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# Red Eye: The Red Herring of Otolaryngologic Diseases

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## Abstract

**Background:** Red eye of otolaryngologic origin could present a diagnostic conundrum. A clear understanding of the otolaryngologic differential diagnosis is required to clinch a diagnosis. In this paper, we describe some diferential diagnosis and diagnostic features of red eyes of otolaryngologic origin.

**Objective**:To describe some diferential diagnosis and diagnostic features of red eyes of otolaryngologic origin with a view to facilitate early diagnosis and treatment.

**Methods**: Records of patients with red eyes of otolaryngologic origin were reviewed. The otolaryngologic culprits and features that proved their culpability were highlighted.

**Results**: In all, 32 patients with red eyes of otolaryngologic origin were seen. Majority had used eye drops as primary eye care. About 71.9% seen by the general practitioners were referred to ophthalmologists on account of persistent ocular symptoms. The otolaryngologic culprits were mostly nasal and paranasal diseases. Eight(25%) required conservative treatment, 24(75%) required surgical intervention and 3(9.4%) developed complete blindness.

**Conclusion:** This study shows that red eyes of otolaryngologic origin are mostly caused by nasal and paranasal sinus diseases. However, both patients and general practioners could be misled to believe the eye is the primary source of the ocular symptoms. Such diagnostic conundrum are associated not only with increased morbidities but also cost of treatments. The need to have a clear understanding of the otolaryngologic differential diagnosis of red eyes is hereby stressed. Also, the public must desist from arbitrary use of eye drops and the slogan: “If symptoms persits after 2 days consult your doctor” should be a community watchword.



### Keywords

Red eye; Red herring; Otolaryngologic diseases; Eye drops; Community watchword


## Introduction

Red eye is a common clinical problem in the general population. It accounted for approximately 15% of consultations with ophthalmologists and almost 6% with general medical practitioners [1]. Over 40% of cases seen in the eye unit of Bawku Hospital, Ghana in 2004 were red eyes [2]. The symptoms and signs include red, irritating, itchy, discharging, epiphoric and painful eyes. The redness being one of the cardinal signs of inflammation in response to all sorts of pathological insults (infection, tumour invasion or physical trauma) is the hallmark of the condition. Depending on the stage and etiological factor, the condition could progress to visual loss, intracranial abscesses and death. Red eye is of varying etiologies and the differential diagnoses are so large that the caregiver must be comfortable with all diagnoses and must be able to distinguish between them [3]. The etiology could be local, regional or systemic in origin. Among the regional factors are otolaryngologic diseases the basis of which is anatomical contiguity between the eyes and their otolaryngologic counterparts. Structurally, the floor of the frontal sinus is the roof of the orbit just as the floor of the orbit is the roof of the maxillary sinus. The ethmoidal sinus abuts on the medial wall of the orbit and the nerves of the orbit are in close proximity with the sphenoidal sinus. There are also venous communications between the orbit and paranasal sinuses. Thus, spread of diseases beyond the body wall of the sinuses can occur through direct spread, venous and perineural spaces. The diagnosis of red eye of otolaryngologic origin can be challenging. First, there may be no striking symptoms of the primary otolaryngologic diseases. And secondly, the useful otolaryngologic symptoms and signs may be masked by inappropriate self-medication. Thus, knowledge of the patterns of otolaryngologic culprits is important to avoid a diagnostic pitfall. Detailed history, thorough physical examinations and ancillary investigations are fundamentals to clinch the diagnosis. Computerized Tomography is valuable as ancillary investigation [4,5]. In so far that there are effective treatment for red eyes of otolaryngologic origin, its prognosis partly depends on early diagnosis by the first medical contacts. Thus, we embarked on this study to facilitate early diagnosis of the condition by non-otolaryngologists who in most cases are the first contacts.

## Methods

This was a retrospective study of patients with red eyes referred by ophthalmologists for otolaryngologic evaluation . Clinic records were essentially the source of information. The information extracted from these records included the patients’ bio data, occupation, onset of ocular and otolaryngologic symptoms, duration of symptoms, treatment previously received, sources of referral, otolaryngologic diagnoses and treatment. Those with incomplete information in their records were excluded from the study. Ethical Clearance was obtained from the institution’s Ethics and Research Committee while written informed consents were obtained from patients with pictorial information.

## Results

Overall, 32 of the 38 cases referred for otolaryngologic evaluation met the study criteria. Of the 32 cases, 19 were males while 13 were females. Their age ranges from 6 years to 58 years. The duration of ocular symptoms varies from 5 days to 18 months. Only 2 (6.25%) consulted ophthalmologists at onset while others had indulged in one form of eye care or the other (Figure 1). About 71.9 % of the patients were seen and referred to ophthalmologists by the general practitioners at the secondary health care level. Three (9.4%) of the patients developed complete blindness. The otolaryngologic culprits were mostly nasal and paranasal sinus diseases. These were Acute bacterial sinusitis – 17 cases (10 ethmoidal, 2 fronto-ethmoidal, 4 maxillary and

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1 multi sinusitis ), Allergic rhinitis – 5 cases, Fungi sinusitis – 2 cases, Maxillary antral carcinoma – 4 cases, Nasopharyngeal carcinoma – 2 cases and infected Dento-alveolar cyst – 1 case. A case of exposure keratitis due to facial nerve palsy was recorded (Table 1). Radiology was positive in 26 (81.25%) of the cases. Eight required conservative treatment, 22 required otolaryngologic interventions, 1 required combined surgery with the neurosugeon and 1 was managed jointly with the maxillofacial surgeon.

## Discussion

Many studies had dwelt on the diverse aetiological factors of red eyes [1-3,6-10]. The present study focused on the otolaryngologic differential diagnoses of red eyes. As the study shows, the otolaryngologic culprits in decreasing order of frequency were infective (Bacterial), allergic, mycotic and neoplastic diseases.

### Acute bacterial sinusitis (53.1%)

This ranks highest among the otolaryngologic causes of red eyes. It accounted for 53.1% of the cases in this series.The sinusitis were noted to produce red eyes by causing orbital cellulitis. Further analysis showed a prevalence of 58.8%, 11.8%, 23.5% and 5.9% for solitary ethmoiditis, fronto-ethmoiditis, maxillary sinusitis and multi sinusitis respectively. This is consistent with other reports that sinusitis is the commonest cause of orbital cellulitis [11-13] with acute ethmoiditis being the most common culprit [12,13]. The preponderance of ethmoiditis in children may be due to the prominence of ethmoid (well pneumatized) in this age group as well as contiguity with the orbit. Although,other paranasal sinuses and the orbit are also contiguous, the bony orbito-sinus interface is thinnest at the ethmoidal region. As depicted by Sinnatanby, the lateral wall of the ethmoidal labyrinth, in the medial wall of the orbit is paper-thin (the lamina papyracea) [14], hence, inflammatory exudates tend to pass most readily from the ethmoid to the orbit than from other paranasal sinuses. Thus, ethmoidal sinus is the first to be considered as the primary focus when evaluating patients with red eyes of otolaryngologic origin. Generally, the clinical pointers are acute onset, nasal discharge, nasal obstruction, facial pain, headache and discomfort in association with acute red eyes. Sometimes however,

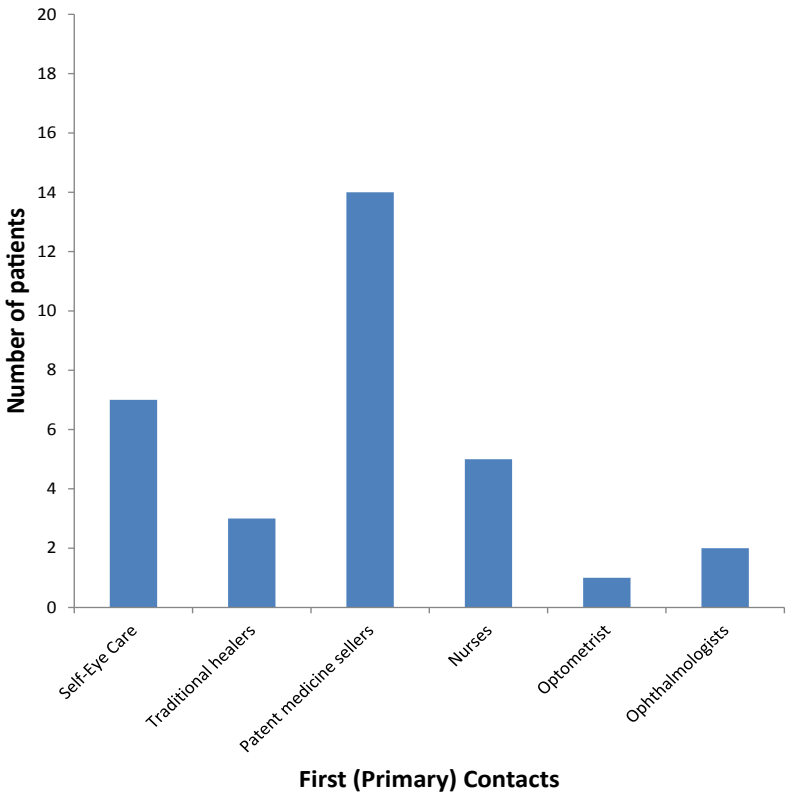


**Figure 1:** Patterns of first (primary) contacts of patients with red eyes of otolaryngologic origin.

**Table 1:** Distribution of the otolaryngologic differential diagnoses of red eyes.

| Otolaryngologcal diferential diagnoses | No of Patients | % |
|---|---|---|
| Acute Bacterial Sinusitis | 17 | 53.1 |
| Allergic Rhinitis | 5 | 15.6 |
| Fungi Sinusitis | 2 | 6.3 |
| Maxillary Antral Carcinoma | 4 | 12.5 |
| Nasopharyngeal Carcinoma | 2 | 6.3 |
| Infected dento-alveolar cyst | 1 | 3.1 |
| Facial nerve palsy | 1 | 3.1 |
| **Total** | **32** | **100** |

the nasal and paranasal sinus' symptoms are trivial or absent at presentation. As noted in our own study, about 35% of the patients with red eyes did not present with nasal or paranasal sinus symptoms. This however did not absolve the nasal and paranasal sinus diseases of culpability as patients were found to have had the symptoms between 1-2 weeks prior to the onset of their red eyes. The lack of symptoms at presentation in these cases could be due to partial resolution of the nasal and paranasal sinus symptoms, suppression of the symptoms by self-medication or the fact that the patients did not consider the symptoms significant. It then behoves on the clinician to always elicit recent or past medical history of nasal and paranasal sinus diseases in every case of red eyes. This should be complemented by thorough physical examination of the nose and paranasal sinuses.Often the examination will show hyperaemic mucosa, engorged turbinates, mucous or mucopurlent discharge with or without tenderness over the involved paranasal sinus(es). Radiographic studies may show cloudiness, diffuse opacity or fluid collection in the paranasal sinuses. The presence of fluid in the paranasal sinuses is an indication for otolaryngologic referral (Figure 2).

### Allergic rhinitis (15.6%)

Five, repesenting 15.6% of our cases were associated with allergic rhinitis. In their own study, Berger et al found that 90.5% of patients with allergic rhinitis also had ocular allergic symptoms [15]. Also in his remark, Granet noted a strong association between allergic rhinitis and ocular allergy [16]. Although, nasal and ocular allergies could be triggered by a common mechanism, there are evidences of a cause-effect relationship in the sequence of their occurence. Often, the inflamamtion starts in the nasal and paranasal sinus cavities and spreads to the orbit. Clinically, the nasal event is heralded by paroxysmal sneezing and watery rhinorrhea. This is followed by nasal obstruction, irritation and discomfort. The hallmark is itching of the nose and throat or eyes. History of exposure to allergens may be obtained in some individuals. In contrast to bacterial sinusitis, pain and tenderness are usually mild or absent. The nasal mucosa may be pale or hyperemic. Contrary to some reports, nasal eosinopilia were not consistent in our own study. Diagnosis of allergic sino-nasal origin of the red eye is facilitated by considering the condition in every case of allergic conjunctivitis. Plain radiograph of the nose and paranasal sinuses may show enlarged turbinates and cloudiness/opacity of the affected paranasal sinus(es).

### Fungi sinusitis (6.3%)

Two mycologically-confirmed cases of fungal sinusitis were recorded in this study. In one case, the fungi invasion originated from the maxillary sinus while in the other, it arose from the frontal sinus. That fungi can enter the orbit to induce orbital cellulitis has been reported [13]. In the past, reports showed that fungal sinusitis is usually found in patients with compromised defense mechanism [17], chronic bacterial sinusitis, AIDS, prolonged use of corticosteroids/antibiotics, and uncontrolled diabetes [18]. In recent studies however, fungi sinusitis has been found to occur in immunocompetent hosts [15,16]. None of the patients in the present study was diabetic, immunodeficient or using immunosuppresive drugs thus reaffirming the new trend of fungi sinusitis occuring in immunocompetent hosts. The onset of cases in this study was insidious and duration was long. There were nasal obstruction and scanty mucoid nasal discharge, in addition to the red eyes and non-axial proptosis. Epistaxis was noted in one of the cases. The epistaxis was intermittent, scanty and spontaneous. The disease is distinguished from the bacterial and allergic sinusitis by its insidious onset and failure to respond to previously-used antibiotic and anti-allergic regimen. Radiology may give the characteristic feature [19].

### Maxillary antral carcinoma (12.5%)

Orbital invasion by malignant tumours of the maxillary sinus were recorded in 4 of our cases. The invasion could be direct or through perineural spaces and venous channels. Tumour invasion of the orbit have been reported by workers [20-22]. Sadly, the tumours recorded in this study were seen too late at the time of otolaryngologic review and expectedly were associated with poor prognosis. The tumour produces red eye by causing inflammatory changes in the orbit. Features that arouse our suspicion were insidious onset, nasal obstruction, epistaxis, unilaterality and non-axial proptosis. In one of the cases, the proptosis was huge and destructive as to cause complete loss of vision. Computerized Tomography showed soft tissue density mass with bony destruction. Diagnosis was established by histological examination.

### Nasopharyngeal carcinoma (6.3%)

This is the most cryptic of the otoloaryngologic malignancies. As remarked by workers, nasopharyngeal carcinoma may show no striking nasal or nasopharyngeal symptoms [23]. The tumour usually arises from the fossa (Fossa of Rosenmueller) in the superiolateral aspect of the nasopharyngeal wall. This site is in close proximity to the foramen lacerum and here, the 6th cranial nerves is at great risk of being caught by the tumour. The most common form of presentation is enlarged (metastatic) cervical lymph nodes. However, early but often ignored symptoms include, naal obstruction, epistaxis or conductive hearing loss due to middle ear effusion [24]. The pointing signs in this study were ear discharge, tinitus, and cranial nerve palsy. Computerized tomography showed lesion in the nasopharynx. A positive biopsy of the nasopharynx was found and confirmed the diagnosis. Early referral to otolaryngologist is crucial to improve the prognostic outlook.

### Infected dento-alveolar cyst (3.1%)

Of interest in this study was finding a red eye in association with dento-alveolar cyst of the upper jaw. It is believed that the orbit was involved either through maxillary sinusitis or vascular communication or both. The clinical features were insidious onset, dento-alveolar swelling and lack of epistaxis. The single most important physical sign is transillumination. This was elicited and positive in our own case. Surgery was both diagnostic and therapeutic.

### Facial nerve palsy (3.1%)

A case of exposure keratitis following facial nerve palsy was recorded in this study. Although, a straightforward diagnosis, the aetiological factor of the facial palsy may remain evasive. In the

**Figure 2:** Showing red eye of (R) Ethmoidal sinusitis.

**Figure 3:** Showing red eye of (R) Maxillary antral carcinoma.

present study, Bell's palsy was responsible. The characteristic features of the palsy were sudden onset, tinnitus and numbness around the ear. In contrast to most reports however, there was no pain in the ear. Red eye in this case was due to dryness of the cornea caused by the inability of the eyelids to spread the tear film on the globe. This predisposes the eye to all sorts of pathological injuries including environmental pollutants. The diagnosis was established on clinical ground after excluding other aetiological possibilities.

### Health-seeking Behaviour of the patients

The health-seeking behaviour of patients in this study is worthy of note. As shown by our records, only two of the patients consulted ophthalmologists at onset whilst others had indulged in one form of eye care or the other (Figure 1). A common denominator to these health-seeking behaviors however was the use of eye drops. Whereas the nasal and paranasal sinuses were the seats of the ocular symptoms, the eye was being treated as if it was the primary source. Expectedly, there were persistent ocular symptoms since the treatments on the eyes were nothing more than chasing the shadow. This prompted the patients to seek further help from the general practitioners. Interestingly, all those who consulted the general practitioners were referred to ophthalmologist without reference to otolaryngologic possibilities. The implications of this were increased morbidities and cost of treatments as shown by the number of patients who required surgical interventions. Since most patients if diagnosed early can be treated at the primary and secondary health care levels, the need to have a clear understanding of the differential diagnosis and diagnositic featrues of the otolaryngologic-induced red eyes at these levels of our health care delivery is hereby stressed.

## Conclusion

This study shows that red eyes of otolaryngologic origin are mostly caused by nasal and paranasal sinus diseases. However, both patients and general practioners could be misled to believe the eye is the primary source of the ocular symptoms. Such diagnostic conundrum are associated not only with increased morbidities but also cost of treatments. The need to have a clear understanding of the otolaryngologic differential diagnosis of red eyes is hereby stressed. Also, the public must desist from arbitrary use of eye drops and the slogan: "If symptoms persits after 2 days consult your doctor" should be a community watchword.

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