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وَمَا أُوتِيتُمْ مِّنَ الْعِلْمِ إِلَّا قَلِيلًا

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Urinary Nitric Oxide in Newborns with Sepsis

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Urinary Nitric Oxide in Newborns with Sepsis

Key words

Nitric Oxide – Urine – Sepsis – newborns.

Abstract

Background: Neonatal Sepsis is a major problem in newborn nurseries because of the difficulty in early diagnosis and because of high morbidity and mortality.

The objective of this study was to investigate whether urinary nitric oxide (NO) level could be useful for the diagnosis of infected newborns.

Methods: Urinary NO are measured for newborns with sepsis on the 1st and on the 4th day who were group of study (group I) and compared with age matched healthy control (group II).

Results: Ninety percent of the septic group showed increase in the urinary NO level during sepsis, while in the control group there was decrease in the NO level, the mean of NO on the 1st day in group (I) was (67.13 ± 50.03) and was (78.52 ± 36.80) in group (II), the mean of NO on the 4th day was (97.49 ± 65.75) while in group (II) was (56.87 ± 29.62) and the percentage change from 1st day was (76.47 ± 103.33) in group I but was (-30.81 ± 25.77) in group II.

Conclusion: Urinary NO level which are quick and easy to measure are higher in the infected newborns as compared with controls. The sensitivity of the test is good and the serial measurements of NO is recommended to early detection of sepsis.

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List of Abbreviation

ADP	=	Adenosine diphosphate
ARDS	=	Acute respiratory distress syndrome
ATP	=	Adenosine triphosphate
BBs	=	Blood barriers
BH4	=	Tetra hydroptein
BW	=	Birth weight
BW	=	Birth weight
CBC	=	Complete blood picture
cGMP	=	Cyclic guanosin monophosphate
CMV	=	Cyto megalovirus
CMV	=	Cyto megalovirus
cNOS	=	Constitutive Nitric Oxide Synthase
CNS	=	Central nervous system
CONS	=	Coagulase negative staph
CRH	=	Corticotropin releasing hormone
CRP	=	C – Reactive protein
CSF	=	Cerebrospinal fluid
DIC	=	Disseminated intravascular coagulopathy
DNA	=	Deoxyribonucleic acid
ECMO	=	Extra corporeal membrane oxygenation
EM	=	Electron microscopy
eNOS	=	Endothelial Nitric Oxide Synthase
ESR	=	Erythrocyte sedimentation rate
FAD	=	Flavin adenine dinucleotide
FDP	=	Fibrin degradation products
FMN	=	Flavin mononucleotide
G –CSF	=	Granulocyte colony stimulation factor
GA	=	Gestational age

GBS	=	Group B streptococcus
Gh	=	Growth hormone
GnRH	=	Gonadotropin releasing hormone
HIV	=	Human immuno deficiency virus
HSS	=	Hematological scoring system
HSV	=	Herps simplex virus
HVS	=	High vaginal swab
IFA	=	Immun fluorescent antibody
IgA	=	Immunoglobulin A
IgE	=	Immunoglobulin E
IgG	=	Immunoglobulin G
IgM	=	Immunoglobulin M
IL – 6	=	Interlukein 6
iNOS	=	Inducible Nitric Oxide Synthase
IPPV	=	Intermittent positive pressure ventilation
IT	=	Immature neutrophils / total
IVIG	=	Intravenous immunoglobulins
LA	=	Latex particle agglutination
LBW	=	Low birth weight
LBW	=	Low birth weight
MBC	=	Minimum bactericidal concentration
MIC	=	Minimum inhibitory concentration
mRNA	=	Messenger ribo nucleic acid
NB	=	Newborn
NEC	=	Necrotizing entero colitis
NICU	=	Neonatal intensive care urite
NK	=	Natural Killer
nNOS	=	Neuronal Nitric Oxide Synthase
PCR	=	Polymerase chain reaction

PGE₂	=	Prostaglandins E₂
PGES	=	Prostaglandin endoperoxide synthase
PMNLs	=	Poly morpho nuclear leucocytes
PPHN	=	Persistent pulmonary hypertension
PRH	=	Prolactin releasing hormone
PROM	=	Premature rupture of membrane
PT	=	Prothrombin time
PTT	=	Partial thromboplastin time
RBCs	=	Red blood cells
RDS	=	Respiratory distress syndrome
rG – CSF	=	Recombinant granulocyte colony stimulation factor
RSV	=	Respiratory syncytial virus
SGA	=	Small gestational age
SIRS	=	Systemic inflammatory response syndrome
TFA	=	Immuno – fluorescent – antibody
TLC	=	Total leucocytic count
TNF	=	Tumour necrosis factor
TNFα	=	Tumour necrosis factor-α
UTI	=	Urinary tract infection
VD	=	Vaginal delivery
VIQ	=	Ventilation perfusion matching
VLBW	=	Very low birth weight
VLBW	=	Very low birth weight
WBCs	=	White blood cells

Correction sheet

Page

2	isolation	Isolation
4	It occur	It occurs
27	Early Manifestations	Early manifestations
29	Late manifestations	II Late manifestations
96	in 1 st day nitric oxide	on 1 st day Nitric Oxide
100	Hospital	hospital
103	cytomegal virus	cytomegalvirus
107	(forceps used)	removed

Chapter 1

Sepsis of Neonates

Sepsis of Neonates

Introduction:

Sepsis as either primary pathology or a complication of other illness, is a major cause of neonatal mortality and morbidity all over the world. The impact of infection can be reduced as international comparisons show, but even in the most technologically advanced countries, the contribution of a susceptible host, non specific clinical presentation and an ever changing population of pathogens makes for a great challenge (*Roberton et al., 1999*).

Infection is responsible for approximately 2 million neonatal deaths per year in developing countries. In other industrialized countries, the mortality rate has decline to 5.1 per 1000 liver births due to progress in obstetrics and neonatal intensive care unit and improved survival particularly preterm and low birth weight neonates, which for the immunological state and the invasive therapies they are subjected to and extremely at risk for sepsis (*Lanari et al., 2001*).

Definition:

Neonatal sepsis is defined as a clinical syndrome of bacteremia with systemic signs and symptoms of infection and a positive culture for central body fluid.

The National Neonatology Forum's definition for hospital is as follows:

(A) Probable sepsis:

Infants with clinical picture suggestive of sepsis with one or more of the following criteria:

- a) Existence of predisposing factors: maternal fever or foul smelling liquor or prolonged rupture of membranes (>12hrs) or presence of gastric polymorphs.

- b) Positive septic screen (two of the four parameters namely, TLC < 5000/mm³, band to total polymorph ratio of > 0.2, CRP > 6ug/ml, and ESR>10mm 1st hr).
- c) Radiological evidence of pneumonia.

(B) Proven sepsis:

Infants with clinical picture of sepsis with either

- Isolation of pathogens from blood, CSF and urine.
- Autopsy evidence.

(*Guha et al., 2005*)

Neonatal sepsis is resulting from the pathophysiological effect of local or systemic infection in the 1st month of life (*Behrman, 1996*).

Sepsis is a set of acute physiologic responses to infection. It is defined by presence of two or more of the following manifestations; fever or hypothermia, tachycardia, tachypnea, and an abnormal white blood cells (WBCs) or increase in immature forms (*Gotoff, 2000*).

Incidence:

The incidence rate of neonatal sepsis varies from country to country, nursery to nursery and within the same nursery at different times (*Kliegman, 1998*).

The incidence of bacterial sepsis and meningitis, especially for *Gram negative enteric bacilli*, is higher in males than in females. Premature/ preterm infants have an increased incidence of sepsis. The incidence of sepsis is significantly higher in infants with very low birth weight (VLBW) <1000 gm at 76 per 1000 live births, than in infants with birth weight BW of 1000-2000 gm at 8 - 9 per 1000 live births.

The risk of death or meningitis from sepsis is higher with low birth weight (LBW) than full term neonates (*Guha et al., 2005*).