Common Headaches and OM Practices

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Disclaimer

- I am a paid faculty member at Oklahoma State University-Center for Health Sciences.
- I am NOT receiving monetary remuneration for this presentation from OSU-CHS nor any other association, nor industry

Objectives

- Participant will know the prevalence of common headaches
- Participant will know the pathophysiology of:
  - Migraine Headache
  - Tension – Type Headache
- Participant will know common OMT treatments for each type of headache

References

- Foundations of Osteopathic Medicine. 4th Edition. Seffinger DO editor. 2018
- Greenman's: Principles of Manual Medicine. 5th edition. DeStafano DO editor. 2017
- Atlas of Osteopathic Techniques. 3rd Edition. Nicholas & Nicholas Editors. 2016

- Headaches are one of the most frequent presenting complaints to both the general practitioner and the neurologist.
- The following represents the current International Headache Society classification of headaches. This classification is useful for establishing a clinical diagnosis of headache type; good scientific models exist for only some of the headache types, and there could be overlap between categories of headache in a given patient.

International Headache Society Classification of Headaches

Migraine
Tension-type headache
Trigeminal autonomic cephalalgias (TACs)
Other primary headache disorders
- **Headache attributed to trauma or injury to the head and/or neck**
- **Headache attributed to cranial or cervical vascular disorder**
- **Headache attributed to nonvascular intracranial disorder**
- **Headache attributed to substance or its withdrawal**
- **Headache attributed to infection**
- **Headache attributed to disorder of homeostasis**
- **Headache or facial pain associated with disorder of the cranium, neck, eyes, ears, nose, sinuses, teeth, mouth, or other facial or cervical structures**
- **Headache attributed to psychiatric disorder**

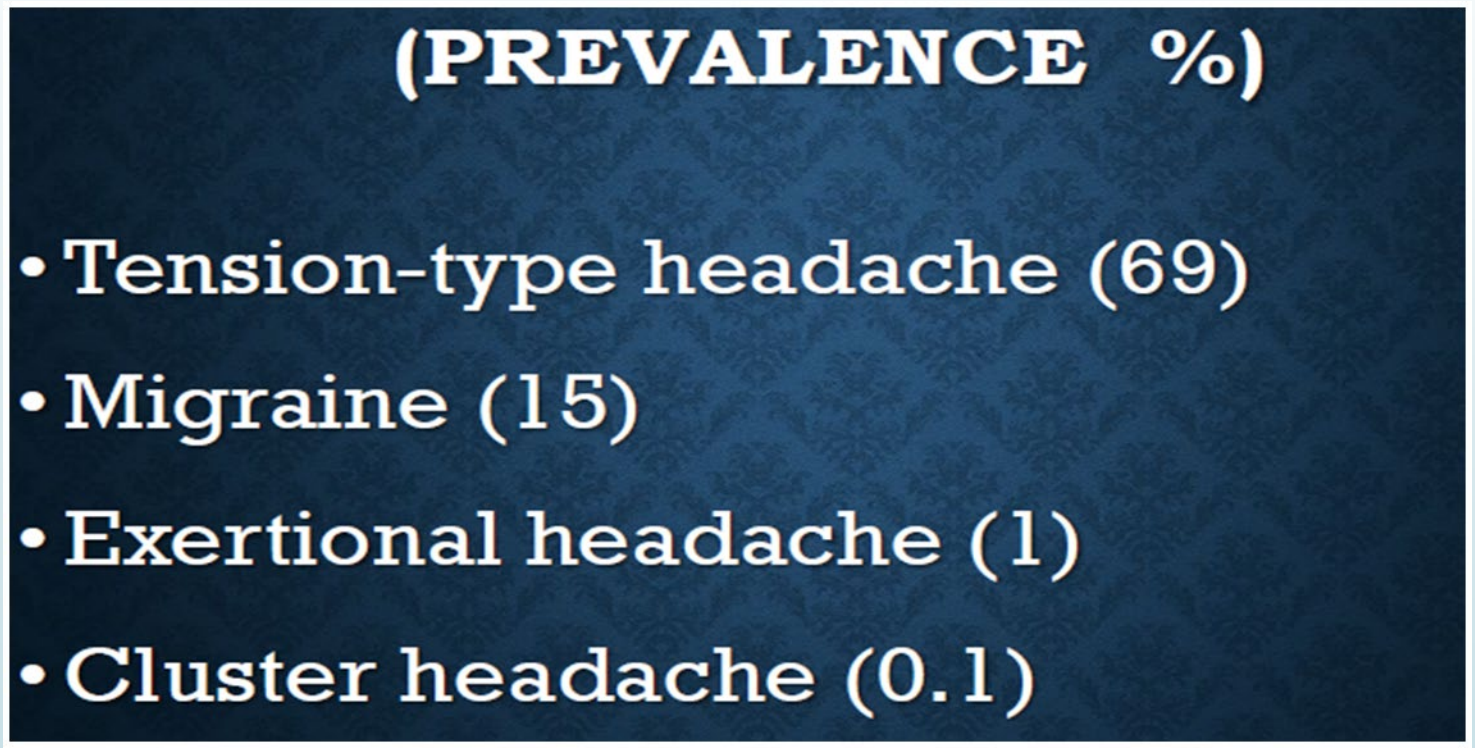
Painful cranial neuropathies and other facial pains
Other headache disorders

From International Headache Society. The International Classification of Headache Disorders, 3rd edition (beta version). Cephalalgia. 2013;33(9):629–808, with permission.

- Most headaches are mixed tension type and migraine. This presentation is complicated by the multifactorial nature of headache, including these features:

  - Physical
  - Psychological
  - Familial
  - Ethnic
  - Cultural

Types and prevalence



- Pain can result from noxious stimulation of the eyes, ears, mouth, and nasal cavities. Pain-sensitive intracranial structures include the venous sinuses and their tributaries, the dura (particularly at the base of the brain), and the arteries of the pia-arachnoid and dura mater. Some extracranial structures are also pain sensitive, including the:
  - Skin
  - Subcutaneous tissues
  - Fascia
  - Muscles
  - Arteries
  - Cranial periosteum
  - Regional articulations

- **A description of the quality and location of the headache is useful in establishing a cause. Investigate these questions:**
  - Does it pound like a vascular headache or squeeze like a tension headache?
  - Does it localize to the region of the extracranial arteries, sinuses, teeth, tendinomuscular attachments, temporomandibular joint, or cervical vertebrae?
  - What are the severity and the time course of the pain?
  - Is there an acute, severe onset, as is typically seen in subarachnoid hemorrhage?
  - Is it chronic and nagging, more typical of tension-type headache?
  - Does it tend to reoccur like migraine?

For example:

- Migraines often occur in the morning and rarely last more than a day or two.
- Cluster headaches typically occur at night and rarely last for more than 30 to 120 minutes.
- Tension headaches can last for weeks or months.

- The associated features of a headache include its relation to:
  - Menstruation
  - Activities
  - Head position
  - Time of day
  - Exercise
  - Sleep habits
  - Environmental toxicity
  - Food and drink intake

- It is important to know the age of onset, relevant family history, and exacerbating and relieving factors. A psychosocial assessment and thorough history and physical examination can reveal the symptoms and signs of anxiety, depression, and anger that can increase and heighten pain awareness.

- The physical examination of these patients includes a thorough general examination and a comprehensive neurologic examination, including:
  - Mental state
  - Cranial nerves
  - Strength
  - Reflexes
  - Coordination
  - Sensation
  - Appropriately detailed musculoskeletal assessment including the head

- The neuromusculoskeletal assessment includes active and static body analysis. Observe and palpate the:
  - Facial and mandibular attachments
  - Temporomandibular joints
  - Temporalis
  - Masseter
  - Occipitofrontalis
  - Buccinators
  - Pterygoid muscles

- Evaluate the levels of muscle contraction and local tenderness with direct superficial and deep cervical palpation from the skin to the synovial joints. Assess rotational characteristics of the head, cervical, and upper thoracic regions, as well as the basi-occipital attachments at the atlas for anterior, lateral, and posterior asymmetry

- In addition, carry out a screening of the total musculoskeletal system.
  - Leg length and lower extremity symmetry
  - Sacropelvic base analysis
  - Cranial rhythmic activity and suture mobility analysis
  - Presence and severity of tender points and trigger points

- In clinical practice, the relationship between symptoms and signs and the ability to reproduce the painful symptoms during the examination are helpful in clinical localization. This is particularly true for the biomechanical syndromes, such as:
  - Temporomandibular joint syndrome
  - Malocclusive dental syndromes
  - Cervical spine syndromes (spondylosis, disc degeneration, facet dysfunction)
  - Cranial neuralgias
  - Cranial suture syndrome
  - Short-leg syndrome
  - Nerve encroachment syndrome
  - Myofascial pain syndromes

- This type of evaluation supplies information that can be essential to formulating comprehensive therapeutic objectives.

Tension-Type Headaches

- Tension-type headaches are classified by the International Headache Society as episodic and/or chronic.
- They are further divided by the presence or absence of involvement of the pericranial muscles.
- Involvement can be demonstrated by electromyography or palpation

Presentation

- Tension-type headache is the most frequent headache type.
  - It is characterized by mild-to-moderate intensity pain, described as pressing or tightening, typically bilateral, and usually occipital in location.
  - In distinction from migraine, it is not aggravated by exercise or routine physical activity.
  - Like migraine, it runs in families, is more common in women, and can be affected by hormonal cycles.
  - It is episodic if it occurs less than half the days of the month and chronic if it occurs more than half the days of the month.

- The International Headache Society distinguishes between tension-type and migraine headaches. Many believe, however, that these headache types are related disorders. In fact, most patients with migraines have tension-type headaches, and many patients with tension-type headaches have migraines.

Mechanisms

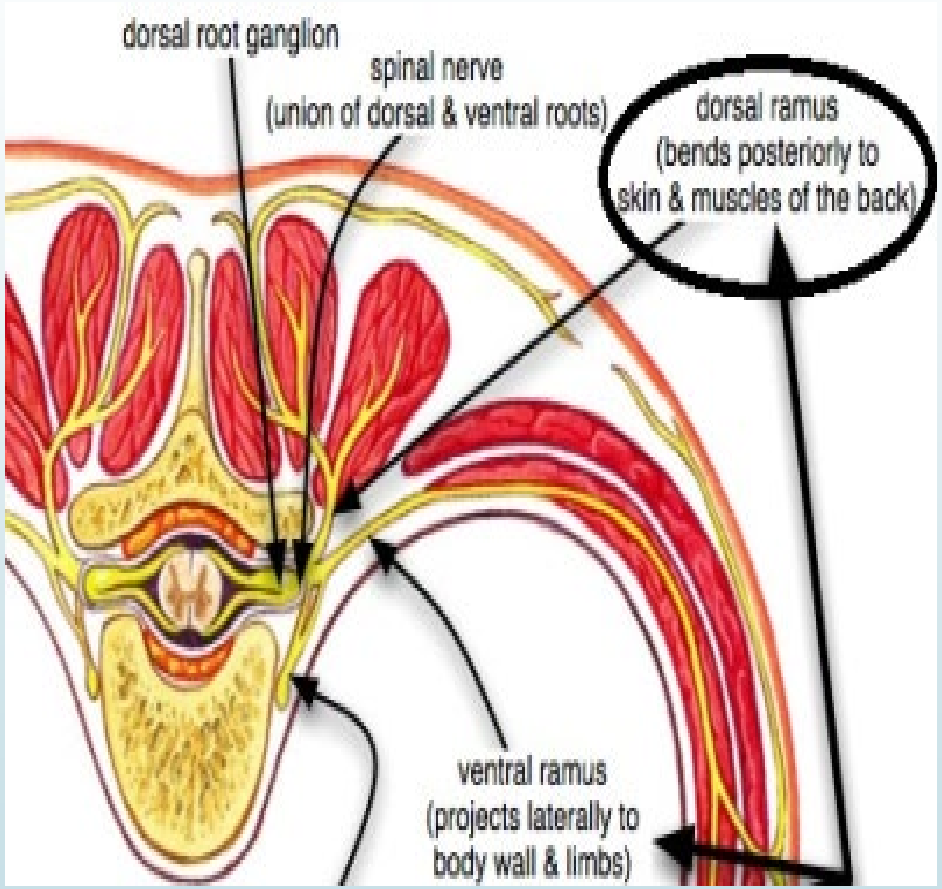
- Both migraine and tension-type headaches might be the result of abnormalities in central pain control mechanisms, as well as trigeminal neuronal hypersensitivity.
- Both might be associated with muscle tenderness, electromyographic abnormalities, and abnormal platelet serotonin levels. When severe, they both can be associated with depressed cerebrospinal fluid and β-endorphin levels

- Clinicians theorize that there might be a vascular, supraspinal, and myogenic integrated model for migraine and tension-type headache
- When the afferent nociceptive signal is intense, sensitization of the entire pain pathway, peripheral and central, can occur.
- In migraine, the nociceptors are vascular and the non-noxious stimuli are vascular pulsations.
- In the tension-type headache, the nociceptors are myofascial and the non-noxious stimuli are muscle contractions.

- In either case, supraspinal facilitation is likely to be present and neuronal sensitization can occur.

Dorsal Rami of the Upper Cervical Nerves

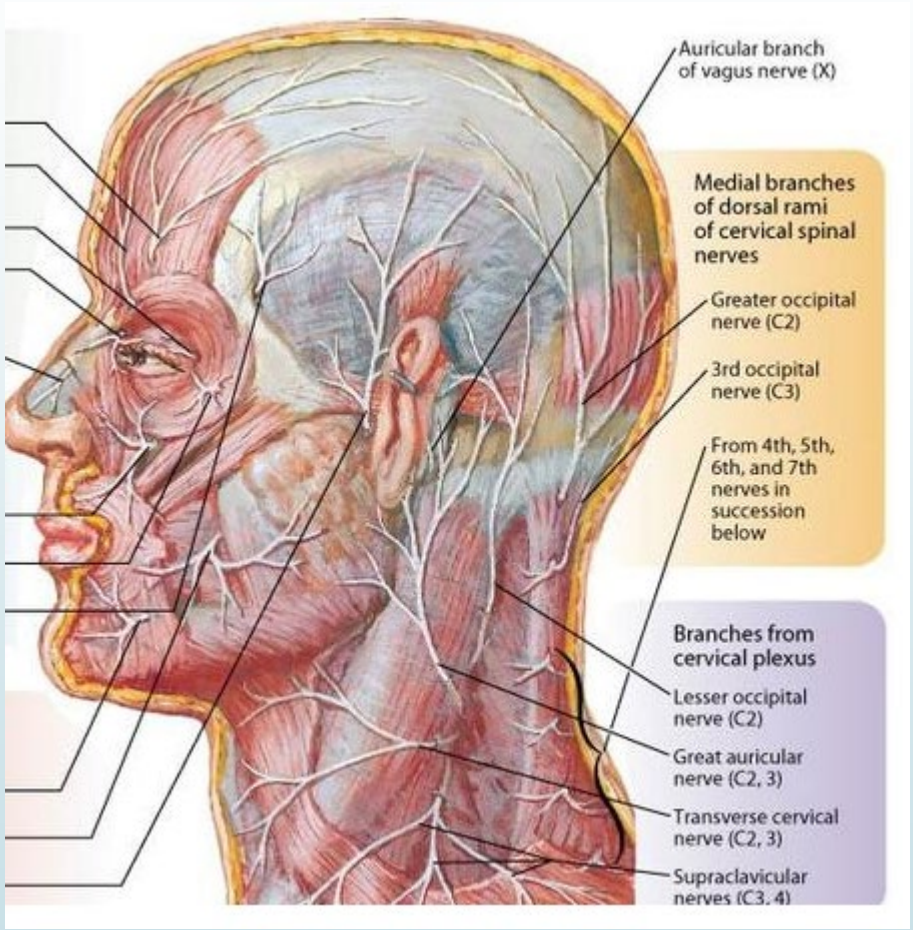
- Understanding the anatomy of the dorsal rami of the cervical nerves is important in understanding how somatic dysfunction at C2 and C3 may be related to tension headaches and "occipital neuritis."
- The greater and lesser occipital nerves have been implicated in the production of tension headaches, so this region is a common area of OMT.
- These branches of the dorsal rami of the upper cervical segments pierce through the fascia just below the superior nuchal line.
- Tension in this fascia has been implicated to cause compression and irritation of the greater occipital nerve.



- The **greater occipital nerve** is the medial branch of the dorsal ramus of the second cervical nerve. It ascends between the muscles of the suboccipital triangle and the semispinalis capitis. The greater occipital nerve pierces the semispinalis capitis and the trapezius near their attachments to the occipital bone and ascends on the back of the scalp with the occipital artery.
- The **greater occipital nerve** supplies the skin of the occipital part of the scalp lateral to the median line and as far superiorly as the vertex of the skull.
- Its lateral branches communicate with those of the **lesser occipital nerve**.
- **The greater occipital nerve** gives off muscular branches to semispinalis capitis and joins with *occipitalis tertius*, the cutaneous branch of the third cervical nerve. The *occipitalis tertius* supplies the skin of the upper part of the back of the neck, near the median line, and the skin of the scalp over the external occipital protuberance.

The cutaneous branches of the cervical plexus are *the lesser occipital, the great auricular, the transverse cervical, and the supraclavicular nerves.*

- The lesser occipital nerve (C2, sometimes also C3) ascends in the neck along the posterior border of the sternocleidomastoid muscle. It pierces the superficial layer of cervical fascia near the insertion of the muscle and divides into branches, which supply the skin and subcutaneous tissue of the scalp behind and above the ear and of the upper portion of the cranial surface of the ear.
- The *great auricular nerve* (C2, C3) arises in the posterior triangle at the lateral border of the sternocleidomastoid muscle. It travels below the lesser occipital nerve and crosses obliquely in a course toward the ear and the angle of the mandible.



Research

- Effectiveness of OMT in the management of frequent episodic tension-type headaches was assessed in a 2014 single-blind randomized placebo-controlled pilot study. In this study, 40 patients were randomly allocated to either an experimental group (OMT) or a control group (sham therapy measuring cranial rythmic impulse)
  - Significant reduction in headache frequency by 40% at 1 month after the end of treatment and by 50% at 3 months after treatment ($P < 0.001$)
  - A 45% reduction in the use of over-the-counter medication at 3 months after treatment ($P < 0.001$)
  - A 20% reduction in pain intensity at 3 months after treatment ($P < 0.001$)
- OMT may be an adjunctive modality to medical management or an alternative for patients who are at increased risk of or intolerant to adverse drug effects or simply are not compliant with drug regimens

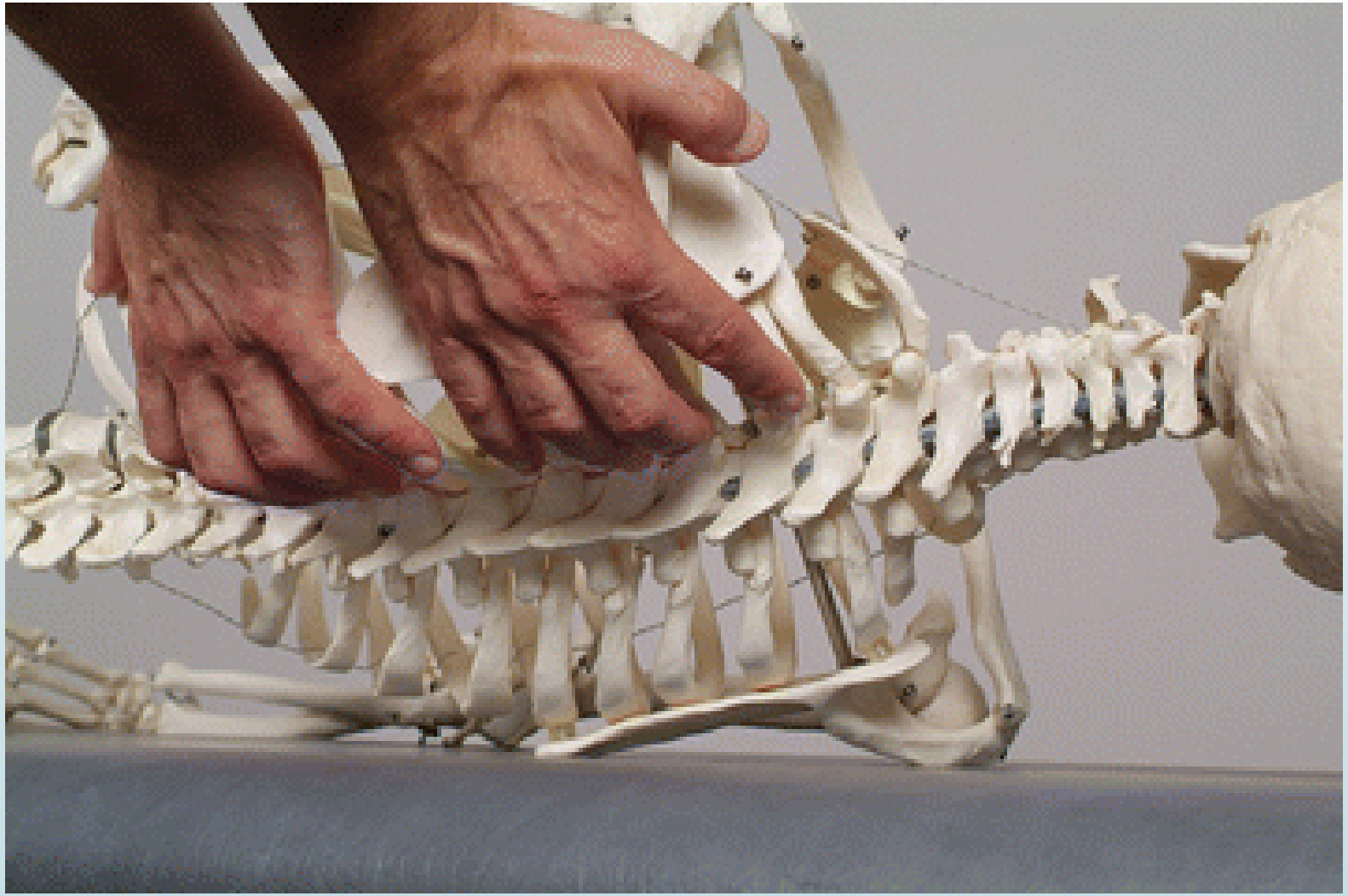
- *Rolle G, Tremolizzo L, Somalvico F et al. Pilot trial of osteopathic manipulative therapy for patients with frequent episodic tension-type headache. J Am Osteopath Assoc. 2014;114(9):678–685.*

Treatment Algorithm for Tension-Type Headache

Treatment Plan	Objective	Technique
Treat upper thoracic and rib dysfunctions	Eliminate upper thoracic dysfunction involved in perpetuating the pain; balance autonomic tone	Soft tissue, MFR, ME, FPR, counterstrain, HVLA, rib raising
Treat cervical dysfunction, particularly involving the occiput, C1, and C2	Eliminate dysfunctional cervical mechanics and soft tissue tension involved in exacerbating the pain	Soft tissue, suboccipital release MFR, FPR, ME, HVLA
Treat cranial dysfunction including TMJ dysfunction	Eliminate cranial strain patterns affecting the trigeminal neurovascular system	Direct and indirect osteopathic cranial manipulative medicine; MFR and ME technique for TMJ dysfunction
Treat the lumbar, sacrum, and pelvis	Eliminate compensatory or contributing strain patterns from below	Soft tissue, MFR, ME, HVLA, counterstrain
Address postural mechanics	Reduce exacerbating factors	Core strengthening, scapular retractions, cervical isometric exercises, proprioceptive training
Stress reduction counseling	Reduce exacerbating factors while enhancing overall well-being	One-on-one counseling to identify specific stressors and individualize stress management strategies
Health promotion and disease prevention	Reduce risk of future illness; enhance overall well-being	Smoking cessation, weight management, exercise and nutrition counseling; health screening

Trapezius ME

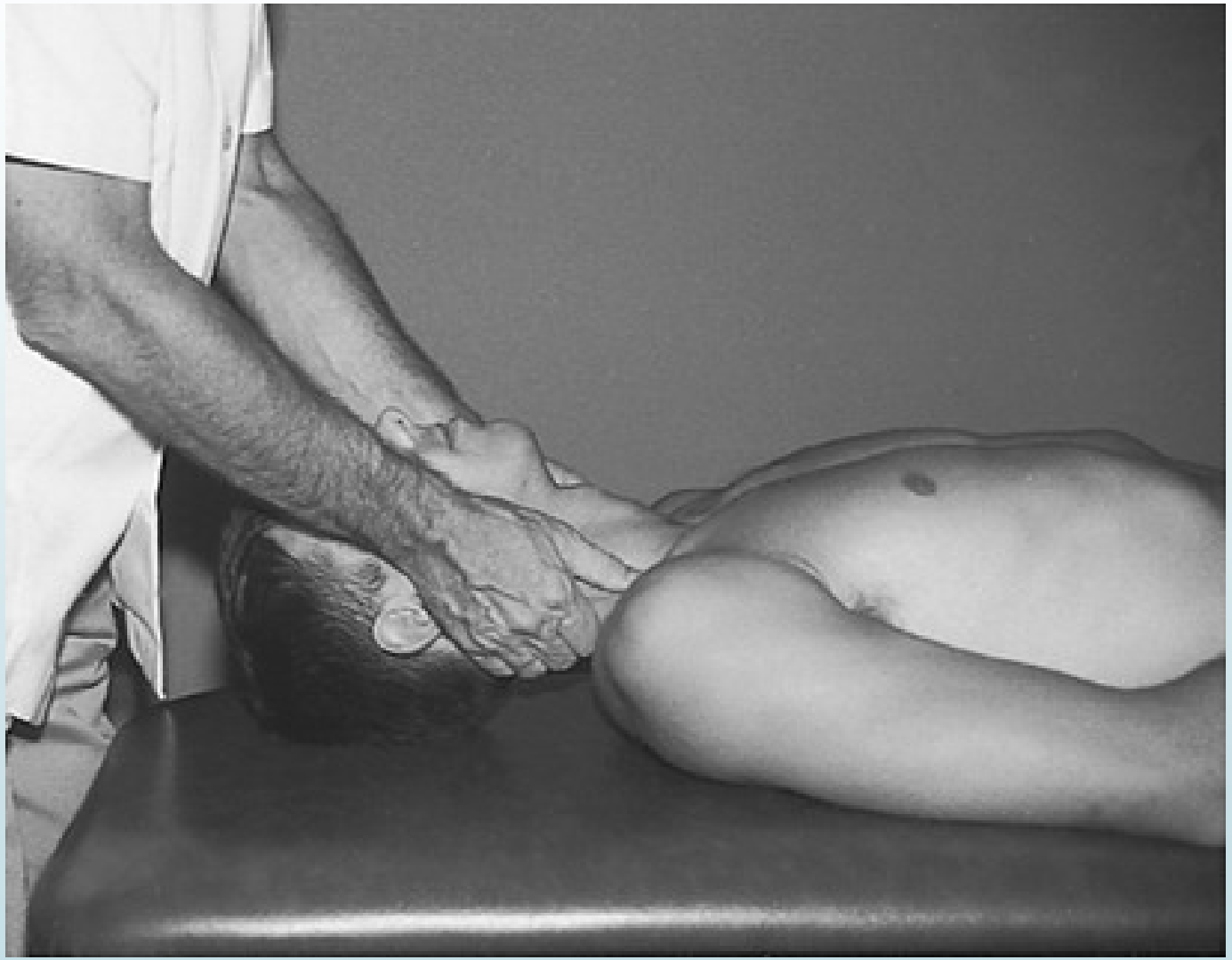
Paraspinal inhibition/rib raising



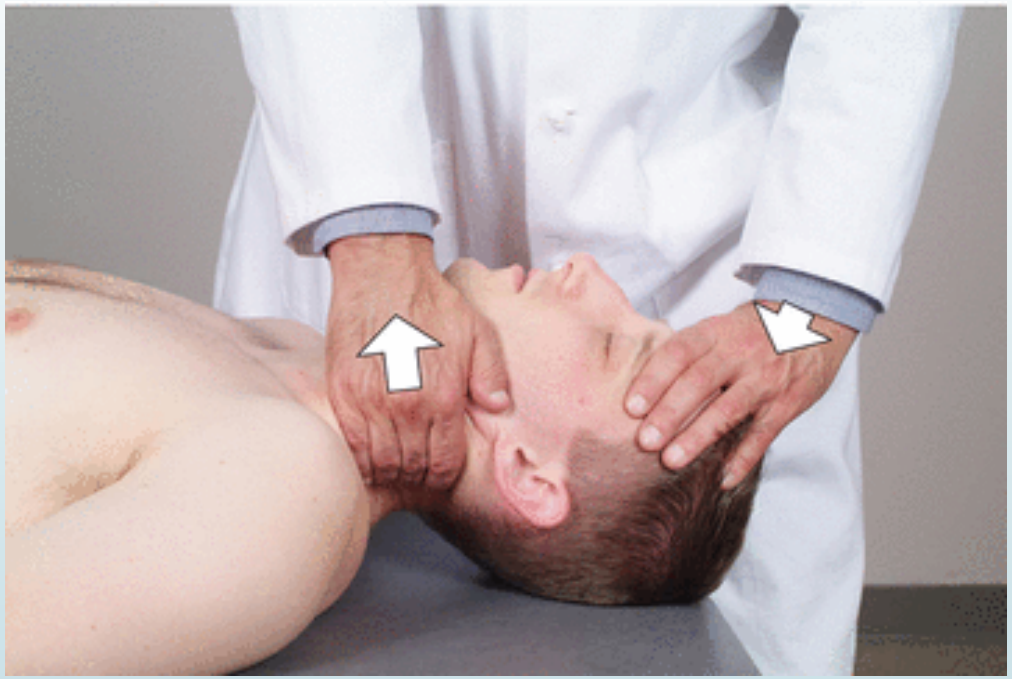
Paraspinal inhibition/rib raising

Articulatory to 1st rib

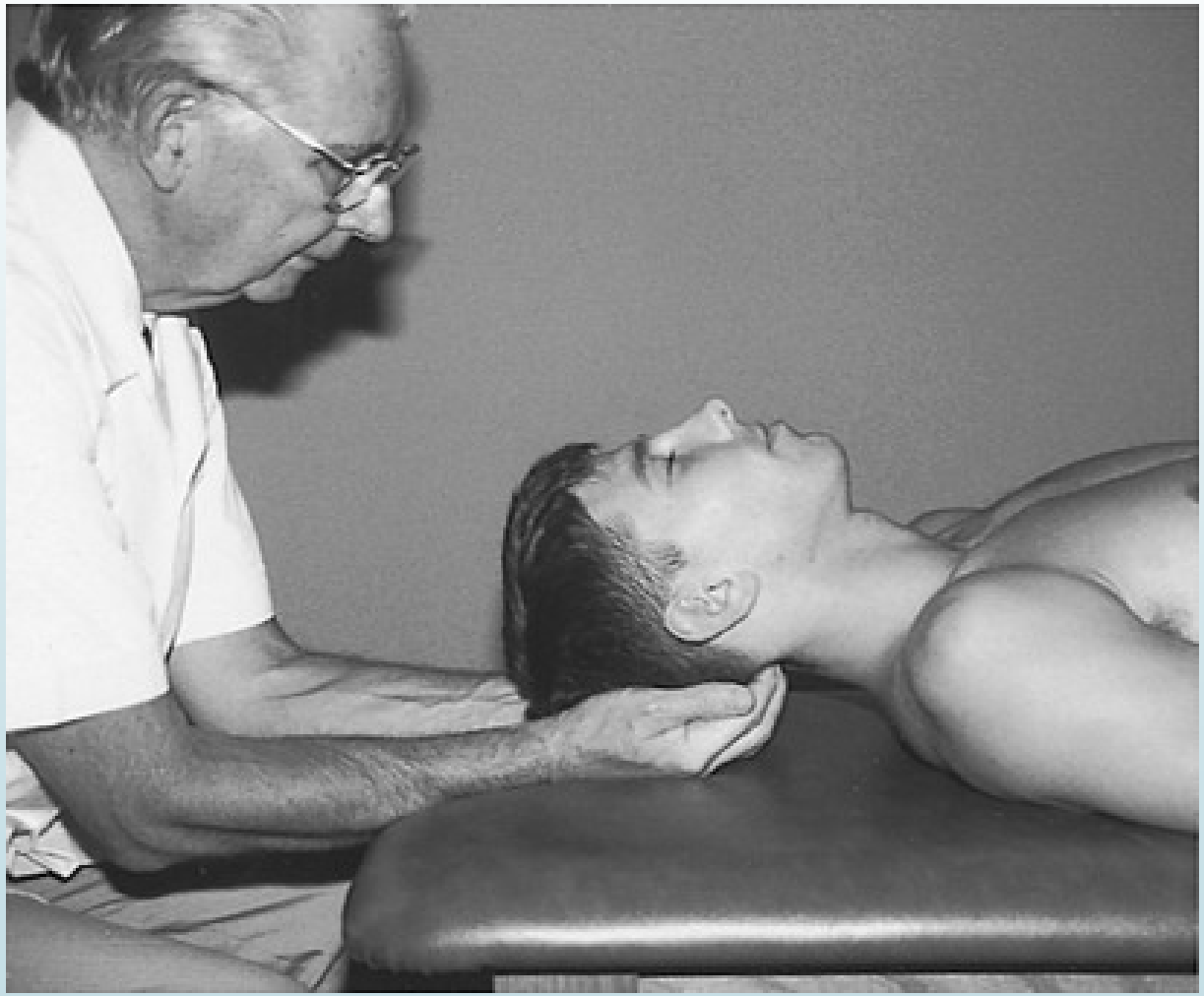
Bilateral Cervical stretch



Contra lateral Traction



Suboccipital Release



Migraine

- Migraine headaches are a common cause of functional disability in the United States.
- The annual cost of lost productivity in the United States has been estimated to range from $1.2 billion to $17.2 billion.

- Migraine headaches are frequently described as a unilateral, throbbing, pounding pain following a vascular distribution of the superficial or deep cerebral vessels and lasting for several hours.
- They can radiate to the opposite side.
- They may be associated with:
  - Nausea
  - Vomiting
  - Diarrhea
  - Vertigo
  - Dizziness
  - Tremors
  - Photophobia (light sensitivity)
  - Phono phobia (sound sensitivity)
  - Sweating
  - Chills

Prodrome

- Scotomas (blind spots in the eyes)
- Photopsia (flashing lights)
- Vertigo
- Paresthesias (abnormal sensations)
- Visual, olfactory, and auditory hallucinations
- Syncope (passing out)

Scintillating scotomas

- Migraine headaches are recurrent and vary widely in intensity, frequency, and duration.
- The initial episode most often occurs during puberty but can occur at any age between 5 and 40 years.
- Migraine can begin in childhood, adolescence, or adulthood.
- In women, it can be associated with the hormonal fluctuation of menstruation.
- For some patients, tenderness, tightness, pain, and limitation of motion in the suboccipital and cervical musculature accompany migraine. Characteristically, migraine is relieved by sleep.

Triggers

- Head injury or other traumas
- Stress
- Hormone fluctuations
- Fasting
- Oversleeping and under-sleeping
- Vasoactive substances in foods (wine and cheese, cold foods)
- Changes in weather and temperature (bright light, poor ventilation)
- Physical stimuli (smoking), caffeine

Mechanism

- The production of migraine symptoms involves two major events: vasoconstriction and vasodilation.
- The cerebral blood vessels can be divided into two major systems: the innervated (adrenergic) system and the noninnervated arterial system.

- The large innervated vascular system consists of the arteries at the base of the brain and the pial arteries. These have a rich adrenergic nerve supply and respond to:

Catecholamines.

- The noninnervated vascular system consists of the parenchymal arteries and the terminal high-resistance arteries. They respond to:

Local metabolic factors.

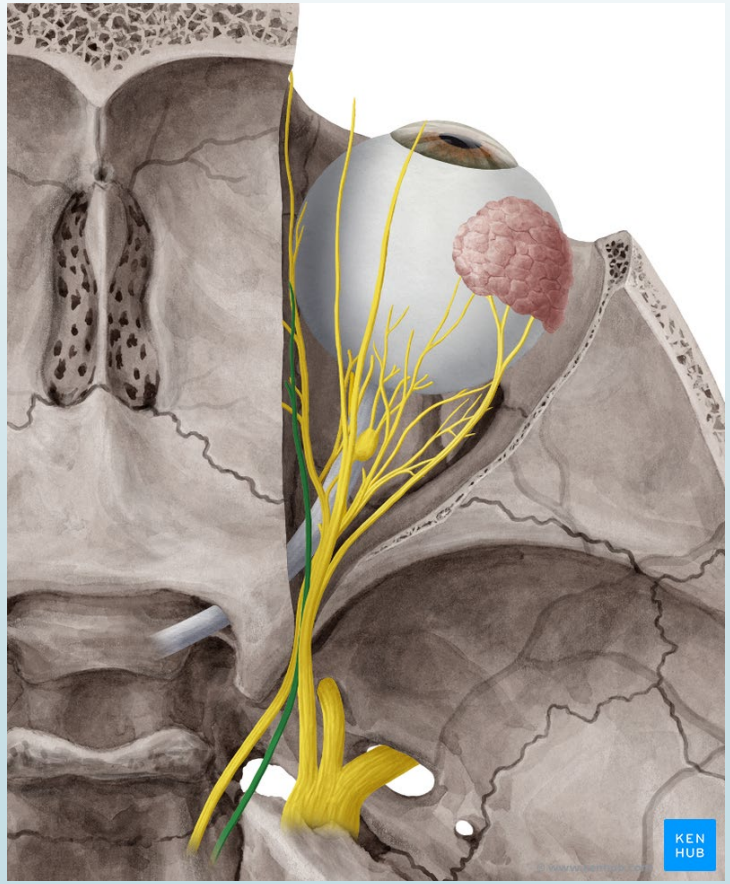
- Trigger factors (listed above) produce unilateral cerebral ***vasoconstriction*** via the adrenergic nervous system.
- In response to local metabolic factors (anoxia and acidosis), the vessels of the noninnervated arterial system ***dilate***, increasing cerebral blood flow and promoting local vasomotor changes resulting in a combined ***dilation*** of the innervated extracranial and intracranial arteries on the same side.

Somatic Dysfunction

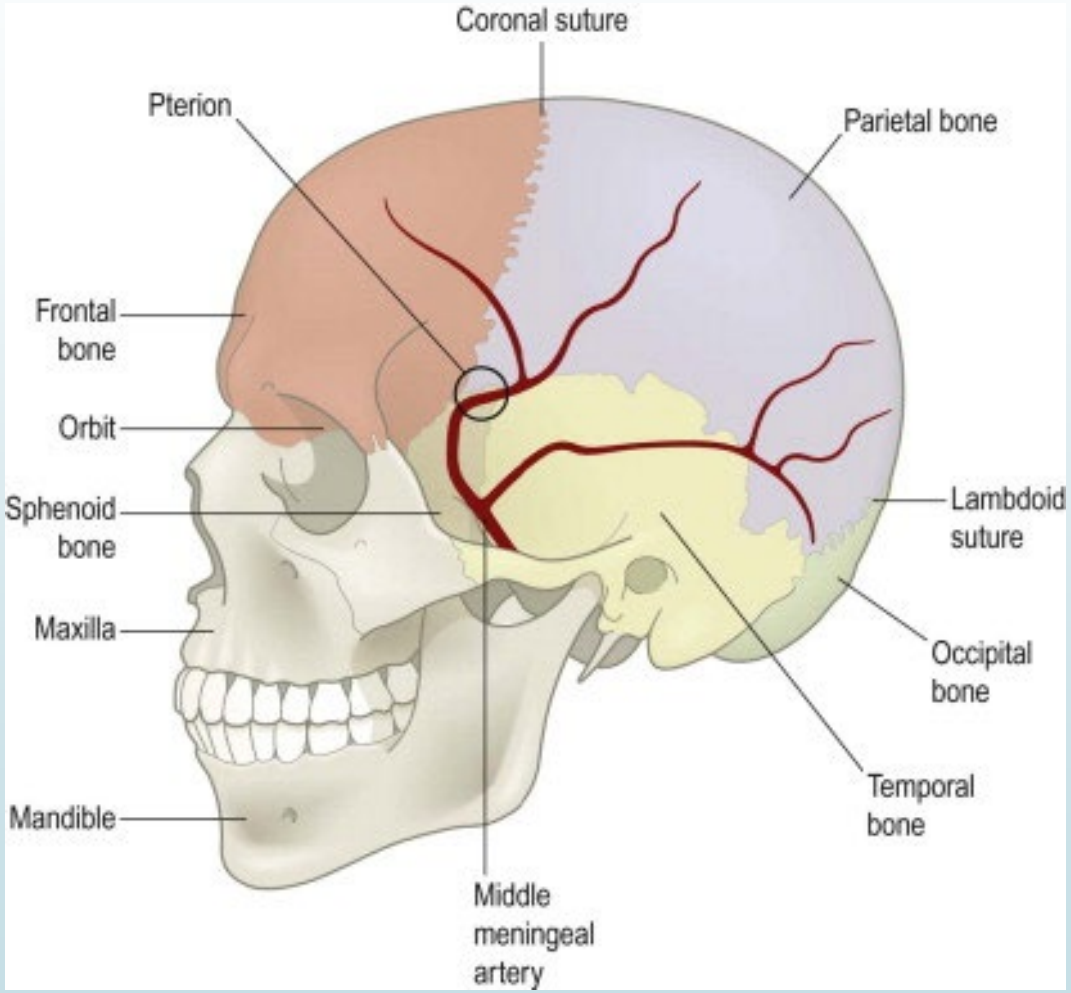
- Somatic dysfunction in the upper thoracic spine increases the level of sympathetic tone to the innervated blood vessels of the head.
- Increased sympathetic tone produces vasoconstriction and a resultant decrease in cerebral blood flow.
- This results in a relative anoxia and may lower the threshold for vasodilation, thereby contributing to the production of migraine symptoms.

- Cranial dysfunction affecting the cortex, thalamus, and hypothalamus and upper cervical dysfunction affecting cervical nerve roots C1–C3 may result in the transfer of afferent pain stimuli to the spinal nucleus of the trigeminal nerve.

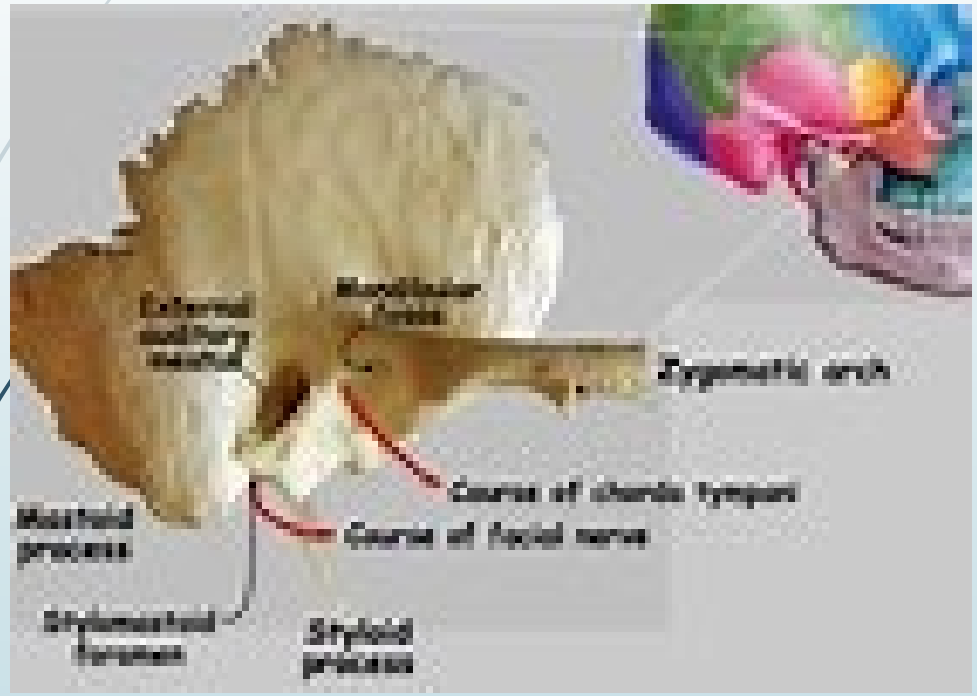
- The trigeminal nerve courses through various portions of the sphenoid bone. An elevated greater wing of the sphenoid (torsion) may apply dural pressure resulting in irritation of the trigeminal nerve, thereby feeding into the trigeminal vascular reflex.

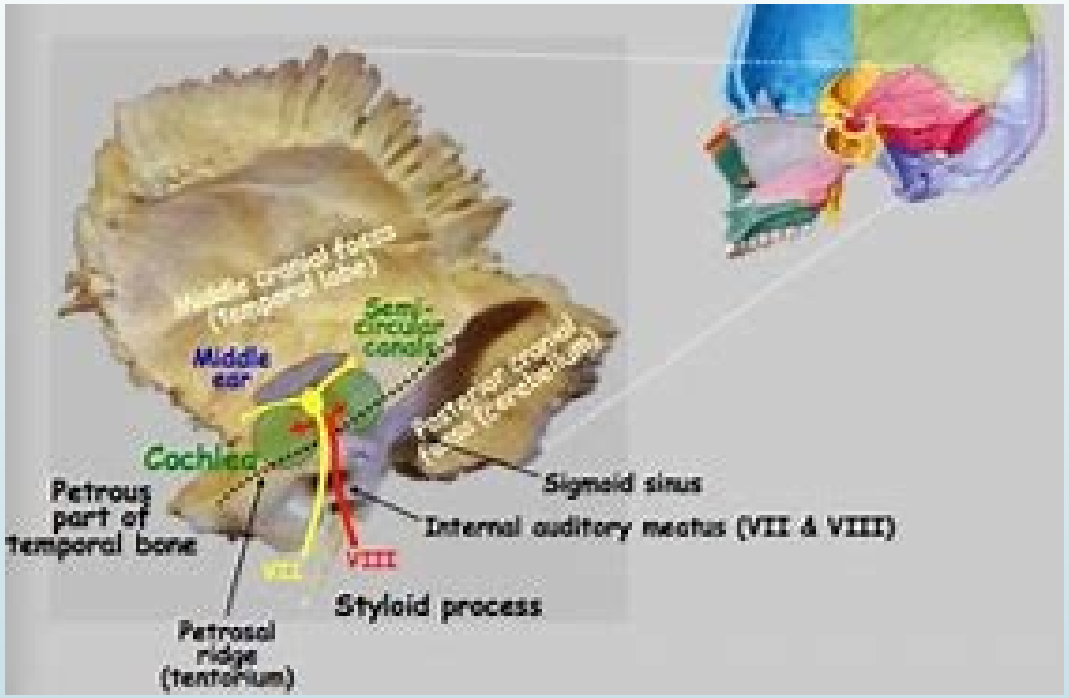


- A sphenosquamous compression can compromise the function of the middle meningeal artery.

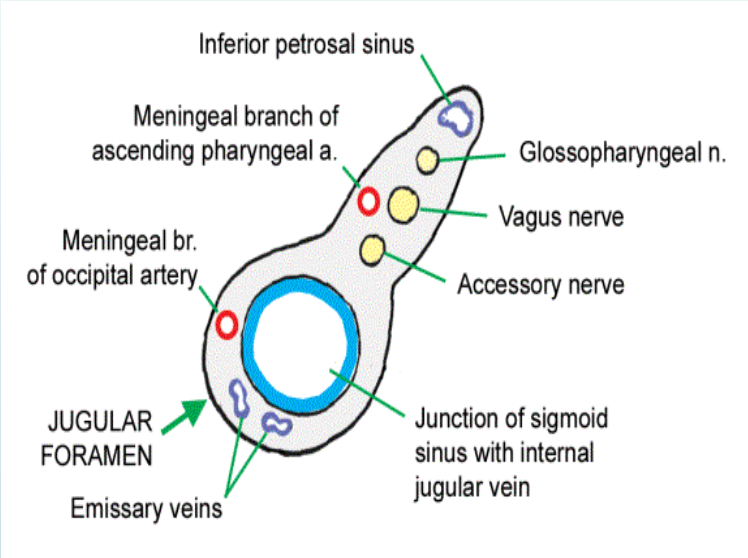


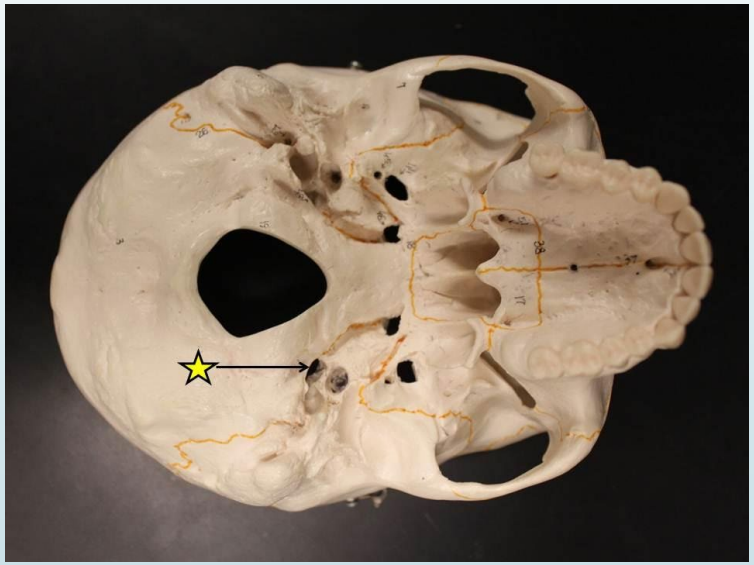
- Dysfunction of the temporal bone, such as internal rotation, can result in reflex vasodilation of the internal and external carotid arteries via the facial nerve





- Occipitomastoid compression can result in reduced venous drainage through the jugular foramen, thereby producing congestion and dysfunction in the cortex, thalamus, and hypothalamus as well as CNs IX and X.





- Migraine headaches are more than just a problem with the cranial structures. They are a total body problem:

Myofascial strain patterns stored within the abdomen or elsewhere in the body can cause tension changes on the base of the skull contributing to the disorder.

Excessive tension around the sacrum and coccyx can pull on the dura and posterior fascial planes, contributing to increased tension in the upper back and neck.

Patients with common migraine or mixed tension-type headaches often have upper thoracic somatic dysfunction associated with (autonomic) dysfunction to the head and neck.

An extended upper thoracic somatic dysfunction (type II) is typically acutely painful and can maintain muscle tension in the head, suboccipital area, and neck.

It is common to find suboccipital cervical dysfunction related to upper thoracic and rib somatic dysfunction.

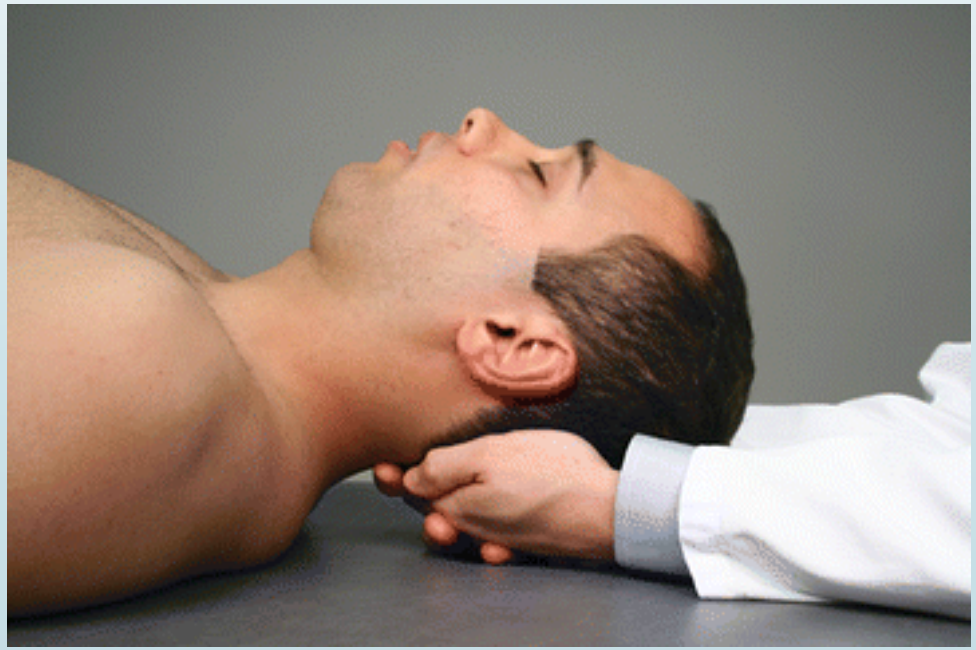
Treating the upper thoracics and ribs with counterstrain or myofascial release techniques improves suboccipital tissue texture abnormality.

Somatic dysfunction of the sphenoid, temporals, and occiput may also be involved in trigeminal dysfunctions and headaches. The trigeminal ganglion provides sensory nerves from the forehead and upper and lower jaw. According to Magoun, normal movement of the temporals is critical, especially in migraine patients.

Compression of the Fourth Ventricle

Treatment often starts with compression of CV4 for ill patients. The treatment augments the healing capabilities of the patient, relaxes the patient, and improves the motion of the CRI.

- The patient lies supine, and the physician is seated at the head of the table with both forearms resting on the table, establishing a fulcrum.
- The physician crosses or interlaces the fingers of both hands, cradling the patient's occipital squama.
- The physician places the thenar eminences posteromedial to the patient's occipitomastoid sutures. *If the thenar eminences are on the mastoid processes of the temporal bones, the compression that follows will bilaterally externally rotate the temporal bones, which may cause extreme untoward reactions*



- The physician resists flexion by holding the patient's occiput in extension with bilateral medial forces. *Note:* The occiput is not forced into extension. Rather, it is prevented from moving into flexion. It is as if the physician is taking up the slack created by extension and holding it there.

- This force is maintained until the amplitude of the CRI decreases, a still point is reached, and/or a sense of release is felt (a sense of softening and warmth in the region of the occiput).

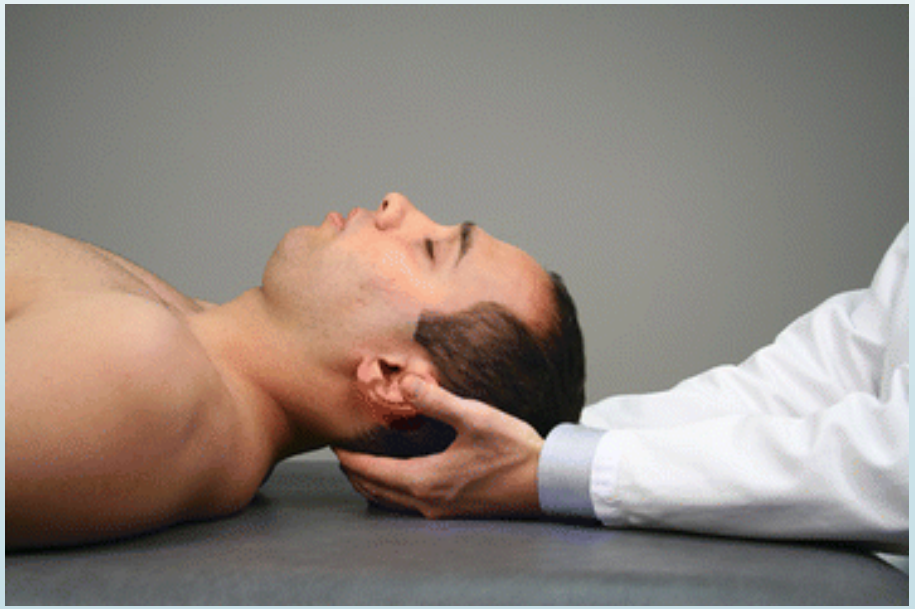
- As the CRI resumes, the physician slowly releases the force, allowing the CRI to undergo newfound excursion.

- The rate and amplitude of the CRI are retested to assess the effectiveness of the technique.

Decompression of the Occipital Condyles

- The objective is to balance the reciprocal tension membrane at the hypoglossal canal, permitting normalized function of cranial nerve XII.

- The patient lies supine, and the physician is seated at the head of the table with both forearms resting on the table, establishing a fulcrum.
- The patient's head rests on the physician's palms, and the physician's index and middle fingers (or the middle and ring fingers) approximate the patient's condylar processes (as far caudad on the occiput as the soft tissue and C1 will allow)

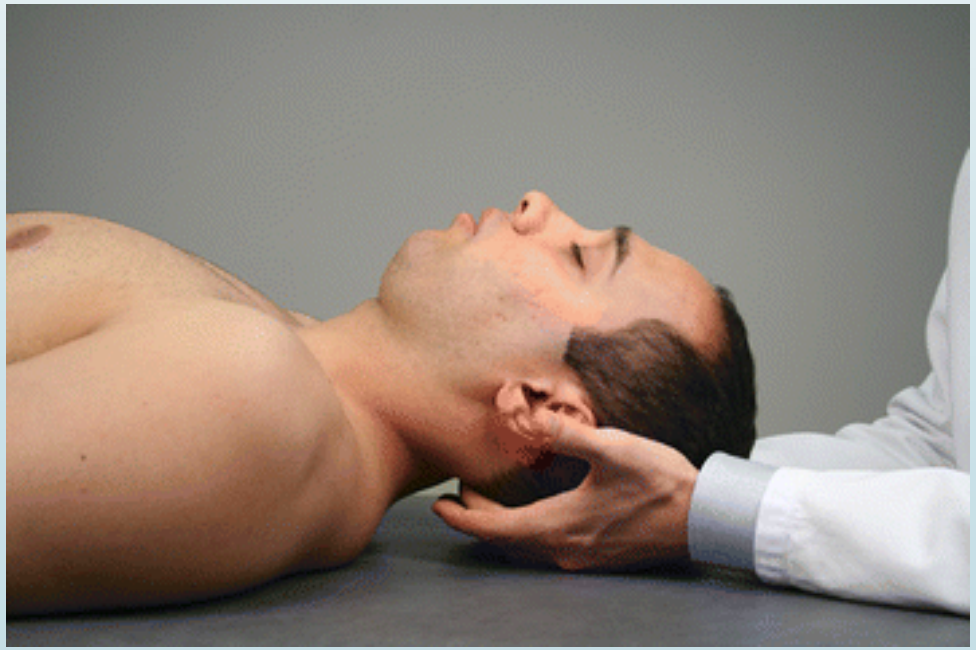


- The fingers of both hands initiate a gentle cephalad and lateral force at the base of the occiput.
- The force is maintained until a release is felt.
- The rate and amplitude of the CRI as it manifests in the basioccipital region are retested to assess the effectiveness of the technique.

Occipitoatlantal Decompression

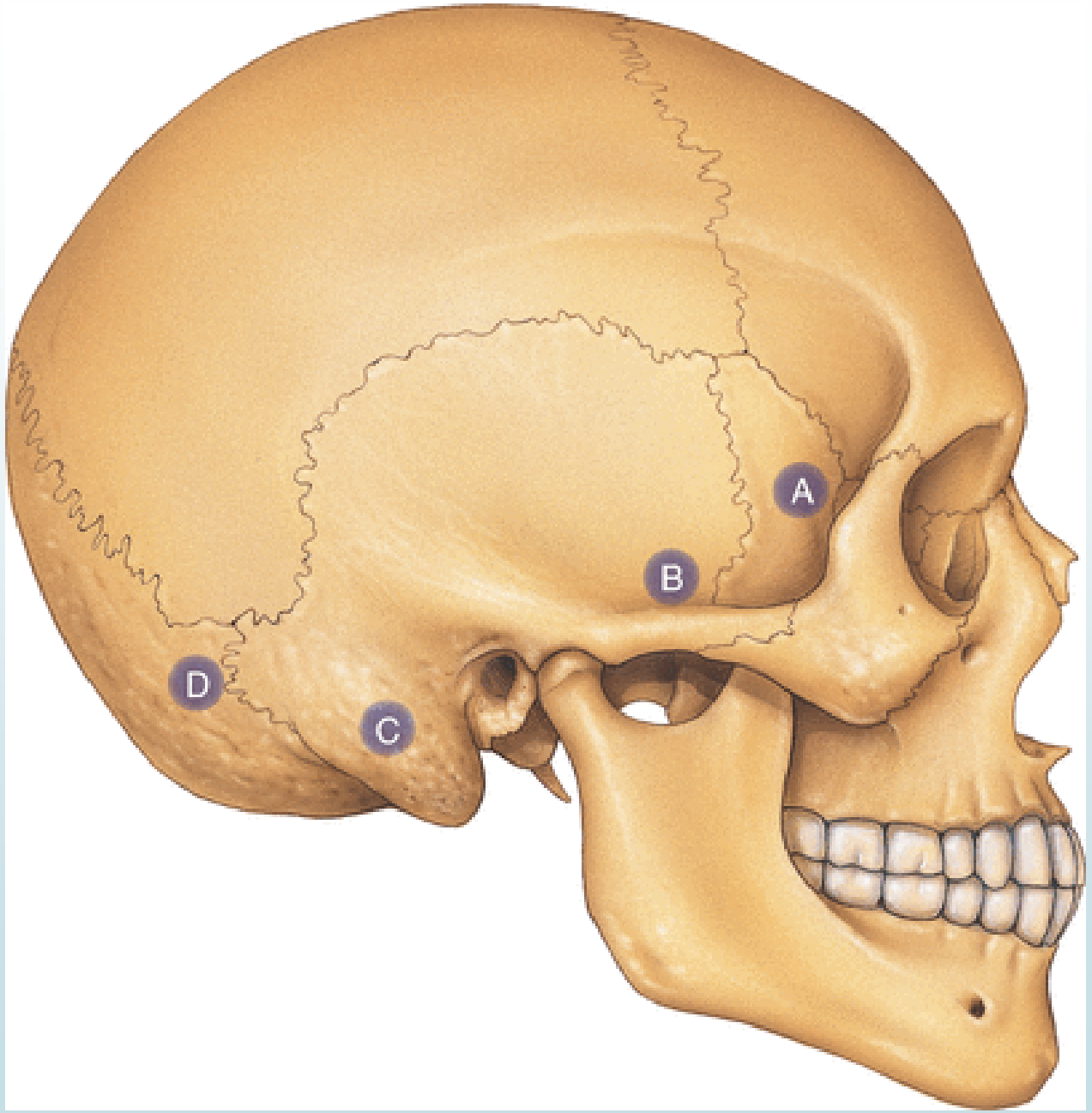
- The objective is to treat occipitoatlantal somatic dysfunction that results from rotation of the occiput on its anteroposterior axis, resulting in misalignment of the condyles in the facets of the atlas. In general, this technique should be performed after decompression of the occipital condyles.

- The patient lies supine, and the physician is seated at the head of the table with both forearms resting on the table, establishing a fulcrum.
- The physician places the pads of both middle fingers on the posterior aspect of the cranium and slides these fingers down the occiput until the fingers are against the posterior arches of the atlas.
- The physician applies caudad pressure with both middle fingers to separate the facets from the condylar parts.



Parietal Lift

- Objective
- The objective is to treat dysfunction of the parietal bones in relation to their sutural or dural connections (i.e., parietotemporal, parietofrontal)


A
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- The patient lies supine, and the physician is seated at the head of the table with both forearms resting on the table, establishing a fulcrum.
- The physician places the fingertips on both parietal bones just superior to the parietal-squamous sutures.
- The physician crosses the thumbs just above the sagittal suture. *Note:* The thumbs are NOT to touch the patient.
- The physician presses one thumb against the other (*arrows*), (one thumb presses upward, while the other resists it).
- Pressing one thumb against the other approximates the fingertips. This induces internal rotation of the parietal bones at the parietal-squamous sutures.

- While maintaining pressure, the physician lifts both hands cephalad until fullness is felt over the fingertips; this fullness is external rotation of the parietal bones (*arrows*).
- The physician gently releases the head.
- The rate and amplitude of the primary respiratory mechanism, especially at the frontal bones, are retested to assess the effectiveness of the technique.

Occipitomastoid Suture Pressure

- **Indications**
- The indications for occipitomastoid suture pressure release are tachycardia (hypoparasympathetic state) and bradycardia (hyperparasympathetic state).
- **Physiologic Goal**
- The goal is to use a reflex (parasympathetic) to decrease the patient's pulse by influencing cardiac rate via cranial nerve X (vagus) or by treating cranial somatic dysfunction at this area that could be causing a secondary bradycardia (somatovisceral type).

OM suture pressure

- The patient lies supine, and the physician is seated at the head of the table.
- The physician palpates the occipitomastoid grooves bilaterally.
- The physician places the index fingers over each mastoid process immediately proximal to the anterior aspect of the groove.
- The physician places the third fingers over the occiput immediately proximal to the posterior aspect of the groove

- The pads of the physician's fingers exert gentle axial traction over the sutures combined with a lateral spreading force away from the midline (*arrows*).

- Gentle pressure is maintained until the desired effect is obtained or until it is determined that the technique will be ineffective.