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Pediatric COVID-19 Involving Complicated Sinusitis With Intracranial Extension And Lemierre's Syndrome: A Case Report

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Introduction

- COVID-19 can manifest with various otolaryngologic symptoms, which occur greater than 20% of the time in children.
- Pediatric patients can develop multisystemic inflammatory syndrome (MIS-C) and life-threatening bacterial infections, including those stemming from the ears, nose, or throat.
- Few cases of complicated sinusitis following SARS-CoV-2 infection have been reported with no known reported cases of intracranial extension and Lemierre syndrome.

Case Report

Presentation

- A 16-year-old female presented to the ER following COVID-19 diagnosis 17 days earlier with worsening symptoms of headache, fatigue, photophobia, visual changes, and neck stiffness with left eye proptosis and CN VI palsy.
- She was febrile and hypotensive and workup revealed an elevated WBC with 85% neutrophils, CRP, ESR, CK, LDH, Fibrinogen, D-dimer, and BNP with anemia and thrombocytopenia (see Table below).
- Concerns for MIS-C prompted transfer to a tertiary medical center for further workup and management.

Imaging Findings

- MRI Brain w/ Contrast: meningitis and a 3.3 x 2.0 x 3.0 cm intracranial abscess along dorsal sella/clivus with bilateral cavernous sinus extension with thrombosis
- CT Sinus w/ Contrast: severe sinus disease of bilateral sphenoid and right maxillary sinuses with bony dehiscence at skull base (see Figures 1-3)
- CT Neck/Chest w/ Contrast: thrombosis of bilateral interna jugular veins (IJV) near skull base (see Figure 4) and bilateral cavitory lung lesions and pleural effusions

Management

- On hospital day (HD) 2, she underwent bilateral sphenoidotomies and right maxillary antrostomy. Purulent secretions were visualized, and vancomycin irrigations were performed (see).
- Sinus cultures grew *Prevotella melaninogenica*, *Cutibacterium acnes*, *Staphylococcus epidermidis*, & MSSA.
- Blood cultures grew *Fusobacterium necrophorum*.
- She required a chest tube during HD 7-12 and went back to the operating room for a sinus washout on HD 9.
- Repeat MRI on postop day 20 showed improvement.
- She was treated with antibiotics (Linezolid/Metronidazole for longest duration) and anticoagulation (Rivaroxaban) for 6 weeks, and neurosurgical intervention was not needed.

Lab/measurement	Result	Reference range
White blood count	12.7 (high)	4.5-11.0 x 10 ³ /mCL
Hemoglobin	9.8 (low)	12.0-16.0 gm/dL
Hematocrit	29.3 (low)	36.0-46.0%
Platelets	91 (low)	150-450 x 10 ³ /mCL
C-reactive protein	25 (high)	0.0-1.0 mg/dL
Erythrocyte sedimentation rate	119 (high)	0.0-10mm/h
Creatine kinase	2,364 (high)	45-230 unit/L
NT-pro brain natriuretic peptide	455 (high)	0.0-125.0 pg/mL
Lactate dehydrogenase	313 (high)	120-290 unit/L
Fibrinogen	616 (high)	164-382 mg/dL
D-dimer	2.53 (high)	0.0-0.49 mcg/mL

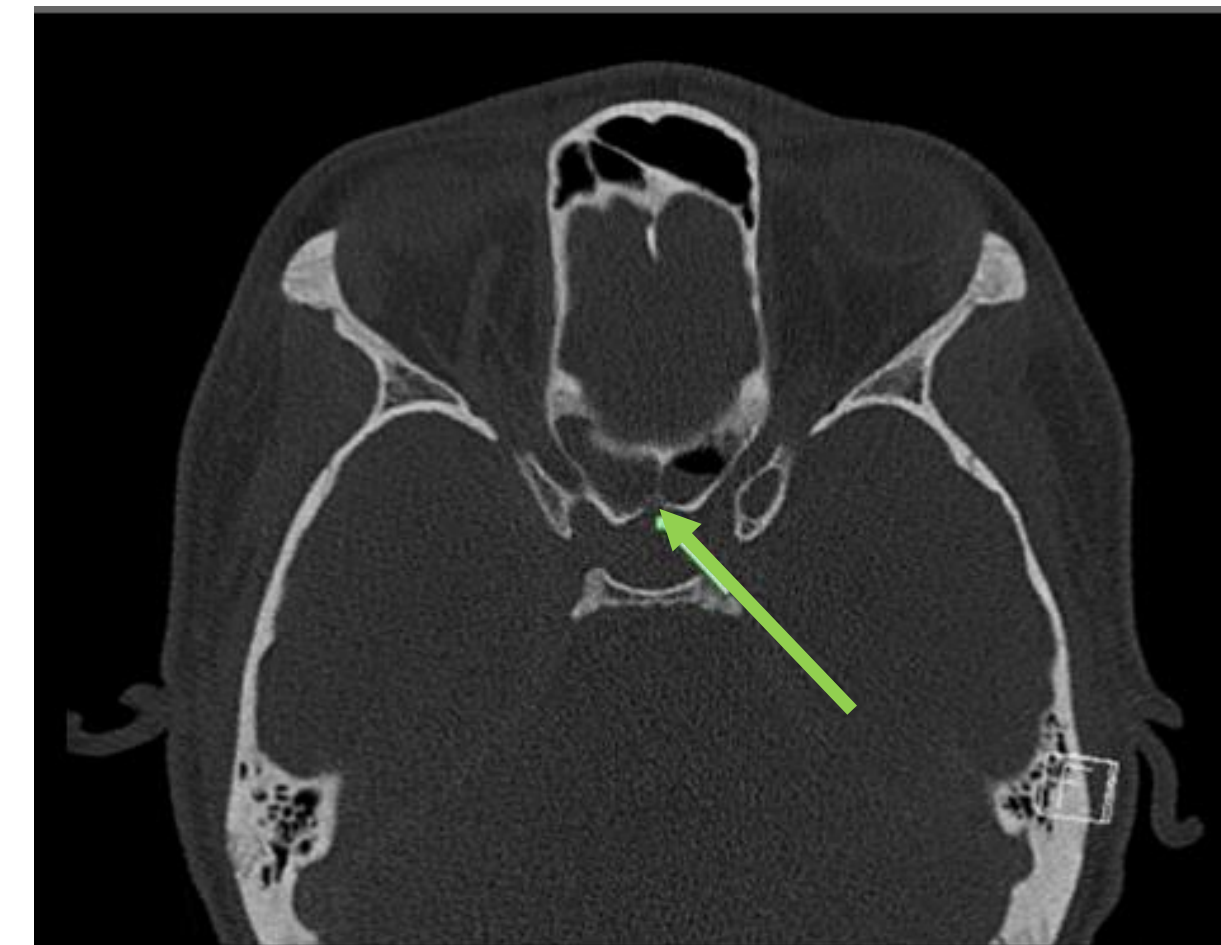


Figure 1: CT Sinus with contrast, axial cut, ethmoid and sphenoid sinus disease with bony dehiscence along posterior wall of right sphenoid sinus/anterior sella (arrow)

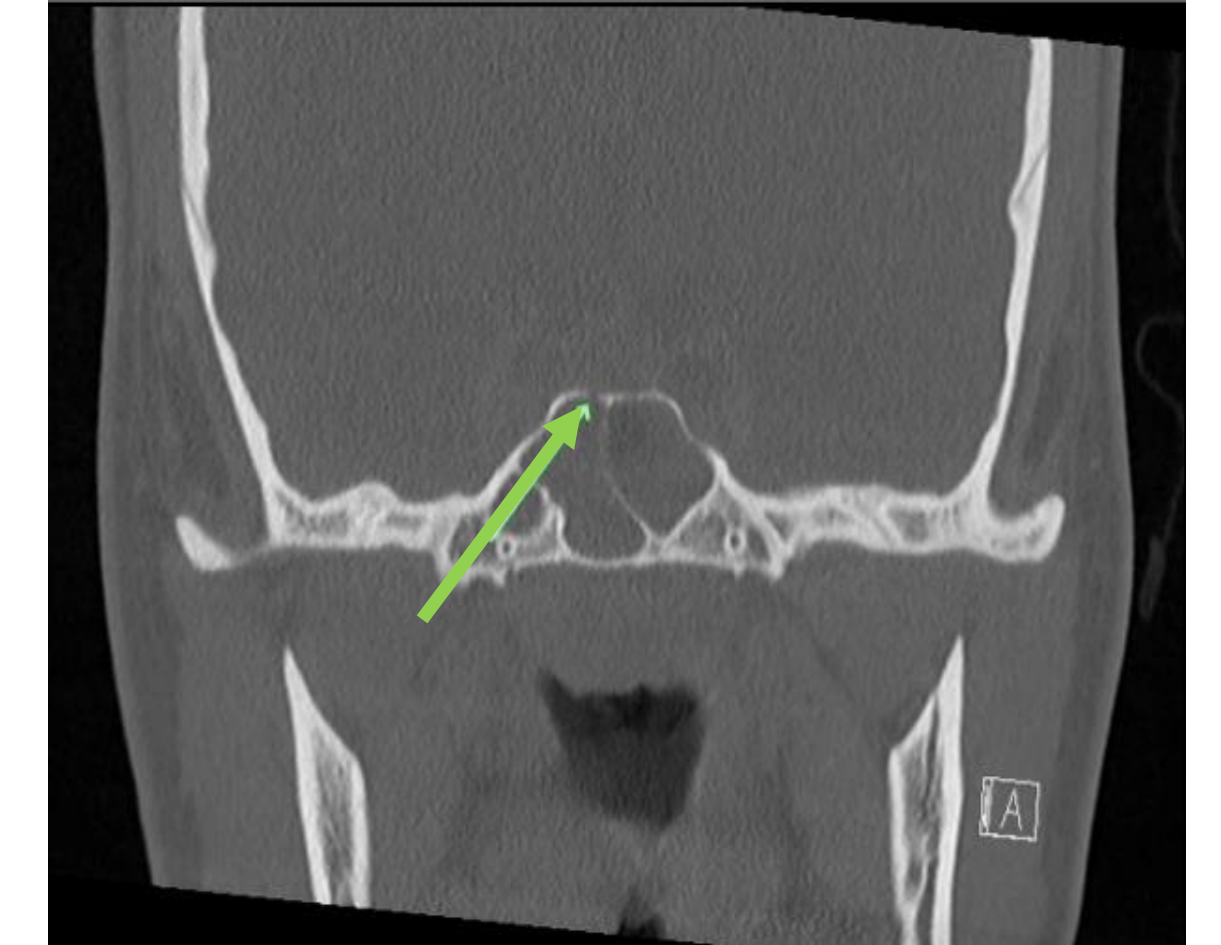


Figure 2: CT Sinus with contrast, coronal cut, sphenoid sinus disease with bony dehiscence along superior right sphenoid sinus (arrow)

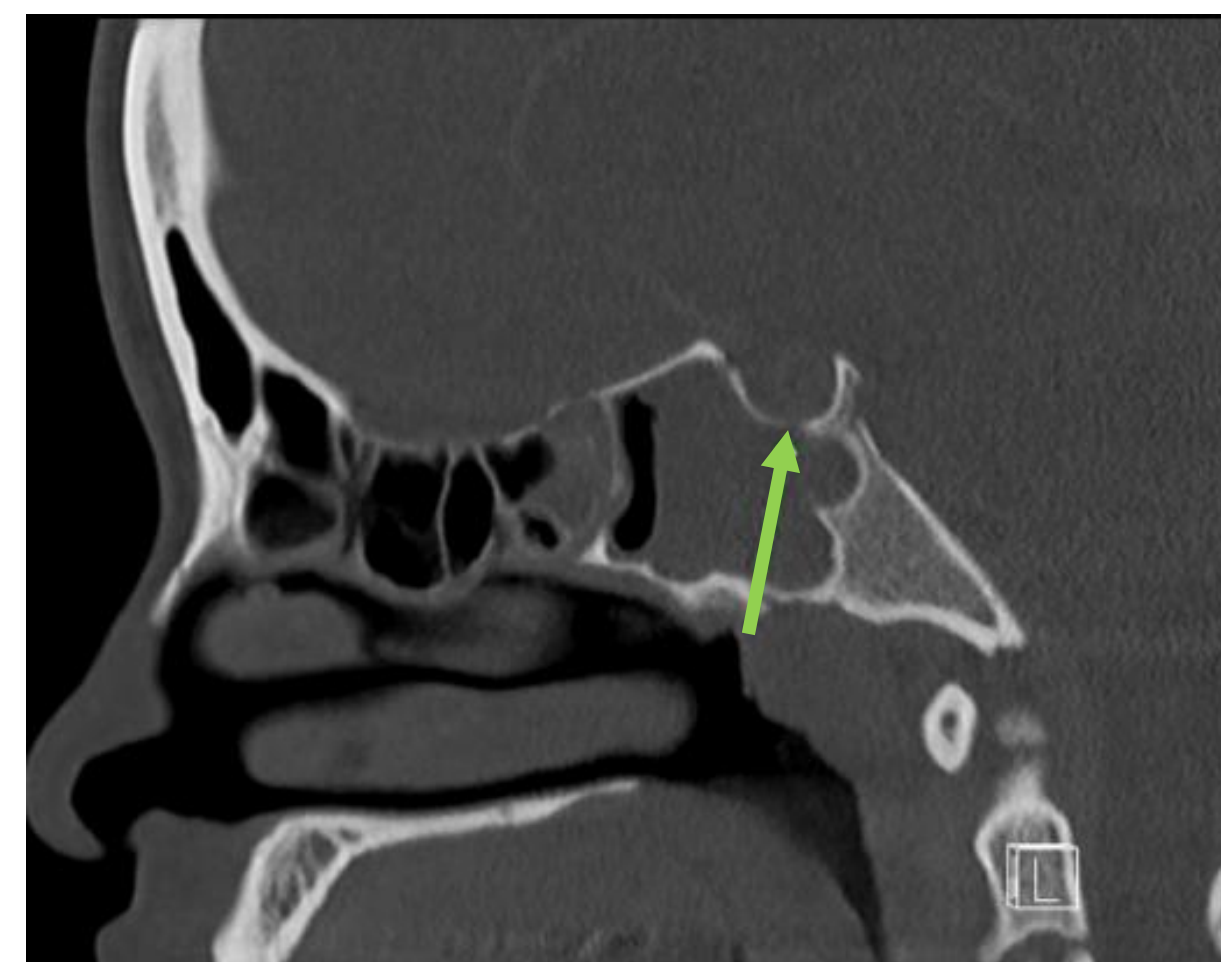


Figure 3: CT Sinus with contrast, sagittal cut, posterior ethmoid and sphenoid sinus disease with bony dehiscence along superior wall of sphenoid sinus/anterior sella (arrow)

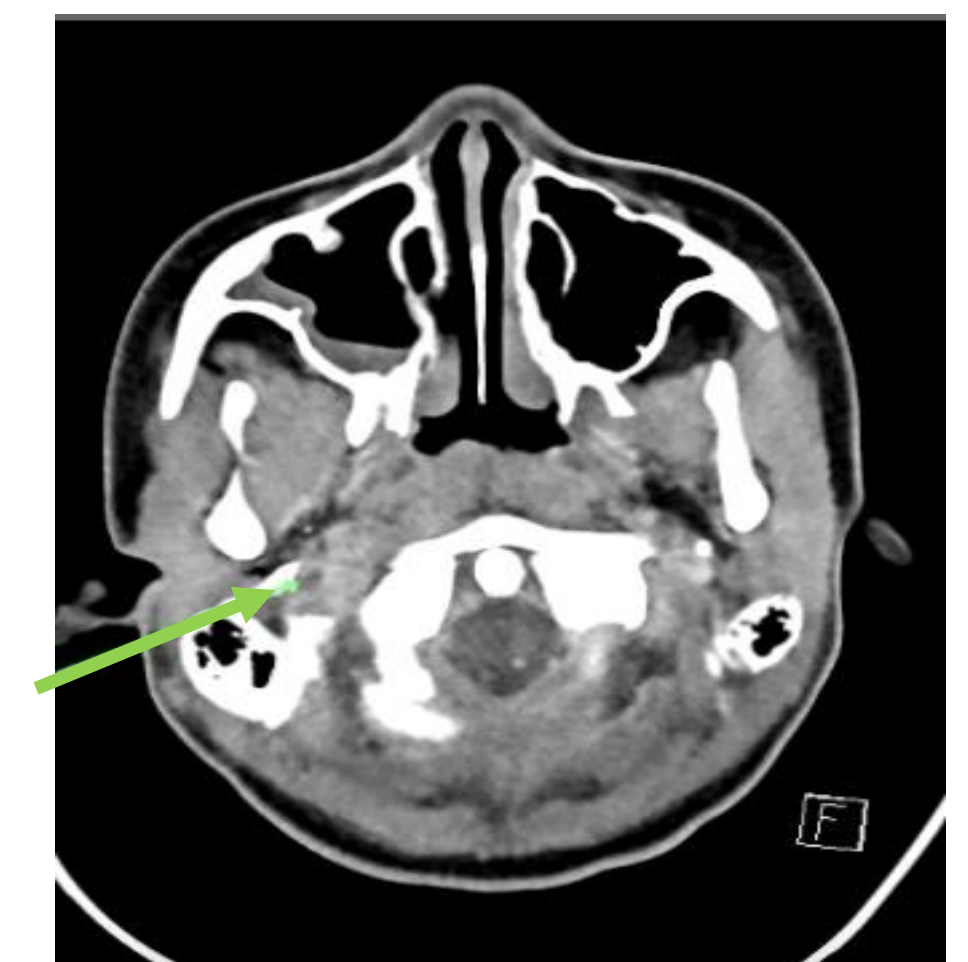


Figure 4: CT Neck with Contrast, axial cut, bilateral, right greater than left, nonocclusive thrombi of the internal jugular veins (arrow)



Figure 5: Purulent secretions and edematous mucosa of right sphenoid sinus



Figure 6: Posterior sphenoid mucosa with area of thinned bone and suspected dehiscence (arrow)

Discussion

- Pediatric patients with COVID-19 and complicated sinusitis may require earlier operative intervention and there should be a low threshold for repeat intervention.
- A longer course of cultured-targeted antibiotics (6 weeks) is needed to adequately treat these infections.
- Anticoagulation for Lemierre syndrome is controversial but reduced the risk of thrombotic complications in this patient.
- COVID-19 may result in immune breakdown and susceptibility for concurrent bacterial infections with greater risk of progression in pediatric patients.

Conclusion

- This is the first pediatric case report describing complicated sinusitis with an intracranial abscess, bilateral cavernous sinus thrombosis, and Lemierre syndrome following COVID-19.
- Further study of SARS-CoV-2 pathophysiology in the sinonasal mucosa is needed.

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