

Incidence, Etiology and Outcome of Retinopathy of Prematurity in NICU Graduates

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Abstract

Background: This condition, known as retinopathy of prematurity (ROP), affects the growing blood vessels in the retina of preterm infants. While improvements in neonatal care over the last several decades have allowed us to preserve preterm newborns, those without ready access to medical help often have permanent vision loss.

Aims and Objectives: To determine the incidence of Retinopathy of prematurity (ROP) in high risk babies admitted to the neonatal unit, to study risk factors for its development and evaluate the effect of laser therapy.

Methodology: This is a hospital based prospective cohort study conducted at Surya Children Hospital, Mumbai. The risk and severity of ROP, as well as the need for therapy, were examined in relation to perinatal and neonatal factors such as birth weight (BW), gestational age (GA), days on mechanical ventilation (DMV), days on oxygen (DOX), and the presence of proven sepsis.

Results: Incidence of ROP according to birth weight in our study is 100% in ≤ 1000 gms. Out of 77 patients receiving oxygen, 81.9% developed ROP of varying stages. 100% of patients who had all 3 risk factors positive i.e. oxygen supplementation, mechanical ventilation and confirmed sepsis developed ROP.

Conclusion: 100% of patients who had all 3 risk factors positive i.e. oxygen supplementation, mechanical ventilation and confirmed sepsis developed ROP. Our study concluded that the Incidence of ROP of various stages in our study is 66%.

Keywords: Retinopathy, Prematurity, NICU, ROP, Paediatrics, Paediatrician

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Introduction

Premature infants at risk for developing retinopathy of prematurity (ROP) are those whose retinal blood vessels have not finished growing normally. Retinal ganglion cell (RGC) revascularization is the primary pathogenic alteration in ROP [1,2]. The resulting effects might be little more than

moderate myopia or could extend all the way to blindness in both eyes. Retrolental fibroplasia was first identified by Terry in 1942. Epidemic proportions were reached in the following decade, and the sickness was eventually contained by limiting access to oxygen. In the 1970s, as a consequence of the

increasing survival of low-birth-weight preterm children thanks to the advent of sophisticated critical care facilities, ROP once again reached pandemic proportions. Retinopathy of prematurity (ROP) is the most common cause of baby blindness worldwide. However, things are different between the developed and developing worlds. Because infants in the latter are often "larger" and "older" than their western counterparts, they are at a higher risk of developing ROP. Screening standards in the West have been questioned on their applicability to developing countries like India [1-5]. In India, 8.8 percent of newborns had a birth weight of less than 2 kilos each year, despite the country's annual birth rate of around 27 million. Over two million babies are at risk of blindness due to Retinopathy of Prematurity (ROP), a condition that is associated with premature birth [6-10]. While improvements in neonatal care over the last several decades have allowed us to preserve preterm newborns, those without ready access to medical help often have permanent vision loss. Our goal is to prevent these preventable illnesses from affecting children.

Aims and Objectives

The goals of this research are to (1) ascertain the prevalence of ROP among high-risk

infants admitted to the newborn unit, (2) investigate the variables associated with its development, and (3) assess the efficacy of laser treatment in preventing and treating ROP.

Methodology

This is a hospital based prospective cohort study conducted at Surya Children Hospital, Mumbai between January 2008 to December 2008. Criteria for participation in the research include: birth weight 1500 gms; gestational age 34 wks; premature infants requiring mechanical breathing, oxygen treatment, or proven sepsis; and a minimum 3-month follow-up time. Babies who do not survive long enough to be evaluated or whose retinas do not fully vascularize, as well as those who are unable to complete the follow-up regimen for any other reason, will not be included in the research.

First eye examination [1]

1st at 32 wks of post conceptional age First checkup after delivery if born before 28 weeks of pregnancy, otherwise during 32 weeks of gestation. To avoid seeing the newborn within the first two weeks after delivery, as illustrated in Table 1.

Follow-up protocol [2]

Table 1: Follow up protocol

No ROP	Once every 2 wks till discharge, then every 4 wks till vascularisation complete
Stage 1,2 ROP	Weekly till disease starts resolving or progress to threshold stage
Stage 3 ROP	Every 3-7 days till disease starts resolving or progress to threshold stage
Threshold ROP	Early treatment within 72 hrs
Retinal detachment in ROP	Early surgical treatment
Regression of disease	Weekly till vascularisation complete

Eye examination method

It took 0.5% tropicamide and 2.5% phenylephrine to induce mydriasis. Indirect ophthalmoscopy with a +30 D lens was used

to examine the fundus of the eye. When necessary, a scleral indentator, wire vectis, or pediatric wire speculum may be employed.

Treatment protocol [1]

Therapeutic intervention is not necessary for ROP stages 1 and 2 until the condition advances to stage 3. The degree of extraretinal fibrovascular proliferation is the most critical prognostic indicator and therapeutic target (EFP). The presence of EFP in zone 1 or 2 for more than 3 consecutive or 5 total clock hours warrants treatment. Every single Stage 4 needs therapy. Rapidly worsening ROP, illness, and EFP in zone 1 or 2 within 3 consecutive or 5 cumulative clock hours need treatment within 24 to 48 hours.

Identification of risk factors

We will examine the following prenatal and neonatal factors and how they affect ROP risk, severity, and treatment requirements:

- Birth weight (BW)
- Gestational age (GA)
- Days on mechanical ventilation
- Days on oxygen
- Presence of confirmed sepsis

Results

The Study population was of 100 neonates. Of the study population, 57% are males and 43% are females. According to birth weight, 13% are ≤ 1000 gms, 60% are between 1001-

1500 gms and 27% are more than 1500 gms. 35% are of gestational age of ≤ 30 wks, 60% are between 30-34 wks and 5% are more than 34 wks. 77% received oxygen of varying duration. Out of 77 patients receiving oxygen, 26% received it for ≤ 3 days and 74% received for more than 3 days. 47% required mechanical ventilation. There were 14% cases of confirmed sepsis. Out of those 66 patients developing ROP, 63.6% required laser treatment. 73.8% had favorable outcome. Incidence of ROP according to birth weight in our study is 100% in ≤ 1000 gms, 68.3% in 1001-1500 gms and 44.4% in > 1500 gms. Incidence of ROP according to gestational age is 97.1% in ≤ 30 wks, 51.7% in 30-34 wks and 20% in >34 wks. Out of 77 patients receiving oxygen, 81.9% developed ROP of varying stages. Of these 98.2% had received oxygen for more than 3 days duration. 95.7% of patients on mechanical ventilation developed ROP. 100% of cases who had confirmed sepsis developed ROP as seen in Figure 1. Out of 42 patients receiving both mechanical ventilation and oxygen for more than 3 days duration, 97.6% developed ROP. 100% of patients who had all 3 risk factors positive i.e. oxygen supplementation, mechanical ventilation and confirmed sepsis developed ROP.

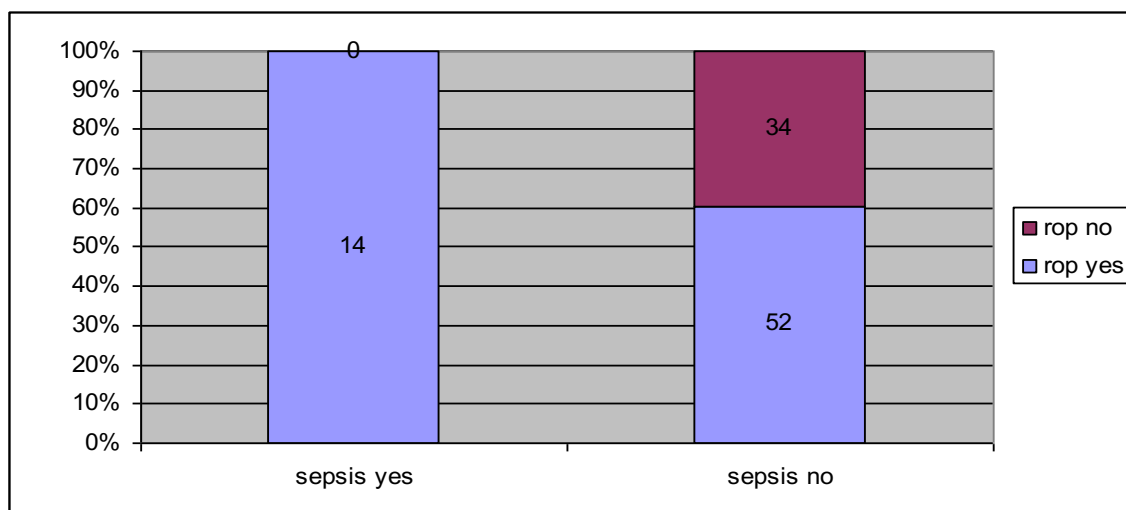


Figure 1: Correlation between development of ROP and confirmed sepsis

Discussion

ROP is a vasoproliferative condition that mostly affects preterm newborns. Birth weight 1500 g, gestational age 34 weeks, or preterm newborns with risk factors such as mechanical ventilation, oxygen treatment, or proven sepsis were included in our research.

We followed these infants for a minimum of 3 months. Of these 66% developed ROP of various stages. Studies in India [1-7] have shown a prevalence of 20-46%. Comparative incidence of ROP in Indian Studies can be seen in Table 2.

Table 2: Comparative incidence of ROP in Indian Studies

	Criteria	Total no. of infants	% of ROP
Charan R <i>et al.</i> [4]	≤ 1700 gms	165	47.27%
Rekha S <i>et al.</i> [9]	< 1500 gms ≤ 34 wks	100	46%
Upadhyay M <i>et al.</i> [10]	< 1500 gms ≤ 34 wks O ₂ > 24 hrs	170	28.2%
R Sowmya <i>et al.</i> [11]	< 1500 gms < 1500 gms	97	32%
Vinekar A <i>et al.</i> [13]	> 1250 gms	138	45.1%
Gupta P <i>et al.</i> [14]	< 1500 gms < 1500 gms	60	21.7%

The Incidence of ROP according to birth weight in our study is 100% in ≤ 1000 gms, 68.3% in 1001-1500 gms and 44.4% in > 1500 gms. Studies by Upadhyay M *et al.* [10] have reported a prevalence of 70.6%, 37.0% and 14.7% in babies weighing ≤ 1000 gms, ≤ 1250 gms and ≤ 1500 gms respectively. In a prospective study of infants born at a weight of less than 1250 grams and at a gestational age of 32 weeks or less, Sharma *et al.* found that all infants weighing less than 750 grams were diagnosed with ROP at some point, while only 41.1% of infants with birth weights of 1001-1250 grams did so.

According to the CRYO-ROP multicenter research (1986-1987) (11), 65.8% of newborns with birth weight 1251 g had ROP to some degree, whereas the frequency was 81.6% in infants 1000 g. The prevalence of ROP in ELBW infants ranges from 45-70%, according to research by Fortes Filho *et al.* [7] and Choo MM *et al.* (15). Researchers Rekha *et al.* [9] found that the incidence of ROP was 83% in infants born between 28 and 29

weeks, 60% in those born between 30 and 31 weeks, and 50% in those born between 32 and 33 weeks. According to research conducted at AIIMS in New Delhi by Upadhyay *et al.* [10], the frequency of ROP ranged from 97.1% in newborns born at or before 30 weeks of gestation to 68.8% in those born between 32 and 34 weeks. Our research indicated that the prevalence of ROP decreased from 97.1% in infants born at 30 weeks of gestation to 68.8% in those born at 32 weeks, and to 30.0% in those born at 34 weeks [11-15].

In our analysis, we found that prolonged exposure to oxygen, mechanical ventilation, and proven sepsis all increase the likelihood of ROP. In situations where sepsis was proven, ROP occurred in every single patient. Similarly, all newborns (100%) with all three of the aforementioned risk factors had ROP. Similar correlations between oxygen treatment, mechanical ventilation, and septicemia and ROP have been seen in additional studies [8-15].

Conclusion

The overall Incidence of ROP across all ages and stages in our research was 66%. When the birth weight is less than 1000 grams, ROP is always present. Our research found that the incidence of ROP increased sharply after 30 weeks of gestation. 63.6% of ROP cases required laser treatment. 73.8% patients had favorable outcome. Out of 77 patients receiving oxygen, 81.9% developed ROP of varying stages. Of these 98.2% had received oxygen for more than 3 days duration. 95.7% of patients on mechanical ventilation developed ROP. 100% of cases who had confirmed sepsis developed ROP. Out of 42 patients receiving both mechanical ventilation and oxygen for more than 3 days duration, 97.6% developed ROP. 100% of patients who had all 3 risk factors positive i.e. oxygen supplementation, mechanical ventilation and confirmed sepsis developed ROP.

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