ORIGINAL ARTICLE

# Plain Radiological Profile of Paranasal Sinuses in Chronic Nasal Diseases in University of Port Harcourt Teaching Hospital

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## ABSRACT

***Background:*** *The paranasal sinuses can get affected by chronic diseases that maybe mitotic, bacterial, fungal and allergic. Plain x-rays, sinoscopy, tomograms, ultra-sound scan, CT-scan and magnetic resonance imaging (MRI) technique are some of the means by which the sinus can be evaluated and a diagnosis made. The aim of this study is to evaluate the plain radiological findings of the paranasal Sinuses in-patient with chronic nasal diseases in the University of Port Harcourt Teaching hospital.*

***Methods:*** *This is a prospective study of patients seen at the otorhinolaryngology out patient clinic of the university of Port Harcourt Teaching Hospital from August 2002 to November 2003. All patients with symptoms suggestive of nasal or paranasal sinus disease of more than 8 weeks duration were evaluated for the study. All the patients had plain radiographs in the occipito-mental, occipito-frontal and lateral views. A radiologist interpreted the x-rays.*

***Results****: A total of 66 patients were seen with a male to female ratio of 1:1.4. Ages of patients ranged from 17 years to 65 years. 72.7% had chronic infective sinusitis, 9.1% had vasomotor rhinitis and 6.1% had allergic rhinitis. Plain x-rays showed engorged turbinates due to allergy in 43.9% of patients, chronic sinusitis with engorged turbinates in 15.1%, engorged turbinates in 13.6%, chronic sinusitis in 10.6% and opaque nasal fossa in 6.1%. The maxillary sinus was most commonly involved site of disease as seen in (71.2%) of patients. The sphenoid sinus was the least involved (7.4%). Thirteen patients (19.7%) did not show any changes in the sinus x-rays.*

***Conclusion****: Chronic sinusitis is the commonest chronic nasal disease. Engorged nasal turbinate was the commonest plain x-ray finding. The maxillary sinus was the most commonly diseased sinus. In 19.7%, the plain radiograph was normal. Plain radiographs are a cheap and readily available. tool for the investigation of diseases of the paranasal sinuses with good results in this environment.*

**KEYWORDS:** Plain radiograph; Chronic nasal disease.

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## INTRODUCTION

The paranasal sinuses are paired air-filled out-pouching of the nasal cavity that are lined by ciliated, pseudostratified columnar epithelium. The sinuses are the maxillary, ethmoidal, frontal and sphenoidal. These sinuses are contained within the bones that they are named after [1,2].

The maxillary sinus, also called the antrum of Highmore, is the largest of the paranasal sinuses. This sinus opens by the ostium at the upper part of the medial wall close to the roof of the antrum and below the middle turbinate. It is pyramidal in shape.

The ethmoidal sinus, also called the labyrinth, is made up of thinly walled air-filled cavities numbering between 6 and16, situated in the ethmoidal bone. These air cells may extend to the middle turbinate, frontal, sphenoid and maxillary bones. The ethmoidal air cells are divided into the anterior and posterior groups and each opens into the hiatus semilunaris and the superior meatus respectively [1,2].

The frontal sinus shows a remarkable variation of size and symmetry. It may extend into the orbital plate or the temporal bone. The left and the right sides are separated by a thin plate of bone which maybe deficient in parts or wholly. It exhibits bony loculations and its ostium opens into the infundubulum [1,2].

The sphenoidal sinus is divided into two by a thin bony plate that maybe absent in some cases. The left and right sides are often not symmetrical. The ostium opens at the upper part of the anterior wall just behind the superior meatus [1,2].

The paranasal sinuses can get affected by chronic diseases that maybe mitotic, bacterial, fungal and allergic. Plain x-rays, sinoscopy, tomograms, ultra-sound scan, CT-scan and magnetic resonance imaging (MRI) technique are some of the means by which the sinus can be evaluated and a diagnosis made. Of all the methods of investigation, plain x-rays remain the cheapest and most readily available in this environment. Its resolution is not as good as CT-scan or MRI [3-7]; however it has the advantage of less irradiation when compared to CT-scans [4].

The nose is a contiguous structure with the sinuses [8-10].

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The shape and space within the nasal cavity has an influence on pattern of disease in the nose, with variations in race affecting the pattern of disease seen[8-10].

This study has been undertaken to evaluate the radiological profile of patients with chronic paranasal sinus diseases at the outpatient unit of the oto-rhino-laryngology department of University of Port Harcourt teaching Hospital.

## MATERIALS AND METHODS

This prospective study was done from august 2002 to November 2003. Patients for the study were recruited from those attending the outpatient clinic of the Ear, Nose and Throat department of the University of Port Harcourt Teaching Hospital. The consultant surgeon first evaluated patients with symptoms and signs suggestive of chronic paranasal disease and obtained informed consent. Symptoms included stuffy nose, anterior rhinorrhoea, sneezing, postnasal drip and epistaxis of more than eight weeks duration. The signs include hypertrophied turbinate and mass in the nasal cavity. Patients were sent to do plain radiographs of the paranasal sinuses. The x-rays were done in at least 3 views: occipito-mental (OM), occipito-frontal (OF) and lateral views. The consultant radiologist interpreted the x-rays. The radiologist was required to comment on each of the sinuses on both sides. The same consultant radiologist reviewed all the x-ray films to reduce inter observer error.

Other information obtained included the age, gender and duration of symptoms. There were no exclusion criteria.

## RESULTS

A total of 66 patients were involved in the study. There were 28 males making (42.4%) of subjects and 34 females making (57.6%). The male to female ratio was 1:1.4. The age range of the patients was 17years to 65 years. Duration of symptoms ranged from 2 months to over 10 years. The mean duration of symptoms was 32.38 months.

The unilateral opacity was found in the frontal sinus in 4 (6.1%) cases, eleven (16.7%) cases in the ethmoids and in 22 (33.3%) of cases in the maxillary sinus.

Thirteen (19.7%) patients did not have any changes seen in the paranasal sinuses while twenty nine (43.9%) had only one sinus involved in the disease. Fourteen (21.2%) had involvement of 3 sinuses. The maxillary sinus alone was involved in 28 (42.4%) of cases. The summaries of results are as shown in Fig. 1. Clinical diagnosis; Fig. 2. Radiological findings and Table I Radiological findings in the sinuses.

| | DEMONSTRATED | OPAQUE | CLEAR | MUCOSAL THICKENING | HYPOPLASTIC SINUS | AIR-FLUID LEVEL | POOR QUALITY FILM | BONY CHANGE |
|---|---|---|---|---|---|---|---|---|
| MAXILLARY SINUS | 66 (100%) | 32 (48.5%) | 19 (28.8%) | 13 (19.7%) | _ | 2 (3.0%) | _ | _ |
| ETHMOIDAL SINUS | 64 (97%) | 15 (22.7%) | 48 (72.7%) | _ | 1 (1.5%) | _ | 2 (3.0%) | _ |
| FRONTAL SINUS | 64 (97%) | 14 (21.2%) | 43 (65.2%) | _ | 7 (10.6%) | _ | 2 (3.0%) | _ |
| SPHENOIDAL SINUS | 63 (95.5%) | 2 (3.0%) | 61 (92.4%) | _ | _ | _ | 3 (4.5%) | _ |

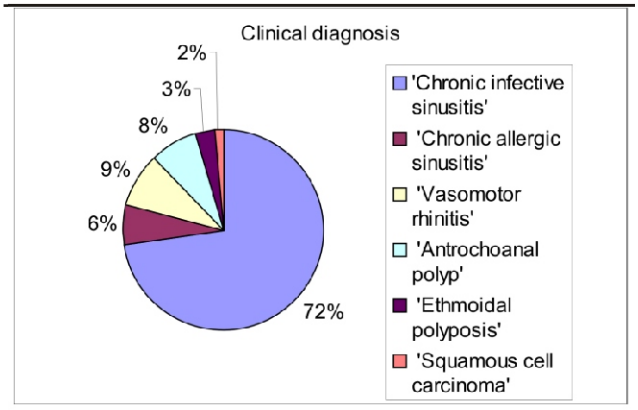


**Fig. 1. Spectrum of Clinical Diagnosis of Patients**

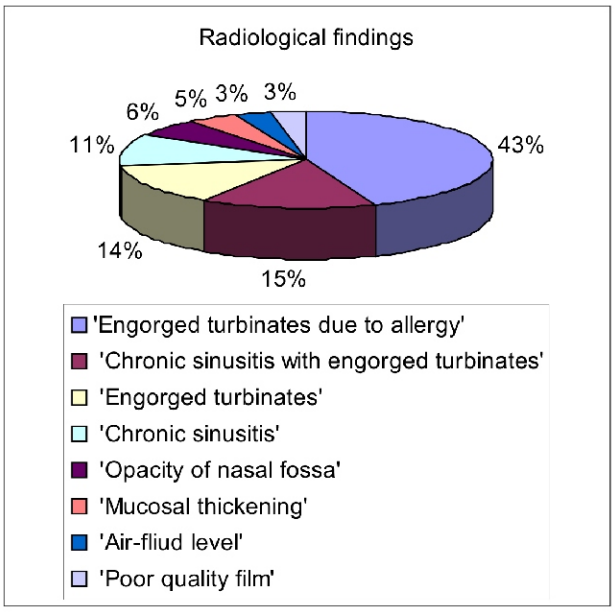


**Fig. 2. Chart Showing the Radiological Findings**

## DISCUSSION

Diseases of the paranasal sinuses were

uncommon in infants and in children as there was no patient seen in this study below the age of 15 years. This is because the drainage in children in whom the sinus is still developing is better than in adults as the maxillary sinus, which is the most commonly involved sinus (table I) has not invaded the alveolar process situated below the floor of the nose. Burkitt's lymphoma is the commonest neoplasia in children in this environment that involves the maxillary sinus. This however is not seen in this series because such diseases are seen and treated at the Paediatric department and not at the ENT department [11].

The mean age of 33.45 years is supportive of other studies that show that diseases of the paranasal sinuses are commonest between the ages of 25 to 45 years [6,7].

The reason for the female preponderance is not immediately known but is in keeping with other studies [11].

Chronic infective sinusitis was by far the commonest clinical finding in this study (72.7%) (Fig. 1). Some studies from other regions in this country show allergy to be the commonest cause of chronic sinusitis. In this series, the incidence of vasomotor rhinitis and allergic rhinitis were low. Fungal infection of the sinus and other specific causes of sinusitis were not seen [11,12].

Incidence of nasal polyps was low and 6.1% were unilateral antrochoanal polyp while 3% were from the ethmoids. The Incidence of mucosal thickening as an isolated finding was low as it was seen as part of cases classified as allergic or chronic sinusitis. Air-fluid levels were seen in a few cases.

One case of nasal malignancy was seen following nasal clearance and histology. Okafor[11] also reported a low incidence of malignancy in South Eastern Nigeria.

Engorged turbinate was the commonest finding on plain radiograph (Fig. 2) [6,10]. In 15.1% of cases it co-existed with features suggestive of chronic sinusitis. In 29 cases, the film was described as engorged turbinate due to allergic rhinitis even though there are no features characteristic of allergic rhinitis as distinct from vasomotor rhinitis or chronic infective sinusitis. This high incidence of allergy on radiography is not in agreement with the clinical findings. More clinical information at the disposal of the radiologist will certainly influence the radiological diagnosis.

The maxillary, frontal and ethmoidal sinuses were demonstrated 100%, 97% and 97% of cases respectively. The ethmoidal and frontal sinuses showed hypoplasia in 1.5% and 10.6% of cases respectively. The inability to demonstrate the ethmoidal, frontal and sphenoidal sinuses was due to poor quality technique. The frontal and sphenoidal sinuses are known to exhibit wide variation in size from extensive invasion of adjacent bones to complete lack of development of either or both sides. The pathological significance of this is not clear [5]. The sphenoidal sinus was demonstrated in 95.5% of cases. The maxillary sinus was most involved in disease processes [7,10-12]. It was described as opaque in 48.5% of cases and had mucosal thickening in 19.7% of cases. The sphenoidal sinus was the least involved in disease processes being clear in 92.4% of cases [6,7,10,13,14] Table I. This finding is supported by most reports of x-rays of the paranasal sinuses in chronic sinusitis. In Lagos however, Olanrewaju found the ethmoidal sinuses to be more involved. In 56.1% of cases, the lesion was unilateral.

In 43.9% of cases, the lesion involved one group of sinuses. In 15.1% of cases, 2 groups of sinuses were involved. In 21.2% of cases, 3 groups of sinuses were involved. Multisinusitis[15] (involvement of 2 ormore sinuses) was seen in 36.3% of cases. No patient had all 4 groups of sinuses involved (pansinusitis).

In 19.7% of cases, the plain x-rays were clear of any evidence of disease within the sinuses in spite of clinical evidence. The reason for this maybe varied. The experience of the radiologist is important in the accuracy of the report. It is also known that the changes in the sinuses may not be significant enough to appear on the plain films irrespective of the clinical findings in some cases. This is the limitation of plain radiographs in the diagnosis of diseases of the paranasal sinuses [3-7].

Plain x-rays are useful in determining the extent and site of the lesion. CT scan and magnetic resonance imaging techniques are more accurate in making diagnosis of chronic nasal sinus diseases [3-5] as they are better at differentiating inflammatory from neoplastic lesion; however CT scan, tomograms and MRI are expensive and are not readily available in this region [6,7,10]. The only neoplastic lesion seen in this series was diagnosed by histology.

Plain radiographs of the paranasal sinus are cheap and readily available tools for the investigation of chronic nasal diseases. It is useful in localizing and determining the extent of disease but has limitations as it may appear normal in the presence of clinical symptoms as shown in this study. It still remains the frontline investigation in diseases of the paranasal sinuses in this environment.

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