Successful treatment for retinopathy of prematurity in a very preterm baby: a case report

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ABSTRACT

Background: Retinopathy of prematurity (ROP) is a leading cause of childhood blindness worldwide, including in Indonesia. ROP screening and intervention are essential to establish the diagnosis, stop disease progression, and prevent retinal detachment that causes blindness. ROP treatments such as vitrectomy and laser are beneficial. This case aims to report the anatomical and functional outcomes after surgery for ROP.

Case description: A very preterm baby with 29 weeks of gestational age and birthweight of 1300 grams was referred to the pediatric ophthalmology clinic at Cipto Mangunkusumo Hospital for ROP screening. Retinal camera (RetCam®) examination revealed stage 3 ROP in the right eye (RE) and stage 4A ROP in the left eye (LE). The LE underwent a vitrectomy, while the RE underwent laser photocoagulation under general anesthesia. Upon examination under sedation (EUS) after surgery, the retina was examined using RetCam® and was found attached to the LE and regressed on the RE. The baby is able to fixate and follow objects. However, the refraction examination showed myopia in both eyes. Glasses were prescribed due to the myopia outcome in this case.

Conclusion: Vitrectomy for stage 4A ROP and laser photocoagulation for stage 3 ROP are effective in anatomical and functional outcomes in a very preterm baby.

KEYWORDS: laser, ROP, stage 3, stage 4, very preterm, vitrectomy.

INTRODUCTION

Improvement in neonatal intensive care units (NICU) has led to a significant increase in the life expectancy of premature babies born with abnormalities or diseases. As life expectancy increases, so do complications and development disorders that may occur, including retinopathy of prematurity (ROP). ROP is a proliferative retinal disorder due to impairment of retinal vasculature development. ROP is classified into five stages. Risk factors for ROP include premature babies, the use of oxygen supplementation, neonatal infection, respiratory distress, inadequate nutrition, and blood transfusion.1 ROP is a leading cause of childhood blindness worldwide, including in Indonesia. A multicenter study in 2016-2017 by Siswanto et al. showed the incidence of all-stage ROP in Indonesia was 6.7% and 18% in babies with gestational age less than 34 weeks and 28 weeks, respectively. The incidence of severe ROP was 4% in babies with a gestational age of less than 28 weeks.2

In a univariate and multivariate logistic regression analysis by Chang et al., among the risk factors, gestational age was significantly associated with ROP development and progression.3 Surgical interventions, such as scleral buckling and vitrectomy, are needed once retinal detachment occurs.4 Vitrectomy is better performed at stage 4A than stage 4B or stage 5 ROP because the anatomical and functional outcomes worsen with the progression of the ROP.5,6 This case aims to report the anatomical and functional outcomes after stage 3 and 4A ROP surgery in a very preterm baby.

CASE DESCRIPTION

A 41-week of postmenstrual age male infant was referred to the pediatric ophthalmology clinic at Cipto Mangunkusumo Kirana Hospital for retinopathy of prematurity screening.

The baby was born spontaneously from a 19-year-old mother at 29 weeks of gestational age, weighing 1300 grams. The baby was in the NICU for two months in the previous hospital, during which the baby received oxygen therapy and a blood transfusion. History of sepsis, seizure, and heart disease was denied. RetCam® (retinal camera) examination revealed stage 3 ROP (extraretinal fibrovascular proliferation) in the right eye (Figure 1) and stage 4A (partial retinal detachment) ROP in the left eye (Figure 2).

The RE was treated with laser photocoagulation under general anesthesia using an indirect diode laser with power settings of 250 milliwatts (mW) with a duration of 100 milliseconds (ms). The LE was treated with vitrectomy under general anesthesia. This vitrectomy procedure commenced with traction released from the core to the peripheral area. The vitreous cavity was filled with air at the end of the procedure.
After surgery, upon examination under sedation (EUS) using RetCam®, there was regression of the ROP on the RE (Figure 3), and the retina was found attached to the LE (Figure 4). Although the patient was able to fixate on and follow objects, the mother complained that her children often held objects close to his face. Refraction examination showed -5.25 dioptre (D) on RE and -3.75 dioptre (D) on LE. The patient was prescribed glasses to correct his myopia.

**DISCUSSION**

Siswanto et al. reported that supplemental oxygen is the leading risk factor for developing and progressing ROP in preterm infants in Indonesia. Conversely, Chang et al. reported that the risk factors that influenced ROP development and progression were not identical. Steroid use, gestational age, the duration of mechanical ventilation during hospital stays, and respiratory distress syndrome were associated with the development of ROP. In contrast, gestational age, bronchopulmonary dysplasia, number of blood transfusions, intraventricular hemorrhage, and periventricular leukomalacia were significantly correlated with ROP progression. This study showed that gestational age was the only factor that correlated with both the development and progression of ROP.

Our subject was born at 29 weeks of gestational age, which was considered very preterm, according to the WHO. A gestational age is a definite indicator of immaturity of preterm infants’ nervous and vascular systems. A lower gestational age increases the possibility of an infant being exposed to an unfavorable setting that contributes to the risk of ROP, such as oxygen supplementation and blood transfusion. Our subject received oxygen therapy and blood transfusion, which were risk factors for ROP development.

Current indications for treatment are based on the Early Treatment of Retinopathy of Prematurity (ETROP) study. Treatment such as laser photocoagulation with the confluent application of burns using indirect ophthalmoscopic delivery is the preferred technique for ablation of the avascular retina in stage 3 ROP. Laser is preferable to cryotherapy because laser is associated with less inflammation and reduced stress on a very preterm baby.
Once retinal detachment occurs in stage 4 ROP, surgical treatment is needed; regardless, the visual outcomes are generally poor. Surgical options include scleral buckling or lens-sparing vitrectomy. Surgery aims to release vitreoretinal tractional components extending between the ridge and the anterior eye, the peripheral retina extending to the ora serrata, the optic disc, and the ridge creating “circumferential” traction. \(^4\) Vitrectomy is generally considered superior to scleral buckling alone for stage 4 ROP.\(^{3,11}\)

Kusaka et al. reported that postoperative vision in stage 4A ROP was better compared to stage 4B and stage 5 ROP.\(^{12,13}\) This very preterm baby in our study was able to fixate and follow objects after surgery. Long-term follow-up is needed to evaluate the improvement of the visual acuity in this patient. Choi et al. reported that the mean follow-up period of 5.6 years was conducted in the advanced stage of ROP with the vitrectomy procedure. It described that visual acuity measurement was required periodically due to the possibility of unfavorable outcomes despite achieving retinal attachment.\(^4\) Studies have also shown that myopia outcomes for premature babies commonly occur after surgeries (vitrectomy, number of laser spot counts).\(^{13,14}\) Therefore, as described in our case, follow-up for the next five years after surgery is required to detect refractive error and retinal attachment.

**CONCLUSION**

Regression and retinal attachment were achieved successfully in a very preterm baby with ROP by performing laser photocoagulation and vitrectomy; thus, blindness could be prevented in this case. Follow-up postoperatively is necessary periodically.

**CONFLICT OF INTEREST**

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

**FUNDING**

This study did not receive any funding or third-party support.

**AUTHOR CONTRIBUTION**

DEY examined and did the surgery for the patient. AC recorded the results of the examination. AC and DEY were involved in the concept, designing, and supervising the manuscript. Both authors agree for this final version of the manuscript to be submitted to this journal.

**REFERENCES**