

Full Length Research Paper

Plain radiographic pattern of chronic sinusitis in Port Harcourt: our recent experience

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Chronic sinusitis is a globally common disease found in otolaryngology practice. Whereas, provisional diagnosis could be on the basis of clinical history and physical examination, radiology and sinus endoscopy are necessary in making definitive diagnosis and management protocol. Plain radiography is the mainstay of radiological diagnosis in most developing countries because it is cheap, simple and widely available. This study therefore established plain radiographic pattern of chronic sinusitis and highlighted our recent experience with these radiographs in the management of chronic sinusitis in our setting. A prospective study of radiographs of 120 patients with chronic sinusitis was carried out between May 2011 to March 2012 in Ear, Nose and Throat clinic of the University of Port Harcourt Teaching Hospital (UPTH). The patients' bio-data (age, gender), clinical features and plain radiographic findings were collected and entered into a proforma. The data was entered into the version 16 of the Statistical package for social sciences (SPSS16). Simple descriptive statistics in the form of mean, frequency distribution tables and percentages were used to illustrate the data. Out of the 120 patients, 70 (58%) were males and 50 (41.7%) were females giving a male to female ratio of 1.4:1. Age range was 1-75 years with average age of 39.1 years. The radiographic abnormalities are haziness or cloudiness, complete opacification, air-fluid level and muco-periosteal thickening. Eighty radiographs (66.7%) demonstrated abnormality in one or both maxillary sinuses; 41 (34.2%) in the ethmoid; 15 (12.5%) in the frontal and 2 (1.7%) in the sphenoidal sinus. The maxillary sinus was mostly involved in the disease process of chronic sinusitis. Besides, chronic sinusitis was found to be commoner in the young adults. However, plain radiographs of the paranasal sinuses are still useful in the management of chronic sinusitis despite its shortcomings in our setting.

Key words: Plain radiography, pattern, chronic sinusitis, Paranasal sinuses, Port Harcourt.

INTRODUCTION

Chronic sinusitis is an inflammation of the mucoperiosteal lining of the mucosa of the Paranasal sinuses that persists for 12 weeks or longer. It may be caused by bacterial or fungal organisms (Weir and Golding-Wood, 1997). It is common worldwide especially in developing nations. It does not have specific symptoms and signs therefore; it may be difficult establishing a definitive diagnosis on clinical grounds alone even though provisional diagnoses can be based on clinical symptoms and signs.

Imaging modalities such as plain radiography, contrast radiography, computed tomography, ultra sonography and sinus endoscopy are essential in clinching firm diagnosis and instituting appropriate management protocol (Okafor, 1983; Dobson et al., 1996; Rose and Jones 1998; Ezeanolue et al., 2000).

Even though recent imaging tools such as computed tomography (CT) scan is more specific and sensitive than plain radiography, CT scan has the disadvantage of delivering higher radiation dose to the patient and it is not readily available in most developing countries. Besides, the few available ones are hardly functional most of the times (Ezeanolue et al., 2000).

Magnetic resonance imaging (MRI) is another imaging

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Table 1. Age and sex distribution of the study population.

Age	Male (%)	Female (%)	Total (%)
1-15	3(2.5)	1 (0.8)	4 (3.3)
16-30	24 (20)	23 (19.2)	47 (39.2)
31-45	26 (21.7)	21 (1.7)	47 (39.2)
46-60	10 (8.3)	4 (3.3)	14 (11.6)
61-75	7 (5.8)	1 (0.8)	8 (6.6)
TOTAL	70	50	120 (100)

Table 2. Prevalence of abnormalities in sinus radiographs.

Sinus	Normal (%)	Abnormal (%)	Total
Maxillary	40 (33.3%)	80 (66.7%)	120 (100%)
Ethmoidal	79 (65.8%)	41 (34.2%)	120 (100%)
Frontal	105 (87.5%)	15(12.5%)	120(100%)
Sphenoidal	118 (98.3)	2 (1.7%)	120 (100%)

tool but it is restricted to the evaluation of complicated sinusitis such as intra orbital and intra cranial manifestations of aggressive sinusitis and Sino nasal neoplasms (Yousen, 1993; Mafee et al., 2006)

More so, it is very expensive and not readily available in our environment. On the other hand, plain radiographic study is readily available, affordable and evaluates the sinuses and the lower one-third of the nasal cavity with minimal radiation dose to the patient. It is relatively easy to interpret especially in our environment where there is dearth of radiologists. This study therefore established plain radiographic pattern of chronic sinusitis and highlighted our recent experience with these radiographs in the management of chronic sinusitis in our setting.

MATERIALS AND METHODS

This was a prospective study carried out among patients seen and treated in the Ear Nose and throat clinics of University of Port Harcourt Teaching Hospital (UPTH) seen between May 2011 and March 2012. The patients' bio-data (age, gender), clinical features and plain radiographic findings were collected and entered into a proforma. The working diagnosis of chronic sinusitis was entertained if there were at least two of the following signs and symptoms for a minimum of 12 weeks; nasal blockage (from hypertrophy of the inferior turbinates); nasal discharge (mucoid or purulent), post nasal drip, excessive sneezing and halitosis (Richtsmeier,1992; Burkholter and Schieffer, 1995). Allergic, vasomotor and infective conditions were not considered exclusively because they may co-exist or one may lead to the other.

The following plain X-ray projection of the paranasal sinuses were reported by the consultant radiologist: Occipitomental view (Waters view); Occipitofrontal view (Caldwell view); and lateral view. The occipitomental (OM) view was used to evaluate the maxillary sinus (Figure1). The occipito-frontal projection was also used to evaluate the frontal and ethmoidal sinuses while the lateral view was used for the sphenoidal sinuses (Figure 2).

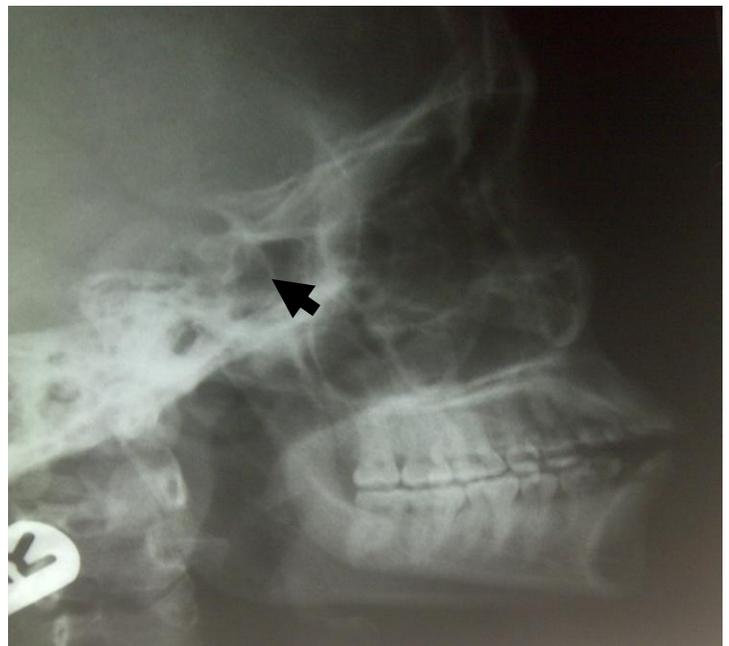
The plain radiographic abnormalities observed in the paranasal sinuses were; gross mucosal thickening, haziness, complete opacity and air fluid level. Radiographs were considered normal if none of the aforementioned features were present. Exclusion criteria included patients with history of epistaxis and or with nasal masses. The data was entered into the version 16 of the Statistical package for social sciences (SPSS16). Simple descriptive statistics in the form of mean, frequency distribution tables and percentages were used to illustrate the data.

RESULTS

Out of the 120 patients, 70 (58%) were males and 50 (41.7%) were females giving a male to female ratio of 1.4:1. Age range was 1-75 years with average age of 39.1 years. Age group 31-45 was mostly affected with chronic sinusitis (Table 1). The maxillary sinus was mostly involved in the disease process of chronic sinusitis (Tables 2 and 3). Opacification of the maxillary sinus and haziness of the sphenoidal sinuses were demonstrated by plain radiographs (Figures 1 and 2).

Table 3. Pattern of abnormalities in sinus radiographs.

Pattern	Maxillary	Ethmoidal	Frontal	Sphenoidal
Gross Mucosal Thickening	24 (30%)			
Haziness	30 (37.5%)	34 (82.9%)	14 (93.3%)	2 (100)
Complete Opacity	25 (31.3%)	7 (17.1%)	1 (6.7%)	
Air Fluid Level	1 (1.3)			
TOTAL	80	41	15	2

**Figure 1.** Occipitomental view showing opaque left maxillary sinus.**Figure 2.** Lateral projection showing hazy sphenoid sinus.

DISCUSSION

Chronic sinusitis was demonstrated in plain radiographs as alteration in the radiolucency of the paranasal sinuses (Phelps, 1997). The age distribution and average age of 39.1yrs seen in this study suggested that chronic sinusitis was more common in the young adults (Table 1). These findings corroborate the findings by earlier workers (Ologe and Olatunji, 2003; Sogebi et al., 2008).

However, there were few patients in the paediatric age groups suggesting that children are less likely to have chronic sinusitis because they have relatively wide ostia and some of their sinuses are not fully developed. These factors could reduce the chances of sinus obstruction that could lead to sinusitis. Moreover, patients above the age of 60 years (elderly) were not many in our series. This could be due to the low life expectancy in Nigeria and the unwillingness of most

elderly patients in our environment to seek orthodox medical attention (Ologe and Olatunji, 2003).

There was slight male preponderance observed in this study. This may be a new trend in our environment because da-Lilly Tariah and Aniemeka in a previous study in Port Harcourt found slight female preponderance (da-Lilly Tariah and Aniemeka, 2006). However, Ologe and Olatunji working in Ilorin noted a slight male preponderance which agrees with our finding (Ologe and Olatunji, 2003). Sogebi et al., in Sagamu also reported a slight female preponderance (Sogebi et al., 2008). Meanwhile, published works have shown that there were no established facts on pathophysiological factors that predispose one sex over the other in chronic sinusitis (Weir and Golding-Wood, 1997; Okafor, 1983; Ezeanolue et al., 2000).

Plain radiographic abnormalities were noted mostly in the maxillary sinus (Tables 2 and 3). Other investigators in Nigeria have reported 47.5%-80.4% maxillary sinus

involvement (Ezeanolue et al., 2000; Marchie, 2001; Ahmad and Tahir, 2009). They all agreed that maxillary sinusitis is much commoner than sinusitis of the other paranasal sinuses. However, Olarenwaju working in Lagos observed that the frontal and ethmoidal sinuses as against the maxillary sinuses were most commonly affected (Olarenwaju, 1992)

The frontal, ethmoidal and the sphenoidal sinuses are anatomically located above the nasal cavities, therefore, their drainage into the nasal cavity is assisted by gravity especially when their openings are not obstructed by disease so that changes or alterations in the aforementioned paranasal sinuses may initially be subtle and not radiologically evident until it becomes extensive with blockage of sinus openings. On the other hand, poor anatomical position drainage predisposes the maxillary sinus to stagnation of secretions and infection more than any other paranasal sinus (Phelps, 1997).

Radiographic findings in this study showed that 33.3% of the patient had normal sinuses. This agrees with the finding by Ahmad and Tahir who worked in Maiduguri, North-east Nigeria (Ahmad and Tahir, 2009). However da-Lilly Tariah and Aniemeka noted normal radiographs in 19.1% of patients in Port Harcourt but in their study, they included patients with nasal masses (da-Lilly Tariah and Aniemeka, 2006).

Negative findings in plain radiograph do not exclude sinus disease therefore, further evaluations of the sinus using CT, or endoscopy are recommended. Wilson and Gracult reported that a normal plain radiograph of the paranasal sinuses suggests but does not prove that a sinus is free of disease (Wilson and Gracult, 1990). This was corroborated by Slack in his study (Slack, 1996). Furthermore, plain radiographic abnormality such as haziness may not necessarily prove a clinical disease for example, the shadow of the lip may mimic mucosal thickening and an opaque maxillary antrum may be due to thickening of the bony wall.

Even though plain radiography has the disadvantage of high rates of false positives and false negatives the inter observer variability is within normal limits. More so, some researchers have shown a good correlation between standard radiography and CT scan in patients with maxillary sinusitis (Mackay and Lurd, 1997; Marchie, 2001). Meanwhile, CT scan remains the gold standard for evaluating the sinuses even though in our environment it is bedevilled by high cost, epileptic functionality and relatively scarce-only found in few other health institutions within and outside our environment.

Some researchers reported that interpretation of haziness and mucosal thickening of the maxillary antrum can be non-specific and that 30 to 50% of mucosal thickening on plain radiography may not be of any clinical significance (Mackay and Lurd, 1997; Marchie, 2001). On the other hand, complete

opacification or fluid level yielded greater than 90% reliability when evaluated by sinus endoscopy (Wilson and Gracult, 1990; Roland et al., 1995).

CONCLUSION

The maxillary sinus was mostly involved in the disease process of chronic sinusitis. Besides, chronic sinusitis was found to be commoner in the young adults. However, plain radiographs of the paranasal sinuses are still useful in the management of chronic sinusitis in our environment despite its shortcomings.

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