

Isolation of some microorganisms from Iraqi patients with chronic maxillary sinusitis.

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Summary:

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Background: Maxillary sinusitis is one of the most common infections of humans. Sinusitis can be defined as an inflammation of the membrane lining of any sinus, especially one of the paranasal sinuses.

Objective: To determine the causative microorganisms of chronic maxillary sinusitis.

Patients: Forty five chronic sinusitis patients were involved in the present study.

Methods: Sampling method were sinus specimens (aspiration or injection aspiration).

Results: *Haemophilus* species, *Streptococcus pneumoniae* (*S.pneumoniae*) and *Moraxella catarrhalis* (*M.catarrhalis*) were the most frequent isolates; in addition *Penicillium* and *Cladosporium* species were isolated from some chronic sinusitis patients.

Conclusion: Chronic sinusitis could be caused by either bacterial species or by fungal species; most bacterial isolates were *Haemophilus* species followed by *S.pneumoniae* and *M.catarrhalis*. The incidences of chronic sinusitis were more at patients age (20-29 years) old groups.

Keyword: Chronic sinusitis, microorganisms, injection aspiration.

Introduction:

Chronic sinusitis is characterized by at least four recurrences of acute sinusitis while acute sinusitis is a short-term condition that responds well to antibiotics and decongestants.⁽¹⁾ Upper respiratory tract infections may be complicated in (0.5 to 5%) of cases by acute sinusitis⁽²⁾. Adult experience an average of two to three upper respiratory tract infections per year, therefore sinusitis is a relatively common affliction⁽³⁾. Identification of sinusitis is important, because the infection in a closed space carries a risk of complication and may warrant an active therapeutic approach, including drainage of secretions and administration of antimicrobial agents^(4; 5; 6; 7).

Radiological examination (by CT-scan) is the most reliable method of diagnosing maxillary sinusitis^(4; 8). Aspiration is important for the demonstration of secretions in the sinus⁽⁹⁾ and for the identification of the specific etiology by culture, which may be useful as a guide for antimicrobial therapy⁽¹⁰⁾.

The role of anaerobes (*Bacteriodes*, *Peptostreptococcus*, *Fusobacterium* and *Viellonella*) in chronic and dentogenic sinusitis is well established^(11; 12; 3), but their occurrence in acute maxillary sinusitis is less clear^(9; 13).

Fungal sinusitis is rare, but *Aspergillus*, *Mucor*, *Candida* and other saprophytic fungi can cause invasive disease in debilitated patients. Fungal sinusitis appears to be undiagnosed, partly because of lack of awareness on the part of clinicians⁽¹⁴⁾.

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Patients and Methods

This study consists of forty five cases were clinically diagnosed as chronic sinusitis, attending the ENT (Ear, Nose, and Throat) outpatient clinic at Baghdad Teaching Hospital and from inpatient at Surgical Specialty Hospital (Al Shahed Adnan formerly) during the period from February through August 2004. Age range of the patients was from 7-82 years with mean age 28 years. Diagnosis of sinusitis were done by ENT specialist (through clinical and radiological examination (X-Ray &/or CT-scan)). Patient under antibiotic treatment or had stopped antibiotic therapy less than one week were excluded from this study.

Specimens were collected by ENT specialist by using sterile antral wash (lavage) instruments (Trocar and Canula) under local or general anesthesia, figure (1). Sinus secretion are aspirated into sterile 20ml syringe; if aspiration yields nothing then the canula was held in the sinus and one to two milliliter of sterile physiological saline (without any bactericidal preservative) was injected into the sinus through the canula and was aspirated again (injection aspiration). Syringe contain the specimen was carefully plugged and (0.5ml) of its content was inoculated within 5 min into supplemented Thioglycolate broth for enrichment⁽¹⁵⁾.

This procedure was done for both right and left maxillary sinuses (ipsilateral and contralateral). Ipsilateral side were determined by the help of radiological finding on X-ray or CT-scan films which shows in which sinus there is more pathological changes (regarded as ipsilateral sinus).

No patients with identical radiological findings in both sinuses were met in this study.

Methods for cultivation and identification of microorganisms were based on microscopical

examination, cultural morphology, biochemical tests and by diagnostic discs⁽¹⁶⁾.

Diagnosis of Some bacterial isolates were confirmed by using commercially available API systems like API 20E and API NH⁽¹⁷⁾.

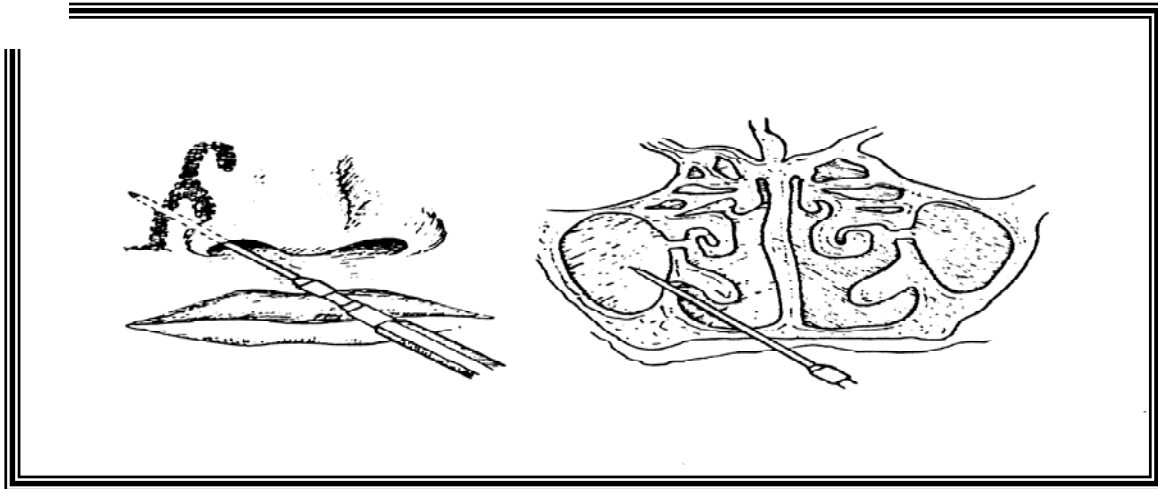


Fig. (1): Right sinus lavage through inferior meatus

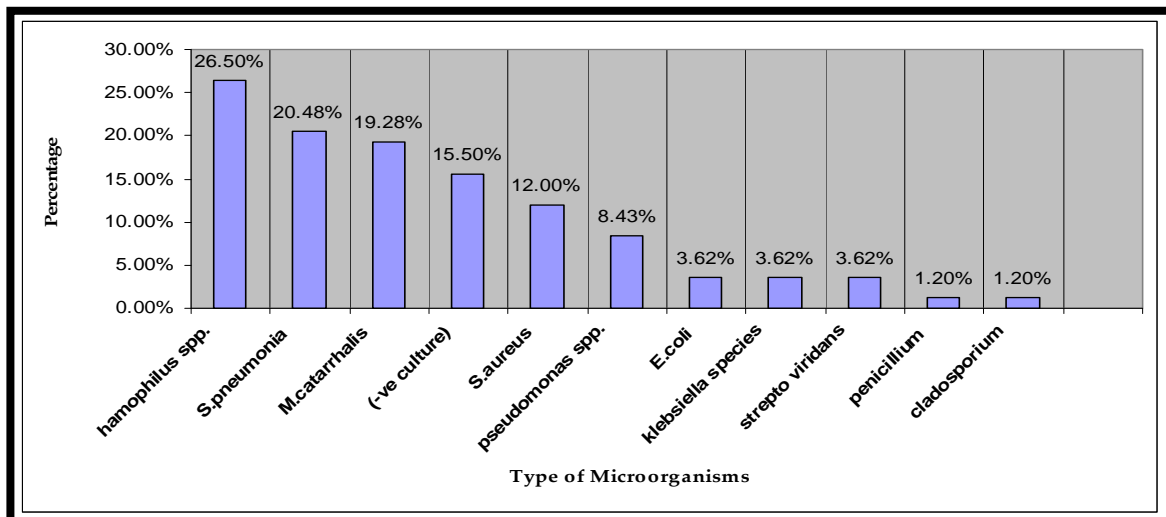
Results

Microorganisms isolated from ipsilateral sinus specimens:

The isolates were; *Haemophilus* species 22 isolates (26.5%); *S.pneumoniae* 17 isolates (20.48%); *M.catarrhalis* 16 isolates (19.28%); *Staphylococcus aureus* (*S.aureus*) 10 isolates (12%); *Pseudomonas* species 7 isolates (8.43%);

E.coli 3 isolates (3.62%); *Klebsiella* species 3 isolates (3.62%); *Penicillium* species one isolate (1.2%) and *Cladosporium* species one isolate (1.2%).Seven (15.5%) maxillary sinus aspirations gave negative culture results. The total isolates from maxillary sinus aspirations were (83) microorganisms; two of them were fungus figure (2).

Fig. (2): Percentage of microorganisms isolated from chronic sinusitis (ipsilateral).



Microorganisms isolated from contralateral sinus specimens:

The microorganisms were; *Haemophilus species* 12 isolates (28%); *S.pneumoniae* 11 isolates (26%); *M.catarrhalis* 11 isolates (26%); *S.aureus* 8 isolates (19%); *Viridans streptococcus group* one

isolate (2%) and *Penicillium species* one isolate (2%). Fourteen (31%) aspirates cultures gave negative growth. Total isolates were (44), 43 of them were bacterial isolates, while a single isolate was fungus, figure (3).

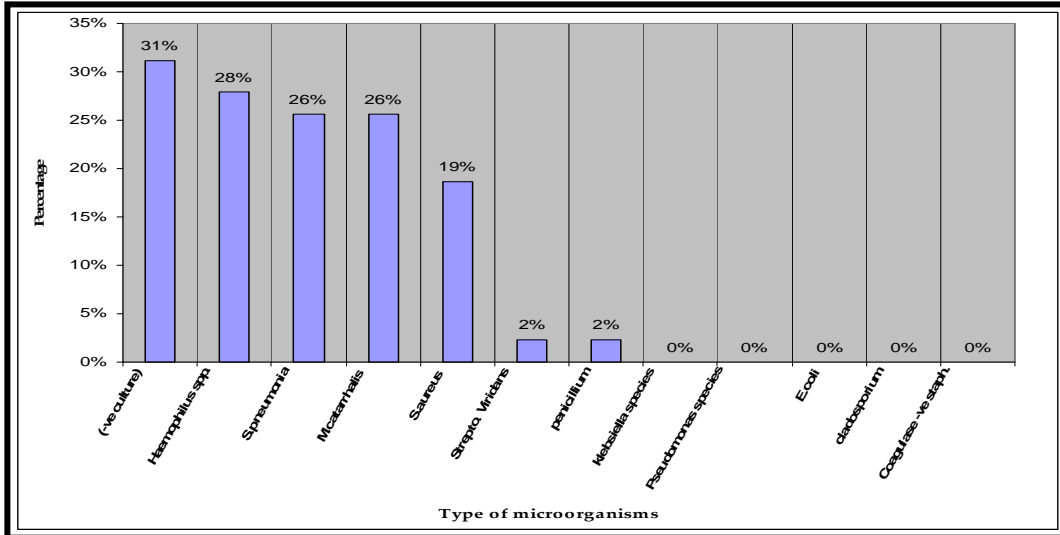


Fig. (3): Percentage of microorganisms isolated from chronic sinusitis (contralateral sinus).

The percentages of leukocytes counts of chronic sinusitis (ipsilateral aspiration smear) were (85.7%) with leukocytes count **above** 20 cells/ oil immersion field while (16.3%) were **below** 20 cells/ oil immersion fields.

While the percentages of leukocytes count of chronic sinusitis (contralateral aspiration smear); were (34.4%) with leukocytes count **above** 20 cells/ oil immersion field while (65.6%) were **below** 20 cells/ oil immersion field. (figure 4a & 4b).

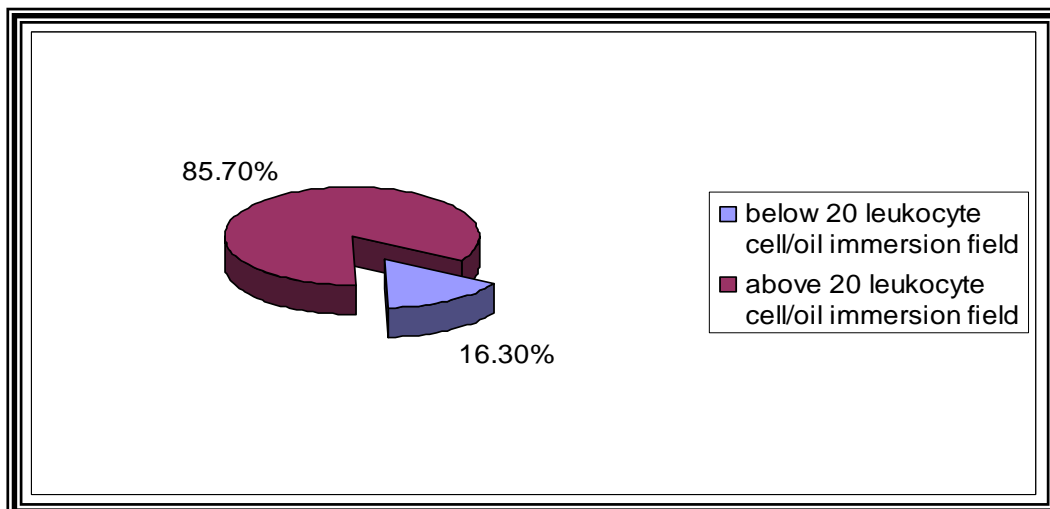


Fig. (4a): Percentages of leukocyte counts in chronic sinusitis (Ipsilateral side) patients.

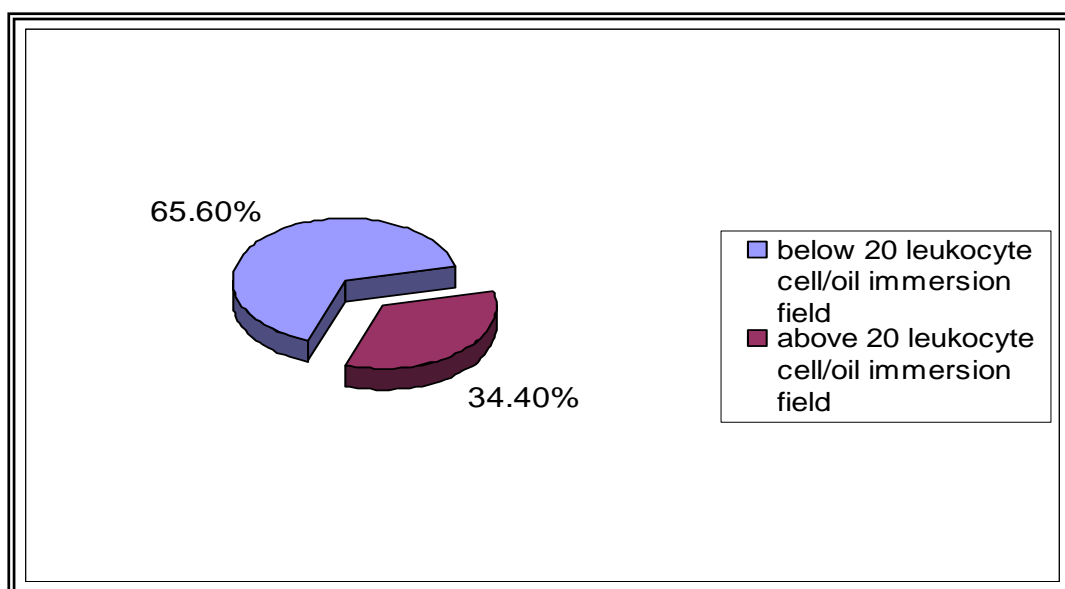


Fig. (4b): Percentages of leukocyte counts in chronic sinusitis (contralateral side) patients.

Discussion

Many earlier studies dealing with microbiological etiology of community-acquired sinusitis have been compromised by technical problems, beginning from specimen collection to the final steps of identification of the microorganisms, especially the fastidious ones such as *Haemophilus* species and anaerobic bacteria^(11; 18; 19). The reason of using sinus aspiration instead of nasopharyngeal swabs in chronic cases was the fact that nasopharyngeal swab culture reflects the sinus flora in only (33%) while sinus aspiration cultures reflect (>95%)⁽²⁰⁾.

In relation to age the present work founds that highest incidence of chronic sinusitis were at age group (20-29) years and these findings are more or less similar to the findings reported by Lindbaek *et al*⁽²¹⁾, this probably explained that this active age group is more exposed to environmental factors such as allergens, climate and temperature changes, air pollution...etc. or whom they have the chance of person-to-person transmission of causative agents.

The present study demonstrated that chronic sinusitis could be due to bacteria or fungi or both; and the infection could be unilateral or bilateral. Both maxillary sinuses were involved in this work, depending on radiological (X-ray &/or CT-scan) and clinical history, ipsilateral appears mostly affected sinus and contralateral appears healthy sinus. Sinus aspirations were obtained simultaneously for each patient; to be examined for presence of microorganisms and enforce our findings by leukocytes count for every aspiration to have an idea about the inflammatory process inside each sinus. The sinus aspirate with leukocytes count

more than 20 cells/ oil immersion field were considered as having true infection while below that were regarded as either contamination or allergy or viral infection which necessities more investigations⁽²²⁾.

Ipsilateral sinus results concerning bacterial isolates coincides with that done by Carenfelt *et al*⁽²³⁾; Van Cauwenberge *et al.*⁽²⁴⁾; Stoll *et al.*⁽²⁵⁾ & Wald,⁽²⁶⁾ while fungal isolates greatly coincides with Matsuwaki *et al.*,⁽²⁷⁾ whom they found a case of allergic fungal sinusitis caused by *Penicillium* and *Cladosporium* species in 57 years old man. Results of contralateral sinus isolates are more or less similar to that of Hannel *et al.*^(28, 29).

The explanation of the above results perhaps can be referred to the fact that the ipsilateral sinus suffers from a true infection with one or more type of organisms. This can be more understandable if we refer to the total number of microorganisms, which were higher in the ipsilateral specimens than of contralateral. Leukocytes count gave another clue for the true infection as the counts were above 20 cells/ oil immersion field in 85.7% of all ipsilateral specimens, compared to 34.40% for the contralateral side specimen.

Some specimens of chronic sinusitis patients in this study gave negative culture results despite of leukocyte counts which were above 20cells/ oil immersion field. This could possibly due to presence of anaerobic microorganisms which colonizes the blocked sinus providing them with a suitable environmental condition, as was reported by Omer⁽³⁰⁾ who cited that the anaerobes, mainly bacteriodes species, were the main causative group of microorganisms in Iraqi chronic sinusitis patients. Similar study was reported by Brook⁽³¹⁾

who also found bacteroides as the commonest anaerobe. Unfortunately anaerobic laboratory conditions could not be accomplished during this study due to the shortage in laboratory facilities. In addition Brook⁽³²⁾ stated that because of the anaerobes fastidious nature, they are difficult to be isolated from infectious sites and are often overlooked. These fastidious anaerobes in addition to their direct pathogenicity in chronic sinusitis, they possess an indirect role through their ability to produce the enzyme beta-lactamase. In this fashion, they are capable of "shielding" non-beta-lactamase-producing bacteria from penicillins.

In the present finding fungal species were isolated from three patients, one old male (83y) with diabetes mellitus and with dental problems involving upper first and second premolar and of the 3rd molar teeth. Cladosporium species was isolated from sinus aspirate of that patient. Other two chronic sinusitis patients were young adults (25y, 35y) without any systemic diseases or dental problem. Penicillium species were isolated from both of those two patients. These findings although of limited patients' number called attention to the fact that fungal sinusitis affect different age groups and not limited to debilitating or immunocompromized persons and this in disagreement with many studies (Gary and Perfect,⁽¹⁴⁾; Dzhambazov *et al*⁽³³⁾) which stated that fungal infection involve debilitating or immunocompromized persons only.

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