

Brief Communication

A clinical audit on the screening program and outcome of retinopathy of prematurity at a neonatal intensive care unit & special care baby unit at a tertiary care centre in Sri Lanka

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Abstract

Introduction

Retinopathy of prematurity (ROP) has become one of the leading causes of preventable childhood blindness worldwide with the increase in survival of preterm babies. Screening for ROP is very important as early detection and timely treatment will help to significantly reduce the incidence, severity and burden of childhood blindness. This study was done to ascertain the effectiveness of a screening program at a tertiary care hospital and its outcome.

Method

The study population comprised of 112 babies selected retrospectively, from January 2018 to June 2018, for screening using a pre-existing data collection tool adapted at SCBU/NICU. Collected data was compared with national guidelines and audit standards to ascertain the effectiveness of screening.

Results

The average birth weight of the babies was 1445g, ranging from 577g to 2550g. The first screening was done by 3 weeks postnatal life in 92.9% and by 4 weeks of postnatal life 94.6%. The main risk factor detected at screening was oxygen therapy (91.3%). Ninety five percent (95.3%) of babies did not develop ROP and were only observed until discharge. 4.7% developed ROP, where 3.8% required intravitreal Bevacizumab and 0.9% required laser treatment; 2.8% had Zone II ROP, 0.9% had Zone II Stage II plus disease and 0.9% had Stage IVa. The average period of post screening follow up was 34 days.

Conclusions

The majority of babies included in the study met the national screening indications and underwent timely screening and subsequent follow up until discharge criteria were met. Five babies required treatment and all of them met the ETROP criteria for early treatment.

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Introduction

Retinopathy of prematurity (ROP), previously referred to as retrolental dysplasia, is primarily a vasoproliferative disease of the retina of preterm babies [1]. It is one of the leading causes of preventable childhood blindness worldwide and has increased along with the increase in survival of preterm babies [2,3]. Screening for ROP is very important as early detection and timely treatment will help to

significantly reduce the incidence, severity and burden of this preventable cause of childhood blindness.

ROP has gone through three 'epidemics'. The first, was in the early 1940s to '50s, where blindness occurred due to unrestricted oxygen administration. Babies <1kg rarely survived and term babies became blind. The second epidemic occurred in the 1960s to '70s, where prematurity (<1kg) was the major contributor to blindness despite the development of oxygen saturation monitoring and improvement in neonatal care. The third and current epidemic is a combination of both epidemics, prevalent in countries with evolving neonatal intensive care such as those in Southeast Asia [4].

Several risk factors are involved, including short gestation, low birth weight, phototherapy, blood transfusion, mechanical ventilation, surfactant therapy [5], oxygen therapy, its duration, low Apgar at 1 and 5 minutes, poor postnatal weight gain, intraventricular haemorrhage, sepsis, multiple pregnancy and anaemia [5, 6]. A study done at a tertiary referral centre in Sri Lanka showed that there was a significant association of patent ductus arteriosus, sepsis, prolonged invasive ventilation and oxygen therapy for more than seven days with the occurrence of ROP [7].

Classification of ROP is based on the International Classification of ROP (ICROP) which includes location denoted by three zones, severity by five stages and presence or absence of plus disease (tortuosity and dilatation of the retinal vessels) [8]. Stage I is characterised by a demarcation line between the vascular and nonvascular retina. In stage II this demarcation line progresses into an elevated ridge. In stage III blood vessels grow onto the ridge (neovascularisation) and into the vitreous. Stage IV refers to partial retinal detachment and complete retinal detachment occurs in stage V.

Treatment is based on the early treatment for retinopathy of prematurity (ETROP) trial and includes Type 1 ROP (severe pre-threshold ROP) which includes Zone I any stage with plus disease, Zone I Stage 3 with or without plus disease and Zone II Stage 2 or 3 ROP with plus disease [9]. Therapeutic interventions include cryotherapy, indirect laser photocoagulation, anti VEGF drugs (intravitreal bevacizumab) and pars plana vitrectomy [10].

Audit Standards

Patients eligible for screening will be identified according to the National Screening Guidelines for Retinopathy of Prematurity and include preterm neonates with a birth weight less than 1500g and/or gestational age less than 34 weeks and any other neonate who had an unstable clinical course or cyanotic congenital heart disease [11].

Screening should be done at a chronological/postnatal age (age based on the time elapsed between birth and date of assessment) of 3 to 4 weeks at a SCBU/NICU. Follow up examinations should be done until resolution of ROP, retinal maturation or 42 weeks corrected age [11].

ICROP should be used to classify the severity of ROP [8] and ETROP guidelines should be used to decide on treatment [9].

Objectives

1. To determine if the babies screened at the Castle Street Hospital for Women (CSHW) between January to June 2018 met the National Screening Guidelines for Retinopathy of Prematurity
2. To identify the risk factors for retinopathy of prematurity in the screened babies.
3. Comparison of treatment of ROP among screened babies with ETROP guidelines

Methods

A retrospective study was done on newborns admitted to the neonatal intensive care unit (NICU) and special care baby unit (SCBU) at CSHW between January to June 2018 who met the screening criteria for ROP, which included a birth weight less than 1500g and/or gestational age less than 34 weeks or any other neonate who had an unstable clinical course or cyanotic congenital heart disease with associated neonatal risk factors such as sepsis, mechanical ventilation, oxygen therapy, surfactant therapy, respiratory distress syndrome, phototherapy, intra ventricular haemorrhage (IVH), blood transfusion or maternal risk factors such as pregnancy induced hypertension (PIH), gestational diabetes (GDM) and antepartum haemorrhage (APH).

The need for screening was decided by the resident Consultant Neonatologist and Paediatrician at CSHW, following which, the in-hospital eye examination to determine the presence of retinopathy of prematurity was done by a single Consultant Paediatric Ophthalmologist attached to the Lady Ridgeway Hospital for Children, Colombo who visited the SCBU/NICU once a week (every Wednesday) for routine screening via binocular indirect ophthalmoscopy (BIO) following pupillary dilatation with the assistance of trained medical and nursing officers.

A pre-existing, data collection tool for ROP, adapted at SCBU/NICU, was used to collect patient information including birth weight, gestational age, postmenstrual age at screening, oxygen therapy, other neonatal and maternal risk factors, assessment records of ROP including classification based on ICROP, treatment and follow up records. Permission to access these records was obtained from the Director, CSHW. Babies who dropped out of the follow up program or were transferred to other hospitals were excluded from the data analysis. Descriptive analysis of data was done using SPSS 23.

Results

A total of 112 newborns were screened during the study period, of which 57.1% were males. The average birth weight was 1445g. The minimum birth weight was 577g and maximum was 2550g. 58% were <1500g (Figure 01).

Ninety-four (85.8%) had a period of gestation <34 weeks and 18(14.2%) had a period of gestation >34 weeks. The first screening was done by 3 weeks postnatal life in 104 (92.9%) and by 4 weeks of postnatal life in 106 (94.6%).

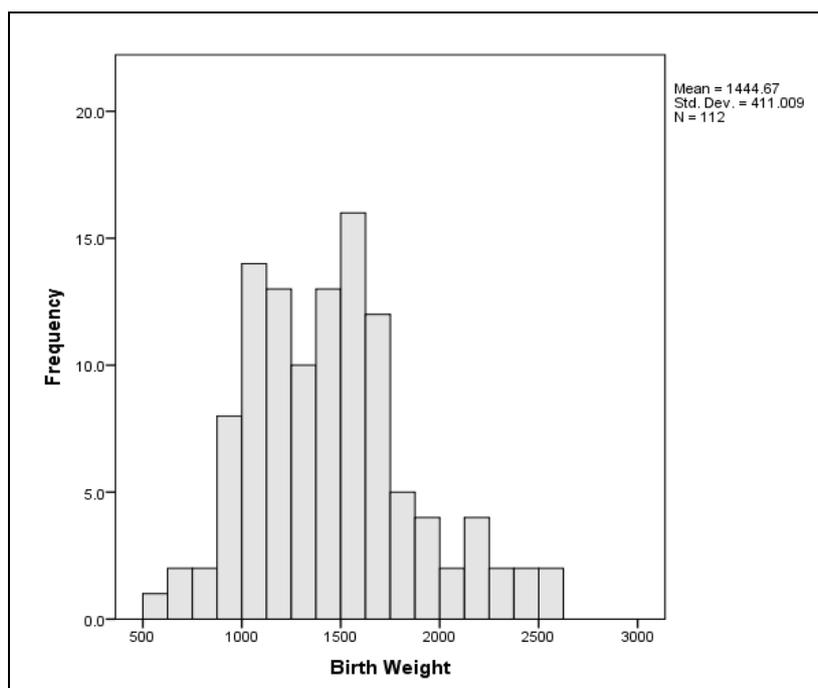


Figure 01: Birth Weight of Screened Babies

Maternal risk factors detected included antepartum haemorrhage (3.8%), gestational diabetes (11.5%) and maternal hypertension (23.1%). The majority (64%) had no maternal risk factors. Of the newborns, 110 (98%) had neonatal risk factors. The main risk factors detected at screening included oxygen therapy 102(91.3%), respiratory distress syndrome 66(58.7%), phototherapy 54(48.1%), blood transfusion 16(14.4%), surfactant therapy 24(21.2%) and proven sepsis 18(16.3%). Ninety five percent 107(95.3%) of the screened newborns did not develop ROP and were observed until discharge criteria were met. Five (4.7%) developed ROP and 4(3.8%) required intravitreal bevacizumab and 1(0.9%) required laser treatment. Three (2.8%) had Zone II ROP, one (0.9%) had Zone II Stage II Plus Disease and one (0.9%) had Stage IVa (Table 01).

Table 1: Treatment of ROP

Serial No	Birth Weight (grams)	Period of Gestation (weeks)	Postnatal Age at Screening (days)	Risk Factors	Severity of ROP	Treatment
1	1025	32+6	15	Oxygen Therapy	Zone II	Bevacizumab
2	1092	28	21	Oxygen therapy, RDS, Phototherapy, Surfactant Therapy	Zone II	Bevacizumab
3	680	23+5	23	Oxygen therapy, RDS, Phototherapy, Blood Transfusion, Surfactant therapy	Zone II	Bevacizumab
4	577	25	21	Oxygen therapy, RDS, Surfactant therapy, Sepsis	Zone II Stage II Plus Disease	Bevacizumab
5	1500	29	21	Oxygen therapy, Surfactant therapy	Stage IVa	Laser treatment

Ninety seven of the 112 newborns were followed up until they were discharged from the program. Seven of these (6.5%) were discharged post-screening due to retinal maturation at the time of screening Three dropped out of follow up. Twelve babies were still in the follow up program and therefore excluded from data analysis. The average period of post-screening follow up was 34 days. The longest period of follow up was 92 days. (Figure 02).

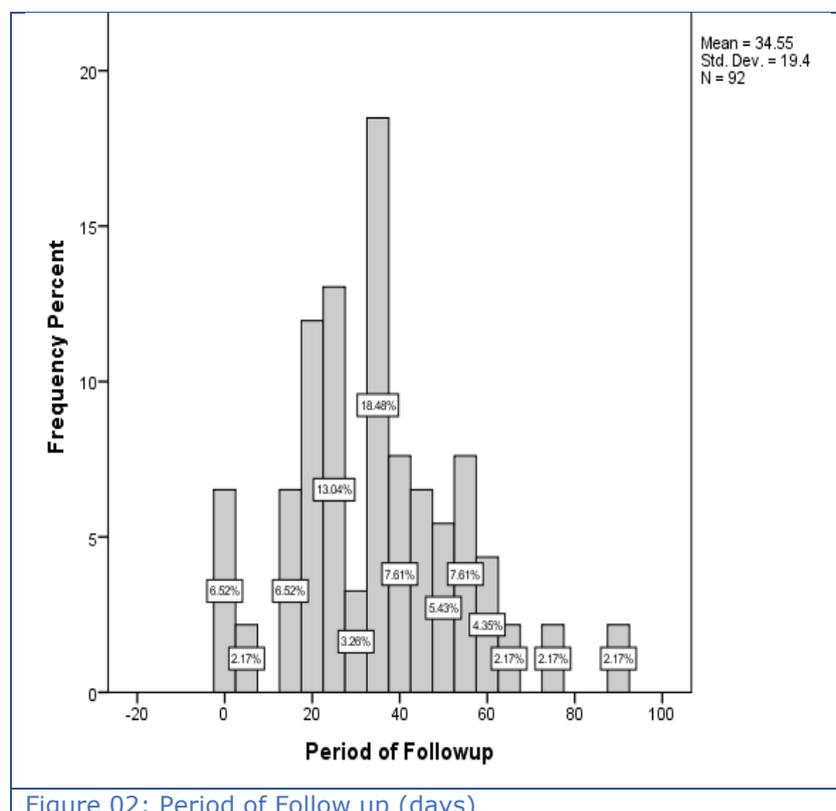


Figure 02: Period of Follow up (days)

The most frequent national screening criteria found in the study cohort included <34 weeks period of gestation found in 85.8% of babies and birth weight <1500g found in 58% of babies. The other babies were selected due to the presence of either maternal or neonatal risk factors. 92.9% of the babies were screened by three weeks of postnatal life. 98% of the screened babies had risk factors for ROP, mainly oxygen therapy (91.3%) followed by respiratory distress syndrome, surfactant therapy, phototherapy, proven sepsis and blood transfusion. The babies were followed up until retinal maturation or 42 weeks corrected gestational age and the average period of follow up was 34 days. 3 babies defaulted follow up. 4.8% (5 babies) required treatment and all five babies met the ETROP criteria for early treatment.

Discussion

The audit revealed that 94.6% of the study cohort had undergone screening by 4 weeks of post-natal life, meeting the stipulated timing of screening at 3 to 4 weeks postnatal life. Although most neonatal risk factors were documented and used as screening criteria, the inclusion of duration of oxygen therapy, mean F_{iO_2} , presence of apnoeic episodes and mode of ventilation may have been useful to capture more babies for screening and for appropriate control of these risk factors.

Other risk factors which could have been considered are anaemia (Hb <11g/dl, HCT <25%), thrombocytopenia, Apgar score, total parenteral nutrition, use of NSAIDS, use of steroids, presence of necrotising enterocolitis, bronchopulmonary dysplasia, hypoglycaemia, postnatal weight gain and meningitis.

The majority (95.3%) of the babies did not develop ROP, indicating the effectiveness of the screening program, prevention and management of risk factors at NICU/SCBU and close follow up by the ophthalmology team.

Action Plan

- ✓ Modification of the screening protocol to include additional risk factors
- ✓ Health education of staff at NICU/SCBU on the importance of timely screening and awareness of risk factors for ROP which will ensure that babies who require screening are not missed and those that are screened will have a better outcome.
- ✓ Maintenance of statistics related to ROP using a computerised data entry program with reminders for screening and detection of defaulted follow up.
- ✓ Research on validity of current screening criteria and incidence of ROP at the national level.
- ✓ Re-audit of the screening program to complete the audit cycle.

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