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## BACKGROUND

- Orbital cellulitis is an invasive infection defined by its location posterior to the orbital septum and can result in severe clinical manifestations
- Computed tomography is the recommended imaging modality for evaluation of orbital cellulitis. The Chandler classification System (CS) is used for grading the extent:
  - I = pre-septal cellulitis
  - II = inflammation beyond the orbital septum
  - III = subperiosteal abscess (Figure 1)
  - IV = orbital abscess
  - V = cavernous sinus thrombosis
- CS is a marker of disease severity and has been used to guide management decisions in orbital cellulitis, but there is a paucity of data describing CS association with microbiology culture results. We hypothesized that culture yields and identification of a causative pathogen would increase as CS increases

## METHODS

- A retrospective analysis using the US Military Health System (MHS) database from June 2009 to September 2019 was completed to capture epidemiological and microbiological trends in pediatric orbital infections
- Included: Age ≤ 21 years old, ICD9/10 codes for orbital cellulitis, June 2009 to September 2019
- Excluded: Ophthalmia neonatorum, cases without radiographic confirmation of orbital involvement
- Demographic data, co-morbid diagnoses, imaging studies, microbiology results, and antibiotics prescribed were collected
- As a secondary objective, radiographic studies were reviewed, and cases grouped by Chandler classification (CS II-V) to assess relationship between CS and culture results
- Descriptive statistics and Cochran-Armitage trend test with exact option, were used when appropriate and performed in SAS 9.4

Table 1. Demographics of cohort

CS stage	Subjects (n=130)	Median Age (9 years)	Male % (66.9)	Sinusitis % (55.4)
II	66	11	65.1%	40.9%
III	46	7.5	63%	71.7%
IV	17	9	76.4%	64.7%
V	1	20	100%	100%

Figure 1. Subperiosteal abscess at the superior aspect of the left orbit with fat stranding of the extraconal superior, orbital fat (Left). Right pre- and post-septal cellulitis in the setting of pansinusitis with small subperiosteal abscess medial right orbit (Right).

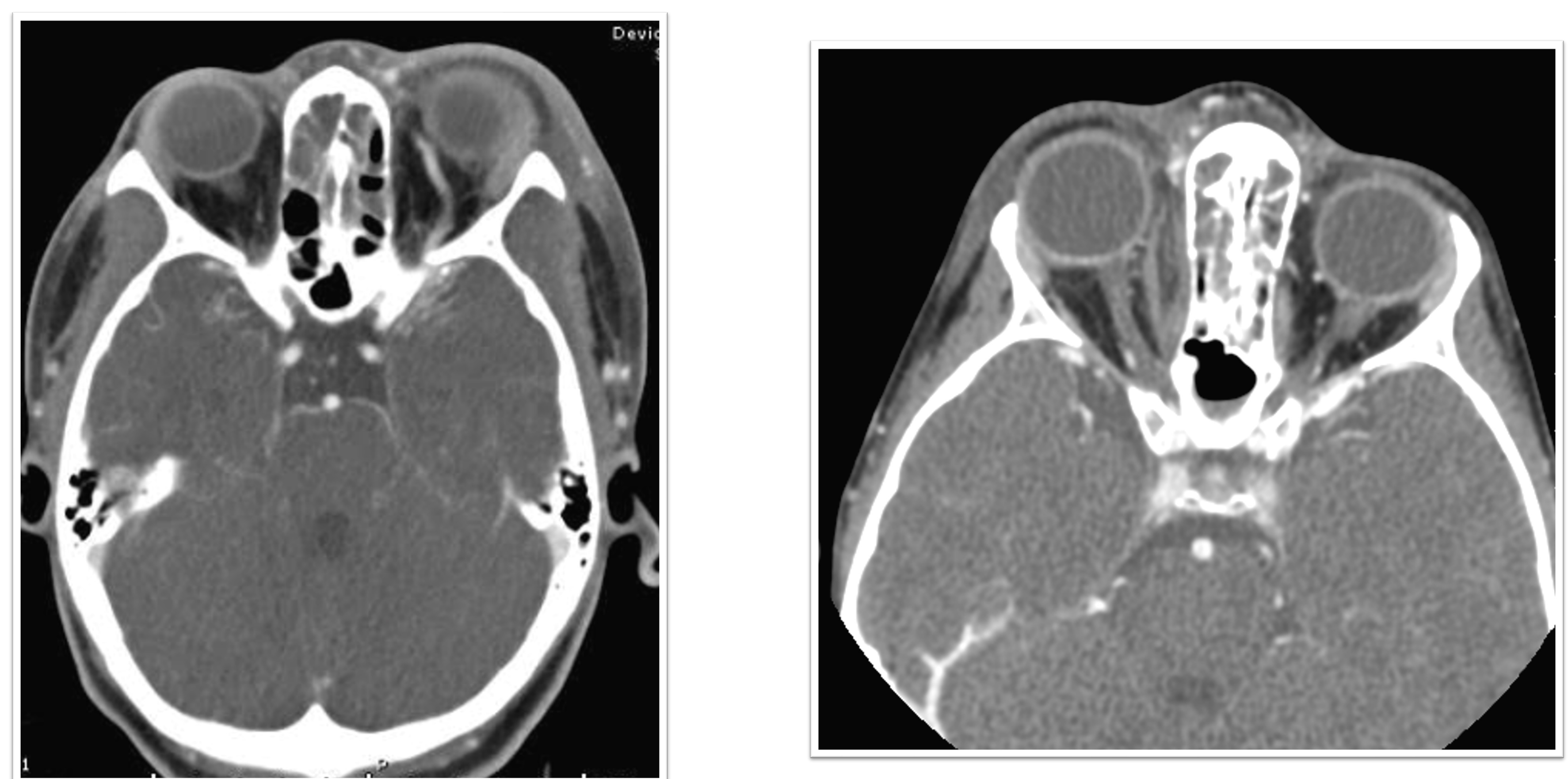


Table 2. CS and culture positivity.

CS stage	Any culture positive* (33.8%)	Blood culture positive (4.6%)	<i>S. aureus</i> positive (29.5%)	<i>S. intermedius</i> positive (13.6%)
II	15 (22.7%)	2 (3%)	6 (40%)	1 (6.7%)
III	18 (39.1%)	2 (4.3%)	5 (27.8%)	4 (22.2%)
IV	10 (58.8%)	1 (5.9%)	2 (20%)	1 (10%)
V	1 (100%)	1 (100%)	0 (0%)	0 (0%)

\* Somers' D(R|C) demonstrated strong association between culture positivity and CS  
 ◇ Cochran-Armitage trend test with exact option demonstrates increased culture positivity as CS stage increases,  $p \leq 0.01$

## RESULTS

- 130 cases of radiologically-confirmed orbital cellulitis were identified (Table 1)
  - Median age = 9 years old (IQR 4-17)
  - 66.9% were male
  - 55.4% had a prior diagnosis of sinusitis
- Incidence of 14.6 cases per 100,000 pediatric admissions to US Military Treatment Facilities
- Microbiology cultures were positive in **33.8%** of cases
- The CS and rates of any culture positivity were significantly different,  $p \leq 0.01$  (Table 2)
- A significant trend was demonstrated between increasing CS and any culture positivity,  $p \leq 0.01$
- Staphylococcus aureus* and *Streptococcus intermedius* were the two most common pathogens.
- There was no significant difference or trend associated with CS and specific pathogen

## DISCUSSION

- This large, nationwide study of pediatric patients in the MHS with radiographically confirmed orbital cellulitis demonstrated higher rates of pathogen identification on cultures as CS increases
- Overall microbiology yield was low but was significantly associated with radiographic characteristics and CS
- Identification of causative pathogens could increase the likelihood for tailored, definitive antimicrobial therapy in pediatric patients with orbital cellulitis

