Original Article

Blood Culture Positivity in Acute Pyogenic Meningitis

Jan Muhammad Afridi, Yasir Rehman, Arshia Munir and Qamar Ali

ABSTRACT

Objective: To compare CSF Culture VS Blood Culture in 88 Patients Newly Diagnosed as Acute Septic Meningitis Admitted in Paediatrics Department KTH.

Study Design: Descriptive / cross-sectional study

Place and Duration of Study: This study was conducted at the Department of Pediatrics, Khyber Teaching Hospital, Peshawar from June 2017 till December 2017.

Materials and Methods: 88 patients presenting with clinical signs and symptoms of acute septic meningitis were selected through non randomized convenient sampling. Before enrolling the patients informed consent was taken from the attendant. For every patient a proper record was maintained on a standardized proforma. Detailed history and examination was done with a special emphasis on signs and symptoms suggestive of meningitis were documented. Lumber puncture was performed under aseptic technique and samples were sent for analysis and culture to the Khyber Medical College Pathology Department. Where the CSF culture was performed by Beckitic Machine using special culture bottle and the results were received and interpreted.

Results: Out of 88 patients with meningitis 7 patients (7.9%) had positive CSF Culture. 10 patients had staphylococcus Epidermidis growth which was considered contamination. Out of 7 positive culture 3 patients (3.4%) had MRSA positive CSF Culture, 2 patients (2.2%) had Staphylococcus Aurius and 1 patient (1.1%) each had Streptococcus Pneumonie and E.Coli in CSF Culture.

Out of 88 patients with meningitis 6 patients (6.8%) had positive blood culture. 8 patients had staphylococcus Epidermidis growth which was considered contamination . Out of 6 positive culture 2 patients (2.2%) had MRSA positive blood Culture, 1 patient (1.1%) each had Staphylococcus Aurius,Streptococcus Pneumonie, Psudomonas and E.Coli in Blood Culture.

Conclusion: In our study it was found that MRSA is the commonest cause of septic meningitis comprising 3 (3.4%) patients followed by Staphylococcus Aurius in 2 (2.2%) and 1 (1.1%) patient each had Streptococcus Pneumonie and E.Coli. Similar results of blood culture were seen with commonest growth of MRSA found in 2 (2.2%) patients followed by 1 (1.1%) patient each of Staphylococcus Aurius,Streptococcus Pneumonie, Psudomonas and E.Coli .

Septic meningitis is a serious condition and inappropriate or delay in the management may result in serious fatal complications therefore aggressive and appropriate antibiotic therapy is vital for better outcome.

Key Words: Acute Pyogenic Meningitis, Cerebrospinal fluid (CSF)

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INTRODUCTION

Acute bacterial meningitis (ABM) is a life threatening illness that is prevalent worldwide. It is a medical emergency that needs early diagnosis and aggressive therapy. Despite advances in management and vaccination, bacterial meningitis remains a severe infection with high rate of mortality and long term neurological disabilities.[1] It has increased mortality and morbidity in the developing countries due to poor health facilities, poor living conditions and lack of access to appropriate preventive and curative services[2,3]. In recent years, despite improvements in Antimicrobial therapy and intensive care support, overall mortality rates related to bacterial meningitis is around 20 to 25 % reported by major centers.[4]

Early clinical suspicion and implementation of appropriate antimicrobial therapy are critical to minimize adverse outcomes, Therefore accurate diagnosis is necessary regarding the important etiological agents to ensure appropriate management.[5] As meningitis is a serious emergency, rapid examination of cerebrospinal fluid (CSF) is considered an essential and critical step in early diagnosis and management of the patients.[6] Blood culture is valuable to detect the causative organism and establish susceptibility patterns if CSF cultures have negative results or be unavailable. However, blood culture positivity differs for each causative organism.[7] Meningitis is mainly diagnosed on the basis of history,

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clinical examination and cerebrospinal fluid examination. Conventional culture methods, though gold standard diagnostic technique, cannot be relied upon in certain situations, due to delay in results availability and relatively limited bacterial growth on culture that is reported worldwide especially in situations where prior antimicrobial therapy was administered [8]. Accurate information on important etiologic agents and populations at risk is needed to determine public health measures and ensure appropriate management of acute bacterial meningitis.[9]

Most cases of bacterial meningitis occur in childhood and its pathogens are varied in different age groups. Streptococcus pneumoniae, Neisseria meningitidis, and Haemophilus influenzae type b are among the prevalent bacterial pathogens of this disease.[10] Introduction of Streptococcus pneumoniae and Haemophilus influenzae type b vaccines recently have changed the epidemiology of acute bacterial meningitis.[11] There has been a decrease in the incidence of H. influenzae type b and S. pneumoniae meningitis in countries where vaccination plan is generally performed against the two bacteria.[12]

MATERIALS AND METHODS

This study was conducted at department of pediatrics, Khyber teaching hospital, Peshawar from June 2017 till December 2017. A cross-sectional descriptive study design was used and 88 patients presenting with clinical signs and symptoms of acute septic meningitis were selected through non randomized convenient sampling. Before enrolling the patients informed consent was taken from the attendant. For every patient a proper record was maintained on a standardized proforma. Detailed history and examination was done with a special emphasis on signs and symptoms suggestive of meningitis were documented.

Lumber puncture was performed under aseptic technique and samples were sent for analysis and culture to the Khyber Medical College Pathology Department. Where the CSF culture was performed by Beckitic Machine using special culture bottle and the results were received and interpreted.

Inclusion criteria:

Patients age less than 15 years with clinical features suggestive of Acute Septic Meningitis.

Exclusion Criteria:

1. Patients more than 15 years of age,
2. Those who have taken IV Antibiotics in the last 24-48 hours.
3. Patients with TBM or Viral meningitis.

RESULTS

In our study Total 88 patients with clinical suspicion of meningitis were included out of which 7 patients (7.9%) had positive CSF Culture. 10 patients had staphylococcus Epidermidis growth which was considered contamination. Out of 7 positive culture 3 patients (3.4%) had MRSA positive CSF Culture, 2 patients (2.2%) had Staphylococcus Aureus and 1 patient (1.1%) each had Streptococcus Pneumoniae and E.Coli in CSF Culture.

All MRSA growths were sensitive to Linezolid and 2 to Vancomycin, while all were found resistant to Ciprofloxacin. Both S. Aureus growths were sensitive to Ciprofloxacin, Linezolid and Gentamycin while one was resistant to Clindamycin and other to Erythromycin and Levofloxacin. S. Pneumoniae was found sensitive to Vancomycin, Meropenem and Doxocycline while resistant to Amikacin, Clindamycin, Ciprofloxacin and Gentamycin. E. Coli growth was found to be sensitive to Amikacin, piperacillin/tazobactam and Meropenem while resistant to Cefotaxime, Ceftriaxone, Ciprofloxacin and Levofloxacin.

Out of 88 patients with meningitis 6 patients (6.8%) had positive blood culture. 8 patients had staphylococcus Epidermidis growth which was considered contamination . Out of 6 positive culture 2 patients (2.2%) had MRSA positive CSF Culture, 1 patient (1.1%) each had Staphylococcus Aurius,Streptococcus Pneumonie, Psudomonas and E.Coli in Blood Culture. MRSA growth was found sensitive to Vancomycine and Linezolide while resistant to Ciprofloxacin, Ceftriaxone and Cefotaxime. S. Aureus growth was sensitive to Ciprofloxacin, Linezolid and Gentamycin while resistant to Clindamycin,Erythromycin and Levofloxacin. S. Pneumoniae was found sensitive to Vancomycin and Meropenem while resistant to Amikacin, Clindamycin, Ciprofloxacin and Gentamycin. E. Coli growth was found to be sensitive to Amikacin, piperacillin/tazobactam and Meropenem while resistant to Cefotaxime, Ceftriaxone, Ciprofloxacin and Levofloxacin. Psudomonas was sensitive to Meropenem while resistant to all other antibiotics.

Out of 88 patients 42 (47.7%) were male and 46 (52.3%) were female and 3 (7.1%) and 4 (8.6%) patients were found culture positive respectively. 42 (47.7%) patients were below 1 year, 1-5 years and above 5 years patients were 23 (26.1%) in each group. 2 patients (2.2%) were culture positive in below 1 year age group while 4 (4.5%) and 1 (1.1%) patient from 1-5 years and above 5 years group respectively.

Fever was found to be the commonest finding in 84 (95.4%) patients, followed by fits in 44 (50%) patients, up going planters in 40 (45.4%) patients, neck stiffness in 32 (36.3%) and altered sensorium in 27 (30.6%) patients.

Table 1 and Bar Graph1 showing percentages of organisms isolated from CSF and Blood culture.

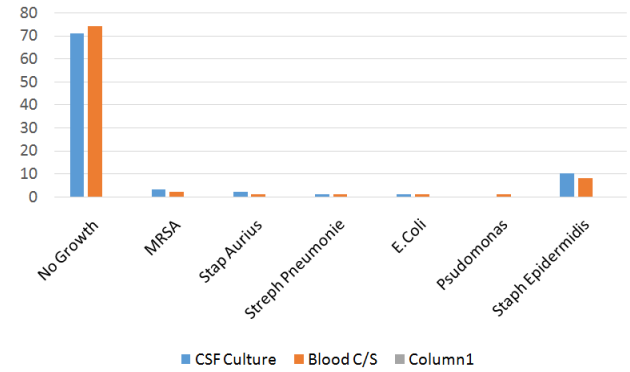
Table 2 and Bar Graph 2 showing gender wise distribution.

Table 3 and Bar Graph 3 showing age wise distribution.

Table 4 and Pie Chart 1 showing Clinical Presentation.

Table No.1: Percentages of organisms isolated from CSF and Blood culture

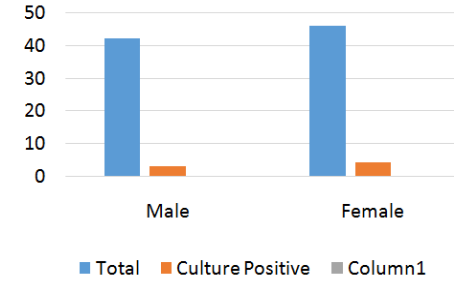
Organisms	CSF C/S	Blood C/S
No Growth	71 (80.6%)	74 (84%)
MRSA	3 (3.4%)	2 (2.2%)
Stap Aurius	2 (2.2%)	1 (1.1%)
Streph Pneumonie	1 (1.1%)	1 (1.1%)
E.Coli	1 (1.1%)	1 (1.1%)
Psudomonas	0	1 (1.1%)
Staph Epidermidis	10 (11.3%)	8 (9%)



Bar Graph No. 1: Percentages of organisms isolated from CSF and Blood culture

Table No.2: Gender wise distribution

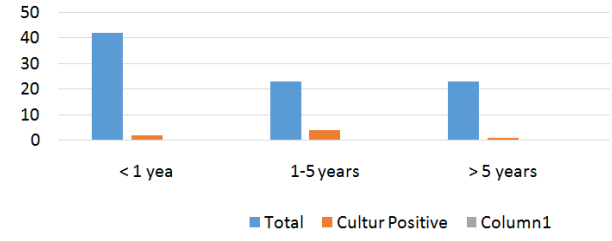
Gender	Total	Culture Positive
Male	42	3
Female	46	4



Bar Graph No. 2: Gender wise distribution

Table No.3: Age wise distribution

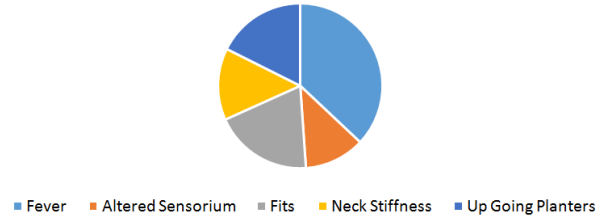
Age Group	Total	C/S Positive
<1 year	42	2
1-5 years	23	4
>5 years	23	1



Bar Graph No.3: Age wise distribution

Table No.4: Clinical Presentation

Presenting Complaints	**No of Patients (%age)**
Fever	84 (95.4%)
Altered sensorium	27 (30.6%)
Fits	44 (50%)
Neck Stiffness	32 (36.3%)
Up Going Planters	40 (45.4%)



Pie Chart 1: Clinical Presentation

DISCUSSION

Bacterial meningitis, an infection of the membranes (meninges) and cerebrospinal fluid (CSF) surrounding the brain and spinal cord, is a major cause of death and disability worldwide[13]. The mortality rate of acute bacterial meningitis remains significantly high in developing countries and is found to be around 16-32% [14,15].

The current standard for the identification of bacterial meningitis in developing countries remains to be microscopic examination and consequent culture of CSF.[16]

In our study a total of 7.9% patients had culture positive CSF while its reported to be 13.7% by Attia et al[17] and 6.7% by Maleeha et al[18]. In our study the commonest organism isolated was MRSA (3.4%) followed by Staph Aurius (2.2%), Staph Pneumonia (1.1%) and E. coli (1.1%) in contrast to coagulase negative staphylococci (5.5%), S.Pneumoniae (2.5%) and H. Influenzae (1%) by Attia et al [17] while in another study Staph Pneumoniae (1.5%), E. coli (1%) and coagulase negative staphylococci (1%) were reported by Maleeha et al [18].

Blood cultures should be performed in all the patients with suspected meningitis. Blood culture reveals the responsible bacteria in up to 80-90% of cases of meningitis.[19] In our study 85.4% blood culture correlated with CSF culture. In our study Out of 6 positive culture 2 patients (2.2%) had MRSA positive blood Culture, 1 patient (1.1%) each had Staphylococcus Aurius, Streptococcus Pneumonie, Psudomonas and E. Coli in Blood Culture, while another study by kalpana et al enterococcus was reported to be positive in 2 (1.4%) patients followed by Pseudomonas and E. coli in 1 (0.7%) Patients each.[20]

In our study 47.7% patients were below 1 year age which is similar to a study conducted by Dharubajjoti et al which reported 46.8% of hospitalized children with meningitis below 1 year while it has been reported 68.3% by Attia et al.[17,21].

In our study 47.7% patients were male while 52.3% patients were female, in contrast to 63.8 % male and 36.2 % female reported by Attia et al while Rajani et al reported 55.2 % males and 44.8 % females.[17,22]

In our study Fever was found to be the commonest finding in 84 (95.4%) patients, followed by fits in 44 (50%) patients, up going planters in 40 (45.4%) patients, neck stiffness in 32 (36.3%) and altered sensorium in 27 (30.6%) patients, while another study by Fahmi Y K et al reported fever in 94% patients, fits in 19.7%, neck stiffness in 26.5%, and altered sensorium in 47% patients [23].

CONCLUSION

In our study it was found that there is a change in pattern of organisms involved in causing acute bacterial meningitis in children at Peshawar. MRSA is the commonest organism which was sensitive to Lenziolid more than Vancomycine and children below 1 year age were the most effected age group. Fever and fits were found to be the commonest presenting complaints.

Recommendations: Patients received with fever, altered sensorium, fits and the clinical signs suggestive of meningitis mentioned above should be hospitalized, Antibiotic cover for meningitis is to be started immediately, cerebrospinal fluid routine examination and blood culture should be sent urgently to avoid the complications of meningitis.

Author's Contribution:

Concept & Design of Study:	Jan Muhammad Afridi
Drafting:	Yasir Rehman
Data Analysis:	Arshia Munir, Qamar Ali
Revisiting Critically:	Jan Muhammad Afridi, Yasir Rehman
Final Approval of version:	Jan Muhammad Afridi

Conflict of Interest: The study has no conflict of interest to declare by any author.

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