Sepsis in Neonatology Unit of Kirkuk Pediatric Hospital

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Abstract

This is a retrospective study reviewed all neonates who were proved to have sepsis by positive blood culture and admitted to the neonatal unit of Kirkuk pediatric hospital from June 1, 2005 to May 31, 2006. Data regarding gestational age, gender, causative microorganisms, drug sensitivity, time of presentation and outcome were collected and analyzed. The result of the study showed higher frequency of neonatal sepsis in premature neonates 12.41% in premature newborns VS. 4.41 % in fullterm neonates). No significant statistical differences were found in outcome between early and late neonatal sepsis. Also it was found that gender had no significant effect in the frequency of neonatal sepsis. Most common causative microorganism for both early and late neonatal sepsis found to be Klebsiella followed by E Coli. Mortality rate was (50.64 %) Most dead infants had early neonatal sepsis (34.18%), while only (16.46%) died from late neonatal sepsis.

Introduction:

Neonatal sepsis may be categorized as early or late onset. Eighty-five percent of newborns with early-onset infection present within 24 hours, 5% present at 24-48 hours, and a smaller percentage of patients present between 48 hours and 6 days of life. Onset is most rapid in premature neonates. Early-onset sepsis syndrome is associated with acquisition of microorganisms from the mother. Transplacental infection or an ascending infection from the cervix may be caused by organisms that colonize in the mother's genitourinary tract, with acquisition of the microbe by passage through a colonized birth canal at delivery. The microorganisms most commonly associated with early-onset infection include group B Streptococcus (GBS), Escherichia coli, Haemophilus influenzae, and Listeria monocytogenes.Late-onset sepsis syndrome occurs at 7-90 days of life and is acquired from the caregiving environment. Organisms that have been implicated in causing late-onset sepsis syndrome include coagulase-negative staphylococci, Staphylococcus aureus, E coli, Klebsiella, Pseudomonas, Enterobacter, Candida, GBS, Serratia, Acinetobacter, and anaerobes. The infant's skin, respiratory tract, conjunctivae, gastrointestinal

tract, and umbilicus may become colonized from the environment, leading to the possibility of late-onset sepsis from invasive microorganisms. Vectors for such colonization may include vascular or urinary catheters, other indwelling lines, or contact from caregivers with bacterial colonization (Remington & Klein, 2001).The clinical signs of neonatal sepsis are nonspecific and are associated with characteristics of the causative organism and the body's response to the invasion. These nonspecific clinical signs of early sepsis syndrome are also associated with other neonatal diseases, such as respiratory distress syndrome (RDS), metabolic disorders, intracranial hemorrhage, and a traumatic delivery. Given the nonspecific nature of these signs, providing treatment for suspected neonatal sepsis while excluding other disease processes is prudent. (Gibbs & Duff,1991).

Patients and methods:

This retrospective study was done in neonatal unit of Kirkuk pediatric hospital. From 1st June 2005 to 31st May 2006 all neonates whom proved to have bacterial sepsis by positive blood culture were included in the study. Data on gestational age, sex, age at presentation, causative microorganism and the result of drug sensitivity obtained from the microbiology department of the hospital lab. Statistical analysis was carried out to assess the deference between the results chi square was applied, statistically significant value was defined as ($p<0.05$).

Results:

At the conclusion of the study, data of 79 neonates whom proved to have bacterial sepsis -by presence of signs and symptoms and positive blood culture for growth of microorganism- have been collected and analyzed.No statistical significant deference was found in the frequency of sepsis between male (4.98%) and female infants (5.31%) as shown in table(1).

Table 1 : Distribution of neonatal bacterial sepsis according to the sex

Sex	Total admission	Bacterial sepsis	%
Male	904	45	4.98
Female	640	34	5.31
Total	1544	79	5.12

P value<0.05

While statistically significant deference was noted in the frequency of bacterial sepsis between fullterm and premature newborns, with greater frequency in premature newborns(12.41%)VS.(4.41%) in fullterm neonates as shown in table(2).

Table 2: Distribution of neonatal bacterial sepsis according to the maturity of the neonate

Gestational age	Total admission		Bacterial sepsis	
	No.	%	No.	%
Fullterm	1407	91.13	62	4.41
Premature	137	8.87	17	12.41
Total	1544	100	79	5.12

P value<0.05

The frequency early neonatal sepsis (43 neonates (54.53 %)) seems to be more than late neonatal sepsis (36 neonates (45.57)) as shown in table(3); but this deference has no statistical significance. Regarding the causative microorganisms, the study showed that Klepsialla followed by E Coli were the most common causative organisms in both early and late neonatal sepsis (30 cases, 13 cases respectively), other microorganisms which discovered in early neonatal sepsis include: Enterobactar, Proteus, and Alkalagenase, While Pseudomonus, Staphilococcus Aureous, and Beta hemolytic Streptococcus tend to be more frequent in late neonatal sepsis. Details of the causative organisms for both early and late neonatal sepsis shown in table (4).

Table 3: Distribution of neonatal bacterial sepsis according to the time of onset

	Early sepsis		Late sepsis		Total	
	No.	%	No.	%	No.	%
Male	25	31.75	20	25.32	45	56.97
Female	18	22.78	16	20.25	34	43.03
Total	43	54.53	36	45.57	79	100

P value<0.05

Table 4: Shows the distribution of neonatal bacterial sepsis according to the causative microorganisms

Type of Microorganisim	Early neonatal sepsis	Late Neonatal Sepsis	Total
Klebsiella	14	16	30
E Coli	8	5	13
Alkalagenase	4	2	6
Proteus	3	2	5
Enterobactar	4	1	5
Alpha hemolytic Strep	2	2	4
Beta hemolytic Strep	1	3	4
Micrococcus	2	1	3
Staph. Aureous	1	2	3
Pseudomonus	1	2	3
Non hemolytic strep	2	0	2
Acinobacter	1	0	1
Total	43	36	79

From the total 79 cases that collected and followed up, 40 cases (50.64 %) were died. Most died infant were complain from early neonatal sepsis (34.18%), while only (16.46%) of died neonates were suffering from late neonatal sepsis; this deference was statistically significant as shown in table (5).

Table 5: Outcome of neonatal sepsis

	Early sepsis		Late sepsis		Total	
	No.	%	No.	%	No.	%
Died	27	34.18	13	16.46	40	50.64
Survive	16	20.25	23	29.11	39	49.36
Total	43	54.43	36	45.57	79	100

P value<0.05

Discussion:

Infection is a major cause of fatality during the first month of life, contributing to 13-15% of all neonatal deaths. Neonatal meningitis, a serious morbidity of neonatal sepsis, occurs in 2-4 cases per 10,000 live births and significantly contributes to the mortality rate in neonatal sepsis; it is responsible for 4% of all neonatal deaths. In the preterm infant, inflammatory mediators associated with neonatal sepsis may contribute to brain injury and poor neurodevelopmental outcomes. (Feigin&Cherry, 1998) .In this study; no statistically deference found in the frequency of proved bacterial sepsis between males and females. Gender predisposition to sepsis, remain controversial, while a study done in Winthrop university hospital showed no gender deference in the frequency of bacterial sepsis[(2)] ; several other studies shows that the frequency and even severity of bacterial sepsis is more in males. (Danai et al., 2006).Premature neonates outnumber fullterm in the frequency of bacterial sepsis this deference was statistically significant. The incidence of sepsis is significantly higher in infants with very low birth than in infants with a birth weight of 1000-2000 g. The risk for death or meningitis from sepsis is higher in infants with low birth weight than in full-term neonates. (Chapman & Faix, 2003).The cause of neonatal sepsis is related to the baby's exposure to bacteria. Early onset sepsis that develops within the first week is usually acquired from the mother, via the placenta or from passage through the birth canal. Late onset sepsis that develops after one week is usually acquired from the caregiving environment. (Behrman, et al., 2000) , in this sample the most common causative organisms causing both early and late neonatal sepsis was Klebsiella infection followed by E. coli. These results were similar to a number of papers represented at the XXIV Annual Meeting of the National Neonatology Forum in 2006 on the incidence and outcome of sepsis, the

organisms causing neonatal sepsis, and their sensitivity to antibiotics. The common themes that emerged from these papers is that the organisms causing early onset sepsis are very similar to those causing late onset sepsis; and the commonest organisms causing early and late onset sepsis are gram negative bacilli, particularly Klebsiella, Enterobactor and Escherichia coli. Staphylococcus aureus is the commonest Gram positive organism. Group B streptococcus is virtually never isolated. (Bernirschke, 2005). A recent population-based study by Stoll et al indicates increased incidence of E. coli sepsis in the first few days of life among very low birth weight infants. The literature also suggests recent increases in ampicillin-resistant E. coli (Stoll et al., 2002) .The mortality rate in neonatal sepsis may be as high as 50% for infants who are not treated. (Long et al.,1997). In this study; from the total 79 cases that admitted and start treatment; only 39 patients (49.36%) complete their chemotherapy and discharge from the hospital; while 40 patients (50.64 %) died prior to completion of their treatment. Most died infant had early onset neonatal sepsis (34.18%), while only (16.46%) died from late onset neonatal sepsis. This result is comparable to a similar study done in the united state between the period from 1995-1998 which showed constant increase in the frequency of death from early neonatal sepsis, in spite of the fact that the incidence of death from both early and late neonatal sepsis had been decline with time.(Hauth & Merenstein, 1997).

Conclusion:

The demographics, pathogens, and outcome associated with neonatal sepsis continue to change. Knowledge of these organisms may help people involved in the care of neonates to choose the right antibiotic for treating sepsis.

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تسمم الدم الجرثومي في وحدة الخدج في مستشفى كركوك الاطفال

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الخلاصة

هذه دراسية وبائية أجريت على جميع المرضى ممن لا تتجاوز أعمارهم ثلاثين يوما الذين ادخلوا ردهة الخدج في مستشفى الأطفال في كركوك للفترة ما بين الأول من حزيران ٢٠٠٥ إلى الحادي والثلاثين من أيار ٢٠٠٦ والذين ثبتت إصابتهم بتسمم الدم الجرثومي.تم اخذ المعلومات المتعلقة بالعمر الجنيني للطفل ، الجنس، الجرثومة المسببة، وقت ظهور الأعراض السريرية، والنتيجة النهائية للمرض من وحدة الإحصاء ووحدة المختبر. وجمعت هذه المعلومات ونظمت في جداول إحصائية لغرض تحليل النتائج.أظهرت نتائج الدراسة إن تسمم الدم الجرثومي يصيب الأطفال الخدج بنسبة اكبر من الأطفال ذوات الأعمار الجنينية الطبيعية، كما أظهرت الدراسة عدم وجود فارق في نسبة الإصابة بالمرض بين الجنسين ، وعدم وجود فارق بين نسبة الإصابة بالمرض في الأسبوع الأول للعمر والإصابة بين الأسبوع الثاني إلى الرابع من العمر.تبين أن جرثومة الاشيريشيا كولاي، وجرثومة كلبسيالا كانا العامل المسبب للمرض في اغلب المصابين . كان معدل الوفيات بين المصابين (٥٠,٦٤%) اغلب الوفيات كانت بين المصابين بالمرض في الأسبوع الأول من العمر(٣٤,١٨%) بينما بلغت الوفيات عند الأطفال المصابين بعد الأسبوع الأول (١٦,٤٦%)