

Functional Result and Visual Outcome in Early Versus Conventional Treatment of Retinopathy of Prematurity

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Objective: Retinopathy of prematurity (ROP) is a significant cause of blindness in childhood worldwide. The objective of the present study is to assess long-term structural and functional results of early (received first treatment at pre-threshold stage) versus conventional treatment (treated at threshold stage) of ROP.

Material and Method: Survivors of ROP patients who underwent early or conventional treatment between 1997 and 2001 were reassessed in 2006. Functional outcome [refractive state, best corrected visual acuity (BCVA)] and anatomical outcome (retina status, ocular alignment) were compared between the two treatments using Chi-square test at $p < 0.05$.

Results: Of 68 patients, 39 (57.4%) returned for reassessment: 11 patients (22 eyes) were in the early treatment group and 28 patients (56 eyes) were in the conventional group. At 5 years or more, a favorable outcome (BCVA $\geq 20/200$) was achieved in 72.7% of the early group vs. 53.6% in the conventional group ($p > 0.05$). Normal to near normal vision (20/12-20/60 or log MAR 0.1-0.5) was significantly found in the early group (54.5% vs. 23.2%, $p=0.008$) and none in the early group lost vision to no light perception. Prevalence of high myopia >5 diopters and astigmatism were significantly higher in the conventional group ($p = 0.001$ and $p = 0.002$ respectively). Smaller degree of ET developed significantly in the early treated group ($p = 0.018$) whereas ET 15 prisms or more developed exclusively in the conventional group ($p = 0.04$). Retinal detachment occurred in 18.1% of the early treated compared to 28.5% of the conventional groups ($p = 0.402$).

Conclusion: Early treatment of ROP at pre-threshold stage offered a better structural and functional outcome than at threshold. ROP patients should undergo periodic fundus examination between 6 months and 1 year of age and yearly thereafter for early detection and repair as well as yearly refraction and ocular alignment assessment to identify high refractive errors, astigmatism and strabismus for early recognition and correction.

Keywords: Retinopathy of prematurity (ROP), Early treatment, Conventional treatment, Functional outcome

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Retinopathy of prematurity (ROP) is a vasoproliferative disorder which affects pre-term infants with low gestational age (GA) and low birth weight (LBW). Blindness from ROP accounts for 8% of the registered blind in developed countries and 40% in developing countries⁽¹⁾. Using WHO definitions of visual loss and a standardized methodology, 244 (95%) of 256 children who were examined in schools for the blind in Thailand (1 school) and in the Philippines (3 schools), were blind or severely visually impaired (SVI). In the two schools together, 15% of children were blind from ROP⁽²⁾.

To minimize risk of SVI in ROP patients, the division of neonatology at the Department of Pediatrics and retina consultants at the Department of Ophthalmology co-developed quality procedures for carefully timed retinal examinations of pre-termed infants at risk for ROP. However, as the tertiary center, ROP patients on referral basis may present late in the course of ROP development, thus it is unlikely to salvage their eyes in a timely manner. Previous studies of ROP in Thai patients were related to an incidence, prevalence, risk factors, immediate surgical result or screening of the patients⁽³⁾. The clinical implications of the Early Treatment of Retinopathy of Prematurity (ETROP) identified characteristics of ROP for early treatment eyes with pre-threshold ROP at highest risk for retinal detachment and blindness while minimizing treatment of pre-threshold eyes likely to show

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spontaneous regression⁽⁴⁾. However, despite early treatment of selected eyes with pre-threshold ROP, some eyes still progress to an unfavorable outcome. Since the authors had begun early treatment in ROP patients at pre-threshold stage since 1997 (before the time of ETROP report), the authors performed a retrospective, nonrandomized, comparative, interventional ROP case series between 1997 and 2001: 1) to study clinical characteristics of ROP patients who were detected at the neonatal intensive care unit (NICU) or were referred to receive treatment 2) to assess long-term structural and functional results of early versus conventional treatment in ROP infants and reassessed them in 2006 when they were at least 5 years of age.

Material and Method

Hospital chart records of patients diagnosed as ROP at the NICU or were referred to receive treatment between January 1997 and December 2001 were reviewed. The study was approved by the institution review board. Screening for pre-terms at risk and management included those whose birth weight was $\leq 1,500$ gms and/or GA, was 31 weeks or less with or without oxygen therapy, and pre-terms with GA of 34 weeks or less, on oxygen supplement > 6 hours, had hypotension, on pressor support or surgery within 1-2 weeks of life. Screening of patients was specified by neonatologists according to quality procedures of the pediatric department. Initial assessment was performed at the NICU. Patients at risk were observed every week to receive treatment or until vascularization had progressed into zone III. The retinal findings eligible for early treatment included any stage of ROP with plus sign or stage 2 or 3 which showed active progression in zone I or II involving any clock hours. Laser indirect ophthalmoscopy (LIO) with diode red 810 nm (Oculight, IRIS medical) was a preferred treatment modality when treatment was indicated and was performed at the NICU within 48-72 hours using topical anesthesia with 0.5% tetracaine eye drops, having a neonatologist or nurses monitor oxygen saturation. Complete scattered laser burn was performed at peripheral avascular zone usually involved 3 sessions in three consecutive days, both eyes at a time, beginning in the quadrant of the involved clock hours. A combined procedure of LIO and cryotherapy was indicated when the disease process progressed to a more severe stage despite laser treatment and was performed under general anesthesia in the operating room. ROP patients who received conventional treatment were treated at threshold ROP

or stage 3 with plus disease in zone II, involving 5 contiguous or 8 cumulative clock hours. Treatment modalities included LIO, cryotherapy or a combination of these depending on surgeon's discretion. In 2006, survivors of ROP patients who underwent early or conventional treatment between 1997 and 2001 were asked to return for both structural and functional outcome assessment. On return follow-up examination, patients underwent cycloplegic refraction, best corrected Snellen's visual acuity (BCVA) measurement, anterior/posterior segment examination, muscle evaluation and angle of deviation measurement. Patients were classified into 2 groups according to treatment. Those who received first treatment at pre-threshold stage were classified as the early treatment group whereas those who were treated at threshold stage were in the conventional group. To assess functional outcome, favorable visual outcome was defined as BCVA of $\geq 2/200$ (log MAR < 0.1) whereas unfavorable outcome was referred to BCVA $< 20/200$. Extreme levels of vision defined as normal vision VA = 20/12-20/25 or log MAR 0.2-0.1, near normal vision VA = 20/12-20/25 or log MAR 0.2-0.1, near blindness (VA $< 20/1,000$, log MAR > 1.7) and no light perception (NLP) were also compared. A refractive state was compared as degree of myopia < 5 , 5-10, or > 10 diopters. Structural outcome was assessed in terms of ocular alignment [esotropia (ET) or exotropia (XT) \leq or > 15 prisms] and as a rate of retinal detachment (RD). Statistical analysis for comparisons between the two treatments is Chi-square test or Fisher's Exact test. A p-value of less than 0.05 was set as statistically significant difference.

Results

Prevalence of live births, pre-terms, LBW $\leq 1,500$ gms and ROP infants detected at the NICU between 1997 and 2001 are presented in Table 1. The average number of annual live births during that period was 6,898.4. On average, 676 premature infants were born per year or 9.8% of annual live births whereas 60 LBW $\leq 1,500$ grams were delivered yearly (8.9% of premature infants or 0.87% of annual live births). Among 300 LBW $\leq 1,500$ gms, 37 were diagnosed ROP. The incidence of ROP was 12.3% of LBW $\leq 1,500$ gms (or 5.5% of premature infants or 0.54% of annual live births). As a tertiary center, 90 patients who were born elsewhere were referred to receive treatment. Overall, there were 127 ROP patients who were detected at the NICU and by referral during the present study period, a mean of 25.4 cases per year. The authors excluded 3 patients who did not survive, 3 patients who had

Table 1. Prevalence of livebirths, preterms, LBW \leq 1500 gms and ROP infants by year (1997-2001)

Year	1997	1998	1999	2000	2001	Total	Average per year
Livebirths	7,677	7,089	6,666	7,052	6,007	34,492	6,898.4
Preterms	645	654	677	766	649	3,381	676.2
LBW \leq 1500gms	59	55	52	68	66	300	60
ROP infants	9	8	6	7	7	37	7.4

LBW = low birthweight

ROP = retinopathy of prematurity

cicatricial ROP and 29 patients who were in advanced stage 5 by the time of referral, not amendable to do surgery.

Regression and progression

At initial assessment, there were 92 patients (184 eyes). Their BW ranged from 610-1650 gms, a mean of 1240.5 gms. GA was 22-30 weeks, a mean of 27.5 weeks. Associated diseases are shown in Table 2. Five common diseases were respiratory distress syndrome (RDS), hyperbilirubinemia, chronic lung disease, persistent ductus arteriosus (PDA) and apnea. Of 92 patients, 85 patients were ROP in stage 1-3 [68/85 patients (136 eyes) were treated at prethreshold (early or at threshold or at threshold (conventional) depending on surgeon's decision, 7 patients (14 eyes) were in stage 4-5 and underwent retina reattachment procedures: 5 eyes in stage 4A, 5 eyes in stage 4B and 4 eyes in stage 5. The time duration since diagnosis to treatment varied from 2.7-20.8 weeks, a mean of 7.4 weeks.

At first month corrected age, 34/184 eyes (18.5%) did not develop ROP or ROP had regressed. Progression to RD stage 4-5 occurred in 22/184 eyes (11.9%) [22/136 eyes (16.2%) which underwent early or conventional treatment (21/136 eyes in stage 2-3 progressed to stage 4: 16 eyes progressed to 4A, 5 eyes to 4B) and 1 eye progressed to stage 5]. Progression to a more advanced stage of RD occurred in 7/14 eyes initially in stage 4-5: 3/5 eyes in stage 4A progressed to 4B and 4/5 eyes in 4B progressed to stage 5. Overall, 36 eyes were in stage 4-5: 18 eyes in 4A, 9 eyes in 4B, 9 eyes in stage 5. These eyes underwent scleral buckling procedure with or without pars plana vitrectomy.

At 12 months corrected age, information on structural outcome was available in 59 patients (102 eyes): 70 eyes (68.6%) had attached retina, 15 eyes (14.7%) had partially attached retina and 17 eyes (16.7%) had totally detached retina or were phthisical. Information on visual outcome was available in 60 of

102 eyes while 42 eyes had attached retina but no record on visual function: 28 of 60 eyes (46.7%) had visual acuity of 20/200 or better, 15 eyes (25%) had minimal vision of hand motion to 20/400, and 17 eyes (28.3%) lost vision to NLP.

In 2006, 68 patients who received either early or conventional treatment were contacted for reassessment and 39 (57.4%) returned. Of these, 11/39 patients (22 eyes) received early treatment and 28/39 patients (56 eyes) underwent conventional therapy. Baseline characteristics of ROP patients who received early or conventional treatment are presented in Table 3. All characters between the two groups were similar ($p > 0.05$). The mean gestational age, mean BW and mean post conceptional age at diagnosis in the early treatment group was less than the conventional group: GA of 26.7 vs. 29 weeks, BW of 1110.9 gms vs. 1221.7 gms and post conceptional age of 33.9 vs. 36 weeks, respectively. Common, associated diseases were respiratory distress syndrome (RDS), hyperbilirubinemia, heart disease, necrotizing enterocolitis (NEC) and sepsis. Referral status in the early group was 54.6% and 85.7% in the conventional group.

Visual outcome

Table 4 compares percentage of eyes with extreme level of vision: normal to near normal vision, near blindness and NLP in both groups. Normal to near normal vision was found in 12 of 22 eyes (54.5%) in the early treatment group vs. 13 of 56 eyes (23.2%) in the conventional group, $p = 0.008$. Near blindness was found in 4 of 22 eyes (18.2%) in the early treatment group vs. 13 of 56 eyes (23.2%) in the conventional group, $p = 0.176$. None of the patients in the early treatment group lost vision to NLP, whereas 5 of 56 eyes (8.9%) in the conventional group did, $p = 0.963$. Table 5 compares favorable visual outcome between the two groups: 16 of the 22 eyes (72.7%) in the early treatment group achieved BCVA \geq 20/200 vs. 30 (53.6%) of 56 eyes in the conventional group, $p > 0.05$.

Table 2. Associated diseases in ROP patients admitted at the NICU by year (1997-2001)

Associated Diseases/year	1997	1998	1999	2000	2001	Total
1. RDS	9	12	11	7	4	43
2. Hyperbilirubinemia	7	6	3	2	1	19
3. Chronic lung disease	8	4	2	2	1	17
4. Hypoglycemia	2	3	-	1	2	8
5. PDA	5	5	1	1	2	14
6. Hypo Na	1	1	1	-	-	3
7. Hypo CA	2	-	1	-	-	3
8. IVH	3	1	1	1	1	7
9. Polycythemia	1	-	-	-	1	2
10. Subglottic stenosis	1	1	-	-	-	2
11. Apnea	3	2	2	1	3	11
12. Pneumonia	2	3	-	-	-	5
13. TOF	1	4	4	1	-	10

ROP = retinopathy of prematurity, NICU = Neonatal intensive care unit, RDS = Respiratory distress syndrome, Hypo CA = Hypocalcemia, PDA = Patent ductus arteriosus, IVH = Intraventricular hemorrhage, Hypo Na = Hyponatremia, TOF = Tetralogy of Fallot

Table 3. Baseline characteristics in ROP patients by treatment group

Characteristics/Treatment group	Early group n = 11	Conventional group n = 28	p-value
Gender			0.73
	Male	5 (45.54%)	15 (53.57%)
	Female	6 (54.55%)	13 (46.43%)
Birthweight (gms)	Mean (SD)	1,110.9 (394.85)	1,221.7 (406.05)
Gestational age	Mean (SD)	26.72 (2.28)	29.03 (2.68)
Postconceptional Age at diagnosis (wks)	Mean (SD)	33.9 (2.165)	36.03 (2.88)
Referral status		6 (54.55%)	24 (85.71%)
Associated disease	RDS	9 (81.82%)	25 (89.29%)
	TTNB	0 (0%)	1 (3.57%)
	Heart disease	3 (27.27%)	8 (28.57%)
	Apnea	2 (18.18%)	0 (0%)
	Hyperbilirubinemia	3 (27.27%)	13 (46.43%)
	Sepsis	1 (9.09%)	3 (10.71%)
	NEC	3 (27.27%)	6 (21.43%)

SD = Standard deviation, TTNB = Transient tachypnea of newborn, NEC = Necrotizing enterocolitis

Table 4. Visual outcome according to extreme level of vision by treatment group

Visual outcome/ Treatment group	Early (n = 22 eyes)	Conventional (n = 56 eyes)	p-value
Normal to near normal vision	12 (54.50%)*	13 (23.20%)	0.008
Near blindness	4 (18.80%)	13 (23.20%)	0.176
NLP	0 (0.00%)	5 (8.9%)	0.963

Normal vision VA = 20/12-20/25 or log MAR 0.2-0.1

Near normal vision VA = 20/30 – 20/60 or log MAR 0.2-0.5

Near blindness < 20/1000, log MAR > 1.7

NLP = No light perception

* Statistical significant difference

Refractive error

Table 6 compares distribution of refractive error in each treatment group. Refraction was obtained in 8 patients (16 eyes) in the early group and 19 patients (38 eyes) in the conventional group. Hyperopia up to +2 diopters developed in 4/16 eyes (25%) of the early group vs 2/38 eyes (5.3%) in the conventional group ($p = 0.056$). Myopia < 5 diopters developed in 12/16 eyes (75%) vs. 20/38 eyes (52.6%) ($p = 0.145$), myopia 5-10 diopters and > 10 diopters were found exclusively in 10/38 eyes (26.3%) and 6/38 eyes (15.7%) in the conventional group, $p = 0.024$, $p = 0.163$, respectively). In other words, prevalence of high myopia > 5 diopters which comprised 42% in the conventional group compared to none in the early treatment group had significantly statistical difference ($p = 0.001$). Astigmatism was significantly higher in the

conventional group (4/16 eyes (25%) in the early group vs. 28/38 eyes (73.6%) in the conventional group, $p = 0.002$) and anisometropia > 2 diopters was found in 2/16 eyes (12.5%) in the early group vs. 16/38 eyes (42%) in the conventional group ($p = 0.057$), respectively.

Strabismus

Ocular misalignment occurred in 4/11 patients in the early treated and 11/28 patients in the conventional group. Angle of deviation post operatively in each treatment group is shown in Table 7. Of 39 patients, ET or XT ≤ 15 prisms occurred in 3/11 patients (27.3%) and 1/11 patient (9.1%) of the early treatment group whereas none in the conventional group had small angle of deviation ≤ 15 prisms ($p = 0.018$ and $p = 0.282$ respectively). On the contrary, high

Table 5. Favourable vs unfavourable visual outcome by treatment group

Treatment group	Early (n = 22 eyes)	Conventional (n = 56 eyes)	p-value
Favourable (VA \geq 20/200)	16 (72.7%)	30 (53.6%)	> 0.05
Unfavourable (VA < 20/200)	6 (27.3%)	26 (46.4%)	> 0.05

VA = visual acuity

Table 6. Distribution of refractive error by treatment group

Characteristics	Early group (n = 16 eyes)	Conventional group (n = 38 eyes)	Fisher's Exact test
Hyperopia	4 (25%)	2 (5.3%)	0.056
Myopia < 5D	12 (75%)	20 (52.6%)	0.145
Myopia 5-10D	0 (0%)	10 (26.3%)*	0.024
Myopia > 10D	0 (0%)	6 (15.7%)	0.163
Astigmatism	4 (25%)	28 (73.6%)*	0.002
Anisometropia > 2D	2 (12.5%)	16 (42%)	0.057

D = diopters

*statistical significant difference

Table 7. Ocular misalignment in angle of deviation and rate of retinal detachment by treatment group

Characteristics	Early group (n = 11 patients)	Conventional group (n = 28 patients)	Fisher's Exact test
ET ≤ 15 prisms	3(27.3%)*	0(0%)	0.018
ET > 15 prisms	0(0%)	9(32.1%)*	0.04
XT ≤ 15 prisms	1(9.1%)	0(0%)	0.282
XT > 15 prisms	0(0%)	2(7.1%)	1.00
Rate of retinal detachment	4/22eyes(18.1%)	16/56 eyes(28.5%)	0.402

*statistical significant difference

degree of strabismus developed only in the conventional group: ET or XT > 15 prisms developed in 9/28 patients (32.1%) and 2/28 patients (7.1%) in the conventional group whereas none of the patients in the early treatment group did ($p = 0.04$ and $p = 1.00$, respectively). Thus, the early treated group had significant smaller degree of ET (15 prisms or less) when compared with the conventional group.

The posterior segment status

From Table 7, the rate of RD in the early treatment group was 4/22 eyes (18.1%) compared to 16/56 eyes (28.5%) in the conventional group which was not of significant statistical different ($p = 0.402$).

Discussion

From the present study, 5.5% of premature infants or 12.3% of LBW with the mean BW of 1240.5 grams, developed ROP. The largest cohort of newborns analyzed to predict risk factors for ROP in the US reported that the total incidence of ROP was 0.12% overall and 7.35% for premature infants and emphasized the role of BW in extended-stay infants (the odds ratios for the development of ROP were greatest in infants weighing less than 1250 grams) as well as Hispanic, having respiratory distress syndrome and intraventricular hemorrhaging⁽⁵⁾. The authors' findings showed the rate of spontaneous regression of ROP occurred in 18.5% of all ROP survivors. For those who underwent early or conventional treatment, all characters between the two groups were similar ($p < 0.05$). In the early treatment group, despite the mean GA and mean BW which was less than the conventional group (GA 26.7 weeks vs. 29 weeks and BW of 1,110.9 gms vs. 1,221.7 gms, respectively), assessment of long-term visual outcome revealed that none of the early treated ROP patients lost vision to NLP and that there were more patients with favorable visual outcome (73% vs. 54%) and more patients with normal to near normal vision (55% vs. 23%) in the early treatment group compared to the conventional group. In the ETROP, final results showed a reduction in unfavorable visual acuity outcomes with earlier treatment, from 19.8% to 14.3% ($p < 0.005$) and reduced unfavorable structural outcomes from 15.6% to 9.1% ($p < 0.001$) at 9 months⁽⁶⁾. Though by the time when the authors began early treatment, ETROP result have not yet been reported, the authors' approach did not early treat Type 2 ROP since the authors did not treat early stage 2 or 3 without plus disease (Type 2 ROP defined as zone I, stage 1 or 2 ROP without plus disease or zone II), stage 3 ROP

without plus disease were considered for treatment only if they progressed to type 1 or threshold ROP⁽⁶⁾.

The present study has shown that both early and conventional groups had similar prevalence of hyperopia, myopia < 5D and anisometropia > 2D but early treatment significantly lowered the incidence of high myopia > 5D and astigmatism. The prevalence of high myopia > 5D was significantly higher in the conventional group (which comprised 42% in the conventional group compared to none in the early treatment group, $p = 0.001$). The ETROP⁽⁷⁾ found a prevalence of high myopia in about 25% of the eyes treated at high-risk pre-threshold and 28% of the high-risk pre-threshold eyes managed conventionally ($p = 0.20$) while the authors did not find a case of high myopia but mild to moderate myopia which developed in 75% of the early treated eyes. The mechanism for the development of myopia post treatment has been controversial and interesting. The authors believe the beneficial effect of optimum diode laser treatment is associated with the development of low to moderate myopia which some studies have shown⁽⁸⁾. A 3 year follow-up refractive outcome in eyes treated with cryotherapy or diode laser found diode laser as effective as cryotherapy but there were significantly fewer myopes in the diode laser group than in the cryotherapy group with no trend towards increasing myopia in the laser treated group and the refraction in these eyes stabilized after 1 year⁽⁸⁾. In a rabbit model, the study showed higher prevalence of high myopia in cryo-treated eyes than in laser-treated eyes. Peripheral retinal cryotherapy causes a significantly greater elongation of the eye compared to diode laser photocoagulation. The increase in anterior chamber depth, peripheral chorioretinal scar and retinal atrophy up to the pars plana, a large area of chorioretinal adhesion and destruction of choroidal architecture in the cryo-treated eyes could have changed the structure of the sclera and make it more susceptible to stretching⁽⁹⁾. However, in threshold ROP treated with diode laser⁽¹⁰⁾, available refractive data in 134/194 eyes revealed a prevalence of high myopia > 5 diopters was 55.2%. While the presented patients did not have a record on ocular alignment in the first year of life, reassessment at least by 5 years of age revealed that smaller degree of ET or XT 15 prisms or less occurred in the early treatment group than in the conventional group, whereas either ET or XT > 15 prisms developed in a significant number of ROP patients who underwent conventional treatment. However, the ETROP found that infants with high-risk pre-threshold ROP show significant variability in the presence vs absence of stra-

bismus in the first year of life and they recommended conservative management⁽¹¹⁾.

The treatment in pre-threshold stage provided a better structural and functional outcome than conventional method, but either treatment modality guaranteed progression of RD. At the first month of life, the authors found progression of RD occurred in both treatment groups in 16.2% of the treated eyes, whereas late in life at 5 years or more, prevalence of RD was 18.1% in the early treatment group and 28.5% in the conventional group. The prevalence of RD in the ETROP study was 89 eyes of 63 patients among 401 enrolled patients at 9 months corrected age⁽¹²⁾. Coats et al found a retinal detachment developed in 36 (13.7%) of 262 eyes and that clinically important vitreous organization and vitreous hemorrhage were predictive for development of retinal detachment⁽¹³⁾. For retinal detachment in ROP, there was no definite guideline for management of stage 4A but the authors advocated scleral bucking performed at an earlier stage of detachment which some authors have suggested to be the same thing when the ROP remains active and not yet involuted to prevent progression. Some suggested early vitrectomy in stage 4A to prevent progression but in the ETROP study, the outcome of retinal detachment was generally poor, despite early vitrectomy the success rate was only a 28%, vitreoretinal surgery for retinal detachment was associated with macular attachment in 16 of 48 eyes. Normal acuity was maintained after surgical repair of stage 4A retinal detachment in 5 (21%) of 24 eyes and vitreoretinal surgery for stage 5 disease was associated with poor functional outcomes⁽¹²⁾.

For stage 5 ROP, a combined procedure would help but most of the time the presented cases were too advanced by the time of referral that vitreoretinal surgery was unlikely to improve any visual results. Despite all intervention performed in these eyes, visual outcome after treatment in detachment eyes of ROP is sometimes poor. Referral status in the conventional group was 85.7% as opposed to 54.5% in the early treatment group. The range of 2.7 to 20.8 weeks or an average of 7.4 weeks in the present study indicated a time delay in a referral system which had an impact on structural and favorable visual outcome. ROP patients have several underlying systemic diseases that require intensive treatment, if it is not appropriate to refer promptly, local ophthalmologists should begin laser treatment in high-risk pre-threshold stage and await the results prior to referral.

In summary, early treatment of ROP at pre-

threshold stage offered a better structural and functional outcome than at threshold. The useful intervention would be to refract and examine these patients between 6 months and 1 year to identify high refractive errors, astigmatism for early recognition and correction. ROP eyes need close follow-up within the first year after treatment. The development of late retinal detachment should warrant periodic fundus examination at a later year at least at 6 months' interval for early detection and repair. Attention should be made towards treatment response and late development of retinal detachment in those eyes which developed changes in different zones at time of active ROP. At the time of study, the research on insulin-like growth factor (IGF-1) and vascular endothelial growth factor (VEGF) in both early phase and proliferative phase of ROP, which are deficient after premature birth, were underway⁽¹⁴⁾ and the use of anti-VEGF had not begun. Current use of anti-VEGF injection, which the authors have begun since 2007, is encouraging and ongoing.

Potential conflicts of interest

None.

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ผลลัพธ์ของการรักษาโรคจอตาในทารกคลอดก่อนกำหนดโดยการรักษาเร็วเทียบกับการรักษาแบบดั้งเดิม

สุขุมาวรศักดิ์, สรินดา นวรัตน์กุลชัย, พรรณลักษณ์ สินสวัสดิ์

วัตถุประสงค์: โรคจอตาในทารกคลอดก่อนกำหนด (Retinopathy of Prematurity, ROP) เป็นสาเหตุสำคัญของตาบอดในทารกทั่วโลก ในประเทศไทยยังไม่มีรายงานผลการรักษา ROP เปรียบเทียบวิธีต่างๆ การศึกษาครั้งนี้เพื่อเปรียบเทียบผลลัพธ์ระยะยาวของการรักษาโรคจอตาในทารกคลอดก่อนกำหนด ระหว่างการรักษาเร็ว ที่ระยะ prethreshold กับการรักษาดั้งเดิม คือรอจนถึงระยะ threshold

วัสดุและวิธีการ: ติดตามผู้ป่วย ROP ที่ได้รับการรักษาเร็วและแบบดั้งเดิม ระหว่างปี พ.ศ.2540-2544 มาประเมินผลการรักษาในปี พ.ศ.2549 (ผู้ป่วยมีอายุ 5 ขวบขึ้นไป) โดยวัดแวนประเมินสภาพสายตาสั้น สายตายาว สายตาเอียงและวัดระดับการมองเห็น โดยถือระดับสายตาที่ได้รับการแก้ไขเท่ากับ 20/200 หรือดีกว่าเป็นเกณฑ์ที่น่าพึงพอใจ เปรียบเทียบระดับการมองเห็นที่ปกติหรือเกือบปกติและที่สูญเสียการมองเห็น สภาพตาเขไม่ว่าเข้เข้าในหรือออกนอก มากหรือน้อยกว่า 15 ปริซึม และอัตราการเกิดจอตาหลุดลอก การเปรียบเทียบทางสถิติใช้ Chi-square test หรือ Fisher's Exact test ที่ระดับความเชื่อมั่น $p < 0.05$

ผลการศึกษา: จากจำนวนผู้ป่วยที่ได้รับการรักษาเร็วและแบบดั้งเดิม 64 คน มีผู้ป่วยที่สามารถตามกลับมารับการตรวจประเมินใหม่ได้ 39 คน คิดเป็นร้อยละ 57.4 ในจำนวนนี้ 11 คน (22 ตา) อยู่ในกลุ่มรักษาเร็วและ 28 คน (56 ตา) อยู่ในกลุ่มรักษาแบบดั้งเดิม พบว่าระดับการมองเห็นที่น่าพึงพอใจในกลุ่มรักษาเร็วกว่าคิดเป็นร้อยละ 72.7 เทียบกับร้อยละ 53.6 ที่รักษาแบบดั้งเดิม ($p > 0.05$) ระดับการมองเห็นที่ปกติหรือเกือบปกติ พบในกลุ่มรักษาเร็วร้อยละ 54.5 เทียบกับ ร้อยละ 23.2 ในกลุ่มรักษาแบบดั้งเดิม ซึ่งแตกต่างกันอย่างมีนัยสำคัญทางสถิติ ($p = 0.008$) อุบัติการณ์สายตาสั้นตั้งแต่ 5 ไดออปเตอร์ขึ้นไปและสายตาเอียง พบแต่ในกลุ่มที่รักษาแบบดั้งเดิม ซึ่งทั้งหมดมีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ ($p=0.001, p=0.002$ ตามลำดับ) สภาพตาเขมีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ โดยพบว่าตาเขเข้าใน 15 ปริซึมหรือน้อยกว่า พบในกลุ่มรักษาเร็ว ($p=0.018$) เทียบกับตาเขเข้าในมากกว่า 15 ปริซึมพบแต่ในเด็กที่ได้รับการรักษาแบบดั้งเดิม ($p=0.04$) อัตราการเกิดจอตาหลุดลอกพบในกลุ่มรักษาเร็วร้อยละ 18.1 เทียบกับแบบดั้งเดิม พบร้อยละ 28.5 ($p = 0.402$)

สรุป : การรักษา ROP เร็ว ที่ระยะ prethreshold ให้ผลลัพธ์ดีกว่าการรอจนถึงระยะ threshold ผู้ป่วย ROP ควรได้รับการตรวจจอตา ระหว่าง 6 เดือน ถึง 1 ปี ในช่วงขวบปีแรกและต่อ ๆ ไปทุกปี เพื่อตรวจพบจอตาหลุดลอก และให้การรักษาทันการ ส่วนการวัดแวนและวัดมุมเข ควรทำทุกปี เพื่อให้ตรวจพบสายตาที่ไม่ปกติและสภาพตาเข เพื่อให้การแก้ไขได้เร็ว
