

Osteopathic Considerations in the Newborn



AOBP with thanks to:

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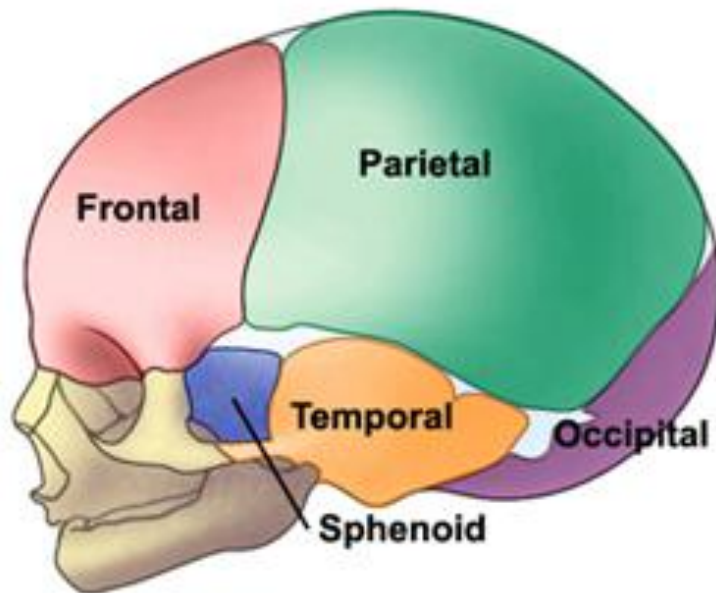
Osteopathic Tenets

- The body's inherent ability for self-repair
- The interrelatedness of body systems
- The body possesses self-regulatory healing mechanisms
- The interrelatedness of structure and function

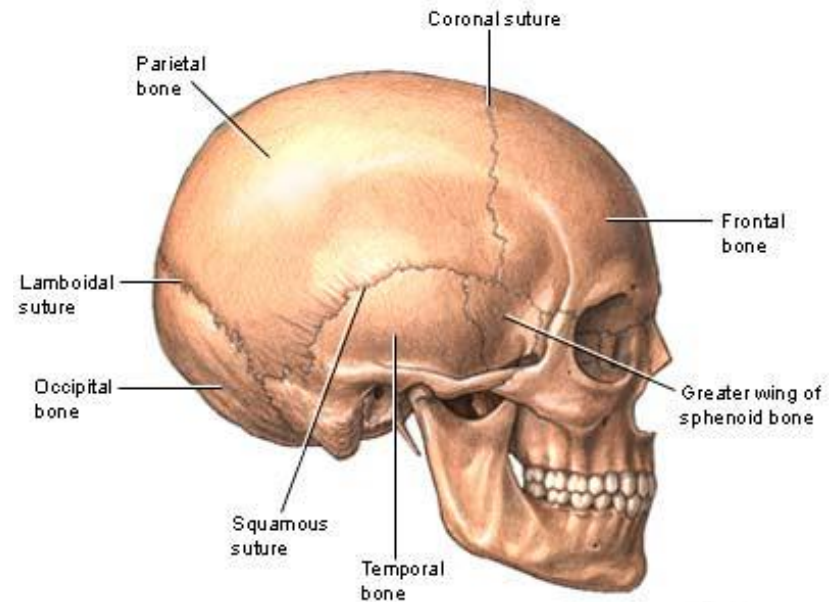
Review Bones and Sutures of the Skull

-the cranial base (a line from the eye socket to base of occiput) is about 30 degrees in a child (more horizontal) and 50 degrees in an adult

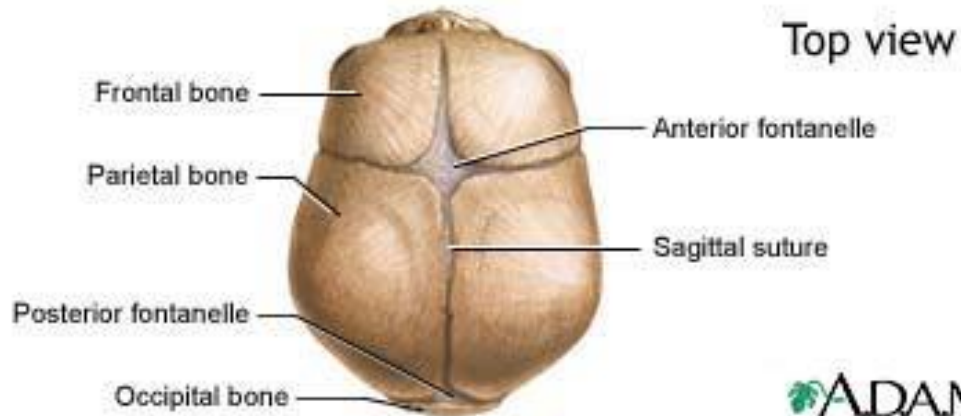
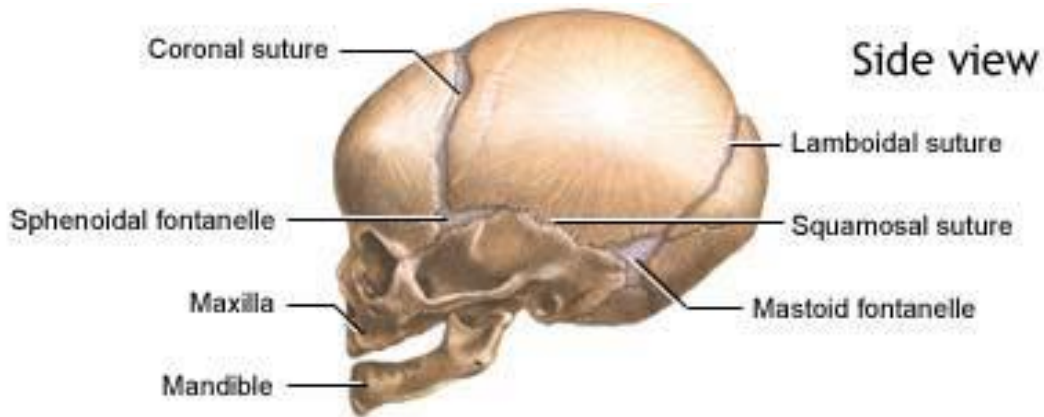
Pediatric



Adult



Note differences of adult and infant skull:



Newborn Anatomy

- Newborn bone is in various forms of maturity
- Bones of the newborn skull are individual and separated by membranous fascia
- Newborn reflex arcs in the spinal cord are still immature
- Bones in newborn will form in response to pressures placed on it as child grows
- The newborn cranium will drastically change shape as the child grows

Osteopathy in the Cranial Field

REMINDER

Cranial Bone Movement

- **Midline:** Flexion and Extension
- **Paired:** Internal and External Rotation

Common Patterns of Cranial Plagiocephaly



LATERAL SBS Strain
(Parallelogram Head)



Flexion (Fat Head)



Extension (Cone Head)

Cranial Somatic Dysfunction Affects Function

- Ophthalmologic
 - CN II, III, IV, VI
- Gastrointestinal
 - CN IX, X, XII
- Respiratory
 - CN X
- Musculoskeletal
 - XI
- Parasympathetics with III, VII, IX, X

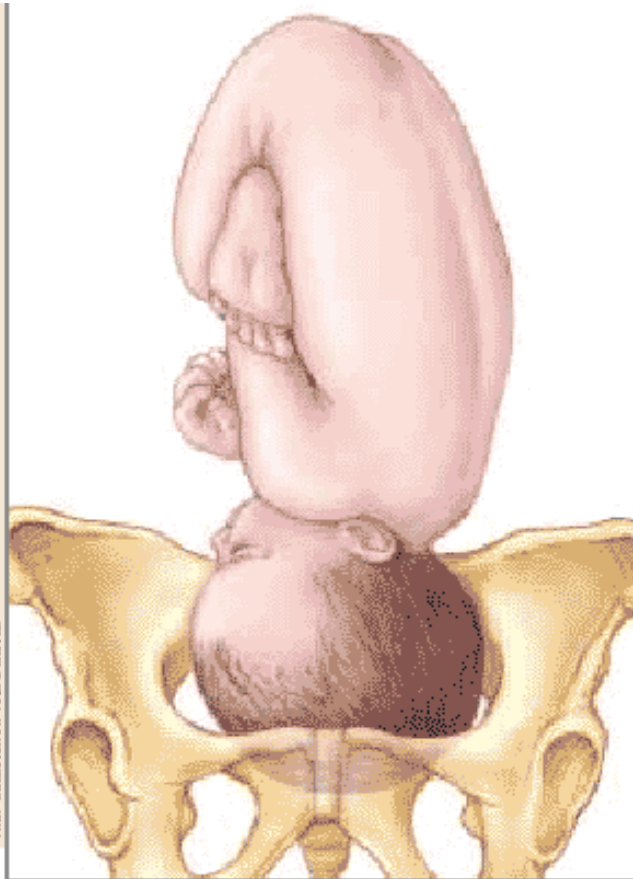
Prevalent Newborn Problems

- Musculoskeletal System
 - Torticollis
 - Positional plagiocephaly
- Respiratory System
 - Bronchopulmonary dysplasia
 - Assisted ventilation
- Gastrointestinal System
 - Constipation
 - Poor Feeding/Sucking
 - GERD
- Neuro-Psycho-Social
 - Strabismus

Torticollis

- Fibrosis of the sternocleidomastoid (SCM) muscle results in ipsilateral neck sidebending and contralateral neck rotation
- Most commonly presents from 3 weeks to 3 months of age
- Following “Back to Sleep” guidelines, infants can now present as asymmetric occipital flattening

Torticollis Etiology

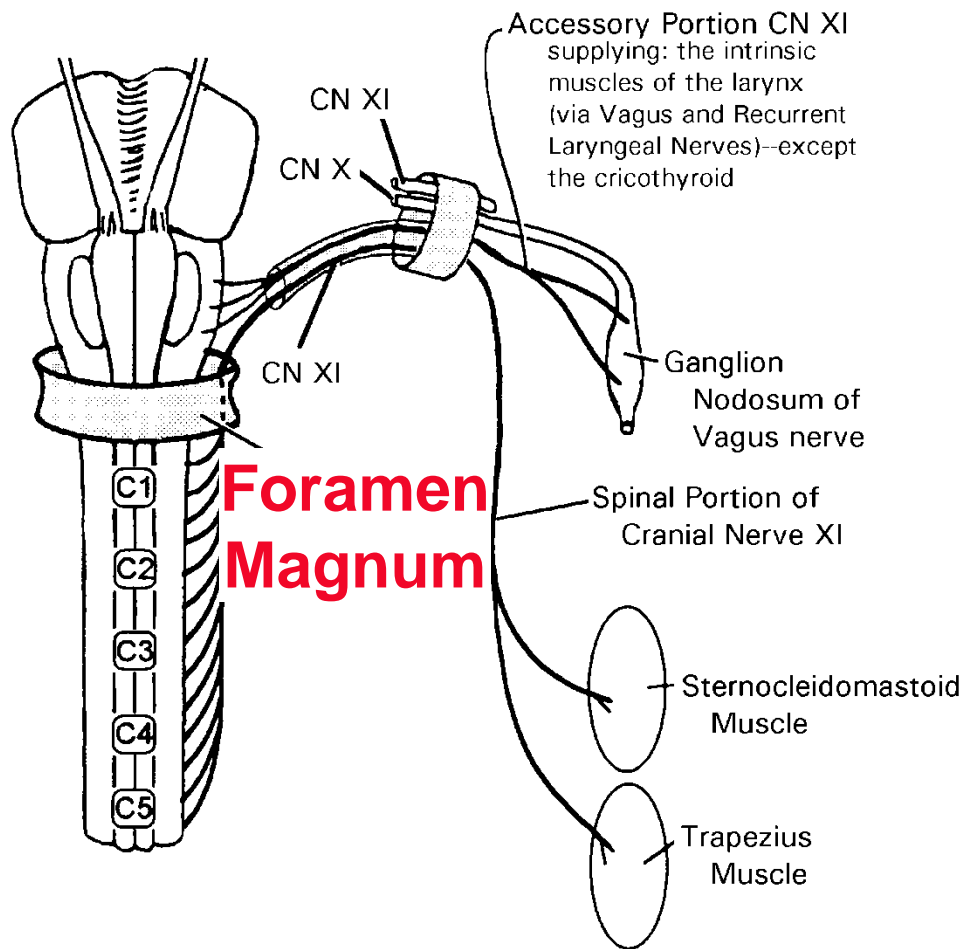


- Proposed positioning in utero
- Some association with prolonged or difficult labor but not necessary causal
- Risks
 - Primiparous mother
 - LGA
 - Male
 - Breech
 - Multiples
 - Maternal uterine abnormalities

Osteopathic Considerations in Torticollis

- SCM attachments at the mastoid process and medial clavicle
- SCM innervation is Accessory nerve
- Attention to temporal bones with expected external rotation of ipsilateral temporal
- Sphenoid torsion with contralateral side elevated
- Compensatory changes throughout the body

CN XI - Accessory Nerve



Osteopathic Considerations in Torticollis with Plagiocephaly

- Torticollis can present as postional plagiocephaly and facial assymetry
- Ipsilateral ear is inferior and posterior due to temporal bone postion
- Ipsilateral eye appears smaller and inferior
- Ipsilateral maxilla and cheek appear smaller and zygoma is inferior

Treatment of Torticollis and Plagiocephaly

- Home positioning to encourage rotation and sidebending to the restricted side
- Encourage awake belly time at a young age
- Home stretching with diaper changes
- Office OMT vs. Physical therapy (PT)
 - No full scale study to indicate one is more effective but PT alone has shown improvement in up to 90%

Proposed OMT for Torticollis and Plagiocephaly

- OMT focused on the SCM, cranial base, occipito-mastoid suture, temporals
- Treatment of the associated and compensatory dysfunctions of the thoracic, lumbar, cervical and sacral regions
- Diagnosis and intervention earlier is better to avoid potential surgical intervention or cranial orthotic devices

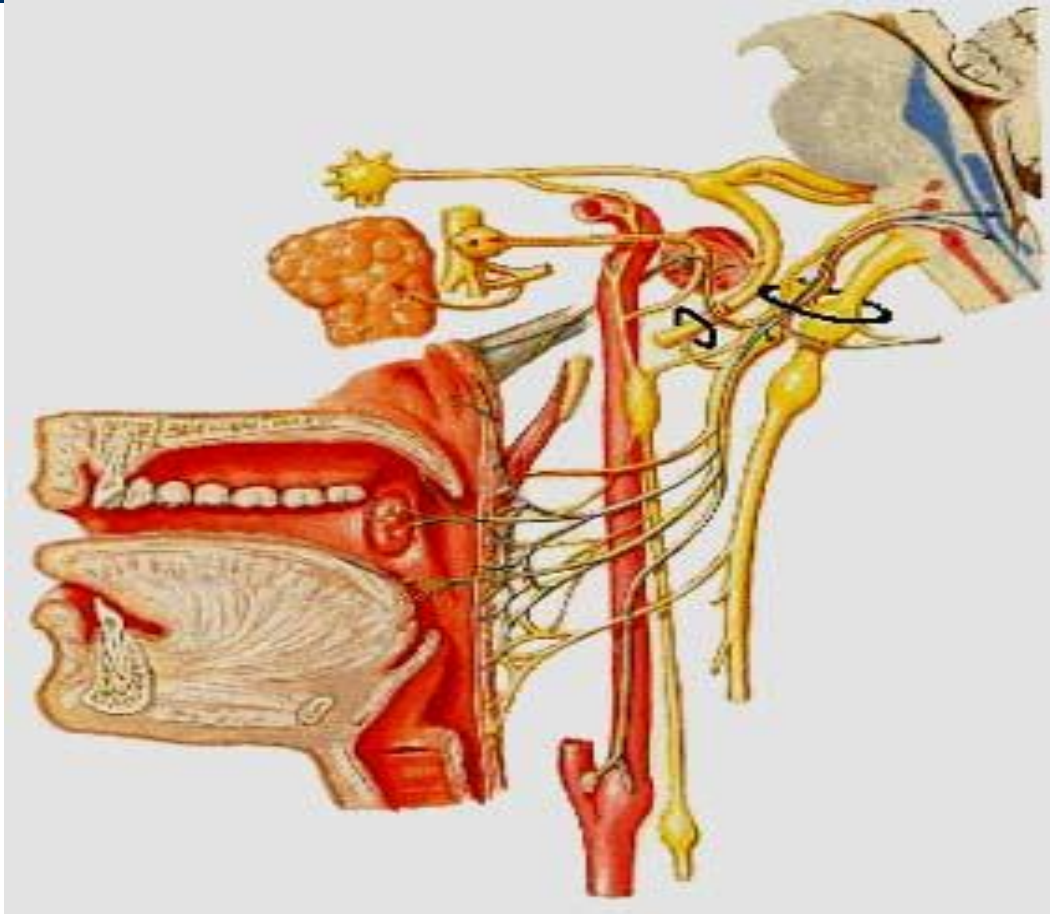
Physiological and Structural Differences: Newborn vs. Adult

- Increased cheek fat pads in newborns make the oral cavity more narrow
- Newborn tongue is larger in size relative to the mouth
- Newborn hyoid bone and larynx are more forward under the tongue
- Newborns must also learn to coordinate suck and swallow with respiration

Nipple Feeding Dysfunction

- Initial nipple feeding requires muscles innervated by CN V and VII to seal the mouth around the nipple
- Bottle and breast feeding requires different actions by the infant tongue
- Pharyngeal swallowing requires use of intrinsic tongue muscle, as well as mandible, hyoid and other stabilizing muscles
- Esophageal swallowing relies on peristalsis

CN IX - Glossopharyngeal Nerve



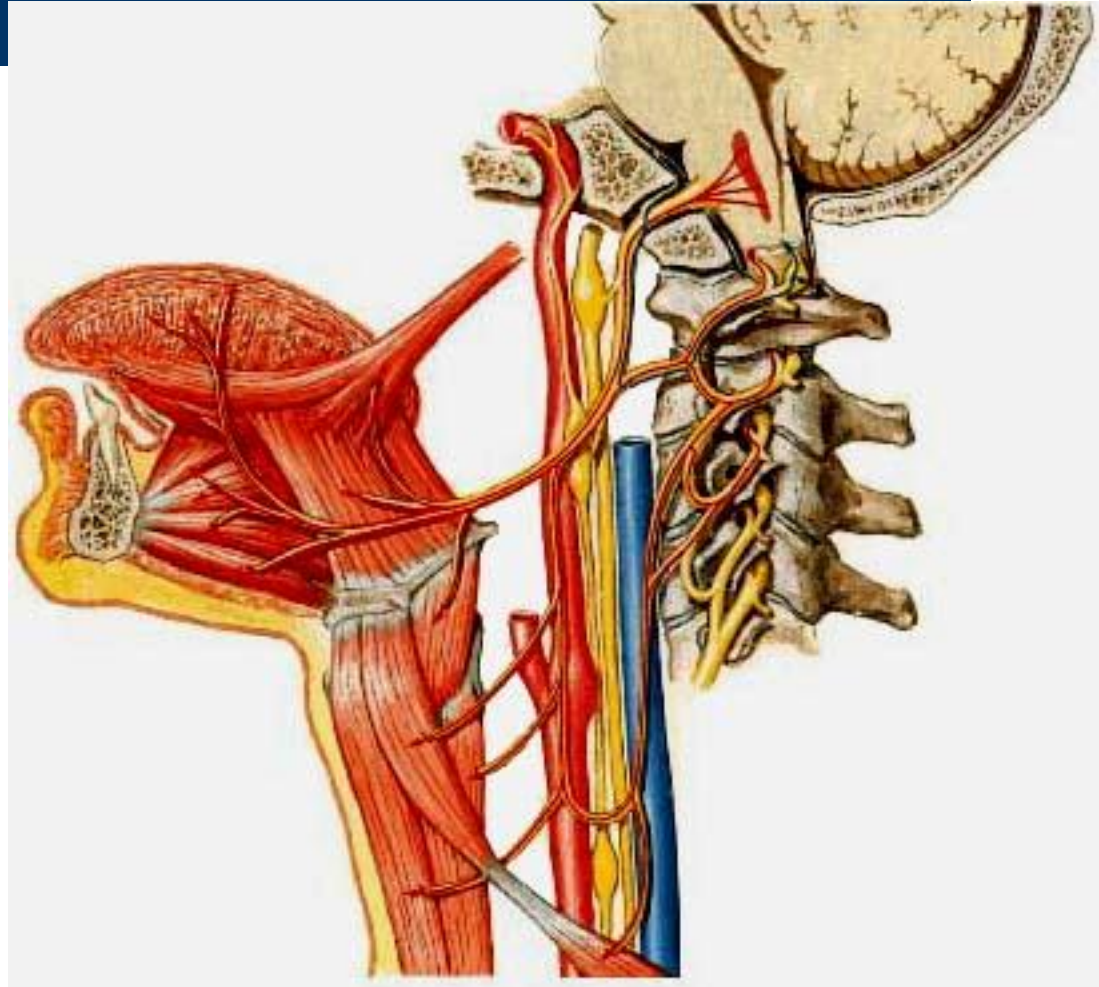
**Jugular
Foramen**

CN IX - Glossopharyngeal Nerve

- **Function**
- **Structure**
- **Dysfunction**
- **History**
- **Physical examination**
- **Motor to muscle; Parasympathetic to glands; Sensory to palate**
- **Jugular foramen**
- **Difficulties swallowing, excessive gag reflex**
- **Trauma to occiput &/or temporals**
- **Test gag reflex**
- **Evaluation of temporals, occiput, occipitomastoid suture**

CN XII - Hypoglossal Nerve

Hypoglossal canal



CN XII - Hypoglossal Nerve

- **Function**
- **Structure**
- **Dysfunction**
- **History**
- **Physical examination**
- **Motor to Tongue**
- **Hypoglossal canal**
- **Dysphagia, tongue function (latch-suckle)**
- **Occipital condyle trauma; intraosseous strain**
- **Test tongue motions**
- **Test neonatal suck**
- **Evaluate occiput (condyles), top cervicals**

Case Report

- *JAOA 2011 report of twins born at 25 weeks with poor transition from gavage feeds to nipple feeds complicated by GERD*
- *After receiving almost daily OMT from DOL 102-DOL 122 both twins were taking all feedings by nipple and avoided earlier plans for surgical placement of gastrostomy tube*
- *Specific OMT used was not based on predetermined protocol, but on independent exam*

Case Report

- Feeding changes were independent of OMM service input and relied solely on neonatology and daily nursing notes
- Twin A improved from 7.9% total feeding volume by nipple prior to OMT to 100% after
- Twin B improved from 38.7% before to 100% after OMT
- No complications were reported with OMT

Osteopathic Considerations in Nipple Feeding Dysfunction

- Stabilization of hyoid bone position and surrounding muscles to level tongue
- Consider entrapment of the hypoglossal nerve in the hypoglossal canal
- Possible comorbid respiratory disease affecting the ability to coordinate breathing with feeds
- Somatic dysfunction of the muscles used for respiration

Occipital Release Technique for Newborns and Infants

- Support the patient's body by cradling it with your forearm
- Support the head and palpate for motion with the ipsilateral hand
- Support the sacrum and palpate for motion with 2 or 3 fingers of the contralateral hand
- Grasp the cranium with fingers evenly splayed "as firmly as you would a ripe tomato so as not to leave impressions"
- Feel subtle release of muscles

Innervation Table

Organ/System	Parasympathetic	Sympathetic	Ant. Chapman's	Post. Chapman's
EENT	Cr Nerves (III, VII, IX, X)	T1-T4	T1-4, 2nd ICS	Suboccipital
Heart	Vagus (CN X)	T1-T4	T1-4 on L, T2-3	T3 sp process
Respiratory	Vagus (CN X)	T2-T7	3rd & 4th ICS	T3-5 sp process
Esophagus	Vagus (CN X)	T2-T8	---	---
Foregut	Vagus (CN X)	T5-T9 (Greater Splanchnic)	---	---
Stomach	Vagus (CN X)	T5-T9 (Greater Splanchnic)	5 th -6 th ICS on L	T6-7 on L
Liver	Vagus (CN X)	T5-T9 (Greater Splanchnic)	Rib 5 on R	T5-6
Gallbladder	Vagus (CN X)	T5-T9 (Greater Splanchnic)	Rib 6 on R	T6
Spleen	Vagus (CN X)	T5-T9 (Greater Splanchnic)	Rib 7 on L	T7
Pancreas	Vagus (CN X)	T5-T9 (Greater Splanchnic), T9-T12 (Lesser Splanchnic)	Rib 7 on R	T7
Midgut	Vagus (CN X)	Thoracic Splanchnics (Lesser)	---	---
Small Intestine	Vagus (CN X)	T9-T11 (Lesser Splanchnic)	Ribs 9-11	T8-10
Appendix		T12	Tip of 12 th Rib	T11-12 on R
Hindgut	Pelvic Splanchnics (S2-4)	Lumbar (Least) Splanchnics	---	---
Ascending Colon	Vagus (CN X)	T9-T11 (Lesser Splanchnic)	R Femur @ hip	T10-11
Transverse Colon	Vagus (CN X)	T9-T11 (Lesser Splanchnic)	Near Knees	---
Descending Colon	Pelvic Splanchnic (S2-4)	Least Splanchnic	L Femur @ hip	T12-L2
Colon & Rectum	Pelvic Splanchnics (S2-4)	T8-L2	---	---

Question 1

1. Dysfunction of which of the following nerves will cause difficulties in swallowing and an excessive gag reflex:
 - A. CN VII
 - B. CN XI
 - C. CN XII
 - D. CN IX
 - E. CN VI

Question 2

2. Dysfunction of which of the following nerves will cause dysphagia, poor tongue function (latch-suckle):
- A. CN XI
 - B. CN XII
 - C. CN V
 - D. CN VI
 - E. CN VII

Question 3

3. A newborn has been diagnosed with torticollis affecting the right SCM. Which of the following is an expected finding on exam?
 - A. External rotation of left temporal
 - B. External rotation of the sphenoid
 - C. Head rotated left, sidebent right
 - D. Head rotated right, sidebent right
 - E. Smaller left palpebral width

Question 4

4. A premature newborn is having difficulty transitioning to nipple feeds. OMT directed at which of the following areas would help stabilize the tongue and improve swallowing?
- A. Cranial nerve XI
 - B. Hyoid bone
 - C. Temporal bones
 - D. T2-3
 - E. Sacrum

Question 5

5. Which of the following is one of the anatomic differences found in a newborn as compared to an adult?
- A. Hard cranial vault to protect brain during delivery
 - B. Immature reflex arcs in spinal cord
 - C. Large oral cavity to accommodate nipple feeds
 - D. More vertical cranial base to allow bottle feeds
 - E. Smaller tongue to provide better latch

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