



## ENT

## ENDOSCOPIC SINUS SURGERY IN COMPLICATED PAEDIATRIC RHINOSINUSITIS : CASE SERIES

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**ABSTRACT** **Background:** Rhinosinusitis is a common condition of the paranasal sinuses. It affects the quality of life and decreases productivity. A complicated rhinosinusitis can also cause morbidity if not properly managed. Paediatric patients have unique risk of developing sinusitis and its complications because of various factors. Although medical therapy remains the mainstay of treatment, surgery is reserved for complicated cases. Paediatric endoscopic sinus surgery has its own challenges because of anatomic difficulty and post-operative care. **Case Series:** We present three cases of paediatric rhinosinusitis with orbital complications. Patients were less than six years. Diagnosis was challenging as the cases had no previous history suggestive of chronic rhinosinusitis. Diagnostic nasal endoscopy is challenging in paediatric age group. All the three cases had failed medical therapy. Endoscopic sinus surgery was done in all the three cases with adenoidectomy in one case. All the three cases improved after surgical intervention. **Conclusion:** management of complicated paediatric rhinosinusitis is challenging. Medical therapy along with surgical intervention are required to avoid further complications and morbidity. Although challenging, prompt surgical interventions should be taken to avoid mortality.

**KEYWORDS :** Orbital Cellulitis, Paediatric Sinusitis, Orbital Decompression

## INTRODUCTION

Rhinosinusitis is a significant health problem accounting to healthcare consumption and productivity loss. Acute rhinosinusitis has a one year prevalence of 6 to 15% whereas chronic rhinosinusitis affects 5 to 12% of the general population. [1]

Children have unique risk factors for rhinosinusitis when compared to adults, the paranasal sinuses in children are smaller and are undergoing the process of maturation and development, so they are at higher risk of obstruction. Obstruction of the sinus ostium and osteo-meatal complex may be facilitated by the presence of allergic and inflammatory factors, upper respiratory tract infections, and adenoid hypertrophy, anatomic abnormalities and other systemic disorders like immune deficiencies, cystic fibrosis, ciliary disorders.[2]

Orbital complications comprise more than 80% of all complications of sinusitis making it the most common complications of paediatric rhinosinusitis. [3] Purulent rhinosinusitis involving the frontal and ethmoid sinuses can cause orbital complications due to spread of infection through the thin lamina papyracea, thrombophlebitis, or through venous drainage.

Rhinosinusitis causes 66 – 82% of orbital infections, and acute ethmoiditis is the rhinosinusitis most associated with orbital cellulitis, especially in children.[3] The prognosis of pediatric patients with chronic rhinosinusitis depends on the degree of severity, complications that have occurred, and is influenced by host factors, the environment and the patient's compliance with treatment. Complications increase patient morbidity and mortality. Pharmacological therapy for chronic rhinosinusitis in children has a success rate of approximately 50%. With the implementation of surgical therapy, the patient's prognosis improves.[2,3]

This article presents 3 cases of complicated paediatric rhinosinusitis requiring surgical interventions, highlighting the diagnostic dilemma, challenges in surgical management and post-operative care.

## Case 1 : Odontogenic Sinusitis with Orbital Cellulitis

A 6 year old boy was referred for exophthalmia that started 3 days prior which was progressively worsening. Patient also gave history of

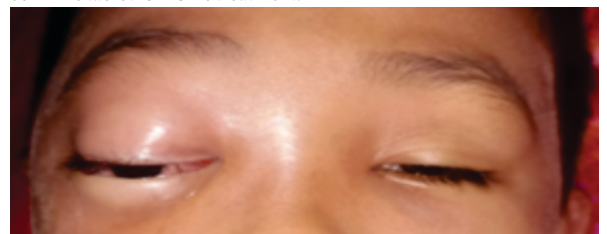
continuous fever associated with chill and rigor following a tooth extraction of right upper pre-molar.

On physical examination, there was purulent rhinorrhoea obstructing the right nasal cavity, swelling/oedema in the left premaxillary area extending upto the inferior palpebrae of the left eye. There was right eye proptosis with decreased mobility and pain on mobilisation. Mucopurulent discharge was noted in right medial canthus.

Nasal endoscopy couldn't be performed as patient wasn't co-operative.

Computed tomography scan of the paranasal sinuses showed iso-dense lesions in the left maxillary, ethmoid, frontal and sphenoid sinuses, accompanied by iso-dense images in the premaxilla to the left inferior eyelid, and breach in the lamina papyracea was seen. The patient was diagnosed with acute rhinosinusitis complicated by premaxillary abscess and odontogenic orbital abscess. This patient received ampicillin sulbactam and metronidazole intravenously.

An endoscopic sinus surgery and orbital decompression was performed by ENT surgeons and pre septal abscess was drained by Ophthalmologist. Patient improved symptomatically after medical and surgical intervention. Removed tissue culture showed Streptococcus anginosus, and was resistant to tetracycline. Patient had cefixime tablet for home treatment.



**Fig 1: Pre-operative Picture of Case 1**

**Case 2 : Acute Rhinosinusitis with Adenoiditis with Orbital Abscess**  
The second patient, a 2-year-old child was consulted by an

ophthalmologist with right eye swelling, pain and redness for 2 weeks. The results of the physical examination revealed lagophthalmos in the right eye, oedema in the superior palpebrae, accompanied by hyperaemia, tenderness, and mucopurulent discharge. Movement of the eyeballs was hampered in all directions accompanied by pain and decreased visual acuity in the right eye.

Nasal endoscopy revealed oedema, hyperaemia and mucopurulent discharge in the middle meatus, anterior 1/3<sup>rd</sup> of the middle turbinate looked unhealthy and necrosed where sample was collected and sent for histopathology. Hypertrophic adenoids were seen accompanied by mucopurulent discharge in the nasopharynx. The patient was diagnosed with acute rhinosinusitis with orbital abscess. This patient initially received ampicillin sulbactam and metronidazole therapy, but was later replaced with ceftriaxone because there was no significant improvement.

Endoscopic sinus surgery was performed with orbital decompression and adenoidectomy by an ENT doctor and incision of the abscess by an ophthalmologist. During surgery, unhealthy polypoidal tissue, necrosed tissue and mucopurulent discharge were found in the maxillary sinus, ethmoid and left frontal recess. There was a defect in the left lamina papyracea. Orbital decompression was performed and purulent discharge was drained.

Postoperative evaluation showed that the eyelids were slightly oedematous but not hyperaemic. The results of surgical tissue culture showed that *Staphylococcus epidermidis* was resistant to amoxiclav, ampicillin, cefoxitin, oxacillin, penicillin G, and tetracycline. Patient had ciprofloxacin tablet for home treatment.



**Fig 2: Case 2**

**Case 3: Acute Rhinosinusitis with Pre-septal Cellulitis with Osteomyelitis of Maxilla**

A 6 year old male patient presented with high grade fever for the past 1 week, redness around left eye for the past 2 days. Patient was referred to ENT in view of nasal discharge and nasal obstruction since 2 days. Patient was initially managed conservatively. Patient's symptoms worsened despite ongoing medical management and fever didn't subside.

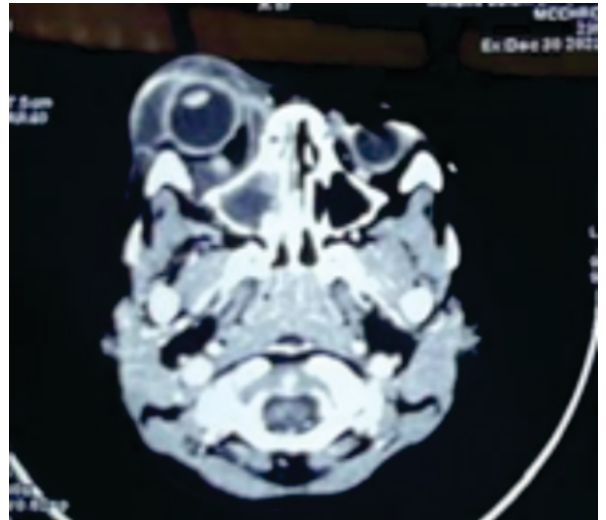
A diagnostic nasal endoscopy was done. On examination purulent discharge was present with necrosis of turbinate mucosa and uncinated process. Tissue was taken and sent for histopathological examination and microscopy for fungal hyphae. Patient was started on injection amphotericin considering the clinical picture and differential diagnosis of sinonasal mucormycosis.

Despite antifungal treatment, fever didn't subside. Histopathological examination showed osteomyelitic lesion and could not demonstrate any fungal elements. Antifungal was stopped. Repeat nasal endoscopy was done. Necrotic bones and purulent material was present in left nasal cavity. Patient underwent functional endoscopic sinus surgery and debridement of dead necrotic tissues which included medial maxillectomy. Post operatively, patient was kept on vancomycin according to the culture sensitivity. Patient's symptoms subsided afterwards.

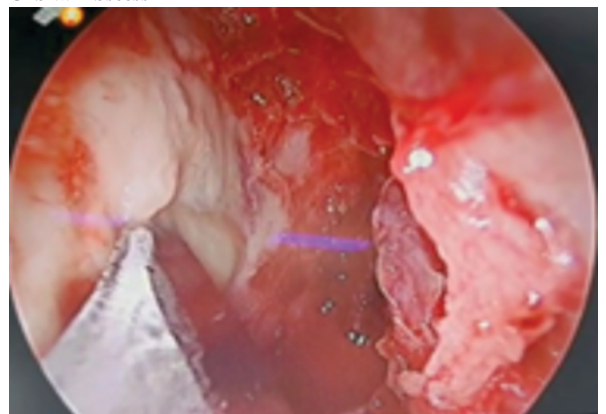


**Fig 3: Case 3**

All our three cases had failed medical therapy prior to surgical interventions. None of the patients had history suggestive of chronic rhinosinusitis. None of our three patients developed bilateral eye involvement or intracranial complications because of our timely interventions.



**Fig 4: Contrast Enhanced Computed Tomography Scan Showing Orbital Abscess**



**Fig 5: Intraoperative Endoscopic Picture Showing Presence of Pus After Incising the Periorbita**

## DISCUSSION

Rhinosinusitis in children according to EPOS (European position paper on rhinosinusitis and Nasal Polyps) is defined as the presence of two or more symptoms, one of which must be nasal congestion/obstruction/congestion or nasal discharge (anterior or posterior), which may be accompanied by pain/pressure on the face or coughing. This needs to be supported by the results of a nasal endoscopic examination or relevant changes in a computed tomography (CT) scan

of the sinuses. To distinguish between acute and chronic rhinosinusitis, it is judged by the onset of symptoms with a cut-off of 12 weeks. It is said to be acute if the onset is less than 12 weeks and chronic if 12 weeks or more.[1]

The pathogenesis of rhinosinusitis arises from changes in the homeostasis of sinus and nasal drainage, which under normal conditions is guaranteed by the patency of the sinus ostium, adequate and active mucus production, and effective ciliary function. However, children have unique risk factors for rhinosinusitis when compared to adults. In children, the paranasal sinuses and ostia are smaller and are undergoing the process of maturation and development, so they are at higher risk of obstruction. Obstruction of the sinus ostium and osteomeatal complex is supported by the presence of allergic and inflammatory factors, upper respiratory tract infections and hypertrophic adenoids which are common conditions in childhood.[2] Odontogenic sinusitis accounts for 45-75% of unilateral maxillary sinusitis. Odontogenic pathologies include endodontic infection, periodontitis, odontogenic cysts and iatrogenic causes. The management of odontogenic sinusitis consists of a combination of medical, dental treatment and endoscopic sinus surgery.[5,6]

The extension of infection to adjacent structures can occur by way of direct bone penetration, either across congenital dehiscence orbital walls, through the anterior and posterior ethmoidal foramen or by means of thrombophlebitis of the ophthalmic venous system.[7]

Orbital complications occur in 6% of cases. Orbital complication can lead to permanent blindness or death if not managed on time. Severity of orbital complications secondary to sinusitis can be grouped into stages according to Chandler's classification.[8]

Computed tomography is the imaging of choice. Contrast computed tomography scan is reserved for cases where abscess formation is suspected in either the orbit or the brain. Addition of magnetic resonance imaging is useful when complications of sinusitis are suspected.[2]

Treatment of complications of pediatric rhinosinusitis involves aggressive medical management, often combined with surgery. Medical therapy is the mainstay of treatment for pediatric CRS with surgery reserved for those resistant to medical therapy or presence of complications such as periorbital abscesses.(9,10)

Adenoidectomy should be considered first line management of refractory pediatric sinusitis.(11)

Few challenges are encountered in paediatric endoscopic sinus surgery in children; anatomy of underdeveloped sinuses and difficult post-operative care or difficulty in cleaning of post-operative cavity. Therefore, endoscopic surgery in pediatric case isn't the same as adult. Adhesion and scarred sinus ostia can be a cause of failure or a revision surgery.[12]

On the other hand, endoscopic sinus surgery has found to have no deleterious impact on facial growth. [13,14]

## CONCLUSION

Paediatric rhinosinusitis is a common entity. Orbital complications are more common in paediatric age group as compared to adults. Whereas medical management remains the mainstay of treatment, surgery is reserved for complicated cases. Endoscopic sinus surgery in children still remain challenging. Identifying cases which require surgical interventions and timely intervention is the key to prevent further complications.

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