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ABSTRACT

Objective: **To determine the bacteriology and antibiotic sensitivity of the bacterial isolates in chronic maxillary sinusitis patients seen at the Kenyatta National Hospital.**
Design: **Cross-sectional study**
Setting: **Kenyatta National Hospital, ENT department.**
Subjects and methods: **Seventy-three patients had bilateral sntral washout done and the lavage submitted for culture and anti-microbial sensitivity between January and June 1996.**
Results: **Antral lavage yielded secretions in 63% of patients but bacteria were cultured in only 28.8% of the specimens. The isolates included *Streptococcus pneumonia* (22.2%), *Staphyloccocus albus* (18.5%), *Staphyloccocus aureus* (11.1%) and *Enterobactericiae* (11.1%). Anaerobic bacteria were cultured in 22.2% of the specimens. Of the commonly used antibiotics, there was high sensitivity to erythromycin, cefadroxyl, chloramphenicol and amoxicillin and poor sensitivity to ampicillin, cotrimoxazole and perfloxacin.**
Conclusion: **The bacteriology of chronic maxillary sinusitis at Kenyatta National Hospital is generally similar to that found elsewhere. The bacteria are susceptible to relatively affordable antibiotics like amoxicillin, erythromycin and cefadroxyl.**

INTRODUCTION

Chronic maxillary sinusitis is a common problem presenting to both the general practitioner and the otolaryngologist. The gold standard for diagnosis of sinusitis is generally agreed to be sinus puncture, aspiration and culture with sensitivity(1). This is invasive, time-consuming and uncomfortable for patients and, therefore, is not convenient to do in the clinical office setting and is rarely performed. Antibiotic treatment is, therefore, empirical and not based on diagnostic tests. Not all patients presenting with features of chronic maxillary sinusitis require antibiotic treatment which may be ineffective if underlying causative factors are not taken care of(2). The predisposing factors to sinusitis essentially cause blockage of the normal ostia with resultant stasis of secretions which lead to inflammation and infection(3). There are many factors in the causation of sinusitis; the main ones being: mechanical obstruction as a result of deviated nasal septum, hypertrophy of inferior turbinates, nasal tumours and nasal foreign bodies. Others are allergy, mucocilliary clearance abnormality and autonomic imbalance.

The bacterial flora of chronic maxillary sinusitis has been found to be both aerobic and anaerobic with polymicrobial colonisation found in upto 55% of antral lavage specimens(4). The bacterial yield in antral washout specimens have varied from 60% to 80%(4-6).

The commonest aerobic bacteria that have been isolated are *Streptococcus pneumonia, Streptococcus pyogenes H-influenza* and *Staphylococcus aureus*. Other aerobic bacteria isolated include *Streptococcus viridans, Klebsiella pneumonia* and less commonly *Pseudomonas aeruginosa* and *Proteus mirabillis.*

In chronic maxillary sinusitis, total blockage of the maxillary ostia may occur leading to a negative pressure and low oxygen concentration in the antrum. This combined with impaired blood supply creates a suitable environment for colonisation by anaerobic bacteria(3). The isolation of anaerobic bacteria in chronic maxillary sinusitis varies from 4% to 50%(7-9). In chronic maxillary sinusitis, treatment is aimed at the colonising microbial flora using antimicrobial agents, at the tissue damaging inflammatory response using anti-inflammatory agents and at the compromised mucocilliary clearance. Restoration of normal mucocilliary clearances is the most important part of treatment as recurrence will be prevented(1). Medical treatment may fail due to lack of attention to the underlying causative factors, presence of mechanical obstruction or inappropriate choice of antimicrobial agents. Newer antibiotics have been advocated because evidence of increasing antibiotic resistance has been found in many communities(1). The frequent use of antibiotics in general and in particular second and third-line antibiotics has resulted in concerns for development of more antibiotic resistant strains of bacteria.

This study was conducted to determine the bacteriology of chronic maxillary sinusitis and their sensitivity pattern to commonly used antibiotics at the Kenyatta National Hospital.

MATERIALS AND METHODS

Seventy three consecutive patients attending the Ear, Nose and Throat Clinic at Kenyatta National Hospital who had clinical features highly suggestive of maxillary sinusitis and those who had paranasal sinus x-rays showing mucosal changes in the maxillary sinus and taken within 2-4 weeks of the time of presentation were recruited into the study. Patients who were on treatment for acute sinusitis, those with head and neck tumours, those who had previous antral surgery except antral washout and those that could not give consent for antral washout under local anaesthesia were excluded from the study.

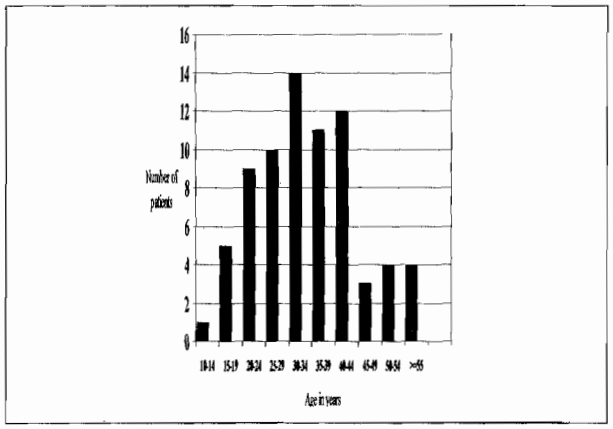
Patients who satisfied the inclusion criteria and gave informed consent were prepared for antral washout after a detailed medical history and clinical examination had been done. Local anaesthesia was administered after decongestion by spraying the nasal cavity with 10% xylocaine spray, packing the inferior meatus with cotton pledgets soaked with 10% lignocaine for 10 minutes. Antral puncture was then done with a Tilley-Lichtwitz trocar and cannula through the inferior meatus. A sterile syringe was then used to collect antral secretions by aspiration after which the antrum was washed with sterile normal saline and the antral washings collected with a bowl held beneath the chin with the patient leaning forward. The antral aspirate or washout sample was placed directly onto a pus swab and Stuart's transport media and transported directly to the department of Microbiology, Kenyatta National Hospital where standard methods for isolation and identification of bacteria were used. The culture media used were blood agar, MacConkey and chocolate blood agar. Antimicrobial sensitivity was tested using standard procedures.

RESULTS

A total of 73 patients met the inclusion criteria and were registered for the study. The age distribution of the patients ranged from 13 years to 70 years (Figure 1). There were 47 females and 26 males giving a female to male ratio of 1.8:1 (Figure 1).

Figure 1

Age distribution



All the 73 patients had received previous medical treatment which had included various antibiotics, analgesics, nasal decongestants and antihistamines. Eighteen patients had received some form of surgical treatment (Table 1).

Table 1

Previous treatment

Previous treatment	No. of patients
Medical	73
BAWO	8
BAWO and cautery	2
Minor nasal surgery	2
Cautery	2
Dental surgery	1
Removal of FB from nose	1
Eye surgery	1
Ear surgery	1

BAWO - Bilateral antral washout
FB - Foreign body

Table 2 indicates the outcome of antral lavage which was positive in 54 (74%) of the patients. The commonest type of secretions were mucoid (48%) in appearance. Bacterial growth was obtained in 21 (28.8%) of the washouts.

Table 2

Type of secretions

Type of secretion	No. of patients	%
Clear	19	26
Mucoid	35	48
Mucopus	19	26
Total	73	100

Table 3

Types of bacterial isolates and their frequency

Bacterial strain	Frequency	%
Aerobes:		
Streptococcus pneumonia	6	22.2
Staphylococcus albus	5	18.5
Staphylococcus aureus	3	11.1
Neisseria species	3	11.1
Streptococcus viridans	1	3.7
Streptococcus pyogens	1	3.7
Enterobactericiae	1	3.7
Meringococcus	1	3.7
Anaerobes:		
Propioni bacterium	3	11.1
Bacteroides melaninogenicus	2	7.4
Anaerobic streptococi	1	3.7
Total	27	100

Table 4

Sensitivity patterns of bacterial isolates to various antibiotics

Antibiotic	*Strep pneumonia* (% sensitivity)	*Staphyloccocus albus* (% sensitivity)	Anaerobes (% sensitivity)
Cefadroxyl	100	100	83.3
Spiramycine	100	100	83.3
Amoxicillin	100	80	83.3
Erythromycin	100	100	100
Chloromphenicol	100	100	100
Cefaclor	83.3	60	83.3
Minocycline	66.7	100	100
Ampicillin	50.0	40	50.0
Perfloxacin	33.3	40	16.7
Cotrimoxazole	16.7	20	0

The total number of bacterial isolates were 27 with the commonest isolates being *Streptococcus pneumonia* (22.7%) followed by *Staphylococcus albus* (18.5%) and *Staphylococcus aureus* (11.1%). Anaerobes constituted 22.2% of the isolates (Table 3). Eighty per cent of both the anaerobes and aerobes showed sensitivity to amoxicillin, erythromycin, chloramphemicol, spiramycin and cefadroxyl, but resistance to amoxycillin, cotrimoxazole and perfloxacin (Table 4).

DISCUSSION

The rate of positive cultures at 30% in this study was lower than that obtained in other studies in which bacterial growth has ranged between 60 and 80%. Pahor *et al*(4) found bacterial growth in 54% while Axelsoson and Brorson(5) had bacterial growth in 78.4%. The bacterial yield of antral secretions is dependent on methods used for collection. Antroscopy has the highest yield since the sinus fluid is collected directly unlike by washing out which was the method used in this study.

In this study, the main aerobic bacteria were *Streptoccocus pneumonia* (22.2%), *Staphylococus albus* (18.5%) and *Staphyloccocus aureus* (11.1%). As in our study, *Streptococcus pneumonia* has been the commonest organism isolated in most other studies(3,4,10). *H. influenza* and *Moraxella catarrhalis* have been isolated in various other studies, but were not isolated in this study(4,10). This is most likely is due to the culture methods used and also because *H. influenza* is commoner in the paediatric age group which was under-represented in the study population. The rate of isolation of anaerobic bacteria has varied in different studies depending on the culture methods used. Carenfelt *et al*(8) found anaerobes in 25 to 50% while Otten *et al*(10) reported 20% isolation and Brook(9) found aerobes in 8%. The main reason for the variability in microbiological species cultured from patients diagnosed with sinusitis is the different inclusion criteria used in different studies.

The antibiotic sensitivity pattern of the commonly isolated aerobic bacteria in this study showed good susceptibility to amoxyl, erythromycin, cefadroxyl, chroramphenicol and spiramycin but high resistance to ampicillin, cotrimoxazole and perfloxacin. A similar pattern of sensitivity and resistance was seen with the anaerobic bacteria. Otten *et al*(10) isolated bacteria in chronic maxillary sinusitis which were most susceptible to pencillin and cephalosporin type antibiotics.

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