

AMSER Case of the Month

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Adolescent with eye pain and forehead swelling

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Patient Presentation

- **HPI:** Adolescent male who had recent antibiotic treatment for strep throat presented with eye pain and forehead swelling for 10 days. The patient denied changes in visual acuity, diplopia, fever, chills, and sweats.
- **Past Medical History:** Recurrent sinusitis, otitis media, and strep throat
- **Medications:** Inhaled fluticasone PRN, amoxicillin 2 weeks ago
- **Vital Signs:** 100.1F, pulse 95, BP 134/75mmHg
- **Physical Exam:** Right eyelid and forehead swelling w/o drainage, reduced visual field which improved with raising the eyelid, rhinorrhea

Pertinent Labs

- **WBC:** 15 K/uL [normal 4.5-11 K/uL]
- **CRP:** 11 mg/dL [normal < 0.5mg/dL]
- **Microculture of abscess:** normal, non-specific oral flora
- **Molecular testing:** Positive for Group A strep

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

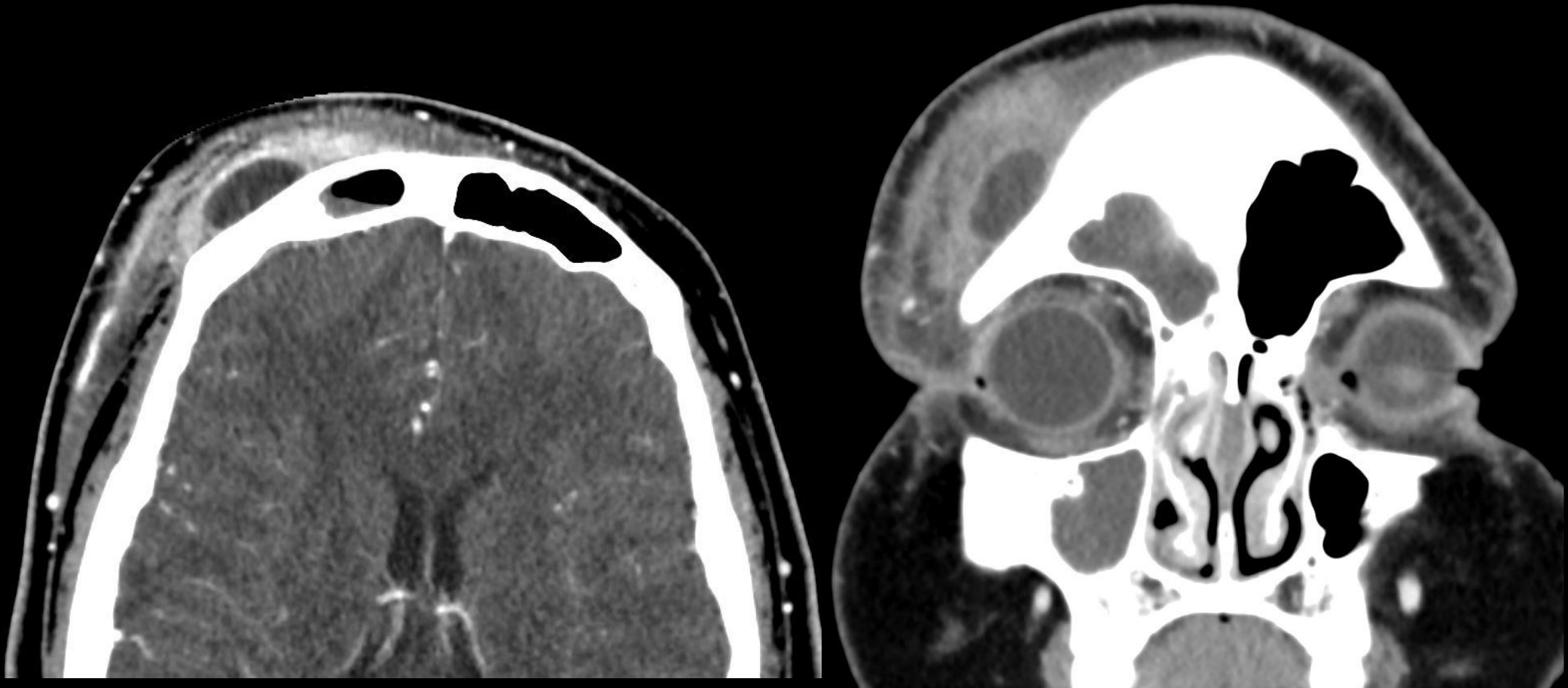
Variant 2: Acute rhinosinusitis with suspected orbital or intracranial complication. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
MRI head without and with IV contrast	Usually Appropriate	○
MRI orbits face neck without and with IV contrast	Usually Appropriate	○
CT maxillofacial with IV contrast	Usually Appropriate	☼☼
MRI head without IV contrast	May Be Appropriate	○
MRI orbits face neck without IV contrast	May Be Appropriate (Disagreement)	○
CT maxillofacial without IV contrast	May Be Appropriate (Disagreement)	☼☼
CT head with IV contrast	May Be Appropriate	☼☼☼
Radiography paranasal sinuses	Usually Not Appropriate	☼
Arteriography craniofacial	Usually Not Appropriate	☼☼☼
MRA head with IV contrast	Usually Not Appropriate	○
MRA head without and with IV contrast	Usually Not Appropriate	○



This imaging modality was ordered by the primary physician

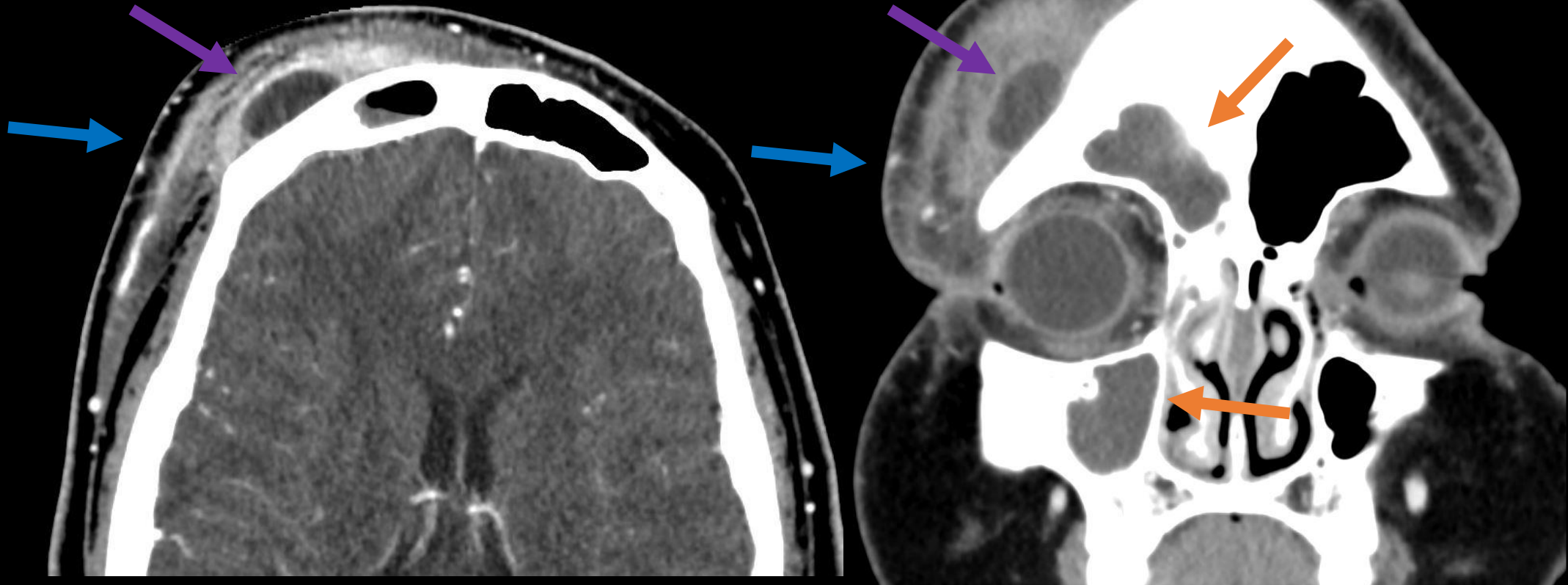
Findings: Unlabeled



Findings: Labeled

Induration and swelling of the frontal scalp and periorbital soft tissues with rim enhancing subgaleal fluid collection adjacent to the right frontal sinus.

Mucosal thickening and fluid in the sinus cavities.

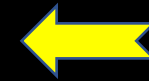


Should Further Imaging Be Pursued?

Select the applicable ACR Appropriateness Criteria

Variant 2: Acute rhinosinusitis with suspected orbital or intracranial complication. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
MRI head without and with IV contrast	Usually Appropriate	○
MRI orbits face neck without and with IV contrast	Usually Appropriate	○
CT maxillofacial with IV contrast	Usually Appropriate	☼☼
MRI head without IV contrast	May Be Appropriate	○
MRI orbits face neck without IV contrast	May Be Appropriate (Disagreement)	○
CT maxillofacial without IV contrast	May Be Appropriate (Disagreement)	☼☼
CT head with IV contrast	May Be Appropriate	☼☼☼☼
Radiography paranasal sinuses	Usually Not Appropriate	☼
Arteriography craniofacial	Usually Not Appropriate	☼☼☼☼
MRA head with IV contrast	Usually Not Appropriate	○
MRA head without and with IV contrast	Usually Not Appropriate	○

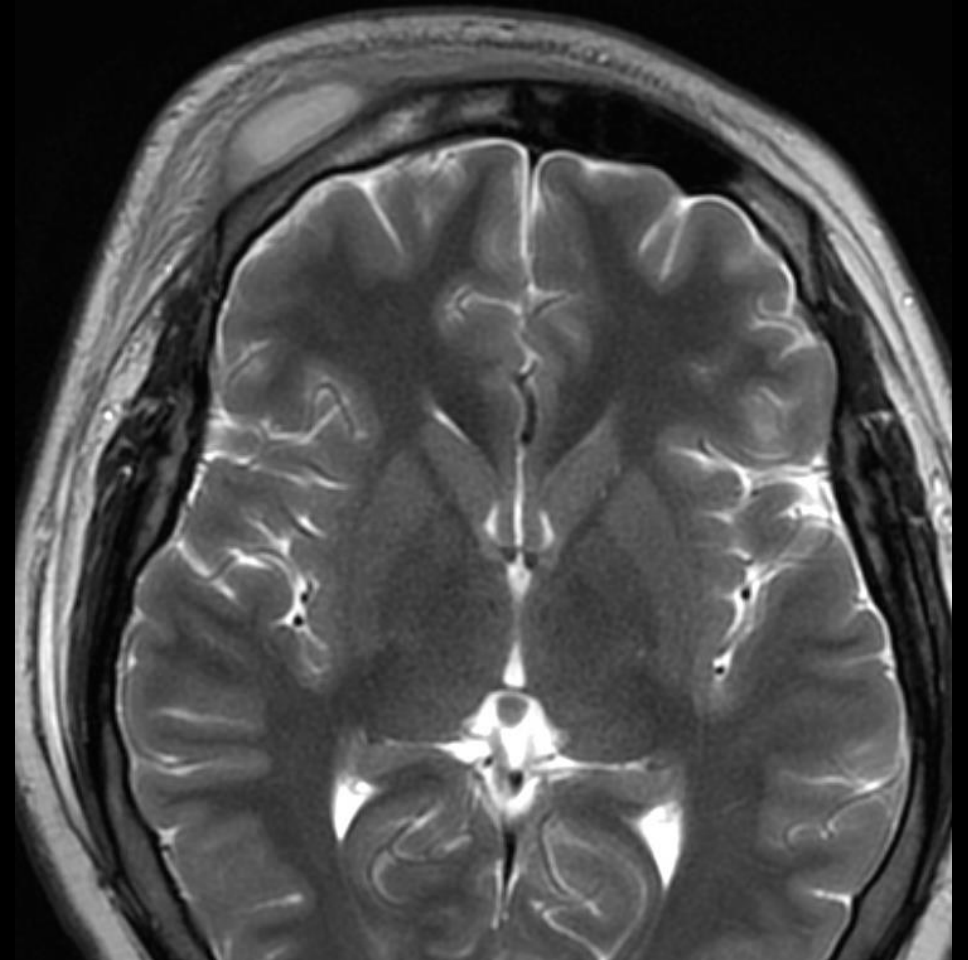


This imaging modality was ordered by the ENT physician

MRI Findings (unlabeled)

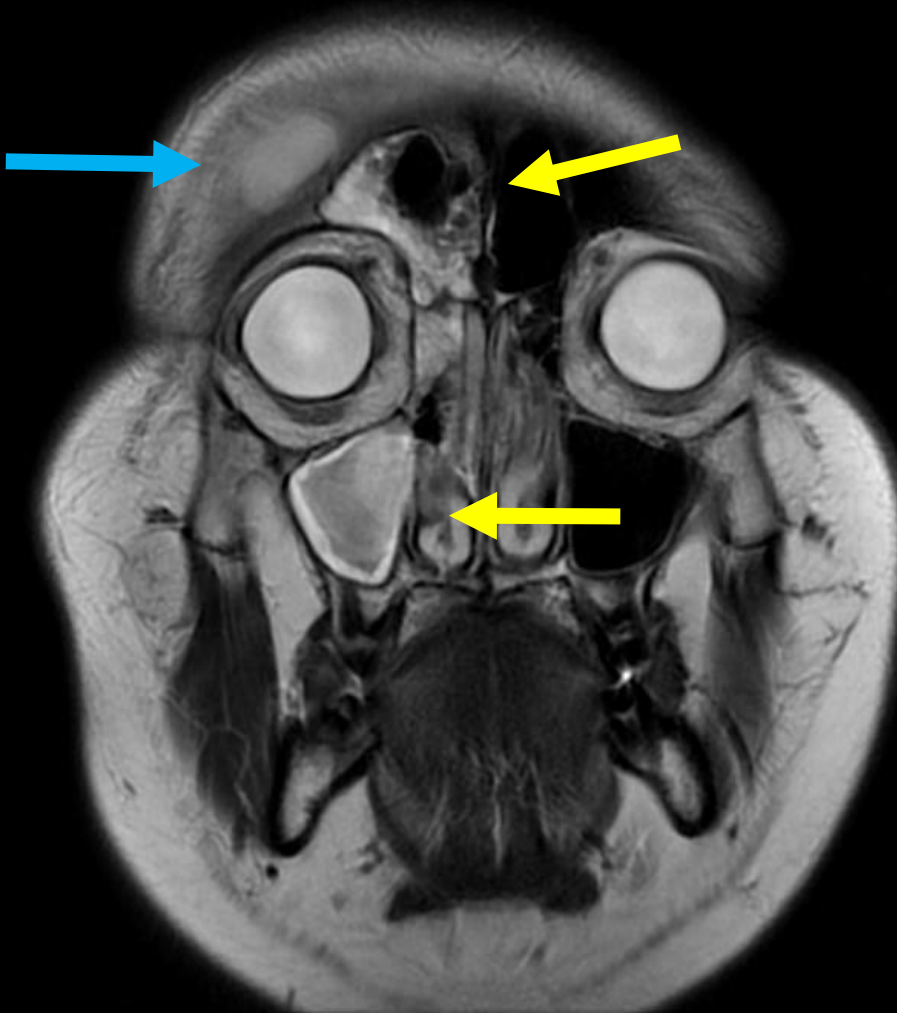


Cor T2



Axial T2

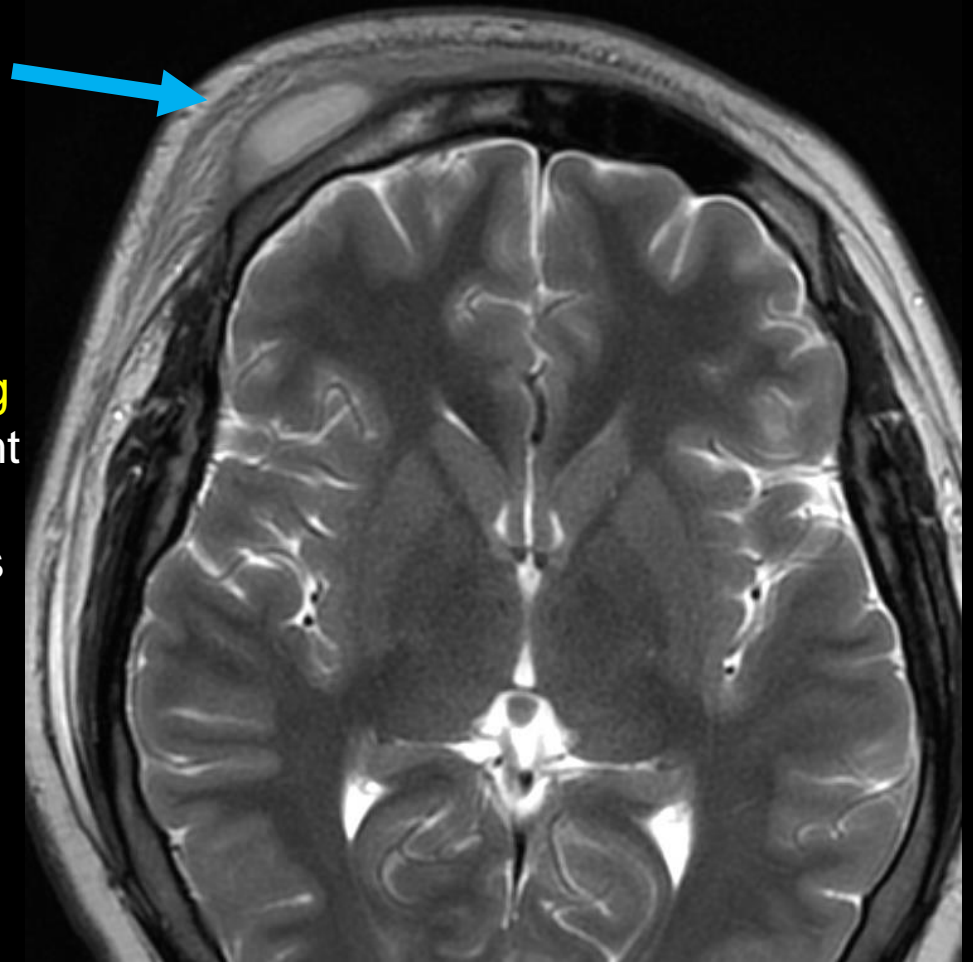
MRI Findings (labeled)



Cor T2

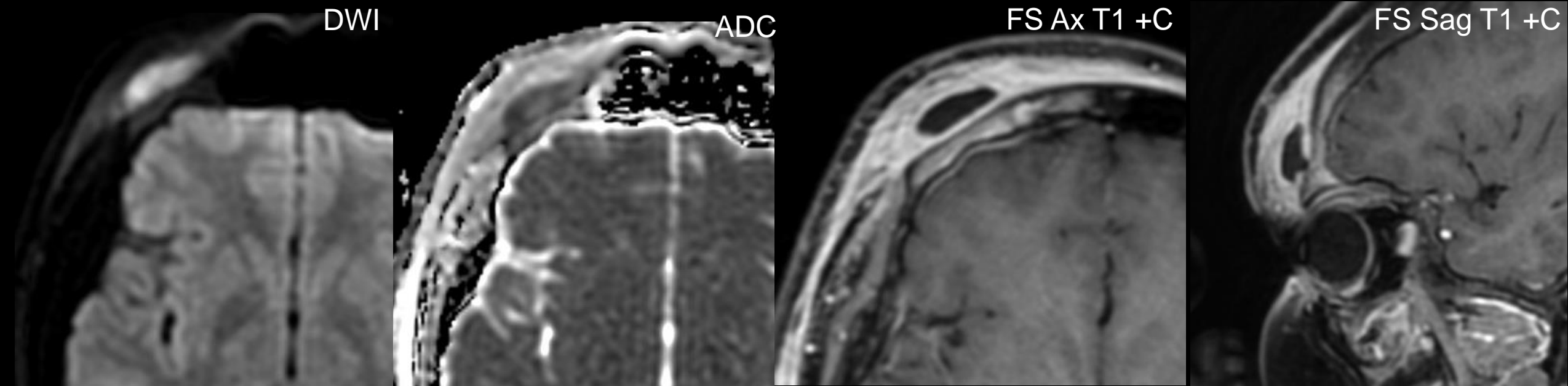
Loculated fluid collection in the right supraorbital scalp.

Mucosal thickening and fluid in the right maxillary, ethmoid, and frontal sinuses (ostioameatal unit pattern).

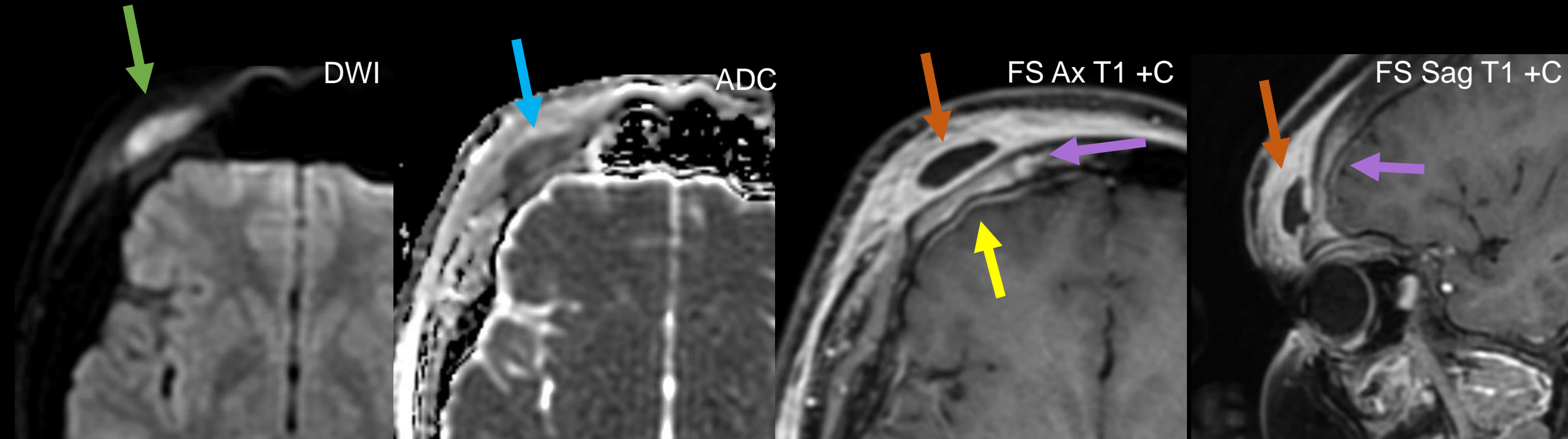


Axial T2

MRI Findings (unlabeled)



MRI Findings (labeled)



Loculated fluid collection in the frontal scalp has central diffusion restriction (high DWI signal and low ADC values) and peripheral enhancement consistent with abscess and cellulitis. There is also enhancement of the adjacent frontal bone and subtle reactive dural enhancement consistent with osteomyelitis.

Final Dx:

Pott's Puffy Tumor: frontal sinusitis with frontal bone osteomyelitis and subperiosteal abscess

Case Discussion

- **Patient outcome:**

- Patient was started on IV ampicillin-sulbactam and underwent endoscopic sinus surgery of the right maxillary, ethmoid, and frontal sinuses with ENT. The frontal scalp abscess was also aspirated.
- Antibiotics were ultimately transitioned to oral metronidazole and IV ceftriaxone for 4 weeks of treatment with ultimate desired clinical improvement.

Pott's Puffy Tumor Discussion

- **Clinical presentation:**
 - Forehead swelling, frontal headache, fevers, periorbital edema and erythema, and rhinorrhea commonly in adolescents
- **Pathology:** Osteomyelitis of the frontal bone with subperiosteal abscess
 - Sources include sinusitis, direct forehead trauma, odontogenic disease, drug use, and immunocompromised state(s)
 - Pathogenesis is related to sinus disease, bone vascularity, and host immune status
 - Polymicrobial infection usually, with *Streptococcus* or *Staphylococcus* in ~50% of cases
- **Diagnosis:**
 - Clinical history and exam
 - Imaging with CT or MRI; US may be considered in children
 - Culture, CBC, inflammatory markers (ESR or CRP)

Case Discussion

- **Radiographic findings:**
 - CT - Opacified frontal sinus with overlying soft tissue swelling; sinus wall defect on bone window; abscess or other complications best seen with contrast
 - MRI – Allows for improved characterization of infection involvement, especially associated intracranial pathology:
 - Subgaleal scalp abscess corresponds to the visible clinical finding of a “puffy” forehead lesion.
 - Potential intracranial complications include pachymeningitis, epidural abscess, subdural empyema, brain abscess, superior sagittal sinus thrombosis, and cerebritis
- **Treatment:** IV broad-spectrum antibiotics + surgery

References:

1. Rohde RL, North LM, Murray M, Khalili S, and Poetker DM. Pott's puffy tumor: A comprehensive review of the literature. *Am J Otolaryngol*. 2022;43(5):103529. doi:10.1016/j.amjoto.2022.103529
2. Kühn JP, Linsler S, Nourkami-Tutdibi N, et al. Pott's puffy tumor: A need for interdisciplinary diagnosis and treatment. Pott's-Puffy-Tumor: die Notwendigkeit einer interdisziplinären Diagnostik und Behandlung. *HNO*. 2022;70(Suppl 1):8-13. doi:10.1007/s00106-021-01134-w
3. Gaillard F, Bell D, Vadera S, et al. Pott puffy tumor. Reference article, Radiopaedia.org. doi:10.53347/rID-4895