Paediatric Preseptal and Orbital Cellulitis: A Six Year Experience from a London Tertiary Centre

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Introduction

- Preseptal cellulitis affects structures anterior to the orbital septum and is usually treated medically.
- Orbital cellulitis involves structures posterior to the septum and should be treated as a multidisciplinary emergency as it can lead to serious complications including blindness, cavernous sinus thrombosis, meningitis, brain abscess and death (1).
- Both conditions have a higher incidence in the paediatric population and are most commonly due to sinus disease (2).
- Most cases can be treated without surgical intervention.
- Cases with a small medial subperiosteal abscess, particularly in the younger age group, can often be managed medically (3).
- Surgical intervention is usually required for other abscesses: where vision is threatened, if there has been no improvement or clinical deterioration with medical treatment.
- In our centre, there is considerable collaboration between the orbital service and ENT department. This study highlights the role of multidisciplinary care in the management of orbital cellulitis.

Methods

A retrospective review was conducted of electronic health records of all paediatric patients hospitalised for preseptal and orbital cellulitis between 28 December 2016 and 31 August 2022 at St George's Hospital, London.

Patients admitted for intravenous antibiotics with a diagnosis of **preseptal cellulitis**, **periorbital cellulitis**, **orbital cellulitis**, **subperiosteal abscess (SPA)**, and **orbital abscess** were included.

Results

	All	*Preseptal*	*Orbital*	*SPA*	*Orbital*	*Orbital*	*SPA*	*SPA*
					Medical	***Surgical***	***Medical***	***Surgical***
n	201	152	49	38	19	30	9	29
Age, years*	6.0 (4.9)	5.2 (4.7)	8.2 (5.0)	9.0 (4.9)	6.5 (4.5)	9.4 (5.0)	7.4 (4.2)	9.5 (5.0)
Length of stay, days*	4.2 (4.9)	3.1 (1.6)	7.7 (8.6)	8.1 (9.5)	6.6 (3.6)	8.5 (10.7)	6.1 (0.8)	8.7 (10.8)
Fever ≥38˚C, %	41.8	34.2	65.3	60.5	57.9	70.0	33.3	69.0
WCC, 10^9/L*	12.4 (5.5)	11.7 (4.8)	14.8 (6.6)	14.6 (4.5)	14.2 (9.1)	15.2 (4.8)	11.6 (3.0)	15.6 (4.4)
CRP, mg/dL*	44.7 (60.7)	32.8 (46.6)	81.0 (81.8)	85.2 (84.2)	62.9 (59.8)	92.5 (92.3)	54.1 (45.4)	96.0 (92.3)

Figure 1. *Clinical summary of patients admitted with preseptal cellulitis and orbital cellulitis. Subperiosteal abscess and orbital cellulitis groups are further subdivided into conservative and surgical management groups.*

*n number of patients, WCC white blood cell count, CRP C-reactive protein, SPA subperiosteal abscess, *Values as mean (±SD)*

Supero-lateral	1
Superior	4
Supero-medial	6
Medial	20
Infero-medial	4
Inferior	1
All four walls	1
Unknown	1

Figure 2. *Location of subperiosteal abscess in orbital cases (number of cases).*

ENT FESS	14
ENT open and FESS	5
ENT open	4
Joint Ophthalmology and ENT FESS	5
Ophthalmology only	2

Figure 3*. Surgical involvement in orbital cases by teams (number of cases).*

Coagulase-negative Staph.	4
Group A Strep.	1
Rothuamucilaginosa spp.	1
Streptococcus milleri	1
None	145

Figure 4*. Positive microbiology culture in preseptal cellulitis (number of cases).*

Group A beta-haemolytic Strep.	5
Streptococcus milleri	7
Staphylococcus aureus	5
Coagulase negative Staph.	3
Moraxella spp.	2
Acinetobacter spp.	2
Alpha-haemolytic Strep.	1
None	29

Figure 5*. Positive microbiology culture in orbital cellulitis (number of cases).*

- 44/49 (90%) of cases of orbital cellulitis were associated with sinusitis and all cases of subperiosteal abscess were associated with sinusitis.
- There is a higher number of orbital cellulitis cases, with a corresponding higher number managed surgically, during the summer months, and interestingly, there is no winter peak.
- Cases of orbital cellulitis requiring surgery, in comparison to cases that did not, were associated with a higher WCC and CRP, older average age, and longer stay (Fig 1).
- All 11 subperiosteal abscesses involving the superior orbital wall were managed surgically; of the 11 subperiosteal abscesses involving the superior orbit, 6 (54.5%) cases had surgical management involving Ophthalmology. Superior and supero-lateral subperiosteal abscesses were always operated on by Ophthalmology (Fig 6).

Location of subperiosteal abscess	n	Medical only	Surgery	ENT FESS	ENT open and FESS	ENT open	Joint Ophthal-mology and ENT FESS	Ophthal-mology only
Supero-lateral		0	2	0	0	0	1	0
Superior	4	0	3	0	0	0	2	2
Supero-medial	6	0	6	1	2	2	1	0
Medial	20	7	13	11	1	1	0	0
Infero-medial	4	0	4	1	1	1	1	0
Inferior	1	1	0	0	0	0	0	0
All four walls	1	0	1	0	1	0	0	0
Unknown	1	1	0	0	0	0	0	0
Total	**38**	**9**	**29**	**13**	**5**	**4**	**5**	**2**

Figure 6*. Management of subperiosteal abscess*

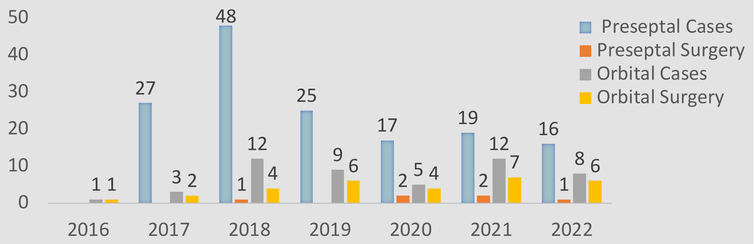


Figure 7. *All cases of preseptal or orbital cellulitis, and cases requiring surgery by year 2016-2022.*

Conclusions

- We found that older children with orbital cellulitis were less likely to respond to isolated medical treatment, which is consistent with the literature (2,3,4).
- The higher rates of surgery found in this study (60% of orbital cases, while most literature ranges 5-50%) (4,5) may reflect earlier intervention to prevent complications and late presentations from peripheral hospitals after a poor response to medical treatment or signs of optic nerve compromise.
- Milder cases are usually also managed locally and not referred to tertiary hospitals.
- This higher rate of surgery in our cohort may also reflect the increased availability of orbital subspecialist expertise on-site and an ENT team regularly dealing with this condition.
- From our experience, hospitals would benefit from the presence of both ENT and Ophthalmology surgeons with orbital expertise on-site to manage cases involving subperiosteal abscesses.

References

1. Jain A, Rubin PA. Orbital cellulitis in children. IntOphthalmolClin. 2001;41(4):71–86.

2. Marchiano E, Raikundalia MD, Carniol ET, Echanique KA, Kalyoussef E, Baredes S, et al. Characteristics of patients treated for orbital cellulitis: An analysis of inpatient data: Orbital Cellulitis: An Analysis of Inpatient Data. The Laryngoscope. 2016 Mar;126(3):554–9.

3. Wong SJ, Levi J. Management of pediatric orbital cellulitis: A systematic review. Int J PediatrOtorhinolaryngol. 2018 Jul;110:123–9.

4. Gonçalves R, Menezes C, Machado R, Ribeiro I, Lemos JA. Periorbital cellulitis in children: Analysis of outcome of intravenous antibiotic therapy. Orbit. 2016 Jul 3;35(4):175–80.

5. Kinis V, Ozbay M, Bakir S, Yorgancilar E, Gun R, Akdag M, et al. Management of Orbital Complications of Sinusitis in Pediatric Patients: J Craniofac Surg. 2013 Sep;24(5):1706–10.