Asia-Pacific Chiropractic Journal

Temporal Bone Cranial Dysfunctions:

A resume of '*The Trouble Maker of The Head*' with a focus on prevalent Vestibulo-Ocular Proprioceptive Syndromes in Chiropractic Practice

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Narrative: Here I discuss the vertebral subluxation, temporal bone cranial dysfunctions, and equilibrium syndromes and show their association via sensory conflict and dysponesis.

The hypothesis derived from clinical and anatomic observations is that the nervous system operating within the disturbed geometric forms and mechanisms of patients with temporal bone cranial dysfunctions will not operate properly.

The examination and treatment of the cranial mechanism, along with other chiropractic procedures that improve proprioceptive signalling throughout the body, assume a new significance and even greater importance than was formerly appreciated.

Indexing Terms: Chiropractic; AK; Applied Kinesiology; proprioception; tone, Temporal bone; dysponesis.

Introduction

For many years now I have been fascinated with the *temporal bone*. Several aspects and understanding of this bone will be discussed in this paper. Its complexity, its beauty, its diverse functioning, and its importance have become more apparent as the years have gone by.

> … The importance of the temporomandibular joint and the cerebellum, between and below the two temporal bones, can hardly be over-emphasised …'

Soon after beginning my own practice in the clinic of the applied kinesiology chiropractic movement's Encyclopedist extraordinaire (Dr David Walther), I was told by the olde master that when he corrected the inspiration and expiration assist cranial dysfunctions of the *temporal bones,* he would simultaneously correct many other cranial patterns found by AK chiropractic examination. He said it also frequently eliminated KI-27 ('switching') testing in a majority of patients. I have found this to be the case also after nearly 30 years of consistent study and treatment.

Dr DeJarnette the Founder of SOT also suggested that the *temporal bones,* with their sculptured mastoid processes, were 'designed by nature' as the way for craniopaths to '*get ahold*' of and improve the tensions within their patients' cranial meninges. Angular forces applied to the mastoid processes of the *temporal bones* are transmitted throughout the cranial system and brain.

After reviewing 300 case records and dozens of books I have found that *temporal bone* cranial dysfunctions were co-present in the following widely differing patient conditions:

- Dizziness
- Syncope
- Tension and cluster and migraine headaches
- Tinnitus
- TMJ problems of widely varying symptom types
- Earache
- Bell's palsy
- Visual disturbances that are amenable to chiropractic treatments
- Conjunctivitis
- Lacrimal duct disturbances
- Nystagmus
- Muscular imbalance of the eyes or ocular lock
- Dyslexia for children and adults
- Loss of visual acuity when measured on the Snellen eye chart
- Sinusitis
- Scalp pains
- Shoulder muscle pain and weakness
- Ischial tuberosity pain
- Sacro-sciatic notch tenderness
- Spinal muscle pain and weakness occurring literally anywhere in the patient when tested
- Hiatal hernia
- Esophageal spasm
- Heartburn
- Duodenal pain
- Digestive syndromes, dysbiosis, and lower bowel problems

(This list is only partial)

A single case does not prove much but under certain circumstances it may lead to some worthwhile discovery. In the cases that this author treats in the clinic, these individual cases and the comorbid and concomitant involvement of the *temporal bone* suggest how endemic and consistent this cranial dysfunction is in subluxated and sick people that chiropractors treat around the world.

I also like to remember, when reciting anecdotal reports of chiropractic's success in the treatment of sick patients, what Sir James Padget said:

> *'Receiving thankfully all that physiology or chemistry or any other science can give us, let us hold that, that alone is true, which is proven clinically and that which is clinically proved needs no other evidence'*

Fig 1: External view, left lateral

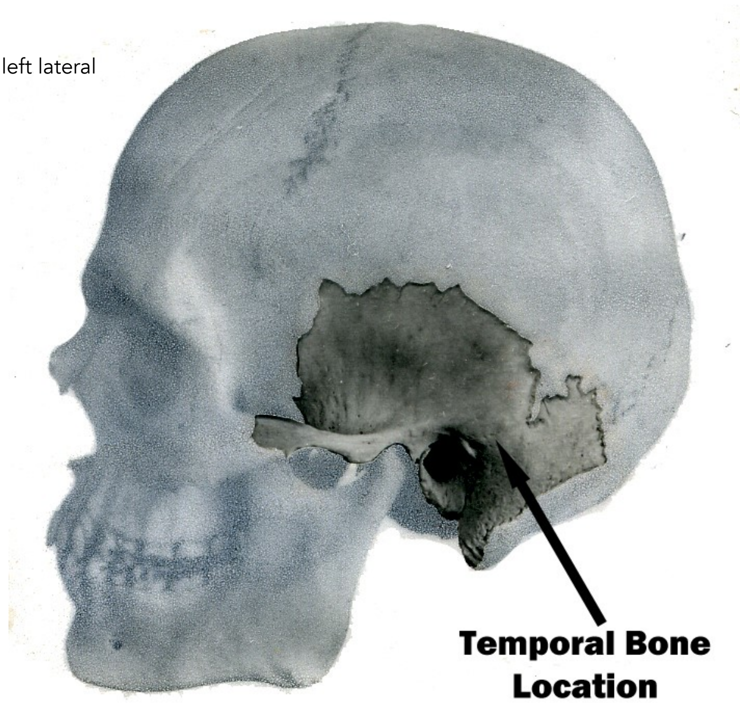


Fig 2: Named parts of the temporal bone

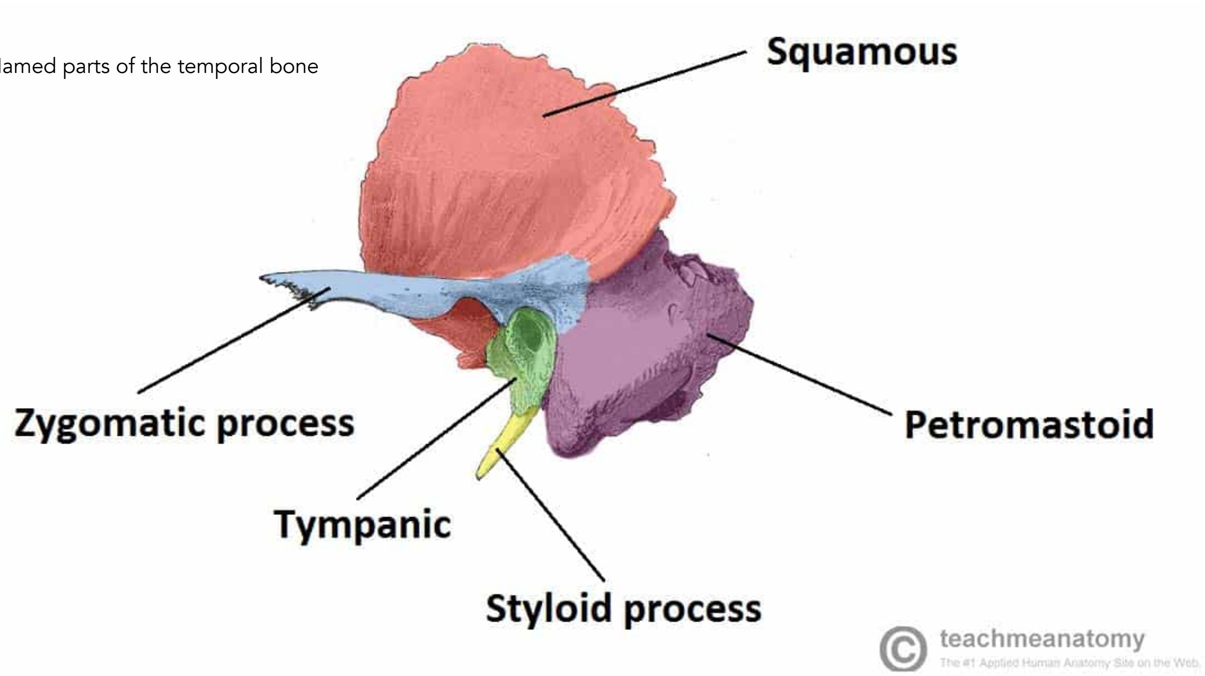
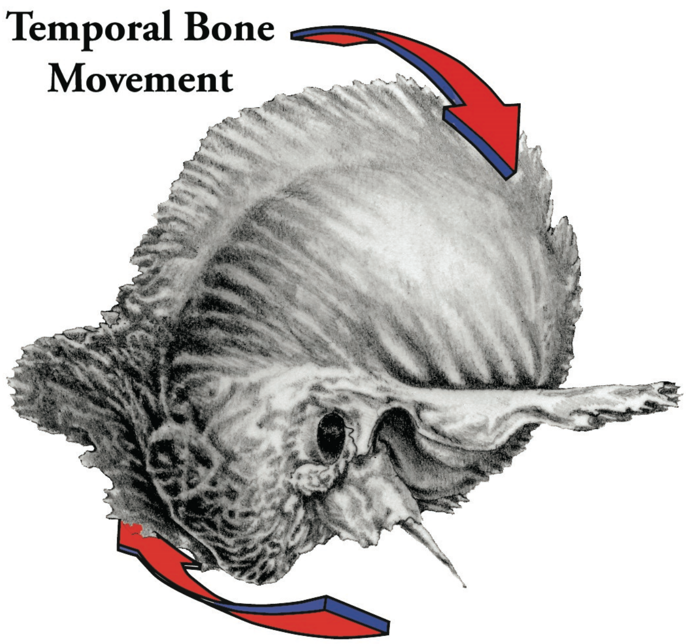


Fig 3: Internal view, left lateral



I confess that a lucid happiness becomes the portion for a physician who begins to discover his natural gifts in the work he does and by the light of an incessantly active meditation, one that frees him from the dross and the foreign deposits that hide his chiropractic cranial passion from him. Thus for me in my work with patients, I frequently find how the *temporal bone* plays a major part in my patients' ensemble of problems.

We are poor indeed if, after many years of working with it, we do not learn how to see in the bones of the skull not only an admirably ordered landscape of valleys and hills, its inner movements, its biological and almost geological unity and rhythm, but also a perfect piece of sculpture with its asymmetrical balance, its silent planes, its tapering lines, its expressive reliefs, its sinuous and pure profiles. The gulfs, promontories, and estuaries of the temporal bone seem embraced by the blood and '*that highest known element in the human body*', that fluid that washes away metabolic gravel and neurochemical sand, that fluid that is indefatigably persistent in striking, caressing, falling, or dripping through the surfaces of the majestic temporal bone.

If we do not apply an ardent curiosity to the study of the architecture and precise shapes of the temporal bone, to the muscles overlying the bone, to the sutures that fit it precisely into the skull, to the nerves that invest its matrix of forms, to the network of veins and arteries within the bone … will our work with the *temporal bone* ever quiver with that animation, at once distinct and mysterious, which causes the living surfaces and dynamics of the bone to vibrate as if under the continuous caress of the influx of the nerves and blood, lymph and CSF, and our own perception of innate intelligence manifesting itself within a patient's head … ?

In studying the *temporal bone,* see how the petrous portion looks like a greedy hand that reaches out to clutch its prey in order to feed on it. The petrous tip of the *temporal bone* is anchored into the posterolateral corner of the body of the sphenoid at the posterior clinoid process by the petroclinoid or apical ligament (usually, but not always present), like a ballerina-on-points. The petrous portion of the temporal is like an anteromedially pointed anvil on which the cranial base is suspended in toward the sphenoid bone at a 45 to 60° angle.

The zygomatic arch is like a wing or a flame reaching out from the temporal. See the harmonious construction of all its parts, the ends of the bone slipping into its soft, padded, and lubricated sockets, ridges, and bevelings. See the way the bone's levers are moved by the pull of dura or turned by the play of muscles. See the close overlapping and the undercuts of the sutural surfaces, with the amphora of the squamous portion to contain the weight of the brain. There is a universal architecture built into the human skull that borrows its most forceful poetry from functional logic. If we study the harmonious geometry and architecture of any cranial bone long enough, the morphological formula of the skull will no doubt arise for us someday.

The architectural structure of the *temporal bones* competes with the *sphenoid* in complexity. They form the most impressive lateral structure of the cranium, and present highly variable and complex sutures. Because of its wedged shape, the *temporal bone* acts as a buttress for the head. It has a flying buttress formation that joins it with the *zygoma*. It has a rhino's-horn-shaped mastoid that is formed by the constant pulling of the *sternocleidomastoid* muscle as the infant raises their head. An infant who develops normally can hold his head up unassisted by six months, at which point the mastoids have ossified and been given their particular shape by the action of the SCM. The shape of the temporal's mastoid process feels like it was specifically designed to fit into the overlapping hand of the manipulative physician.

The *temporals* are functionally married to the *sphenoid* and *mandible*, and their connection to the tentorium is immediate and extensive. *Temporal bone* cranial dysfunctions always involve the tentorium and therefore influence other bones that attach to the tentorium, the *sphenoid*, *occiput*, and the other *temporal bone*. The *pharyngeal* muscles are suspended from the inferior aspect of the petrous portion. The core link means that the sacrum and ilia may also be affected, or be affecting the temporals. Muscles and joints in the lateral portions of the body, like the shoulders and hips, may echo the *temporal bones*' condition. (1, 13, 35)

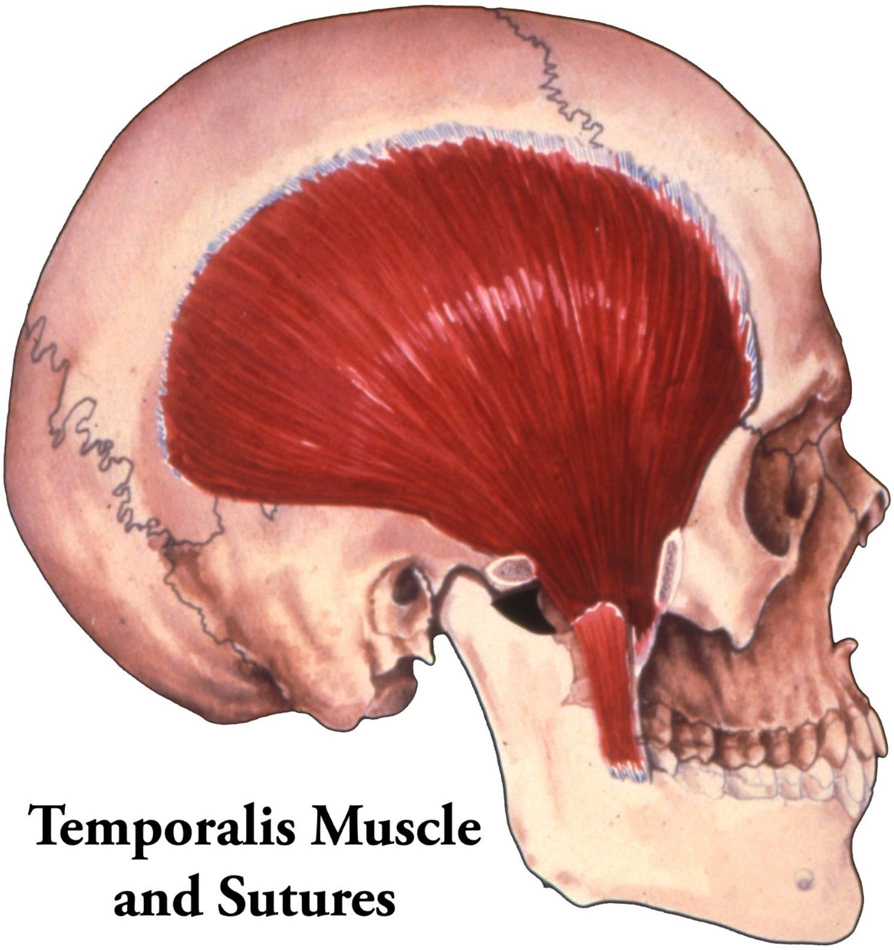
Muscular and ligamentous attachments at the styloid and mastoid add potentially disturbing forces to the *temporal bone*. The muscles of mastication and the occlusion of the teeth both affect the temporal, especially the *temporalis* muscle. The temporomandibular joint, *lateral pterygoid* muscles, retrodiscal ligaments, muscles attaching the *hyoid* to the *temporal bone*, sphenotemporal ligaments, stylomandibular ligaments, and the most powerful neck muscles of all, the *sternocleidomastoid*, all affect the temporal bones.

The importance of the temporomandibular joint and the cerebellum, between and below the two temporal bones, can hardly be over-emphasised.

The famous dental researcher and clinician Dr Harold Gelb wrote about one aspect of the AK method for diagnosing muscular impairments in TMD: (57)

> *'Therapy localisation (TL) is a technique by which dysfunctioning musculature seems to be quickly identified. Although the physiological mechanisms which account for the dynamics of TL are not understood, the physiological consequences of therapy localisation may be replicated with remarkable consistency. In brief, the fundamental observation made by TL is that any strong, normally functioning muscle will become relatively weak when the individual places his fingers on any dysfunctioning musculature'*

TMJ Disorders & Whole-Body Muscle Dysfunction -- An Applied Kinesiology Advantage



Temporalis Muscle and Sutures

The Temporal Bone Cranial Dysfunction:

The proprioceptive integration of the Vestibular System with the Visual Righting mechanisms

Watch a seagull or swan flying, or a cheetah or giraffe or ostrich running, or your own dog or cat walking along. They keep their heads held horizontally, such that the planes of the horizontal semicircular canals remain perpendicular to gravity. This constancy of position in relation to gravity makes the head a stabilised platform, which considerably simplifies the processing and fusion of vestibular, visual, and kinaesthetic information as well as their coordination.

All mammals have three semicircular canals on each side of their heads. The canals are situated in three approximately perpendicular planes, though not the ones you might guess. To locate it in humans, just look at a person from the side and plot a line from the meatus of the ear to the external edge of the eye. The horizontal canal is in a plane that overhangs this line by 20°. The two remaining planes of the canals are at 45° with respect to the frontal and sagittal planes of the body. (2, 3, 4)

Why is this anatomical configuration important in our patients with symptoms? Because the three planes of the semicircular canals form a basic frame of reference to which our entire perception of movement through space is organised. The geometry of the canals dictates the organisation of the cerebral analysis of visual movement and perhaps also many other movements. This perception of space may even prove to be the basis for Euclidean geometry. (5)

Now the labyrinthine and visual righting reflexes may be disturbed by joint or muscle problems in the neck, as well as by cranial dysfunctions that may result from either whiplash dynamics or a blow to the head during an automobile accident or other head and neck trauma. (6, 7, 10-, 11, 12, 13)

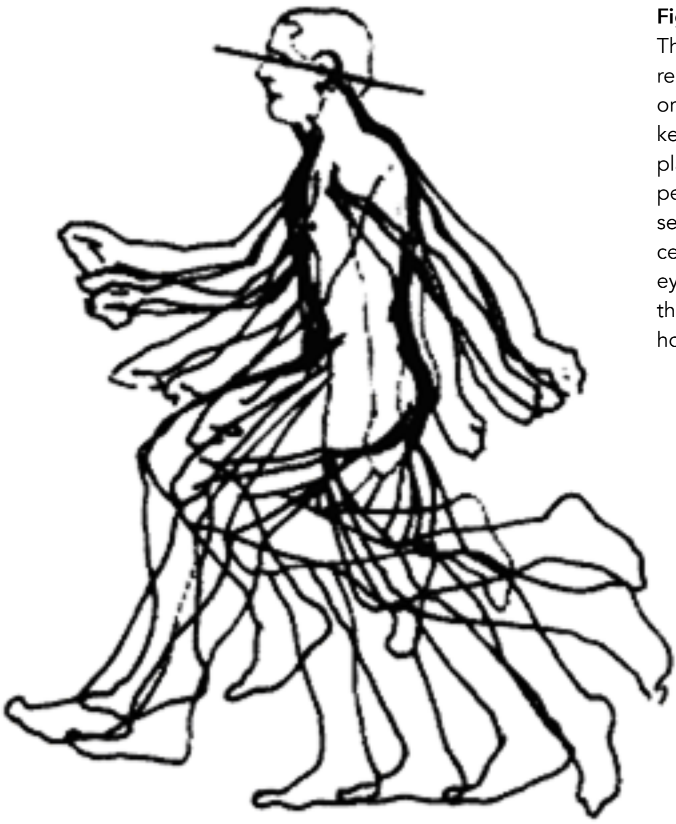


Fig 7: Photographs of a man running (drawn after DuCroquet). The visual righting, labyrinthine, and head-on-neck reflexes are responsible for evaluating and maintaining the body's orientation in space. The nervous system constantly attempts to keep the head held horizontally during movement, so that the plane of the horizontal semicircular canals remains perpendicular to gravity. The angular geometry of the semicircular canals helps coordinate the organisation of the cerebral analysis of visual movement with the inputs from the eyes, joints and muscles, and other proprioceptors throughout the body. The line drawn indicates roughly the plane of the horizontal semicircular canal.

The head-on-neck reflexes come from the equilibrium proprioceptors located in the upper cervical ligaments, and these also can be disturbed by subluxations or fixations of these vertebrae after trauma. (8, 9)

During trauma mechanoreceptors throughout the body may be subjected to tensile stress and deformation, and trauma may increase dural tension throughout the craniosacral system. (14) Abnormal dural tension may impair the movement and elasticity of the CNS itself, causing symptoms to then arise from its own tissues. (15)

In the middle of the petrous portion of the temporal bone is the acoustical vestibular organ. This is an organ so delicate that it can detect a movement of the stereo-cilia on the hair cells the distance of the diameter of a hydrogen atom. (4)

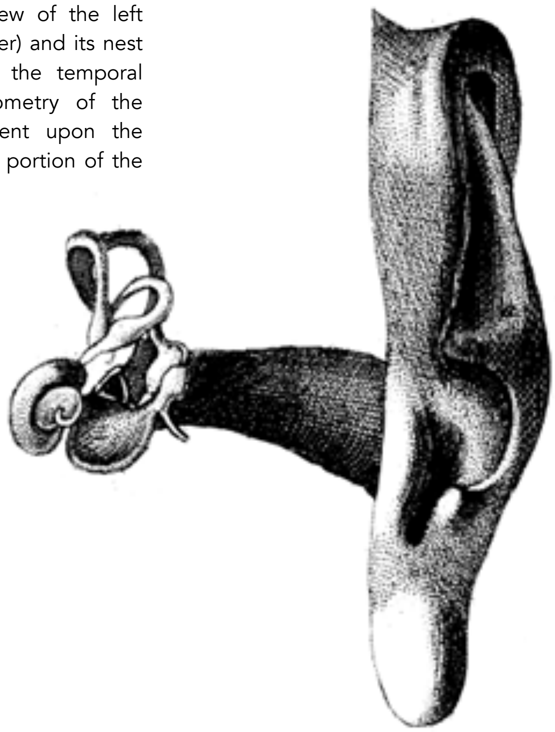
The forces of trauma affect the membranous labyrinth within the of the skull. Acceleration and deceleration forces following collision may activate in a violent and intense way the ciliated cells of the semicircular canals and the matrices of the otolithic organs. (16) The forces of acceleration and deceleration can 'deprogram' the sensory cells of the membranous labyrinth.

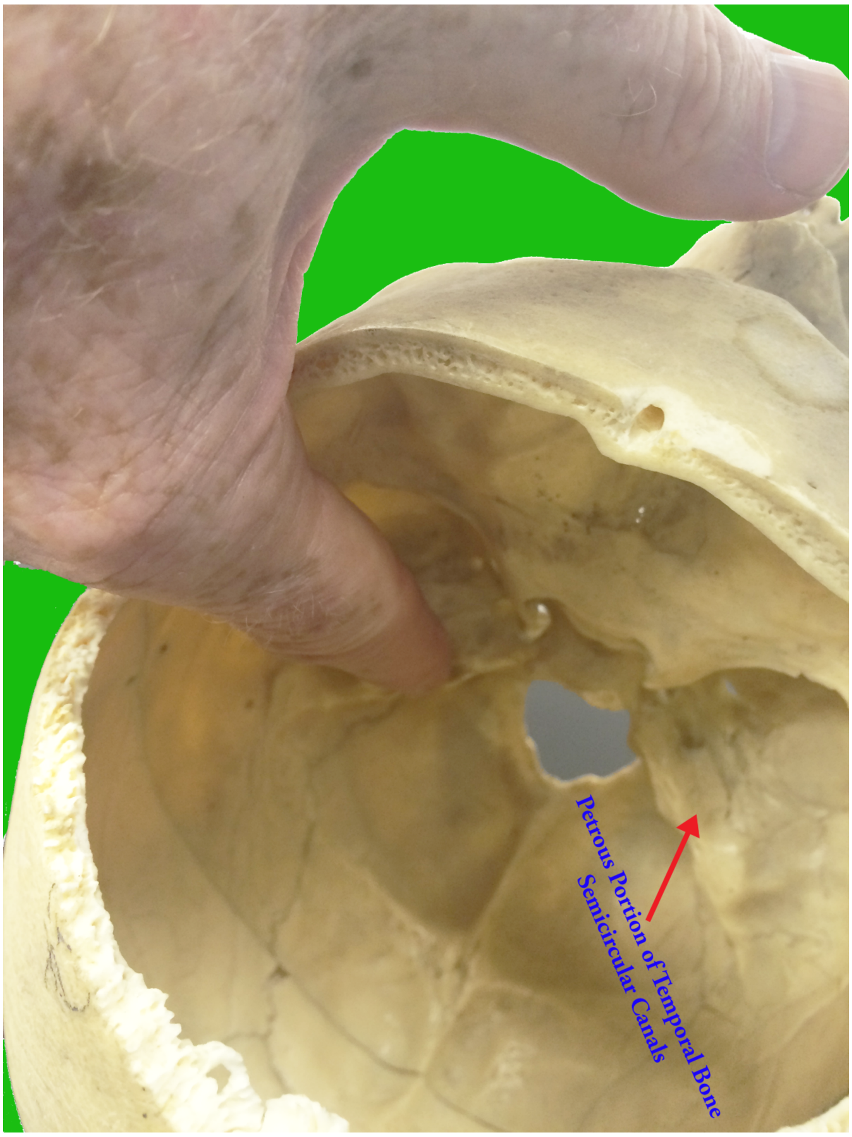
The endolymph no longer properly stimulates the sensory cells situated at the level of the crista ampullaris, semicircular canals, and membranes of the saccule and utricle. When the trauma is violent, some ciliated cells may be partially destroyed.

More commonly, they are stunned to the point of no longer transforming body movements into accurate sensory signals. In some cases they become hyper-reactive and generate too many signals, such that the over-stimulated cerebellum can no longer provide reliable information to the body.

Movement of the endolymph and the geometry of the stereo-cilia themselves are determined by the movement and positioning of the temporal bone in relation to the earth's gravitational field.

Fig 8: Showing an anterior view of the left acoustical vestibular organ (upper) and its nest within the petrous portion of the temporal bone (below) where the geometry of the semicircular canals is dependent upon the motile geometry of the petrous portion of the temporal bones.





The lack of reliable information means that anti-gravitational muscle function, muscle tone, and posture are not properly maintained; consequently, the vestibular nuclei do not receive proper sensory input for decoding and distribution to the body, particularly in regard to cerebellar control. The cerebellum normally integrates labyrinthine, visual, and kinaesthetic information that is used to provide motor output for correct balance. (16, 17) In post-traumatic syndromes, some of the sensory inputs no longer yield proper responses. (18) Freeman-Wycke's one-leg standing, Hautant's, Romberg's and other cerebellar tests are frequently positive in these patients. (Note: Discussed in my previous 'Propriception' paper)

Because of incorrect activation and poor responses from the cerebellum after trauma, the patient has numerous symptoms found also in disturbed proprioceptive syndromes: loss of balance, vertigo, nausea, motion sickness, poor depth perception, headaches, vertebral pain, and poor visual accommodation. (6, 16, 19, 20, 21, 22, 23, 24, 25, 58)

From this discussion it may be reasonable to assume that trauma may affect the functionality of the eyes, inner ears, muscles and joints. When any one of these sensory organs is dysfunctional, sensory conflict (dysponesis) may result. The importance of correcting the vestibulo-ocular, vestibulo-spinal, and optokinetic reflexes in the examination and treatment of patients with motion sickness will be discussed next.

Eliminating disorganisation between the equilibrium proprioceptors and the reflexes discussed in the next section is paramount to obtaining optimal results in patients who have persisting equilibrium syndromes after trauma. Failure to recognise this problem and correct it is often the reason that a post-traumatic equilibrium disorder or other vestibulo-ocular problem persists for years after an injury.

Relevance to the vestibulo-ocular, vestibulo-spinal, and optokinetic proprioception

The visual righting, labyrinthine, and head-on-neck reflexes are responsible for evaluating and maintaining the body's orientation in space. (26) In 1948 Spector described the failure in the mechanisms of multi-sensory integration as the underlying cause of some types of vertigo and nausea, but he provided no therapeutic approach for correction. (27) If all three reflexes are not providing the same information about the body's orientation, this neurologic disorganisation produces the misdirected effort known as dysponesia (sensory conflict). (28, 58) This can happen when one reflex indicates the head is level and another that it is tilted. It also occurs when the body detects motion that the eyes cannot detect.

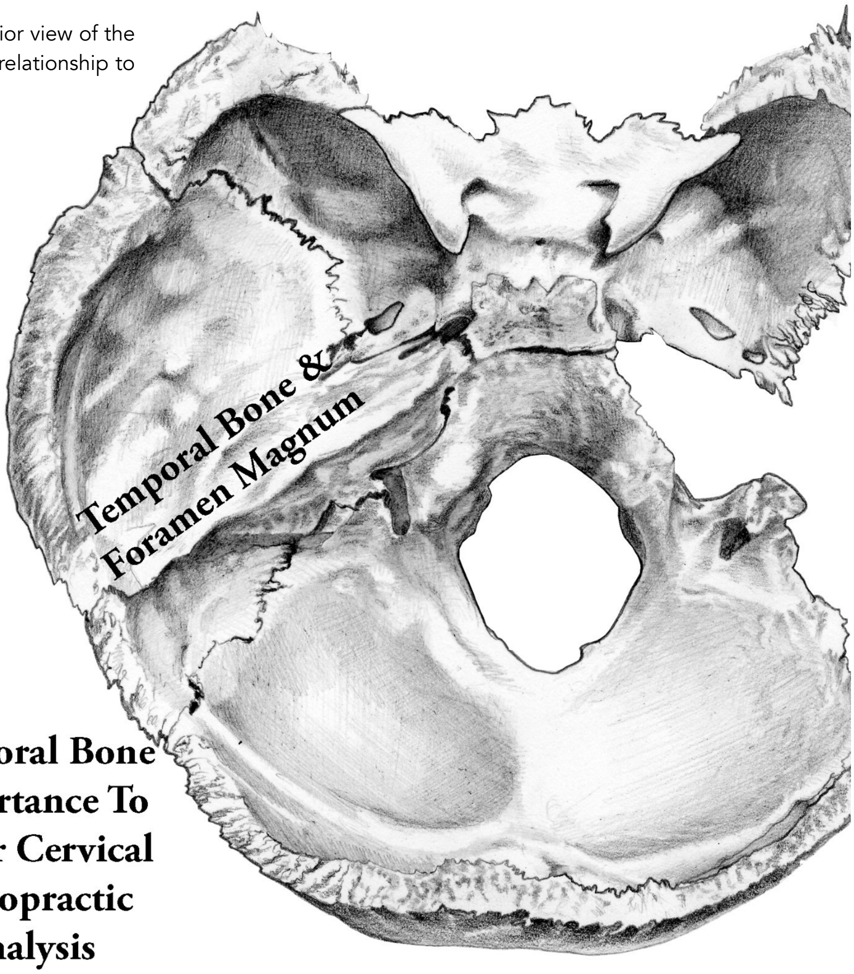
The combination of an upper cervical subluxation or fixation, a temporal bone cranial dysfunction, and inhibition of muscles in the neck is frequently found in the clinic to produce this kind of problem.

It is well known in neurology that pathways descending from the vestibular sensors and flowing through the vestibular nuclei ensure postural reactions that keep the body upright, stable, and in balance. They also initiate compensatory reflexes during tilting, bouncing, braking, and other movements of the body. These are the so-called vestibulo-spinal reflexes. In principle, they are well identified and depend on neural networks that connect each semicircular canal with the postural muscles of the neck.

Another major mechanism that allows us to follow the landscape while we are moving is a very old reflex action, the optokinetic reflex. The nerve pathway that processes these signals also influences the centres that control posture. (58)

What is quite noteworthy about the optokinetic reflex to the hypothesis in this paper is that all along this pathway neurons respond to visual movements in preferred directions aligned along the planes of the semicircular canals of the vestibular system. (29)

Fig 9: Showing a superior view of the temporal bone and its relationship to the foramen magnum



Temporal Bone Importance To Upper Cervical Chiropractic Analysis

Around 1930 it was discovered that a network of neurons in the brainstem connects the semicircular canals and the muscles of the eyes. (30)

Around 1965 Szentagothai established the exquisite correspondence between each semicircular canal and each of the three pairs of eye muscles. (31)

Breinin has shown that there are receptors, probably muscle spindles, in the extraocular muscles that signal their static tension. (32) The integration of sensory inputs between the visual and the vestibular mechanisms appears to be a crucial factor in resolving many cases of proprioceptive disturbances in our patients.

The geometrical correspondence between the visual system and the semicircular canals extends primarily into the motor system. The plane of action of the three pairs of extraocular eye muscles, which enable rotation of the eyeball, is approximately parallel to the planes of the semicircular canals. (33) The angular geometry of the semicircular canals is thus basic to the perception and control of movement.

Fig 10: Showing the integration of sensory inputs

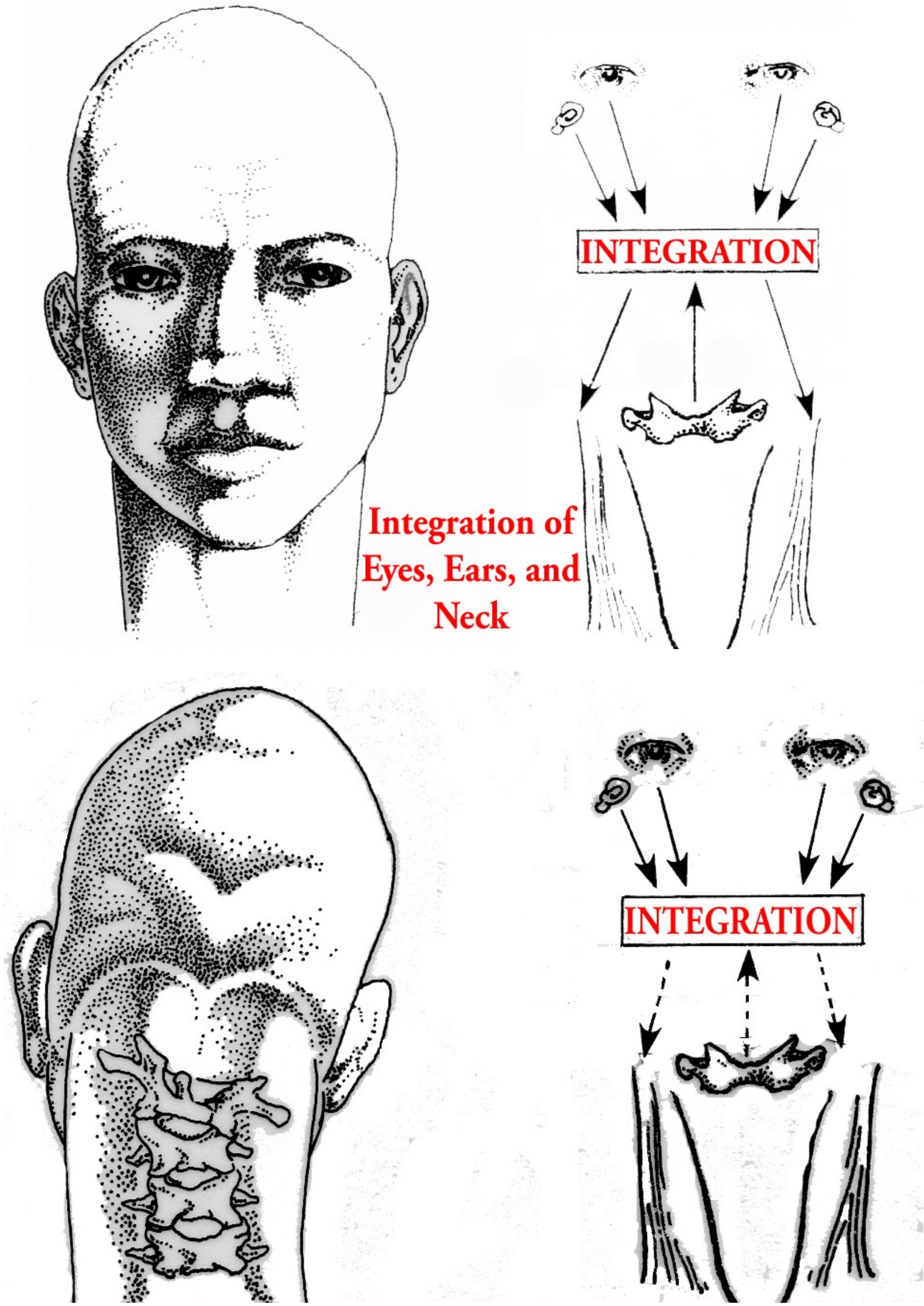


Fig 11: Pathways of motion sickness

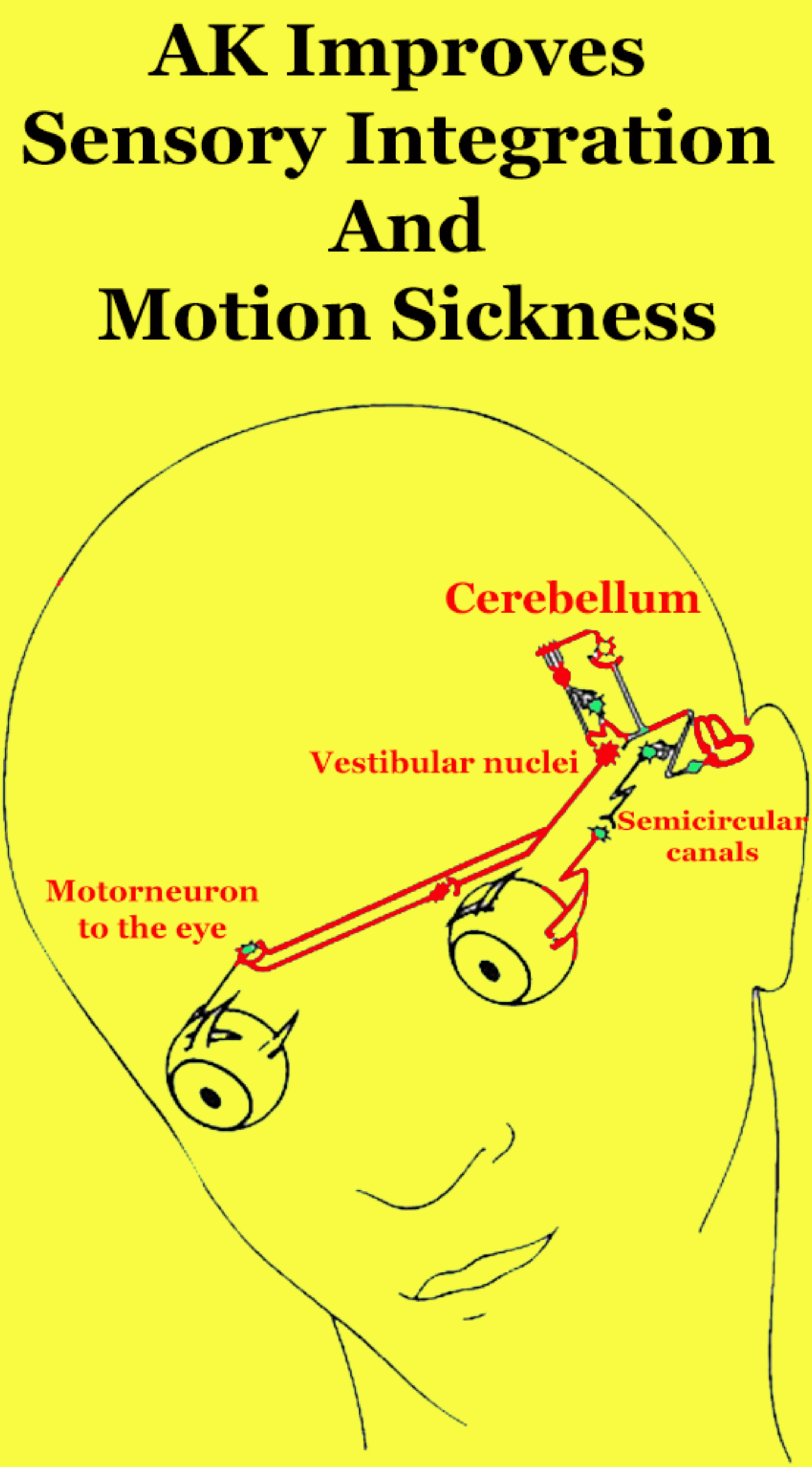


Figure 11 shows how the vestibulo-ocular reflex stabilises retinal images during head movements. What is called the vestibulo-ocular reflex is the product of the synergism of neurons that join the vestibular receptors to the muscles of the eye. A common cause of sensory conflict in patients with proprioceptive syndromes is different signalling coming from the visual righting, labyrinthine, and head-on-neck reflexes. If these separate reflex mechanisms are not providing the same information about the body's orientation and movement through space, this sensory conflict produces the misdirected effort known as dysponesia. (Redrawn after Berthoz with permission).(16)

The patient's sensory ensemble

The active movement of the eyes detected by the receptors in the extraocular muscles influences the neurons of the visual cortex and leads to a preference in these cells for given lines of orientation. In this way, projection of the proprioceptors of the eye (and of the neck) on the neurons of the visual cortex contributes to their directionality. It suggests as well that the muscles of the eye constitute a frame of reference with the same capacity as the semicircular canals. (4, 25, 34)

The importance of specifically testing the muscles of the eye becomes apparent in this context. It seems likely that the proprioceptors of the eye muscles contribute at least as much as other muscle receptors to the total integrative/afferent process and that the sensory input that acts upon those receptors is accordingly important. Ocular lock testing can evaluate just this factor in the patient's sensory ensemble.

Because the planes of action of the eye muscles are close to those of the semicircular canals, it is difficult in a particular patient to know which one is producing the problem. Specific testing of these separate but integrated mechanisms will have to be carried out on the patient.

With temporal bone cranial dysfunctions or mal-positions, an obliquity of the reciprocal tension membranes (RTM) may result, and may change the angulation of the semicircular canals in relationship to the earth's gravitational field. (1, 10, 11, 35, 36 through to 54)

The RTM consists of the periosteal attachments of the meningeal dural membrane of the falx cerebri and cerebelli, tentorium cerebelli, and the diaphragma sella. The lateral attachments of the tentorium cerebelli on the internal aspect of the skull can be modified by temporal bone cranial dysfunctions.

In the clinic the temporal bones are frequently found in counter-rotation, producing discordant integration once again from the vestibular sensory inputs coming from each side of the head. (1, 35, 50, 51) The tissue and fluid tensions inside the vestibular mechanism within the petrous portion of the temporal bone, as well as its geometrical inclination on either side of the head, can therefore be changed by cranial dysfunctions like these.

Fig 11a: Temporal bone moves with AK

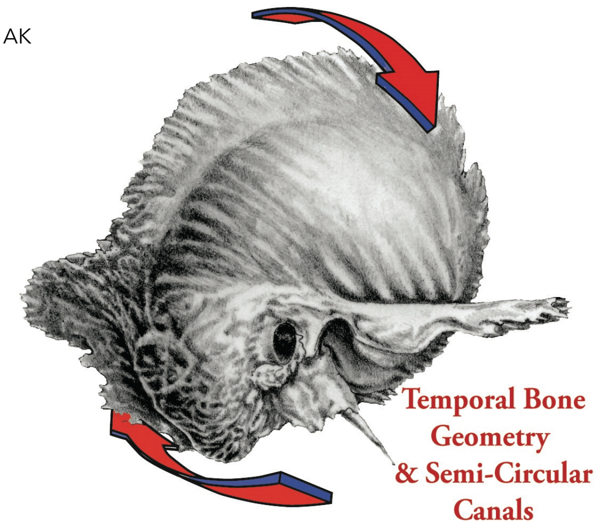
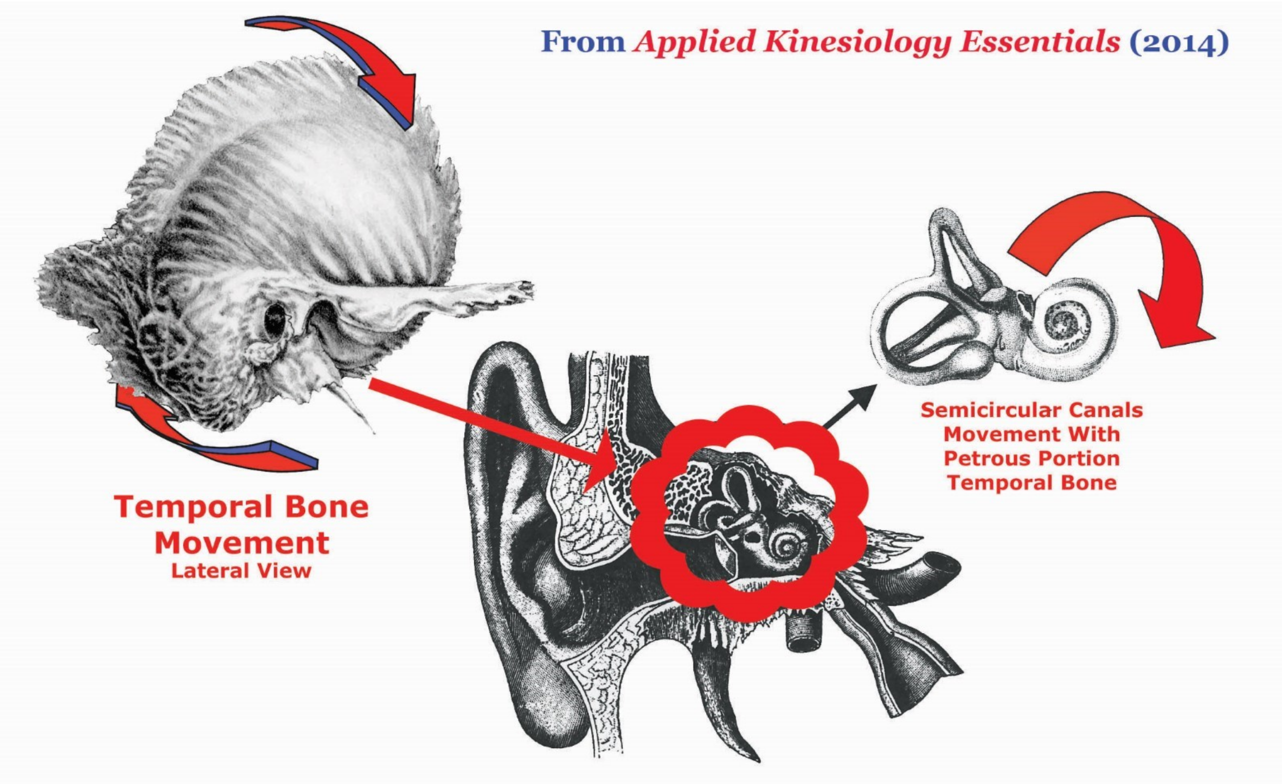
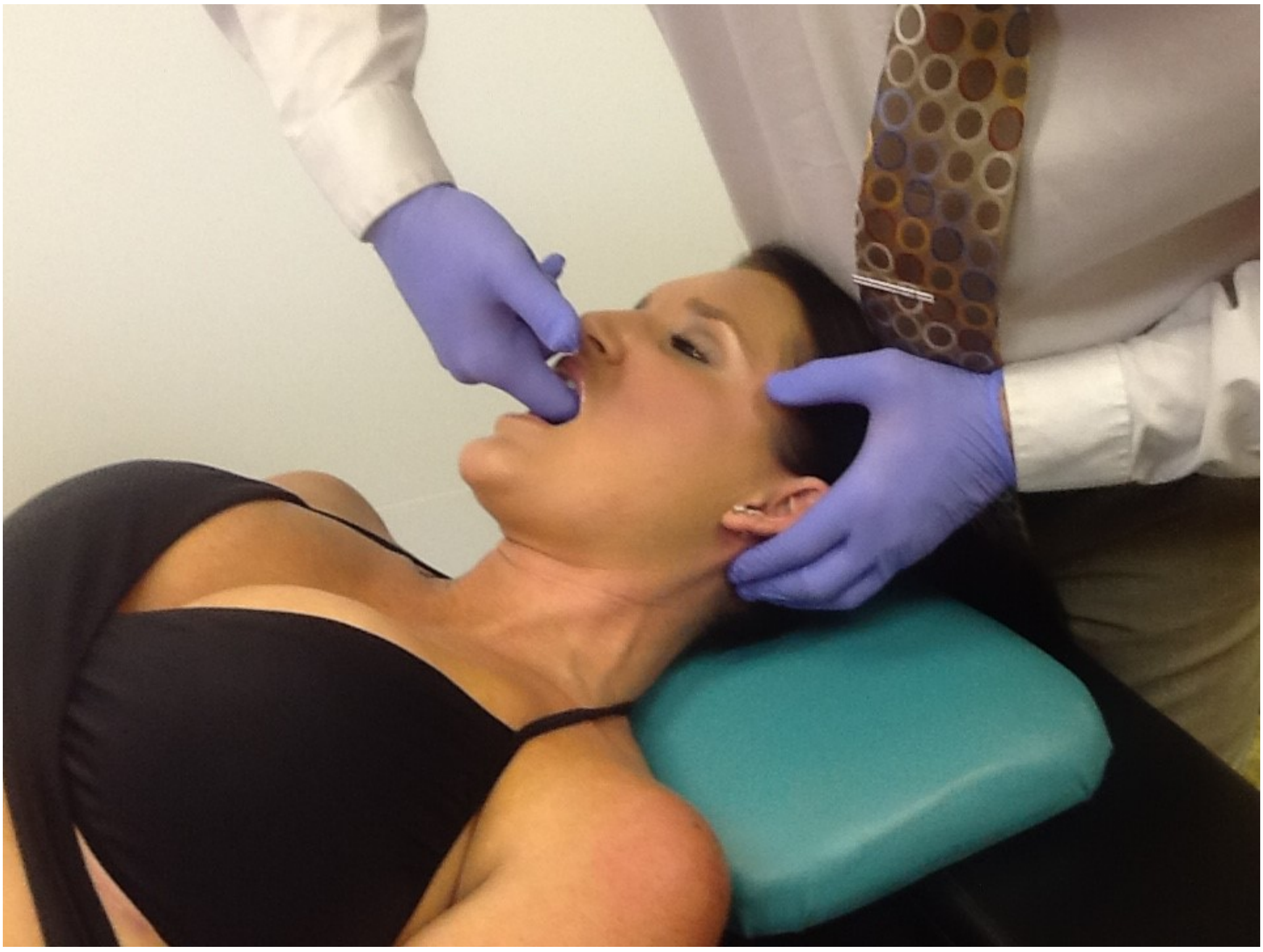


Fig 11b: Temporal bone cranial dysfunctions may change the angulation of the semicircular canals and the movement of fluids through the vestibular mechanism. They may also change the shape of and tension within the jugular foramina, as well as the drainage of blood from the head through the jugular vein. They may also decrease the elasticity of the tentorium cerebelli and increase the tension on the cranial membranes throughout the skull. This distortion may be transmitted to all the other bones of the skull. The cranial nerves are ensheathed by dura mater and pia mater membranes that must remain supple; otherwise they may cause mechanical deformation and abnormal tension on the nerve bundles. [10, 11, 36-54)

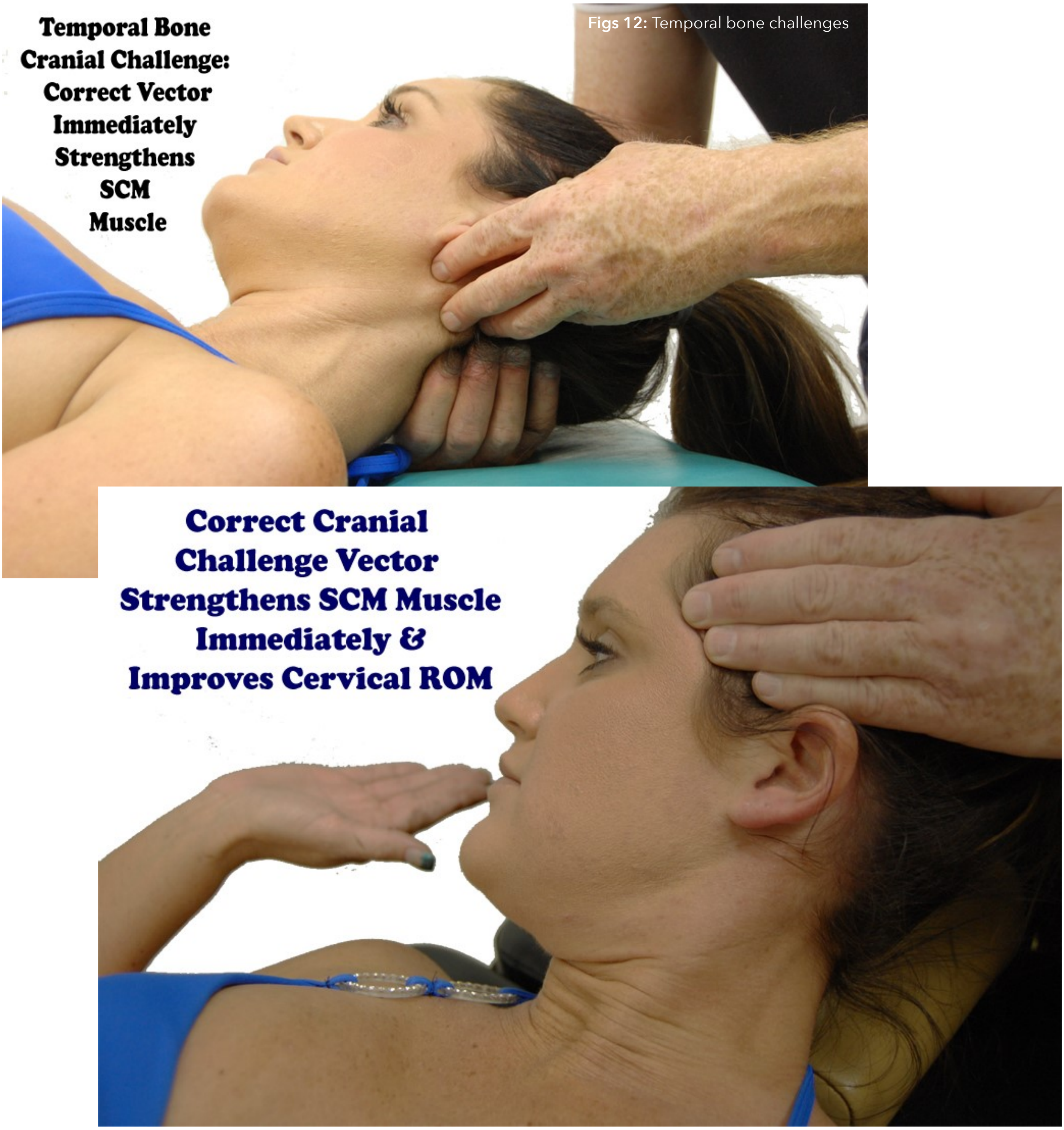




AK challenge

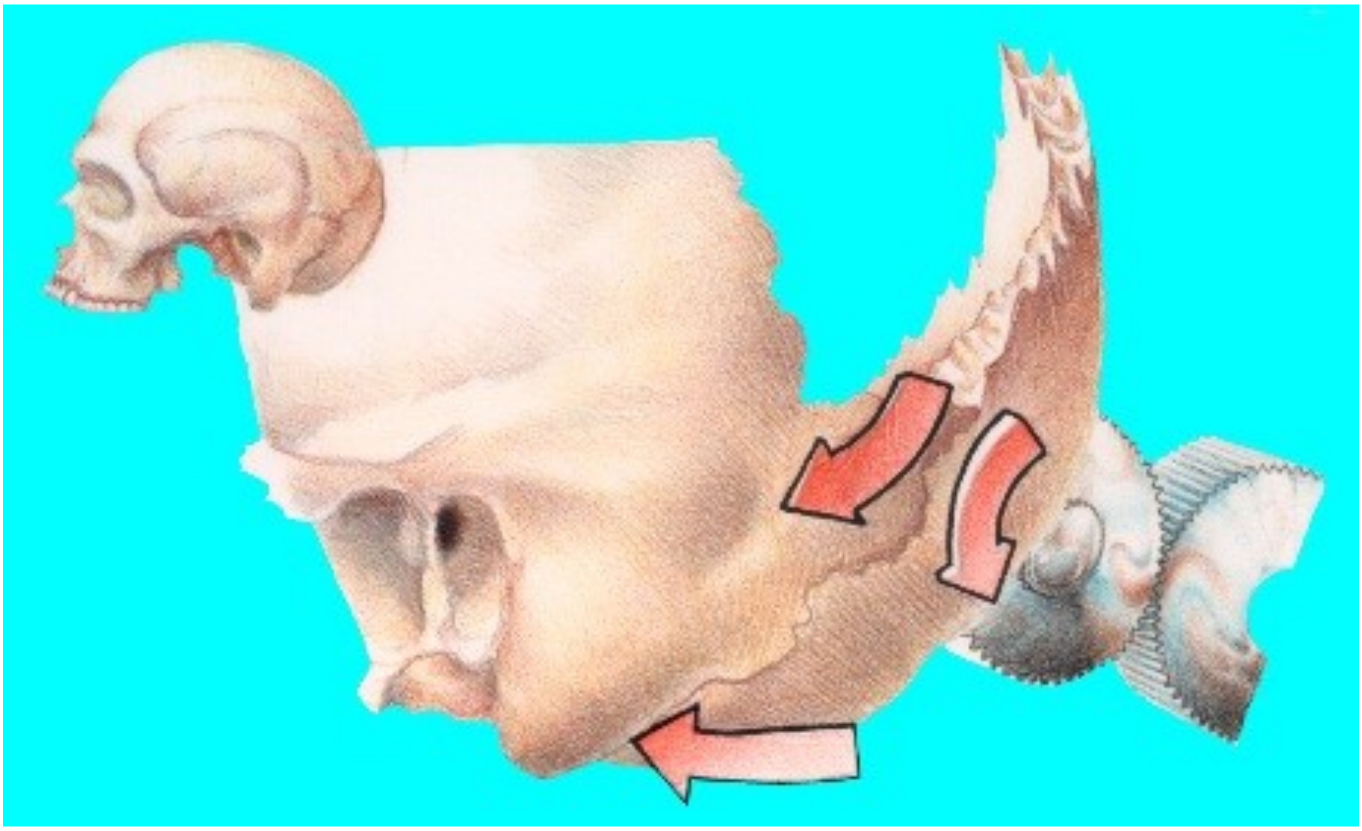
The measurable amplitude of cranial bone motion ranges between 40 microns to 1.5 mm according to differing authorities. (44, 45, 46, 47, 48, 48, 50) When temporal dysfunctions are present in the patient, there are frequently visible and tactile signs of the dysfunctions. One mastoid process will be closer to the table than the other, and one mastoid process will be more prominent on one side and more depressed on the other.

Whenever a symptom in the patient suggests the temporal bone, a dependable diagnostic modality is available in applied kinesiology. The diagnostic method used to discover a temporal bone cranial dysfunction is termed a '*cranial challenge*' or '*therapy localisation*'. Therapy localisation will be positive directly over the *squama* of the *temporal bone*.



Figs 12: Temporal bone challenges

Fig 13: The physiologic rationale for the chiropractic cranial challenge procedure



The physiologic rationale for the challenge procedure can be described as follows:

From Magoun's classic text, Osteopathy in the Cranial Field, 3e, in the chapter '*Principles of Treatment*', there are five different methods described for '*securing the point of balanced membranous tension which must be followed to secure the best results*'.

> *'EXAGGERATION: This is the ordinary procedure for the usual case and is employed when not contraindicated. To employ this method, increase the abnormal relationship at the (cranial) joint by moving the articulation slightly in the direction towards which it was lesioned. To do this with the two members of an articulation augments the chance of securing a reduction because of the increased resilience of the membranes'.*

In the AK rebound challenge procedure, which employs Magoun's exaggeration procedure, the physician momentarily increases the fault pattern of a single bone or group of cranial bones with the intention that this vector of force placed will cause a temporary increase in the tension of the reciprocal tension membranes (RTM) of the cranio-sacral system. If this vector of force increases the RTM tension, it will produce a momentary lowering of the overall muscle tone of an indicator muscle.

The correction pressure is then sustained through several respiratory cycles using the same vector as found in the challenge. This allows the RTM to accumulate enough energy or tension to free itself and spring back, or rebound, into the correct relationship. Magoun calls this the *exaggeration correction* and it is the preferred method of correction in Chiropractic and Osteopathic schools of teaching. This rebound correction is assisted by the patient's own inherent breathing, which further induces the membranes into correction.

With applied kinesiology challenge procedures we are guided into the proper vectors of force to be imparted to this architecturally impressive but neurologically delicate bone and system of sutures. However, we must be able to feel the movement occurring in the bone as we correct it, feeling both for the sutural response and for the synchronisation of the dura. We are introducing a force designed to lubricate and then free the last threads of adherence or imbalance in the temporal's structural interrelationship with the other cranial bones and with the tentorium itself during an AK cranial correction.

Temporal Bone Dysfunction and Cranial Nerve Involvements

Physicians who perform neurological evaluations have numerous signs and symptoms to look for in patients with cranial nerve problems. Applied kinesiology has added a significant number of functional neurological tests that indicate cranial nerve involvement in their patients.

Cranial nerves 3, 4, 5, 6, 7, 8, 9, 10, and 11 all have relationships with the temporal bone. The nuclei of all the motor branches of the cranial nerves are located in the area between and below the occiput and the temporal bones, i.e., the brainstem. These are all true peripheral nerves in the sense that they synapse external to the central nervous system.

In addition to the head, the cranial nerves also have significant functions in the neck, chest, and abdomen. Every time we change any relationship between the occiput and temporals, especially affecting the tentorium cerebelli, we affect the tissue tension around all of these nerves. This is particularly important if we think of the far-reaching influences of the vagus nerve and when we think of the frequency with which vestibular and auditory (cranial nerve VIII), neck (cranial nerve XI), and digestive problems (cranial nerve X) are encountered in clinical practice.

The jugular foramen is the intervertebral foramina between the occiput and the temporal bone. The foramen contains

i. the jugular vein
ii. the vagus nerve
iii. the spinal accessory, and
iv. the glossopharyngeal nerve.

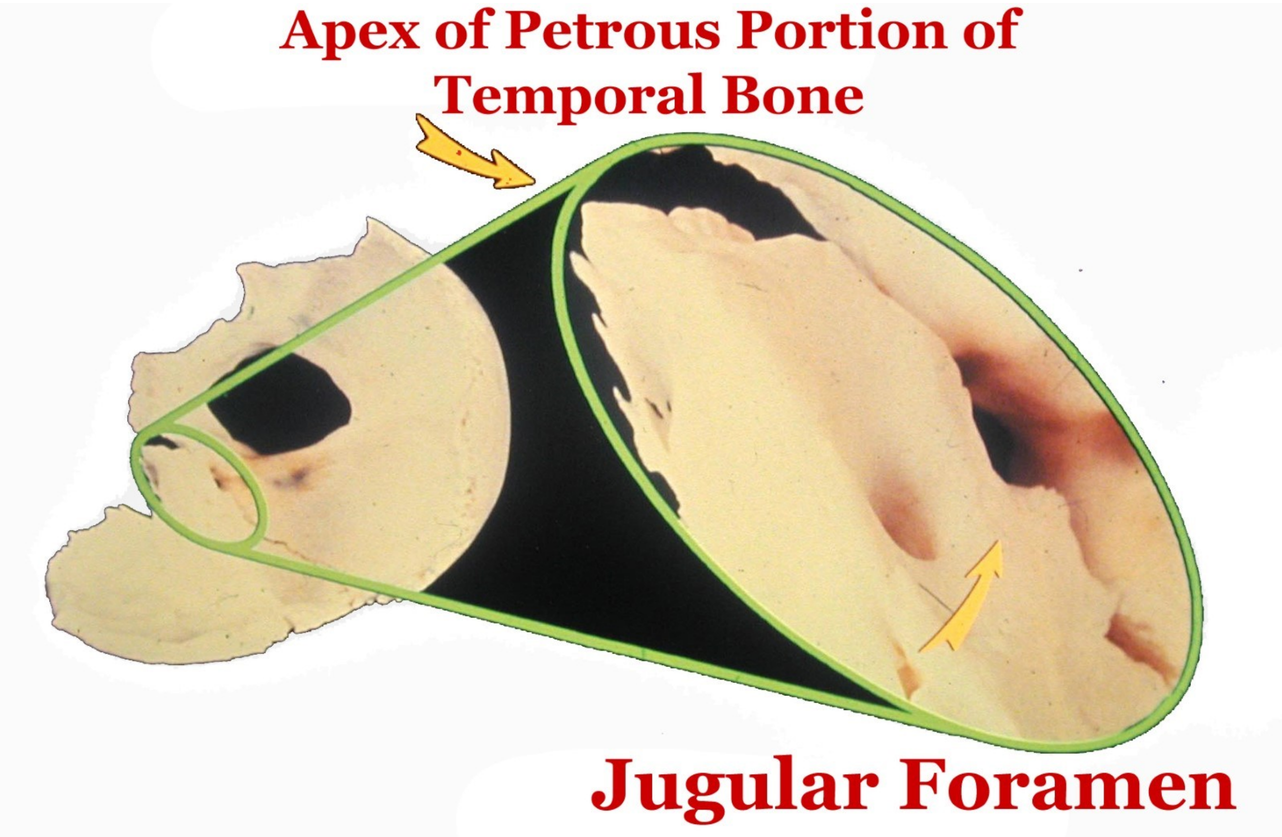
Dr. Goodheart describes it as though there are four fingers coming out of your jacket's sleeve.

The border of the temporal with the occiput, the occipito-mastoid suture, is an elongated crevice that remains open throughout life. The open architecture of the jugular and petrous portions makes the cranial base portion of the temporals, as well as the occiput and sphenoid, susceptible to subluxation. There can be foraminal encroachment here because of dural sleeve occlusion.

This may produce vagal signs and symptoms (S/S), glossopharyngeal (S/S), and spinal accessory (S/S), and temperature differences in the face and neck.

The Goodheart précis of the Signs and Symptoms of cranial nerve entrapments at the jugular foramina: (55)

Fig 14: The jugular foramen



Cranial Nerve IX (S/S):

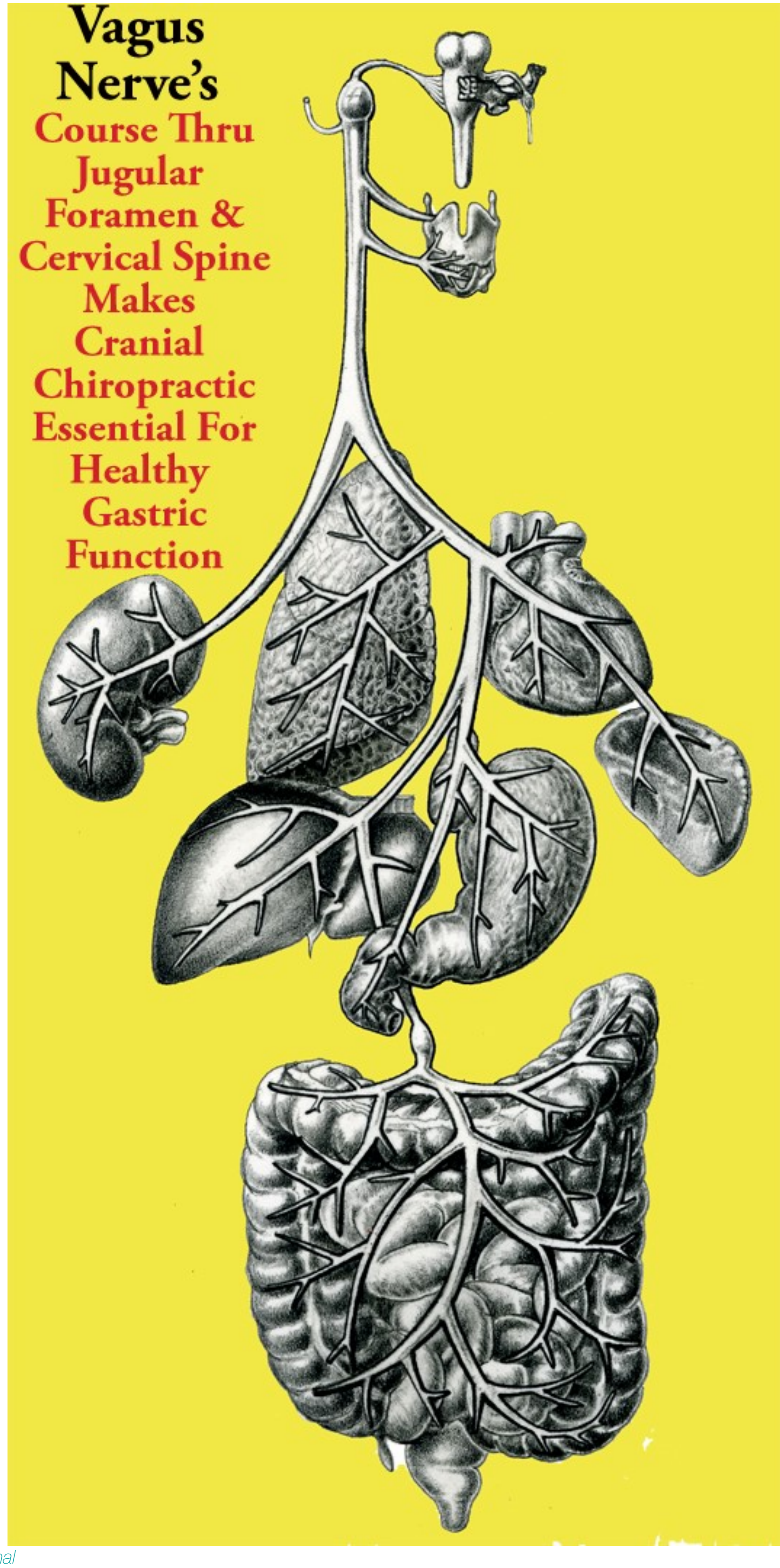
- Uvula deviated to one side; swallowing problems
- Upper pharynx muscles innervated by the glossopharyngeal nerve. Patients don't complain of it
- Very few uvula hang down in the centre. Uvula deviation will be found frequently if we look for it. Patients can't taste bitterness on the tongue (the posterior ⅔ of tongue is innervated by glossopharyngeal nerve)

Cranial Nerve X (S/S):

- Cardiac rate, rebound tenderness of the abdomen; digestion. Child not gaining weight properly. Spastic pyloric valve; vomiting. Common in children 2.5 years and up. Not so common in younger children
- Check to see if one foot turns-in better than the other
- Check tone of abdomen between one side and another. Usually will be much tighter on one side than another
- Both will improve after correction of universal cranial dysfunction or jugular foramen decompression technique. Frequently, compression of ventricle 4 (CV-4) is also needed.

- It should be remembered that cranial dysfunctions producing (S/S) attributable to cranial nerve X would likely be producing signs in cranial nerve IX because of their intimate anatomical association. The nuclei of both cranial nerves are in the floor of the 4th ventricle, and the ganglia are in the same jugular foramen.

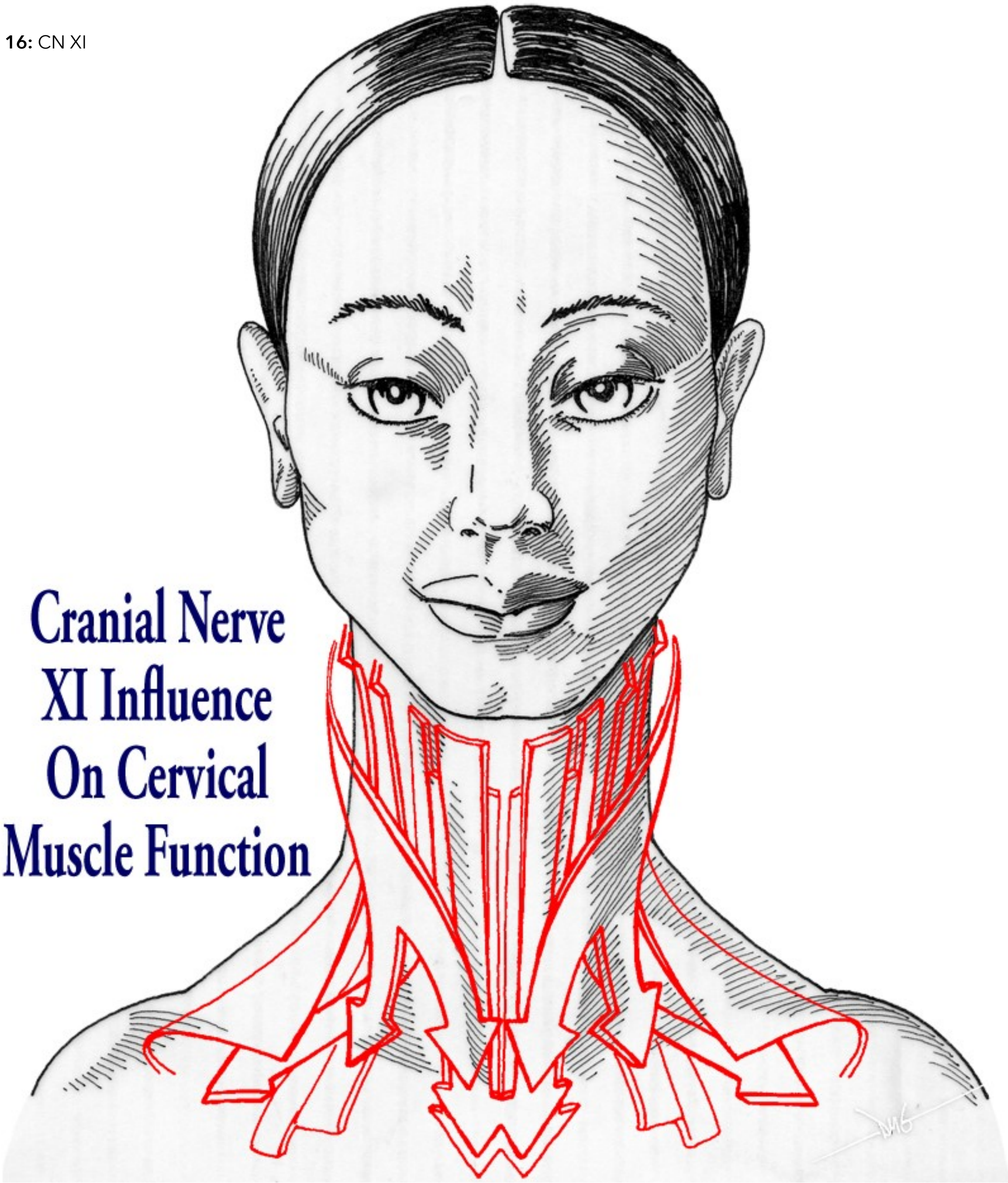
Fig 15: Vagus nerve



Cranial Nerve XI (S/S):

- SCM, *upper trapezius*, or *splenius capitus* tension or weakness
- AK testing of the SCM and u*pper trapezius* and *splenius capitus* muscles offers cranial technicians one of the most immediately available and accurate windows on the cranial nerve system in the therapeutic world today. Cranial dysfunctions producing irritation to cranial nerve XI will frequently be affecting other cranial nerves when tested
- Cranial Nerve XI and the entire cranial nerve system are so intimately related as to be inseparable due to dysfunctions at the jugular foramen
- Whenever cranial nerve XI dysfunction is found, a complete evaluation of all the cranial nerves should be made. Because cranial nerves usually carry dural and pia mater sleeves with them, it is critical to evaluate all of them when dural tension is discovered in a patient. When this is done and treatment is given to all the cranial dysfunctions found, patients may experience undreamed of improvements in their clinical pictures

Fig 16: CN XI



Conclusion

The evidence presented in this article allows the vertebral subluxation, temporal bone cranial dysfunctions, and equilibrium syndromes to be associated via sensory conflict and dysponesis. It is my hope that illustrating this relationship will lead to future investigation by a variety of researchers to further document the relationship between vertebral subluxations, cranial dysfunctions, abnormal muscle tone, equilibrium disturbances, sensory conflict, and other health problems.

The hypothesis derived from clinical and anatomic observations is that the nervous system operating within the disturbed geometric forms and mechanisms of patients with temporal bone cranial dysfunctions will not operate properly.

Anatomical distortions of the geometry of the eyes or the vestibular mechanism within the temporal bones (producing a tilt in the angular geometry of the semicircular canals) may create discordant sensory input into the CNS compared to that coming into it from the spinal joints and muscles, thereby creating sensory conflict and producing poor stability and deficient motor activity.

This lays the groundwork for pain and numerous proprioceptive syndromes. Thus the examination and treatment of the cranial mechanism, along with other chiropractic procedures that improve proprioceptive signalling throughout the body, assume a new significance and even greater importance than was formerly appreciated.

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Cite: Cuthbert S. Temporal Bone Cranial Dysfunctions: A resume of '*The Trouble Maker of The Head*' with a focus on prevalent Vestibulo-Ocular Proprioceptive Syndromes in Chiropractic Practice. Asia-Pac Chiropr J. 2024;4.4. apcj.net/papers-issue-4-4/#CuthbertTemporalBone.

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