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# ORIGINAL ARTICLE

## Orbital cellulitis complicating sinusitis: a 15-year review

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**Abstract**
***Background:*** Orbital cellulitis is an infection of the orbital soft tissues behind the orbital septum. Primary sinus infection is the most common cause of orbital cellulites. It is an ocular emergency that threatens not only vision but also life from complications such as meningitis, cavernous sinus thrombosis, and brain abscess.
***Method****:* A fifteen-year retrospective review (1986 – 2000) of all cases of orbital cellulitis, but with special focus on those of sinogenic origin seen at the University College Hospital, Ibadan, Nigeria.
***Results*****:** Ninety patients were managed. There was a male preponderance (M: F ratio of 2:1) while 84% of the patients were below 20 years of age. Sinogenic orbital cellulitis constituted 57% of the study population (ninety cases) with the left orbit being involved most (55%), while the maxillary sinus had the highest incidence of sinusitis either singly (18%) or combined (65%). Complication of orbital cellulitis was found to be 52%, with no death but 11% became blind due to panophthalmitis.
***Conclusion:*** Though antibiotics have altered the course of sinusitis, its grave complications still persist in our environment. It is hoped that a well-structured health education/awareness programme and early referral to specialists will improve the final outcome.

**Key words:** Orbital cellulites, sinusitis, panophthalmitis, blindness

### Introduction

The paranasal sinuses are a group of paired air containing spaces that surround the nasal cavity extending superiorly to the skull base and laterally to encompass the medial wall and floor of the orbit. They include the maxillary, ethmoidal, frontal, and sphenoidal sinuses with each having narrow ostium that opens into the nose. [1]

Inflammation of their mucosal lining is referred to as sinusitis. This is a frequent occurrence and their complications, which can be life threatening, have become rare especially in the developed nations since the introduction of antibiotics. [2] However, in Ibadan, Nigeria, this is not the case. [1]

Orbital cellulitis is an infection of the orbital soft tissues behind the orbital septum. It occurs in any age group but is mostly a disease of childhood. [2] It is an ocular emergency that threatens not only vision but also life from complications such as meningitis, cavernous sinus thrombosis, and brain abscess. [3, 4] In the pre-antibiotic series of Birch-Hirachfield, 19% of cases died and 20% were blinded in the involved eye. [5] Primary sinus infection is the most common cause of orbital cellulitis. Infection of the sinuses spread to the orbit either by; [1, 2] a) direct extension through the thin bone [lamina papyracea] found in the lateral wall of the ethmoid complex, the floor of the frontal sinus and roof of the maxillary antrum; b) local thrombophlebitis or infected thrombi along valveless venous connections. Complications are more frequent due to ethmoiditis and in adults the frontal sinus is frequently responsible.

This report aims at drawing attention to the continued leading sinogenic origin of orbital cellulitis. It is hoped that this will prompt early diagnosis and treatment, and reduce morbidity and mortality.

### Patients and Methods

This is a retrospective study of all cases of clinically/radiologically diagnosed orbital cellulitis in ninety patients admitted into the Ophthalmology and Otorhinolaryngology wards of the University College Hospital, Ibadan, Nigeria within a fifteen year period (1986 – 2000).

The medical records of these patients [sixty males and thirty females] were retrieved and analyzed. Data extracted included age, sex, underlying cause of orbital cellulitis, and site of the pathologies (orbital cellulitis and sinusitis). Also, included were the microbiological agents and surgical treatment offered.

## Results

A total of 90 patients consisting of 60 males and 30 females were reviewed, with a male to female ratio of 2:1. Their ages ranged from 3.5 to 66 years, with 84% of the patients being below 20 year of age (Figure 1).

Sinusitis was the underlying cause of orbital cellulitis in 51 patients (57%). Other causes are as shown in Fig. 2. In sinogenic orbital cellulitis, the left orbit was involved in 55% and the right in 31% while it was bilateral in 14% of the patients. The maxillary sinus had the highest frequency of sinusitis either singly (18%) or combined with other sinuses (65%) (Table 1). There were only eight positive cultures with staphylococcus aureus (75%) being the common isolate. Other organisms isolated are β-haemolytic streptococcus (12.5%) and Neiseria gonorrhoea (12.5%). No fungus was isolated.

Complications of orbital cellulitis were seen in 47 (52%) of the 90 patients. Empyema (lid/scalp) was the commonest (46.8%) (Table 2). All the patients with sinogenic cause had one form of surgery or the other as shown in Table 3. Two patients aged 14 and 18 years were found to have alveolar rhabdomyosarcomas from the histology specimen obtained at antrostomy.

Figure 1: Age and sex of patients with orbital cellulitis

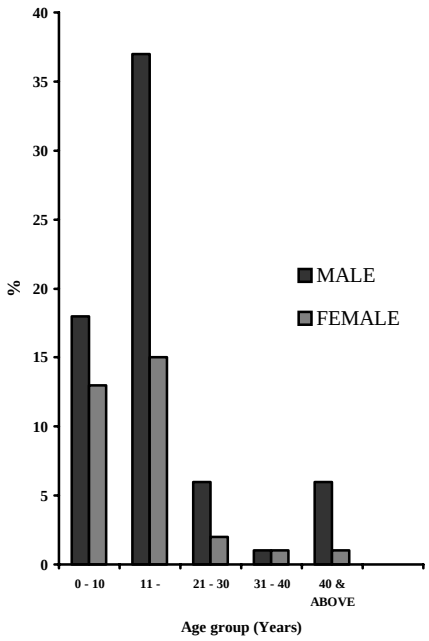


Figure 2: Aetiological causes of orbital cellulites

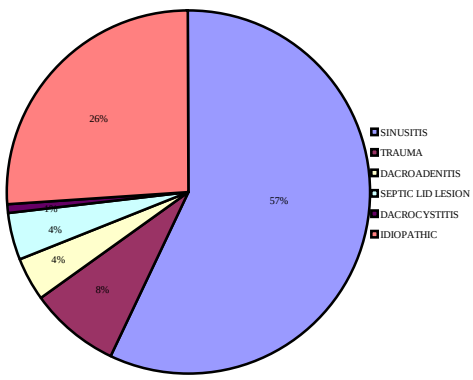


Table 1: Site distribution of sinusitis in 51 patients

| Sinus | No. (%) |
|---|---|
| Maxillary | 9 (18) |
| Frontal | 5 (9) |
| Ethmoidal | 2 (4) |
| Maxillary + ethmoidal + frontal | 14 (27) |
| Maxillary + frontal | 9 (18) |
| Maxillary + ethmoidal | 6 (12) |
| Maxillary + sphenoidal | 2 (4) |
| Frontal + ethmoidal | 3(6) |
| Maxillary + ethmoidal+ sphenoidal | 1 (2) |

Table 2: Complications of orbital cellulites in 47 patients

| Complications | No. (%) |
|---|---|
| Empyema (lid/scalp) | 22 (46.8) |
| Panophthalmitis | 10 (21.3) |
| Cavernous sinus thrombosis | 9 (19.2) |
| Exposure keratitis/corneal perforation | 5 (10.6) |
| Meningitis | 1 (2.1) |

Table 3: Surgical treatment of sinusitis in 51 patients

| Surgery | No. (%) |
|---|---|
| Proof puncture and antral lavage | 18 (35) |
| Intranasal antrostomy | 6 (12) |
| Frontoethmoidectomy + intranasal antrostomy | 6 (12) |
| Intranasal antrostomy + polypectomy | 2 (4) |
| Intranasal antrostomy+ ant. Partial turbinectomy | 2 (4) |
| Frontoethmoidectomy + Caldwell Luc procedure | 1 (2) |
| Caldwell Luc procedure | 1 (2) |
| Frontal trephination | 1 (2) |
| Incision & drainage of lid/scalp abscess | 14 (27) |
| Evisceration | 5 (10) |
| Enucleation | 3 (6) |

## Discussion

The introduction of antibiotics has altered the course of sinusitis and its complication.[1, 2] This is more evident in the developed countries. The most disturbing complications of sinusitis involve the orbit and intracranial cavity. [6] Most orbital inflammations arise as complication of primary sinus disease. [1 – 4] The young are more frequently affected in orbital complications of sinusitis. In this series, 84% of the patients were below 20 years of age. This is in agreement with the studies of Majekodunmi, Osuntokun, and Moloney *et al*, who had 70%, 80% and 85%, respectively. [3, 4, 7]

The male preponderance also conforms to the findings of other workers.[3, 4, 8, 9] Reasons for this is unclear. However, Kenny et al and Child have suggested that females were possibly more immunologically competent. [10, 11] The study of Ogunleye *et al* seems to be at variance with this view as males with sinusitis are more immunocompetent than females in our environment. [12] They however reaffirmed a previous observation that immunity in healthy humans decline at young and old ages. This study further confirms this observation as 57% of our patients are of sinogenic origin. The left orbit has been more frequently affected by orbital cellulitis as consistently shown by other studies. [4, 7, 13] This was also observed in this study, although the reason for this is not clear.

The most common pattern of sinus involvement causing orbital cellulitis was the combination of maxillary, ethmoidal and frontal sinuses (multisinusitis) which is similar to the result of Mortimore *et al.* [9] However, the ethmoidal and maxillary sinuses were most frequently involved in the study by Swift *et al.* [13] The multiple sinus involvement is probably an indication of the severity of the infection and the continuous nature of the mucosal lining of the paranasal sinuses.

Staphylococcus aureus being the commonest pathogen isolated in this series has been documented in many studies where it has acted as a particularly aggressive organism and should never be treated as a contaminant. [2 – 4, 7, 13] The low yield [positive bacteriological culture] could be due to the fact that the patients had been on antibiotics prior to presentation to the hospital. It is however surprising to note that no fungal organism was isolated. One would have thought that fungi elements could have invaded the sinuses secondarily as a result of inappropriate use of the antibiotics. Complication rate of orbital cellulitis in this study was 52%. All the patients survived, but 11% became blind due to panophthalmitis and 16% had to have destructive surgeries. This is at variance with the study of Mortimore *et al* who had a 26% incidence of blindness[9]. The diagnosis of alveolar rhabdomyosarcomas on histology of specimen obtained during antrostomy highlights the importance of subjecting every specimen no matter how 'insignificant' to histology. [14]

Though the course of sinusitis especially with regards to its complications has been altered by the advent of antibiotics, significant morbidity and mortality is still seen in the developing countries. This is largely due to ignorance, poverty, and under treatment on the part of the patients and delayed/missed diagnosis on the part of the clinicians. Health education and awareness programmes aimed at understanding the magnitude of the problem and urgent appropriate measures instituted on time become imperative

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