Retinopathy of Prematurity; A Study of Risk Factors and Early Management

Thesis

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List of Abbreviations:

AAP	**:**	American Academy of Pediatrics
AAO	**:**	American Academy of Ophthalmology
AAPOS	**:**	American Association for Pediatric Ophthalmology and Strabismus
AGA	**:**	Appropriate for Gestational Age
BPD	**:**	Bronchopulmonary Dysplasia
CRP	**:**	C-Reactive Protein
DWMI	**:**	Diffuse White Matter Injury
ELBW	**:**	Extreme Low Birth Weight
EPO	**:**	Erythropoietin
ETROP	**:**	Early Treatment for Retinopathy of Prematurity
FiO_2	**:**	Fraction of Inspired Oxygen
GA	**:**	Gestational Age
GH	**:**	Growth Hormone
GMH-IVH	**:**	Germinal Matrix Hemorrhage- Intraventricular Hemorrhage
IGF-1	**:**	Insulin Growth Factor-1
INL	**:**	Inner Nuclear Layer
IUGR	**:**	Intrauterine Growth Retardation
IVH	**:**	Intraventricular Hemorrhage
LBW	**:**	Low Birth Weight
LGA	**:**	Large for Gestational Age
LMP	**:**	Last Menstrual Period
NBW	**:**	Normal Birth Weight
NEC	**:**	Necrotizing Enterocolitis
PDA	**:**	Patent Ductus Arteriosus
PHI	**:**	Periventricular Hemorrhagic Infarction
PIGF-1	**:**	Placental Insulin Growth Factor-1

PIP	**:**	Peak Inspiratory Pressure
PROM	**:**	Premature Rupture of Membrane
PVL	**:**	Periventricular Leukomalacia
RDS	**:**	Respiratory Distress Syndrome
ROP	**:**	Retinopathy of Prematurity
SGA	**:**	Small for Gestational Age
SpO_2	**:**	Saturation of Oxygen
TPN	:	Total Parenteral Nutrition
UTI	**:**	Urinary Tract Infection
VEGF	**:**	Vascular Endothelial Growth Factor
VEGFR-1	**:**	Vascular Endothelial Growth Factor Receptor-1
VLBW	**:**	Very Low Birth Weight
VPC	**:**	Vascular Precursor Cells
WG	**:**	Weeks of Gestation
WHO	**:**	World Health Organization

AIM OF WORK

To delineates the magnitude of the problem of Retinopathy of Prematurity, and emphasizes the role of early detection of ROP by proper screening. And also to show that, early management is the best way to safe vision in children susceptible to blindness due to ROP.

Abstract:

Retinopathy of prematurity is a disorder of retinal vascular development in preterm infants. It is a major cause of childhood blindness worldwide. Timely and accurate screening is the most important first step in management, as earlier treatment results in improved visual prognosis. Screening guidelines should be implemented in all neonatal intensive care units. Thus, we should emphasize the role of neonatologists in implementing retinal examination in all high risk neonates through cooperation with specialized ophthalmologists. Introduction of wide-field retinal digital imaging allows easy fundus screening and follow up.

Key words:

(Retinopathy – Prematurity)

INTRODUCTION

Retinopathy of prematurity is an important cause of preventable blindness in children. It is a vasoproliferative disorder of the retina primarily affecting severely premature infants. The WHO considers the control of childhood blindness a top priority. The first case reports of ROP were described by Theodore L. Terry in Boston in 1942 **(Coats, 2005).**

ROP is characterized by abnormal neovascular development in the retina of premature infants. These abnormal blood vessels are fragile and can leak or bleed, scarring the retina and pulling it out of position. This causes a tractional retinal detachment, which is the main cause of visual impairment and blindness in ROP **(Azad and Chandra, 2005).**

The stages of ROP describe the ophthalmoscopic findings at the junction between the vascularized and avascular retina; Stage 1 is a faint demarcation line, Stage 2 is an elevated ridge, Stage 3 is an extraretinal fibrovascular tissue, Stage 4 is a sub-total retinal detachment, while Stage 5 is a total retinal detachment. In addition, "Plus disease", which indicates significant vascular dilation and tortuosity observed at the posterior retinal vessels, may be present at any stage and reflects the increased blood flow through the retina **(Ohlsson and Aher, 2006).**

The vascular changes in the early stages most often regress with time, but stage 3 may progress and lead to total tractional retinal detachment and blindness. Premature infants considered at risk for blindness are screened with fundus examinations for ROP to identify those who will need Laser therapy or cryotherapy to help prevent further progression **(Chatarina et al., 2006).**

Recent advances in neonatal care, led to increased survival of smaller and more premature infants, these infants are at a much higher risk for ROP, but not all babies who are premature develop ROP. It has been believed for many years that oxygen therapy increases the risk of ROP in preterm infants. However, ROP can occur even with careful control of oxygen therapy. The disease improves and leaves no permanent damage in milder cases of ROP. However, infants with more severe disease can develop impaired vision or even blindness **(Padmani et al., 2005).**

THE PREMATURE INFANT

Preterm delivery is the most important risk factor for neonatal morbidity and mortality. The World health Organization (WHO) defined the premature infant, as live born infant delivered before 37 weeks from the first day of the last menstrual period (LMP). Low birth weight (LBW) is birth weight (BW) equal to or less than 2500gm, which may be caused by short period of gestation, intrauterine growth retardation (IUGR) or both **(Graham, 2002).**

Infants can be classified according to BW into; Normal birth weight (NBW); 2500- 3999 gm, LBW; 1500- 2500 gm, Very low birth weight (VLBW); 1000- 1500 gm and Extreme low birth weight (ELBW); < 1000 gm **(Stoll and Kleigman, 2004).**

In developing countries, approximately 70% of LBW have IUGR; while in developed countries only 30% of LBW neonates are IUGR. Neonates with IUGR have a greater morbidity and mortality than appropriately grown GA infants **(Stoll and Kleigman, 2004).**

The incidence of prematurity is very difficult to be determined. The incidence of hospital births with LBW is approximately 7.6% in the United States, 6.5% in Great Britain, 5.5% in Sweden, 7% in France, and 10% in Japan. The LBW rate has increased because of an increased number of preterm births. Only 30% of LBW infants in the United States have IUGR and were born after 37 weeks. VLBW infants are predominately premature. In the United States, the VLBW rate is approximately 1.4% and their survival is directly related to BW **(Horeber et al., 2002).**

In a survey done in Egypt, the incidence of prematurity was approximately 11% in EL-Menia Governorate, and 50% in EL-Qualiobia Governorate **(EL-Rafei, 2002).**

Although prematurity is mostly of unknown cause (50% of cases). Some identifiable causes of prematurity are summarized in (Table 1) **(Mountquin, 2003).**

Table (1): Identifiable causes of prematurity

Fetal	* Fetal distress. * Multiple gestations. * Erythroblastosis. * Non-immune hydrops. * Intrauterine growth retardation. * Fetal anomalies.
Placental	* Placenta previa. * Abruptio-placenta.
Uterine	* Bicornate uterus. * Incompetent cervix.
Maternal	* Pre-eclampsia. * Chronic medical illness. * Maternal infections (e.g., group B streptococci, urinary tract infection, Listeria monocytogenes& Chorioamnionitis).
Others	* Premature rupture of membranes. * Polyhydramnios. * Iatrogenic. * Maternal age > 35 years, or < 18 years. * Lifestyle & smoking. * Psychological stress.

(Mountquin, 2003)