METHODS OF UNDERSTANDING THE TOPIC OF ANATOMY TO STUDENTS AND THE LATEST INFORMATION

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Annotation: The calvaria, the uppermost part of the skull, protects the cerebral cortex, cerebellum, and orbital contents. It is composed of the frontal bone, parietal bones, temporal bones, and occipital bone. The coronal suture is the transverse mid-anterior junction of the frontal bone and the two parietal bones. The parietal bones articulate with the temporal bones inferiorly via the squamosal sutures and the occipital bone posteriorly via the lambdoid suture. The sagittal suture lies along an anterior-posterior axis and is the articulation of the two parietal bones.

Key words: head, mouth, cerebrum.

The pterion is the articulation of the frontal, parietal, temporal, and sphenoid bones just superior to the pinna. The asterion is the articulation of the parietal, temporal, and occipital bones. Finally, the skull base allows the passage of various neurovascular structures. It is composed of the sphenoid and ethmoid bones (which have their associated air sinuses) and parts of the frontal, temporal, and occipital bones.

Anteriorly, the frontal bone forms the superior aspect of the orbits. The glabella is a key midline landmark of the frontal bone. It lies superior to the nasion and between the superciliary ridges. The frontal sinuses lie deep to the brow ridges. The bregma is the junction of the coronal and sagittal sutures, and lambda is the junction of the lambdoid and sagittal sutures. The temporal bones subdivide into petrous, squamous, zygomatic, and mastoid parts. The petrous portion houses the inner ear. The mastoid is a bony prominence that lies posterior to the auricle and has an associated sinus. The occipital bone is the most posterior aspect of the skull.

Intracranial Fossae

There are three cranial fossae with various structural landmarks. The anterior cranial fossa forms from the frontal bone, the sphenoid bone, and the ethmoid bone. The middle cranial fossa forms from the sphenoid bone and two temporal bones. Finally, the posterior cranial fossa forms from the occipital bone and two temporal bones. The critical anatomic landmarks of each fossa are listed below.

- Anterior Cranial Fossa (contains frontal lobe of the brain)
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        - Cribriform plate
- Middle Cranial Fossa (contains temporal lobe of the brain)
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        - Optic canal

  - Superior orbital fissure
  - Foramen spinosum
  - Foramen rotundum
  - Foramen ovale
- Posterior Cranial Fossa (contains the cerebellum)
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  - Internal auditory meatus
  - Jugular foramen
  - Foramen magnum
  - Hypoglossal canal

Facial Bones

There are 14 facial bones with specific anatomical landmarks and embryologic development mechanisms. These include the two nasal conchae, two nasal bones, two maxilla bones, two palatine bones, two lacrimal bones, two zygomatic bones, the mandible, and the vomer. The maxillae have associated air sinuses. The temporomandibular joint (TMJ) is a significant landmark for effective mastication, and its dysfunction is common in adults.

Embryologically, the skull derives from ectodermal neural crest and mesoderm. The frontal, ethmoid, and sphenoid bones derive from the neural crest, while the parietal and occipital bones originate from the mesoderm. The temporal bones derive from both the mesoderm and neural crest. The skull develops alongside the rapid growth of the nervous system in the embryonic phase of development (weeks 1 to 8). Ossification and structural molding begin in the fetal phase (week seven onward).

Early Development

Mesoderm begins to form in the third week of gestation after early mesenchymal cells have migrated through the primitive streak. These cells then proliferate in a longitudinal fashion adjacent to the notochord (paraxial mesoderm) and eventually divide into various early connective tissue populations, including the sclerotome and myotome. The sclerotome develops into the mesodermal portions of the skull (parietal bones, occipital bone, and petrous portion of the temporal bone).

Neural crest cells form the rest of the neurocranium: the frontal bone, ethmoid bone, sphenoid bone, and squamous portion of the temporal bone, as well as the entirety of the viscerocranium. Five significant pharyngeal arches form in humans, starting rostral to caudal around days 19 to 21 of gestation. These arches form muscles, cartilaginous and osseous structures, nerves, blood vessels, and various organs of the head and neck. Each arch has components of ectoderm, mesoderm, endoderm, and neural crest. Some of the neural crest components form parts of the viscerocranium previously discussed, including the mandible, maxilla, incus, and malleus (arch 1) and stapes and styloid process of the temporal bone (arch 2).

Several genes play an important role in forming the cranium, including the Dickkopf family, matrix metallopeptidase 9, Indian hedgehog, Sonic hedgehog (Shh), Fibroblast Growth Factor 3, and the family of collagen genes (i.e., COL1A1).

Fetal Development and Ossification

There are two mechanisms by which bones develop and ossify: intramembranous ossification and endochondral ossification. Intramembranous ossification is the direct formation of early bone from undifferentiated mesenchyme without a template, and endochondral ossification utilizes cartilage as a precursor formed by chondrocytes for bone maturation.

The bones of the cranial vault (including the parietal, frontal, occipital, and squamous temporal bones) and viscerocranium (including the maxilla, mandible, and other flat bones of the face) undergo intramembranous ossification. The skull base (including the sphenoid and ethmoid bones) forms via endochondral ossification. Mesenchymal maturation does not occur until after the formation of the neurovasculature, allowing for the development of the foramina. This process is especially important in the skull base, where nerves and blood vessels exit the cranium.

Branchial Arch Derivatives

- First Branchial Arch - the mandibular nerve of trigeminal nerve (CN V3)
- Second Branchial arch - the facial nerve (CN VII)
- Third Branchial Arch - the glossopharyngeal nerve (CN IX)
- Fourth Branchial Arch - the vagus nerve (CN X)
- Sixth Branchial Arch - the superior and recurrent laryngeal nerve branches of the vagus nerve (CN X)

Most of the blood supply to the skull and its associated structures comes from the common carotid arteries (anterior circulation) and vertebral arteries (posterior circulation).

The common carotid artery bifurcates into the internal and external carotid arteries. The external carotid artery is the main blood supply to the skull bones and meninges. It travels up the side of the neck; eight main branches feed the superficial structures of the skull and face. The maxillary artery is the most prominent and clinically relevant of these branches. The middle meningeal artery is a branch of the maxillary artery, and injury secondary to blunt force trauma to the lateral skull at the pterion can lead to epidural hematoma. The internal carotid artery has no branches in the neck and enters the base of the skull, supplying intracranial structures. The internal carotid and vertebral arteries combine to form a large anastomosis called the circle of Willis. The anterior communicating artery, two anterior cerebral arteries, two middle cerebral arteries, two posterior communicating arteries, two posterior cerebral arteries, and basilar artery (superior continuation of the vertebral arteries) all contribute to this anastomosis.

The dural venous sinuses (i.e., superior sagittal, straight, and transverse sinuses) and superficial and deep veins of the head (i.e., cerebral veins, great vein of Galen, cerebellar, and facial veins) drain into the internal and external jugular veins bilaterally and ultimately to the superior vena cava and right atrium of the heart.

The brain and central nervous system have been traditionally thought not to contain lymphatic vessels. However, some believe that the cerebrospinal fluid (CSF) does have some connection with the lymphatic system and drains through the cervical lymph nodes. The recent discovery of a “glymphatic system,” composed of a network of CSF, cerebral interstitial fluid, and meningeal vasculature, has shed more light on this debate and is an area of ongoing research.

References:

1. Abdukodirova, S., Muradova, R., & Mamarizaev, I. (2024). PECULIARITIES OF USING POLYOXIDONIUM DRUG IN CHILDREN WITH CHRONIC OBSTRUCTIVE BRONCHITIS. Science and innovation, 3(D5), 213-219.
2. Xoliyorova, S., Tilyabov, M., & Pardayev, U. (2024). EXPLAINING THE BASIC CONCEPTS OF CHEMISTRY TO 7TH GRADE STUDENTS IN GENERAL SCHOOLS BASED ON STEAM. Modern Science and Research, 3(2), 362-365.
3. Шарипов, Р. Х., Расулова, Н. А., & Бурханова, Д. С. (2022). ЛЕЧЕНИЕ БРОНХООБСТРУКТИВНОГО СИНДРОМА У ДЕТЕЙ. ЖУРНАЛ ГЕПАТО-ГАСТРОЭНТЕРОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ, (SI-3).
4. Xayrullo o'g, P. U. B., & Rajabboyovna, K. X. (2024). Incorporating Real-World Applications into Chemistry Curriculum: Enhancing Relevance and Student Engagement. FAN VA TA'LIM INTEGRATSIYASI (INTEGRATION OF SCIENCE AND EDUCATION), 1(3), 44-49.
5. Xayrullo o'g, P. U. B., Jasur o‘g‘li, X. H., & Umurzokovich, T. M. (2024). The importance of improving chemistry education based on the STEAM approach. FAN VA TA'LIM INTEGRATSIYASI (INTEGRATION OF SCIENCE AND EDUCATION), 1(3), 56-62.
6. Xayrullo o'g, P. U. B., & Umurzokovich, T. M. (2024). Inquiry-Based Learning in Chemistry Education: Exploring its Effectiveness and Implementation Strategies. FAN VA TA'LIM INTEGRATSIYASI (INTEGRATION OF SCIENCE AND EDUCATION), 1(3), 74-79.