Clinical And Bacterial Profile Of Pyogenic Meningitis in Children

ABSTRACT

AIM
To describe the clinical, bacterial and epidemiological profile of Pyogenic meningitis (PM) in children aged between 3 months to 15 years.

METHODS
We conducted a retrospective study of all cases of pyogenic meningitis collected in the Department of Pediatrics of Adichunchanagar Institute of medical sciences, during a period of June 2012-May 2014. Thirty cases of pyogenic meningitis based on inclusion and exclusion criteria were recorded and their profile analyzed retrospectively.

RESULTS
Majority of the cases (92%) occurred during infancy. The most frequent organisms were Streptococcus pneumoniai (43%) and Haemophilus influenzae (40%), followed by Neisseria meningitidis (6%). The main clinical manifestations were fever (100%), seizures (28%) and vomiting (22%). Bulging fontanel was noted in 15 cases (55%), somnolence in 11 cases (40%) and axial hypotonia in 12 cases (44%). 29% of the children were found to have post meningitis sequel.

INTRODUCTION
Pyogenic meningitis (PM) in children remains an important pediatric problem because of their impact on morbidity and mortality. In recent years, significant changes in the epidemiology of bacterial meningitis in children are observed. They are a consequence of the introduction of vaccines against the bacteria involved in meningitis. The objectives of our study were to describe the PM profile in our region and specify the latest treatment recommendations of PM in children.

Methods
We conducted a retrospective study of all cases of PM admitted in the Department of Pediatrics of Adichunchanagar Institute of medical sciences, during a period of June 2012-May 2014. The inclusion criteria were: a) age 3 months - 15 years; b) identification of the organism by direct examination of cerebrospinal fluid (CSF) and/or the presence of soluble antigens positive in CSF and/or CSF cultures. Infants under 3 months were excluded. We retrospectively analyzed the records collected during the study period for clinical, bacterial and epidemiological profile of all 30 cases included in study. Then we analyzed the results by software SPSS Type-15. Descriptive statistics were used to summarize the data. Categorical variables were expressed as frequency while quantitative variables were expressed as means and standard deviations. The correlations between the variables were tested by the test chiiex. The significance level was set at 0.05.

RESULTS
Epidemiological Study: Hospital incidence of PM was 1.8 / 1,000 hospitalizations. We found a clear winter predominance (52%). The majority of our patients (92%) were infants with average age at diagnosis one year 6 months with a male predominance and a sex ratio of 1.2. All patients were vaccinated according to the national immunization schedule but none of them received vaccine against Haemophilus influenzae and S. Pneumonia.

Clinical study: The average time taken for consulting the doctor after onset of symptoms was 28 days. Fever (63%) was a constant cause of consultation and was usually between 39 °C and 40 °C (63%) and associated with vomiting in 15 cases (50%) and seizures in 8 cases (28%). Initial examination showed drowsiness (40%), axial hypotonia (44%), a bulging fontanelle (55%), stiff neck (29%) and signs of Kerning and Brudzinski (7%). Blood examination showed neutrophilic leukocytosis in 24 patients (80%), CRP was positive in 28 patients (93%).

Bacteriological study: CSF was cloudy in 28 cases (93%). Cell count more than 100 / mm3 was noted in 27 patients (90%) which was predominantly neutrophils in 90% of children and lymphocyte in 3 patients who received prior antibiotics diffusible across the blood-brain barrier. CSF glucose was low in 26 cases and was less than 2 mmol / l in 48%. CSF Gram staining was positive in 23 cases (76%) of which 11 each were Gram-negative bacilli and gram-positive diplococci and one was Gram-negative cocci. The search for soluble antigens performed in 12 cases, was positive in 4 cases. The culture was positive in 27 cases (90%). It showed: a) Haemophilus influenzae b (HI) (12 cases), Streptococcus pneumoniai (SP) (13 cases) and Neisseria meningitidis (NM) (2 cases). The culture was negative in 3 patients. We collected 28 cases of PM in infants. The cause was identified in 25 cases of which 12 were HI, 11 S.Pneumonia meningitis (SPM) and 2 N. Meningococci meningitis (NMM). The 2 cases of PM in older children were secondary to SP.

Pneumococcus was sensitive to Penicillin G in 10/13 cases, ampicillin in 11/13 cases and cefotaxime and vancomycin in all cases. Haemophilus influenzae b had an intermediate sensitivity to Peni G in 3 cases / 11 and it was resistant to amoxicillin in 3 cases.

Treatment: The first-line antibiotic therapy was usually guided based on direct examination was based to be replaced by and was ceftriaxone (100 mg / kg / day in 2 divided doses) in 6 cases and ceftriaxone (150 mg / kg / day in 2 divided doses) associated with vancomycin (60 mg / kg / day in slow perfusions 4) in 24 cases. In uncomplicated purulent meningitis, average duration of antibiotics was 15 days in SP, 11 days in case of HI and 10 days in case of NM. A corticosteroid dexamethasone at a dose of 0.15 mg / kg x 4 / d IV was prescribed in 26 cases (86%); HIM (12 cases), SPM (12 cases) and NMM (2 cases). The average length of antibiotic treatment was 17 days and ranged from 8 to 43 days. This time varied depending on the pathogens and the presence or absence of complications.

DISCUSSION
Epidemiological study: There is a significant decrease in the frequency of hospital PM in children. This decrease in frequency is due to improved living conditions, early treatment of ENT infections and the introduction of the vaccine against the HI in the national immunization schedule. But since 2012, there was again an increase in the frequency of PM in our department: here HIM (40%), SPM (43%) and NMM (6%) were
identified. All patients were vaccinated according to the national immunization schedule but none of them against HI and SP. In Europe, the decline in cases of HI serotype b due to vac-
cination introduced since the nineties, is estimated at over 90%,
with an incidence of 0.01 / 105 in Denmark and Germany 0.74
in Switzerland.3,4,5 Similarly, the United States, the introduc-
tion of vaccination in 1990 antihaemophilus was followed by a
82% decrease in the incidence of Haemophilus meningitis in
children under five years between 1991 and 1995.6 In African
countries,7,8 Hib vaccine is not routine practice, S. pneumoniae
and H. influenzae dominate bacterial etiologies of meningitis in
infants and small children in these countries over the past ten
years. In our series, the organism most frequently found was the
SP (43%). The age group between 3 months to 2 year was the
most affected. Similarly, a French study reported that 70% of cases
of meningitis due to SP occur before the age of two years with a
peak incidence between four and six months.9 In the United
States, PCV 13 is recommended in all children under two years of
age and for children 2 years to less than 5 years defined as high risk.10 The incidence of meningitis since the introduction of
PCV fell by 59% in children less than two years from an inci-
dence of 10/105 to 4/105.10 In our study we collected only two
cases of NMM. Similarly Mezghani11 who conducted a retro-
spective study between 1993 and 2001 of all PM cases collected
in the microbiology laboratory of the University Hospital Habib-
Bourguiba Sfax, reported that the PM in infant and small child
was mainly due to HI (66%) and SP (23%). NM was isolated in
6% of cases. Serogroup B was the most common (81%) followed
by serogroup C (19%).

Therapeutic Antibiotic therapy should be initiated at the lat-
est within three hours, ideally within one hour of arrival at the
hospital, regardless of the time elapsed since the alleged onset
of meningitis. Initial antibiotic treatment of bacterial meningi-
tis is guided by direct CFSE examination.12 It includes a third-
generation cephalosporin, or cefotaxime or ceftiraxone, with
vancomycin if the initial orientation cannot rule out pneumococcal meningitis. If the rapid implementation of antibiotics is the key element in the prognosis of meningitis, it appears that the administration of corticosteroids is also essential to improve the prognosis of certain pyogenic meningitis, provided that this corticosteroid is started before or concomitantly to the first injection of anti-
biotics. Only dexamethasone is recommended because it is the
only steroid that has been evaluated as an adjunct to treatment of bacterial meningitis. The dose is 0.15 mg / kg intravenously,
repeated every 6 hours for 4 days. The indications are: positive
direct examination suggestive of HI or SP in children; cases of
suspected bacterial meningitis, where the indication of brain
imaging delay the completion of the lumbar puncture; where the
cerebrospinal fluid is cloudy or purulent when direct examina-
tion is negative but the data from other laboratory tests of CSF
and blood can retain the diagnosis of PM. Dexamethasone is not
recommended in immunocompromised patients, in those who
have previously received antibiotic parenterally, and meningoco-
coccal meningitis in children.13

Evolution The main element of poor prognosis, regardless of organization seems to be the initiation of antibiotic treatment. Death often depends on the causative agent. In the case of pneumococcal meningitis, mortality is 10-20%. Risk fac-
tors for death were the presence of convulsions, coma, pupillary asymmetry, hemodynamic disorders with need for ICU admis-
sion, pressor amines, assisted ventilation and a low glucose level
(<0.4 g / l). In the case of meningococcal meningitis, lethality
is around 10%. It is higher if purpurapulmonary is associated where it is 25%. Lethality seems lower for serotypes B, C and
W 135; it is higher for serotype Y (about 26%). Sequelae encoun-
tered are partial or complete deafness in in 7 to 30%, major
neurological in 12% of cases (mostly obstructive hydrocephalus,
motor weakness). The onset of effects depends on the causa-
tive organism. In the case of pneumococcal meningitis, the risk of neurological sequelae is of the order of 30-50% which may be: seizure disorders, severe development disorders or cognitive
impairment detected at school learning. The most common se-
quela remains deafness: 10-35% depending on the study. In the
case of meningococcal meningitis, the risk of neurological dam-
age is variable but seems smaller than for pneumococcus, on the
order of 10%. In the case of meningitis caused by Haemophilus
influenzae treated, neurological sequelae (seizure disorders, developmental delay, etc.) can occur in 20% of cases. Transient
ataxia in the early days may appear and regress without sequae-
ex.16 Deafness is also the main sequel of meningitis caused by
Haemophilus influenzae type b. The frequency of sequelae in
case of Haemophilus influenzae type b is proportional to the
concentration of bacteria in the CSF of the first lumbar punc-
ture. In our series, the sequelae were observed in 8 cases (29%)
which included 5 cases of SPM,2 of HIM and 1 case of NMM.

CONCLUSION
PM in our study was mainly due to HI and SP and HIM will definitely decrease in our country due to the introduction of the Hib vac-
cine in the national immunization schedule. We also hope that the pneumococcal vaccine is introduced into our national im-
munization schedule which could reduce the number of cases of SPM that are more formidable because of their high mortality
and severe neurological sequelae

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