

Exchange Transfusion versus Intravenous Immunoglobulins in Treatment of Isoimmune Hemolytic Neonatal Jaundice

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ
صدق الله العظيم

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*To my dear **Father**; who taught me how to love, scarify
and how to be a genuine person*

*To my dear country, **EGYPT**, to which I am proud to
belong*

*To **everyone** scarified his soul for our rights...we will never
forget you*

*To my dear **family**...who provided me with love and
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Abstract

Key words: (hemolytic jaundice- exchange transfusion- intravenous Immunoglobulins)

Progressive hemolytic jaundice is conventionally treated with phototherapy and exchange transfusion. Recent studies have demonstrated that the use of intravenous immunoglobulins is promising in its management. In Our study 40 neonates with neonatal jaundice due to ABO and Rh incompatibility were studied. They were divided into 2 groups; one treated with immunoglobulins and other treated with exchange .We concluded that immunoglobulins decreases the level of serum bilirubin as exchange transfusion and in addition it shortens the period of hospitalization and phototherapy with no side effects detected.

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List OF Abbreviations

AAP	: American Academy of Pediatrics
ALT	: Alanine Transaminase
AST	: Aspartate Transaminase
ATP	: Adenosine Triphosphate
B_F	: Free Bilirubin
CHT	: Congenital hypothyroidism
CNS	: Central Nervous System
CO	: Carbon monoxide
CPD	: Citrate phosphate dextrose
ELBW	: Extremely low-birthweight
ETCO	: End Tidal carbon monoxide in Breath
Fab	: Fragment, Antigen Binding
Fc	: Fragment, Crystallizable
FFA	: Free fatty acids
G6PD	: Glucose -6- phosphate-Dehydrogenase Deficiency
GGT	: G-Glutamyl Transferase
Hb	: Hemoglobuin
HBV	: Hepatitis B Virus
Hct	: Hematocrite
HCV	: Hepatitis C Virus
HDN	: Hemolytic disease of newborn
HE	: Hereditary Elliptocytosis
HIDA	: Hepatoiminodiacetic acid
HIV	: Human Immunodeficiency Virus
I/T	: Immature to total ratio
Ig	: Immunoglobulin
IgA	: Immunoglobulin A
IgD	: Immunoglobulin D
IgE	: Immunoglobulin E
IgG	: Immunoglobulin G
IgM	: Immunoglobulin M

IPT	: Intraperitoneal transfusion
IUT	: Intrauterine transfusion
IVIG	: Intravenous Immunoglobulins
IVT	: Intravascular transfusion
MRI	: Magnetic Resonant Imaging
NADPH	: Nicotinamide adenine dinucleotide phosphate
NAIT	: Neonatal alloimmune thrombocytopenia
NAN	: Neonatal alloimmune neutropenia
NEC	: Necrotising enterocolitis
NH	: Neonatal hemochromatosis
PK	: Pyruvate kinase
Plt	: Platelets
PPARs	: Peroxisome-Proliferated Activated Receptors
RBC	: Red blood cells
SGOT	: Serum Glutamic Oxaloacetic Transaminase
SGPT	: Serum Glutamic Pyruvic Transaminase
TCB	: Transcutaneous Bilirubinometry
TLC	: Total leucocytic count
TSB	: Total serum bilirubin
UCB	: Unconjugated bilirubin
UDPG-T	: Uridine-Diphosphoglucuronyl Transferase
WBC	: White blood cells

Introduction

Neonatal hyperbilirubinemia is a commonly seen neonatal problem, approximately 60-70% of term infants and 80% of preterm infants develop jaundice in the first week of life. Although transient, the condition accounts for up to 75% of hospital readmission in the first week after birth (*Shapiro, 2006*).

Neonatal jaundice secondary to isoimmune hemolytic anemia (Rh-ABO incompatibility) is a cause of high serum bilirubin level due to hemolysis of red blood cells secondary to transplacental passage of antibodies.

Sensitization in Rh incompatibility occurs when an Rh D-negative mother may first encounter the D antigen while being pregnant with Rh D-positive child, or by receiving a blood transfusion of Rh D-positive blood. Once the mother has been sensitized her immune system produces IgM isotope that do not cross the placenta, later it produces IgG isotope that transverse the placental barrier (*Urbaniak and Gresis, 2000*).

The O positive mothers have Ig anti-A or anti-B antibodies, 10% to 15% of them are IgG producers . When an A or B positive newborn is born to an O positive mother, the O positive red cells with high titers of anti-A or anti-B cross the placental barrier and reach the fetal circulation and cause hemolysis. ABO incompatibility causes less severe anemia and jaundice than Rh incompatibility (*Bhat, 2005*).

The degree to which the fetus is affected correlates with the amount of maternal antibody that crosses the placenta (*Koeing, 2000*).

This leads to increased risk of acute bilirubin encephalopathy and kernicterus (*Murray and Roberts, 2007*).

Exchange transfusion is sometimes needed besides the conventional therapy (phototherapy) as it corrects anemia associated with hemolysis and is effective in removing sensitized red blood cells before they are hemolyzed. It also removes about 60% of bilirubin from the plasma, resulting in a clearance of about 30% to 40% of total bilirubin as it equilibrates with the extravascular tissue. Exchange transfusion is not without a risk. It carries a 5% risk of major morbidity and the risks associated with blood exposure. Infants receiving exchange transfusion have increased risks of infection, necrotizing enterocolitis, acidosis, hypocalcaemia, hypoglycemia, electrolyte abnormalities and air embolism (*Patra, 2004*).

In recent years, intravenous immunoglobulins (IVIG) have been successfully used in isoimmune hemolytic anemia (Rh-ABO incompatibility) (*American Academy of Pediatrics, 2004*).

It has been found that after IVIG administration there was a significant fall in total serum bilirubin level and no exchange transfusions were required (*Walsh et al., 2008*).

None of the studies of IVIG use for Hemolytic Disease of the newborn reported any serious side effects; they are very rare but include hypersensitivity and anaphylaxis (*Gottstein and Cooke, 2003*).

Intravenous immunoglobulins (IVIG) were found to decrease hemolysis leading to reduction in serum bilirubin level. The immunoglobulin could act by occupying the Fc receptors of reticulo-endothelial cells preventing them from taking up and lysing antibody coated RBCs (*Walsh and Molloy, 2009*).

Aim of the Work

1. To assess the effectiveness of IVIG in reducing the need for exchange transfusion, the duration of phototherapy and hospital stay.
2. To compare between the efficiency of exchange transfusion and IVIG in lowering level of TsB in neonates suffering from indirect hyperbilirubinemia due to Rh and ABO incompatibility.