

Skull Base Inflammation

Skull base inflammation (SBI) is due to either infection or non-infectious inflammatory etiologies that can have serious complications if not diagnosed and treated early. Clinical presentation can often be misleading, particularly for skull base osteomyelitis (SBO), where patients are often afebrile with normal or near-normal laboratory results. There is considerable overlap of the imaging findings between SB infection, inflammation, and malignancy including bony erosion and soft tissue prominence/mass which contribute to the diagnostic challenge of these pathologies. **High clinical suspicion with early biopsy are essential in the work up and management of these patients.**

In this exhibit, we aim to highlight the following teaching points regarding skull base inflammation:

LATERAL SBO:

- Temporal bone infection (otitis externa, mastoiditis) that progresses to skull base osteomyelitis.
- The overwhelming majority of patients have diabetes mellitus; thought to be related to:
 - Alkaline cerumen which results in loss of the anti-bacterial function of cerumen
 - Microangiopathy and hypoperfusion of bone
- **SBO patients are often afebrile with normal WBC and variable ESR and CRP. There must be high suspicion for aggressive infections in diabetic patients presenting with symptoms of lateral SB infection.**

CENTRAL ("ATYPICAL") SBO:

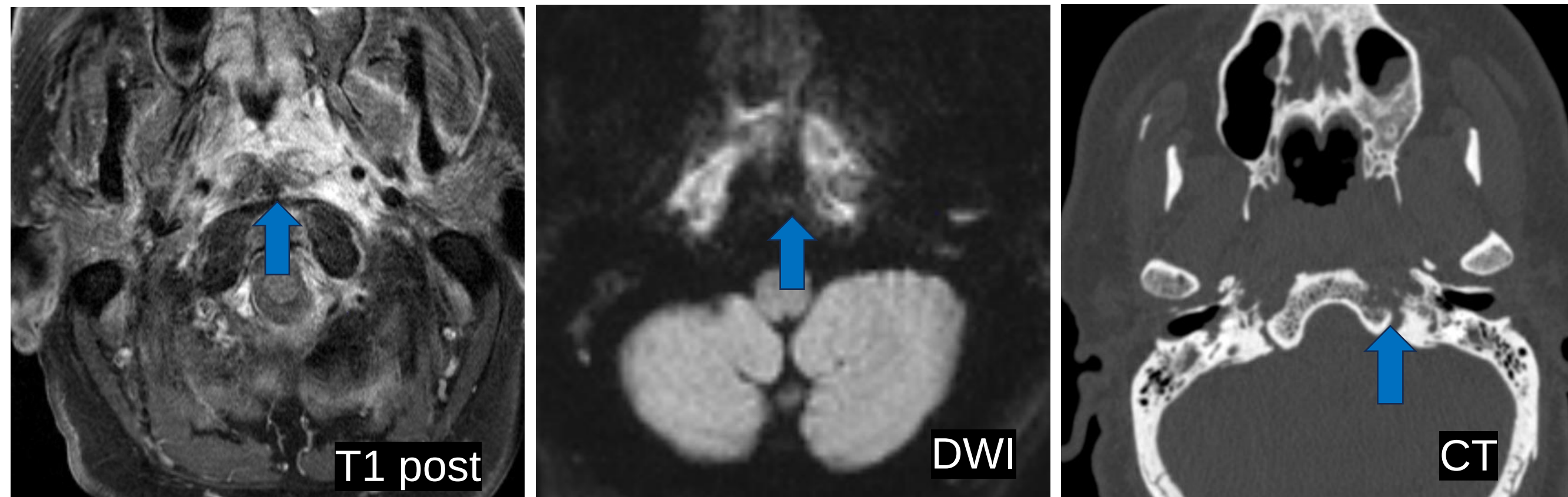
- Less common. Infection usually begins in the sinonasal cavity, oro/nasopharynx or oral cavity before spreading to the skull base.
 - **Diabetes is still a significant risk factor, but patients with a history of radiation therapy for head and neck cancers are also at risk.**

MALIGNANCY:

- Although not an inflammatory process, included here because of the overlapping imaging and clinical findings.
- **Malignancy must be ruled out.**
- The 3 most common malignancies of the nasopharynx are nasopharyngeal carcinoma, lymphoma, and minor salivary gland tumors.

Central Skull Base Osteomyelitis

75-year-old male with a history of diabetes with worsening headache, neck pain, right-sided hearing loss, and nasal congestion for two months.

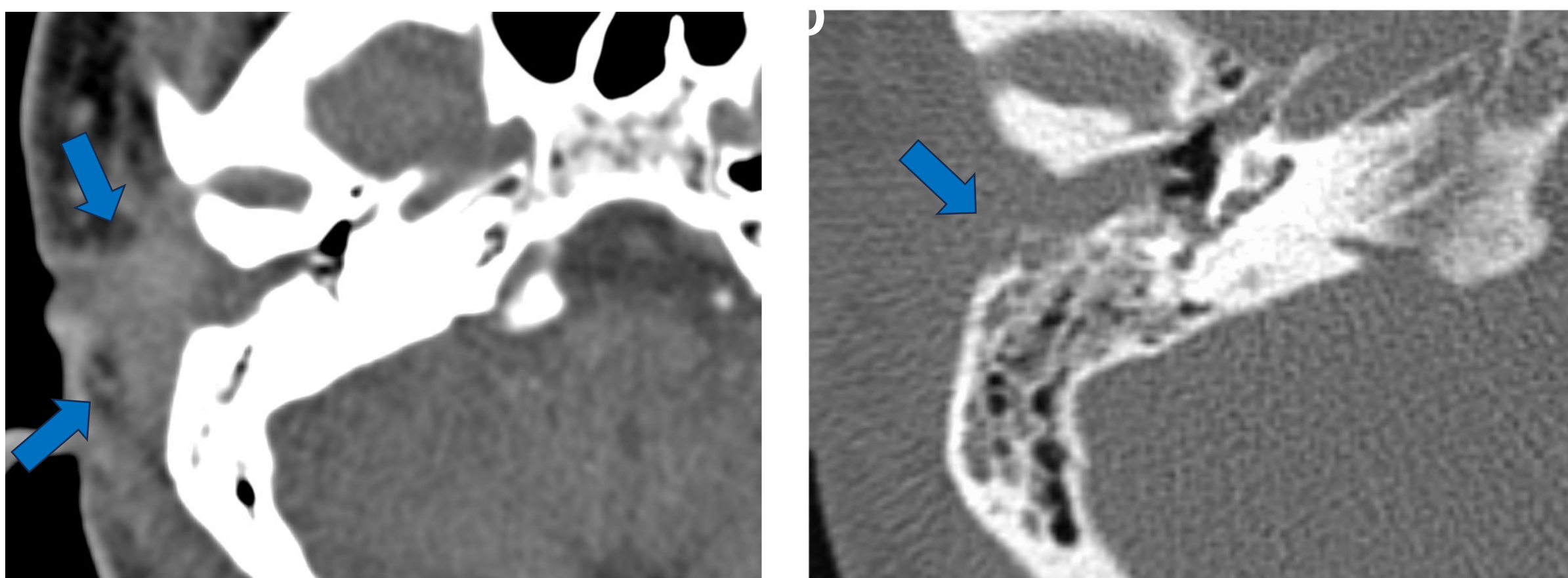


- Soft tissue thickening and enhancement in the nasopharynx and retropharyngeal space, with abscess formation just below the skull base
- Associated restricted diffusion
- Bony erosions along the left inferior clivus

- **Pathology** - Benign squamous mucosa with aggregates of acute and chronic inflammatory changes.
- The patient was started on empiric antibiotics on admission, thus initial cultures were negative. Continued broad spectrum IV antibiotics with improvement.
- Central "Atypical" SBO often mimics nasopharyngeal carcinoma on imaging. Findings suggestive of SBO includes abscess formation and involvement of the lateral structures.
- Cranial nerve deficits should prompt suspicion of malignancy, which must be ruled out. Early biopsy is essential!

Lateral Skull Base Osteomyelitis

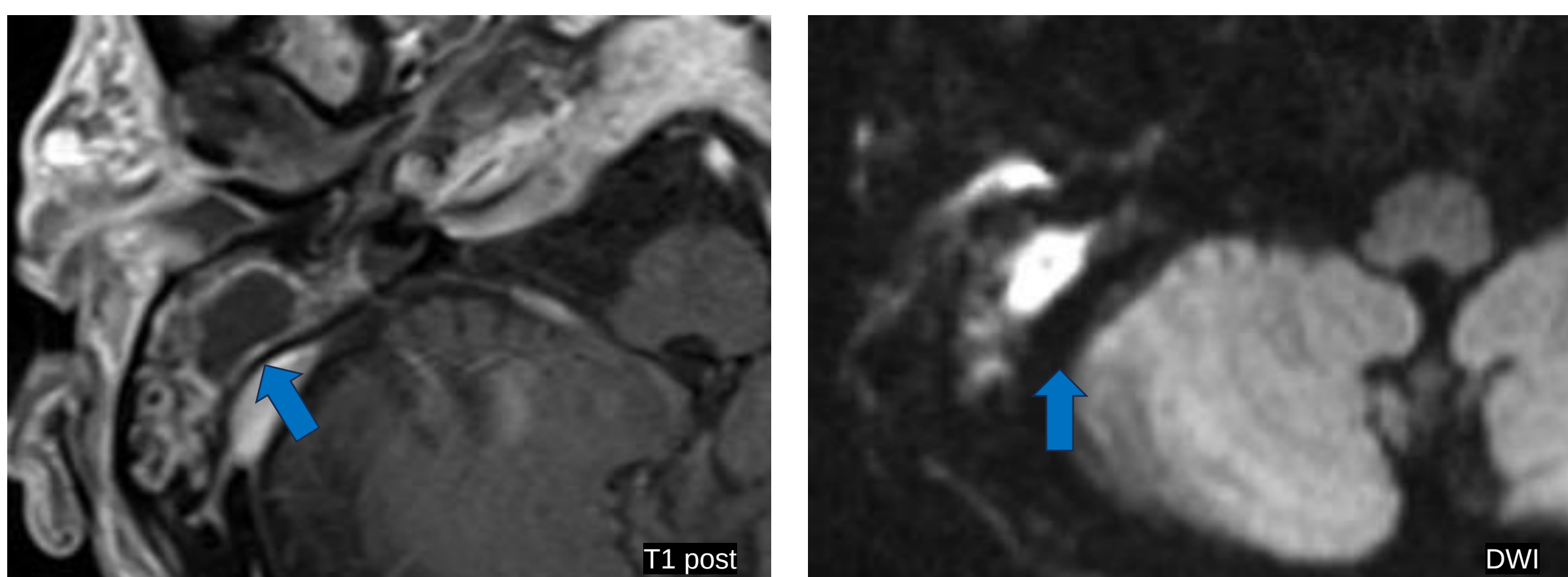
67-year-old male with DM and chronic right otitis media presents with right otorrhea



- Extensive soft tissue thickening and inflammation of the right external auditory canal and surrounding soft tissues
- Subtle erosion of the lateral cortex of mastoid
 - **Cortical erosion occurs earlier than trabecular erosion**

Unfortunately, the cortical erosion was not appreciated, and the patient was discharged with the diagnosis of otitis externa and mastoiditis and treated with oral antibiotics

Patient returns to ER 3 weeks later with worsening ear pain and headaches



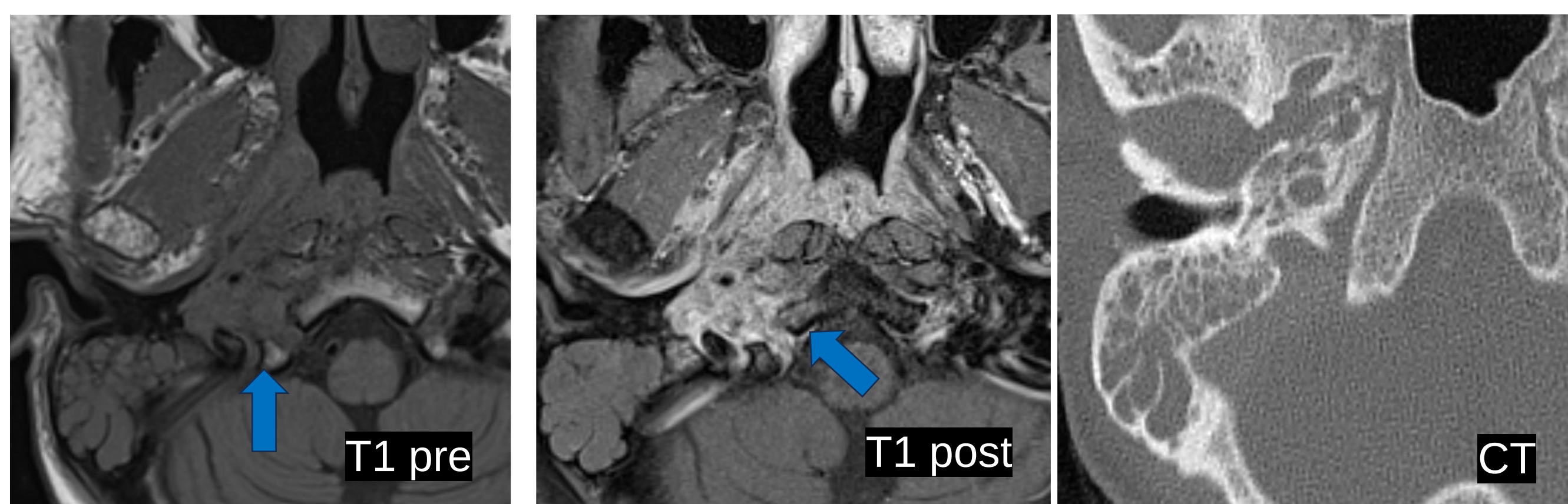
- Diffuse opacification and enhancement of the right mastoid and middle ear
- Restricted diffusion due to abscess formation
- Loss of bony trabeculae

Teaching points

- High suspicion necessary for aggressive infection in all diabetic patients
- Must scrutinize **cortical margin** for areas of osseous erosion
- Fever and elevated WBC may not be present
- LSBO requires hospital admission and IV antibiotics

Skull Base Inflammation - Pseudotumor

62-year-old patient with a history of sarcoidosis, hoarseness and right facial pain.

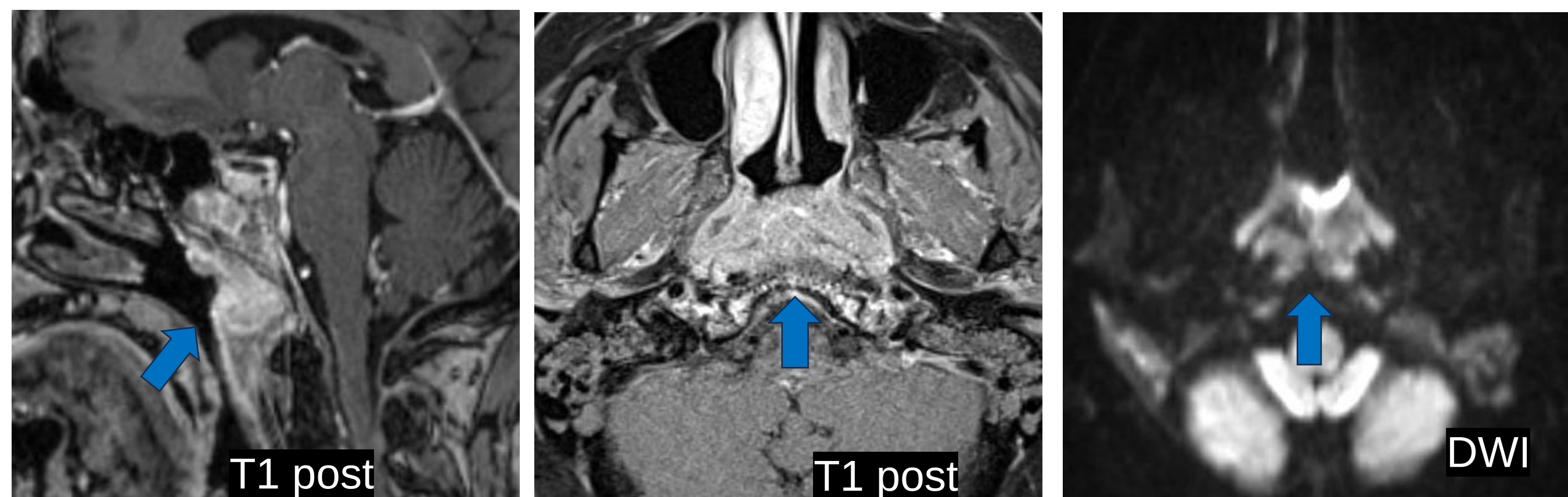


- Scattered areas of skull base pseudotumor characterized by soft tissue thickening and enhancement
- No bony destruction

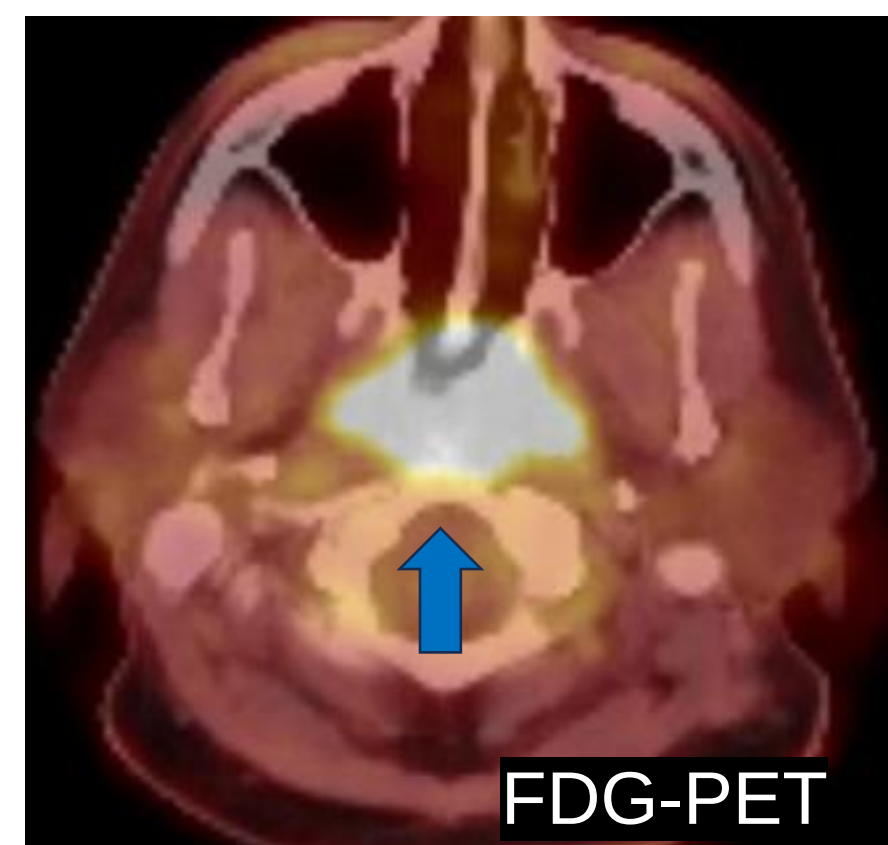
- **Pathology** - acute on chronic inflammation
- Extensive unremarkable workup with multi-institutional collaboration
- Patient ultimately improved on steroids
- Imaging findings of skull base pseudotumor are often nonspecific
- Diagnosis of exclusion, often requiring multiple biopsies

Nasopharyngeal Carcinoma

77-year-old patient with throat fullness



- Irregular enhancing soft tissue mass centered on the nasopharynx
- Restricted diffusion reflecting hypercellularity
- Associated increased FDG activity



Contact

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References

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2. Chapman PR, Choudhary G, Singhal A. Skull Base Osteomyelitis: A Comprehensive Imaging Review. AJNR Am J Neuroradiol. 2021 Mar;42(3):404-413. doi: 10.3174/ajnr.A7015. Epub 2021 Jan 21. PMID: 33478944; PMCID: PMC7959418.
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