A CORRELATION STUDY OF DIFFERENT ANTIBIOTIC REGIMENS WITH CLINICAL DATA, LABORATORY DATA, AND OUTCOME IN CASES OF NEONATAL SEPSIS, AT ABOUL-RISH UNIVERSITY HOSPITAL

Thesis

Submitted for partial fulfillment of Master Degree (M.Sc.) in Pediatrics

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2008

Abstract

The present study was performed to study the antibiotic regimen pattern used in management of neonatal sepsis in NICU, Aboul-Rish University Hospital, Cairo University, and to correlate them to clinical data, laboratory data and outcome of cases of neonatal sepsis. The study included 70 neonates who were diagnosed as neonatal sepsis whether from the beginning of admission course or during their stay. The study was conducted in the period from January 2007 to June 2007.

The total number of cases admitted in this period was 494 neonates of which 70 neonates had neonatal sepsis representing 14% of the total cases. The number of males was 44 representing 62.9% of total cases compared to 26 females representing 37.1% of total cases. The gestational age of the cases ranged between 29 and 40 weeks with mean of 35.4 ± 3.1 weeks. The number of full term was 29 representing 41.4% of total cases compared to 41 preterm representing 58.6% of total cases.

Key Words :

Complete blood Count – Caesarian section – Endotracheal tube .

ACKNOWLEDGEMENT

First of all, I would like to thank GOD almighty the most merciful, for giving me the ability to accomplish this work.

My deepest gratitude and great appreciation to ***Prof. Dr. Amira Abdelfatah Edreis,*** *Professor of Pediatrics, Cairo University, for her excellent supervision, useful advice and valuable cooperation all over the course of this work. Without her helpful guidance, kind encouragement and constructive comments, this work simply could not be completed.*

My deepest thanks and gratitude are specially expressed to ***Prof. Dr. Hanna Mohammed Abou El-Ghar,*** *Assistant Professor of Pediatrics, Cairo University, for her unlimited and talented efforts to accomplish this work. She followed me up all through the course of this work and gave me so much of her precious time.*

I would like sincerely to thank ***Prof. Dr. Rasha Mohammed Gamal Eldin,*** *Assistant Professor of Pediatrics, Cairo University, for her meticulous supervision, helpful instructions and sincere cooperation.*

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LIST OF ABREVIATIONS

CBC	Complete blood count
CoNS	Coagulase negative staphylococci
CRP	C-reactive protein
CS	Caesarian section
CSF	Cerebrospinal fluid
DIC	Disseminated intravascular coagulation
E coli	Escherichia coli
EDHS	Egypt Demographic and Health Survey
EOS	Early-onset sepsis
ET	Exchange transfusion
ETT	Endotracheal tube
FEP	Fisher's Exact Probability
GBS	Group B streptococcus
G-CSF	Granulocyte colony stimulating factor
GM-CSF	Granulocyte Macrophage colony stimulating factor
HIE	Hypoxic ischemic encephalopathy
I/T	Immature to total neutrophils
IL-6	Interleukin-6
IL-8	Interleukin-8
INIS	International Neonatal Immunotherapy Study
IVIG	Intravenous Immunoglobulin
LOS	Late onset sepsis
LP	Lumber puncture
MRSA	Methicillin resistant Staph aureus
MCP	Monte Carlo Probability
NICU	Neonatal intensive care unit
NMR	Neonatal mortality rate
PCT	Procalcitonin
PMN	Polymorphonuclear

PPHN	Persistent pulmonary hypertension of the newborn
PROM	Prolonged rupture of membranes
RDS	Respiratory distress syndrome
SD	Standard deviation
SIRS	Systemic inflammatory response syndrome
TLC	Total leucocytic count
UTI	Urinary tract infection
VLBW	Very low birth weight
WBC	White blood cell
WHO	World Health Organization

ABSTRACT

Sepsis is a significant cause of morbidity and mortality in neonates. This work studied the antibiotic regimen patterns used in management of neonatal sepsis in NICU, Aboul-Rish University Hospital, and correlated them to clinical data, laboratory data and outcome of cases. The study included 70 neonates who were diagnosed as neonatal sepsis from January 2007 to June 2007. The use of WBC indices together with CRP results was more sensitive than using CBC with differential WBC count alone and there was no upper hand among different antibiotic regimens.

(Key Words: neonatal sepsis, antibiotic regimens, outcome)

INTRODUCTION

AND

AIM OF THE WORK

INTRODUCTION

According to World Health Organization (WHO) estimates, there are about 4 million neonatal deaths a year, 98% occurring in developing countries ***(WHO; 1996, Stoll; 1997)***. Infection, prematurity, and birth asphyxia are the main causes. Worldwide over twenty million newborns get infected each year. Of four million neonates dying each year, 36% are due to severe infections ***(Lawn et al; 2005)***. In Egypt neonatal mortality rate is 20/1000 according to Egypt Demographic and Health Survey (EDHS) ***(El-Zanaty and Way; 2006)***.

In Egypt, incidence of neonatal sepsis in at risk neonates was 59% in the study of ***(El-Maraghi et al; 1984)***, while ***(Badrawi et al; 1994)*** found it to be 53%. Rates of sepsis exceeding 50% in a neonatal intensive care unit (NICU) in Cairo, Egypt, were investigated in September 2001 and association with bacterial contamination of glucose containing intravenous fluids was proved ***(Moore et al; 2005)***. Another study was performed at NICU Cairo University Children's Hospital during the period from April 2003 to October 2004.This study population included all 826 neonates admitted during this period. Infection represented 22.5% (n=186) of cases ***(Seoud et al; 2005)***.

The suspicion of sterile-site (blood, spinal fluid, urine and lung) infection is the most common cause for neonatal admission to the NICU. In addition, nosocomial infections are common among neonates who require extended neonatal intensive care and are associated with an increase in mortality, morbidity, and prolonged length of hospital stay ***(Craft and Finer; 2001)***.

Newborn babies have an immature immune system and therefore may not elicit all signs of infection, and delay in treatment may lead to severe illness or death. Early treatment with antibiotics has been shown to reduce mortality due to sepsis in the neonatal period. Early treatment depends on knowledge of risk factors and picking up early signs of infection in this age group. However the signs of infection tend to be non-specific. Suspected sepsis is therefore defined as any clinical concern for infection to warrant the starting of intravenous antibiotic therapy before laboratory or microbiological evidence of infection ***(Gerdes; 2004)***.

Most authors describe neonatal infection by the terms "early-onset" and "late-onset" infection. Early-onset infections are confirmed infections that occur in the first three days of life, whereas late-onset infections occur after the third day. This distinction is important, as the organisms causing early infections are different from those that cause late infections ***(Craft and Finer; 2001)***. In neonates, the most common sterile source from which a pathogen is isolated is the blood stream (sepsis). Meningitis, urinary tract infections and pneumonia are less common.

Diagnosis of neonatal sepsis is difficult because the clinical signs are subtle and nonspecific and laboratory tests including the “gold standard” blood culture are not always reliable ***(Gerdes; 1991, Polin; 2003, Malik et al; 2003 and Baltimore; 2003)***.

Monitoring the effectiveness of therapy is primarily a clinical enterprise, and most septic neonates improve symptomatically within 24 to 48 hours. With most infections, positive culture sites should be re-cultured after 48 hours of treatment. The white blood cell (WBC) count and the immature to total neutrophil (I/T) ratio may increase dramatically as the neonate responds to treatment, and should begin to normalize by 72

hours. C-reactive protein (CRP) is a useful adjunct to monitor the effectiveness of treatment; neonates whose CRP concentrations do not gradually decrease after 48 to 72 hours of therapy may not be responding properly. The goal of treatment should be to have an asymptomatic newborn with negative repeat cultures and normal WBC counts and CRP, all occurring with at least 3 days of antibiotic treatment remaining ***(Gerdes and Polin; 2002)***.

Antibiotics are the most common medications reported to be used in the NICU ***(Clark et al; 2006)***. Ampicillin and gentamycin are the antibiotics most commonly used to treat neonates suspected of having early infections. In contrast, vancomycin, aminoglycosides, and cefotaxime are the most common antibiotics used to treat late infections ***(Stoll et al; 2002)***.

Diagnosis and management of newborns with infections is challenging and continuous reviewing and evaluation of the used antibiotic regimens in a NICU seems to be vital for achieving our goals of decreasing mortality and morbidity. We believe this study, through examining the causative organisms for sepsis and the antibiotic regimen used at the department of Neonatology Aboul-Rish hospital, Cairo University, and correlating them with the outcome of our patients, could help us better serve our patients, and could improve our results.

AIM OF THE WORK

General objective:

To correlate different antibiotic regimens with clinical data, laboratory data and outcome in cases of neonatal sepsis, in the Neonatal Intensive Care Unit, Children's Hospital – Cairo University.

Specific objectives:

- To evaluate the effect of different antibiotic regimens on observed clinical data related to neonatal sepsis, and compare between the effectiveness of the various lines of antibiotics used on the clinical manifestations of sepsis.
- To evaluate the effect of different antibiotic regimens on the results of laboratory data related to neonatal sepsis, and compare the lines of management regarding laboratory sepsis data.
- To evaluate the efficacy of current antibiotic regimens used for treating neonatal sepsis cases in NICU, Aboul-Rish University Hospital, Cairo University, and come out with a recommendation for antibiotics lines of treatment.