Case Studies in the Skull Base

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No disclosures related to this presentation

DDx Based on Anatomy
Anterior Skull Base

• Common:
  • Meningioma
  • Sinonasal Mucocele
  • Fibrous Dysplasia
  • Sinonasal Osteoma
  • Metastasis
  • Esthesioneuroblastoma

DDx Based on Anatomy
Central Skull Base

• Common:
  • Fibrous Dysplasia
  • Meningioma
  • Multiple Myeloma
  • Metastasis
  • NHL
  • Pituitary Macroadenoma
  • Arachnoid Granulation

DDx Based on Anatomy
Anterior Skull Base

• Uncommon:
  • Squamous Cell Ca
  • NHL
  • SNUC
  • Melanoma
  • Nerve Sheath Tumor

DDx Based on Anatomy
Anterior Skull Base

• Rare:
  • Cephalocele
  • Hemangiopericytoma
  • Nasal Dermal Sinus
**DDx Based on Anatomy**

**Central Skull Base**

- Uncommon:
  - Chordoma
  - Chondrosarcoma
  - Paget Disease
  - Langerhans Histiocytosis

**Central Skull Base**

- Rare:
  - Cephalocele
  - Ecchordosis Physaliphora
  - Aneurysm

**Posterior Skull Base**

- Common:
  - Meningioma
  - Metastasis
  - Jugular Foramen Mass
    - Paraganglioma
    - Schwannoma
    - Meningioma
  - Arachnoid Granulation

**Posterior Skull Base**

- Uncommon:
  - Dural Sinus Thrombosis
  - Chordoma
  - Dural A-V Fistula

**Posterior Skull Base**

- Rare:
  - Chondrosarcoma
  - Plasmacytoma
  - Giant Cell Tumor

**Case 1**

Axial T1 Post

Axial T2

Coronal T2
Case 1

**DDx**

- Paget Disease
- Ossifying Fibroma
- Osteosarcoma
- Skull Base Metastasis
- Fibrous Dysplasia
- Benign Fatty Skull Base Lesion

**Fibrous Dysplasia**

- Congenital disorder with defect in osteoblastic differentiation
- Classic “ground glass” appearance in expansile bone lesion
- Three presentations:
  - Monostotic (70%)
  - Polyostotic (25%)
  - McCune-Albright (5%)

**DDx: Paget Disease**

**DDx: Benign Fatty Skull Base Lesion**

- Often concerning or confusing appearance on MRI
- Typically low T1/T2 signal in ossified +/- fibrous portions
- Variable enhancement depending on lesion pattern
- Fibrous portions can have avid enhancement.
**Case 1**

**DDx: Benign Fatty Skull Base Lesion**

![Axial T1](image1) ![Axial T1 Post FS](image2)

**Case 1**

**DDx: Metastatic atypical pleomorphic adenocarcinoma of right submandibular gland**

![Axial CT](image3) ![Axial T1 Pre](image4) ![Axial T1 Post](image5)

**Case 1**

**DDx: Intraosseous Meningioma**

![Axial CT](image6) ![Axial T1 Post FS](image7)

**Case 2**

**Esthesioneuroblastoma**

- Malignant neuroectodermal tumor arising from olfactory mucosa in superior nasal cavity
- Peripheral tumor cysts at intracranial tumor-brain margin is highly suggestive
- Bimodal distribution, 2nd and 6th decades
- Classic dumbbell-shaped mass with "waist" at the cribriform plate

**DDx: Anterior Skull Base Lesions WithBone Destruction**

- Sinonasal Squamous Cell Carcinoma
- Fungal Sinusitis
- Sarcoïdosis
- Osteosarcoma
- Non-Hodgkin Lymphoma
- Sinonasal Melanoma
- Langerhans Histiocytosis
- Skull Base Metastasis
- Meningioma
- Sinonasal Undifferentiated Carcinoma

**Case 2**

**DDx: Anterior Skull Base Lesions With Bone Destruction**

- Esthesioneuroblastoma
- Malignant neuroectodermal tumor arising from olfactory mucosa in superior nasal cavity
- Peripheral tumor cysts at intracranial tumor-brain margin is highly suggestive
- Bimodal distribution, 2nd and 6th decades
- Classic dumbbell-shaped mass with "waist" at the cribriform plate

**Case 2**

**DDx: Anterior Skull Base Lesions With Bone Destruction**

- Esthesioneuroblastoma
Case 2

DDx: Melanoma

Axial CT
Coronal CT

Case 2

DDx: Melanoma

Coronal T1 Post FS
Axial T2

Case 2

DDx: Fungal Sinusitis

Axial CT
Axial T2
Axial T1 Post FS
Coronal CT
Coronal T2
Coronal T1 Post FS

Case 2

DDx: Sinonasal Atypical Neuroendocrine

Coronal T2
Coronal T1 Post FS
Axial T1 Pre

Case 2

DDx: Meningioma

Sagittal T1 Pre
Axial T2
Coronal T1 Post

Case 2

DDx: JNA

Axial CT
Coronal T1 Pre
Coronal T1 Post FS
Case 3

Sagittal T2  Axial T1 Post FS

Case 3

Axial CT

Case 3

DDx: Intrinsic Central Skull Base Lesion

- Chordoma
- Chondrosarcoma
- Myeloma
- Ecchordosis Physaliphora
- Lymphoma
- Skull base metastatic disease

Case 3

Ecchordosis Physaliphora

- BENIGN hamartomatous lesion derived from notochord remnant.
- Pre-pontine cistern, dorsal to clivus
- Connected to osseous stalk or pedicle
- Well marginated SCLEROTIC rim
- T2 Bright, NO enhancement (in almost all cases)
- < 1 cm, follow Q1 year; > 1 cm, consider biopsy

Case 3

DDx: Chordoma

- Main DDx:
  - Chordoma
  - Skull Base Mets
  - Dermoid/Epidermoid
  - Arachnoid Cyst
- Imaging Pearls
  - ID of stalk arising from clivus
  - Can be IDENTICAL to CHORDOMA
Case 3
DDx: Lymphoma
Axial T2  Axial T1 Post

Case 3
DDx: Lymphoma
Axial ADC  Axial DWI

Case 3
DDx: Multiple Myeloma
Axial CT  Axial CT/PET

Case 3
DDx: Multiple Myeloma
Axial T2  Axial T1 Pre  Axial T1 Post FS

Case 3
DDx: Nasopharyngeal Mucosal Cyst
Sagittal  Axial T2  Axial T1 Post

Case 3
DDx: Fossa Navicularis
Sag CT  Axial T2
**Case 3**

- Intraosseous Chordoma
- Echordosis physaliphora
- Intradural Chordoma
- Tornwaldt Cyst
- Extraosseous Chordoma
- Fossa Navicularis
- Canalis Basilaris Medianus

**Case 4**

- DDx: Invasive Central Skull Base Lesion
  - Meningioma
  - Perineural Tumor Spread
  - Osteomyelitis
  - Nasopharyngeal Carcinoma (Posterior Spread)
  - Invasive Pituitary Macroadenoma ( Inferior Spread)
  - Chondrosarcoma
  - Osteosarcoma

**Invasive Pituitary Macroadenomas**

- Benign, invasive pituitary adenoma
- Variable Enhancement
- Dural tail may mimic meningioma
- Generally > 5cm
- Sella expanded or inferior cortex destroyed

**Imaging Pearls:**

- Does this arise from the pituitary?
- Look for contiguous soft tissue into the sella

**Companion Case:**

Pituitary Macroadenoma with Apoplexy
Case 4
DDx: Skull Base Osteomyelitis

Case 5
DDx: Jugular Foramen Lesions
- Schwannoma
- Meningioma
- Mets
- Pseudolesion
- Dehiscent Jugular Bulb
- Paraganglioma
Case 5

Glomus Jugulare Paraganglioma

- Neural crest cell origin
- Permeative-Destructive osseous change
- > 2cm, often see “salt and pepper”
- Main vascular supply = ascending pharyngeal
- Presents with Objective Pulsatile Tinnitus

Imaging Pearls

- Use Bone CT to distinguish between jugular lesions.
- Prominent flow void = PEPPER
- Vector of spread = SUPEROLATERAL
- Permeative Bone Destruction

DDx: Meningioma

Axial CT Post
Axial T1 Post FS

Coronal CT Post
Coronal T1 Post FS

DDx: Schwannoma

Coronal T2
Coronal T1 Pre
Coronal T1 Post FS

Axial CT Post
Axial T1 Post FS
Summary

- Often a long DDx
- Much of the pathology overlaps regions
- Intrinsic vs. Invasive lesions
- MRI and CT complement each other
  - Enhanced MRI: Soft tissue characterization
  - Non-enhanced CT: Bony margin delineation