

Purulent Meningitis in Children: A Retrospective Study of 70 Cases in Senegal

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Abstract: *Introduction:* Despite much progress, purulent childhood meningitis (PCM) remains a public health problem. The objective of this work was to determine the epidemiological, clinical, therapeutic and evolutionary profile of purulent meningitis in children. *Methods:* Based on retrospective work carried out over a 4-year period (01 January 2014 to 31 December 2017), we studied the epidemiological, clinical, therapeutic and evolutionary aspects of cases of purulent meningitis hospitalized in the pediatric ward of the Children's Hospital of Diamniadio. Included were all children from 29 days to 15 years of age in whom the diagnosis of purulent meningitis was confirmed by the laboratory. *Results:* The hospital frequency was 1.9%. The mean age of the patients was 41.0 months. Among the affected children, 68.6% were fully vaccinated. The main germ was *Neisseria meningitidis* W135 (58.8%). Third generation cephalosporins were the antibiotics of choice (97.1%). No resistance was found to them. The cure rate with sequelae was 5.7%. *Streptococcus pneumoniae* was the germ responsible for 50% of the objective sequelae. The mortality rate was 7.1%. *Conclusion:* *Neisseria meningitidis* W135 is the main germ of purulent meningitis in our study. It is not included in the national routine immunization. It is imperative to adapt vaccination to the epidemiological fluctuation of pathogens in our regions.

Keywords: Meningitis, Purulent, Child, Germs, Senegal

1. Introduction

Purulent childhood meningitis (PCM) is an endemic disease that remains a topical issue in developing countries, particularly those in the meningitis belt where children are the most vulnerable population [1]. Although much progress has been made, both preventively and curatively, PCM remains a public health problem. Indeed, the bacteriological

spectrum of this disease is constantly evolving. Thus, while the preventive measures currently in place have reduced the number of cases of PCM, they have also led to epidemiological fluctuations and the emergence of new germs. Therefore, constant updating of data becomes essential to maintain control over PCM epidemics and to improve curative and preventive management of PCM both at national and sub-regional levels. It is within this framework that we undertook this study whose general

objective was to determine the epidemiological, clinical, therapeutic and evolutionary profile of PCM.

2. Methods

This is a retrospective study conducted over a 4-year period (1 January 2014 to 31 December 2017) at the Diamniadio Children's Hospital (DCH). It is a level III reference pediatric hospital on the health pyramid in Senegal. Included in the study were all hospitalized children aged between 29 days and 15 years whose diagnosis of PCM was confirmed in the laboratory by cerebrospinal fluid (CSF) with a cellularity >10 elements/ mm^3 with the presence of altered polynuclear cells (APC). All CSF specimens were sent to the laboratory for cytological, chemical and culture studies on non-specific media. The search for soluble antigens in the CSF by latex was done and the antibiogram was systematically performed for any strain isolated in culture. The data were collected from hospitalization records and pediatric ward records and analyzed using Sphinx v5, SPSS 21 and Microsoft Excel 2010 software.

3. Results

During the study period, there were 3,526 hospital admissions including 70 confirmed cases of PCM. The

hospital frequency was 1.9%. There was a steady increase in PCM cases at DCH between 2014 and 2017 (Figure 1). The disease was present all year round with peaks mainly observed in March and June (Figure 2). The average age of patients was 41 months [extremes of 01 months and 180 months]. The sex ratio was 2.33. The socio-economic level was low in 57.1% (40 patients). Of the patients, 68.6% were fully vaccinated according to the national vaccination programme. The main objective physical signs were fever (62.9%), stiff neck (46.7%), Kernig's sign (32%), Brudzinski's sign (29.2%) and bulging fontanel (23.3%). The CSF was cloudy in 45.7%. Bacteria and/or its soluble antigens were detected in 24.3% of cases. The main germ was *Neisseria meningitidis* (Nm) W135 (58.8%). The other germs were *Streptococcus pneumoniae* (23.5%), *Streptococcus agalactiae* (5.9%), *Staphylococcus aureus* (5.9%) and *Salmonella spp* (5.9%). *No Hib meningitis* has been objectified. The different germs objectified according to age are shown in Table 1. Third generation cephalosporins (C3G) were the antibiotics of choice (97.1%). No resistance to C3G was objectified. The cure rate without sequelae was 80%. Sequelae were observed in 5.7% of cases. Pneumococci was the germ responsible for 50% of the cases of objective sequelae. The mortality rate was 7.1%. Figure 3 summarizes the evolution according to the length of hospitalization.

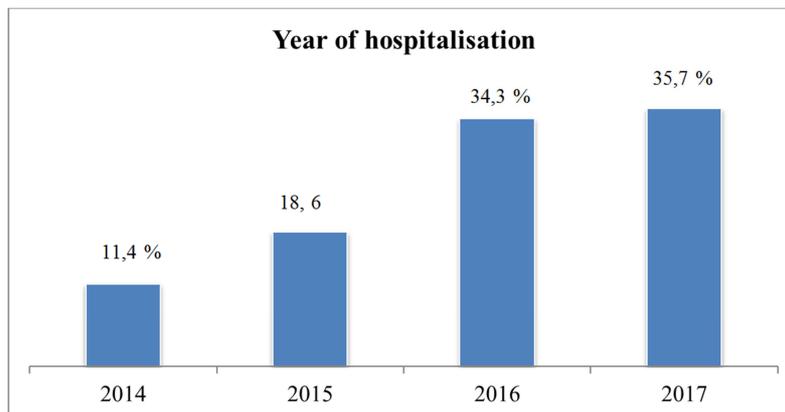


Figure 1. Breakdown by year of hospitalization.

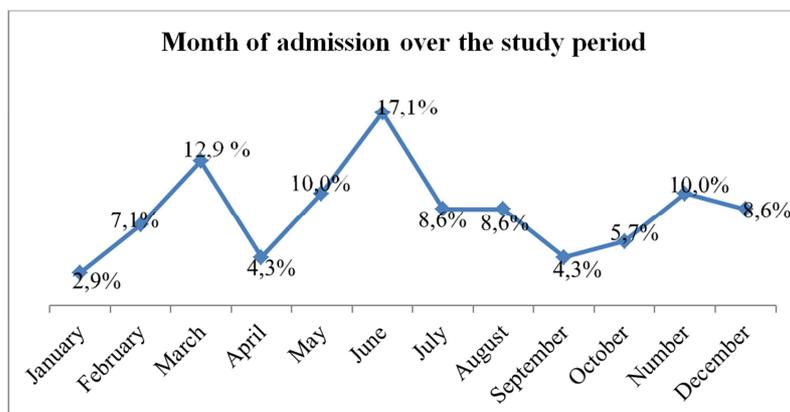


Figure 2. Distribution by month of admission.

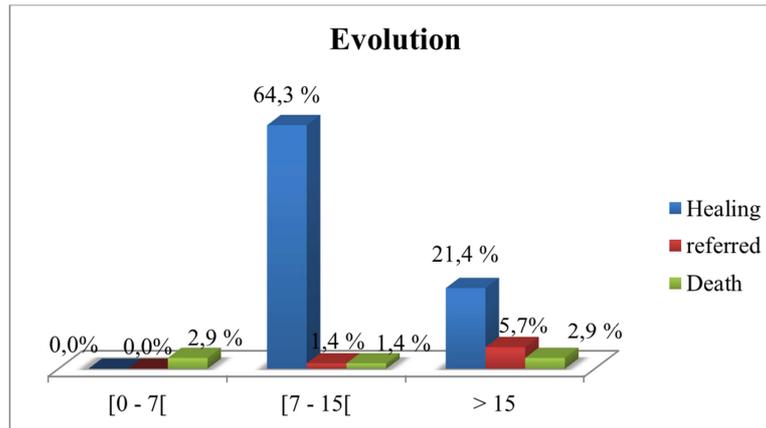


Figure 3. Breakdown according to changes in the length of hospital stay.

Table 1. Distribution according to age and identified germ.

Germs	Age	1-24 months	25-60months	61-180months	Total
	Neisseria meningitidis W135	3	5	2	10
Pneumococcus	3	1	0	4	
Staphylococcus aureus	1	0	0	1	
Streptococcus agalactiae	1	0	0	1	
Salmonella spp	1	0	0	1	
Total	9	6	2	17	

4. Discussion

In our study, the hospital frequency of PCM was 1.9%. A study conducted in Senegal in 2003 reported a hospital frequency of 4.9%. [2] This now reflects the regression of PCM. A male predominance was noted (sex ratio = 2.33). This result is in line with other studies carried out in Senegal with a sex ratio of 1.27. [2, 3] However, other studies reported a female predominance. [4, 5] There is therefore no direct relationship between the occurrence of PM and gender. Infants are the most affected age group, as described in the literature. [6-8] PCM mainly affects the lower socio-economic strata of society. The results of our study are consistent with those of the literature. [2, 6, 7] The predominance of low social strata can be explained by overcrowding, unfavorable lifestyle in this group, as well as lack of vaccination or incomplete vaccination status in some cases. The proportion of children with an up-to-date vaccination status was therefore much higher than that of children whose vaccination status was not up to date. This could be due to inefficacy of vaccination for external reasons (conditions of delivery and storage, method of vaccination etc.) or internal to individuals (immunity). Another reason could be a reduction in the effectiveness of vaccination due to a change in the sero-epidemiological profile. [9-11] A bacterium or its soluble antigens were detected in 24.3% of cases. This result is much lower than those reported in other studies which showed 64% and 64.8% respectively. [7, 12] This finding shows the inadequacy of our technical support. Among the germs objectified, the main one was *Nm W135* in 58.8% of cases. In recent years, many studies have objectified the emergence of *Nm. W135* in Senegal. [13-15] Indeed, *Nm W135* is now one of

the main seeds of objectified PCM in both adults and children. [9, 13, 16, 17] The rate of recovery without sequelae was 80%. This is higher than the rate observed in Senegal in previous studies with 45% and 67% respectively. [18, 19] One could conclude that with the new curative and preventive treatments, the overall prognosis of PCM has improved considerably in Senegal.

5. Conclusion

PCM is a serious condition for which management has improved. Nevertheless, in view of the emergence of new pathogenic agents, it is imperative to adapt vaccination to the epidemiological fluctuation in our regions and therefore to consider integrating new vaccines against PCM into the Senegalese routine immunization programme.

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