

## Orbital complications of sinusitis in children in Komfo Anokye Teaching Hospital

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### Abstract

**Objective:** To evaluate the pattern and incidence of orbital complications due to sinusitis in children in Komfo Anokye Teaching Hospital.

**Methods:** Ninety-two children aged between 2 and 14 years who presented with various orbital complications as a result of sinusitis among 1627 children in a 5-year period were evaluated to analyze the pattern and the incidence of the various stages and forms.

**Results:** Of the 1627 children evaluated, 92 (5.7%) had orbital complications. Among those with complications, 52.2% presented with orbital cellulitis, 22.8% presented with subperiosteal abscess, 14.1% presented with periorbital cellulitis, 8.7% presented with orbital abscess, and 2.2% presented with cavernous sinus thrombosis.

**Conclusion:** Despite the low incidence of sinogenic orbital complications, this study showed that orbital cellulitis is the most common among all orbital complications as a result of sinusitis in children.

**Keywords:** Sinusitis, orbital complications, periorbital cellulitis, orbital cellulitis, subperiosteal abscess, cavernous sinus thrombosis.

### Özet: Komfo Anokye Eğitim Hastanesi'ndeki çocuklarda sinüzite bağlı orbital komplikasyonlar

**Amaç:** Çalışmanın amacı Gana, Kumasi'de bulunan Komfo Anokye Eğitim Hastanesi'ndeki çocuklarda sinüzite bağlı orbital komplikasyonların patern ve insidanslarını değerlendirmektir.

**Yöntem:** Hastalığın değişik evre ve formlarının patern ve insidanslarını değerlendirmek için beş yıllık dönemde 1627 çocuk arasında sinüzit sonucu değişik orbital komplikasyonlarla gelmiş 2 ila 14 yaşlarında 92 çocuk değerlendirilmiştir.

**Bulgular:** Değerlendirilen 1627 çocuktan 92'sinde (%5.7) orbital komplikasyonlar mevcuttu. Komplikasyon olanlar arasında %52.2'si orbital selülit, %22.8'i subperiosteal apse, %14.1'i periorbital selülit, %8.7'si orbital apse, %2.2'si kavernoöz sinüs trombozuyla gelmişti.

**Sonuç:** Sinojenik orbital komplikasyonların düşük insidansına rağmen bu çalışma çocuklarda sinüzit nedeniyle tüm orbital komplikasyonlar içinde en çok görülenin orbital selülit olduğunu göstermiştir.

**Anahtar sözcükler:** Sinüzit, orbital komplikasyonlar, periorbital selülit, orbital selülit, subperiosteal apse, kavernoöz sinüs trombozu.

Sinusitis is an inflammatory condition of the mucous membrane of the paranasal sinuses. This is normally a microbial infection commonly caused by viruses such as Rhinovirus, Myxovirus, Reovirus, etc. and bacteria such as *Staphylococcus aureus*, *Streptococcus-β-haemolyticus*, *Haemophilus influenzae*, *Neisseria catarrhalis* and *Proteus mirabilis*.<sup>[1]</sup> Sinusitis can result in nasal and postnasal space disorders, dental conditions, and traumatic conditions of the cranio-maxillofacial bones and also the blood stream septicemia. This condition often presents with frontal headache, fever, general malaise, offensive nasal discharge, blocked nose, and halitosis. It is best managed with the use of systemic antibiotics, analgesic/antipyretic and topical nasal decongestants.<sup>[1,2]</sup>

Sinusitis can complicate intracranial and extracranial conditions if the management is not properly administered. The intracranial complications include meningitis, epidural, subdural and cerebral abscesses, whereas some of the extracranial complications include orbital complications, otitis media, tonsillitis, the formation of nasal polyps and others. Orbital complications have been found to be one of the major challenges for ophthalmologists and the otorhinolaryngologists in the sense that it can result in loss of vision of the eye of the affected orbit or at times death when there is intracranial involvement.<sup>[2,3]</sup>

However, no studies have been performed in Ghana to determine the association between sinusitis and orbital com-

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**Received:** February 5, 2017; **Accepted:** March 15, 2017

Online available at:  
www.entupdates.org  
doi:10.2399/jmu.2017001008  
QR code:



plications in children. The aim of the present study was to evaluate the pattern and incidence of orbital complications due to sinusitis in children in Komfo Anokye Teaching Hospital.

## Materials and Methods

A retrospective study by review of records was conducted in the Ear, Nose and Throat (ENT) and the Eye Departments of Komfo Anokye Teaching Hospital (KATH) between January 2010 and December 2014. Komfo Anokye Teaching Hospital is the second largest teaching hospital in Ghana with a bed capacity of 1500 and serves as a referral center for mid and northern parts of the country. Besides, it also receives referrals from neighboring countries like Burkina Faso, Ivory Coast and Togo.

Ninety-two patients out of 1627 cases diagnosed as sinusitis, who suffered sinusitis with eventual orbital complications and who had been attended to by the otorhinolaryngologist and the ophthalmologist, had their records evaluated.

Their diagnoses were established on the basis of their clinical presentations, clinical examinations, radiological and hematological findings as at the time of their visit.

The patients with a history of trauma to the orbit, those with thyroid orbitopathy and with dental extraction infection were excluded from the study.

The patients with a history of ocular pain and those with pain on moving the eye ball, proptosis, and chemosis were included in the study. In all of the patients, clinical ear, nose and throat examinations were performed together with the radiological investigation (a Conventional x-ray of the paranasal sinuses i.e. Water's view). The patient's visual acuity was checked using the Snellen's visual acuity chart and their intraocular pressure was measured with the Goldman's applanation tonometer to exclude any increase intra-ocular pressure disease. The presence of proptosis was confirmed by measuring with an exophthalmometer. Computerized tomography and ultrasonography were performed in some of the patients to establish their diagnosis.

Clinical presentation was assessed according to Chandler's classification:

- **Group I:** Pre-septal cellulitis eyelid edema without palpable pus and not associated to visual loss of extraocular mobility limitation.
- **Group II:** Orbital cellulitis without abscess, diffuse edema of orbital fat tissue without abscess forming.

- **Group III:** Orbital cellulitis with subperiosteal abscess, abscess forming between the orbit periosteum and bone, eyeball shift with or without movement limitation, with or without visual acuity reduction.
- **Group IV:** Orbital cellulitis with orbit fat tissue abscess, severe proptosis, may be frontal and not lateral or inferiorly shifting as in a subperiosteal abscess, a severe limitation in eye mobility, with or without ophthalmoplegia, with or without visual loss.
- **Group V:** Cavernous sinus thrombosis, orbital phlebitis expanding within the cavernous sinus and crossing the basilar plexus towards the other side, resulting in bilateral disease.

Ethical consent and approval were received from the Committee on Human Research, Publications and Ethics of the Kwame Nkrumah University of Science and Technology (KNUST), School of Medical Sciences and Komfo Anokye Teaching Hospital (KATH).

## Results

Of the 1627 patients, whose data were analyzed, 92 were found to have developed orbital complications. The patients consisted of 61 males (66.3%) and 31 females (33.7%), and the male-to-female ratio was 2:1.

The patients were aged between 2 and 14 years and 6.5% were between 1 and 3 years, 16.3% were between 4 and 6 years, 30.4% were between 7 and 9 years, 38.1% were between 10 and 12 years and 8.7% were between 13 and 15 years.

The mean age of the patients in the study group was 8.8 (range: 2 to 14) years. The age distribution of the patients was shown in Table 1.

Using the Chandler's classification of orbital lesions, 14.1% presented with the stage of periorbital cellulitis, 52.2% with the stage of orbital cellulitis, 22.8% with the stage of subperiosteal abscess, 8.7% with the stage of orbital

**Table 1.** The age distribution of patients.

Age group (years)	n (%)
1-3	6 (6.5%)
4-6	15 (16.3%)
7-9	28 (30.4%)
10-12	35 (38.1%)
13-15	8 (8.7%)

abscess, and 2.2% presented with the stage of cavernous sinus thrombosis as shown in Table 2.

## Discussion

Many studies in the literature reported orbital cellulitis as the most common complication of sinusitis, and it is most frequently associated with ethmoiditis in children.<sup>[4-9]</sup> Tobin et al., Hirsch et al. and Wells et al. also reported orbital cellulitis or abscess occurring most frequently from ethmoidal sinusitis and less frequently from maxillary sinusitis or frontal sinusitis and it is more common than intracranial extensions.<sup>[10-12]</sup>

Al-Madani et al. also reported 616 cases of acute sinusitis, of which 36 (5.8%) presented with orbital complications.<sup>[13]</sup> Of these patients, 26 (72.2%) were children and within them 21 (80.8%) had preseptal whereas 5 (19.2%) had orbital cellulitis. In a retrospective review study, Welkoborsky et al. analyzed the clinical records of 49 children (27 girls, 22 boys, with a mean age of 11.8 years).<sup>[14]</sup> They found out that 18 (36.7%) presented with orbital complications due to acute sinusitis. Using Chandler's classification, 10 (20.4%) were found to have preseptal whereas 8 (16.3%) had orbital cellulitis. Similarly, Stojanović et al. in the clinical center in Kragujevac, reported of orbital complications in 53 patients (1.35%) out of 3912.<sup>[15]</sup> This study has confirmed the relationship between sinusitis and orbital complications in children with an incidence rate of 5.7%. This seems in conformity with the literature published by Al-Madani et al. (5.8%) and Neto et al. (6.0%).<sup>[13,16]</sup> Stojanović et al. reported 1.4%, which is much lower whereas Welkoborsky et al. also reported 36.7%, which is much higher.<sup>[14,15]</sup>

There is a higher incidence in males than females with a male-to-female ratio of 2:1. This conforms to the study by Adedeji et al. and Neto et al.<sup>[4,16]</sup> The higher incidence in males as to the females will be difficult to explain. In the present study, the mean age of the patients was 8.8 years which conforms to other presentation which found it to be between 6 and seven years. Neto et al. reported of a mean age of 6.5 years whereas Welkoborsky et al. also reported of 11.8 years.<sup>[14,16]</sup>

In the developed countries, most of the patients presented at the early stages. Sobol et al.<sup>[17]</sup> in Canada reported 72% of patients presenting with the stage of periorbital cellulitis, 19% with the stage of orbital cellulitis, and 9% with the stage of orbital abscess, but they did not report any incidence of the latter two stages of orbital complications which

**Table 2.** The pattern of orbital complications using Chandler's classification.

Group	Stage	Description	n (%)
I	Periorbital cellulitis	Edematous, non-tender eyelid	13 (14.1%)
II	Orbital cellulitis	Difference in edema and influential of orbital contents without abscess formation	48 (52.2%)
III	Subperiosteal abscess	Apparent collection of purulent exudates between the periosteal and the bony orbital wall with exophthalmus and chemosis	21 (22.8%)
IV	Orbital abscess	Marked exophthalmus, chemosis and visual impairment	8 (8.7%)
V	Cavernous sinus thrombosis	Proptosis, globe fixation and severe loss of visual acuity	2 (2.2%)

normally present with poor prognosis. However, it is worrying that severe complication like orbital abscess (8.7%), subperiosteal abscess (22.8%) and cavernous sinus thrombosis (2.2%) in total accounted for 38.7% of all sinogenic orbital complications. Over one third of all orbital complications from sinusitis in children seen in Komfo Anokye Teaching Hospital were severe which may be life-threatening or at minimum a damage to the eye. Perhaps, these children are reporting late or the management of regime needs to be reviewed by all involved in the management.

## Conclusion

Orbital complications are among the most common complications of sinusitis in children especially between seven and nine years of age. Orbital complications can present with various stages, of which orbital cellulitis is the frequent stage as it is the state where most patients start to manifest most of the clinical signs and symptoms.

Orbital complications can result in the loss of vision and even death and therefore, it is very important to refer to proper management for every child presenting with an offensive nasal discharge and periorbital swelling as it may be an indication of a sinogenic orbital complication.

We recommend the adoption of a more dynamic approach for the management of sinusitis. Early recognition and appropriate treatment may prevent these life-threatening complications.

**Conflict of Interest:** No conflicts declared.

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Please cite this article as: Opoku-Buabeng J, Lartey SY. Orbital complications of sinusitis in children in Komfo Anokye Teaching Hospital. *ENT Updates* 2017;7(1):38–41.