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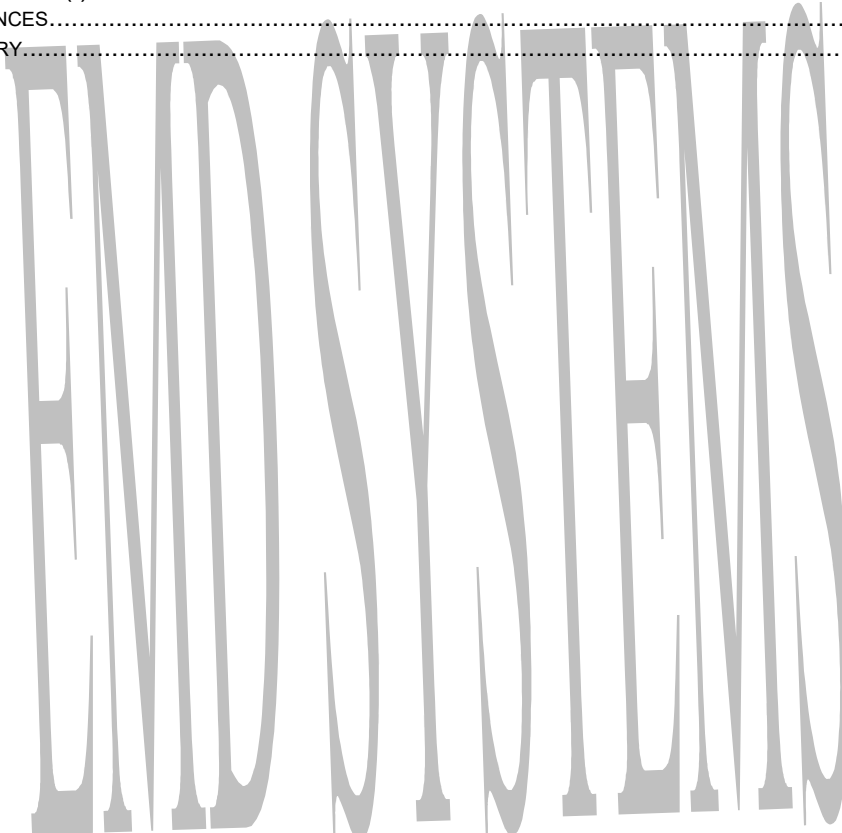
[Document Related To]

Amendment sheet

| Version No. | Release Date | Modified by Date | Reviewed by Date | Authorized by Date | Remarks |
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| 1.0 | | Resource DD/MM/YY | | | Initial Version |

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1. SKULL

1.1. Overview

The skull is the bony framework of your head. It gives shape to your head and face. It also holds and protects your brain, and other facial features such as the eyes, nose and ears. The skull is not just one single bone structure. It is made up of eight cranial bones and fourteen facial bones.

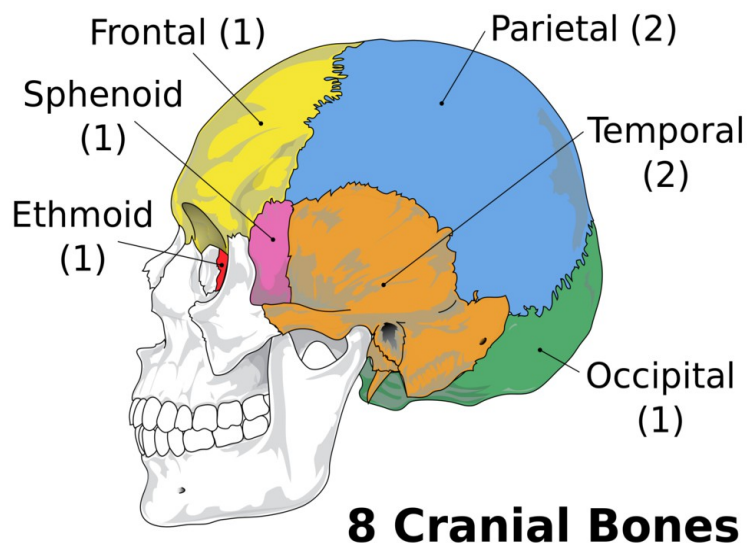
The skull can be divided into two main parts: the cranium and the mandible. The cranium is the largest part of the skull enclosing the brain, eyes, ears and nose. The mandible is the lower jaw, also known as the jaw bone.

1.2. Functions

A human adult skull is made of 22 bones: 8 cranial bones and 14 facial bones. Except for the mandible, where the bones meet are ragged edges called sutures. When you are born, these skull bones are only loosely held together allowing them to move. This allows the head to compress during birth, and then to expand as the baby grows. After about 12 to 18 months these bones fuse together forming the hard, protective skull.

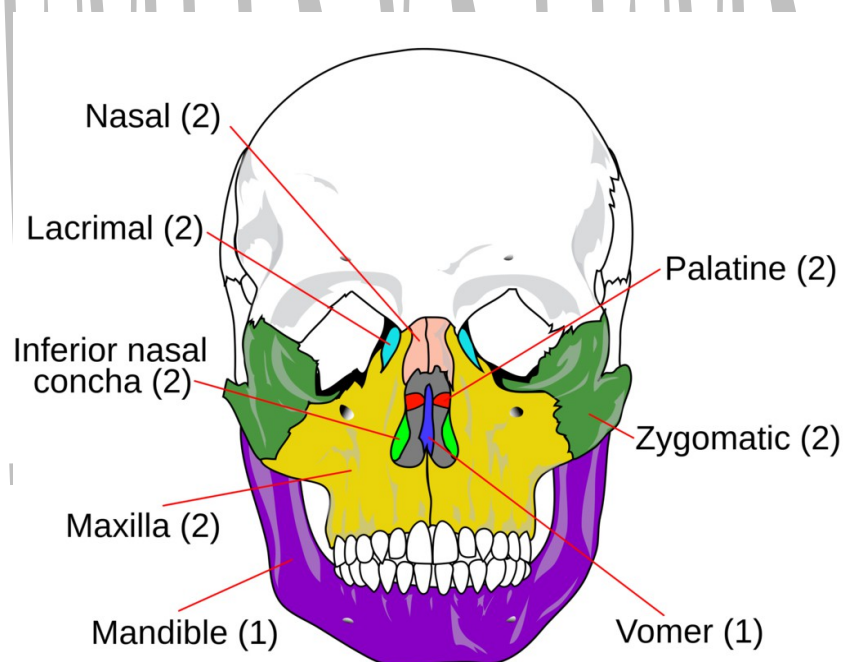
1. cranial bones

- ➔ The eight bones forming the cranium include one frontal bone, two parietal bones, one occipital bone, one sphenoid bone, two temporal bones and one ethmoid bone.



2. facial bones

- The main facial bones include the two nasal bone, two inferior nasal conchae, two lacrimal bones, two palatine bones, two zygomatic bone, one vomer bone, two maxilla and one mandible.
- The skull contains openings for the eyes, ears, nose and mouth. These holes not only provide protect, but in the case of the eyes, provide a socket for rotation
- The maxilla is the fusion of two bones and forms the upper jaw. The maxilla attaches to the zygomatic or cheek bones. The maxilla holds the upper teeth. The mandible is also known as the lower jaw. It holds the lower teeth. The mandible is connected to the upper part of the skull by two jaw joints. These jaw joints allow you to open and close your mouth.
- The skull connects to the first cervical vertebra or atlas on the upper end of the cervical spine. A series of muscles and ligaments attached to and surround the atlas. This allows for the normal up, down and rotational head movement.



14 Facial Bones

1.3. Major Diseases and Symptoms

| S. No | Disease | Symptoms |
|-------|--|--|
| 1 | Benign or malignant tumors - <i>Benign tumors</i> can often be removed, and, in most cases, they do not come back. Cells in benign tumours do not spread to other parts of the body. <i>Malignant tumors</i> are cancerous and are made up of cells that grow out of control. Cells in these tumours can invade nearby tissues and spread to other parts of the body | 1.pain or pressure on nerves or blood vessels, chills,discomfort 2.the tumors can grow quite large before they are felt |
| 2. | Vascular processes (aneurysm, arterial venous malformation, cavernous malformation)-(for more detail see Glossary) | 1.Pain,Swelling occurs when the VM fills with blood, and the blood remains in the abnormal veins. 2.headache or pain behind or above the eye, which can be mild or severe 3.blurred or double vision 4.dizziness 5.visual deficits 6.seizures |
| 3 | Congenital disorders (chiari malformation, basilar invagination)(for more detail see Glossary) | 1.Ringing or buzzing in the ears (tinnitus) 2.Weakness 3.Slow heart rhythm 4.Curvature of the spine (scoliosis) related to spinal cord impairment 5.Abnormal breathing |

1.4. Radiology Examinations

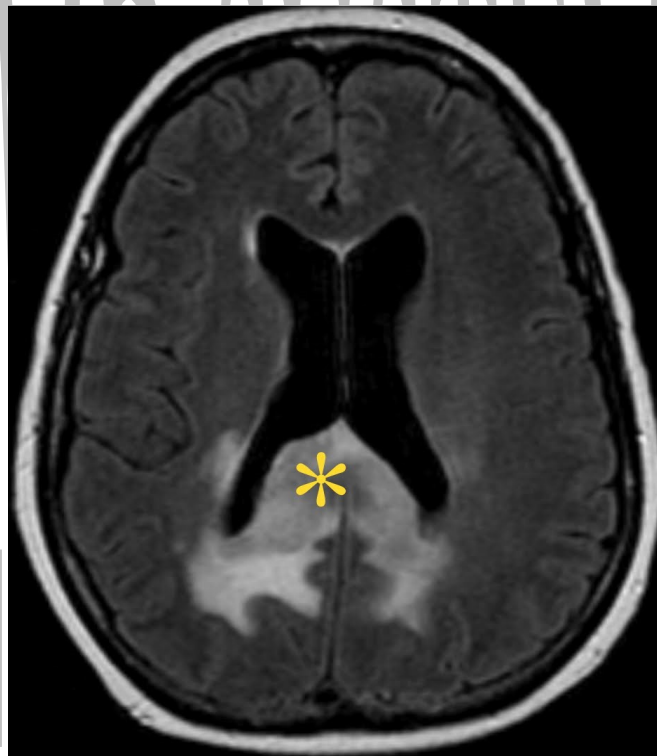
1.4.1 Applicable Radiology Examinations

| Radiology Examination Name | Is Applicable (Yes/No) |
|----------------------------|------------------------|
| CT (Computed Tomography) | yes |
| BD (Bone Densitometry) | No |
| MG (Mammography) | No |
| MR (Magnetic Resonance) | yes |
| NM (Nuclear Medicine) | yes |
| RT (RadioTherapy) | No |
| US (Ultrasound) | yes |
| CR (Computed Radiography) | yes |
| DX (Digital Radiography) | No |
| PT (Positron Tomography) | yes |

| | |
|------------------------|----|
| RF (Radio Fluoroscopy) | No |
| SC (Secondary Capture) | No |
| XA (X-Ray Angiography) | No |

1.4.2 MRI ()

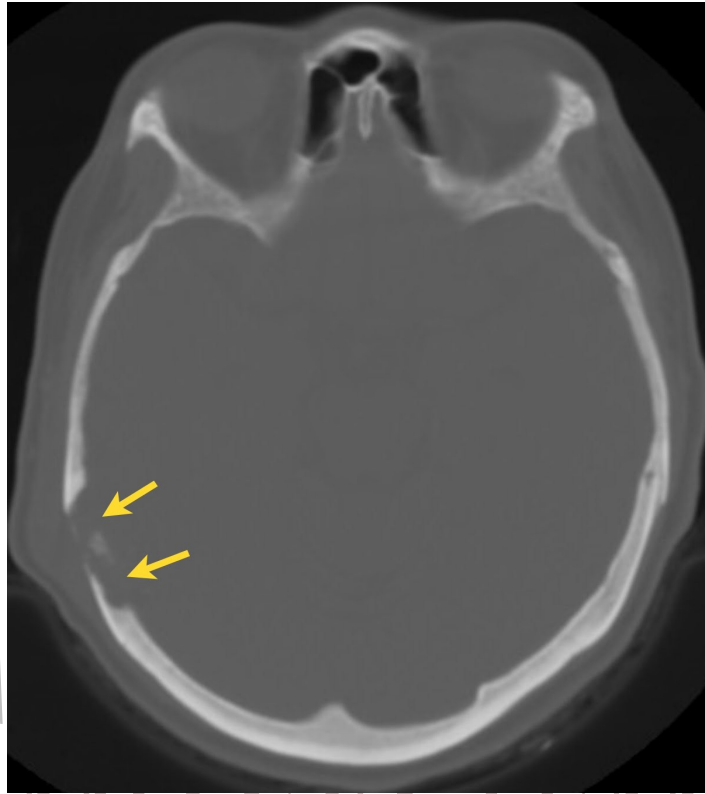
The gray matter of the brain consists of the cortex that lines the external surface of the brain and the gray nuclei deep inside of the brain, including the thalami and basal ganglia. Within the gray matter lie the cell bodies of the roughly 85 billion neurons that constitute the processing engine for the brain. White matter is comprised of the neuronal axons that interconnect different regions of the brain and serve as the interface between the brain and the rest of the body. Different diseases affect the gray and white matter in distinct patterns



MRI in a patient with a brain tumor (*) that crosses the midline of the brain to involve both hemispheres

1.4.3 CT ()

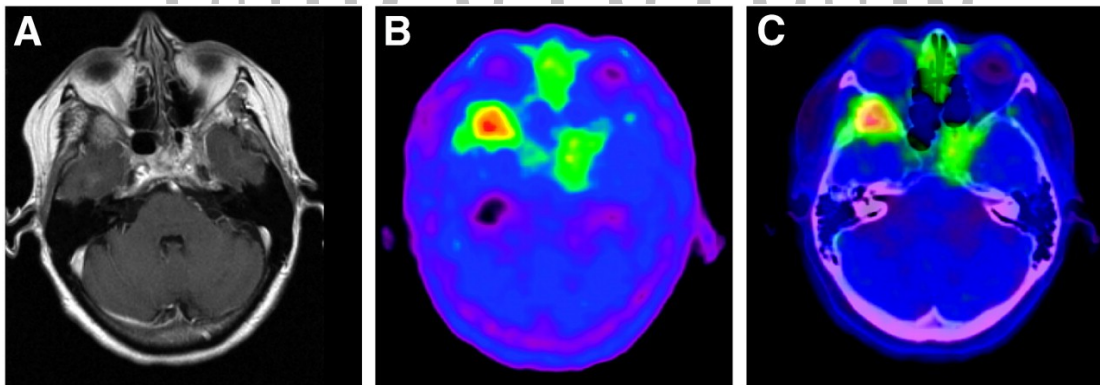
The bones that surround the brain, including the calvarium, facial skeleton and skull base, are collectively referred to as the skull. These structures provide protection for the brain and a rigid frame to support the functions of the face. Because cortical bones contain very little water, they are evaluated reliably only with CT. The marrow within these bones, however, can be seen on MRI images. Bones can be the primary source of disease, or they can be secondarily involved by different infections and tumors.



CT in a patient with kidney cancer. The yellow arrows point to a tumor in the right skull bone from a metastasis.

1.4.4 PET/CT ()

(A) Gadolinium-enhanced T1-weighted MR image showing right retroorbital and left cavernous sinus meningioma of patient 1. (B) ^{18}F -TYR PET image showing high uptake in both tumor locations. (C) Fused PET/CT image.



1.5. References

| S. No | URL |
|-------|---|
| 1 | https://www.boundless.com/physiology/textbooks/boundless-anatomy-and-physiology-textbook/skeletal-system-parts-of-the-skeleton-7/the-skull-79/general-features-and-functions-of-the-skull-458-5063/ |
| 2 | http://www.kidport.com/RefLib/science/HumanBody/SkeletalSystem/Skull.htm |
| 3 | http://my.clevelandclinic.org/services/orthopaedics-rheumatology/diseases-conditions/malignant-soft-tissue-tumors |
| 4 | http://www.healthline.com/health/benign |
| 5 | http://www.baylorhealth.com/PhysiciansLocations/AllSaints/SpecialtiesServices/Neuroscience/AllSaintsSkullBase/Pages/SkullBaseDisease.aspx |
| 6 | http://www.healthline.com/health/aneurysm-in-the-brain#Overview1 |
| 7 | https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4078224/ |
| 8 | http://health-fts.blogspot.in/2012/01/brain-ct-mri.html |

1.6. Glossary

| S.no | Terms | Description |
|------|------------------------------|---|
| 1 | viscerocranium | The skeleton that supports facial structure. |
| 2 | sutures | A fairly rigid joint between bones of the neurocranium |
| 3 | neurocranium | The protective vault surrounding the brain and brain stem. |
| 4 | Vascular Diseases | any condition that affects the blood vessels along the route between the heart and lungs. |
| 5 | congenital disorder | A congenital disorder is a medical condition that is present at or before birth. These conditions, also referred to as birth defects, can be acquired during the fetal stage of development or from the genetic make up of the parents. |
| 6 | aneurysm | A brain (cerebral) aneurysm is a bulging, weak area in the wall of an artery that supplies blood to the brain. |
| 7 | arterial venous malformation | An AVM is a tangle of abnormal and poorly formed blood vessels (arteries and veins). |
| 8 | cavernous malformation | Cerebra cavernous malformations are collections of small blood vessels (capillaries) in the brain that are enlarged and irregular in structure) |
| 9 | chiari malformation | Chiari malformation is a condition in which brain tissue extends into your spinal canal |
| 10 | basilar invagination | Basilar invagination is invagination (infolding) of the base of the skull that occurs when the top of the C2 vertebra migrates upward. |