

Review Article

The Bacteriological Profile of Otorhinolaryngological Infections

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To cite this article:

Rachidi Meriem, Nouri Hassan, Raji Abdelaziz, Sora Nabila. The Bacteriological Profile of Otorhinolaryngological Infections. *American Journal of Laboratory Medicine*. Vol. 4, No. 6, 2019, pp. 111-114. doi: 10.11648/j.ajlm.20190406.15

Received: November 3, 2019; **Accepted:** November 27, 2019; **Published:** December 6, 2019

Abstract: Otorhinolaryngological infections are common pathologies especially in children, their clinical manifestations are varied. Knowledge of the microbial ecology of these infections in the ENT sphere may be important for the choice of probabilistic antibiotic therapy, but also for adapting and adjusting the treatment in therapeutic failure situations and complications. This is a descriptive retrospective study between January 2017 and August 2018. Including all samples taken in the ENT field in patients hospitalized in the ORL service of Med VI University Hospital of Marrakech. Of the 115 samples, bacterial confirmation was found in 87% of cases. The bacteriological profile was dominated by Gram-positive bacteria in 52% of cases. Isolated strains were mainly represented by *Streptococcus* (28%), followed by *Staphylococcus aureus* (22%). Enterobacteria accounted for 34% of isolates dominated by *Klebsiella pneumoniae* found in 20.5% of cases. The study of antibiotic susceptibility of isolated strains revealed a penicillin sensitivity of 98% in isolates of *Streptococcus pneumoniae*. A 75% sensitivity to amoxicillin was revealed in *Enterococcus* and all strains of *Staphylococcus aureus* were sensitive to meticillin. In enterobacteria, resistance to C3G was 18%, 38% to fluoroquinolones, 35% to cotrimoxazole and 29% of strains were resistant to Gentamycin. The multi-resistant strains of *Pseudomonas aeruginosa* were found in 8% of cases.

Keywords: ENT, Adult, Bacterial Infection

1. Introduction

Ear, nose and throat (ENT) infections include upper respiratory tract (RSV), nose, throat, sinus and ear infections, which are upper respiratory infections. Several clinical entities are defined, Rhinopharyngitis, Acute Middle Otitis, Angina and Rhinosinusitis. These pathologies are common pathologies especially in children, their clinical manifestations are varied. Knowledge of the microbial ecology of these infections in the ENT sphere may be important for the choice of probabilistic antibiotic therapy, but also for adapting and adjusting the treatment in therapeutic failure situations and complications.

ENT infections are frequently found in the short-term practice of ENT [2]. The predominance in children is probably related to the anatomical configuration but also to the

immaturity of the immunity of this age group. [3]

They are very common, benign and often recover spontaneously. However, they can have a significant individual and collective social impact. They are responsible for more than half of antibiotic prescriptions, repeated medical consultations and thus have a significant ecological impact in the selection of resistance to antibiotics and infectious consequences. [1]

Viral infections of the ENT sphere are extremely frequent and the etiological diagnosis is not justified in this context or the treatment is only symptomatic.

Bacteriological diagnosis is essential in complicated forms to confirm the diagnosis, adapt antibiotic therapy and guide the etiology with appropriate antibiotic therapy.

This study was conducted in order to know the bacterial ecology of ENT infections and to evaluate the antibiotic

sensitivity of the incriminated germs at the Marrakech hospital center.

2. Patients and Methods

This is a retrospective descriptive study including all the samples taken in the ENT field in children hospitalized at the ENT department of Med VI University Hospital in Marrakech. The samples were sent for bacteriological examination and processed in the microbiology laboratory of Med VI University Hospital of Marrakech between January 2017 and August 2018.

The bacteriological study was performed according to conventional methods with quantitative cytology, direct examination and culture on enriched media. Bacterial identification was made according to morphological, cultural and biochemical characters. The study of antibiotic susceptibility was carried out according to the recommendations of the French Microbiology Society (CA-SFM).

A record of exploitation made it possible to note for each sample: the age, the sex, the service, the isolated germ and its sensitivity to the antibiotics. Statistical analysis and data entry were performed by Microsoft Office Excel 2007.

3. Results

During this period, a total of 115 samples were sent to the Microbiology laboratory for bacteriological examination. Bacterial confirmation was found in 87% of the cases, ie 100 identified strains. The average age was 45 years old with extreme ages (1 to 65 years). A male predominance was found with a sex ratio H / F of 1.4.

53% of the samples received were obtained by swabbing, 14% were biopsies and 33% included atrial punctures, cellulite, atrial pus, nasal pus and drainage of abscesses.

The bacteriological profile was dominated by Gram-positive bacteria in 52% of cases. Isolated strains were mainly represented by *Streptococcus* (28%), followed by *Staphylococcus aureus* (22%) and *Enterococcus faecium* (2%).

Streptococcal strains were divided as follows: 49% *Streptococci viridans*, 38% *Streptococcus pyogenic* and 9% *Pneumococcus*.

Enterobacteria accounted for 34% of isolates dominated by *Klebsiella pneumoniae* found in 20.5% of cases. In isolated non-fermentative gram-negative bacteria, *Pseudomonas aeruginosa* was found in 8% of cases. *Haemophilus influenzae* was isolated in 2% of isolates and mycotic infections with *Candida albicans*, *Aspergillus* accounted for 2%. The distribution of isolated bacterial species is represented in Table 1.

Table 2. reports the distribution of the isolated bacterial species according to the clinical context.

Table 1. Distribution of bacterial species isolated from ENT infections at Marrakech University Hospital 2017-2018.

Bacterial species (n=100)	Numbre %	
<i>Streptococcus</i>	28	Gram positif bacteria 52%
<i>Staphylococcus aureus</i>	22	
<i>Enterococcus faecium</i>	2	
<i>Klebsiella pneumoniae</i>	7	
<i>Escherichia coli</i>	6	Gram négatif bacteria 46%
<i>Proteus mirabilis</i>	6	
<i>Enterobacter cloacae</i>	7	
<i>Citrobacter freundii</i>	4	
<i>Morganella morganii</i>	4	
<i>Pseudomonas aeruginosa</i>	8	
<i>Acinetobacter baumannii</i>	2	Yeast 2%
<i>Haemophilus influenzae</i>	2	
<i>Candida albicans-Aspergillus</i>	2	

Table 2. Distribution of bacterial species isolated from ENT infections at Marrakech University Hospital according to the clinical context.

Clinical context	Bacteria found
Orbital cellulitis - cervical	
<i>Streptococcus pyogènes de groupe A</i>	5
<i>Staphylococcus aureus</i>	7
<i>Haemophilus influenzae</i>	1
<i>Pseudomonas aeruginosa</i>	2
<i>Entérobactéries</i>	14
Ear specimens	
<i>Pneumococcal</i>	2
<i>Streptococcus pyogènes de groupe A</i>	3
<i>Streptococcus agalactiae de groupe B</i>	3
<i>Staphylococcus aureus</i>	5
<i>Haemophilus influenzae</i>	1
<i>Pseudomonas aeruginosa</i>	6
<i>Entérobactéries</i>	20
Sinusitis (Biopsy)	
<i>Pneumococcal</i>	2
<i>Streptococcus viridans</i>	14
<i>Staphylococcus aureus</i>	10

The study of antibiotic susceptibility of isolated strains revealed a penicillin sensitivity of 98% in isolates of *Streptococcus pneumoniae*. 45% of *Viridans Streptococcus* isolates were of diminished susceptibility to penicillins.

A 75% sensitivity to amoxicillin was revealed in *Enterococcus* and all strains of *Staphylococcus aureus* were sensitive to meticillin.

In enterobacteria, resistance to C3G was 18%, 38% to fluoroquinolones, 35% to cotrimoxazole and 29% of strains were resistant to Gentamycin.

The multi-resistant strains of *Pseudomonas aeruginosa* were found in 8% of cases.

1% of the isolates were of reduced susceptibility to carbapenems and multidrug-resistant bacteria accounted for 9% in all the strains studied.

4. Discussion

ENT infections are most often benign but can be formidable in weakened patients. Viruses are the most common agents of rhinitis, rhino-pharyngitis and non-streptococcal tonsillitis. In acute viral otitis media, it is the respiratory syncytial virus that is most often involved in 70% of cases [4]. Viral infections of

the ENT sphere are often the cause of bacterial superinfection and Coincidences are also found. [5]

There is a bacterial flora commensal ORL polymorphic RSV level. Within the commensal flora, there are potentially pathogenic bacteria that can colonize transiently the upper airway as *Streptococcus pneumoniae*, *Streptococcus pyogenes*, *Staphylococcus aureus*, *Haemophilus influenzae*, and *Branhamella catarrhalis* *Neisseria meningitidis*. [6, 7]

Bacteriological sampling is essential to better adapt the treatment based on the results of culture and antibiogram in cases of external malignant otitis, OMA with retro-tympanic effusion and sinusitis accompanied by complications. It remains nonindispensable in case of rhinopharyngitis. [7, 8]

In this study, we draw up the bacteriological profile of ENT infections to know the local epidemiology, by comparing the results found with the data of the literature, to allow a good choice of antibiotherapy by referring to the recommendations of the SFILF (Société de Pathologie Infectieuse French Language).

The objectives of the bacteriological examination are specific to each context and there is a list of bacteria usually considered as pathogenic for each location. [6]

In this series, Gram-positive bacteria represented by *Staphylococcus aureus* and *Streptococci* were the most incriminated organisms. This result is comparable with most of the literature data [1, 3]

We note the high frequency of viridans isolated *Streptococci* in the biopsies of patients with a clinical picture of sinusitis. This result does not agree with the data found in B. Yehouessi et al [10] who conducted a study on 1752 cases of patients followed for sinusitis. with a bacterial ecosystem dominated by *Staphylococcus aureus* followed by *pneumococcus*.

Another bacteriological study of adult acute sinusitis in 1990 isolated *Haemophilus influenzae* followed by *Streptococcus* spp, in particular *Streptococcus pneumoniae* and *Branhamella catarrhalis* [11]. However, the incrimination of *Streptococci* as pathogenic bacteria remains Discussed according to the clinical context and the sample. The obtaining of a quality sample requires specialized and invasive techniques.

Sinus infections include different clinical entities, microbiological diagnosis is difficult and must be oriented by the clinical context, the type of infection, acute or chronic, community or nosocomial, the immune status of the patient, the history of the disease, the amount of bacteria isolated and the geographical origin of patients [6].

The bacteriological profile in atrial specimens was dominated by *Pseudomonas aeruginosa* and *Staphylococcus aureus*. This result is comparable to those reported by Roland et al [12, 13]. Recurrent otitis (OMR) and otitis externa can be poly-microbial. The nature of the sample for atrial infections plays an important role in the interpretation of the results. The swabbing does not allow to affirm the pathogenic role of certain germs which can be commensals of the external auditory canal. the isolation of *Haemophilus*, *pneumococcus* or *moraxella* makes it possible to affirm with certainty the role of these pathogens which does not belong to the flora of the external auditory canal. Even the realization of paracentesis

makes the interpretation easier. the susceptibility test should be made on the presumed pathogenic species in AMO and OMR.

The study of the sensitivity of isolated bacteria to antibiotics determines the choice of antibiotic therapy. *Pneumococci* isolated from our series had a penicillin sensitivity of 98%, gold *staphylococci* were methicillin-sensitive, and this result is consistent with literature data [9].

In enterobacteria, resistance to C3G was 18% as found in the study of Ouedraogo et al with sensitivity to C3G found in 77% of chronic otitis media [14].

The results of this study testify to a polymorphic bacterial flora. The search of the pathogens in the middle of this commensal flora, requires the realization of quality samples to limit the contamination by this flora and need the knowledge of the clinical presentation to guide research (angina) especially for "swab" type swabs: tonsil swabs (angina) and external auditory meatus (otitis externa).

The procedure leading to the prescription of antibiotic therapy must be rigorous, systematic and justified. It must make it possible to clearly identify the situations that impose urgent antibiotic therapy on those that can lead to therapeutic abstention and a simple clinical reassessment.

5. Conclusion

The interpretation of microbiological results in ENT infections remains difficult. It depends on several parameters at once of the nature and the quality of the sample, the bacterial species but also conditions of transport and routing.

We must always take into account the presence of a commensal polymorphic flora that colonizes the ENT sphere and the possible presence of commensal bacteria potentially pathogenic in this flora. Microbiological research must always be oriented by the clinical context.

These data carry a value of orientation, for the practitioner, in the choice of an antibiotherapy of first intention but the antibiogram remains the best way for a better efficiency towards pathogenic germs. Their care is complex and requires a multidisciplinary approach.

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