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CASE SERIES

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COMPLICATED SINUSITIS IN PEDIATRIC PATIENTS: AN INSTITUTIONAL REVIEW

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ABSTRACT

INTRODUCTION

he array of complications in acute sinusitis is a well learned phenomenon. The step-ladder of complications described by Chandler et al extensively discusses the peculiarity of each stage. The targeted treatment is such that it halts the disease process at a lower rung in the ladder. Acute sinusitis is more aggressive in the pediatric population, and therefore, requires immediate attention.

METHOD

We present the cases of five pediatric patients who presented with orbital complications at varying stages, i.e., 3 with pre-septal cellulitis and 2 with post-septal cellulitis, in the emergency department of our tertiary care hospital between January 2023 to December 2023 and were prospectively analyzed.

RESULT

Ethmoidal sinusitis was documented on imaging in all the cases. Each of them underwent endoscopic sinus surgery with or without external incision and drainage along with intravenous antibiotic therapy. All the patients had symptomatic improvement post-surgery within a period of 7-10 days.

CONCLUSION

The management with respect to conservative trial vs surgical management should be based on the symptomatology at the time of presentation, and stage of complication.

KEY WORDS

Sinusitis; Rhinology; Pediatrics; Endoscopic sinus surgery

INTRODUCTION:

Chandler et al was instrumental in describing the pathogenesis of complications occurring secondary to acute sinusitis. In the elaborate account, he divided the complications into five following groups – Inflammatory edema, orbital cellulitis, subperiosteal abscess, orbital abscess, and cavernous sinus thrombosis (1). Each fore mentioned entity is marked by a progressively worsening clinical profile. Orbital disease is known to affect children, incidence peaking in the first fifteen years and carry a relatively better prognosis if detected early. Older individuals often present with a more aggressive course and require urgent attention (2). There is a higher preponderance for males than females (3). The treatment modalities for orbital complications include intravenous antibiotic therapy, incision and drainage, endoscopic sinus surgery and abscess drainage or a combination of the above. The evidence for standard of care is rather scattered in the literature.

MATERIALS AND METHODS

We present the cases of 5 pediatric patients treated at our tertiary care institute with orbital complications from January 2022 to December 2023. The data was analyzed prospectively. The details of the cases are described briefly: -

Case 1:

A 6-year-old boy presented with history of fever for 3 days, left sided nasal obstruction and discharge, gradually progressive painful left sided periorbital swelling (Figure1).

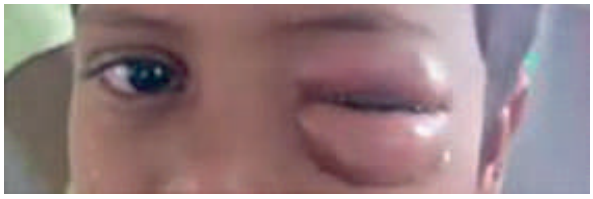


Figure 1: Clinical picture at the time of initial presentation

On nasal examination, mucopus was noted in the left middle meatus. Periorbital edema with inferiorly located pus point was seen. Paranasal sinus examination showed tenderness of the maxillary sinus. Visual acuity was grossly normal, extraocular movements full and free; pupils were reactive to light. Hemogram revealed leukocytosis. A contrast enhanced computed tomogram showed soft tissue density in the left maxillary and ethmoid sinuses with obstruction of osteomeatal complex. The intraconal compartment of orbit appeared free of disease (Figure 2).

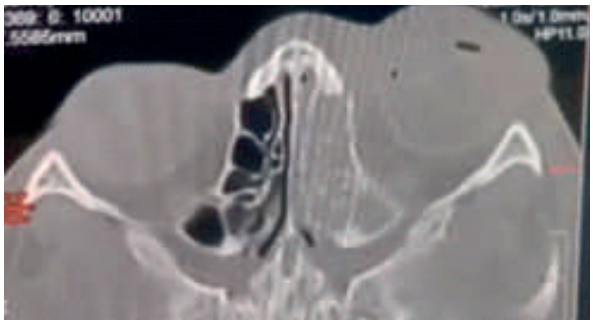


Figure 2: Axial section of bony window of computed tomogram scan showing ethmoid sinusitis with pre-septal cellulitis.

He underwent incision and drainage under intravenous antibiotic cover followed by endoscopic sinus surgery. Pus culture yielded Methicillin Resistant Staphylococcus Aureus. He was started on culture directed antibiotics for a total duration of 2 weeks. Symptomatic improvement was apparent within three days of surgical intervention (Figure 3).

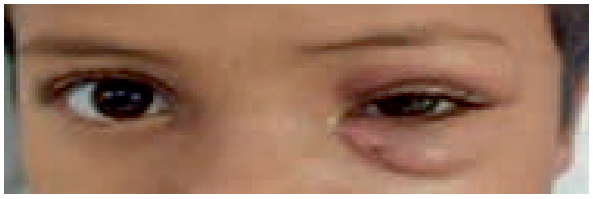


Figure 3: Clinical picture on third post operative day

Case 2:

A 10-year-old boy presented with history of fever and rapidly progressive left eye swelling. On examination, the child was febrile. Nasal examination revealed mucosal congestion and purulent discharge in left middle meatus. Left eye showed lower lid edema with erythema of overlying skin, tenderness, and upward displacement of eye (Figure 4).

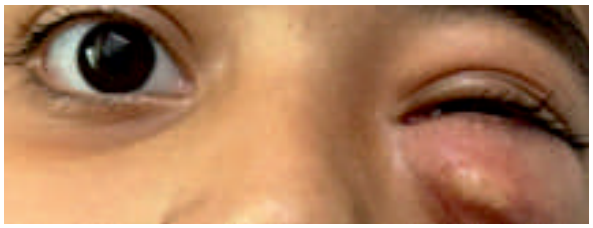


Figure 4: Clinical picture of patient on initial presentation

Vision was grossly normal and extraocular movements were full and free in all gazes. The contrast enhanced computed tomogram showed mucosal thickening of maxillary and ethmoid sinus and enhancing soft tissue density overlying the premaxilla (Figure 5).

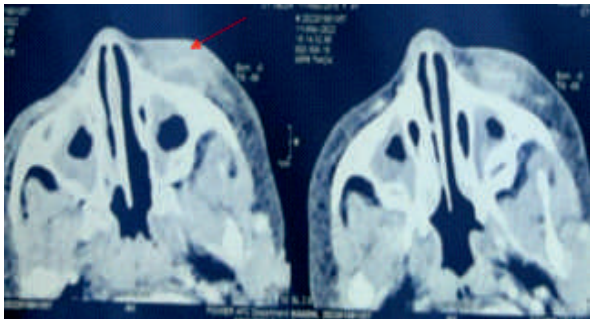


Figure 5: Location of abscess seen in axial section of contrast enhanced computed tomogram

The child underwent incision and drainage via a nick in the inferiorly located dependent pus pocket. He was started on intravenous antibiotics and underwent endoscopic sinus surgery. (Figure 6).

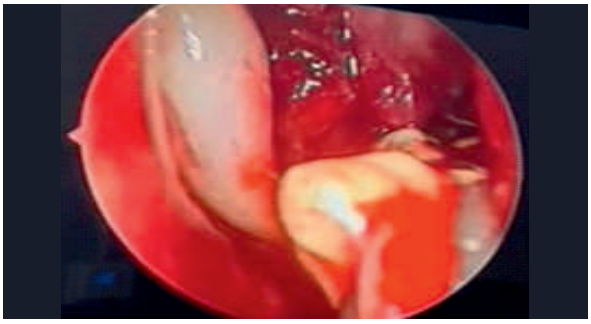


Figure 6: Endoscopic view of left maxillary ostia showing removal of thick pus

Gradual reduction in lid edema was observed within 5 days (Figure 7).

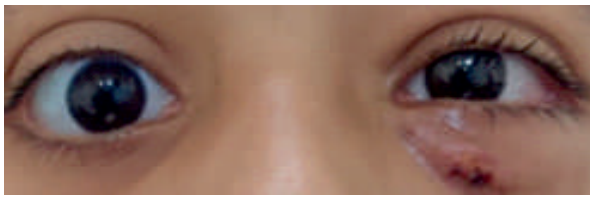


Figure 7: Clinical picture of patient on fifth post operative day.

Case 3:

A 12-year-old female visited the emergency with complaints of high-grade fever, right eye swelling, diminution of vision and diplopia. On examination, the patient had gross periorbital edema, chemosis (Figure 8).

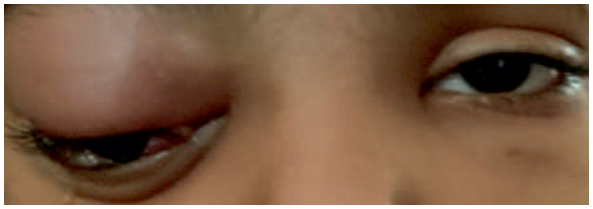
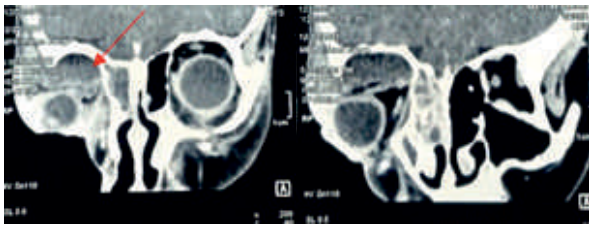


Figure 8: Preoperative clinical picture of patient

The eyeball was pushed downwards, visual acuity was documented as 6/24, extraocular movements were restricted in the upward and medial gaze. The contrast enhanced computed tomogram demonstrated a loculated enhancing collection in the superomedial and superolateral quadrant of orbit with evidence of ethmoidal sinusitis (Figure 9).

Figure 9: Coronal section of contrast enhanced



computed tomogram scan. Arrowhead depicting location of intra-orbital abscess

She was immediately started on intravenous antibiotics. The abscess was initially drained by a lynch incision and then she was taken up for definite surgery in the form of endoscopic sinus surgery and drainage of abscess. Post operatively, a close monitoring of the vision documentation was performed. Recovery was gradual. Reversal of visual acuity to 6/6, acquisition of full range of extraocular movements, reduction in periorbital edema was achieved by twelfth post operative day (Figure 10).

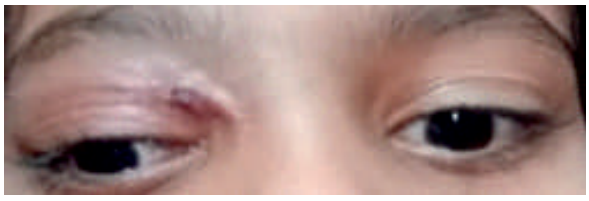


Figure 10: Clinical picture of patient on ninth post operative day

Case 4:

A 5-year-old girl presented with history of fever, left eye swelling for four days (Figure 11).

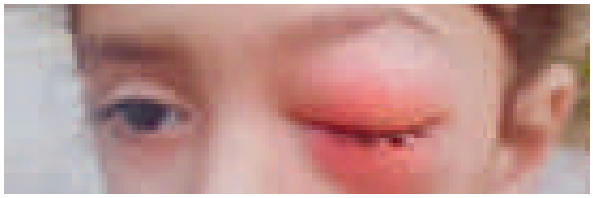


Figure 11: Clinical picture of patient preoperatively

Examination revealed mucopus in left middle meatus, periorbital edema, and erythema of the overlying skin. Vision and extraocular movements were preserved. Computed tomogram showed soft tissue density in left maxillary and ethmoid sinuses. She was started on intravenous antibiotics. Having observed no significant clinical improvement, she was taken up for endoscopic sinus surgery after a 48-hour observation window period. The surgical outcome was satisfactory and patient was discharged on post operative day eight. (Figure 12)

Figure 12: Clinical picture of child on post operative day eight

Case 5:

A 9-year-old boy presented with history of high-grade fever, nasal discharge, halitosis, left eye proptosis, diminution of vision in left eye for 4 days. On examination, the child has grossly edematous nasoseptal mucosa in the left nasal cavity, purulent discharge in vestibule, purulent post nasal drip. The left eye was pushed infero-laterally had marked chemosis, proptosis, erythema of overlying skin (Figure 13).

Figure 13: Clinical picture of patient preoperatively

The visual acuity was 6/12 and extraocular movements were restricted in the medial gaze. A contrast enhanced computed tomogram demonstrated evidence of maxillary and ethmoidal sinusitis, subperiosteal abscess and soft tissue density over premaxilla (Figure 14).

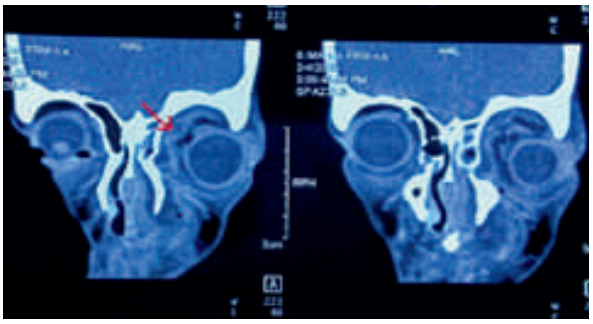


Figure 14: Arrowhead pointing to collection in the superomedial orbital compartment.

Intravenous antibiotics were started and lynch incision was given to release the pus pent up under pressure. Endoscopic sinus surgery was done after 24-hours with drainage of residual pus. The clinical profile of the patient started improving after 4 days (Figure 15). The visual acuity and extra ocular movements gradually returned to normal after 7 days.

Figure 15: Clinical image on post operative day 5 showing marked reduction in orbital swelling.

RESULTS

In our series, 3 patients (60%) had pre-septal disease and 2 (40%) had a post- septal pathology. Males (60%) were predominant. Fever, nasal discharge, and periorbital swelling was the most common symptom seen in 100% of the cases. Visual complaints were reported in 40% while only 1 patient (20%) reported halitosis. (Table 1). Radiological evidence of ethmoidal sinusitis was present in all 5 patients. The mean duration of clinically evident recovery was seven days.

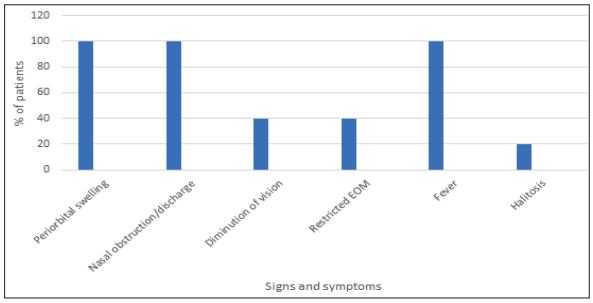


Table 1 showing the distribution of symptomatology amongst patients

DISCUSSION

The anatomical intimacy between the orbit and paranasal sinus facilitates spread of sinus pathologies to the orbit and beyond, leading to catastrophic complications. With the advent of antibiotic era, there was a significant drop in the incidence of complications associated with acute sinusitis. However, the role of surgery remains primal in such conditions. Orbital cellulitis secondary to sinus infection can happen in all age groups, but pediatric population is way more commonly affected than adults. The incidence varies from 1.6 per 100 000 in children to 0.1 per 100 000 in adults (4). The orbit may get involved in sinonasal infections owing to the delicate thin bony separation of lamina papyracea between orbit and ethmoid sinus, hematogenously through valveless venous channels, or through the natural foramina in the orbital floor (5). Although in literature all anterior sinuses have been implicated in giving rise to orbital infections, it is the ethmoid sinus which is quoted as the culprit across majority of reported cases. The coexistence of ethmoidal sinusitis with orbital cellulitis being as high as 43% (6). Maxillary and ethmoid sinusitis together contribute up to 90% of the cases. In our patients too, ethmoidal and maxillary sinusitis was universally seen. Other causes of orbital infections include ocular trauma, upper respiratory tract infection, chronic dacryocystitis, dental trauma, etc. (7).

The contribution of Chandler et al in enumerating and describing these range of complications is noteworthy. He proposed five stages of development of complications – inflammatory edema, orbital cellulitis, subperiosteal abscess, orbital abscess, cavernous sinus thrombosis. Inflammatory edema constitutes preseptal cellulitis, i.e., inflammation of structures lying anterior to the orbital septum. Rest of the categories form the spectrum of post septal cellulitis which is more sinister but less common (8). Our series had two patients of the post septal group and three of preseptal cellulitis. Each stage of the above-mentioned complications stated in the Chandler classification is clinically distinguishable from each other to some degree. Hence, a radiological supplementation not only aids in confirming the clinically findings but also provides a road map during surgery. Backing up clinical findings with Computed Tomogram scan is slowly emerging as a guideline in the management of acute sinusitis (9) . Whenever multiple or intracranial complication is suspected, Magnetic resonance imaging is deemed superior. Computed tomogram scans demonstrate mucosal thickening of sinuses, air fluid level during acute infection and when performed with a contrast, are able to pin point the location of any evolving abscess.

Cases of preseptal cellulitis have a grey zone in choosing the treatment of choice. A trial of conservative management is often attempted. Administration of intravenous culture directed or empirical antibiotics followed by response assessment after 48 hours is a widely practiced

dictum. Failure to respond to conservative management or worsening of symptoms the necessitates surgery (10). Younger children tend to respond well to conservative management than adults and adolescents since the latter often have a polymicrobial foci of infection. The proponents of early surgical intervention in orbital cellulitis suggest that it significantly mitigates the morbidity associated with vision and intracranial complications (11).

On the other hand, in cases where vision is threatened, frank abscess is apparent clinically or radiologically, a wait and watch policy is strongly discouraged. These patients require drainage on an urgent basis. A simple technique is draining the abscess via a lid incision to relieve orbital pressure and buy time for definite sinus surgery. Orbital abscess is approached by a lynch incision for drainage of superiorly located abscess (12). Endoscopically, the thin plate of lamina papyracea is breached to drain out residual pus in the medial compartment of orbit (13). We employed a similar approach to our patient (Case 3,5) wherein superior-medial lid incision was made to access the superiorly located pus pocket before embarking on sinus surgery.

CONCLUSION

Orbital complications resulting secondary to sinus pathology have serious implications and therefore, require prompt intervention. The decision for conservative or surgical management should be based on the symptomatology at the time of presentation and stage of complication assessed after complete clinico-radiological investigations. Early intervention impedes the development of fulminant complications.

DISCLOSURES:

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Conflict of interest: None

Ethical Standards: The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation (Indian- GCP, ICH-GCP, ICMR guidelines) and with the Helsinki Declaration of 1975, as revised in 2008.

Author contribution: PN supervised the manuscript, collected data, performed the surgeries. VB analyzed the data, wrote the manuscript. AR supervised the surgeries and overlooked the manuscript. NG gave the final approval for manuscript. VK was involved in perioperative patient care.

Data availability statement: The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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