INCIDENCE AND FEATURES OF RETINOPATHY OF PREMATURITY AT BENHA TEACHING HOSPITAL

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ABSTRACT

Purpose: To evaluate incidence and features of retinopathy of prematurity (ROP) at Benha Teaching Hospital.

Methods: This prospective study was carried out in the Neonatal Intensive Care Benha Teaching Hospital. One hundred and ninety-three consecutive preterm infants with a birth weight of 1900 g or less were screened for ROP. The first examination was performed at 4-7 weeks of postnatal age.

Results: Mean gestational age of all premature infants was 29.4 ± 2.3 weeks (range 21-35), mean birth weight was 1200 ± 290 g (range 525-1900), and mean duration of oxygen therapy was 26.0 ± 25.2 days (range 0-205). Seventy-two children developed acute ROP, giving an overall incidence of 37%.

The incidence in preterm with birth weight of <1500 g and <1250 g was 40% and 50% respectively. Eighteen of the 72 children with ROP (26%) reached threshold ROP, argon laser treatment were effective in inducing regression in all cases.

Conclusion: In this study the incidence of ROP patients was comparable to other reports. Pediatricians and ophthalmologist should participate actively in screening for ROP especially in preterm infants with birth weight less than 1500g as early treatment can actively prevent the subsequent cicatrizing complications with resultant tractional retinal detachment and blindness.

Key words: Preterm-retinopathy of premature.

INTRODUCTION

The normal retina is unique in that it contains no blood vessels until the fourth month of gestation. Vascularization begins at the optic disc and then proceeds slowly toward the peripheral retina. The nasal retina is fully vascularized at about 8 months of gestation but the wider temporal retina is not fully vascularized until after full-term delivery; consequently at any stage of prematurity, the temporal retina is much more susceptible to Retinopathy of Prematurity (ROP)[1].

The primary effect of oxygen on the infant with an incompletely vascularized retina is retinal vasoconstriction which if sustained is followed by some degree of vascular closure. Damage to the capillary endothelium follows and ultimately complete closure of the immature portions of the vascular bed occurs[2].

Retinopathy of prematurity was considered to be one of the major causes of infant blindness during the past 2 decades. The survival rate of extremely premature infants as well as the frequency of ROP has increased. Many reports have been published on the incidence and severity of ROP[3-12]. However, the incidence of ROP in Benha Teaching Hospital is not known.

This study high light the incidence and features of ROP among premature infants in the Neonatal Intensive Care Unit of Benha Teaching Hospital.

SUBJECTS AND METHODS

Ophthalmologists examined 193 cases of preterm infants from January 2009 to January 2011 born at Benha Teaching Hospital. Infants with gestational age of <35 weeks or birth weight and <1900 g were included. Died cases were excluded from the study. The awake premature infants were initially examined in the Neonatal Intensive Care Unit (NICU) at postnatal age of 4-7 weeks. Eyes were dilated with 2.5% phenylephrine and 1% tropicamide eye drops every 15 minutes one hour before examination.

Examination of the anterior segment was performed looking for remnant of anterior or posterior vasculosa lentis, vitreous haze, and engorged iris vessels. This was followed by indirect ophthalmoscopy with the available +20 diopters lens and scleral depressor, the posterior retinal vessels were examined carefully before any pressure was put on the globe, as that might deflate any engorged blood vessels and give false impression of absent plus disease.

All history information, including birth weight, gestational age, pre and postnatal medications, oxygen supplementation, and concomitant diseases were recorded. Presence, extension and staging of ROP were documented using the international classification for ROP.[13]

Infants without ROP were examined monthly until complete retinal re-vascularization took place. Infants with Stage one or 2 ROP were re-examined every two weeks while those with pre-threshold ROP were re-examined weekly, until resolution or progression to a more advanced stage. Infants with Stage 3 plus (threshold) disease were managed by retinal ablation surgery then

followed till regression was complete with no other complications, such as cataract, macular dragging, or retinal detachment. laser treatment was used via indirect ophthalmoscope delivery system (Nidek-Japan). The aim of treatment is to ablate the avascular retina anterior to the ridge. Data were recorded and analyzed. Statistical significance was determined using Student's t-test and chi-square analysis methods; p <0.05 was considered significant.

RESUTLS

One hundred and ninety-three preterm infants were included in the study. Of them, 103 (54%) were girls and 90 (45%) were boys. The distribution of infants among different gestational age and birth weight groups are shown in tables 1 and 2. The mean birth weight ± SD was 1200 ± 290 g (range; 525 – 1900 g), and the mean gestational age ± SD was 29 ± 2.3 weeks (range; 22 – 34 weeks). The overall incidence of ROP was 72 /193 (37 %). However, the incidence was 40% and 50% in infants with birth weight <1500 g and <1250 g, respectively. No infants with birth weight of >1500 g developed ROP. Incidence of ROP decreases significantly with increasing birth weight and gestational age (p<0.001), table (1). Retinopathy of prematurity developed in 71 of 187 infants with gestational age <32 weeks (38%) table (2). The mean birth weight and gestational age were significantly lower, whereas duration of oxygen therapy was significantly longer in infants who developed ROP compared to those who did not (table 3). This association is more prominent for those infants who had laser treatment table (4). The distribution of retinopathy of prematurity cases among different stages were nearly equal table (5).

Table (1): Infant weight distribution in the study

Infant birth weight	Retinopathy of prematurity		Total
(gm)	ROP present (N0=72) %	No ROP (N0=121)	(n=193)
<750	23 (95.8)	1 (4.2)	24 (12.3)
751-1000	36 (68.5)	17(31.5)	53 (27.7)
1001 - 1250	11 (17.7)	51(82.3)	62 (31.8)
1251 - 1500	2 (5.3)	35(94.7)	37(19.5)
1501 -1900	0 (o%)	17(100)	17 (8.7)
Overall	72 (37)	121 (63%)	193 (100)

Table (2): Gestational age distribution of the study population

Gestational age (weeks)	Retinopathy of prematurity		Total No. (%)
	Yes (N=72)	No (N = 121)	
22-23	4(100)	0	4 (2)
24-25	13 (92.9)	1(7.1)	14 (7.2)
26-27	28 (61.7)	18(38.3)	46 (24.1)
28-29	21 (30)	49(70)	70 (35.9)
30-32	5 (9.3)	48(90.7)	53 (27.7)
33-34	1 (16.7)	5(83.3)	6 (3.1)
Overall	72	121	193 (100)

Table (3): Comparison of birth weight, gestational age and duration of oxygen treatment between preterm infants with and without retinopathy of prematurity.

Risk factors		Retinopathy of prematurity		p value
		Yes	No	
Birth weight (g)	Range	520-1340	720-1960	p< 0.001
	Mean ±SD	856.5 ± 177.3	1250.4±264.1	
Gestational age (wks)	Range	22-33	25-34	p< 0.001
	Mean ± SD	26.8 ±2.2	29.4+1.9	
Oxygen therapy (days)	Range	1-200	0-180	p< 0.001
	Mean ± SD	44.0 ±37.9	11.9 ±20.5	

Table (4): Comparison of birth weight, gestational age, and duration of oxygen therapy between preterm infants who received laser treatment and those who did not

Risk factors		Retinopathy of prematurity		p value
		Yes	No	
Birth weight (g)	Range	520-1130	580-1960	p< 0.001
	Mean ±SD	787.4+ 166.7	1137.1+294.3	
	No.	(17) (8.8%)	(176)(91.2%)	
Gestational age (wks)	Range	22-33	23-34	p< 0.001
	Mean ±SD	26.0 ±2.7	28.7 ±2.2	
	No.	(17) (8.8%)	(176) (91.2%)	
Oxygen therapy (days)	Range	6-240	0-180	p< 0.001
	Mean ±SD	66.7 ±59.0	19.3 ±24.0	
	No.	(17) (8.8%)	(176) (91.2%)	

Table (5): Distribution of retinopathy of prematurity cases among different stages

Stage	No.	%
1	18	25
2	19	26.4
3 (early)	17	23.6
3 (threshold)	18	25
Total	72	100

The incidence of different stages of ROP is shown on Table 5. The incidence of severe ROP (Stage 3 or more) was 48% (35/72) in infants with ROP). However, 26% (19/72) of infants with ROP reached an advanced stage (threshold disease) that needed cryo-therapy or laser treatment to induce regression. Five infants received cryo-therapy, whereas 14 infants were treated with laser after binocular indirect ophthalmoscope laser became available. This ablative treatment was carried out at a mean postnatal age of 12.5 weeks (87.1 days) (range 8.6-16.3 weeks), which induced regression of the disease in all patients. Spontaneous regression took place in all infants with early stages of ROP (Stages 1, 2, and early 3). The disease was bilateral in all infants with ROP. Both eyes were at the same stage of disease involvement in 93.6% of infants with ROP. In 98.3% of infants with ROP, both eyes had the same zone affected. The incidence of ROP was slightly higher in female infants compared to males (39.6% and 34.8%), but the difference was not statistically significant (P=0.5892).

DISCUSSION

ROP is a leading cause of blindness in preterm infants receiving oxygen therapy. The reported incidence of ROP in the population of infants at risk (<1500 g birth weight) ranges from 16-56%.[4,12] It was estimated that approximately 546 babies were blinded by ROP in one year in the USA.[2] The incidence of ROP in infants of <1500 g birth weight in this study was 41%, which was comparable to other studies.[17,18,20] Also, in our study 54 of 72 infants (75%) with ROP only had mild to moderate disease which regressed spontaneously.

Since there is an effective treatment for threshold ROP with cryotherapy[16,18] and more recently with laser.[19,20] Aattention should be paid to ophthalmic screening in all NICU. Timing of the first examination is important as there is a narrow window of opportunity to deliver a timely treatment which is after developing threshold disease and before progression to retinal detachment and other blinding complications. This magnifies the roles of both the pediatrician and the ophthalmologist in early detection of this blinding disease and conducting general screening program for a particular population that takes into consideration the features and the behavior of the disease in that particular population, and should not base recommendations on a single study[21].

Research oriented trials suggest an earlier screening for example at 4-6 postnatal weeks suggested by Cryotherapy-ROP group,[16] whereas clinical studies usually recommend a later age for screening for example 7-9 and 8-10 postnatal weeks recommended by Palmer[22] and Flynn.[23]

In this study the youngest age at which laser treatment was needed for threshold disease was 8 postnatal weeks. We recommend, based on the results of this study, to perform the first dilated fundus examination by an experienced ophthalmologist at 4-7 weeks of postnatal life (or 31-35 weeks post-conceptual age). Earlier examinations will be stressful to the infant and insufficient by themselves since the mean age of onset of ROP has been shown to be 7.9 (range 3-16) postnatal weeks or 36 weeks (range 31-43) post-conceptual age.[14-24] No infants in our study with a birth weight of > 1500 g developed ROP, however, our two infants with birth weight >1250 g and <1500 g developed only Stage one ROP, which regressed spontaneously. All those infants who needed laser treatment (have reached threshold disease) are of <1250 g. while their gestational age ranges between 22 and 33 weeks. Therefore it is safe to suggest screening only infants of <1500 g in our population. One infant with gestational age of 33 weeks developed threshold ROP, which regressed after laser therapy. His birth weight was 1025 g and had 52 days of oxygen supplementation with multiple medical problems that included respiratory distress syndrome, intra-ventricular hemorrhage, patent ductus arteriosus, necrotizing enterocolitis, meningitis, and Candida albican septicemia. This particular patient illustrates the importance of small birth weight, longer duration of oxygen supplementation, and the presence of concomitant medical problems in the development of threshold ROP even when gestational age is more than 32 weeks.

This study used birth weight rather than gestational age, and postnatal rather than post-conceptual age in recommending whom and when to screen as birth weight reflects the health of the infant more than gestational age, and in our area gestational age may not be accurate as ultrasonography is not performed routinely at the early stages of pregnancy. In addition, determination of birth weight is simple and does not require sophisticated equipment. Moreover, nurses at NICU routinely use postnatal, not post-conceptual, age to calculate infant age.

Ideally one should follow preterm infants till normal retinal vessels reach the ora serrata, at which stage the infant is immune to ROP. However, practically, if avascularity or even stage one or 2 ROP is present only in zone 3 with complete vascularization of the nasal retina, the infant will not develop advanced ROP and its complications. In general, retinal vascularization can be considered virtually complete as soon as normal retinal vessels have developed on the nasal side to within one disc diameter of the ora serrata[24] Therefore, from a practical point of view, if the temporal ora serrata and the ends of the developing retinal vessels look normal, and can be seen in one view of the condensing lens of the indirect ophthalmoscope, it is considered safe to stop following the infant for acute ROP.

In conclusion, ROP is one of the major diseases that affect premature infants and could lead to bilateral blindness. Screening programs for ROP should be implemented in every NICU. Screening should be carried out by an experienced ophthalmologist and offered to all premature infants with birth weight of < 1500 g or gestational age of <33 weeks to insure early detection and timely treatment of threshold ROP to prevent its blinding sequalae .

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الملخص العربى

عنوان البحث: معدل حدوث و خصائص الاعتلال الشبكى للاطفال المبتسرين فى مستشفى بنها التعليمى

هدف البحث: دراسه مستقبليه لتقييم معدل الحدوث و خصائص الاعتلال الشبكى للاطفال المبتسرين فى مستشفى بنها التعليمى

طريقة البحث: شملت الدراسه مائه وثلاث وتسعون من الاطفال المبتسرين بوحدة الرعاية المركزة (المحضن) للاطفال المبتسرين الذين يقل وزنهم عن ١٩٠٠ جرام و الذين يتم فحصهم لتشخيص الاعتلال الشبكى و كان اول فحص عند عمر من ٥ الى٧ اسابيع من الولاده.

نتائج البحث: أظهرت الدراسه أن متوسط عمر هؤلاء الاطفال كان (٢٩,٤) أسبوع عند الولاده وأن متوسط أوزانهم كان (١٢٠٠جم) وقد أعطى هؤلاء الاطفال اكسجين لمدة ٢٦ يوم فى المتوسط و من بين هؤلاء الاطفال أظهرت الدراسه أن اثنان وسبعون حاله كانت تعانى من الأعتلال الشبكى بنسبة حدوث ٣٦% (نسبه اجماليه) و أن معدل الحدوث فى الأطفال الذين كان وزنهم (١٥٠٠جم) ٤٠% وأن معدل الحدوث فى الأطفال الذين كان وزنهم ١٢٥٠جم (٥٠%) وكانت جميع هذه النسب لها دلالات احصائيه .و أن ١٨ حاله من بين اثنين وسبعون حاله كانوا يعانون من اعتلال شبكى مستلزم للعلاج بالليزر أو التبريد بنسبة ٢٦%

توصيات واستنتاجات البحث: توصى الدراسه بالأهتمام بفحص الأطفال من قبل أطباء الأطفال و العيون لتشخيص الأصابه بالأعتلال الشبكى فى الأطفال المبتسرين و خاصة الذين يتلقون أكسجين بالحضانه و ذلك لمنع المضاعفات و التى قد تؤدى الى العمى لدى هؤلاء الاطفال.