Anatomy

Head and Neck

Imaging Overview
Before You Begin

This module, intended for *pre-clinical medical students*, is part of the core anatomy teaching series. There should be no prerequisite knowledge necessary for medical students to successfully review and understand this module.

Many of the additional module series in our website build off a strong understanding of human anatomy as it presents in imaging. Please refer back to these anatomy modules if you ever need to review.

If material is repeated from another module, it will be outlined as this text is so that you are aware
Introduction

• The Head and Neck includes:
  • Skull and Cranial Cavity
  • Face and Scalp
  • Eyes and Orbits
  • Ears
  • Nasal Cavity and Pterygopalatine Fossa
  • Oral Cavity and Pharynx
  • Larynx
  • Neck

• In this module, we will explore basic H&N anatomy identifiable with common imaging modalities
Plain Film Radiographs
Head and Neck Radiographs

- Utilize ionizing radiation to capture images
- Material density determines the degree of X-ray attenuation, and thus, appearance:
  - Gas (Air)
  - Fat
  - Soft Tissue (Water)
  - Bone
  - Metal
Basic Osteology Overview
Skull Base
Osteology
Crista galli
Lesser wing
Greater wing
Mastoid
Sag. suture
Frontal sinus
Ethmoid air cells
Inf. Turbinate
Dens
Mandible
N = nasal
V = vomer
M = mandible
S = sphenoid
P = parietal
T = temporal

Frontal sinus
Maxilla
Frontal bone
Z
Sphenoid sinus

Maxillary sinuses
Greater wing
Maxillary sinus
Lesser wing
Frontal process of zygo. bone
Zygomatic arch
L. Mastoid
Computed Tomography (CT)
H&N CT

- Utilizes ionizing radiation to produce cross-sectional images
- Digital “windowing” can highlight specific tissues
- Note the patient orientation shown to the left
Muscles of the Head
Muscles of the Neck

- m. mylohyoideus
- mandibula
- m. digastricus
- os hyoideum
- m. scalenus medius
- m. scalenus anterior
- m. omohyoides (venter inferior)
- m. omohyoides (venter superior)
- m. sternocleidomastoideus
- processus mastoideus
- clavícula
- m. trapezius
First Cervical Vertebrae – Atlas

Anterior tubercle

Outline of section of odontoid process

Outline of section of transverse atlantal ligament

Transverse process

Super. Artic. Surface

Anter. Arch

Lateral mass

Foramen transversarium

Groove for vertebral artery and first cervical nerve

Posterior tubercle

Poster. Arch
Second Cervical Vertebrae - Axis

- Dens
- For alar ligaments
- For trans. ligament of atlas
- Superior articular surface
- Body
- Foramen transversarium
- Spinous process
Seventh Cervical Vertebrae
Use airway, apices of lung, and scapula to estimate level on body.
Follow Vessels of neck superiorly in axial CT: CCA, IJV, Vert. art; then follow SCM, then trapezius.
Vertebral level:___
Post. Belly of Digastric m.

Dens

L. Masseter

L. Parotid gland

L. Medial pterygoid

SCM

Splenius
L. Medial pterygoid
L. Masseter
L. Parotid gland
L. Medial pterygoid
Post. Belly of Digastric m.
Splenius
Coronoid process

Pterygoid fovea

L. Temporalis

L. Masseter

L. Lateral pterygoid
Coronoid process

Foramen ovale

TMJ

L. Temporalis

L. Masseter

L. Mastoid Air Cells
Optic nerve
Medial and lateral check ligaments
Lateral rectus
Optic nerve
Temporalis
Utilize the spine, TMJ, bones of the face, and clavicles to assess depth of coronal image.
Lateral pterygoid

Medial pterygoid

Nasopharynx
Inf. Orb.
fissure

Ethmoidal air
cells

Mid. Turbinate

Inf. Turbinate
Superior rectus

Lateral rectus

Inferior rectus

Medial rectus

Optic nerve

L. Temporalis

L. Masseter
Magnetic Resonance Imaging (MRI)
MRI

• Utilizes powerful magnetic fields and radio-frequency pulses to excite (usually hydrogen) atoms within tissues
  • The energy released by atoms as they return to baseline can be captured to produce an image
  • By varying parameters such as pulse frequency, image qualities can be modulated (i.e. T1 vs T2 weighted)

• MRI can highlight structures that may not be apparent in CT imaging
  • MRIs are particularly apt when imaging soft tissues

• As they do not rely on X-rays, MRI studies do not expose patients to radiation
MRI – Axial Series
Cochlea

Semi-circular canals

Vestibule

Vestibulocochlear and Facial nerves

Semi-circular canals
MRA and Angiography
Vasculature of the Neck
Arteries of the Face
Straight sinus
Transverse sinus
Sigmoid sinus
IJV
Superior sagittal sinus
Great cerebral vein
Straight sinus
Trans. sinus
Sigmoid sinus
IJV's
END