Regressed retinopathy of prematurity in children aged 5 - 8 years in Sivas, Turkey

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In this present study regressed retinopathy of prematurity has been investigated in children born prematurely (< 2300 g birth weight and < 34 weeks gestational age) in Sivas, Turkey during January 1989-January 1992. At the age of 5-8 years, 55 children born prematurely were examined; eye fundus information could be obtained by indirect ophthalmoscopy in all of them. The frequency of regressed retinopathy of prematurity was 35.45 percent for the whole group. Severe forms with optic atrophy, dragged optic disk, vitreoretinal scarring, retinal traction and temporal avascular retina were seen in 13.63 percent of cases. Moderate forms with pigmentary changes, vitreoretinal interphase changes and lattice degeneration were seen in 21.81 percent of cases. While the severe and moderate regressed premature retinopathy findings in premature children with gestational ages of 30-34 weeks were observed to be 12.0 and 14.0 percent, respectively, those in the 25-29 week-gestational-aged premature children were determined to be 5.0 and 28.33 percent, respectively. Although the incidence of both severe and moderate regressed premature retinopathy was higher in the 25-29 week gestational-aged group when compared to that of the 30-34-week-gestational-aged group, the difference was not found to be statistically significant ($p > 0.05$).

In conclusion, premature retinopathy should not only be followed up in the early stage with active changes but also later in infancy and childhood because of regressed premature retinopathy findings that may require treatment.

Key words: prematurity, regressed retinopathy of prematurity.

There are many hazards of preterm birth, and survivors are more prone to developing abnormalities of motor and sensory functions, including the visual system. retinopathy of prematurity (ROP) continues to be a serious problem in prematures despite improved possibilities of neonatal care, monitoring and treatment. The etiology is still unknown but several factors have been suggested to be involved in the development of the disease[1-3]. ROP, a proliferative inflammatory process attacking the developing retinal vessels during the perinatal period, remains one of the significant contributors to permanent morbidity in the premature population[4-7]. In its severest form, ROP progresses to total retinal detachment and blindness. In its milder forms, ROP is now known to leave ocular sequelae in the form of myopia and strabismus[8]. In the last decade important investigations have been made to prevent and dimish the severity of ROP[2,6]. We have conducted a retrospective study on premature children born in Sivas, Turkey during 1989-1992 in order to investigate the occurrence of ocular abnormalities. This paper deals with regressed ROP findings. A comparative study on the prevalence of visual impairments, refractive errors and ocular motility disorders in premature babies and a control grop of full-term babies will be reported separately.

Material and Methods

The study was performed in a well-defined geographical area, the Sivas region, on children born between January 1989-January 1992, with a birth weight < 2300 g and a gestational age < 34 weeks. The conditions for making such a study in the Sivas region were considered to be quite

favorable. We divided the premature children into two groups according to birth weight and gestational age. A total of 30 premature children constituted group I, whose gestational ages ranged between 25-29 weeks. Group II included a total of 25 premature children with gestational ages ranging from 30-34 weeks. At the age of 5-8 years, each child underwent a standard examination of visual function, ocular motility and ophthalmoscopic fundus appearance. Mydriatic drops (cyclopentolate hydrochloride 1%) were used to obtain a full view of the retinal periphery. The fundus was examined using the indirect binocular ophthalmoscope and a 20 diopter lens. A scleral depressor could not be used in any of the children aged 5-8 years. Exact information on fundus condition was available for 110 eyes of 55 premature children. In our classification of regressed ROP, we followed the suggestions of the International Committee for the Classification of Late Stage of ROP[9]. We have included in this study a subdivision into severe and moderate regressed ROP in order to differentiate the deegree of severity. The severe form included cases with vitreoretinal scarring equal to or larger than one optic disk diameter, optic atrophy, the presence of tangential traction of the retina, dragged optic disk and peripheral avascular retina. The remaining cases with ony pigmentary change, vitreoretinal interphase changes and lattice degeneration constituted the group of patients with moderate regressed ROP. We compared the incidence of the severe and moderate forms of ROP between the two groups. For statistical evaluation, "the significance of difference between the two groups' percentage method" was used.

Results

A total of 30 premature children constituted group I. Their gestational ages ranged between 25-29 weeks, the mean age being 27.8 ± 0.9 weeks. Of these, 16 (53.3%) were male and 14 (46.6%) female. At examination their ages varied between 5 and 8 years; the mean age was 6.7 ± 1.1 years. Their minimum, maximum and mean birth weights were 1100 g, 2000 g and 1617 ± 267 g, respectively. Group II included a total of 25 premature children. Their gestational ages ranged from 30 to 34 weeks and the mean age was 31.5 ± 1.3 weeks. Of these, 12 (48%) were male and 13 (52%) female. They were 5-8 years old, the mean age being 6.32 ± 1.18 years. Their minimum, maximum and mean birth weights were 1200 g, 2300 g and 1844 ± 367 g, respectively.

The results of the fndus examination of children performed by indirect opthalmoscopy are given in Table I.

Table I. Regressed Premature Retinopathy Findings in All Premature Children

	Group I n	(60 eyes) (%)	Group II n	(50 eyes) (%)
Normal	34	(56.66)	37	(74.0)
Optic atrophy	-	(-)	1	(2.0)
Scarring in the temporal peripheral retina	3	(5.0)	2	(4.0)
Increase in pigmentation in the temporal retina	13	(21.66)	5	(10.0)
Vitreoretinal interface anomalies	3	(5.0)	2	(4.0)
Dragged aptic disk	5	(8.33)	3	(6.0)
Temporal avascular retina	1	(1.66)	-	(-)
Lattice degeneration	1	(1.66)	-	(-)

While the fundus in 34 (56.7%) eyes in group I was observed to be normal, scarring in the temporal peripheral retina was found in three (5%) eyes, increase in pigmentation in the temporal retina in 13 (21.7%) eyes, dragged optic disk in five (8.3%) eyes, temporal avascular retina in one (1.7%) eye, lattice degeneration in one (1.7%) eye and vitreoretinal interface anomalies were noted in three (5%) eyes. As for group II, the fundus in 37 (74%) eyes was found to be normal while optic atrophy was observed in one (2%) eye, scarring in the temporal peripheral retina in two (4%) eyes, increase in pigmentation in the temporal retina in five (10%) eyes, dragged optic disk in three (6%) eyes, and vitreoretinal interface anomalies were noted in two (4%) eyes.

Regressed premature retinopathy findings were described in 26 (43.3%) of 60 eyes of 30 premature children in group I. In group II, regressed premature retinopathy findings were determined in 13 (26%) of 50 eyes of 25 premature children. As for the evaluation made without subdividing by gestational age, regressed premature retinopathy findings were encountered in 39 (35.5%) of 110 eyes of 55 premature children.

While the severe and moderate regressed premature retinopathy findings in group II were observed to be 12 and 14 percent, respectively, those in group I were determined to be 15 and

28.3 percent, respectively. Although in group I the incidence of both severe and moderate regressed premature retinopathy was higher than that of group II, the difference between the two groups' findings was not statistically significant ($t = 2.93$, $p > 0.05$).

Increase in pigmentation in the temporal retina was the most frequent ROP finding in both group I and group II, with a high incidence of 21.7 and 10 percent, respectively. Without taking the gestational age into consideration, an increase in pigmentation in the temporal retina was encountered in 18 (16.4%) of the 110 eyes of 55 premature children.

Discussion

Severe ROP, congenital cataract and optic atrophy account for vision loss in premature children[10]. Several studies from the United States have shown that the incidence of blindness from ROP in infants with birth weights of less than 1500 g ranges from 1.8 to 4.0 percent, but the distribution is markedly skewed towards those weighing less than 1000 g[11].

It is well established that ROP is commoner in premature babies of low birth weight than in others. In one study regressed ROP was seen in about two-thirds of the prematures with birth weights < 1000 g[12]. Similar findings were seen with regard to immaturity. More than half the children with a gestational age of < 30 weeks had ROP[12]. In preterm infants with a birth weight below 2000 g, a gestational age less than 36 weeks and a history of oxygen therapy, ROP should be investigated. Such an investigation may be made during the 7-9th week of life most satisfactorily. The pupilla of the infant is not well dilated earlier and vitreous blurring caused by the tunica vasculosa lentis leads to an insufficient viewing of the fundus. For this reason, ROP cannot be determined and a wrong diagnosis may be made if the fundus examination is made before the 7th-9th week of life. ROP may lead to varying retinal pathologies. When examining the pathological changes of the posterior segment, it is observed that it includes peripheral retinal pigmentation changes, vitreous blurring, peripheral retinal lacerations and lattice degeneration, fibrous bands in the temporal peripheral retina, retinal blood vessel retractions, retrolental fibrovascular membranes, retinal detachment, retinal traction, vitreoretinal scarring, deformations in the optic disk and similar lesions[13].

In 80 percent of infants, ROP regresses spontaneously and may occasionally have a few sequelae. In the remaining approximately 20 percent of infants, complications related to scarring may develop following active ROP[13]. While some of these complications may not be significant at all, others may be etremely serious and even lead to loss of vision[14,15].

The International Committee for the Classification of Late Stages of ROP has pointed out that regressed ROP has a broad spectrum of eye fundus abnormalities[9]; we clasisfied them in two groups as severe and moderate. The severe form included cases with vitreoretinal scarring equal to or larger than one optic disk diameter, optic atrophy, the presence of tangential traction of the retina, dragged optic disk and peripheral avascular retina. The remaining cases with only pigmentary changes, vitreoretinal interphase changes and lattice degeneration constituted the group of patients with moderate regressed ROP.

In one study, regressed ROP was seen in about 30 percent of children with birth weights < 1000 g, but in 45.5 percent in the total group[12]. Moderate forms with pigmentary changes and/or vitreortinal interphase changes were found in 35.8 percent. Pigmentary changes were the most common signs of regressed ROP. Severe forms with vitreoretinal scarring and retinal traction were seen in 9.7 percent[12].

The incidence of severe, moderate and total regressedd ROP findings in our study as well as in several other studies is shown in Table II.

Table II. Incidence of Severe, Moderate and Total Regressed ROP Findings in Our and Several Other Studies

	Severe ROP (%)	Moderate ROP (%)	Total ROP (%)
Present Study	13.63	21.81	35.45
Gallo et al.[12]	9.70	35.80	45.50
Priscilla et al.[16]	7.8	6.9	10.0
McGinnity et al.[17]	3.0	3.7	6.7

There is a very significant relation between neurological development and ROP. Following investigations, it has been established that

hypoperfusion episodes in the cerebral blood circulatilon lead to cerebral ischemia. In addition, the ocular blood flow decreases, increasing the existing retinal ischemia. As a result, the severity of premature retinopathy increases[14]. The association between periventricular hemorrhage, periventricular leukomalacia, extensive cerebral parenchymal changes proven by ultrasound examination and ROP was interesting but not statistically significant[10]. Damage to the retina by light (especially blue spectrum of light) has also been implicated in the pathogenesis of ROP[18].

Risk factors for regressed ROP are extreme prematurity, extremely low birth weight, severe respiratory distress syndrome and intraventricular hemorrhage. According to Brown et al.[19], when the critically ill preterm infants were examined, intraventricular hemorrhage and convulsions were higher in ratio in the group with scarring ROP than in the group without. It has been suggested that there may be a close association among regressed ROP, high-grade myopia and ischemic brain lesions[10]. In one study[20], it was observed that asphyxia in preterm infants was associated with poor visual prognosis. Of the 607 preterm infants, 48 percent had acute ROP. Spontaneous resolution occurred in most cases and only six of the infants developed scarring ROP[20].

With regard to the ophthalmoscopic findings, pigmentary changes were the commonest signs of regressed ROP, in 37.3 percent of cases[12]. In this study, pigmentation changes in the peripheral retina were found in 21.7 percent of cases in the severe premature group. As for the mild premature group, this ratio was 10.0 percent. Without taking the gestational age into consideration, an increase in pigmentation in the temporal retina was encountered in 18 (16.36%) of 110 eyes of 55 premature children.

The high frequency of regressed ROP in our material strongly indicates that prematurely born children are an ophthalmological risk group, with increased incidence of retinal complications. They must therefore be carefully followed up during the period of visual development in order to prevent visual dysfunction with intervention as early as possible.

Finally, pediatricians and ophthalmologists must continue to jointly investigate the conditions that predispose to ROP in the hope of preventing or at least diminishing the severity of the disease.

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