

More Than a Runny Nose:

An Illustrative Review of Orbital and Intracranial Complications of Sinusitis in Children

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Objectives

- Review orbital and intracranial complications of sinusitis.
- Recognize imaging findings on CT and MRI.
- Understand how imaging findings relate to clinical management.

Introduction

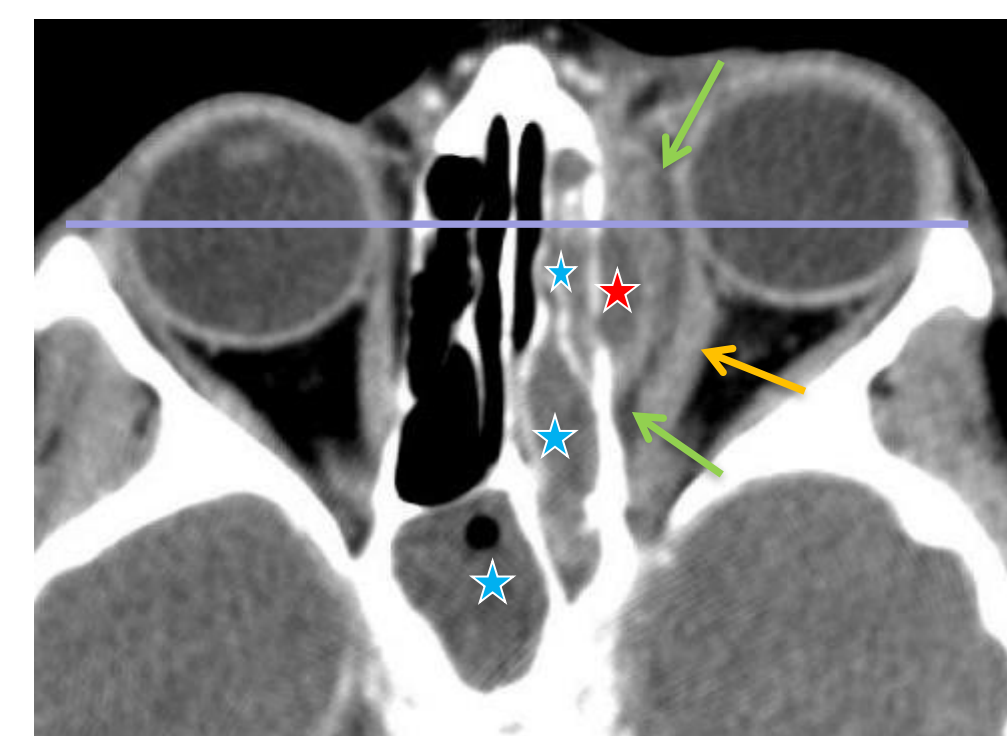
Sinusitis is a common entity in children. Imaging plays an important role when there is concern for complicated disease, which may include orbital and intracranial extension. Such complications carry significant morbidity/mortality, thereby accentuating the need for timely diagnosis and management. Interpreting radiologists should be familiar with the complications that can occur, their imaging appearance, and their clinical implications, all of which will be reviewed in this educational exhibit.

Post-septal Orbital Cellulitis

Post-septal orbital cellulitis is the most common complication of sinusitis (ethmoid >> frontal). A **subperiosteal abscess** is often seen.

Enhanced CT demonstrates **sinus opacification, inflammatory stranding of orbital fat, extraocular muscle displacement and thickening, and proptosis**. Medial orbital wall is commonly thinned or dehiscent.

Further complications include venous thrombosis and intracranial spread of infection.



Ophthalmic Vein Thrombosis

Ophthalmic vein thrombosis most commonly results from an orbital infectious or inflammatory process, with sinusitis being a common etiology.

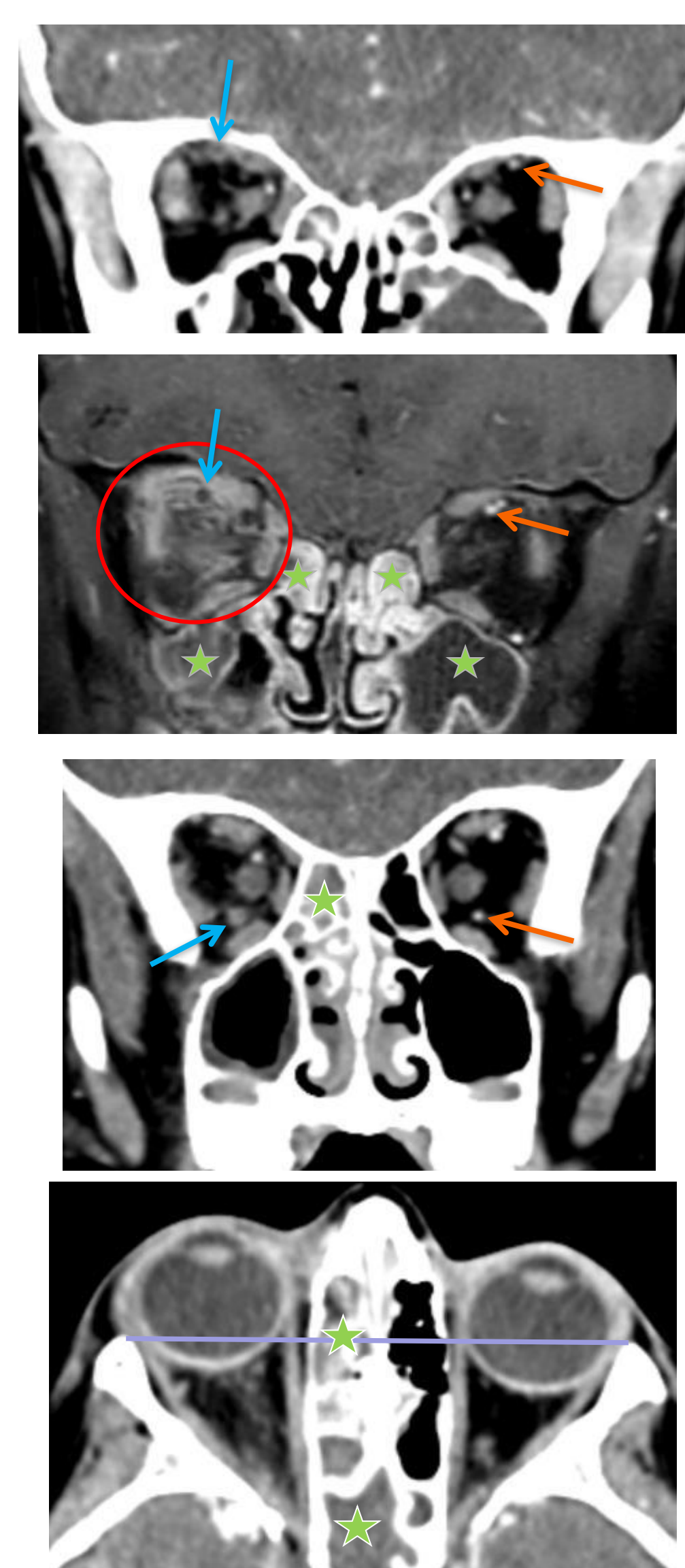
Superior >> inferior ophthalmic vein involvement.

Superior ophthalmic vein thrombosis:

- **Thrombosed enlarged right** and **patent left** superior ophthalmic veins
- **Diffuse orbital inflammation**
- **Sinus opacification**

Inferior ophthalmic vein thrombosis:

- **Thrombosed enlarged right** and **patent left** inferior ophthalmic veins
- **Proptosis**
- **Sinus opacification**

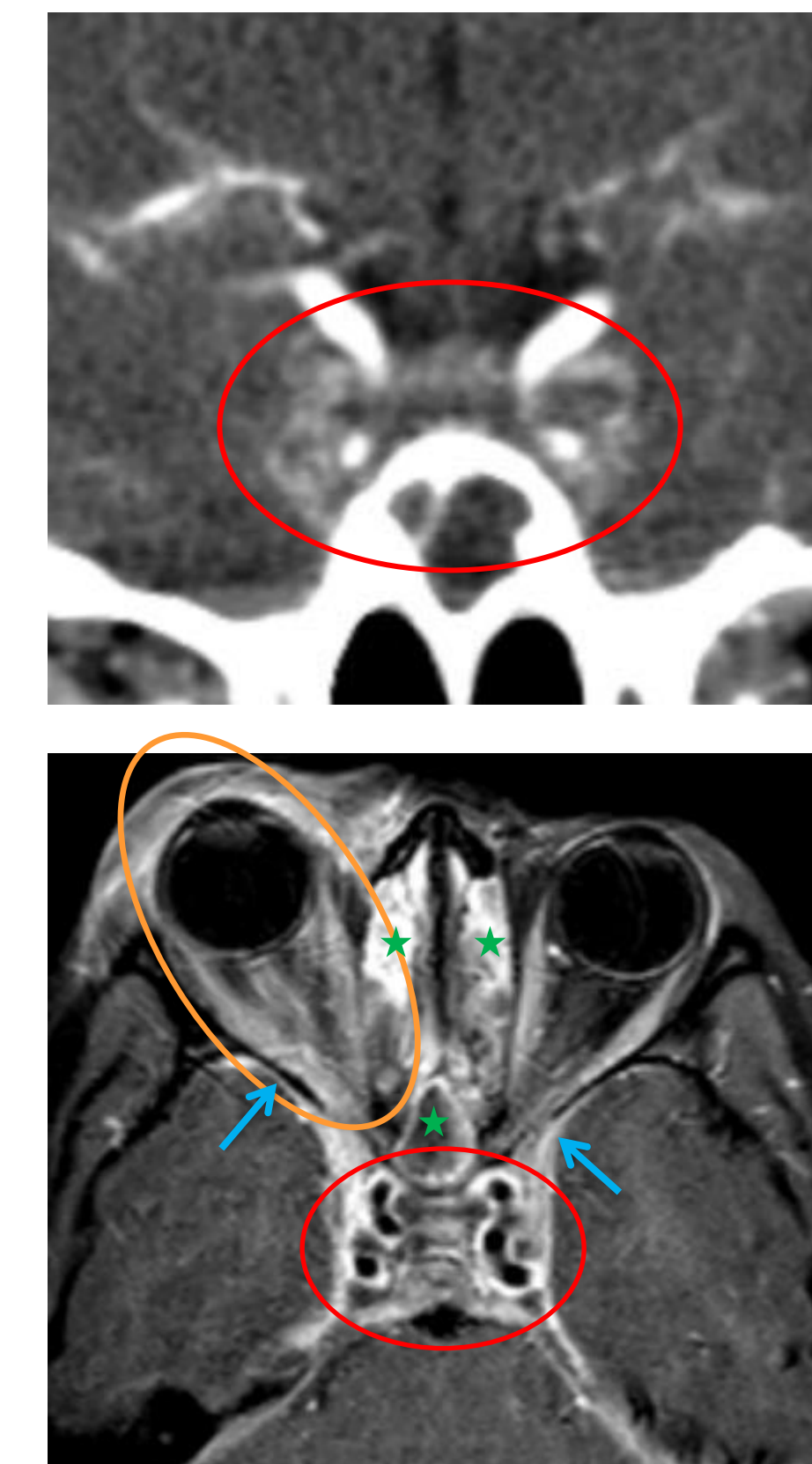


Cavernous Sinus Thrombosis

Cavernous sinus thrombosis is a rare but serious complication of sinus and/or orbital infections (ophthalmic veins drain into the cavernous sinuses).

CT shows cavernous sinus expansion with **patchy areas of non-enhancement**. MR shows **paranasal sinus opacification, orbital inflammation with proptosis, abnormal dural enhancement, and patchy areas of non-enhancement**.

Treatment includes antibiotics and anticoagulation.

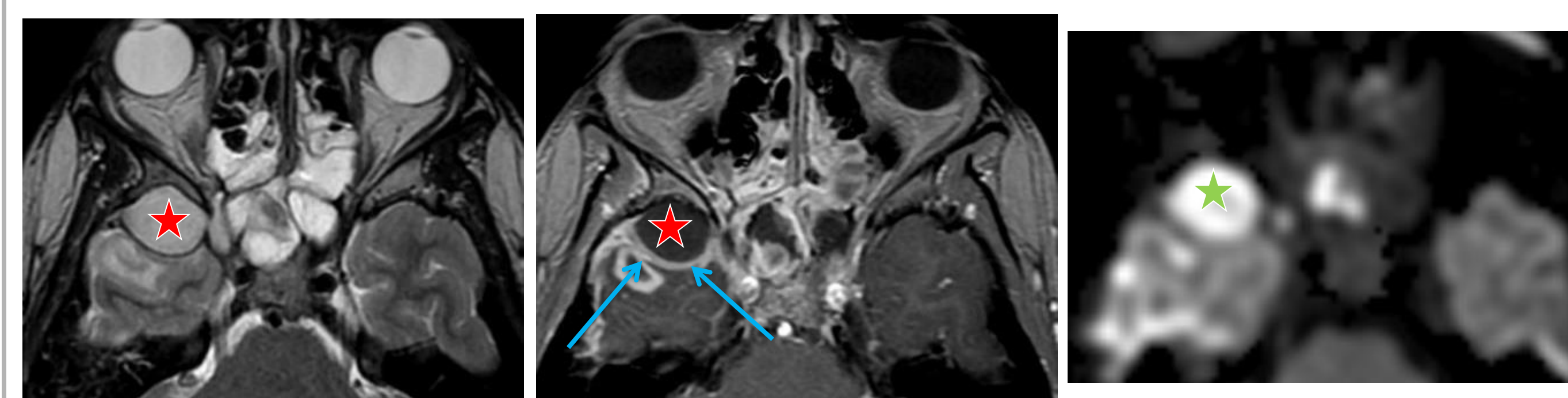


Epidural Abscess

Intracranial spread results most commonly from frontal >> sphenoid sinus disease.

Imaging findings of epidural abscess:

- **epidural collection**
- **rim enhancement**
- **restricted diffusion**



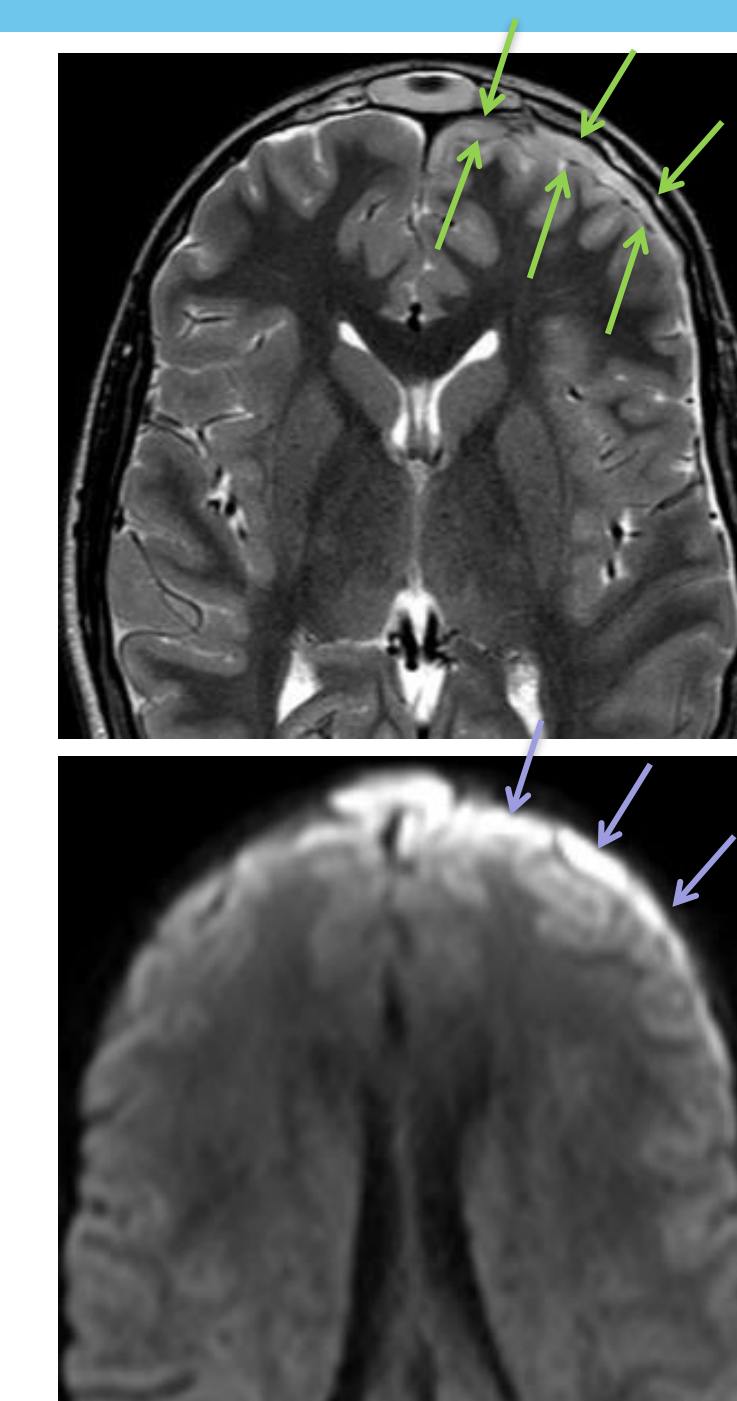
Subdural Empyema

Intracranial spread results most commonly from frontal >> sphenoid sinus disease.

Imaging findings of subdural empyema:

- **subdural collection**
- **restricted diffusion**

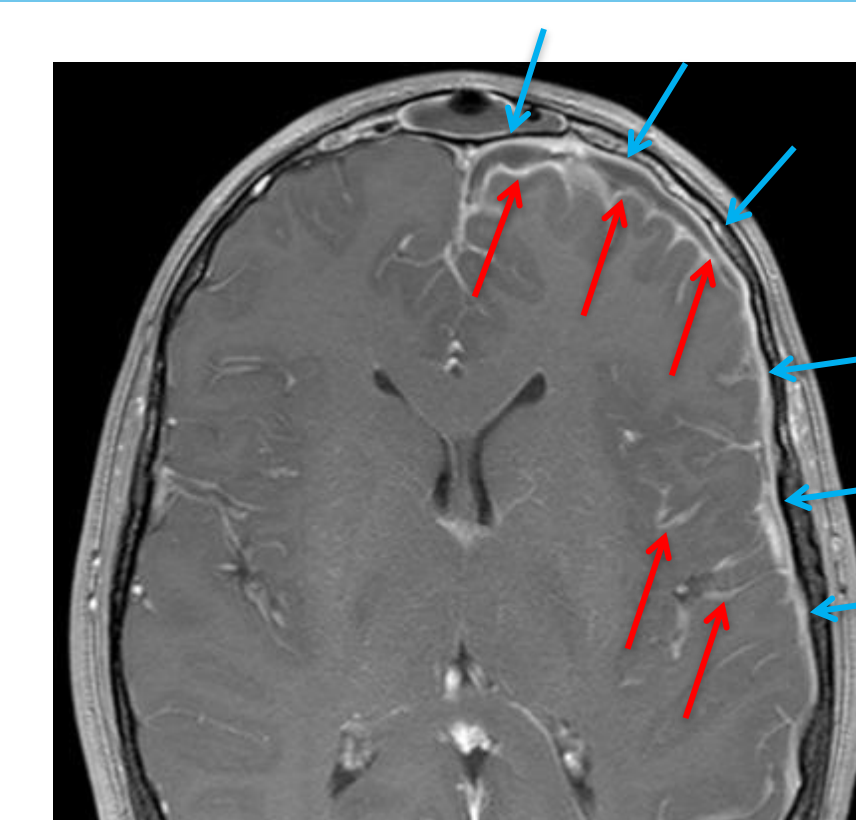
Subdural empyemas often progress rapidly with devastating clinical consequences and thus warrant urgent/emergent neurosurgical evaluation.



Meningitis

Intracranial spread results most commonly from frontal >> sphenoid sinus disease.

Imaging findings of meningitis: **leptomeningeal +/- dural enhancement**.

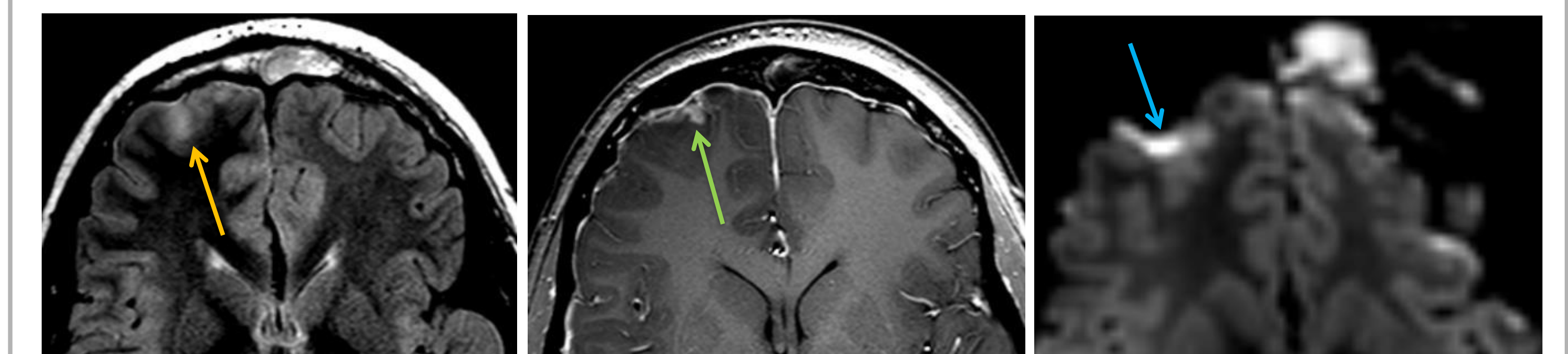


Cerebritis

Intracranial spread results most commonly from frontal >> sphenoid sinus disease.

Imaging findings of cerebritis:

- **superficial edema**
- **+/- enhancement, restricted diffusion**

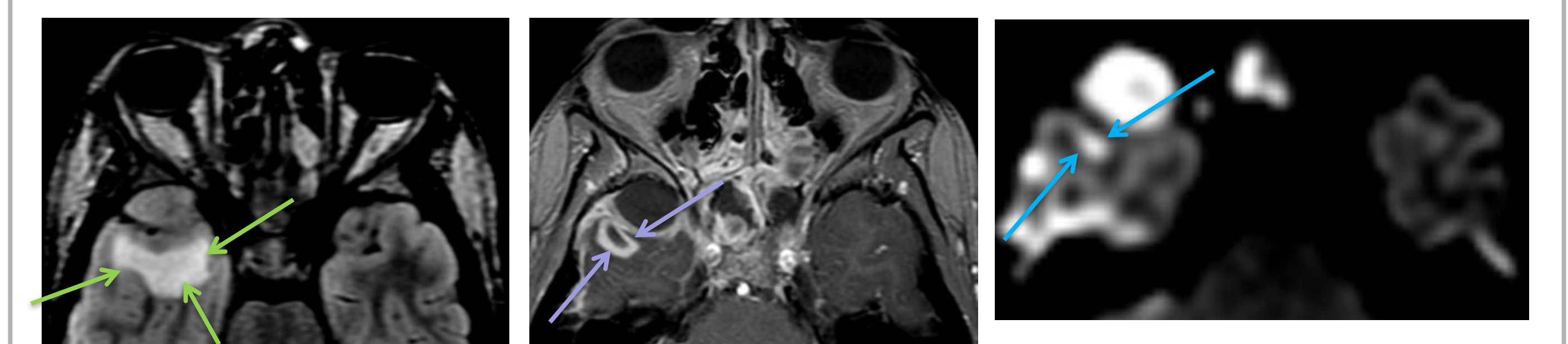


Brain Abscess

Intracranial spread results most commonly from frontal >> sphenoid sinus disease.

Imaging findings of brain abscess:

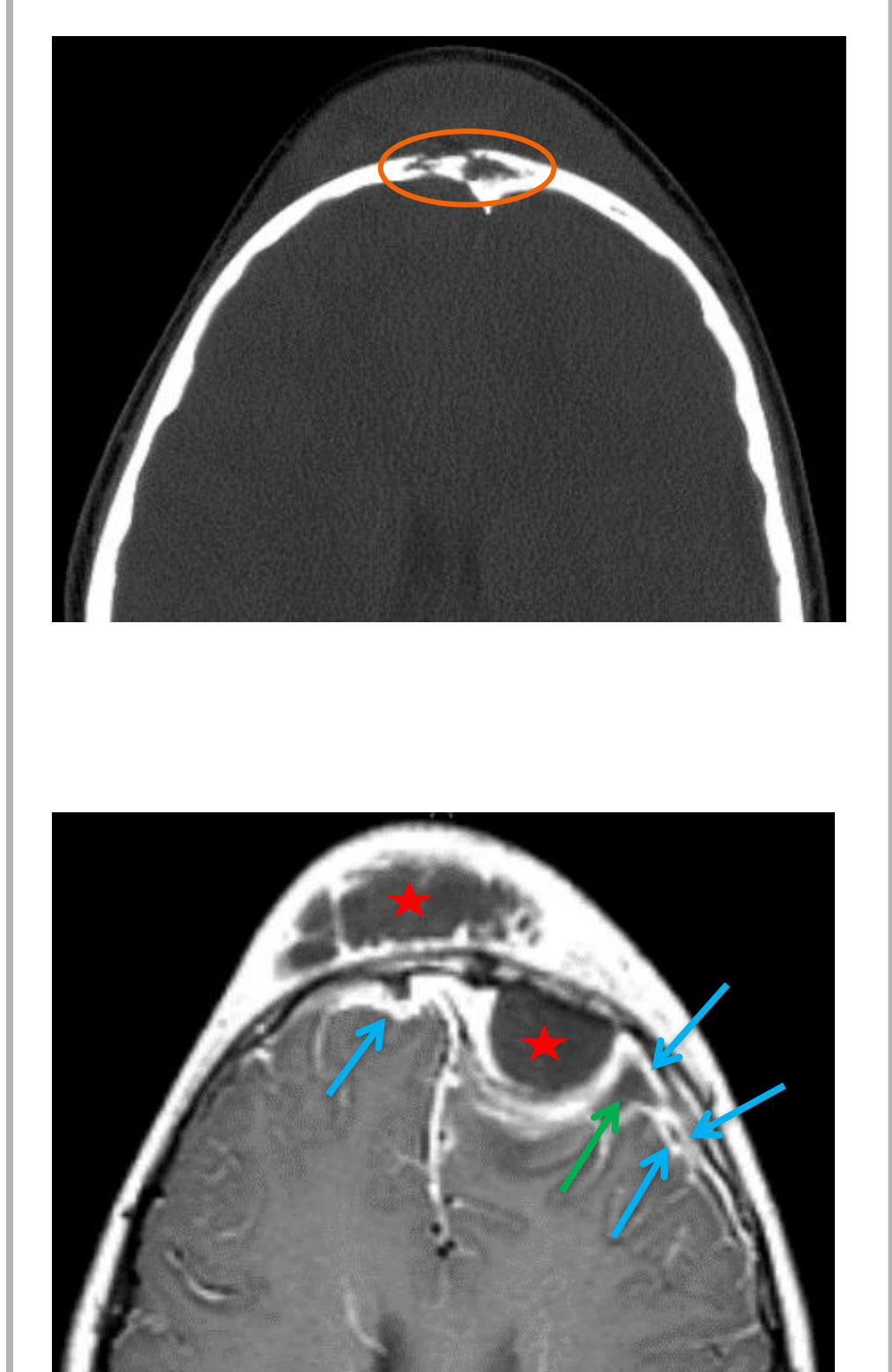
- **parenchymal edema**
- **rim enhancement**
- **restricted diffusion**



Pott Puffy Tumor

- Infectious process characterized by a frontal subperiosteal and/or subgaleal abscess and frontal bone osteomyelitis resulting from frontal sinusitis
- Most often in children and adolescents.
- Can result in orbital and intracranial spread of disease.
- Treatment: surgical drainage, antibiotics.

CT shows **irregularity of the frontal bone with bony dehiscence**. Postcontrast MR shows **superficial soft tissue and epidural abscesses, subdural empyema, and meningeal enhancement**.



Summary

Imaging plays an integral role in the work-up and management of orbital and intracranial complications of sinusitis. It is therefore imperative that the interpreting radiologist be familiar with the spectrum of complications that may occur.

Selected References

Dankbaar JW, van Bommel AJM, Pameijer FA. Imaging findings of the orbital and intracranial complications of acute bacterial rhinosinusitis. Insights Imaging. 2015;6(5):509-18.