



Research Paper

## Current profile of nosocomial bacterial meningitis at Ibn Tofail UHC Mohamed VI hospital in Marrakech

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**ABSTRACT:** Nosocomial bacterial meningitis is a complication that can occur after neurosurgery or treatment contaminating the meninges. We conducted a descriptive retrospective study in the microbiology laboratory of Ibn Tofail hospital in Marrakech over a period of three years. We carried out a cytobacteriological study and a culture for all the CSFs received with a suspicion of nosocomial meningitis. During the study period, 198 CSF were analyzed. The bacterial culture was positive in 11% of cases and sterile in 60% of cases. The most implicated germ was *Pseudomonas aeruginosa*, representing 44% of the isolates. The level of resistance shows the presence of sensitive strains in 29% of cases and PBN in 13% of cases. EBLSE and carbapenem resistance were also found in 29% each. The prognosis is often life-threatening with high mortality. Prevention of nosocomial meningitis is possible.

**KEYWORD:** meningitis, nosocomial, resistance, antibiotics

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### I. INTRODUCTION

Nosocomial bacterial meningitis is a complication that can occur after neurosurgery or treatment contaminating the meninges. It is a major medical emergency responsible for significant morbidity and mortality. The objective of this work is to study the clinical and bacteriological profile of bacterial meningitis as well as to present the state of play of this pathology.

### II. MATERIAL AND METHOD

This is a descriptive retrospective study, carried out in the microbiology laboratory of Ibn Tofail Hospital in Marrakech, over a period of three years, from January 2016 to December 2018.

The CSF samples were taken quickly in the laboratory and were processed without delay. We performed a cytobacteriological study and culture for all samples. Bacterial identification was carried out by the "Api 20E" biochemical gallery and the sensitivity to antibiotics tested by antibiogram on agar media according to the recommendations of EUCAST. The study included CSFs analyzed in our laboratory, coming from different departments of Ibn Tofail Hospital, and having a positive culture. Any patient admitted with meningitis was excluded from the study.

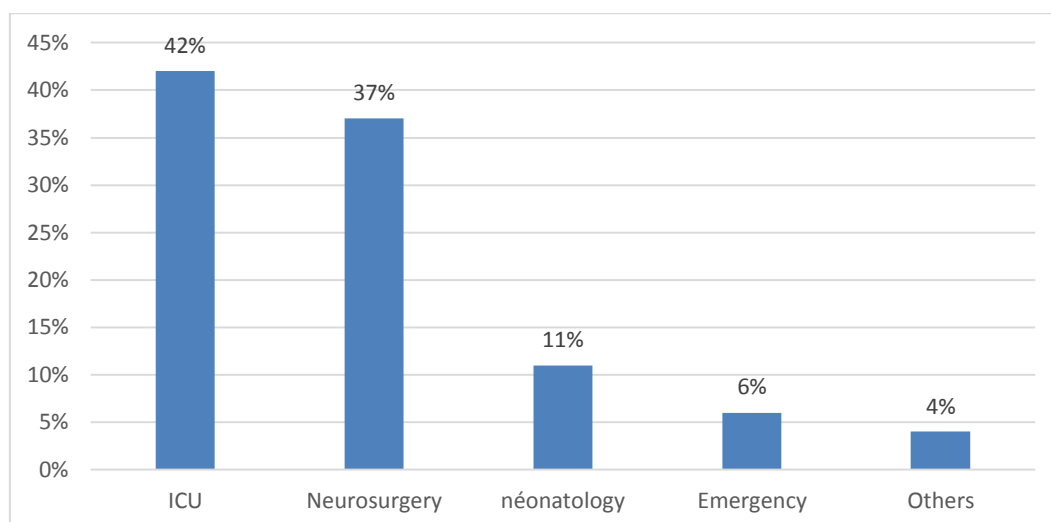
### III. RESULT

During the study period, 198 CSF were analyzed. The bacterial culture was positive in 11% of cases and sterile in 60% of cases. The average age was 33 years with extremes ranging from 1 day to 79 years.

The CSF was cloudy in 83% of cases.

The blood glucose / blood sugar ratio was less than 0.4 in 70% of patients. 73% had a proteinorachia greater than 1.5 g / l.

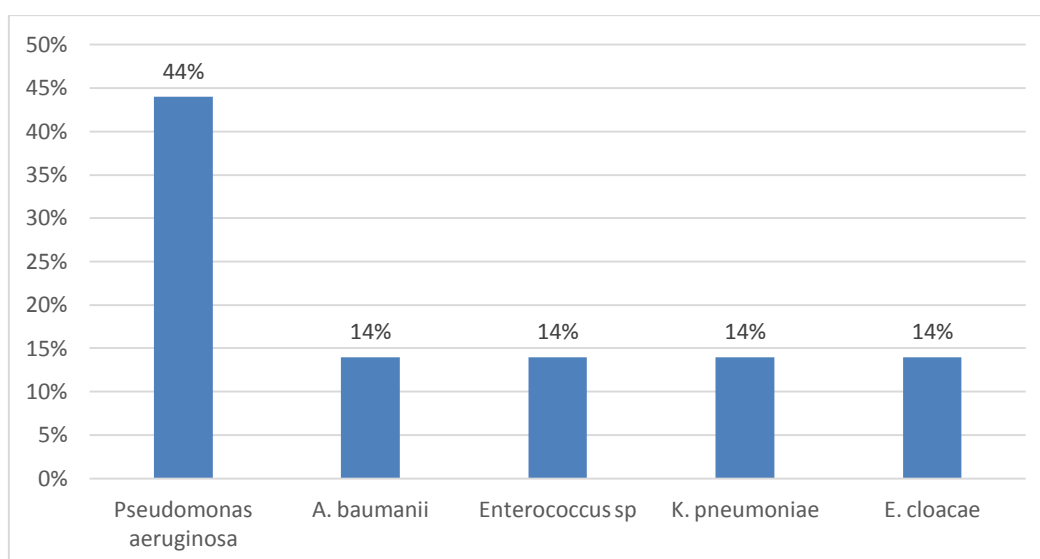
CSF most often came from intensive care units (42%), followed by neurosurgery (37%), then neonatology (11%), emergencies (6%) and finally other surgical services (4%) (Figure 1).



**Figure 1:** Distribution of CRLs according to the originating service

The most implicated germ was *Pseudomonas aeruginosa*, representing 44% of the isolates. The remainder was shared between *Acinetobacter baumannii*, *Enterococcus* spp, *Klebsiella pneumoniae*, and *Enterobacter cloacaere* showing 14% each (Figure 2).

The level of resistance shows the presence of sensitive strains in 29% of cases and PBN in 13% of cases.



**Figure 2:** distribution by isolates

BMRs were also found: EBLSE (29%) and resistance to carbapenems (29%). Co-resistance was noted: 57% of strains resistant to aminoglycosides, 29% to sulfamethoxazole-trimethoprim and 14% to fluoroquinolones.

#### IV. DISCUSSION

Meningitis is said to be nosocomial if it occurs in hospital or if it follows a potentially contaminating procedure. Nosocomial meningitis are rare but serious pathologies.

Some authors report that *A. baumannii*, *P. aeruginosa* and *K. pneumoniae* were the bacteria most implicated in postoperative meningitis [1]. Others report a predominance of CGP in external ventricular leads [2,3]. We do not report any cases of CGP.

The recommended empiric antibiotic treatment is Vancomycin combined with cefepime, ceftazidime or meropenem, before being adapted to the antibiogram [4].

In the literature, several observations report the use of colistin intrathecally. Intravenous colistin alone is not sufficient to treat meningitis caused by multidrug-resistant BGNs. The intrathecal and intraventricular routes have been shown to be effective and safe [5].

The rate of methicillin resistance in *S. aureus* found in the five main hospitals in the district of Thessaly (central Greece) was 14.8% [6]. In the Nordic countries (Sweden, Denmark), the percentage of *Staphylococcus aureus* resistant to methicillin has remained very low (<2%) [7].

According to data from the national observatory for the epidemiology of bacterial resistance to antibiotics [8], the frequency of susceptibility of *P. aeruginosa* to ticarcillin is the lowest among those of naturally active beta-lactams (56.4%), while that of piperacillin is higher (77.0%). Ceftazidime and imipenem remained the most active among the beta-lactams. Sensitivity to fluoroquinolones and amikacin was consistently less than 90%. According to the national survey on the prevalence of nosocomial infections and anti-infectious treatments in healthcare establishments in France 2017 [9], the proportion of strains of *P.aeruginosa* resistant to carbapene was 13.46%.

For aminoglycosides, resistance to *A. baumannii* has evolved very brutal, it would affect 70 to 85% of strains. Furthermore, no colistin resistant strain was isolated in this study. On the other hand, the increase in the use of this molecule for the treatment of infections with multidrug-resistant strains of *A. baumannii* is believed to be the cause of the appearance of resistance [10].

In Europe, between 1997 and 2004, the prevalence of *K. pneumoniae* producing betalactamases, increased from 9 to 13.6% according to the meropenem yearly program susceptibility test information collection (MYSTIC). National studies carried out in France, Italy, Spain, Belgium and Poland corroborate this result [11].

In a study conducted in Turkey [12], the overall rate of resistance to carbapenems was 37.5%. In addition, carbapenem-resistant *A. baumannii* and MRSA are endemic in many hospitals. The rate of resistance to carbapenems in strains of *A. Baumannii* and MRSA causing healthcare associated infections in teaching hospitals was 87.3% and 43.2% in 2012, respectively.

In our study, EBLSE was found in 29% of cases and resistance to carbapenems also in 29% of cases.

## V. CONCLUSION

Nosocomial bacterial meningitis is a formidable complication. Its diagnosis is based on a set of clinical, biological and microbiological. Early diagnosis and treatment is essential for hope to improve the prognosis.

The PCR search for bacteria present in the CSF is proving to be a promising examination, with the possibility of an early diagnosis of the bacterial origin of postoperative nosocomial meningitis.

The prevention of these postoperative meningitis is possible with the right knowledge and awareness of health care staff of risk factors, strict compliance with hospital hygiene measures, an operating technique rigorous and the application of an antibiotic prophylaxis protocol adapted according to indications.

The prognosis is often life-threatening with high mortality. A good collaboration between attending physician, radiologist and biologist remains inevitable in order to guarantee good patient care.

## REFERENCES

- [1]. Behice K, Ferit K, Aslihan U, et al. The causes of postoperative meningitis: The comparison of Gram-negative and Gram-positive pathogens. *TurkNeurosurg*, 2017, 1:9.
- [2]. Korinek et al. Prevention of externalventricular drain relatedventricularis, *Acta Neurochir (Wien)* 147(1) :39 45
- [3]. Harold Noël, AuresChaïb, Isabelle Pouljol (i.pouljol@invs.sante.fr), Jean-Michel Thiolet, Bruno Coignard, Signalement de méningites nosocomiales après acte invasif sur le rachis, France, 2001-2005. *BEH thématique* 12-13 / 3 avril 2007
- [4]. Diederik van de Beek. Nosocomial BacterialMeningitis. *N Engl J Med* 2010; 362:146-154.
- [5]. Baragiacchi O, Giuseppe de Rosa FG. Intrathecal or intraventricular colistin: a review. *Infez Med.* 2016;24(1):3-11.
- [6]. Petinaki E, Miriagou V, Tzouveleki LS, Pournaras S, Hatzi F, Kontos F, et al. Bacterial resistance study group of Thessaly. Methicillin-resistant *Staphylococcus aureus* in the hospitals of Central Greece. *Int J Antimicrob Agents* 2001;18:61-5.
- [7]. Zygmunt DJ, Stratton CW, Kernodle DS. Characterization of four  $\beta$ lactamase produced by *Staphylococcus aureus*. *Antimicrob Agents Chemother* 1992; 36:440-5.
- [8]. Bertrand X, Costa Y, Pina P. Surveillance de la résistance bactérienne aux antibiotiques dans les bactériémies : données de l'observatoire national de l'épidémiologie de la résistance bactérienne aux antibiotiques(ONERBA) 1998-2003, *Médecine et maladies infectieuses* 35 (2005) 329-34.
- [9]. Enquête nationale de prévalence des infections nosocomiales et des traitements anti-infectieux en établissements de santé, France, mai-juin 2017.
- [10]. Elouennass, M., Bajou, T., Lemnouer, A. , Foissaud, V., Hervé, V., & Baaj, A. *Acinetobacter baumannii* : étude de la sensibilité des souches isolées à l'hôpital militaire d'instruction Mohammed V, Rabat, Maroc. *Médecine et Maladies Infectieuses* 2003 ;33 :361-364.
- [11]. Canton R, Novais A, Valverde A, Machado E, Peixe L, Baquero F, et al. Prevalence and spread of extended-spectrum  $\beta$ -lactamase-producing *Enterobacteriaceae* in Europe. *Clin Microbiol Infect* 2008;14:144-53.
- [12]. SİPAHI et al. Pooled analysis of 899 nosocomial meningitis episodes from Turkey. *Turk J Med Sci*.