Relationship of outcome of neonatal sepsis to blood culture status

A retrospective study

Thesis

Submitted for Fulfillment of Master Degree of Pediatrics

By

Amir Ahmed Abd el Fattah Abd el Rahman

Under the supervision of

Prof. Mohamed Hisham Sayed Ahmed
Professor of Pediatrics
Cairo University

Associate Prof. Amany M. Ezzat Elwan
Associate Professor of Pediatrics
Cairo University

Lecturer Noran Fahmy Hussien
Lecturer of Pediatrics
Cairo University

Faculty of medicine
Cairo University
2009

علاقة ناتج التسمم الدموي للأطفال حديثي الولادة بنتيجة مزرعة الدم

دراسة بأثر رجعي

توطئة للحصول على درجة الماجستير فى طب الأطفال

مقدمة من

طبيب / أمير أحمد عبد الفتاح عبد الرحمن

تحت إشراف

الأستاذ الدكتور / محمد هشام سيد أحمد
أستاذ طب الأطفال
جامعة القاهرة

الدكتورة / أمانى محمد عزت علوان
أستاذ مساعد طب الأطفال
جامعة القاهرة

الدكتورة / نوران فهمى حســـين
مدرس طب الأطفال
جامعة القاهرة

كلية الطب
جامعة القاهرة
٢٠٠٩

بسم الله الرحمن الرحيم

(واتقوا الله ويعلمكم الله والله بكل شئٍ عليم)

سـ رة الـ قرةالآية (٢٨٢)

Acknowledgement

First and foremost, thanks and praise **ALLAH,**

most gracious, most merciful.

I would like to express my deep gratitude, thanks, and respect to our eminent **PROF. DR. MOHAMMED HISHAM SAYED AHMED**, Professor of Pediatrics, Faculty of Medicine, Cairo University for granting me the privilege of working under his supervision and for his great encouragement and unfailing tender advice throughout this work and throughout my career.

No words can be sufficient to express my deep gratitude, admire and appreciation to **DR. AMANY M. EZZAT ELWAN**, Associate Professor of Pediatrics Faculty of Medicine, Cairo University for her great support, valuable advice and continuous encouragement. Her sincere effort and help will never be forgotten.

Many thanks and deep appreciation to **DR. NORAN FAHMY HUSSIEN**, Lecturer of Pediatrics, Faculty of Medicine, Cairo University for her great help and constant support to perform this work.

I am grateful to **DR. RASHA MOHAMMED GAMAL EL-DIN**, Associate Professor of Pediatrics, Faculty of Medicine, Cairo University, for coming and discussing this work.

Special thanks and appreciation to **PROF. DR. MONA FARID KOUNSOH** Professor of Pediatrics, Faculty of Medicine, El-Fayoum University for coming and discussing this work.

Last but not by any means least, I would like to express my warm gratitude to my parents and all members of my family for their kindness, trust, unfailing support and much needed encouragement.

Dedication

To my parents who gave me everything I have in my life.

To my wife who supported me.

To my son Ahmed and my daughter Mariam who made my days shinning.

LIST OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES

ABBREVIATIONS

AAOG	American Academy of Obstetrics and Gynecology
AAP	American Academy of Pediatrics
CD	Cluster of differentiation
CDC	Centers for Disease Control and Prevention
CMV	Cytomegalovirus
CNS	Central nervous system
CONS	Coagulase negative staphylococci
CSF	Cerebrospinal fluid
CRP	C-reactive protein
DIC	Disseminated intravascular coagulopathy
ELBW	Extreme low birth weight
ELISA	Enzyme linked immunosorbent assay
EOS	Early onset sepsis
ESR	Erythrocyte sedimentation rate
GBS	Group B streptococcal sepsis
G-CSF	Granulocyte colony-stimulating factor
GM-CSF	Granulocyte macrophage colony stimulating factor
HSV	Herpes simplex virus
HTV	Human T-lymphocyte virus
IAP	Intrapartum antibiotic prophylaxis
IgA	Immunoglobin A
ILs	Interleukins
IVIG	Intravenous immunoglobulin
LBW	Low birth weight
LOS	Late onset sepsis
MBC	Minimum bactericidal concentration
MIC	Minimum inhibitory concentration
MRSA	Methiciline resistant staph aurous
NEC	Necrotizing enterocolitis
NICU	Neonatal intensive care unit

PCR	Polymerase chain reaction
PMN	Polymorphonuclear leucocyte
PROM	Premature rupture of membrane
RBCs	Red blood cells
RDS	Respiratory distress syndrome
SIRS	Systemic inflammatory response
VLBW	Very low birth weight
VRE	Vancomycine-resistant enterococci
VZV	Varicella zoster virus
WBCs	White blood cells
WHO	World health organization

Introduction and Aim of Work

Neonatal sepsis is one of the major health problems throughout the world. Every year an estimated 30 million newborns acquire infection and 1-2 million of these die. ***(Afroza; 2006).***

The incidence ranges from 1 to 8 per 1000 infants almost equal distribution of early onset and late onset cases. ***(Stoll et al.; 2002).***

Preterm infants have increased susceptibility to infection about 3-10 fold higher than full term neonates. ***(Stoll et al; 2002).***

Neonatal sepsis may be categorized as early onset, late onset, and nosocomially acquired sepsis. ***(Anwer et al.; 2000).***

Early onset sepsis presents during the first flow days of life usually progresses rapidly and has multicentric organ involvement. ***(Oddie and Embleton; 2002).***

Late onset sepsis usually occurs in healthy full term infants after 72 hours of life with positive blood culture ***(Kliegman 2002).***

Nosocomially acquired sepsis: low birth weight, length of stay, indwelling vascular catheter, end tracheal tubes and frequent use of broad spectrum antibiotics are risk factors that enhance the possibility of nosocomial infection. ***(Kliegman 2002).***

Clean safe delivery, early and exclusive breast feeding, strict postnatal cleanliness following adequate hand washing and aseptic technique during invasive procedures might reduce the incidence of neonatal sepsis. Prompt use of antibiotics according to standard policy is warranted to save the newborn lives from septicemia. ***(Afroza; 2006).***

The present study was carried out to compare between septic neonates who have positive blood culture with those who have negative blood culture by clinical manifestations, other laboratory tests and outcome for admitted cases in Kasr el- Aini NICU over the period of one year from Jan. 2007 to Jan 2008.

NEONATAL SEPSIS

Neonatal sepsis, sepsis neonatorum, and neonatal septicemia are terms that are used to describe the systemic response to infection in the newborn infant. The criteria for neonatal sepsis should include documentation of infection in a newborn infant with a serious systemic illness in which non-infectious explanations for the abnormal pathophysiologic state are excluded or unlikely ***(Gottof; 2000)***.

Neonatal sepsis is a disease of infants who are younger than one monthof age, critically ill, and have positive blood cultures ***(Gonzalez et al.; 2004)***.

Septicemia may be a prelude to infection of specific organ system (such as meningitis or osteomyelitis) or occasionally may follow unrecognized or inadequately treated localized infection ***(Bellig; 2004)***.

Many focal infections such as meningitis, pneumonia and urinary tract infection that can occur in other age groups may occur in neonates as well, but infections in neonates have unique elements that differ from those in older age groups. In neonates, focal signs and symptoms due to localized infections may be clinically imperceptible and thus difficult to differentiate on initial presentation from generalized blood stream infections **(*Baltimore; 2002*)**.

Neonatal sepsis is one of the major causes of morbidity and mortality in the newborn. Surviving infants can have significant sequelae

as a consequence of central nervous system involvement, septic shock, or hypoxemia secondary to severe parenchymal lung disease. ***(Chacko and Inderpreet ; 2005)***.

PATHOGENESIS AND EPIDEMIOLOGY

Infections are a frequent and important cause of morbidity and mortality in the neonatal period. As many as 2% of fetuses are infected in utero, and up to 10% of infants have infections in the 1st mo of life. Neonatal infections are unique for several reasons:

1. Infectious agents can be transmitted from the mother to the fetus or newborn infant by diverse modes.

2. Newborn infants are less capable of responding to infection because of immature immune response.

3. Coexisting conditions often complicate the diagnosis and management of neonatal infections.

4. The clinical manifestations of newborn infections vary and include subclinical infection, mild to severe manifestations of focal or systemic infection, and rarely, congenital malformations resulting from infection in the 1st trimester. The timing of exposure, inoculums' size, immune status, and virulence of the etiologic agent influence the expression of disease in a fetus or newborn infant.

5. Maternal infection that is the source of transplacental fetal infection is often undiagnosed during pregnancy because the mother was either asymptomatic or had nonspecific signs and symptoms at the time of acute infection.