

Orbital Cellulitis And Subperiosteal Abscess Of Frontal Bone Complicating Unilateral Pansinusitis: A Case Report.

Akinola M.A¹, Betiku AO², Jagun O.O², Adefalajo A.P³, Yusuf A.O.A³, Sorungbe A.O¹, Yahaya O.P¹

¹ENT Unit, Department of Surgery, Ben Carson School of Medicine, Babcock University, Ilishan Remo Ogun State, Nigeria

²Ophthalmology Unit, Department of Surgery, Babcock University, Ilishan Remo Ogun State, Nigeria

³Radiology Unit, Department of Surgery, Babcock University, Ilishan Remo Ogun State, Nigeria

ABSTRACT

Objective

The aim of this report is to demonstrate that acute rhino-sinusitis may result in orbital cellulitis and even life threatening complications especially intracranial abscesses in children and young adults. Rare complications such as subperiosteal abscess seen in this patient may also occur. Morbidity and mortality can be prevented through early diagnosis and treatment by relevant specialists.

Method

We present a case report and literature review on unilateral pansinusitis complicated with orbital cellulitis and subperiosteal abscess of the frontal bone.

Results

Following a diagnosis of orbital cellulitis and subperiosteal abscess of the frontal bone from a unilateral pansinusitis, an initial intravenous antibiotic was given for 72 hours, followed by a

surgical drainage with subsequent rapid improvement.

Conclusion

Acute rhinosinusitis may be complicated by orbital cellulitis and abscess formation. Prompt referral to a tertiary health facility as well as cooperation between the Ophthalmologists and Otorhinolaryngologists is very important to prevent life threatening complications.

Key words: Orbital cellulitis, Pansinusitis, Subperiosteal abscess

Corresponding Author: Dr Akinola Moses Ayodele. ENT Unit, Department of Surgery, Babcock University, Ilishan Remo Ogun State, Nigeria. E-mail- Akinolam@babcock.edu.ng

INTRODUCTION

Acute rhino-sinusitis especially in children is usually associated with upper respiratory tract infection due to virus such as adenovirus, influenza virus, rhinovirus and parainfluenza virus. The progression of this as a result of super-imposed bacteria infection may result in serious complications such as soft tissue infection, inflammation of the bone, orbital and intracranial complications¹.

Orbital involvement can result from diverse paranasal sinus pathologies². However primary sinus infection is the most common cause of orbital cellulitis³. Other aetiologies of orbital cellulitis are dacryocystitis, orbital foreign body, periocular trauma, iatrogenic, odontogenic infection, endophthalmitis, orbital tumours and local skin infection^{4, 5}. Orbital complications accounts for 74-85% of complications arising from acute rhinosinusitis. It usually follows ethmoidal sinus infection. The ethmoid sinus is only separated from the orbit by the lamina papyracea⁶.

The orbital septum originates from the periosteum and arising from the anterior extension of the periosteum from the orbital margins into the eyelids, separates the superficial portion of the eye

(preseptal region) from the deeper orbital structures (postseptal region)⁷.

In developing countries, rhinosinusitis is under treated and is one of the leading causes of orbital complications⁸. In the pre-antibiotic era, the morbidity and mortality were 20.5% and 17% respectively⁹. With the advent of potent antibiotics and new surgical modalities rates have declined to 3-11% and 1-2.5% respectively¹⁰. Chandler et al. described orbital complications in five stages¹¹. Preseptal cellulitis (stage I), orbital cellulitis (stage II), Subperiosteal abscess (stage III), orbital abscess (stage IV), and cavernous sinus thrombosis (stage V). However identifying the stages in children with swollen and painful eye may be difficult.

When sinusitis is the primary cause, infection usually spread through the floor of the frontal sinus or the roof of the maxillary antrum¹²⁻¹⁴. The orbital complications may result from extension of the infection through the bony defects (osteitic bone destruction), thrombophlebitis or through the communicating veins⁶.

CASE REPORT

A 13 year old female secondary school student presented in our hospital with one week history of nasal discharge, fever and left eye swelling. There

was associated history of nasal congestion and frontal headache. There was no history of facial pain, paroxysmal sneezing, postnasal drip or hawking. Left eye swelling rapidly progressed in size, associated with moderate to severe pain and blurring of vision. There was no prior history of trauma to the eyes. No ear or throat symptoms. There was no known family history of allergy in this patient.

Patient was reviewed by the Otorhinolaryngologist and Ophthalmologist. Physical examination showed acutely ill looking girl, febrile (38°C), mildly dehydrated, no significant peripheral lymph node enlargement and no pedal oedema. Respiratory rate was 20/min, chest was clear. Pulse was 120/minute and regular.

Ocular findings: Left proptosis with inflamed eye lids (Fig 1). Tenderness was worse on the left medial canthus. Visual acuity and intraocular pressure could not be assessed.

Otorhinolaryngologic findings: Diffuse swelling and tenderness of the left frontal, ethmoidal and maxillary sinuses. There was mucopurulent nasal discharge on the left with inflamed inferior turbinates. However, there was no sign of meningeal irritation or any neurological deficit.

The diagnosis of left orbital cellulitis secondary to acute rhinosinusitis was made. The following investigations were carried out: Computed Tomography scan of the paranasal sinuses and Full Blood Count. The result of the full blood count showed white Blood Count of 10,100 mm³/L and Packed Cell Volume of 33.9%.



Figure 1: Left proptosis with inflamed eye lid

Pre- and post contrast computed tomography scan of the orbits and nasal sinus in the axial and coronal sections, demonstrated in brain and bone windows (Fig 2) and (Fig. 3 A and B.). Significant findings included fluid filled left maxillary antrum with complete depneumatization. The ipsilateral osteomeatal complex, frontal, ethmoidal and to a lesser extent, ipsilateral sphenoidal sinus were filled with fluid. There was no bony destruction. There was associated lobulated abscess (hypodense collection 18Hu, with air locules and wall enhancement) of the medial aspect of the left orbit extending the upper eyelid and superiorly to the soft tissues (subperiosteal) of the forehead (frontal bone).

Conclusion: Left orbital cellulitis and subperiosteal frontal bone abscess, complicating unilateral pansinusitis

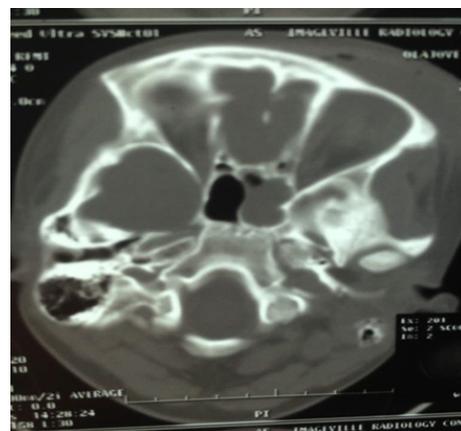
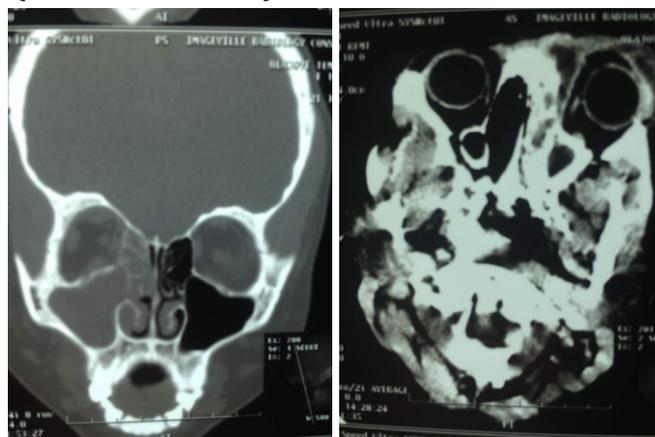


Fig. 2: Axial bone window showing complete pneumatization of the left maxillary antrum (black arrow) and ipsilateral sphenoidal sinus (small white arrow).



AB

Figure 3: Coronal bone window (A) and axial soft tissue window (B). These show obstructed osteomeatal complex (thin black arrow), left ethmoidal sinus with complete depneumatization (white arrow) and lobulated abscess of the medial aspect of the left orbit, having air locules (arrowhead) extending to the upper eyelid (thick white arrow).

MANAGEMENT

She was subsequently admitted and intravenous ceftriaxone 1gm 12 hourly, intravenous metronidazole 250mg 8 hourly, intramuscular dexamethazone 8gm12 hourly, ciprofloxacin eye drops 8 hourly, chloramphenicol ointment nocte and betamethasone-neomycin-nose drops 2 drops 8 hourly into each nasal cavity were administered for 72 hours while the patient was being prepared for surgery as her condition was not improving. She had urgent orbital abscess drainage using the lid approach and endoscopic sinus surgery to drain the sinuses. Post operative condition was satisfactory. She was discharged home fifth day postoperatively on oral antibiotics (cefixime).

DISCUSSION

Orbital complications are the most frequently encountered complications of acute rhinosinusitis. Infections of paranasal sinuses especially the ethmoid sinus can spread directly to the orbit via the thin and often dehiscent lamina papyracea¹⁵ or hematogenously via the venous system¹⁶. According to Chandler's classification, orbital complications may progress according to the following steps¹¹: Pre-septal cellulitis, orbital cellulitis, subperiosteal abscess, orbital abscess and cavernous sinus thrombosis.

Intracranial complications are most frequently associated with ethmoidal, frontal or sphenoidal sinusitis and include epidural abscess, meningitis, encephalitis, superior sagittal and cavernous sinus thrombosis. Infections can spread from sinuses to the intracranial compartment via two routes: valveless diploic veins or by erosion of the sinus bones¹⁷. The clinical presentation of the intracranial complications can be non-specific. However, the majority of patients presents with signs and symptoms such as nausea and vomiting, diminished consciousness and signs of meningeal irritation.^{18,17,19-21} Intracranial abscesses often proclaim themselves by signs of increased intracranial pressure, meningeal irritation and focal neurological deficit such as third, sixth or seventh cranial nerve palsy^{18,19,22}.

The advent of endoscopic nasal examination, radiological imaging techniques and potent antibiotics have resulted in significant reduction in the incidence of orbital complications of acute rhinosinusitis. Orbital complications associated with rhinosinusitis are preseptal cellulitis, orbital cellulitis, subperiosteal abscess, orbital abscess and cavernous sinus thrombosis. In orbital complications, common responsible bacterial agents are Haemophilus influenzae, streptococcus pneumoniae and staphylococcus aureus. In acute bacterial rhinosinusitis, infection

spreads to the surrounding tissues via direct, venous, lymphatic and perineural routes. Direct spread takes place when the infection creates osteomyelitis in the compact and diploic bones²³⁻²⁷. In the clinical practice manual of the American Academy of Paediatrics (2013) on the diagnosis, treatment and management of acute bacterial sinusitis in children between 1 and 18 years of age, Waldet et al³¹ emphasized that 82% of the cases diagnosed with acute sinusitis in the United States are prescribed antibiotics.

The duration of medical treatment of acute rhinosinusitis varies between 10 and 28 days. In patients with intraorbital complications, ceftriaxone, ampicillin-sulbactam, or piperacillin are recommended. Metronidazole is usually added to cover for the anaerobes. In addition to the antimicrobial therapy, it is necessary to administer nasal decongestant and nasal corticosteroid as well as nasal saline irrigation³¹.

In the guideline study by Wald et al³¹, clinicians are advised to assess cases diagnosed with acute bacterial sinusitis with contrast paranasal CT and MRI especially where intracranial complication is being suspected. Paranasal sinus CT and/or MRI are important for both confirmation of the acute rhinosinusitis diagnosis and planning of the surgical treatment for rhinosinusitis or its complications. Paranasal sinus CT is recommended for the diagnosis and treatment of complications especially orbital abscess. MRI is also important in the assessment of complications due to sinus infections such as cavernous sinus thrombosis. For diagnosis, follow-up of treatment and possible complications of acute rhinosinusitis, as well as for surgical planning of the cases considered, paranasal sinus CT is a frequently used nasal image modality with high sensitivity²⁷⁻³².

CONCLUSION

Acute rhinosinusitis may be complicated by orbital cellulitis and abscess formation. Urgent referral to the tertiary health center where facilities are available for its prompt management is very important to avoid life threatening intracranial complications.

REFERENCES

1. Gallagher RM, Gross CW, Phillips CD. Suppurative intracranial complications of sinusitis. *Laryngoscope*. 1998; 108:1635-42. <http://dx.doi.org/10.1097/00005537-199811000-00009>.
2. Gordts F, Herzeel R. Orbital involvement in sinus pathology: often without ocular pain. *Bull Soc Belge Ophtalmol*, 285 (2002), pp.9-14
3. Ogunleye A.O.A, Nwaorgu O.G.B, Lasisi A.O. Complications of sinusitis in Ibadan, Nigeria West Afr J Med, 20 (2001), pp.98-101
4. Kanra G, Secmeer G, Gonc E.N, Ceyhan M, Ecevit Z. Periorbital cellulitis: a comparison of different treatment regimens, *Acta Paediatr Jpn*. 1996;38(4)339-42.
5. Vairaktaris E, Moschos M.M, Vassiliou S, Baltatzis S, Kalimeras E, Avgoustidis D, et al. Orbital cellulitis, orbital subperiosteal and intraorbital abscess: report of three cases and review of the literature. *J Craniomaxillofac Surg*. 2009;37(3):132-6.
6. Suhaili DN, Goh B.S , Gendeh B.S. A ten year retrospective review of orbital complications secondary to acute sinusitis in children *Med J Malays*, 65 (1) (2010), pp. 49-52
7. Soon V.T. Pediatric subperiosteal orbital abscess secondary to acute sinusitis: a 5-year review. *Am J Otolaryngol*. 2011;32(1):62-8.
8. Lavania A, Sharma V, Reddy N.S, Baksh R. Orbital cellulitis: a complication of sinusitis. *Kathmandu Univ Med J*, 3 (3) (2005 Jul), pp. 292-293
9. Sguthorpe J.D, Hochman M. Inflammatory sinus diseases affecting the orbit. *Otolaryngol Clin North Am*, 26 (4) (1993 Aug), pp. 657-671
10. Patt B.S, Manning S.C. Blindness resulting from orbital complications of sinusitis. *Otolaryngol Head Neck Surg*, 104 (6) (1991 Jun), pp.789-795
11. Chandler JR, Langenbrunner DJ, Stevens ER. The pathogenesis of orbital complications in acute sinusitis. *Laryngoscope*. 1970;80(9):1414-28. Comment in: *Ann Otol Rhinol Laryngol*. 1977;86 (Pt 1):616-22; *Laryngoscope*. 1997;107 (4):441-6.
12. Swift A.C, Charlton G. Sinusitis and acute orbit in children. *J Laryngol Otol*, 104 (1990), pp.213-216
13. Wald ER, Pang D, Milmore GJ, Schramm VL Jr. Sinusitis and its complications in paediatric patients. *Paediatr. Clin North Am*. 1981;28(4):777-96.
14. Uzcategui N, Warman R, Smith A, Howard CW. Clinical practice guideline for the anagement of orbital cellulitis. *J Paediatr Ophthalmol Strabismus*. 1998;35(2):73-9; quizz 110-1.
15. Rumelt S, Rubin P A. Potential sources for orbital cellulitis. *International ophthalmologic clinics*, 1996; 36 (3):207-21
16. Eustis H S, Mafee M R, Walton C, Mondnca J, M R Imaging and CT of orbital infections and complications in acute rhinosinusitis. *Radiology clinics of North America*. 1998; 36 (6) : 1165-83
17. Mortimore S, Wormaid P J. The Groote Schuur hospital classification of the orbital complications of sinusitis. *The journal of Laryngology and otology*. 1997; 111 (8) : 719-23
18. Gallagher R M, Gross C M, Philips C D. Suppurative intracranial complications of sinusitis. *The Laryngoscope*. 1998; 108 (11 pt 1) : 1635-42
19. Jones N S, Walker J L, Bass S, Jones T, Punt

- J. The intracranial complications of rhinosinusitis : can they be prevented? *The Laryngoscope* . 2002; 112 (1) : 59-63
20. Bayonne E, Kania R, Tran P, Huy B, Herman P. Intracranial complications of rhinosinusitis. A review, typical imaging data and algorithm of management. *Rhinology*. 2009; 47 (1):59-65
21. Hicks C W, Weber J G, Reid JR, Moodley M. Identifying and managing intracranial complications of sinusitis in children : a retrospective series. *The paediatric infectious disease journal*. 2011; 30 (3):222-6
22. Kastner J, Tandy M, Lisy J, Grabec P, BETKA J. Orbital and intracranial complications after acute rhinosinusitis. *Rhinology* . 2010; 48 (4) : 457-61
23. Watkins LM, Pasternack MS, Banks M, Kousoubris P, Rubin PAD. Bilateral cavernous sinus thromboses and intraorbital abscesses secondary to *Streptococcus milleri*. *Ophthalmology* 2003;110:569-74.
24. Hytonen M, Atula T, Pitkaranta A. Complications of acute sinusitis in children. *Acta Otolaryngol Suppl* 2000; 543:154-7.
25. Lund VJ, Kennedy DW. Quantification for staging sinusitis. The Staging and Therapy Group. *Ann Otol Rhinol Laryngol Suppl* 1995; 167: 17-21.
26. Younis RT, Lazar RH, Bustillo A, Anand VK. Orbital infection as a complication of sinusitis: are diagnostic and treatment trends changing? *Ear Nose Throat J* 2002; 81:771-5.
27. Guven M, Suoğlu Y, Erdamar B, Colhan I, Demir D. Orbital complications of acute sinusitis. *Kulak Burun Bogaz Ihtis Derg* 2004; 12: 115-9.
28. Ryan JT, Preciado DA, Bauman N, Pena M, Bose S, Zalzal GH, et al. Management of pediatric orbital cellulitis in patients with radiographic findings of subperiosteal abscess. *Otolaryngol Head Neck Surg* 2009; 140: 907-11.
29. Bhargava D, Sankhla D, Ganesan A, Chand P. Endoscopic sinus surgery for orbital subperiosteal abscess secondary to sinusitis. *Rhinology* 2001; 39: 151-5.
30. Woolley EJ, Patel M. Subdural empyema resulting from displacement of a root into the maxillary antrum. *Br Dent J* 1997; 182:430-2.
31. Wald ER, Applegate KE, Bordley C, Darrow DH, Glode MP, Marcy SM, et al. Clinical practice guideline for the diagnosis and management of acute bacterial sinusitis in children aged 1 to 18 years. *Pediatrics* 2013; 132: 262-80.
32. Bedwell J, Bauman NM. Management of pediatric orbital cellulitis and abscess. *Curr Opin Otolaryngol Head Neck Surg* 2011; 19:467-73.