45° each direction.)

AA rotation >30° can cause stretching and kinking of the contralateral vertebral artery.

Acute rotation > 45° may occlude the ipsilateral vertebral artery.

The facets of AA junction will permit up to 40° rotation before locking.

Contralateral alar and ipsilateral transverse ligament also resist pathological rotation.

OA and AA joint capsules obviously support the restriction of ROM in this region.

OA condyles restrict lateral bending to 3–5° and Alar ligaments the AA to 6-7°.

CERVICAL SPINE 2-7

UNCOVERTEBRAL JOINTS (U-JOINT)

Reduce shearing and c-spine disc pathology

Guide translation of cervical articular segment in the tri-planar motion – bowl on bowl concept

ZYGAPOPHYSEAL JOINT

Joint planes $\sim 45^\circ$ to the vertical

Upper more horizontal and lower more vertical

Designed to manage weight bearing load of head as disc is less sufficient for this function



CERVICAL DISC

Thin especially posterior and lateral

Cervical disc pathology rare

U-joint helps protect IV foramen

Lamella do not have alternating orientations as in a lumbar spine

More annulus and smaller nucleus

After 40 yoa typically no nucleus left to herniate

Cervical interbody joints form saddle articulation convex AP & concave side-side



VERTEBRAL MOTION SEGMENT

Anterior vertebral bodies, disc, Anterior & Posterior Longitudinal Ligament

Posterior neural arches, Z-Jts, transverse & spinous process, associated ligaments

FUNCTIONAL COMPONENTS OF THE VERTEBRA

Vertebral body and disc function is weight bearing and load transmission

Neural Arch (pedicles and laminae) provide protection

Joints provide guidance and restraint of movement

Spinous and transverse processes are levels for muscle and ligament actions

SPINAL BIOMECHANICS

CRANIOVERTEBRAL REGION

Movement	Osteokinematics	Arthrokinematics
OA flexion	Anterior Sagittal rotation Axis through mastoid	Posterior glide of condyles on lateral masses of C1
OA Extension	Posterior Sagittal rotation Axis through mastoid	Anterior glide of condyles on lateral masses of C1
OA Side Flexion / Rotation	SF produces contralateral translation of C0 on C1 Rotation is contralateral to SF due to banked lateral masses	Ipsilateral condyle glides anteromedial Contralateral condyle glides posterolateral
AA Axial Rotation	Axis is through dens Conjunct SF occurs	Ipsilateral posteroinferior Contralateral anteroinferior
AA Flexion & Extension	Sagittal motion with Axis through osteoligamentous ring	Central part glides superior & inferior on the dens Lateral joints glide posterior with flexion and anterior with extension
AA Side Flexion	Conjunct Rotation with debate if contra or ipsilateral	Slight translation ipsilateral

CERVICAL SPINE

Movement	Osteokinematics	Arthrokinematics
Flexion	Anterior sagittal rotation with anterior sagittal translation Axis posteroinferior in upper cervical moving more anterosuperior in lower cervical	Anterosuperior glide at Z-Jt Anterior glide at U-Jt
Extension	Posterior sagittal rotation and translation	Posteroinferior glide at Z-Jt Posterior glide at U-Jt
Rotation – Side Flexion	Rot coupled with ipsilateral SF Contralateral translation	Ipsilateral Z-Jt Post-Inf-Med Contralateral Z-Jt Ant-Sup-Lat Ipsilateral U-Jt Inf-Post Contralateral U-Jt Sup-Ant

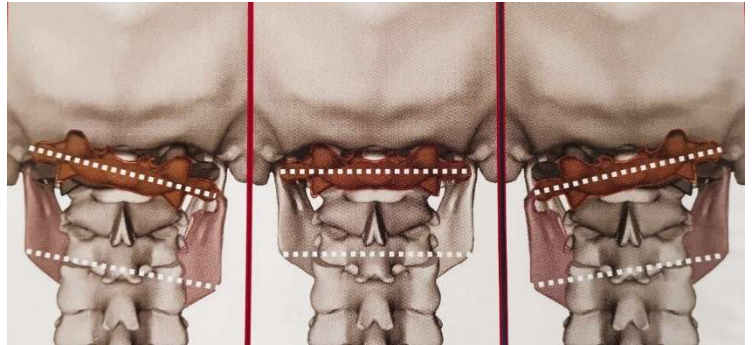
MANAGEMENT OF CVJ IN RELATION TO TMD

As we've established, pain in the TMJ and facial regions can be referred from the cervical spine without any significant biomechanical faults at the TMJ itself.

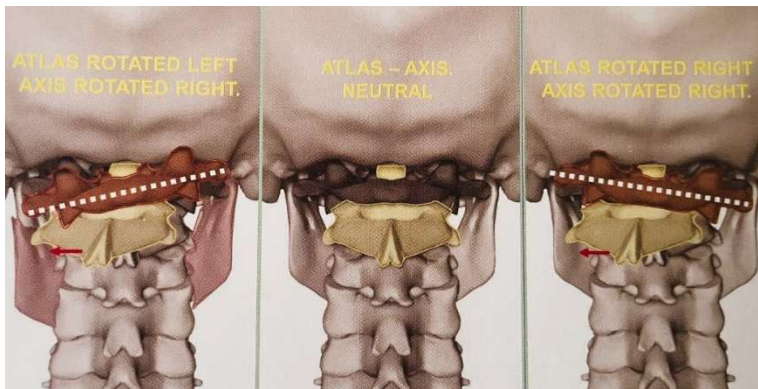
Although TMD can occur without cervical involvement, they are very commonly associated. Therefore, it is imperative to objectively assess the function of both the TMJ and the CVJ using a sound biomechanical assessment model.

Rocabado suggests rotation and lateral tilting of C1 and / or C2-3 will directly result in a compensatory bite misalignment with potential compression of one side and distraction of the other TMJ.

Further he states the angle of inclination of the mandible tends to adopt that of the atlas (C1).



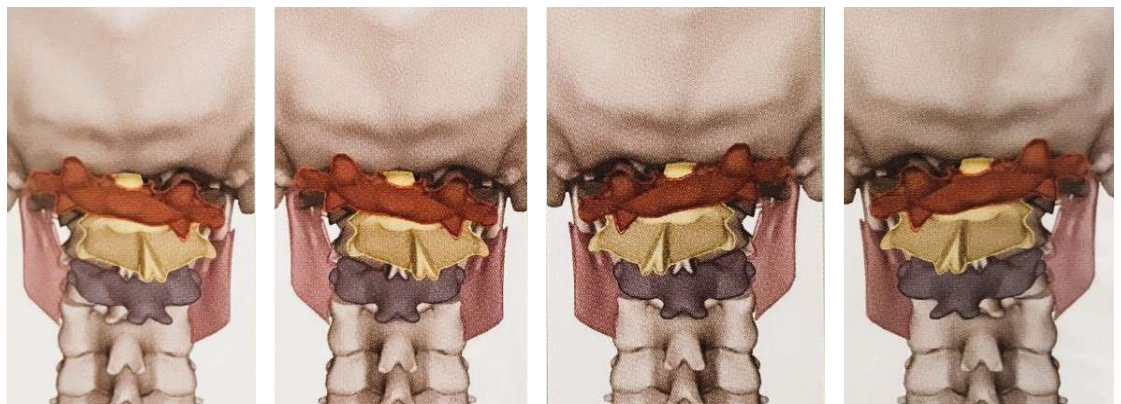
Treatment needs to initially focus on correction of the upper cervical alignment and mobility. It is reasonable to perform simultaneous treatment on the TMJ, however it will be difficult to achieve sustained improvement without addressing the Csp first.



A number of possible combinations can occur where C1 and C2 can be found to be rotated contralaterally or ipsilaterally to one another.

The position of C3 can also be rotated and certainly literature suggests the articulation of C2/3 is the most common source of referred pain.

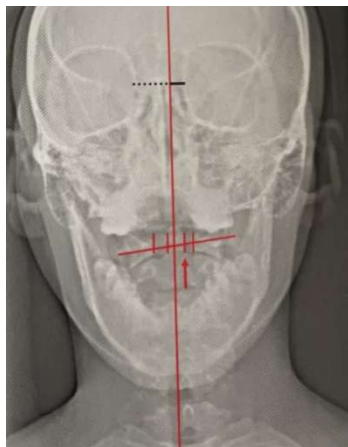
The first 2 images show C1 rotated right and C2 rotated left, with and without C3 rotation, while images 3 and 4 show the opposite contralateral rotational patterns.



The following XR image depicts the right rotation of C1 as indicated by the increased space seen on the right between the DENS and C1 lateral masses (shown by the small vertical red lines).

Conversely C2 is rotated to the left as the C2 spinous process is seen to the right of the midline of the DENS (as depicted by the red arrow).

You can see the associated inclination of the occlusal plane of the mandible with the right lower than left (depicted by the horizontal red line).



In this next image you can see the right rotation of the C1 and C2 using the same markers as described above.

In this case the horizontal red line shows the angle of inclination of C1 as opposed to the plane of the mandible.

However, you can appreciate a similar angle of inclination of the mandible.

Unfortunately, we do not have xray vision, nor will we frequently have sophisticated imaging results available. So, we will need to rely on our physical assessment of the alignment and mobility of the upper cervical segments.

Loss of mobility and symmetrical alignment can occur due to a number of articular or myofascial influences. These factors can act as barrier(s) to restoring normal function.

Based on our findings, we can perform a number of myofascial release techniques, joint mobilizations, mobilizations with movement and muscle energy techniques to assist with restoring neutral alignment and equal mobility in each direction.

Further, the upper cervical spine does not exist in a bubble. Rather it is influenced by CT postural alignment. Common findings would include increased thoracic kyphosis and loss of cervical lordosis, which can present as forward head posture and chin poke due to CVJ compensation. I strongly recommend you assess and address these factors during the course of your management plan for optimal results.

Just like in the spine and SIJ, I commonly find the painful or more painful side does not always correlate with the side that presents with the greatest mobility dysfunction.

You may commonly find patterns of unilateral hypomobility and over time this loss of mobility may result in compensatory hypermobility on the contralateral side. You will likely be able to observe a deviation toward the hypomobile side.

If this pattern exists, it is important to address the hypomobility otherwise it would be very difficult to correct the hypermobility.

CERVICOGENIC DIZZINESS (CGD)

DEFINITION:

Cervicogenic dizziness is non-rotatory dizziness described as unsteadiness that is associated with neck pain and/or stiffness and is triggered by cervical movements or positions (Heikkila et al., 2000; Wrisley et al., 2000).

CHARACTERISTICS:

Lightheadedness or disequilibrium associated with cervical dysfunction.
Not resulting from vestibular dysfunction and, therefore, rarely results in true vertigo.
Most often associated with neck flexion-extension injuries.
Also seen with severe cervical arthritis, herniated cervical disks, and head trauma.
Common patient complaints include ataxia, unsteady gait, or postural imbalance associated with neck pain, limited neck range of motion, or headache.

PREVALENCE:

The 2008 English Longitudinal Study of Ageing (>65 years) reported that 11.1% of aged individuals experience dizziness (Stevens et al., 2008) while another study found that 30% had dizziness and of those, 66% had cervical spine involvement.

Studies report that the incidence of dizziness in patients with cervical spondylosis is 50%, and up to 65% in patients aged over 65 years. Surprisingly, up to 89% of dizziness in 1000 outpatients, was diagnosed as CGD, which negatively affects quality of life.

ETIOLOGY:

Attributed to abnormal proprioceptive inputs from cervical proprioceptors into the ipsilateral medial and inferior vestibulospinal nucleus (cervico-vestibular pathway), which in turn disrupts the head and neck's orientation in space.

DIAGNOSTIC CRITERIA:

CGD is considered a diagnosis of exclusion.
We must first eliminate other diagnoses, such as vestibular or CNS pathologies.

DIFFERENTIAL DIAGNOSIS:

Other sources of vertigo, unsteadiness, or oscillopsia triggered by head movement:

LABYRINTHINE

- Benign Paroxysmal Positional Vertigo
- Post-Traumatic Otolith Vertigo
- Perilymphatic Fistula
- Superior Canal Dehiscence

VESTIBULAR NERVE

- Unilateral Vestibular Loss
- Vestibular Neuritis
- Bilateral Vestibular Loss
- Vestibular Neuroma

OCULOMOTOR

- Central Positional Nystagmus/Vertigo
- Migraine +/- aura
- Vestibulocerebellar Ataxia

VASCULAR

- CVA
- Rotational Vertebral Artery Occlusion – VBI
- Vestibular Migraine
- Carotid Sinus Syndrome
- Orthostatic Hypotension

PSYCHOGENIC

- PPPD

INTOXICATION / DRUG INDUCED**TREATMENT:**

Reid et al., found that the use of manual therapy such as sustained natural apophyseal glide (SNAG) and passive joint mobilization (PJM) provided both short and long-term benefits for people with chronic cervicogenic dizziness. These treatments provided immediate and sustained reduction in intensity of dizziness. Also, frequency and associated disability was substantially reduced at 12 months.

No difference found between the 2 manual therapies in reducing dizziness. Both also resulted in increased cervical ROM with some additional benefit from the SNAG. Further, the manual therapy and placebo groups all saw similar improvement at 12 mo, however the improvements in SNAG and PJM groups were observed immediately after the interventions and were then maintained for 12 months with a magnitude of change almost double the placebo group. Whereas the placebo group was much more gradual and did not reach significance until 12 months.

Lystad et al. performed a meta-analysis of randomized controlled clinical trials of manual therapy for treatment of CGD. There appears to be at least moderate level evidence suggesting benefit. There was no clear gold standard and treatment should be based on individual clinical findings.

Wrisley et al. suggested in order to fully address all of the patient's symptoms, it may be necessary for manual therapy and vestibular specialists to treat patients together. Manual therapy to decrease irritation of cervical proprioceptors and exercises with graded exposure to sensory inputs to improve the patient's use of vestibular and proprioceptive inputs for balance. In addition, they recommend eye exercises to improve the function of Vestibular Ocular Reflex (VOR).

CERVICOGENIC HEADACHES

DEFINITION:

Headache pain associated with injury or dysfunction of anatomical structures in and around the upper cervical spine.

PREVALENCE:

There is significant overlap in presentation between Occipital Neuralgia, Cervicogenic Headache, Migraine and Tension Headache. Sjaastad et al. suggested prevalence of CGH at 4.1%

Neck pain is obviously a key feature required for a diagnosis of Occipital Neuralgia and Cervicogenic Headache. This is complicated by the fact it has been described as a predominant feature in 68% of patients with migraine and tension-type headaches.

ETIOLOGY:

Proposed mechanism Trigemino-cervical nucleus. Reid et al. suggested 50% of proprioception originating from C1-3 joints. C1-3 spinal nerve nociceptive / proprioceptive afferents converge onto those from adjacent cervical nerves and first division of trigeminal nerve (5), via the trigeminal nerve spinal tract.

This allows for upper cervical pain to be referred to regions of the head innervated by cervical nerves (occipital and auricular regions) as well as referral into the parietal, frontal, and orbital regions innervated by the Trigeminal nerve.

GREATER OCCIPITAL NERVE (GON): Originates from dorsal ramus of C2. Branches out to become the largest pure sensory nerve in the body. Closely approximates the Inferior Oblique, Semispinalis Capitis and Trapezius. Supplies integument of the scalp overlying the posterior skull to the vertex.

LESSER OCCIPITAL NERVE (LON): Originates from ventral ramus of C2-3 cervical plexus. Close proximity to SCM before exiting through the deep fascia at the occiput. Supplies scalp, posterior third of temporal fossa, neck posterior and superior to auricle.

THIRD OCCIPITAL NERVE: Originates from dorsal ramus of C3 and innervates the integument of the lower occipital scalp and upper neck.

No experimental studies have shown that structures innervated by lower cervical nerves are capable of directly causing headache.

Barmherzing and Kingston suggest most common source is C2-3 z-joints (70%) > C1-2 joint > C3-4.

Other structures like IVD can be a source of headache, but prevalence is not known.

CHARACTERISTICS:

There are many different classification systems that attempt to define the characteristics of a CGH. Below are the common characteristics most seem to agree on:

*Temporal relationship with cervical disorder to support causality
Hx of +/- MVA / Trauma, Posture Dysfunction, Mobility Dysfunction
Tend to unilateral and side locked
Tend to refer posterior to anterior – neck -> oculo-fronto-temporal areas
May have dizziness described as lightheaded or foggy
Painful and decreased cervical ROM
Worsened with provocation of the neck (movement, posture, palpation)
+/- radiates to the shoulder and arm
+/- positive DI and /or clinical findings to support Dx
Varying duration that may last hours to days
Fluctuating continuous pain
Moderate, dull aching non-excruciating pain, usually non-throbbing
Anaesthetic blockades abolish pain
HA improves with Rx of the cervical dysfunction*

Note: Due to connections with cranial nerve 8 (vestibulocochlear), 9 (glossopharyngeal) and 10 (vagus), symptoms such as tinnitus, dizziness and nausea may be features of both ON and CGH, however, less likely than in migraines.

DIFFERENTIAL DIAGNOSIS:

Dissecting aneurysms of the vertebral or internal carotid arteries.

Cerebrovascular features, which typically emerge within 1–3 weeks of HA onset.

Lesions of the posterior cranial fossa

*Dura mater & vessels of posterior fossa are innervated by upper cervical nerves.
Distinguished by onset of neurological features or systemic illness.*

Meningitis can be distinguished by presence of systemic illness and neck rigidity.

Herpes zoster during its prodromal phase; distinguished by eruption of vesicles

Neck–tongue syndrome - rapid turning of the head subluxes the AA joint posteriorly. Ipsilateral occipital pain and compression of C2 nerve produces numbness of tongue.

C2 neuralgia - Inflammatory disorders or injuries of lateral AA joint can result in the adjacent nerve becoming incorporated in fibrotic changes of chronic inflammation.

C2 spinal nerve can be compromised by a meningioma, neuroma, anomalous vertebral arteries, and several other vascular anomalies. Distinguished by features of neuropathy and tends to be lancinating pain in the occipital.

Tumors, fractures, infections, cervical spondylosis, osteochondritis, and rheumatoid arthritis of the spine have not been formally validated, but may support causation.

Upper cervical myelopathy or radiculopathy - high percentage reporting headache.

Other causes: cervical dystonia, Chiari malformation, whiplash, congenital malformations, space occupying or destructive lesions, infection.

CHARACTERISTICS OF OTHER COMMON TYPES OF HEADACHES:

MIGRAINE

*Element of nausea
Sensitivity to light and/or sound
Unilateral
Tends to refer anterior to posterior
May shift side to side
Multiple Triggers
Typically moderate to severe with presence of aura
Vascular event – no strong evidence of PT Rx benefit
May have vestibular symptoms – Vestibular Migraine*

VESTIBULAR MIGRAINE

*Insidious onset
+/- family Hx, migraine Hx or Hx of motion sickness > general population.
+/- post-trauma or post-surgical response.
Episodic dizziness or vertigo, imbalance/ataxia, nausea
+/- headache
+/- tinnitus, aural fullness, phono / photophobia, visual aura, no hearing loss.
Duration: Episodes 5 minutes to 72 hours.*

MEDICATION OVERUSE OR REBOUND HEADACHE

*>= 15 days / mo with HA
>= 3 months of regular use of HA meds (>= 2-3 days / week)
Treatment is primarily education to reduce medication use
Also find alternative treatments, exercise, activity modification to manage and reduce reliance on medication.*

TENSION

*Bilateral
Sense of mild-moderate pressure
Not aggravated with physical activity*

OCCIPITAL NEURALGIA

*Typically associated with hyperextension or rotation of the neck
Often described as sharp, shooting, stabbing or burning
Localized to sub-occipital region and tend to be side locked
Tends to refer posterior to anterior
Distribution one or more of the greater, lesser or 3rd occipital nerve
Typically unilateral (85%) at onset however may spread
Severe symptoms seconds to minutes, with possible persistent dull ache
+/- corresponding tenderness, trigger point, dysesthesia or allodynia
+/- Tinel's sign
Pain is eased temporarily by local anesthetic block of affected nerve(s)*

CRANIOVERTEBRAL REGION ASSESSMENT

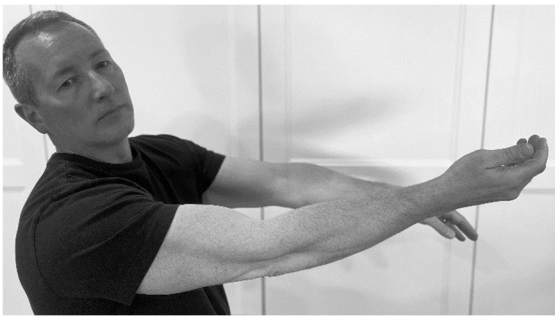
HAUTANT'S TEST



Seated screen for VBI. However do not perform if you see signs and symptoms suggestive of VBI

Client in sitting is asked to raise arms to 90° and hold.

Positive sign would be inability of client to maintain arm position or report of VBI symptoms.



Step1 – close eyes with stationary head – if positive suspect cerebella disorder.

Step 2 – extend and rotate neck – positive test would suggest VBI.

CV dysfunction would be unlikely to cause a loss of proprioception in the arms.

HEAD AND BODY – BODY ON HEAD TEST

Can be performed in sitting or lying.

In sitting on a stool turn head to side and assess symptoms

Then hold head still and turn body using the rotation of the stool.

In lying turn the head to one side on a stationary body.

Return to start position, hold head stationary and log roll the body to the side.

Movement of head and body together stresses vestibular system (watch for nystagmus).

Movement of body on stationary head in theory stresses only the cervical structures.

SEATED VERTIBRAL ARTERY TEST

In sitting, with feet on floor, ask the client to lean forward with their elbows on their knees and their head resting in their hands.

Hold this position 30 seconds.

Then, rotate to the left or right and hold 30 seconds in each position.

This test is less stressful than the supine version and helps to better differentiate between VBI & vestibular dysfunction.

TRANSVERSE LIGAMENT TESTING

METHOD 1: Palpate C1 posterior arch with index finger & cradle the occiput with rest of hand.

Slowly lift head and C1 towards the ceiling together until you appreciate an end feel.

The end feel should be a firm ligamentous sensation with approximately 3mm of movement maximum.

Enquire about symptoms, pain is not a positive finding, rather neurological findings are the primary concern.



METHOD 2: Palpate C1 posterior arch with index finger and the anterior C2 transverse processes with the thumbs.

Hold C2 stable through the thumbs and push C1 anteriorly with your index fingers.

The end feel should be a firm ligamentous sensation with 3mm of movement maximum.

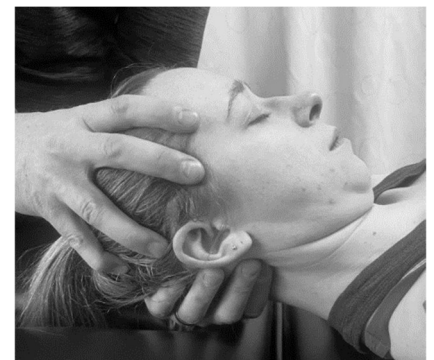
Enquire about symptoms without guiding the patients response – pain is not a positive finding, rather neurological findings is the primary concern.

ALAR LIGAMENT TESTING

With left hand, palpate C2 spinous process then block rotation with your thumb against the left spinous process. (if you prefer you can use a lumbrical grip)

With your right hand cradel top of the head, bring the client into a CV flexion position, then passively produce a right side flexion.

The tension on the contralateral Alar ligament should immediately induce a right rotation at C2 which will cause the spinous process to rotate left against the thumb you positioned to block this movement.



You should appreciate a fairly immediate (<5°) and very firm ligamentous end feel.

Repeat this process satilizing right C2 spinous process and producing a left side flexion.

Note: due to variable orientation of the Alar ligament, approximately 70% of subjects will be most taut in CV flexion (chin tuck). If you appreciate the appropriate end feel you can stop the test. If you feel the end feel is lax then repeat the test in neutral and possibly CV extension. This test is only positive if laxity is appreciated in all 3 positions.

VERTEBRAL ARTERY TESTING

If you have concerns about possible vertebobasilar artery insufficiency you should proceed with the post-traumatic exam where CN and CV stability is screened before VA testing.

If you can safely proceed to this step the test is broken down into 3 parts:

1. *Cervical extension with hold for 30 seconds*
2. *Cervical Rotation with hold for 30 seconds*
3. *Combined extension and rotation with hold for 30 seconds*

Please note it takes 40 degrees of rotation to begin to partially occlude the vertebral artery and possibly up to 60 degrees to fully occlude it. Be cautious not to rule out the arterial insufficiency if you have limited cervical AROM.

You can re-test CN testing in the vertebral artery stress position.

This test does not fully rule out VBI, however it is the best option we currently have.

If there are no neurological concerns I typically proceed directly to step 3 of the testing.

PIVM TESTING – C2-7 U-JOINT VS Z-JOINT DISCRIMINATION

Lying supine with client's head in neutral position (approximately 20° flexion)

Hold C2 on either side using index and middle finger posterior on the lamina.

Apply a lateral translation of C2 on C3 assessing for a restriction of movement.

Move down and repeat at C3/4 and so on until you have assessed the entire Csp.

If you find a loss of movement at a particular level in a specific direction, then re-test that level and direction in flexion and extension.

If all 3 positions are reduced, it implicates the Uncovertebral joint as the translation is lost.

If worse in flexion or extension, that suggests the Zygapophyseal joint is at fault.

If you bias into flexion and feel a restriction into left lateral glide the right joint is moving from flexion toward neutral and the left toward further flexion, therefore you suspect the left Z-jt is unable to flex and requires a superior-anterior glide.

Conversely, if you bias into extension and feel a restriction into left lateral glide the right joint is moving toward further extension and the left toward neutral, therefore you suspect the right Z-jt is unable to extend and requires a posterior-inferior glide.

CRANIOVERTEBRAL FLEXION-ROTATION TEST

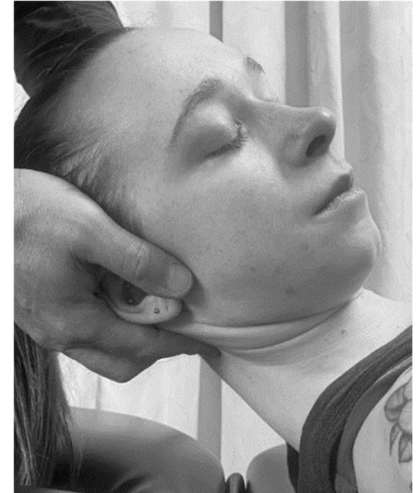


Flex the cervical spine to tighten the posterior spinal ligamentous system.

This will reduce movement through C2-7 articulations as these ligaments terminate at C2 therefore do not affect AA mobility.

Cradle the occiput and palpate C1-2 with the index and middle fingers.

Rotate the head to left and right comparing the amount (40-45° each direction) and quality of movement.



JOINT POSITION ERROR TEST

This is a good test of cervical proprioception, which can also be used for treatment.

First set and centre the laser on the client's head.

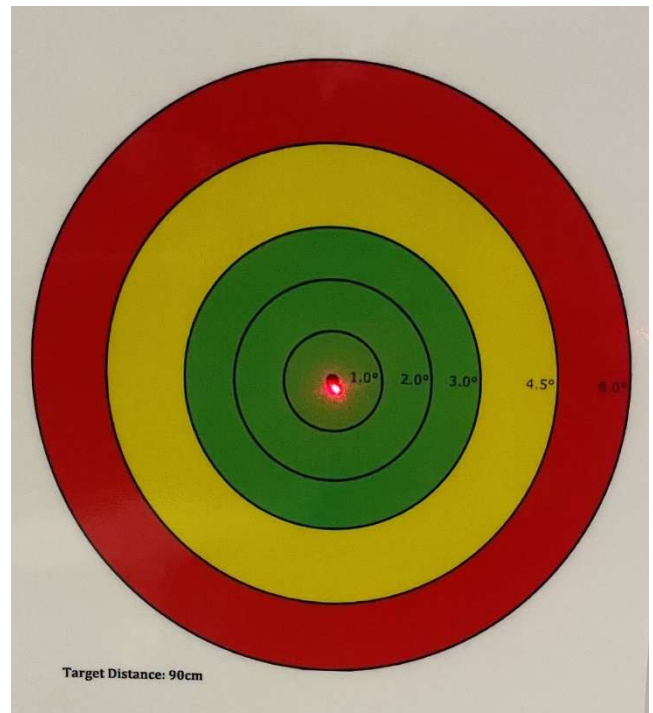
Then move the centre of the target to match the client's resting head position.

Ask the client close their eyes and then move their head in a particular direction then back to what they believe to be centre before opening their eyes.

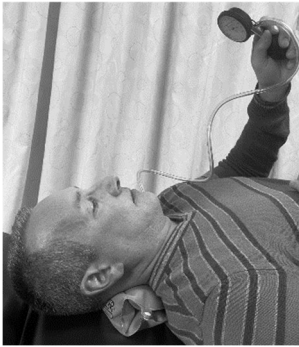
Test through movement up, down, left and right 3 times in each direction with an accuracy score out of 12 (3x in 4 directions).

Yellow and green counts as a point, while red or beyond is counted as a miss.

Allow the client to perform practice round in all directions.



TESTING DEEP NECK FLEXOR FUNCTION

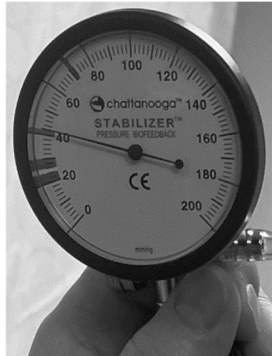


Place the stabilizer tool in the cervical lordotic curve.

Pump up the resting level to approximately 30mmHg.

First ask the client to perform a chin tuck and assess the quality relative to the axis of rotation and making sure superficial anterior muscles activity is minimal.

The pressure on the cuff should initially raise as you perform the chin tuck to approximately 40mmHg.



Then ask the client to perform a progressive head lift, which will decrease the pressure on the cuff.

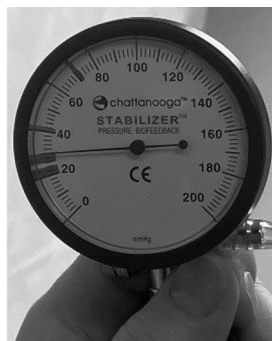
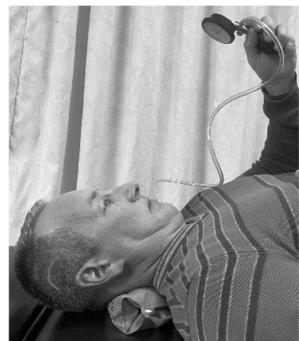
Ask the client to try hitting each of the 5 colour gradients for 2 seconds each (total 10 second hold).

Make sure quality remains good and the client doesn't perform a jaw thrust to elevate.

See how many repetitions the client can comfortably and properly perform up to a maximum of 10.

Literature suggest <90 seconds is a consistent finding in client's suffering from chronic neck pain.

Therefore, if they are able to successively complete 10 repetitions of the 10 second holds (100 seconds in total), you can have some degree of confidence they have functional deep neck flexor strength.



Note: If you do not have this device, you can still assess cervical deep neck flexion by assessing the quality of the chin tuck head lift. First assess the client's ability to perform a chin tuck, then make sure the client is able to maintain this position as they perform a head lift. Make sure they don't revert to a chin poke position which would suggest over activation of the SCM. If you see this compensatory pattern, educate the client on methods to self monitor to reduce SCM activity. SCM can also be deactivated by applying some sub-occipital traction, asking the client to look down or applying a stretch through the distal insertion at the clavicles.

CRANIOVERTEBRAL REGION TREATMENT

OA FLEXION – BILATERAL



For a bilateral or symmetrical posterior glide, cradle occiput with one hand and stabilize C1 with lumbricle grip.

Place your shoulder on the client's forehead using the same side as you choose to handle the occiput.

Apply a posterior glide with a simultaneous action of scooping with the occiput hand and producing an anterior-posterior (AP) push through your shoulder.

Make sure to rotate through the CVJ axis through the ear.

OA FLEXION - UNILATERAL



To produce, for example, a right unilateral posterior glide, side flex the head through the axis of the CVJ to the left, then rotate the head to the right.

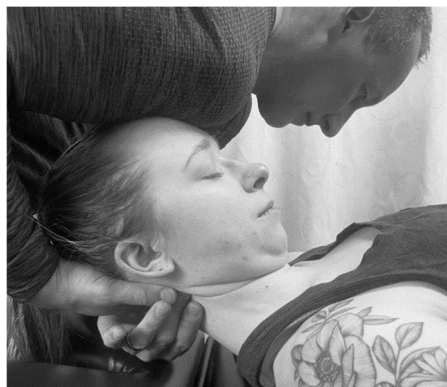
You will feel the right mastoid move posteriorly and will create the point of purchase for your fingers.

Apply an AP glide with the shoulder, however shift your right hand on the occiput so the index and middle fingers are pulling the right mastoid posteriorly in arcing motion.

Apply an AP glide with the shoulder, however shift your right hand on the occiput so the index and middle fingers are pulling the right mastoid posteriorly in arcing motion.



OA - OAA FLEXION STRETCH



Hold and support the head as per the OA posterior glide.

Rotate the head through the CVJ axis, on a stabilized C1 (for OA stretch) or C2 (for OAA stretch).

However, instead of applying an AP glide, hold a sustained end-range stretch as tolerated by the client.

You can add elements of side flexion and rotation to enhance the stretch unilaterally.

AA ROTATION GLIDE

For a right rotation cradle occipit with your left hand, grasping C1 with lumbricle grip.



Then with your right hand reach around to the left side of the C2 spinous process.

Flex the neck to add tension to the lower cervical segments

Bring the occipit and C1 to the extent of available right rotation while stabilizing C2.

You then have the option of pulling on the C2 spinous process to produce left C2 rotation or a relative right AA rotation. Or you can push the left side of C1 to produce a direct right rotation.

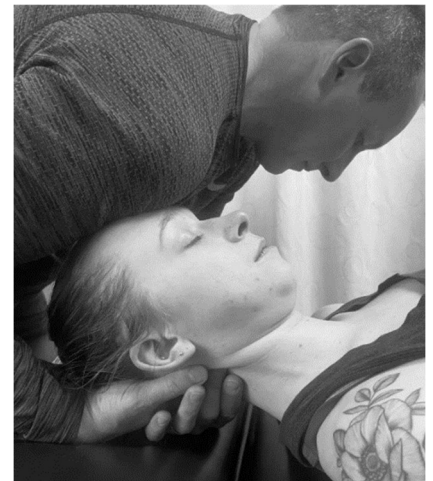
SYMMETRICAL OA OR OAA TRACTION

Cradle occipit with one hand and stabilize C1 (for OA traction) or C2 (for OAA traction) with lumbricle grip.

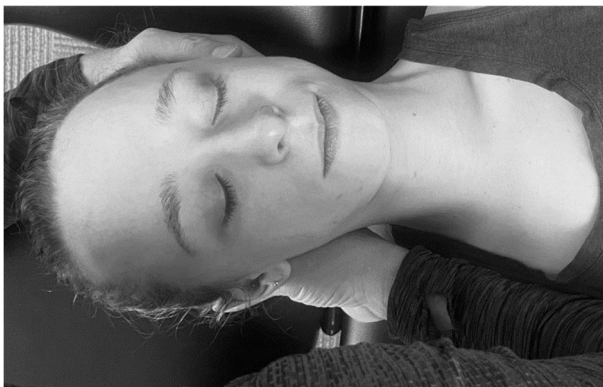
Using your ipsilateral shoulder, stabilize the client's head to prevent CV flexion.

Apply a graded traction force 1-4 and sustain for a minimum of 10 seconds.

Note: This technique can be done in combination with the OA posterior glide and the OA-OAA stretch for an effective treatment of CV postural articular hypomobility and / or myofascial tension.



UNILATERAL OA OR OAA TRACTION



Stand on the intended treatment side.

Cradle occipit on the treatment side with your caudad hand so that your force can be directed cranially.

With your cranial hand reach around and support the contralateral side of the head for client comfort and to prevent side flexion of the head.

Slightly side bend the head towards you to rest the occipit on you tractioning hand.

Then apply a graded cranially directed force by securing the head against your body weight shifting in that direction.

C2-3 U-JOINT IMP OR SAL



Emphasis is placed on either the inferior posterior medial (IMP) or the superior anterior lateral (SAL) direction.

Line up arm and body with the direction that you intend to mobilize.

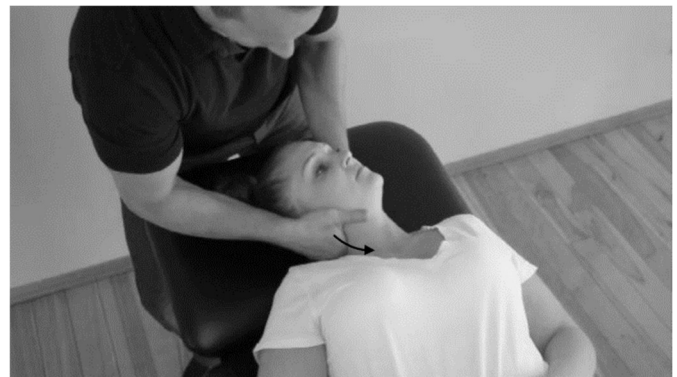
Two handed glide is generally a 60/40 split where the 60% is applied to the direction (IMP or SAL) that you feel requires the mobilization.

C4-5 EXTENSION

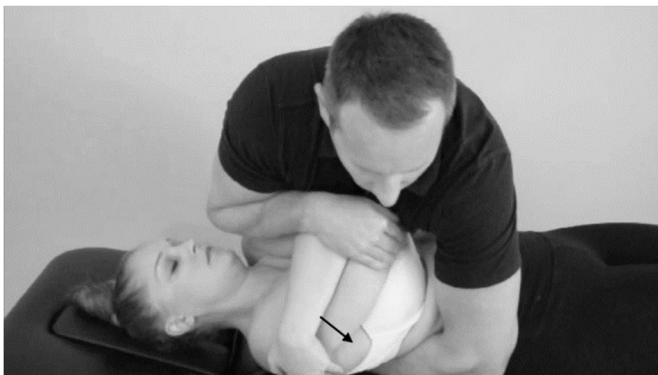
Assist bias into extension by lowering the head of the bed.

Gain purchase on the C4 segment along radial side of the second MCP joint.

Line up your arm and body with the direction you intend to mobilize and perform an inferior posterior glide of C4 on C5 (towards the client's opposite hip).



THORACIC EXTENSION



Stand above the patient's arms.

Bias into extension by side flexing the patient away from yourself.

Pushing from a superior direction, produce an inferior glide at the segment.

Drop the client's body further onto the contact hand to set the segment into an extension position.

EXERCISES



CERVICAL EXTENSION OVER ROLL

You can use a simple towel roll or a variety of tools designed for this purpose.

This is best performed as a low load long duration (LLLD) stretch to improve cervical lordosis.

Forward head posture with reduced lordosis is a common finding in upper cervical and TMJ dysfunctions.

Can also add chin tucks in this position.

AA ROTATION STRETCH

To facilitate left rotation as in the picture, grasp and stabilize the towel with your left hand.

Wrap the towel around your neck and try to hook the edge around the atlas.

Turn the head into left rotation and pull gently with the towel until you appreciate a stretch at the right AA joint.

You can use stretch into flexion or extension throughout the cervical spine.



ISOMETRIC ROTATION

You can engage the Obliquus Capitis Inferior and the rectus capitis anterior to create rotation at the AA joint.

Push isometrically against the temple in the direction you wish to restore and in the opposite direction with pressure against the contralateral mastoid.

You can then turn your head in the direction you are trying to restore approximately 10° and repeat the process.

Repeat this 4-5 times until you reach the 40-45° of motion available at the AA joint.

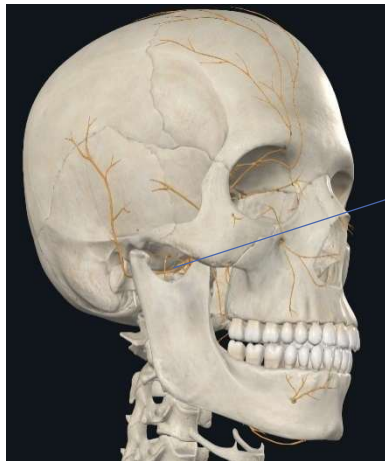


DNF STRENGTHENING

Start with neck over roll, wrap band behind head, perform a chin tuck and hold the tuck as you add tension to the band.

POSTURAL STRENGTHENING

Perform a resisted cervicothoracic extension maintaining the horizontal head position.

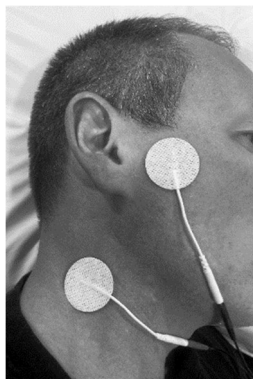
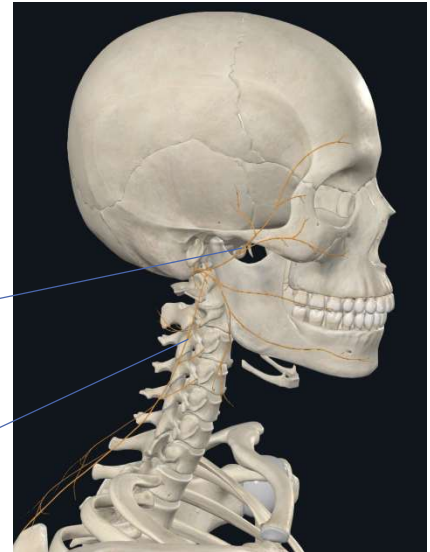


TENS applied to the Cranial nerve 5, 7 and 11 points is very effective in managing TMJ pain and tension.

Trigeminal nerve (5)

Facial nerve (7)

Spinal Accessory nerve (11)



Recommended electrode placement just anterior to the mandibular condyle and just below the point of intersection of the Sternocleidomastoid and Upper Trapezius. As you can see these are ideal points to access the nerves and are used by my dental colleagues prior to fitting mouth guards and splints. You can achieve pain management through stimulation of the motor nerve to facial musculature, the SCM and UFT as well as the sensory nerve to the face. You may also try one electrode on the suboccipital muscle region to access the greater, lesser and third occipital nerve.

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