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Prevalence of Meningitis Among Infants with Neonatal Sepsis

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Abstract
Background; *Neonatal sepsis still forms the most important and serious causes of morbidity and mortality out come in the neonatal periods of infantsespeciallypreterm very low birthweight whom admitted for management in neonatal intensive care units. The morbidityand mortality related to the maturity degree and time of discovered and treatment, there are very high risk of mortality and morbidity due to difficulties in rapid diagnosis as the conformation of NS if blood culture is positive but if the blood culture is negative, the physician cannot differentiate meningitis from sepsis clinically without lumbar puncture and CSF culture and sensitivity.*
Objectives*; The aim of this study to remember the treating physician the incidence of neonatal meningitis among newborns with late-onset sepsis, and to determine whether it is mandatory to perform a lumbar puncture and cerebrospinal fluid (CSF) analysis in all infants of late-onset neonatal sepsis.*
Study Design*; This study was carried out in the Pediatrics department [Neonatal Intensive Care Unit] of Zagazig general and Healthy Insurance Hospitals in Sharika Egyptover 50 neonatal infants(28 females and 22 males) presenting with late-onset neonatal septicemia. All studied neonates were subjected to history taking, clinical examination stressing on points of the clinical sepsis score, routine investigations (complete blood count, C-reactive protein, blood culture), and CSF analysis and culture.*
Results; *All 50 neonatal infants were positive for the clinical sepsis score: 40 cases were positive for the hematological sepsis score and 10 cases out of 50 were positive for CSF culture; among the 10 cases with positive CSF cultures, there were 4 cases (40%) with negative blood cultures*
Conclusion; *There is a high incidence of neonatal meningitis among neonatal infantsdiagnosed neonatal early and late sepsis, the incidence increased toward late onsetsepsis Neonatalmeningitis frequently occurs in the absence of bacteremia. Hence,lumbar puncture and CSF examination is mandatory in all cases with late-onset sepsis.*

Keywords: *Lumbar puncture, meningitis, neonatal sepsis*

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I. Introduction

Neonatal sepsis still forms the most important and serious causes of morbidity and mortality out come in the neonatal periods of infants especially preterm very low birth weight whom admitted for management in neonatal intensive care units. The morbidity and mortality related to the maturity degree and time of discovered and treatment, there are very high risk of mortality and morbidity due to difficulties in rapid diagnosis as the conformation of NS if blood culture is positive but if the blood culture is negative, the physician cannot differentiate meningitis from sepsis clinically without lumbar puncture and CSF culture and sensitivity

According to the onset of occurrence of neonatal sepsis whether affect the infants early within first 72 hours of life it is known as early onset neonatal sepsis and if affecting the infants after that period it is known as late onset neonatal sepsis[2]. Environmental organisms in the homes or in the hospitals are the main cause of neonatal sepsis, but the infections via blood is most important and serious causes of morbidity and mortality [1]. The severity of prevalence of sepsis increased with prematurity and very low birth weight about 25% of very low birth weight affected by sepsis but only less than 0.1% of late onset neonatal sepsis of all newly born infants are affected [3]. Differential blood cell count, protein C reactive and acute phase reactant can be used for diagnosis but in early onset infections CRP is less sensitive [4]. Blood fore culture and sensitivity used for confirming the diagnosis of sepsis when the result is positive, but if it is negative we must need lumbar puncture and culture of cerebrospinal fluids to differentiate between meningitis caused by pathogenic bacteria and clinical sepsis [5]. Because of 12 % to 54% of patients with meningitis and negative blood culture have positive culture for CSF [6].

II. Patients And Method

Our study was included 50 patients(28 females and 22 males) presenting with late-onset sepsis admitted in the neonatal intensive care unit Zagazig university hospital as their signs and symptoms noticed after the fir 72 hours after birth,Babies with symptoms and signs of these criteria [congenital anomalies, congenital infection, perinatal asphyxia, early onset sepsis, intracranial hemorrhage and mother drugs during pregnancy] must be excluded. All the infants admitted and carried out in our work having same criteria of symptoms and signs of sepsis[Irritability, lethargy, poor feeding, apnea, tachypnea, respiratory distress, cyanosis, bradycardia, tachycardia, hypotonia, seizures, Poor skin color, poor perfusion, hepatomegaly, splenomegaly, abdominal distension and temperature instability]. All admitted babies underwent full history taking; (perinatal, natal and family), delivery history and gestational age. Complete clinical examination for scoring according to modified sepsis score. All babies subjected to complete and differential blood count, C-reactive protein, acute phase reactant, blood for culture and sensitivity and lumbar puncture for CSF culture and sensitivity for the negative blood culture sepsis babies. Peripheral blood sample under complete aseptic procedures, lumbar puncture also performed under complete aseptic techniques by inserting sterilized needle between fourth and fifth lumbar vertebrae for examination of CSF (observation of color, turbidity), test for glucose, protein, cells and culture & sensitivity.

III. Results

Alltotal 50 babies with neonatal sepsis were positive for the clinical sepsis score (100%). The next most clinical finding was suckingin (95%) of babies noticed weak, followed by (75%) of patients with sepsis found their Moro reflexes were weak and (55%) of infants the babies were lethargic. 40 cases out of 50 babies in our study, were positive for hematological sepsis score and 10 babies out of them were negative. Only 25 infants out of alladmitted patients their blood cultures were positive 1o out of them for klebsiella, and only 10 babies with sepsis reported CSF positive culture 4 out of them for Staph. Aureus, despitenegative blood culture results for 6 patients they recorded positive culture of CSF.

Number of patients (n)	n%	Scores
0	00 %	1
0	00 %	2
20	40 %	3
8	16 %	4
18	36 %	5
4	08 %	6
0	00 %	7

Table 1; Clinical sepsis scores and number of patients

No ofpatients	%	Organisms found in blood culture
25	50%	No growth
10	20%	Klebsiella spp.
4	8%	Staph. Aureus
4	8%	Staph. Spp. Pathogens
2	4%	Citrobacter spp.
2	4%	Pseudomonas spp.
2	4%	Coagulase negative Staph. Aureus spp.
1	2%	Methicillin resistant Staph. Aureus spp.

Table 2; Blood culture results

No of patients	**%**	**Organisms found in CSF culture**
40	80%	No growth
4	08%	Staph. Aureus
2	04%	Enterobacter spp.
2	04%	Klebsiella
1	02%	Pseudomonas spp.
1	02%	Streptococcus spp.

Table 3; Results of cerebrospinal fluid culture.

Blood culture	**Cerebrospinal fluid culture**

	Positive	**Negative**	**Total n %**	**Z test**	**P value**
No growth	3(6%)	22(44%)	25 (50%)	4.09	0.001***
Klebsiella spp.	2(4%)	08(16%)	10 (20%)	2.16	0.015 *
Staph. Aureus	2(4%)	02(04%)	04 (10%)	00	0.51**
Staph.Spp. Path.	0(0%)	04(08%)	04 (08%)		
Enterobacter	1(2%)	01(02%)	02 (04%)		
Pseudomonas	1(2%)	00(00%)	01 (02%)		
Streptococcus	1(2%)	00(00%)	01 (02%)		
M.R.S.A.	0(0%)	01(02%)	01 (02%)		
C.N. Staph	0(0%)	02(04%)	02 (04 %)		
Total	**10(20%)**	**40(80%)**	**50(100%)**	**4.86**	0.001***

Table 4;Relation between theblood culture and cerebrospinal fluid culture

*****pointed to significant
****** pointed to non-significant
******* pointed to high significant
MRSA.Methicillin resistant Staph. Aureus spp.
C.N.S. coagulase negative Staph. Aureus spp.

IV. Discussion

Neonatal sepsis still forms the most important and serious causes of morbidity and mortality out come in the neonatal periods of infants especially preterm very low birthweight whom admitted for management in neonatal intensive care units. **Bozaykut A**, et.al. discussed the morbidity and mortality related to the maturity degree and time of discovered and treatment, there are very high risk of mortality and morbidity due to difficulties in rapid diagnosis as the conformation of NS if blood culture is positive but if the blood culture is negative, the physician cannot differentiate meningitis from sepsis clinically without lumbar puncture and CSF culture and sensitivity[8].

Kumar A, et.al.They revealed that the neonatal period is the first four weeks of life, any symptoms and signs clinically agree with sepsis during this neonatal period known as neonatal sepsis and if these pictures found after first 72 hours of life it is known as late onset of sepsis [7]. Our study found that 12 preterm patients (24%) and 38 full term babies (76%) have sepsiswith high incidence in full term than preterm babies with their age ranged from 6 days to 28 days. The evaluation of our studied patients was spotted to sepsis score of neonatesthat agree with results recorded by **Duöllner Y**. [9]. 20 patients (40%) scored 3, (16%) of 8 patients scored 4,18 patients (36%) scored 5 and 4 patients (8%) scored 6. At the time of evaluation of our sepsis patients 46 patients (92%) noticed with weak sucking then weak Moro reflexes found in 34 patients (68%) of our studied patients that agree with results taken by**Lundgreen K,et.al**[10]. The results of protein C reactive in this study from 6 mg/dl up to 186 mg/dl, as 20 patients (10%) have protein C reactive negative and 2 patients (4%) of them given blood culture positive agree with results recorded by **Rayemond J**,**et.al**.[11], also in this work the commonest organisms of neonatal sepsis was Klebsiela spp. That agree with studied by **Criraam R**. [12].

Study of cerebrospinal fluids and lumbar puncture for culture and sensitivity for all 50 patients of our study, 40 patients (80%) CSF results no abnormalities shown (glucose and protein) cells was normal and 10 patients (20%) CSF study for cells showed increased number of cells 100-25000 cells/mm^3despite difficulties sample of lumbar puncture of neonates. Also, CSF culture showed no growth for 40 patients (80%) 10 patients (20%) CSF culture was positive 4 patients (8%) Staph. Aureus was the causative organism that co inside and agree with studied of **Smmith PB, et.al**. and**WalishTJ,et.al**.[13,14].we noticed in our study 10 patients with positive culture of cerebrospinal fluids 6 patients (60%) out of the positive 10 had negative blood culture and 4 patients (40%) out of them had positive blood culture that agree with **Mohan R,et.al**.[15],

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