Hypermobility/CCI/AAI/Craniocervical Junction Misalignment...? *The Importance of diagnosis and staging in managing Craniocervical Syndromes*

An introduction to craniocervical junction/cervical spine instability and its potential implications on human health

A proposed approach to management -- from least to more invasive interventions

Dr Iain G Smith, DC, CC, BCAO

AONM Webinar 27th January 2021

The Craniocervical Junction (CCJ)

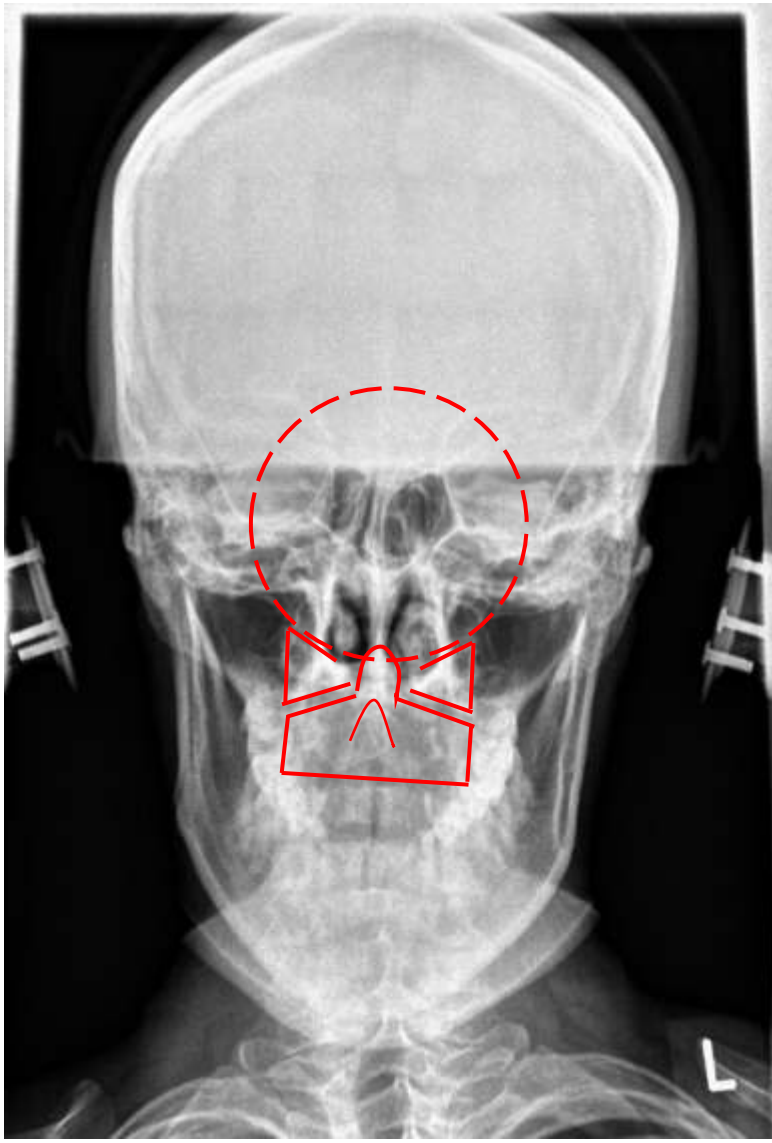
Skull base (C0)

Atlas (C1)

Axis (C2)

Connective tissue

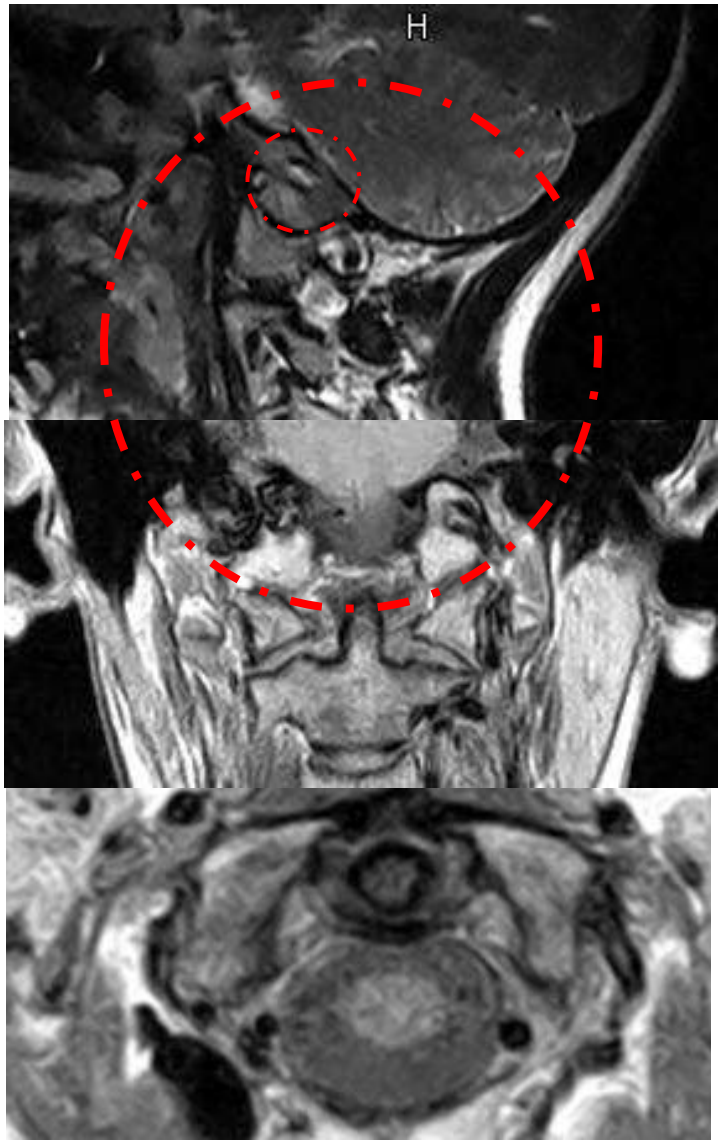
Muscles



The Craniocervical Junction (CCJ)

Atlanto-occipital joint

"The C1 lateral masses contain the occipital condyles in a cuplike fashion, facilitating flexion and extension. The condyles of these paired joints in sagittal direction are arcuate & thus due to this anatomy, motion about the vertical axis is not possible. Thus, this joint has movement only around the transverse & A-P axes. These joints allow forward or backward bending (nodding of head) & a slight lateral tilting motion to either side. ***They do not permit rotation*****."**

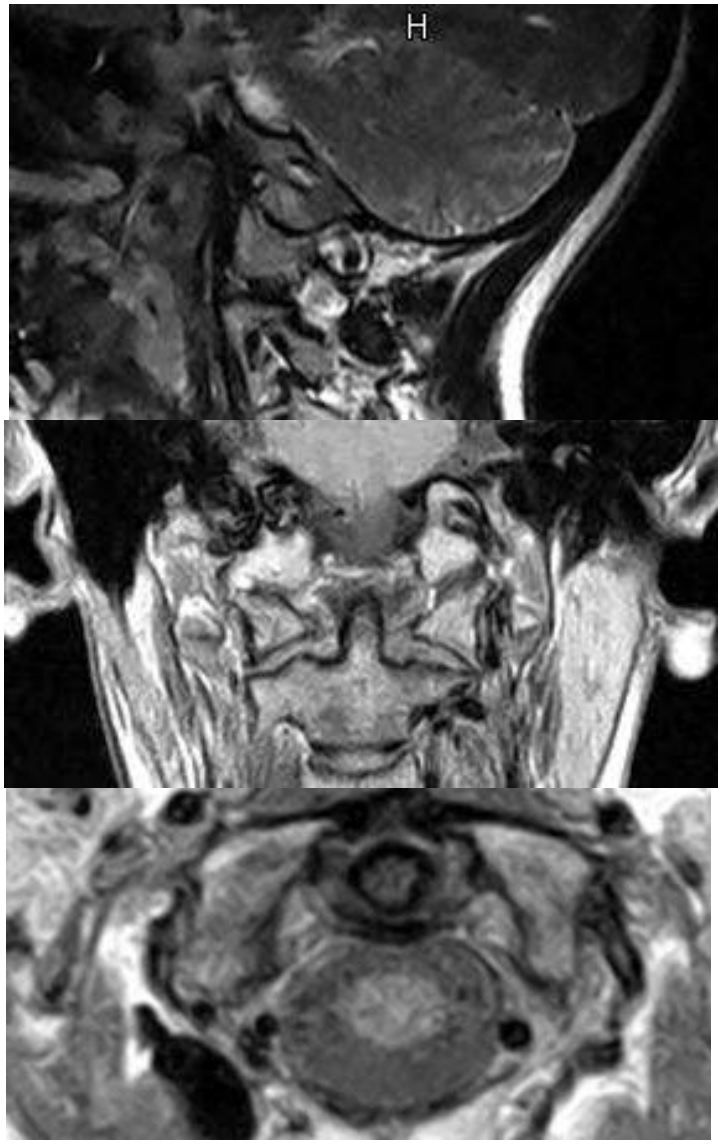


Saxena A (2017) ***Cranio-Cervical Trauma Eidemiology, Classification, Diagnosis and Management****. J Spine Neurosurg 6:5. doi: 10.4172/2325-9701.1000284*

The Craniocervical Junction (CCJ)

Atlanto-axial joint

"Rotation of atlas occurs around the odontoid process .... The superior facet of the axis is convex & the inferior facet of the atlas is either horizontal or slightly convex with horizontal orientation of the articulation. Because of this, these facets slide forward & backward on each other with rotation. The Atlanto-axial joints allow less flexion and extension motion than rotation ."



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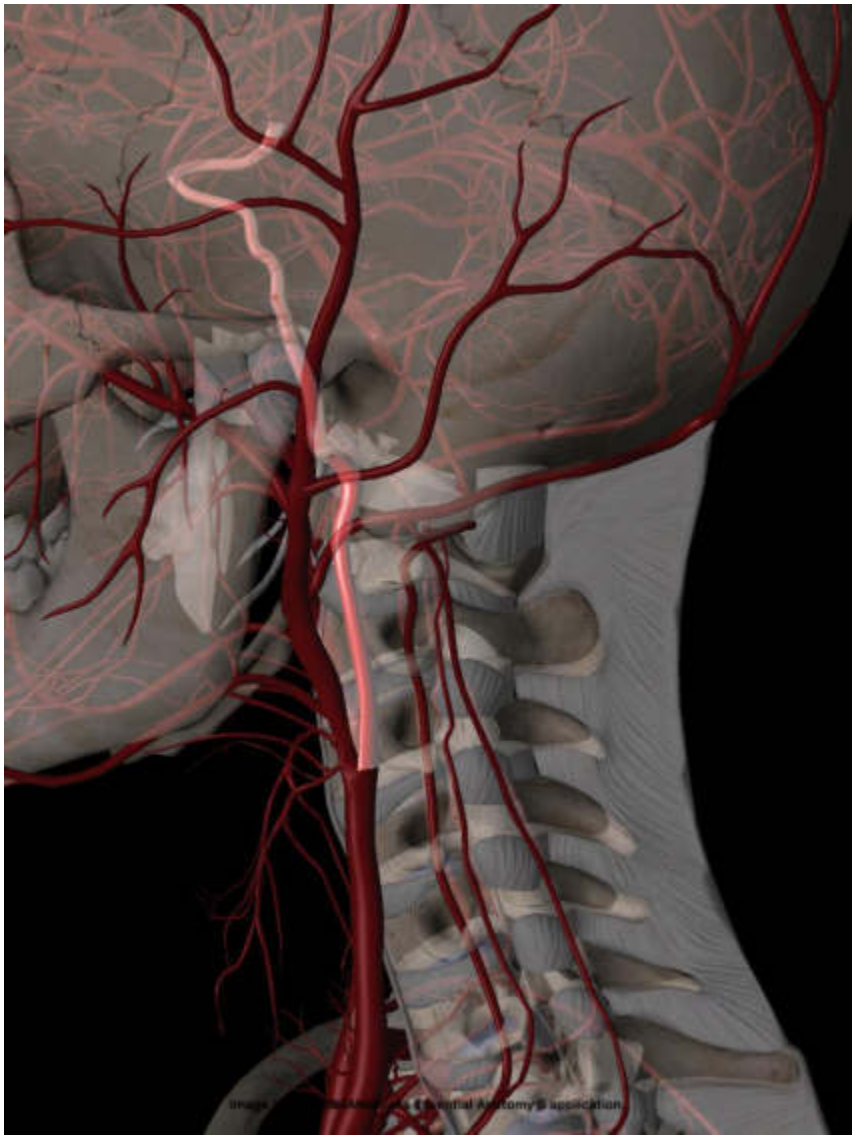
CCJ misalignment/deformation

"Malformations and misalignments of the CCJ cause deformation and obstruction of blood and CSF pathways and flow between the cranial vault and spinal canal that can result in faulty craniospinal hydrodynamics and subsequent neurological and neurodegenerative disorders."

The Role of the Craniocervical Junction in Craniospinal Hydrodynamics and Neurodegenerative Conditions
Michael F. Flanagan (Neurology Research International: Volume 2015, Article ID 794829)

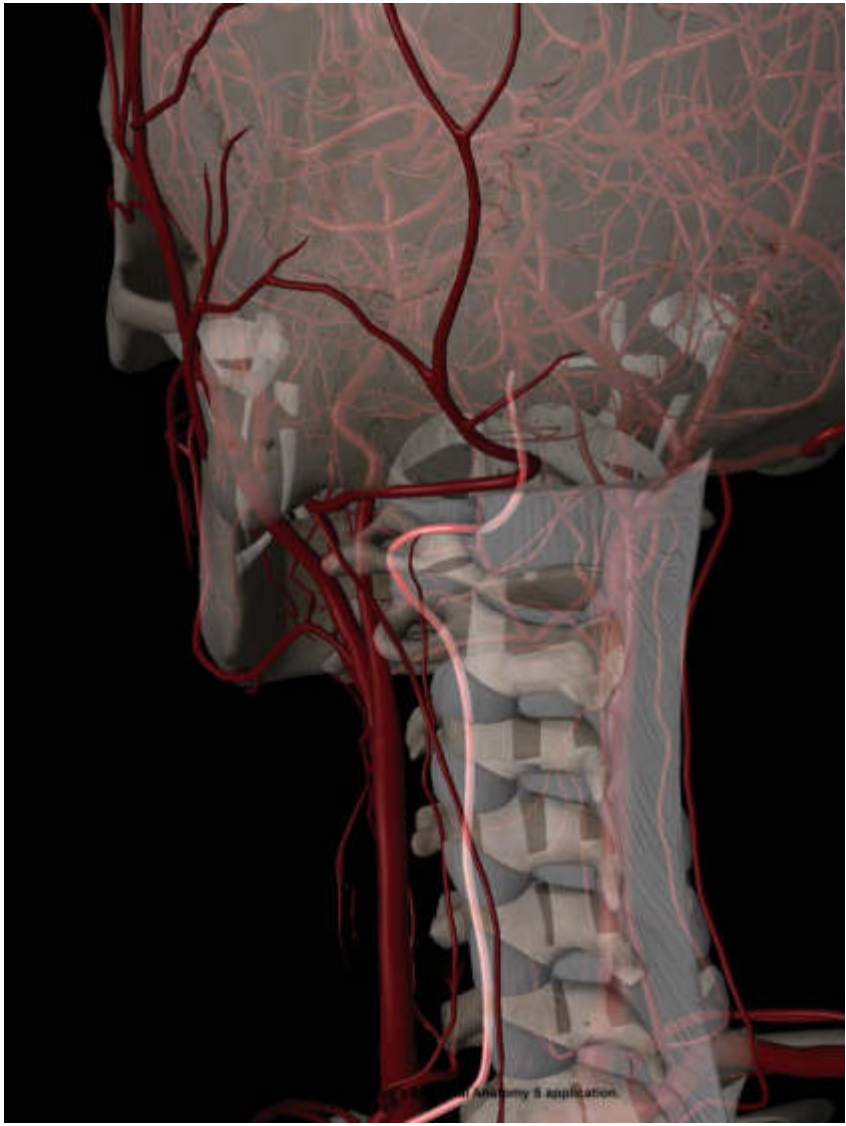
Brain Arterial Supply

Anteriorly: internal carotid arteries (75 – 80%)



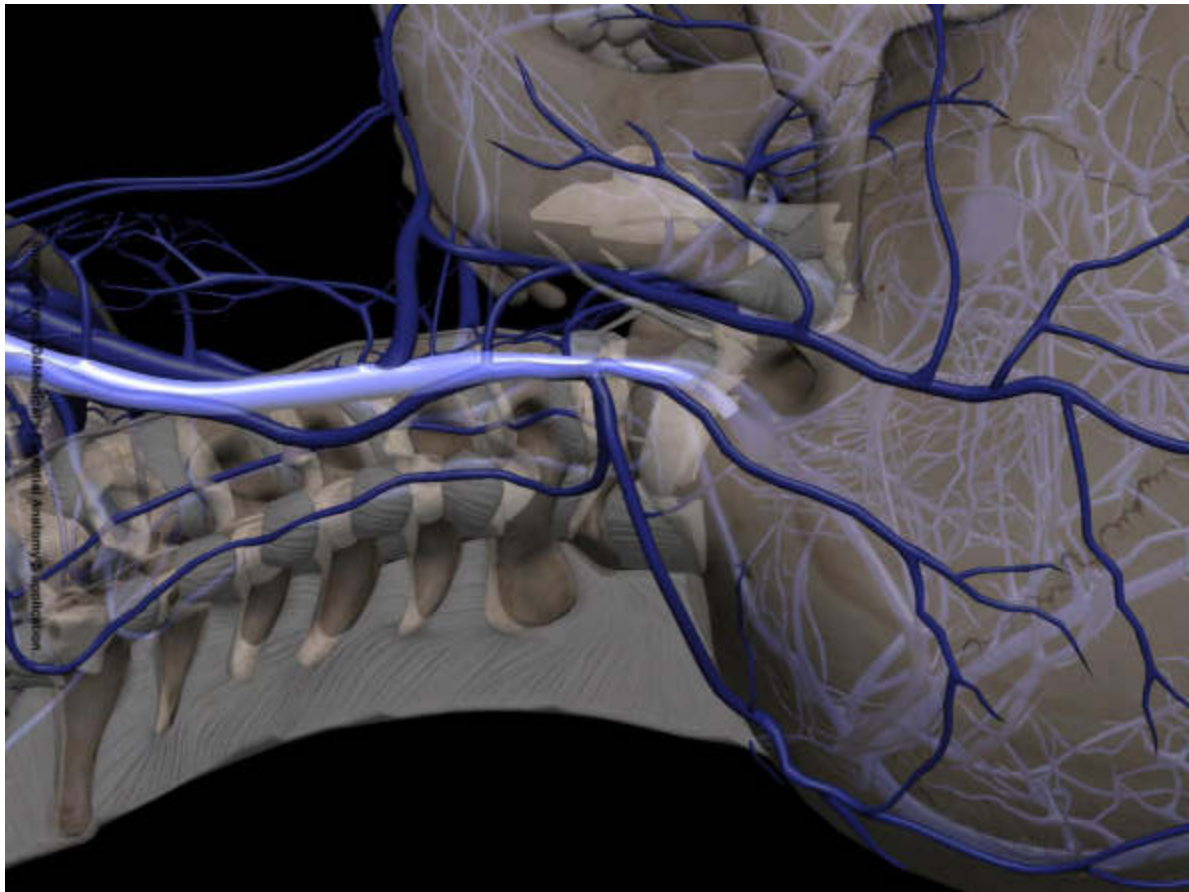
Brain Arterial Supply

Posteriorly: vertebral arteries (20-25%)



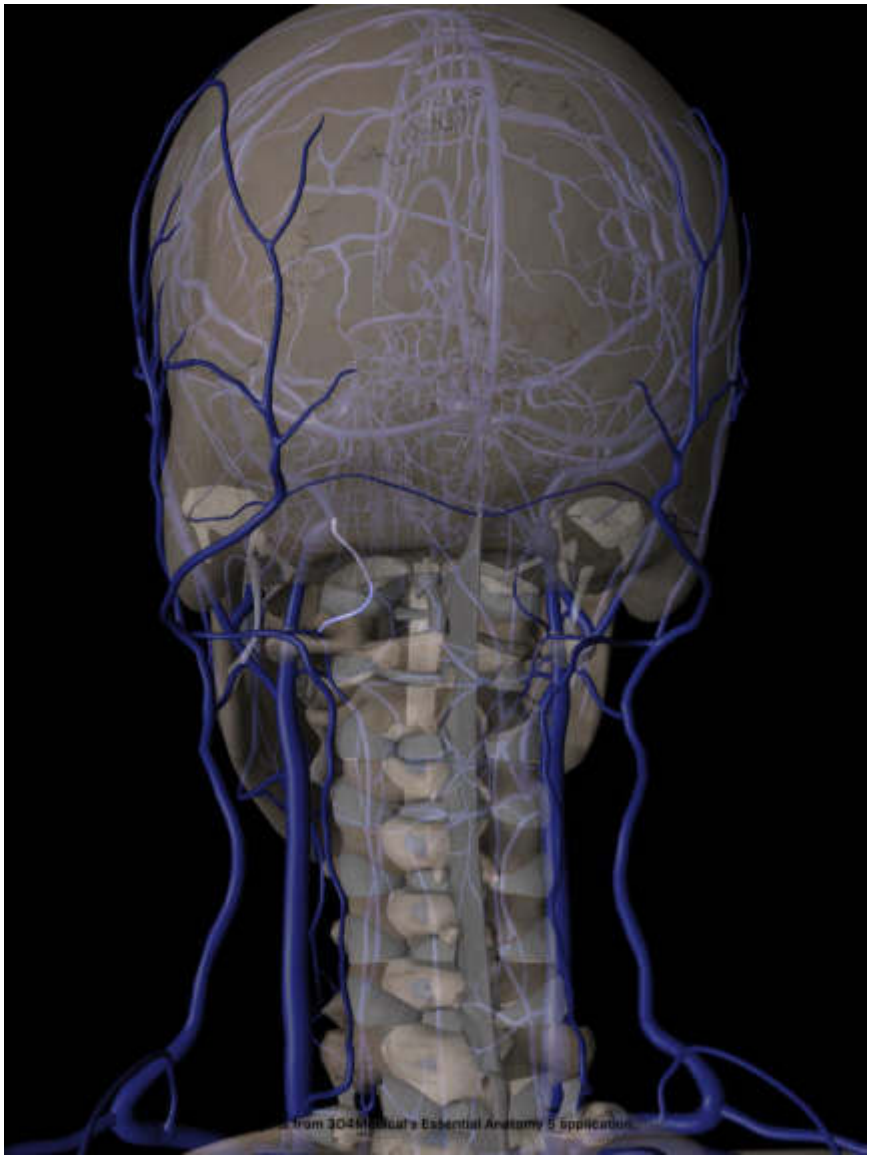
Primary Venous Return Pathway

When recumbent: primary venous outflow is via the transverse, sigmoid sinus, JF, internal jugular vein



Primary Venous Return Pathway

When erect: re-directs to the accessory posterior emissary return pathway i.e., primarily the occipital marginal sinus system to the suboccipital cavernous venous plexus and vertebral venous plexus (important in brain temperature control)



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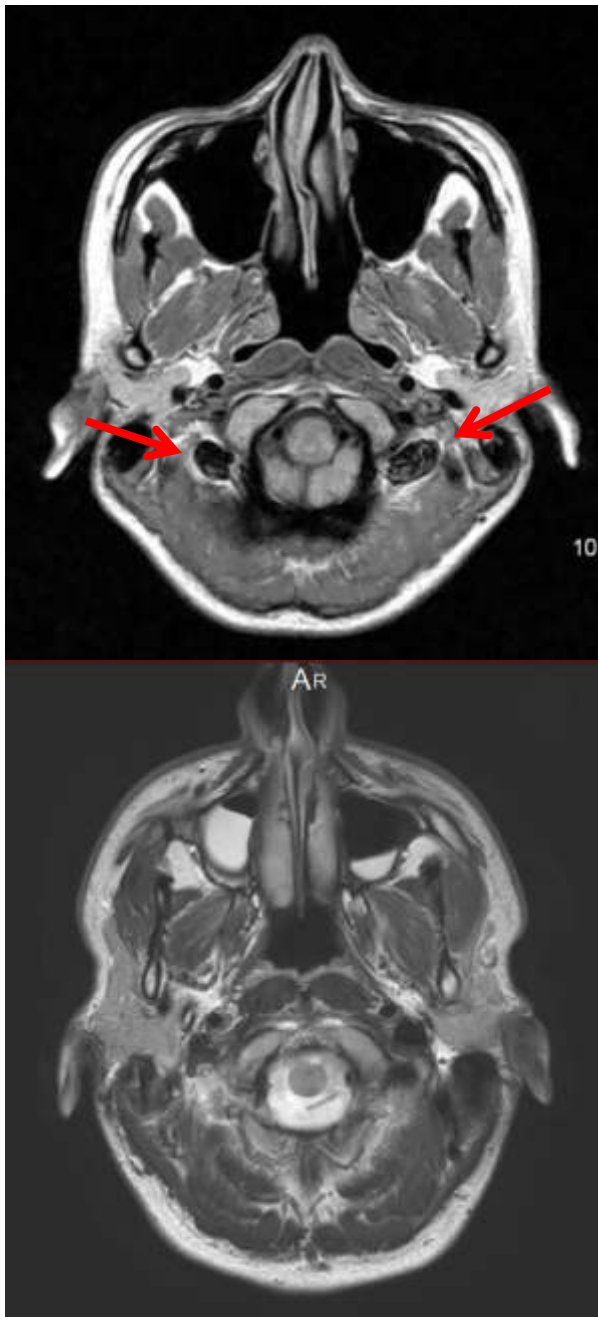
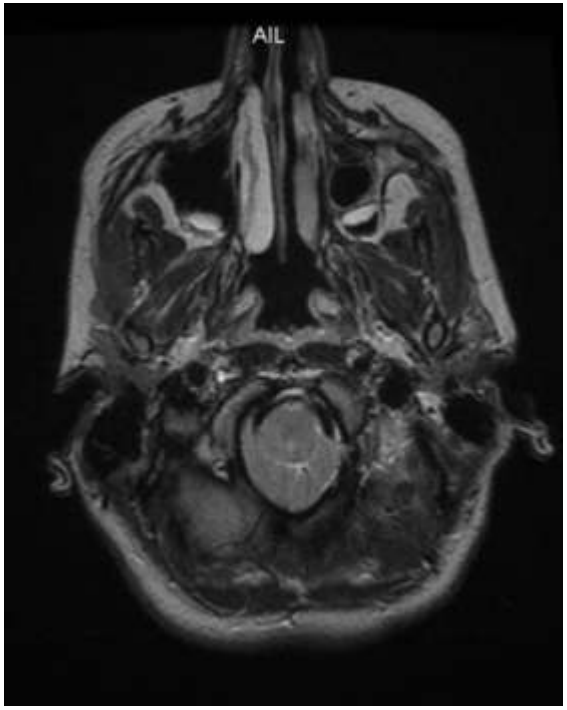


Cerebrospinal Fluid (CSF)

500ml produced per day

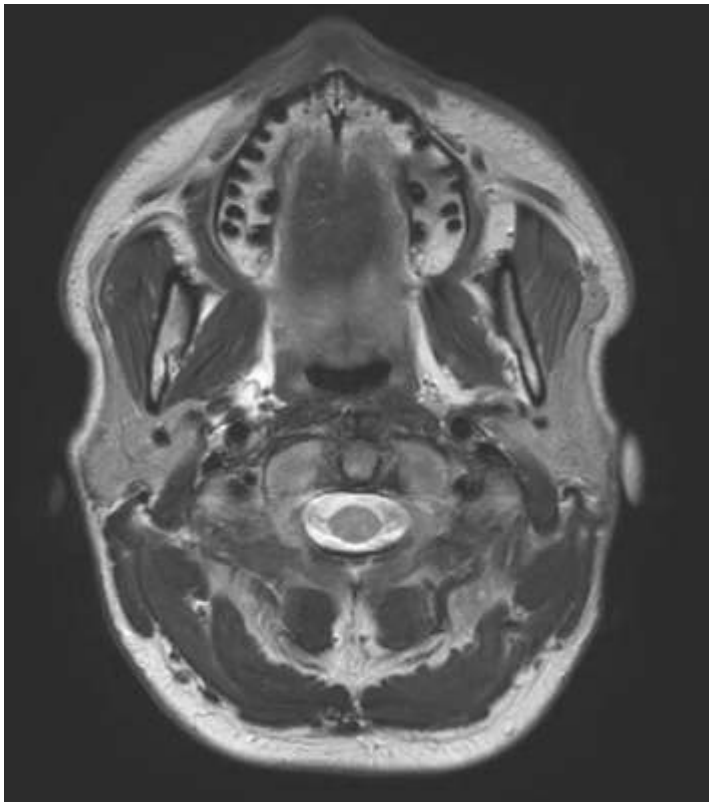
Approx. 150ml constant volume (brain, cord, lumbar cistern)



Dentate Ligament-Cord Distortion Hypothesis

Dr John Grostic Jr.

Neurological dysfunction can occur either by direct mechanical insult and/or by ischemic changes affecting the metabolic status of the cord.



Dentate Ligament-Cord Distortion Hypothesis

Dentate ligament cord distortion:

- cord ischaemia
- altered postural reflexes
- caudal tension on the brainstem worsening CTE

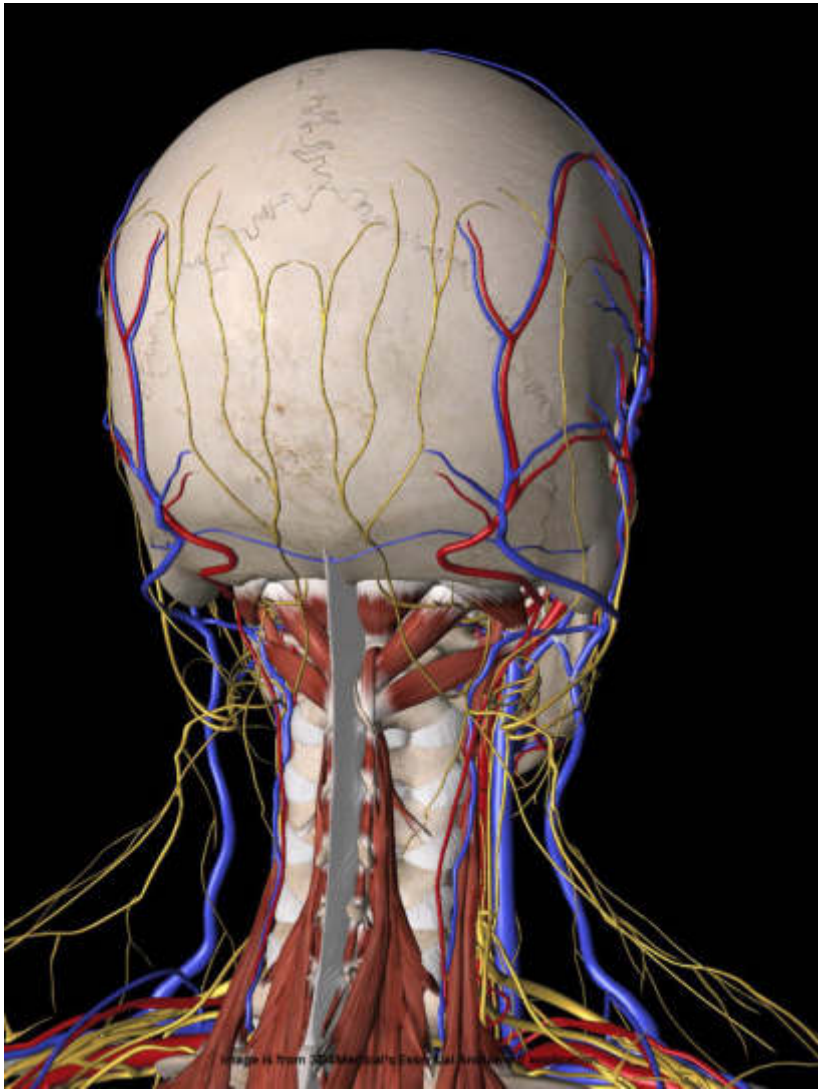
The Craniocervical Junction (CCJ)

Major anatomical junction

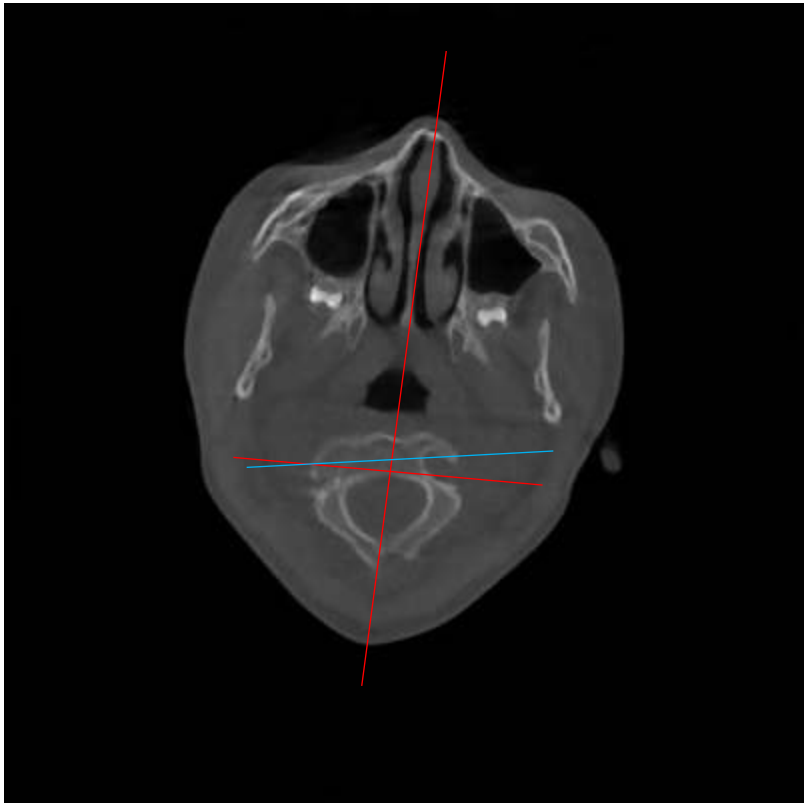
"Physiological choke point"

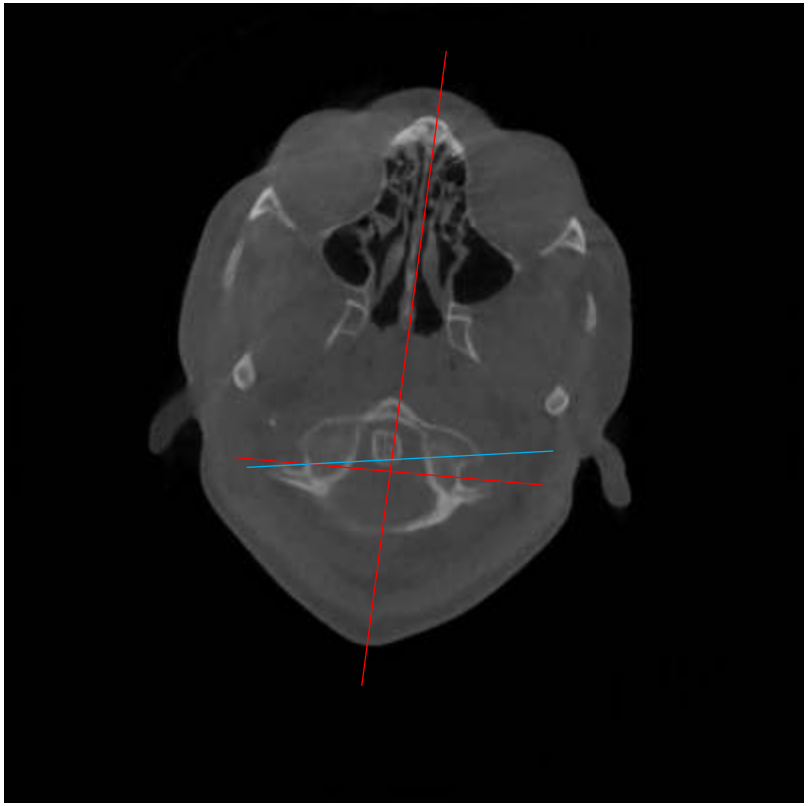
"Animals go to the base of the skull to kill prey, not L5."

- Dr Roy Sweat, DC, BCAO (Founder of Atlas Orthogonal Upper Cervical Specific Procedure)



CCJ misalignment/deformation

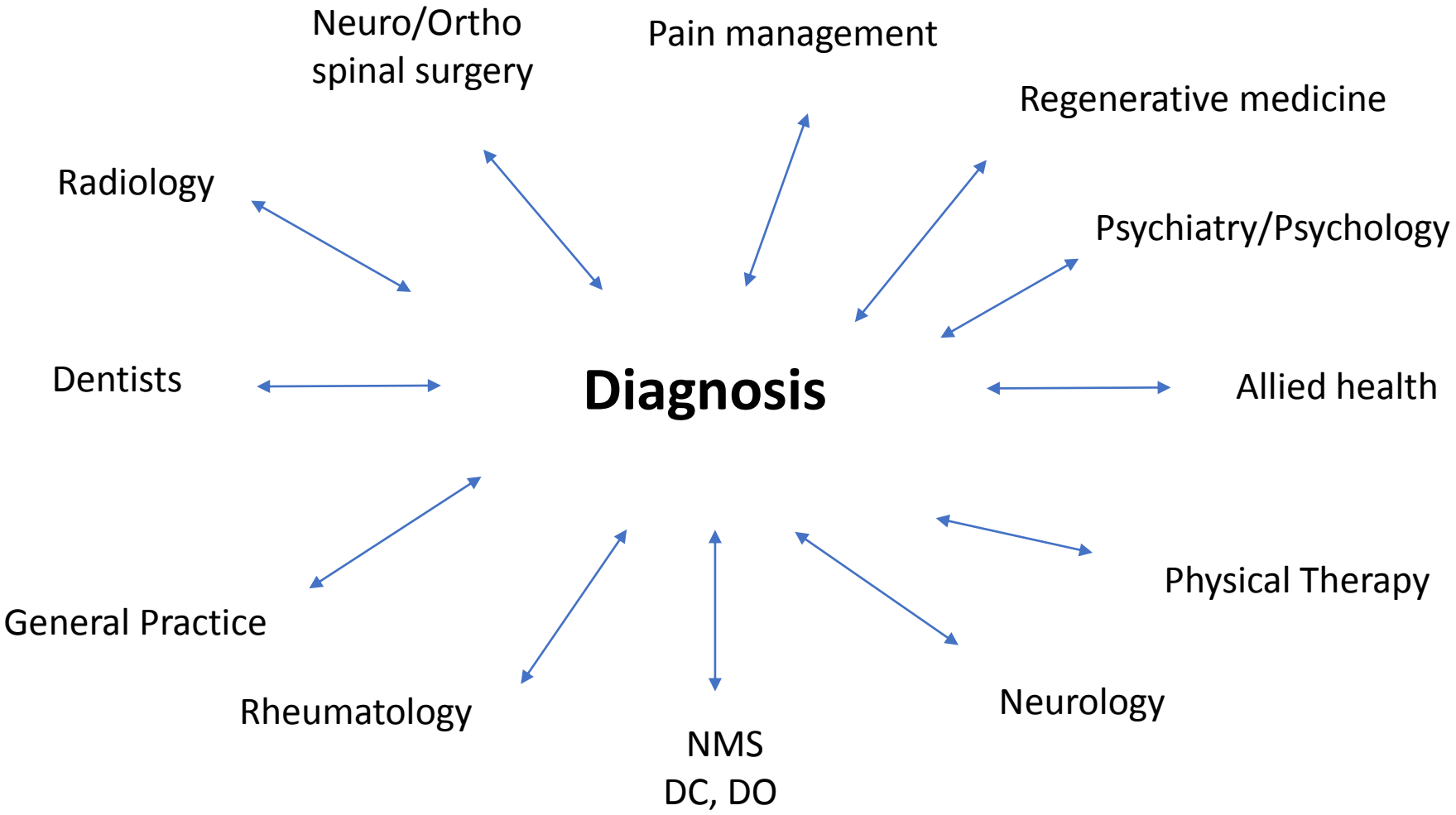




CCJ misalignment/deformation

Collectively the sequelae of CCJ compromise, and its concomitant signs and symptoms – regardless of aetiology - can be broadly classified as '**Cranio-Cervical Syndrome'**

Cranio-Cervical Syndrome



Cranio-Cervical Syndrome

Clinical Presentation

Neuromusculoskeletal

Neurovascular

Craniospinal Hydrodynamics

Cranio-Cervical Syndrome

Signs/Symptoms:

- **Pressure HA is often the primary symptom** (described as 'hatband too tight'; 'feels like head is going to explode')
- **Migraine HA/Cephalgia/neuralgia/TN/NDPH**
- **Head feels 'too heavy for the neck'** (may be associated with head tremor)

Cranio-Cervical Syndrome

Signs/Symptoms:

- **'Cog fog'** (poor concentration, irritability, low mood/depression/anxiety, early cognitive decline, dysphasia)
- **Sleep disturbance** (can wake on fairly consistent cycles; sometimes sleeping as little at 15-20mins at a time)
- **Dizziness/Disequilibrium/Vertigo/Tinnitus** (sound like Meniere's?)