Original Article

DOI: 10.14235/bas.galenos.2019.3412
Bezmialem Science 2020;8(2):170-4

Evaluation of Retinopathy of Prematurity: Four-year Follow-up Study in a Newly Established Tertiary Neonatal Intensive Care Unit in Turkey

Prematüre Retinopatisinin Değerlendirilmesi: Türkiye'de Yeni Kurulan Yenidoğan Yoğun Bakım Ünitesinde Dört Yıllık Takip Çalışması

Bilge TANYERİ BAYRAKTAR[1], Süleyman BAYRAKTAR[2], Zeynep MERİÇ[3], İbrahim Arif KOYTAK[4]

[1]Bezmialem Vakıf University Faculty of Medicine, Department of Neonatology, İstanbul, Turkey
[2]Haseki Training and Research Hospital, Clinic of Pediatric Intensive Care, İstanbul, Turkey
[3]Bezmialem Vakıf University Faculty of Medicine, Department of Pediatrics, İstanbul, Turkey
[4]Bezmialem Vakıf University Faculty of Medicine, Department of Opthalmology, İstanbul, Turkey

ABSTRACT

Objective: Retinopathy of prematurity (ROP) is one of the leading causes of childhood vision loss in both developed and developing countries. In this study, we aimed to assess the results of ROP screening and treatment, and to evaluate the risk factors in our newly established unit. We also compared our data with other studies reported in Turkey.

Methods: Two-hundred and forty eight (33.9%) infants were enrolled in ROP screening between January 2012-January 2016. The results of ROP screening and treatment, and the risk factors for ROP in infants followed up in a newly established neonatal intensive care unit were determined.

Results: ROP was observed in 25.8% of premature infants in different stages and zones. In the logistic regression analysis, we found an increased risk of ROP development in those patients with the following risk factors: Low gestational age [p=0.0001, odds ratio (OR)=0.73], sepsis (p=0.003, OR=0.57), and bronchopulmonary dysplasia (p=0.0035, OR=0.41).

Conclusion: Good antenatal care, improving unit conditions, and regular screening will decrease the ROP incidence in our facility to the level of developed countries. Hopefully, this will help to reduce the future sequelae of visual function loss in these patients. The awareness of the risk factors and the complications of ROP will decrease the incidence of the disease in unexperienced and newly organized NICUs.

Keywords: Retinopathy of prematurity, risk factors, Turkey, neonatal intensive care unit

ÖZ

Amaç: Prematüre retinopatisi (ROP) hem gelişmiş hem de gelişmekte olan ülkelerde çocukluk çağı görme kaybının önde gelen nedenlerinden biridir. Bu çalışmada, yeni kurulan ünitemizdeki ROP taraması ve tedavisinin sonuçlarını ve risk faktörlerini değerlendirmeyi amaçladık. Sonuçlarımızı Türkiye'de yapılan diğer çalışmalarla da karşılaştırdık.

Yöntemler: Ocak 2012-Ocak 2016 tarihleri arasında iki yüz kırk sekiz (%33,9) bebek ROP taramasına dahil edildi. Yeni kurulan yoğun bakım ünitesinde takip edilen bebeklerde ROP tarama ve tedavi sonuçları ile risk faktörleri belirlendi.

Bulgular: Prematüre bebeklerin %25,8'inde farklı evre ve bölgelerde ROP gözlendi. Lojistik regresyon analizinde, aşağıdaki risk faktörleri olan hastalarda artan ROP gelişme riski bulduk: Düşük gebelik yaşı (p=0,0001, OR=0,73), sepsis (p=0,003, OR=0,57) ve bronkopulmoner displazi (p=0,0035, OR=0,41).

Sonuç: Doğum öncesi iyi bakım, ünite koşullarının iyileştirilmesi ve düzenli tarama, ünitemizdeki ROP insidansını gelişmiş ülkeler seviyesine ulaştıracaktır. Umut ediyoruz ki bu da hastalarda görme fonksiyonlarının gelecekteki sekelini azaltmaya yardımcı olacaktır. Risk faktörleri ve komplikasyonlarla ilgili farkındalığın artması özellikle deneyimsiz ve yeni kurulan yenidoğan yoğun bakım ünitelerinde hastalığın görülme sıklığını azaltacaktır.

Anahtar Sözcükler: Prematürite retinopatisi, risk faktörleri, Türkiye, yenidoğan yoğun bakım ünitesi

Address for Correspondence: Bilge TANYERİ BAYRAKTAR, Bezmialem Vakıf University Faculty of Medicine, Department of Neonatology, İstanbul, Turkey
Phone: +90 532 737 32 15 **E-mail:** Bbayraktar@bezmialem.edu.tr **ORCID ID:** orcid.org/

Received: 21.06.2019
Accepted: 03.09.2019

Cite this article as: Tanyeri Bayraktar B, Bayraktar S, Meriç Z, Koytak IA. Evaluation of Retinopathy of Prematurity: Four-year Follow-up Study in a Newly Established Tertiary Neonatal Intensive Care Unit in Turkey. Bezmialem Science 2020;8(2):170-4.

Introduction

Retinopathy of prematurity (ROP) is a proliferative vitreoretinopathy characterized by the abnormal vascularization of retinal blood vessels in premature infants (1-5). It is an important cause of childhood blindness in countries with a high human development index and low socio-economic income (1-5). This disease occurs in different stages ranging from mild to severe. In addition to blindness, each year 2,300 newborns are influenced by the late sequelae, such as retinal detachment, myopia, and strabismus (2-4). In the first three years of life, premature infants face several types of strabismus or refractive errors. Therefore, premature infants require regular eye examinations whether or not they are diagnosed with ROP (6). Timely screening and treatment are crucial to the outcomes in these patients (1).

The prevalence of ROP remains high today due to the increasing survival rates of extremely low birth weight (BW) babies (4-7). Hitherto, there have been 3 epidemics of ROP. The first one occurred between 1940 and 1945 due to uncontrolled oxygen use. After the development of neonatal nursing, the second one developed between 1960 and 1970. The third one was reported in 1980 and still continues today (2,5,8). Low BW, low gestational age (GA), and oxygen therapy are among the factors responsible for ROP (6,9).

In this study, we aimed to assess the results of ROP screening and treatment, and to evaluate the risk factors for ROP in babies followed up in our newly established neonatal intensive care unit (NICU). We also compared our data with other studies reported in Turkey.

Methods

Study Design and Data Collection

This retrospective trial was conducted in the NICU at the …… Hospital in …., Turkey, between January 2012 and January 2016, using the unit's database. This study was approved by the local ethical board (22.06.2016/386). It was conducted in accordance with the ethical guidelines of the Declaration of Helsinki. The neonates included in this research had BWs of 1,500 grams or less, and/or GAs of 32 weeks or less. We also included larger infants with unstable clinical situations, based on the recommendations of the American Academy of Pediatrics, Academy of Ophthalmology, and American Pediatric Ophthalmology and Strabismus Academy (10). Seven-hundred and thirty-one premature infants were followed up during the study, and 248 of these were admitted into ROP screening programs. All of these were inborn patients.

The demographic characteristics of the patients, potential risk factors for ROP, eye examinations, and type and course of treatment were recorded. Those neonates who died before the ROP screening began were excluded from this research.

Screening Procedure

The ROP screening began at 4-6 weeks of age or between 31 and 33 weeks of age. One hour before the examination, 0.5% tropicamide and 2.5% phenylephrine HCl were applied to both eyes every five minutes for a total of 3 doses. After sufficient pupil dilatation was achieved, the eye examinations were completed with using eyelid speculums with a 28 D lens indirect ophthalmoscope under topical anesthesia (proparacaine HCL, 0.5%). Scleral indentation was used for the ocular rotation. All of the examinations and treatments were performed by the same ophthalmologist (A.K.) over the course of the study (four years). The infants were monitored during the examination, and were provided with 24% sucrose and a pacifier if analgesia was needed.

The ROP stage and zone classification were outlined for each eye using the International Classification of Retinopathy of Prematurity (ICROP) (11). The babies without ROP were followed up until they reached a 45-week GA, every 2-3 weeks, until the peripheral retinal vascularization fully developed. The infants with ROP were treated and followed up according to the criteria of the Early Treatment for Retinopathy of Prematurity Cooperative Group (12). These patients were treated with transpupillary diode laser photocoagulation and intravitreal bevacizumab, which was used in aggressive ROP cases.

Statistical Analysis

The statistical analysis of the data was performed using SPSS version 17 (SPSS Inc., Chicago, IL). Thet-test was used to analyze the continuous variables, whereas the chi-squared test was used for the categorical variables. The logistic regression analysis was conducted to define the variables that affected the development of ROP. A p value<0.05 was considered to be statistically significant.

Results

A total of 731 premature infants were monitored in the NICU during the four-year study period. Of these, 248 (33.9%) infants were enrolled in ROP screening; 119 (48%) females and 129 (52%) males. ROP was observed in 64 (25.8%) premature babies in different stages and zones. Of these patients, 36 (56.3%) had stage I, 17 (26.6%) had stage II, and 9 had (14.1%) stage III diseases. Aggressive ROP was detected in 2 (3.1%) patients; however, stages IV and V were not observed. The mean GA of the infants with ROP was 29.11±2.92 weeks (range=22-35 weeks), and the mean BW was 1224.57±474.54 g (range=485-2480 g). There was a statistically significant difference between the groups with and without ROP, according to the GA and BW (p=0.0001). The demographic features and risk factors for the babies with and without ROP are given in Table 1.

ROP regressed in 48 (75%) of the infants. Of the patients who were treated, the mean GA was 27.31±2.87 weeks, and the mean BW was 1015.00±331.15 g. The mean GA and BW in the treatment group were lower than those in the non-treated group, and the statistical difference was significant (p<0.005 and p<0.045, respectively). Diode laser photocoagulation and intravitreal bevacizumab were used in babies at rates of 18.8% (n=12) and 6.3% (n=4), respectively. There were no complications in either treatment modality.

We found a significant relationship between the GA, BW, respiratory distress syndrome (RDS), sepsis, intraventricular hemorrhage (IVH), patent ductus arteriosus (PDA), bronchopulmonary dysplasia (BPD), apnea, anemia, blood transfusion, oxygen therapy, and ROP by using the Chi-squared analysis (p value for each parameter = 0.0001, for apnea p = 0.013). However, there was no significant association between the gender, type of delivery, antenatal steroids, preeclampsia, multiple births, intrauterine growth restriction (IUGR), necrotizing enterocolitis (NEC), and ROP (p>0.05). In the logistic regression analysis, we found an increased risk of ROP development in those patients with the following risk factors: Low GA (p=0.0001, OR=0.73), sepsis (p=0.003, OR=0.57), and BPD [p=0.0035, odds ratio (OR)=0.41] (Table 2).

Discussion

ROP is one of the leading causes of childhood vision loss in both developed and developing countries (1-5). Recently, the increasing number of multiple pregnancies with assisted reproductive technology and the development of nursing care in the NICU have increased the incidence of ROP (6). According to the American Pediatric Ophthalmology and Strabismus Academy, 14,000 infants are diagnosed as having ROP in the US every year. Of these children, 1,100-1,500 exhibit severe forms of this disease, with 400-600 children going blind (2). However, the incidence is generally low in developed countries (13,14).

Table 1. Demographic features and the risk factors of the patients screened for ROP

Risk factor	ROP (+) (n=64)	ROP (-) (n=184)	p
GA (week)*	29.03±2.96	32.43±2.20	0.0001
BW (gram)*	1218.09±473.60	1852.46±571.18	0.0001
Gender (F/M)	29/35	90/94	0.62
Delivery mode (C/S)	55	154	0.67
Antenatal steroid	33	83	0.37
Preeklampsia	23	57	0.47
Twins	7	32	0.22
IUGR	5	3	0.44
RDS	70	45	0.0001
Sepsis	42	38	0.0001
NEC	6	2	0.97
IVH	18	10	0.0001
PDA	18	14	0.0001
BPD	19	2	0.0001
Apnea	13	16	0.013
Anemia	43	31	0.0001
Blood transfusion	30	12	0.0001

Abbreviations: ROP: Retinopathy of prematurity, GA: Gestational age, F: Female, M: Male, C/S: Caeserean section, IUGR: Intrauterine growth retardation, RDS: Respiratory distress syndrome, NEC: Necrotizing enterocolitis, IVH: Intraventricular hemorrhage, PDA: Patent ductus arteriosus, BPD: Bronchopulmonary dysplasia

Hwang et al. (15) reported that the incidence of ROP was 34.1% in Korea. In one study conducted in Northern Iran, incidence of ROP was 45% (16). Research conducted in Egypt found the incidence to be 36.5%, with the number of patients without follow up results being very high (17). The study by Öner et al. (18) reported a ROP incidence of 20.9%, with a mean GA of 31.35±3.5 weeks and a mean BW of 1,504.27±499.09 g. Additionally, Ekinci et al. (19) reported a 30.8% incidence of ROP, but the infants included in their study were larger premature babies. The incidence of ROP was 36.3% in the research conducted by Özbek et al. (20), who reported that 1.5% of the cases had stage V in their study group. In research from the middle of the Black Sea region, the incidence was reported as 30.8% (21). Moreover, Hanedar et al. (22) reported their ROP incidence as 23.7%. The ratio of ROP cases that required treatment was 8% in the trial conducted by Esen et al. (23). Furthermore, the ROP incidence was 56.8% in the study by Sönmez et al. (24). In our study, the prevalence of ROP was lower than the studies which screened for ROP in our country, but the incidence was higher than the studies conducted in developed countries.

A low GA, low BW, RDS, anemia, hyperbilirubinemia, apnea, IVH, NEC, oxygen therapy, and blood transfusion were the risk factors reported for ROP (6,25-27). The most important ones were a low BW and low GA (27-29). Hwang et al. (15) found PDA and invasive ventilation to be risk factors for ROP in cases with stage III or above disease. In a study from Iran, the main risk factors were identified as multiple births, a low BW, and oxygen therapy longer than 5 days (16). In the study by Yilmaz et al. (30) from our country, a low BW, low GA, ventilator use, and blood transfusion were the risk factors most commonly associated with the development of ROP. Ekinci et al. (19) showed that the BW, GA, and oxygen therapy were independent risk factors. However, Sönmez et al. (24) found that the GA, BW, phototherapy, RDS, mechanical ventilation, and continuous positive airway pressure (CPAP) support were risk factors for ROP, but multiple births, sepsis, and blood transfusion were not. A low GA, low BW, and blood transfusion were found to be risk factors for ROP in another study from Turkey (31).

Table 2. Multivariate Logistic Regression Analysis of Risk Factors for ROP

Risk factor	Wald	OR	95% CI (min-max)	P
GA	14.95	0.73	0.62-0.85	0.0001
Sepsis	8.57	0.57	0.39-0.83	0.003
BPD	4.42	0.41	0.18-0.94	0.035

Abbreviations: ROP: Retinopathy of prematurity, GA: Gestational age, BPD: Bronchopulmonary dysplasia, CI: Confidence interval, min: Minimum, max: Maximum

In our research, the risk factors of ROP were similar with recent studies: A low GA, low BW, RDS, sepsis, IVH, PDA, BPD, apnea, anemia, and blood transfusion were identified as risk factors. However, antenatal steroids were not protective against ROP. In our logistic regression analysis, we found that the GA, sepsis, and BPD were independent risk factors that influenced the development of ROP.

Peripheral retinal ablation with cryotherapy was determined to be the appropriate treatment based on the Cryotherapy for Retinopathy of Prematurity (CRYO-ROP) study (32). In 1999, the laser ablation criteria were identified by the Early Treatment for Retinopathy of Prematurity (ET-ROP) study, which found it to be more successful than cryotherapy (12). We also applied the ET-ROP criteria in our treatment plan. Diode laser photocoagulation (18.8%) was applied to those patients who underwent treatment, and no complications were observed during or after the treatment. In the study by Ekinci et al. (19), 6.2% of the cases were given laser treatment, and the success rate in that group of infants was 80%. In that study, the mean BW and GA of the treated babies were 1,249.8±334.2 g and 29.1±3.1 weeks, respectively (19). Beden et al. (21) treated 11% of the patients in their study, in which they evaluated babies with GAs of less than 37 weeks old. Moreover, Hanedar et al. (22) treated 28.8% of their patients, while the treatment rate was 8.6% in one study from the capital of Turkey (26).

The role of VEGF in the pathogenesis of ROP is well-understood. In 2004, the FDA approved the use of intravenous (IV) bevacizumab in the treatment of metastatic colon cancer. Since then, it has also been used in the field of ophthalmology in the treatment of proliferative retinal diseases (33). Bevacizumab was preferred in zone I or II disease stage 3 proliferative retinopathy (PR) plus (+) in the Bevacizumab Eliminates the Angiogenic Threat of Retinopathy of Prematurity (BEAT-ROP) study (34). However, the systemic absorption of the drug during treatment and the long-term effects on the baby are not known (35). Intravitreal bevacizumab may be preferred in aggressive zone I disease cases or those infants who are unable to tolerate the laser. In our patient group, 4 (6.3%) infants underwent intravitreal bevacizumab treatment, and no complications were seen during the treatment, follow-up, or after the application.

In this study, we aimed to determine the incidence, course, treatment outcomes, and risk factors for ROP in premature infants. Our results were within the acceptable limits for our country, although our NICU was newly established and consists of new residents and nurses with low levels of experience. With the increasing experience in the care of premature infants in the coming years, we hope the cases of ROP will decrease.

Study Limitations

Some limitations of our study should be noted. For example, this was a retrospective study with the related limitations. In addition, fluctuations in the oxygenation were not documented in our cases. Finally, the number of infants participating in our research was not as large as it could have been, because we included only inborn patients.

Conclusion

Not losing patients during the follow-up depends on how well informed the families are, as well as how closely the neonatal team follows the patients after discharge. Good antenatal care, improving NICU conditions, and regular screening, monitoring, and treatment will push the ROP incidence in our facility to the level of developed countries. Hopefully, this will help to reduce the future sequelae of visual function loss in these patients. The awareness of the risk factors and the complications of ROP will decrease the incidence of the disease in unexperienced and newly organized NICUs.

Ethics

Ethics Committee Approval: This study was approved by the local ethical board (22.06.2016/386).

Informed Consent: Obtained.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: B.T.B., Design: B.T.B., Z.M., Data Collection or Processing: B.T.B., Analysis or Interpretation: B.T.B, S.B., İ.A.K., Literature Search: BT.B., Writing: B.T.B.,

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

Acknowledgements: The authors would like to thank Ms.Monica Ann Malt for English editting and Ömer Uysal for statistical analysis.

References

1. Bas AY, Koc E, Dilmen U, ROP Neonatal Study Group. Incidence and severity of retinopathy of prematurity in Turkey. Br J Ophthalmol 2015;99:1311-4.
2. Broxterman EC, Hug DA. Retinopathy of prematurity: a review of current screening guidelines and treatment options. Missouri Medicine 2016;113:187-90.
3. Yonekawa Y, Thomas BJ, Thanos A, Tedorich B, Drense KA, Trese MT, et al. The cutting edge of Retinopathy of Prematurity care expanding the boundaries of diagnosis and treatment. Retina 2017;37:2208-25.
4. Sen P, Rao C, Bansal N. Retinopathy of Prematurity: An Update. Sci J Med & Vis Res Foun 2015;vol XXXIII:93-6.
5. Shah PK, Prabhu V, Karandikar SS, Ranjan R, Narendran V, Kalpana N. Retinopathy of prematurity: Past, present and future. World J Clin Pediatr 2016;5:35-46.
6. Zhu T, Zhang L, Zhao F, Qu Y, Mu D. Association of maternal hypertensive disorders with retinopathy of prematurity: A systematic review and meta-analysis. PLoS One 2017;12:e0175374.
7. Fang JL, Sorita A, Carey WA, Colby CE, Murad MH, Alahdab F. Interventions To Prevent Retinopathy of Prematurity: A Meta-analysis. Pediatrics 2016;137:e20153387.

8. Suelves AM, Shulman JP. Current screening and treatments in retinopathy of prematurity in the US. Eye and Brain 2016:837-43.
9. Yau GS, Lee JW, Tam VT, Liu CC, Yip S, Cheng E, et al. Incidence and Risk Factors of Retinopathy of Prematurity From 2 Neonatal Intensive Care Units in a Hong Kong Chinese Population. Asia Pac J Ophthalmol 2016;5:185-91.
10. Section on Ophthalmology American Academy of Pediatrics, American Academy of Ophthalmology, American Association for Pediatric Ophthalmology and Strabismus. Screening examination of premature infants for retinopathy of prematurity. Pediatrics 2006;117:572-6.
11. International Committee for the Classification Retinopathy of Prematurity. The international classification of retinopathy of prematurity. Arch Ophthalmol 2005;123:991-9.
12. Early Treatment for Retinopathy of Prematurity Cooperative Group. Final results of the early treatment for retinopathy of prematurity (ETROP) randomized trial. Trans Am Ophthalmol Soc 2004;102:233-50.
13. Goble RR, Jones HS, Fielder AR. Are we screening too many babies for retinopathy of prematurity? Eye 1997;11:509-14.
14. Gilbert C, Fielder A, Gordillo L, Quinn G, Semiglia R, Visintin P, et al. Characteristics of infants with severe retinopathy of prematurity in countries with low, moderate, and high levels of development: implications for screening programs. Pediatrics 2005;115:e518-25.
15. Hwang JH, Lee EH, Kim EA. Retinopathy of prematurity among very-low-birth-weight infants in Korea: incidence, treatment, and risk factors. J Korean Med Sci 2015;30:S88-94.
16. Rasoulinejad SA, Montazeri M. Retinopathy of prematurity in neonates and its risk factors: a seven year study in northern Iran. Open Ophthalmol J 2016;10:17-21.
17. Nassar MM. Screening for retinopathy of prematurity: a report from Upper Egypt. Int J Ophthalmol 2016;9:262-5.
18. Öner A, Özkırış A, Güneş T, Karaküçük S, Erkılıç K, Çetin N. Prematüre retinopatisi: 2 yıllık tarama sonuçlarımız. Erciyes Tıp Dergisi 2005;27:104-9.
19. Ekinci A, Akçakaya AA, Yaylalı SA, Sadıgov F. Prematüre retinopatisi: dört yıllık tarama sonuçlarımız. Okmeydanı Tıp Dergisi 2015;31:75-81.
20. Özbek E, Genel F, Atlıhan F, Güngör İ, Malatyalı R, Menteş J, ve ark. Yenidoğan yoğun bakım ünitemizde premature retinopatisi insidansı, risk faktörleri ve izlem sonuçları. İzmir Behçet Uz Çocuk Hast. Dergisi 2011;1:7-12.
21. Beden Ü, Demir S, Aygün C, Küçüködük Ş, Erkan D. Screening for retinopathy of prematurity (ROP) in the middle Black Sea region of Turkey. Turk J Pediatr 2012;54:223-9.
22. Hanedar A, Göncü T, Adıbelli FM, Çakmak A, Oğuz H. Prematüre retinopatisi tarama ve tedavi sonuçları. Harran Üniversitesi Tıp Fakültesi Dergisi 2015;12: 274-80.
23. Esen E, Erdem E, Yar K, Demircan N, Soylu M. Prematüre retinopatisi tarama sonuçlarımız: ideal tarama programı nasıl olmalı? Turk J Ophthalmol 2014;44:42-6.
24. Sönmez K, Özcan PY, İlhan B, Koçak Altıntaş AG. Yenidoğan yoğun bakım ünitesindeki bebeklerde prematüre retinopatisi sıklığı, gelişiminde etkili risk faktörleri ve tedavi sonuçları. Ret-Vit 2011;19:225-30.
25. Seiberth V, Linderkamp O. Risk factors in retinopathy of prematurity. Ophthalmologica 2000;14:131-5.
26. Küçükevcilioğlu M, Mutlu FM, Sarıcı SÜ, Ceylan OM, Altınsoy HI, Kılıç S, et al. Frequency, risk factors, and outcomes of retinopathy of prematurity in a tertiary care hospital in Turkey. Turk J Pediatr 2013;55:467-74.
27. Zengin N, Özer EA, Zengin MÖ, Türe G, Sütçüoğlu S, Talay E. Prematüre retinopatisi sıklığı ve risk faktörlerinin değerlendirilmesi. Çocuk Sağlığı ve Hastalıkları Dergisi 2014;57:87-96.
28. Günay M, Topçuoğlu S, Çelik G, Gürsoy T. Prematüre retinopatisi: sıklık azalıyor mu? Zeynep Kamil Tıp Bülteni 2013;44:214-20.
29. Mutlu FM, Altinsoy HI, Mumcuoğlu T, Kerimoglu H, Kiliç S, Kul M, et al. Screening for retinopathy of prematurity in a tertiary care unit in Turkey: frequency, outcomes, and risk factor analysis. J Pediatr Ophthalmol Strabismus 2008;45:291-8.
30. Yılmaz R, Ünüvar Ş, Karaaslan E, İnce DA, Demir S, Demir HD. Prematüre retinopatisi taraması yapılan elli dokuz bebeğin retrospektif değerlendirilmesi. Journal of Contemporary Medicine 2013;3:161-5.
31. Altunbaş HH, Kır N, Ovalı T, Dağoğlu T. Prematüre retinopatisi: klinik seyir ve risk faktörleri. T Oft Gaz 2002;32:286-90.
32. Cryotherapy for Retinopathy of Prematurity Cooperative Group. 15-year outcomes following threshold retinopathy of prematurity. Arch Ophthalmology 2005;123:311-8.
33. Micieli JA, Surkont M, Smith AF. A systematic analysis of the off-label use of bevacizumab for severe retinopathy of prematurity. Am J Ophthalmol 2009;148:536-43.
34. Mintz-Hittner HA, Kennedy KA, Chuang AZ. Efficacy of intravitreal bevacizumab for stage 3+ retinopathy of prematurity. N Engl J Med 2011;364:603-15.
35. Lien R, Yu MH, Hsu KH, Liao PJ, Chen YP, Lai CC, et al. Neurodevelopmental outcomes in infants with retinopathy of prematurity and bevacizumab treatment. PLoS One 2016;11:e0148019.