e-ISSN: 3023-6479

AOR

Volume: 2

Issue: 1

Year: 2025

Archives of Ophtalmological Research

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From the Editor; Starting the Second Year…

We have completed our first year with the scientific contributions of researchers and the devoted support of our referees. In the new year, we want to add up-to-date and higher-impact value studies to the literature by working more and producing more. Our aim is Journal of Archives of Ophthalmological Research to be included in the national publication indexes as soon as possible. In this process, your valuable contributions are very important for us to move forward together toward this goal.

With our deepest respects...

Prof. Dr. Uğur ACAR

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Original Article

DOI: 10.51271/AOR-0022

Relationship between retinal vein occlusion and ocular biometric parameters

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Cite this article: Öztürk C, Cevher S, Duran M. Relationship between retinal vein occlusion and ocular biometric parameters. *Arch Ophthalmol Res.* 2025;2(1):1-4.

Received: 24/10/2024 ◆ **Accepted:** 25/11/2024 ◆ **Published:** 07/01/2025

ABSTRACT

Aims: To compare the biometric characteristics of eyes with unilateral retinal vein occlusion (RVO) with unaffected eyes of patients and eyes of healthy participants

Methods: The affected eyes (group 1) and unaffected eyes (group 2) of 57 patients with unilateral RVO and the right eyes of 57 healthy participants (group 3) were included in the study. Axial length (AL), vitreous length (VL), anterior chamber depth (ACD) and lens thickness (LT) measurements by ultrasonic biometry were retrospectively analyzed.

Results: Mean AL was 22.61±0.89 mm in group 1, 22.93±0.88 mm in group 2 and 23.10±0.90mm in group 3. Mean AL was found to be lower in group 1 compared to both group 2 and group 3 ($p<0.001$, $p=0.005$, respectively). Mean VL values were 15.28±1.11 mm in group 1, 15.36±1.44 mm in group 2, and 15.97±1.01 mm in group 3. Mean VL was statistically significantly shorter in group 1 than both group 2 and group 3 ($p=0.026$ and $p=0.001$, respectively). Mean VL was statistically significantly lower in group 2 than in group 3 ($p=0.015$). In group 1, the mean ACD was 3.02±0.41 mm, in group 2 the mean ACD was 3.15±0.50 mm, and in group 3 the mean ACD was 3.01±0.32 mm. While the mean ACD of group 1 was lower than that of group 2 ($p<0.001$), there was no statistically significant difference between group 1 and group 3 and between group 2 and group 3 ($p=0.696$ and $p=0.092$, respectively). Mean LT was similar in all groups and no statistically significant difference was found between the groups ($p>0.05$)

Conclusion: Ocular causes of RVO may include short AL and short VL.

Keywords: Retinal vein occlusion, axial length, biometry, anterior chamber

INTRODUCTION

Retinal vein occlusion (RVO) is the second most common retinal vascular disease after diabetic retinopathy and causes unilateral vision loss.[1] According to the location of the occlusion, it is classified as central retinal vein occlusion (CRVO) and branch retinal vein occlusion (BRVO).[2] A comprehensive meta-analysis showed that the prevalence of CRVO was 0.13%, the prevalence of BRVO was 0.64% and the prevalence of BRVO was 0.64% worldwide in 2015. According to these prevalence results, it was calculated that approximately 28.06 million people were affected by RVO in 2015.[3]

Although the pathophysiology of CRVO is not well understood, several hypotheses have been proposed. One hypothesis for CRVO is that the central retinal vein is compressed and thrombosed by the atherosclerotic central retinal artery at the level of the lamina cribrosa.[4] In branch retinal vein occlusion, it has been shown that the thin-walled vein traveling in the common adventitial sheath in the arterio-venous transition areas is compressed and thrombosed between the retina and the artery with increased thickness due to atherosclerosis.[5] Many ocular and systemic risk factors have been identified for the development of RVO. Systemic risk factors such as atherosclerotic heart disease, diabetes mellitus, hypertension, hematological disorders causing thrombophilia, and oral contraceptive use have been associated with RVO.[6-8] Recent studies have shown many cases of RVO secondary to coronavirus 19 disease.[9] Previous studies have shown that ocular risk factors are glaucoma, hyperopia, and short axial length (AL).[10,11] Short axial length results in a narrow scleral canal and small lamina cribrosa holes. Stasis and thrombosis develop as nerve fibers and vascular structures pass through the lamina cribrosa.

This study aimed to investigate the ocular risk factors for RVO in patients with unilateral RVO by comparing AL, anterior chamber depth (ACD), vitreous length (VL), and lens thickness (LT) measurements in the affected eye with the patients' fellow eyes and healthy participants' eyes.

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METHODS

The medical records of 57 patients who were admitted to Hitit University Ophthalmology Clinic between January 2022 and December 2023 and diagnosed with RVO were retrospectively analyzed. The study was approved by the Hitit University Non-interventional Researches Ethics Committee (Date: 05.04.2024, Decision No: 2024-08) and was conducted in accordance with the tenets of the Declaration of Helsinki. The 57 eyes of the affected patients (group 1), 57 unaffected fellow eyes (group 2), and the right eye of a healthy control group of 57 patients (group 3) were included in the study. Age, sex, presence of ocular diseases and systemic diseases such as diabetes mellitus, hypertension, and atherosclerotic heart disease that may lead to RVO were investigated and recorded.

Detailed ophthalmological examinations of the patients and the control group were performed. The diagnosis of the patients was confirmed by fundoscopic findings such as tortuous vessels, intraretinal hemorrhages, soft exudates, and fundus fluorescein angiography. A-scan ultrasonography (Nidek AL-Scan) and optical coherence tomography (Triton, Topcon Corporation, Tokyo, Japan) were performed to assess the presence of macular edema in all patients and healthy controls. Before the A-scan ultrasound measurements, local anesthetic drops (0.5% proparacaine, Alcaine, Alcon **Pharmaceuticals**, Rijksweg, Belgium) were instilled in all patients and healthy subjects, and one minute after instillation, measurements were taken with an 11 MHz contact probe, applying minimal pressure to the cornea and facing the optical axis. During the measurement, the device took 10 consecutive measurements for AL, ACD, VL, and LT in series and provided results by averaging these measurements. The measurements were compared between the eyes of the patients with RVO, the unaffected fellow eyes of the patients, and the eyes of the healthy control group.

Patients with a previous diagnosis of retinal pathology (diabetic retinopathy, age-related macular degeneration, hereditary maculopathies), patients who had been treated for RVO, patients with a history of ocular surgery, and patients who developed macular edema during the course of the disease were excluded from the study as this may affect the ultrasound measurements.

Statistical Analysis

One-sample Kolmogorov-Smirnov test was used to assess the normality of the data distribution. Parameters with normal distribution were assessed using the within-group paired samples test and the between-group independent samples test, while parameters with non-normal distribution were assessed using the within-group Wilcoxon test and the between-group Mann-Whitney U test. The Chi-squared test was used for categorical parameters. Data are presented as mean and standard deviation from this value. $p<0.05$ was considered statistically significant. SPSS ver. 25.0 was used for statistical calculations.

RESULTS

The study included 57 eyes of 57 patients with RVO (group 1), 57 unaffected fellow eyes of patients (group 2), and 57 right eyes of 57 healthy participants (group 3). The mean age was 60.73 years in the patients with RVO and 59.86 years in the healthy subjects. While 30 of the patients with RVO were male and 26 were female, 31 of the healthy participants were male and 26 were female. There was no significant statistical difference in age and gender between patients with RVO and healthy subjects ($p=0.468$ and $p=0.706$, respectively). The presence of diabetes and hypertension was assessed in all participants and no difference in the prevalence of diabetes and hypertension was found between patients with RVO and the healthy control group ($p=0.895$ and $p=0.867$, respectively) (Table 1). Among the patients with RVO, the right eye was affected in 31 patients (54.4%), and the left eye was affected in 26 patients (45.6%), and there was no difference in laterality between the eyes ($p=0.508$). Of the patients with RVO, 30 were male (52.6%) and 27 were female (47.4%) and there was no statistically significant difference between the sexes ($p=0.611$). CRVO was observed in 18 patients and BRVO in 39 patients. The upper quadrant was involved in 28 patients and the lower quadrant was involved in 11 patients with BRVO.

Table 1. Demographic data of the patient and control group

	Patient group	Control group	p
Age	60.73±9.75	59.86±9.89	0.468
Gender (male/famele)	30/27	31/26	0.706
Diabetes mellitus, no (%)	19 (33.3%)	17 (29.8%)	0.895
Hypertension, no (%)	28 (49.12%)	29 (50.87%)	0.867

The mean AL was 22.61±0.89 mm in group 1, 22.93±0.88 mm in group 2, and 23.10±0.90 mm in group 3. The mean AL was lower in group 1 than group 2 and group 3 ($p<0.001$, $p=0.005$ respectively). There was no statistically significant difference in mean AL between group 2 and group 3 ($p=0.322$) (Figure 1).

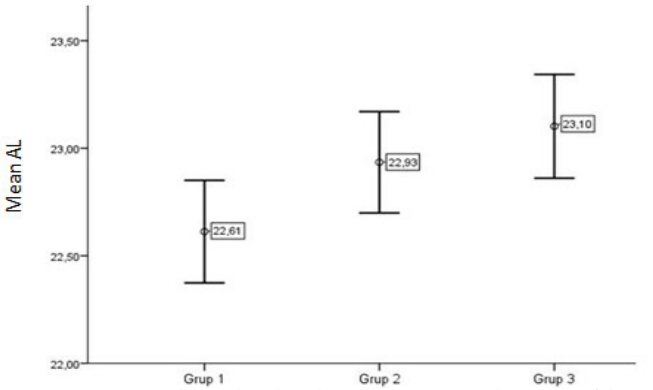

Figure 1. Mean axial length values between groups with 95% confidence interval

AL: Axial length

The mean VL was 15.28±1.11 mm in group 1, 15.36±1.44 mm in group 2, and 15.97±1.01 mm in group 3. The mean VL was statistically significantly shorter in group 1 than in group 2 and group 3 ($p=0.026$ and $p=0.001$, respectively). When comparing unaffected eyes, the mean VL was statistically significantly shorter in group 2 than in group 3 ($p=0.015$) (Figure 2).

The mean LT was 4.30±0.78 mm in group 1, 4.39±0.65 mm in group 2, and 4.26±0.68 mm in group 3. The mean LT was similar in all three groups and no statistically significant difference was observed in pairwise group comparisons ($p>0.05$).

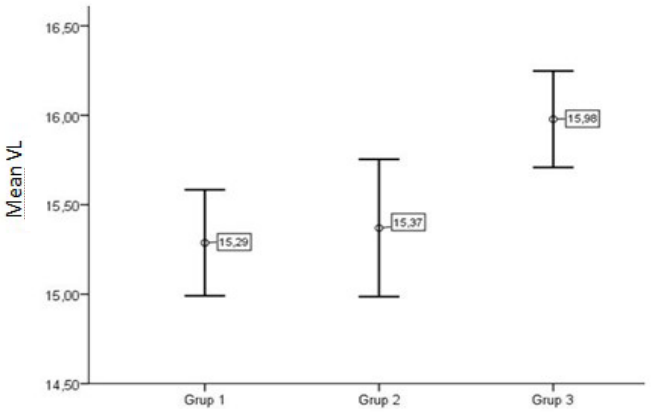

Figure 2. Mean vitreous length values between groups with 95% confidence interval

VL: Vitreous length

The mean ACD was 3.02±0.41 mm in group 1, 3.15±0.50 mm in group 2, and 3.01±0.32 mm in group 3. The mean ACD of group 1 was statistically significantly lower than group 2 (p<0.001). However, there was no significant statistical between group 1 and group 3 and between group 2 and group 3 (p=0.696 and p=0.092, respectively) (Table 2).

DISCUSSION

RVO is a globally prevalent disease leading to visual loss. The epidemiology of the disease has been investigated in previous population-based studies and large meta-analyses. The prevalence of RVO was 0.7% in females and 0.6% in males (p=0.59), while the prevalence of CRVO was 0.1% in females and 0.2% in males (p=0.71) in the Beaver Dam eye study published by Klein et al.[12] In this study, no statistically significant difference was found between right and left eyes in patients with RVO (p=0.72). The prevalence of RVO was 1.6% in both men and women in the study by Mitchell et al.[13] using data from the Blue Mountains eye study. In our study, there was no significant statistical difference in gender and laterality in patients with RVO (p=0.508 and p=0.611, respectively).

Although systemic hypertension, older age, atherosclerosis, and diabetes mellitus have been shown in previous studies as risk factors for RVO, mechanical factors are also thought to play a role in the pathophysiology of the disease.[2] Previous studies have shown that short AL measurements may be a risk factor for RVO. Ghoghari et al.[15] reported that the mean AL of the affected eyes of 35 patients with RVO was 0.80 mm shorter than the mean AL of 35 eyes of the healthy control group (p=0.01). Szigeti et al.[16] studied the affected eyes of 40 patients with RVO, unaffected fellow eyes, and the right eyes of 40 healthy subjects. Mean AL was 22.99±0.56 mm in eyes with RVO, 23.09±0.51 mm in unaffected fellow eyes, and 23.48±0.68 mm in healthy subjects' eyes. While the mean AL of the healthy subjects' eyes was found to be statistically significantly higher than both the eyes with RVO and the fellow eyes (p=0.001 and p=0.005, respectively), no statistically significant difference in AL was found between the eyes with RVO and fellow eyes of the patients (p=0.052). Another study by Çiloğlu et al.[17] compared 49 patients with CRVO, 71 patients with BRVO, and healthy subjects. While there was no statistically significant difference in AL between the eyes with CRVO and BRVO and the unaffected fellow eyes of the patients (p=0.064 and p=0.104, respectively), the mean AL of the eyes of the healthy subjects was significantly higher than the AL of the eyes affected by CRVO and BRVO (p=0.0001 and p=0.0004, respectively). There are also studies in the literature with different results. Vural et al.[18] found that the mean AL of 31 eyes with CRVO was 23.14±0.86 mm, the mean AL of 42 eyes with BRVO was 23.24±0.82 mm, and the mean AL of 41 healthy eyes in the control group was 23.38±0.87 mm, and there was no statistically significant difference between the groups (p=0.460). Longo et al.[19] analyzed 39 eyes of patients with CRVO, the patients' fellow eyes, and the eyes of 39 healthy subjects and found no statistically significant difference in AL between the groups (p=0.069). In our study, the mean AL was 22.61±0.89 mm in eyes with RVO (group 1), 22.93±0.88 mm in the unaffected fellow eyes (group 2), and 23.10±0.90 mm in the eyes of the healthy participants (group 3). The mean AL was statistically significantly lower in group 1 than in group 2 and group 3 (p<0.001, p=0.005, respectively). There was no statistically significant difference in mean AL between group 2 and group 3 (p=0.322). These results suggest that RVO may be caused not only by systemic diseases but also by ocular effects. In the short AL, the flow in the retinal vein is slowed down due to the narrowing of the lamina cribrosa and the scleral canal through which the retinal vein and the retinal artery pass. It has been suggested that this slowing of blood flow may predispose to thrombus formation in areas of arteriovenous compromise with narrowing of the venous lumen.[20] This study showed that AL has statistically effect on RVO. However, it is difficult to show that this difference is clinically significant and has a cut-off value.

Szigeti et al.[16] reported that VL values in the eyes of patients with RVO were significantly lower than both the patients' fellow eyes and the eyes of healthy subjects (p<0.001). There was no significant difference in VL between healthy and fellow eyes (p=0.709). In our study, group 1 was significantly shorter than group 2 and 3 in mean VL (p=0.026 and p=0.001 respectively) and, group 2 was significantly lower than group 3 in mean VL (p=0.015).

The relationship between RVO and ACD has also been investigated in previous studies. Wu et al.[21] reported that the mean ACD in the eyes with CRVO of 24 patients was 2.43±0.45 mm and the mean ACD of the fellow eyes was 2.55±0.46 mm (p<0.001). Coşkun et al.[11] analyzed the eyes of 25 patients with RVO, the fellow eyes of 25 patients,

Table 2. Comparison of biometric values of the groups

	Group 1	Group 2	Group 3	p group1 vs group 2	p group 1 vs group 3	p group 2 vs group 3
AL	22.61±0.89	22.93±0.88	23.10±0.90	<0.001	0.005	0.322
VL	15.28±1.11	15.36±1.44	15.97±1.01	0.026	0.001	0.015
LT	4.30±0.78	4.39±0.65	4.26±0.68	0.349	0.863	0.402
ACD	3.02±0.41	3.15±0.50	3.01±0.32	<0.001	0.696	0.092

AL: Axial length, VL: Vitreus length, LT: Lens thicknes, ACD: Anterior chamber depth

and the eyes of 26 healthy subjects. The ACD was higher in the control group than in the eyes with RVO and in the fellow eyes (p<0.001). There was no statistically significant difference between the fellow eyes of the patients and the eyes with RVO (p=0.918). Contradictory results have been reported. The studies by Vural et al.[18] and Szigeti et al.[16] found no statistically significant difference in ACD between the eyes of patients with RVO, fellow eyes of patients and the eyes of the control group. In our study, the mean ACD of Group 1 was statistically significantly lower than group 2 (p<0.001). No statistically significant difference was found between group 1 and group 3, and between group 2 and group 3 (p=0.696 and p=0.092, respectively). The presence of a short VL and a narrow ACD in eyes with RVO supports the theory of mechanical thrombus formation in the retinal vein that we mentioned above.

One of the main risk factors for RVO is older age. The prevalence of the disease increases with age. An increase in LT is also observed with the development of cataract in older age. Therefore, it is difficult to say that LT is one of the mechanical factors that may play a direct role in the development of RVO due to the introduction of age-related confounding factors. In our study, there was no statistically significant difference in LT between the groups.

Limitations

Our study also has many limitations. As it was a retrospective study, it was not possible to assess the presence of hematological diseases that may predispose to thrombosis and the medications used by the patients. Although the number of patients was determined according to the power analysis, the power of the study was affected by the fact that the study was not conducted with a larger number of patients.

CONCLUSION

Our results suggest that short AL is a risk factor for the development of RVO. However, it should be noted that ocular and systemic factors should be considered in the development of the disease. Further studies with more patients with RVO and control groups should be performed.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Hitit University Non-interventional Researches Ethics Committee (Date: 05.04.2024, Decision No: 2024-08).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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Archives of
Ophtalmological Research

Original Article

DOI: 10.51271/AOR-0023

Evaluation of the long-term efficacy of intravitreal bevacizumab in retinopathy of prematurity

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Cite this article: Harbalıoğlu Y. Evaluation of the long-term efficacy of intravitreal bevacizumab in retinopathy of prematurity. *Arch Ophthalmol Res.* 2025;2(1):5-8.

Received: 03/11/2024 ◆ **Accepted:** 28/11/2024 ◆ **Published:** 07/01/2025

ABSTRACT

Aims: To evaluate retinal vascularization following intravitreal bevacizumab (IVB) treatment in infants diagnosed with retinopathy of prematurity (ROP).

Methods: The study retrospectively evaluated patients diagnosed with type 1 ROP and aggressive ROP (A-ROP) who received treatment between 2021 and 2024. The analysis included gestational age at birth, birth weight, weeks of post-gestational treatment, timing of retinal vascularization, recurrence of ROP, and the need for additional treatments.

Results: In total, 30 infants were included in the study, with a total of 58 eyes evaluated. Intravitreal bevacizumab injection at a dose of 0.625 mg (0.025 ml) was administered to all 58 eyes. The average birth weight of the preterm infants was 1178±509 grams (ranging from 500-2790) and their average gestational age was 28.2±2.7 weeks (ranging from 23-34 weeks). The average gestational age of the preterm infants at the time of receiving intravitreal bevacizumab treatment was 36.6±2.1 weeks (range: 32-39), while the average duration of follow-up post-treatment was 29.5±4.3 weeks (range: 21-37) after treatment. After treatment, ROP findings showed significant regression, and plus disease regressed in 93.3% of the cases. Additional laser photocoagulation was done in four eyes of two cases. The mean week for complete retinal vascularization was 61.9±3.5 (range 55-67) weeks.

Conclusion: Intravitreal bevacizumab monotherapy achieves high rates of regression in cases of type 1 ROP and aggressive ROP (A-ROP). Furthermore, complete retinal vascularization can be attained during the follow-up period.

Keywords: Retinopathy of prematurity, aggressive retinopathy of prematurity, type 1 retinopathy of prematurity, intravitreal bevacizumab, retinal vascularization, laser photocoagulation

INTRODUCTION

Retinopathy of prematurity (ROP) condition is considered among the top three causes of childhood blindness which can be prevented in many countries.[1] The incidence of ROP has, however, worsened in the past decade because of the advancements in managing and supporting the survival of preterm infants.[2] This condition's development is predominantly influenced by low birth weight and advanced prematurity.[3] In ROP, visual sequelae, including total loss of vision, can develop if adequate follow-up and treatment processes are not implemented. To aid in the assessment of ROP and in directing any necessary follow-up or treatment actions, a system of classification has been introduced.[4] ROP is, therefore, classified in the light of three zones demarcating retinal involvement, clock hours bearing extent, and five stages indicating severity. Also employed are expressions like plus disease (which involves venous dilation and increased tortuosity of arteries), pre-threshold stage, and threshold stage for patients who need treatment urgently. As an uncommon yet the most destructive subtype, aggressive retinopathy of prematurity (A-ROP) does not adhere to the classical developmental stages.[5] In the early stages of A-ROP, all of the posterior pole vessels predominantly exhibit significant dilatation and tortuosity. It typically presents in posterior zones (Zone I and posterior Zone II) and can cause blindness if left untreated.[6]

The treatment of ROP is guided by the criteria established by the early treatment for retinopathy of prematurity (ET-ROP) study group. Treatment is permitted only for type 1 ROP cases, which include: ROP at any stage in zone 1 including when plus disease is present; in zone 1 without plus disease, at stage 3 ROP; and in zone 2 with plus disease, at stages 2 and 3 ROP. Based on the ET-ROP data, laser photocoagulation (LP) continues to be the gold standard for ROP treatment.[7] However, despite achieving anatomical success with LP, visual outcomes can be particularly limited in cases of ROP that involve the posterior region.[8,9] According to the Bevacizumab eliminates the angiogenic threat of ROP (BEAT-ROP) study, intravitreal bevacizumab (IVB) (0.625

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mg/0.025 ml) is more effective than laser photocoagulation for cases of zone 1 retinopathy of prematurity.[10] In the current study, the records of ROP cases treated in our clinic with IVB injection (0.625 mg/0.025 ml) were retrospectively examined to investigate treatment effectiveness and retinal vascularization completion times.

METHODS

This study involved 58 eyes from 30 preterm infants with retinopathy of prematurity who were followed up at a Training and Research Hospital in Samsun from 2021 to 2024, in whom type 1 ROP and A-ROP were observed, and intravitreal bevacizumab injection was applied. Approval from the Ondokuz Mayıs University Clinical Researches Ethics Committee was obtained (Date: 26.09.2024, Decision No: OMÜ KAEK 2024/381). The principles of the Declaration of Helsinki were considered when carrying out this research.

At our hospital, ROP screening is routinely performed for all preterm infants born with a birth weight below 1500 grams (g) and/or a gestational age of less than 32 weeks. Additionally, all at-risk cases with a birth weight exceeding 1500 grams or a gestational age greater than 32 weeks who were referred to our department, as well as all preterm infants who received cardiopulmonary support therapy, are routinely screened. Diagnosis and follow-up procedures were carried out following the recommendations of the American Academy of Pediatrics published in 2013[11] and the ROP Guidelines of the Turkish Neonatology and Ophthalmology Societies.[12] The criteria established by the International Committee for the Classification of Retinopathy of Prematurity (ICROP)[5] were utilized for the diagnosis of A-ROP. Accordingly, A-ROP typically affects zone I but less commonly zone II, does not follow the classic stages, and is accompanied by plus disease. In addition to peripheral retinal involvement, widespread venous dilatation and arterial tortuosity are observed throughout the retina. Besides, A-ROP may be accompanied by widespread neovascularization, arteriovenous shunt vessels, vitreous haze, and hemorrhage, as well as pupillary rigidity may also be present.

The exclusion criteria included patients who had initially undergone laser treatment, received treatment at another center or had been diagnosed with stage 4A, 4B, or 5 ROP at the first screening. Data were collected from the medical records of the ROP cases included in this study such as birth weeks (BW), birth weights (BWt), time of ROP onset, presence of A-ROP, the start of initial treatment, post-treatment follow-up duration, time to complete retinal vascularization, and the need for additional treatment. All initial and follow-up examinations of the cases were performed using a binocular indirect ophthalmoscope.

IVB injections (0.625 mg/0.025 ml) at a dose of 0.625 mg/0.025 ml (Avastin, produced by Genentech Inc., San Francisco, California, USA) were administered to 58 eyes of 30 preterm infants. All injections were performed in a surgery suite. After positioning the patients on the operating table, ocular anesthesia was applied using topical anesthetic drops under the supervision of a pediatric anesthesiologist. The patients' eyelids and eyelashes were cleansed with 10% povidone-iodine and covered with a sterile drape. Following the insertion of a lid speculum, the conjunctiva was sterilized for 3 minutes with 5% povidone-iodine. Intravitreal injection was performed with a 30-gauge insulin syringe, 1-1.5 mm posterior to the temporal limbus. After injection application, topical moxifloxacin 0.5% (Vigamox®, Alcon, Turkiye) antibiotic treatment was administered five times daily for one week.

Follow-up of the Cases

The cases were monitored at 1, 3, and 7 days post-injection for ROP monitoring and possible complications. Subsequently, until complete retinal vascularization was achieved, the cases were monitored every two weeks during the first three months, followed by check-ups every three to four weeks. Regression was considered as a reduction in plus disease signs and the stages of ROP. Reactivation was considered as the reappearance of plus disease signs and the development of classic ROP stages, and recurrences were managed using LP and IVB. On the other hand, complete retinal vascularization was considered as the extension of retinal vessels reaching the ora serrata. The observations were conducted using binocular indirect ophthalmoscopy with the aid of 360-degree scleral indentation.

RESULTS

Of the preterm infants, 19 (63.3%) were girls, while 11 (36.6%) were boys. Intravitreal bevacizumab (0.625 mg/0.025 ml) injections were administered to 58 eyes of 30 preterm infants. The mean birth weight of the cases was 1178±509 (500-2790) grams, and the mean gestational weeks was 28.2±2.7 (23-34). The average post-gestational weeks when intravitreal bevacizumab treatment was administered was 36.6±2.1 (32-39) weeks with an average post-treatment follow-up period of 29.5±4.3 (21-37) weeks (Table 1).

Table 1. Demographic data of ROP cases treated with IVB

Parameter	Value
Gender (F/M)	19/11
Infant/eye	30/58
Mean birth weight in grams (±SD)	1178±509
(min-max)	(500-2790)
Mean gestational weeks (±SD)	28.2±2.7
(min-max)	(23-34)
Week of treatment initiation (mean±SD)	36.6±2.1
(min-max)	(32-39)
Proportion of cases diagnosed with A-ROP	40%
Follow-up period after treatment (weeks, mean±SD)	29.5±4.3
(min-max)	(21-37)
Time to complete vascularization (weeks, mean±SD)	61.9±3.5*
(min-max)	(55-67)
Proportion of cases requiring reactivation and additional treatment	6.7%

*Cases in which vascularization was completed, ROP: Retinopathy of prematurity, IVB: Intravitreal bevacizumab, SD: Standard deviation, Min: Minimum, Max: Maximum, A-ROP: Aggressive retinopathy of prematurity

A significant proportion of the cases showed regression in ROP symptoms after treatment, and plus disease regressed in 93.3% of the cases. Twelve patients were diagnosed with A-ROP, accounting for 40% of the patients. Only two patients needed further treatment for recurrence, representing 6.7% of the cases. Both of these patients had an initial diagnosis of A-ROP. Additionally, the rate of A-ROP diagnosis was

higher among females compared to males. The average vascularization time was 62.8 weeks for preterm infants diagnosed with A-ROP and 61.3 weeks for those type 1 ROP diagnosis. Among females, the average vascularization time was 62.6 weeks, while for males, it was 60.7 weeks (Table 2) and no statistically significant differences were found (p>0.05). The differences in vascularization times between preterm infants with A-ROP and type 1 ROP diagnosis were not statistically significant (p=0.226). Accordingly, being diagnosed with A-ROP did not lead to a significant difference in vascularization times.

Table 2. Vascularization times by A-ROP diagnosis and gender

		Gender		
		Female	Male	Total
Diagnosed with A-ROP	Yes	7	5	12 (62.83)*
	No	12	6	18 (61.33)*
Total		19	11	30
Vascularization time		62.63	60.73	61.96*

*: Time to complete vascularization (weeks), A-ROP: Aggressive retinopathy of prematurity

DISCUSSION

This study evaluated IVB treatment and retinal vascularization in patients diagnosed with type 1 ROP and A-ROP, along with their demographic characteristics. The findings showed regression in 93.3% (n=28) of patients after a single dose of IVB treatment following the diagnosis of ROP. In the two patients who did not show regression, positive outcomes were achieved after additional laser treatment. The absence of negative outcomes in any of the cases and the high rate of regression suggest that IVB treatment works effectively for cases of ROP.

Today, one therapy option is to apply laser to the avascular peripheral retina, an approach whose efficacy has been clinically demonstrated. Although this treatment has proven effective, it also bears serious complications. Laser treatment only works in roughly half of instances, especially when Zone I ROP is present, and even in successful cases, its efficacy is overshadowed by significant visual field losses and myopia.[13-16] In zones I and II, the BEAT-ROP research showed that a 0.625 mg dose of IVB was successful in treating stage 3 ROP.[17] Although the BEAT-ROP study has its limitations, it yields promising outcomes for ophthalmologists regarding the future of ROP treatment.

A big challenge in anti-VEGF treatment for ROP is determining the timing and extent of retinal vascularization completion. Our findings revealed that retinal vascularization slows down compared to physiological vascularization following IVB treatment in ROP cases. Clinically, complete retinal vascularization refers to retinal vessels reaching the temporal ora serrata. The average time to achieve complete vascularization in the current study was 61.9 weeks. However, demonstrating complete vascularization through angiography might have provided more meaningful results. According to the BEAT-ROP research, the average time needed for complete vascularization had been observed to be 19.5 weeks post-treatment.[18] In our study, on the other hand, this time was 25.9 weeks. Sukgen et al.[19] reported that the average time for complete vascularization in ROP cases with IVB treatment of 0.625 mg was 55.9 weeks. Spandau et al.,[20] however, observed an average time of 65 weeks to achieve complete vascularization.

Despite complete regression has been reported in all cases of A-ROP with intravitreal bevacizumab treatment, recurrence can still occur in the following periods. Yetik et al.[21] showed that post-treatment recurrence occurs at an earlier stage and with greater frequency in all patients with A-ROP compared to classic ROP conditions. Therefore, effective follow-up of these cases is essential. In this study, the recurrence rate following IVB monotherapy was found to be 6.7%, with both patients diagnosed with A-ROP. Martinez- Castellanos et al.[22] evaluate 672 ROP cases to which IVB was applied between 2005-2017; they have observed recurrence requiring treatment in 6.8% of cases. In our study, LP was administered as an additional treatment. Yetik et al. achieved success with a second IVB injection in three of the five (8.1%) cases with recurrence, while a third IVB injection was needed for the remaining two cases. Nicoara et al.[23] achieved regression in three of the five (14.7%) cases that developed recurrence by applying LP after IVB. When recurrence is observed in ROP cases involving zone I, posterior ROP, and A-ROP following anti-VEGF monotherapy, LP is recommended as a second treatment if vascularization has progressed to zone II, whereas additional anti-VEGF therapy is suggested if vascularization remains in zone I.[24] In our study, since the vascularization was had reached zone II in both patients, we administered laser photocoagulation therapy to treat the recurrence.

In a comprehensive study Çömez et al.[25] identified recurrence in 38 (14.8%) of 257 eyes. Furthermore, they determined recurrence in 32 (20.8%) of 154 eyes with A-ROP and in 6 (5.8%) of 103 eyes with type 1 ROP, all of which were treated with laser photocoagulation. This treatment resulted in the resolution of ROP and plus disease symptoms in all eyes. However, a second recurrence detected in 6 eyes (2.3%) after LP, necessitating repeated IVB injections, which subsequently resulted in the resolution of ROP findings in all affected eyes.

CONCLUSION

This study demonstrates the effectiveness of IVB treatment in cases of type 1 ROP and A-ROP. Since it does not require general anesthesia, can be applied quickly, does not cause retinal ablation, and does not prevent peripheral vascularization, it is considered the first-line treatment option, particularly in A-ROP cases that require urgent treatment. However, the safety outcomes of IVB treatment for retinopathy of prematurity should be evaluated further in larger clinical research.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Ondokuz Mayıs University Clinical Researches Ethics Committee was obtained (Date: 26.09.2024, Decision No: OMÜ KAEK 2024/381).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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Archives of
Ophtalmological Research

Original Article

DOI: 10.51271/AOR-0024

Assessing the informational quality of TikTok videos on refractive surgery: a comparative study

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Cite this article: Reyhan AH, Berhuni M, Uzun İ, Mutaf Ç, Eryavuz M. Assessing the informational quality of TikTok videos on refractive surgery: a comparative study. *Arch Ophthalmol Res*. 2025;2(1):9-13.

Received: 06/11/2024 ◆ **Accepted:** 09/12/2024 ◆ **Published:** 07/01/2025

ABSTRACT

Aims: Evaluate the quality and reliability of TikTok videos on refractive surgery (LASIK, PRK, SMILE), comparing content from healthcare professionals and patients, and assess TikTok's role in disseminating ophthalmological information.

Methods: Analyzed 200 TikTok videos (98 by physicians, 102 by patients) using DISCERN, JAMA, and Global Quality Score (GQS). Recorded and compared view count, likes, comments, and video length. Examined correlations between these metrics and quality scores.

Results: Mean DISCERN, JAMA, and GQS scores for all videos were 44±13.2, 2.27±0.94, and 2.86±1.22, indicating moderate quality. Physician-uploaded videos scored higher on all measures. Strong positive correlation between video length and quality scores. Strong negative correlation between engagement metrics (views, likes, comments) and DISCERN scores. Physician videos had higher view counts, longer durations, and more comments, while patient videos received more likes.

Conclusion: TikTok videos on refractive surgery generally show moderate quality and reliability. Content from healthcare professionals is superior in quality and informativeness. However, higher engagement does not equate to better information quality. These findings underscore the necessity for patients to critically evaluate social media content when seeking information on refractive surgery. Larger, comprehensive studies are needed for more definitive insights. The results guide patients in making informed decisions and help healthcare professionals develop effective social media strategies for disseminating accurate ophthalmological information.

Keywords: Refractive surgery, TikTok, health information quality

INTRODUCTION

Social media platforms are playing an increasingly important role in the dissemination of health information.[1] Short video-sharing platforms such as TikTok have become popular sources for users seeking information on various health topics.[2] In the field of ophthalmology, both patients and healthcare professionals are using these platforms to share and obtain information.

Techniques such as laser-assisted in situ keratomileusis (LASIK), photorefractive keratectomy (PRK), and small incision lenticule extraction (SMILE) are widely used in refractive surgery and are attracting significant interest from patients.[3] Access to accurate and reliable information about these procedures is crucial if patients are to make informed decisions.

Recent years have seen an increase in research focusing on the quality and reliability of health-related content on social media platforms.[4] However, studies specifically evaluating the content related to refractive surgery on TikTok are limited. In order to address this gap, this study set out to evaluate the quality and reliability of TikTok videos related to refractive surgery.

This research examined videos shared on TikTok using popular hashtags such as #lasik, #prk, and #smile. It involved a comparative analysis of videos uploaded by physicians and patients, evaluating factors such as content quality, number of views, likes, and comments. Additionally, the quality of information in these videos was assessed using standard evaluation systems such as DISCERN, the Journal of the American Medical Association (JAMA) score, and the Global Quality Score (GQS).

The objective of this study was to assess the quality and reliability of information about refractive surgery on TikTok, to highlight the differences between content shared by healthcare professionals and patients, and to elucidate the role of this platform in the dissemination of ophthalmological information. The findings will provide valuable insights that

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can help patients make more informed decisions and guide healthcare professionals in their social media strategies.

METHODS

The videos were evaluated and scored in a double-blind manner by two experienced ophthalmologists (A.H.R and M.E). This study did not require ethical approval as it did not involve any human subjects or animal experiments. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This study evaluated excimer laser surgery videos on TikTok. The videos were identified using popular hashtags including #refractivesurgery and #lasereyesurgery. Additional content was located through searches of common terms such as 'LASIK,' 'PRK,' and 'SMILE LASER.' The videos were uploaded on 1 March 2024. In order to prevent new videos from appearing in the hashtag, all data collection was performed according to the downloaded videos.

Only videos in English were included in the study. Videos shorter than 15 seconds and duplicates were eliminated. The 200 videos with the highest view counts were selected. The video sources were categorized into two main groups based on the characteristics of the content creators: patient-generated and physician-authored videos. The number of views, video length, number of likes, number of comments, time since upload (age), and viewing rate (view count/day) were recorded for each video.

All videos were scored using DISCERN, JAMA, and GQS. DISCERN is a scoring system which consists of 16 questions in three parts developed by Oxford University and that measures the informative quality and reliability of videos (Table 1).[5] DISCERN system scores range from 15 to 75 and are classified as excellent (63-75 points), good (51-62 points), reasonable (39-50 points), poor (27-38 points), or very poor (15-26 points). The JAMA scoring system evaluates the quality of information in health-related videos. As shown in Table 2, it contains four criteria, each scored 0 or 1, with 4 points indicating high quality.[6] GQS is a scoring system which evaluates the general quality of videos (Table 2).[7] The scoring range is between 1 and 5 points, with 1 indicating the lowest quality and 5 indicating the highest.

The patient education materials assessment tool for audiovisual materials (PEMAT-A/V) is a validated tool used to assess the understandability and actionability of audiovisual patient education materials, such as TikTok videos involving refractive surgery. It consists of 13 binary criteria, 10 of which evaluate understandability and three actionability, yielding a total score that reflects the video's educational quality (Table 3). Higher scores indicate more effective communication of key messages and actionable information to viewers.[8,9]

Statistical Analysis

Statistical analyses were conducted on SPSS version 21.0 software (statistical packages for social sciences; SPSS Inc., Chicago, IL, USA). Compliance with normal distribution was evaluated using the Shapiro Wilk test. Measurable data which met parametric conditions were expressed as mean ±standard deviation. For measurable data which did not meet parametric conditions, the distribution was expressed

Table 1. Descriptive characteristics of the analyzed videos (n=200)

Variables	Value
View count (n)[a]	151250 (2300-32400000)
Video length (sec)[a]	43 (15-278)
Like (n)[a]	4527 (94-6100000)
Comment (n)[a]	114 (3-22600)
View rate[a]	585 (10-937500)
Age (day)[b]	428 (±330)
Source of the video, n (%)	
Doctor	98 (49)
Patient	102 (51)
Keyword, n (%)	
LASIK	92 (46)
PRK	67 (33.5)
Smile	41 (20.5)
DISCERN[b]	
Reliability	23.8 (±6.8)
Treatment choices	20.1 (±6.74)
Overall quality score	2.35 (±1.05)
Total score	44 (±13.2)
PEMAT-AV score[b]	
Understandability (%)	72.8 (±22)
Actionability (%)	55.8 (±30.8)
JAMA total score[b]	2.27 (±0.944)
GQS total score[b]	2.86 (± 1.22)

DISCERN: Quality criteria for consumer health information, GQS: Global quality score, JAMA: Journal of the American Medical Association, PEMAT: Patient education materials assessment tool, Not normally distributed data is given as median (range), Normally distributed data are given as mean (±standard deviation)

Table 2. Comparison of the data between groups with and without a doctor as the video source

Variables	Physicians (n=98)	Patient (n=102)	p
View count (n)[a]	110600 (2300-11500000)	220350 (12800-32400000)	0.091
Video length (sec)[a]	47 (15-278)	37 (15-145)	0.005
Like (n)[a]	2296 (94-1400000)	8803 (209-6100000)	0.005
Comment (n)[a]	84 (3-15900)	156 (3-22600)	0.018
View rate[a]	495 (10-200000)	608 (18-937500)	0.326
Age (day)[b]	379.14 (±271.476)	475.3 (±373.474)	0.230
DISCERN[b]			
Reliability	27.34 (±5.818)	20.47 (±5.933)	<.001
Treatment choices	23.70 (±6.163)	16.69 (±5.347)	<.001
Overall quality score	2.88 (±1.038)	1.83 (±0.772)	<.001
Total score	51.04 (±11.686)	37.16 (±10.910)	<.001
PEMAT-AV score[b]			
Understandability	82.76 (±19.427)	63.20 (±20.083)	<.001
Actionability	71.09 (±28.824)	41.09 (±25.074)	<.001
JAMA total score[b]	2.76 (±0.813)	1.80 (±0.821)	<.001
GQS total score[b]	3.47 (±1.142)	2.27 (±0.997)	<.001

DISCERN: Quality criteria for consumer health information, GQS: Global quality score, JAMA: Journal of the American Medical Association, PEMAT: Patient education materials assessment tool, Not normally distributed data are given as median (range), Normally distributed data are given as mean (± standard deviation), The independent-samples t-test was used for the data that met the parametric condition, and the Mann-Whitney U test was used for those meeting the non-parametric condition in the comparison of the data between two groups

Table 3. Correlation between, PEMAT-AV score, DISCERN, GQS, JAMA, view rate, view count, video age, video lenght, number of likes and comment

	View count	Video length	Like	Comment	View rate	Age
DISCERN						
Reliability	r=-0.241, p<0.001	r=0.393, p<0.001	r=-0.239, p<0.001	r=-0.224, p=0.001	r=-0.123 p=0.082	r=-0.184, p=0.009
Treatment choices	r=-0.301, p<0.001	r=0.366, p<0.001	r=-0.306, p<0.001	r=-0.278, p<0.001	r=-0.188, p=0.008	r=-0.189, p=0.007
Overall quality score	r=-0.039, p=0.585	r=0.334, p<0.001	r=-0.045, p=0.525	r=-0.010, p=0.893	r=0.056, p=0.434	r=-0.204, p=0.004
Total score	r=-0.278, p<0.001	r=0.384, p<0.001	r=-0.281, p<0.001	r=-0.260, p<0.001	r=-0.162, p=0.022	r=-0.189, p=0.007
PEMAT-AV score						
Understandability	r=-0.126, p=0.076	r=0.344, p<0.001	r=-0.135, p=0.057	r=-0.134, p=0.059	r=0.014, p=0.846	r=-0.252, p<0.001
Actionability	r=-0.103, p=0.145	r=0.285, p<0.001	r=-0.121, p=0.088	r=-0.133, p=0.060	r=0.041, p=0.568	r=-0.303, p<0.001
JAMA total score	r=-0.118, p=0.097	r=0.212, p=0.003	r=-0.156, p=0.027	r=-0.117, p=0.098	r=0.001, p=0.985	r=-0.296, p<0.001
GQS total score	r=-0.115, p=0.105	r=0.380, p<0.001	r=-0.123, p=0.083	r=-0.113, p=0.111	r=0.003, p=0.962	r=-0.220, p=0.002

PEMAT: Patient Education Materials Assessment Tool, DISCERN: Quality criteria for consumer health information, GQS: Global Quality Score, JAMA: Journal of the American Medical Association, r: correlation value according to Spearman's correlation test, bold p values indicate statistically significant, Spearman's correlation test was used to evaluate the correlation of data with each other

as median (min-max). Categorical variables are expressed as number (%). In the comparison of data between the two groups, the independent samples T test was used for data that met parametric conditions and the Mann-Whitney U test was used for those that met non-parametric conditions. Spearman's correlation test was applied to determine the correlations between the data. A p value <0.05 was considered statistically significant.

RESULTS

two hundred videos were evaluated, revealing that 50.62% were related to LASIK, 30.45% were associated with PRK, and 18.93% pertained to SMILELASER. Of these, 98 videos (49%) were uploaded by physicians, and 102 videos (51%) were uploaded by patients. Descriptive characteristics of all videos are shown in Table 1. Ninety-two (46%) videos were LASIK, 67 (33.5%) were PRK, and 41 (20.5%) were SMILE. The mean DISCERN, JAMA and GQS scores of all 200 videos were 44±13.2, 2.27±0.94, and 2.86±1.22 respectively. The PEMAT-AV scores indicate that the material has a moderate level of understandability, with a mean score of 72.8 (±22), However, the actionability score is lower, at 55.8 (±30.8),

Analysis of video metrics revealed that patient-created content, compared to physician-created content, was characterized by significantly shorter durations (37 vs 47 seconds, p=0.005), higher median likes (8.803 vs 2.296, p=0.005), and more comments (156 vs 84, p=0.018), while the difference in view counts (220,350 vs 110,600) approached but did not reach statistical significance (p = 0.091).There was no significant difference between the two groups in terms of view rate or age (p=0.326 and p=0.230, respectively). The mean DISCERN values of videos uploaded by physicians and patients were 51.04±11.68 and 37.16±10.91, the mean JAMA values were 2.76±0.81 and 1.80±0.82, and the mean GCS values were 3.47±1.14 and 2.27±0.99, respectively, and all were significantly higher in the physician videos (p<0.001 for all). PEMAT-AV scores revealed that physician-created videos had significantly higher understandability (82.76±19.427) and actionability (71.09±28.824) compared to patient-created videos, which scored 63.20±20.083 and 41.09±25.074, respectively, with both differences being statistically significant (p<.001). A comparison of data between the two groups is shown in Table 2.

A strong positive correlation was determined between video length and DISCERN, JAMA, and GQS values (r=0.384, p<0.001; r=0.212, p=0.003; and r=0.380, p<0.001, respectively). A strong negative correlation was observed between the numbers of views, likes, and comments and DISCERN scores (r=-0.278, p<0.001; r=0.384, p<0.001; r=-0.281, p<0.001; and r=-0.260, p<0.001, respectively). The correlations between DISCERN, JAMA, and GQS and the number of views, video length, number of likes, number of comments, viewing rate, and age are shown in Table 3.

The analysis of TikTok videos related to refractive surgery, as evaluated by the DISCERN scoring system, reveals a diverse range of quality, with 13.0% classified as very poor, 22.0% as poor, 30.5% as reasonable, 27.0% as good, and 7.5% as excellent the physician-generated videos demonstrated a notably superior quality distribution: a significant proportion were categorized as "good" (43.9%) or "reasonable" (29.6%), with an impressive 13.3% achieving the "excellent" designation. Conversely, patient-generated videos exhibited a markedly different profile: a substantial portion fell into the "poor" category (36.3%), with another significant segment classified as "reasonable" (31.4%) (Figure).

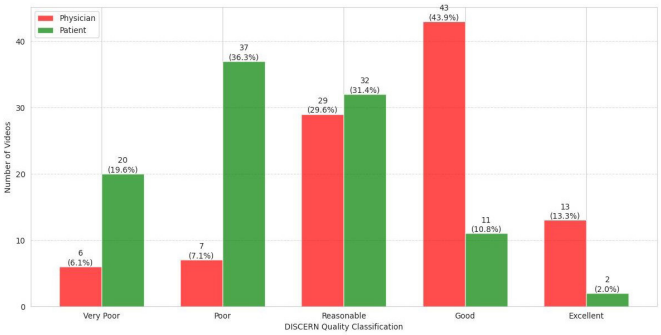

Figure. Comparison of DISCERN quality classification ratings for TikTok videos on refractive surgery by physicians and patients

DISCUSSION

Individuals across the world frequently use the internet to obtain information about health issues and the treatment thereof. Popular video-sharing internet sites such as TikTok are frequently employed for that purpose. Excimer laser is the general term used for laser surgery methods for correcting refractive errors. The most commonly used refractive

surgeries are LASIK, PRK, and SMILE. Patients with refractive errors and who wish to undergo excimer treatment can watch excimer laser videos on TikTok, which is the easiest and most economical way to obtain information concerning these. TikTok videos can be uploaded by both physicians and non-physicians, although this can result in the transmission of misinformation, which may lead to confusion for patients.

DISCERN is a scale that measures the informative quality and reliability of videos. In the present study, the mean DISCERN score of all 200 videos was 44±13.2, and reliability and informative quality were moderate. The DISCERN score (information quality and reliability) of the videos uploaded by physicians was at a good level and was significantly higher than the DISCERN score of those uploaded by patients. Since healthcare professionals, especially physicians, possess greater knowledge and experience of excimer laser surgery than patients, the quality and reliability of physician videos will also be high. Similarly, in their study of the content of LASIK videos on TikTok, Haddad et al.[10] reported that videos from health professionals were of higher quality than those from non-physicians. Siegal et al.[11] also reported that videos from health professionals were of higher quality in their study investigating the quality of TikTok videos in the context of varicocele. Villa-Ruiz et al.[12] reported that videos uploaded by health professionals were more reliable than other videos in their study investigating the reliability of the most viewed dermatological content on TikTok. In contrast to the present research, some studies have reported that health-related TikTok videos are inadequate in terms of informational quality and reliability.[13,14]

The mean JAMA score used to determine the quality of information in health-related videos in this study was 2.27±0.94 (partially sufficient). The videos uploaded by physicians achieved a significantly higher JAMA score, and their quality of the information was notably higher. In their study investigating the quality of videos concerning heart failure, Gong et al.[15] also stated that videos uploaded by healthcare professionals achieved a higher JAMA score. The higher information quality of videos uploaded by physicians, who possess more comprehensive information about the surgical procedure, may be regarded as an expected finding. The mean GQS score of all 200 videos in the present study was 2.86±1.22 (low quality), the GQS of the videos uploaded by physicians being significantly higher than that of the videos from patients. Similarly, Dimitroyannis et al.[16] considered the quality of TikTok videos about sinusitis and reported a significantly higher GQS score for videos uploaded by healthcare professionals than for those videos uploaded by non-physicians. Haddad et al.[10] observed low JAMA and GQS scores for TikTok videos related to LASIK and described both the informational quality and video quality as poor.

In the current study, a strong positive correlation was observed between video length and DISCERN, JAMA, and GQS scores. This indicates that the quality and reliability of the content increase in line with the video length. Similarly, Haddad et al.[10] and Chen et al.[17] reported a moderate positive correlation between video length and DISCERN and GQS scores. In a study investigating TikTok videos related to Helicobacter pylori in China, Du et al.[18] also reported a positive correlation between video length and DISCERN and GQS scores. Gong et al.[15] reported a strong positive correlation between GQS and video length, and a moderate negative correlation between GQS and video age. Interestingly, in the current study, DISCERN scores were strongly negatively correlated with the number of views, viewing rate, likes, and comments. TikTok viewers tend to watch and like more engaging videos rather than those of higher quality in the context of refractive surgery.

The PEMAT-AV assessment revealed a relatively high understandability score of 72.8 (±22), indicating that patient education materials are generally comprehensible to a broad audience. However, the lower actionability score of 55.8 (±30.8) suggests that patients may struggle to translate their understanding into practical actions. Similarly, Sampige et al.[9] reported an average understandability score of 88.1% and an actionability score of 50.6% for TikTok educational videos, reinforcing the findings of our study. These results collectively underscore the critical need for developing educational materials that not only convey information clearly but also provide actionable guidance to enhance patient engagement and decision-making. Consistent with previous research, this study, utilizing the PEMAT-AV assessment, demonstrated that content developed by healthcare professionals exhibited superior comprehensibility among the target audience compared to materials sourced from non-professional entities.[8,19] Physician-sourced videos exhibited higher understandability and actionability scores, highlighting the value of professional expertise in creating effective educational content for social media. However, healthcare professionals may need training in digital content creation and social media utilization to fully realize this potential. Additionally, patient-sourced videos also achieved a certain level of understandability and actionability, emphasizing the importance of patients sharing their experiences.

The analysis of TikTok videos on refractive surgery reveals a wide range of quality based on the DISCERN assessment. While many videos fall in the Reasonable to Excellent range, a sizable portion are rated as poor or very poor. These findings highlight the variability in health content quality on social media and the need to develop strategies to improve the overall quality of information available to users.

Physician-created videos exhibit higher quality and reliability, with a substantial proportion classified as "good" or "reasonable" and some achieving "excellent" ratings, as determined by the DISCERN scoring system. In contrast, patient-generated videos are predominantly in the "poor" and "reasonable" categories, with few reaching "excellent," according to the same scoring criteria. This disparity, highlighted by the DISCERN classification, raises concerns about misinformation and the challenges patients face in evaluating online health information. These findings underscore the need for patients to critically assess the credibility of online sources and the opportunity for healthcare providers to leverage social media for patient education by producing high-quality, engaging content to counter misinformation.

Videos uploaded by physicians attracted significantly higher view counts, longer durations, compared to those uploaded by patients. We would suggest that TikTok viewers show greater interest and engage more with physician videos due to their higher quality and reliability, resulting in increased viewership and comment activity. In contrast, in their study investigating TikTok videos related to acute otitis media,

Dimitroyannis et al.[20] reported that videos uploaded by non-healthcare professionals attracted significantly higher view counts compared to those uploaded by healthcare professionals. Viewers tend to trust and engage more with TikTok content from healthcare professionals, likely because these creators are seen as credible sources of information, and the platform's algorithms may further amplify their reach by prioritizing verified accounts.

Interestingly, videos uploaded by patients garnered significantly more likes and more comments than those uploaded by physicians. This increased engagement may perhaps be attributed to patient videos focusing more on personal experiences with the treatment or featuring interesting content curated from other sources, rather than purely informational content. This content strategy potentially resonates more with the general TikTok audience, leading to higher like counts.

Limitations

The limitations of this study include the restriction to English-language videos, its cross-sectional design, and the evaluation of only 200 videos. Furthermore, another significant limitation was the lack of assessment regarding whether clinicians adequately described corneal topography evaluation and the specific criteria utilized in determining appropriate refractive surgery options in their videos.

CONCLUSION

TikTok videos related to excimer laser surgery are of moderate quality and reliability in terms of informational content but are of low quality overall. Videos uploaded by physicians are of higher quality, more reliable, and more informative compared to those uploaded by patients. Comprehensive studies evaluating a larger number of videos are now needed for more objective findings.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study did not require ethical approval as it did not involve any human subjects or animal experiments.

Informed Consent

This study did not require informed consent as it did not involve human participants.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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Archives of
Ophtalmological Research

Case Report

DOI: 10.51271/AOR-0025

Bilateral panopthalmitis with orbital cellulitis due to *Klebsiella pneumoniae* causing bilateral blindness in a diabetic patient: a rare case report

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Cite this article: Küpeli Çınar A, Çınar AC, Güçlü H, Gürlü V. Bilateral panopthalmitis with orbital cellulitis due to *Klebsiella pneumoniae* causing bilateral blindness in a diabetic patient: a rare case report. *Arch Ophthalmol Res.* 2025;2(1):14-16.

Received: 13/08/2024 ◆ **Accepted:** 24/10/2024 ◆ **Published:** 07/01/2025

ABSTRACT

A 60-year-old diabetic female patient was referred to the clinic with decreased vision and pain in both eyes. The patient had eyelid and conjunctival edema in both eyes and no sense of light projection. Globe movements were restricted in all directions. The anterior and posterior chambers could not be visualized. Magnetic resonance imaging showed findings consistent with orbital cellulitis and panophthalmitis. *Klebsiella pneumoniae (K. pneumoniae)* was identified as the causative agent. Systemic and topical treatments were applied to the patient. The patient was discharged after her symptoms and complaints regressed. However, despite the clinical response to treatment, the patient developed bilateral phthisis bulbi. In conclusion, when proptosis, decreased vision, and pain complaints develop in diabetic patients, treatment should be started quickly, and it should be kept in mind that *K. pneumoniae* may be the cause.

Keywords: Bilateral blindness, *Klebsiella pneumoniae*, orbital cellulitis, panophthalmitis

INTRODUCTION

Klebsiella species are facultatively anaerobic gram-negative bacilli that are part of the human gastrointestinal flora. They are very common causative organisms for endogenous endophthalmitis in Asia and are often associated with immunosuppressive diseases such as diabetes mellitus and pyogenic liver abscesses.[1] *Klebsiella pneumoniae (K. pneumoniae)* is also a notable member of this family. Endophthalmitis caused by *K. pneumoniae* has a poor prognosis despite intravenous (IV) and intravitreal antibiotic therapy.[2] The concurrent presentation of orbital cellulitis is a particularly severe and rare manifestation of *Klebsiella* endophthalmitis.[3] In this case report, a diabetic patient presenting with bilateral *K. pneumoniae* endogenous panophthalmitis accompanied by orbital cellulitis is examined.

CASE

A 60-year-old diabetic patient was referred to the clinic with swelling in both eyelids, pain, and decreased vision. It was learned that the patient had been hospitalized in the internal medicine department of an external center for about 10 days with a diagnosis of diabetic ketoacidosis. During this period, the patient's blood sugar was regulated, and she was referred to a tertiary healthcare institution due to a sudden decrease in vision, swelling of the eyelids, and the development of pain in the eyes. Her clinical history was unremarkable except for uncontrolled diabetes. There was no light perception in both eyes at presentation. Both eyelids were highly edematous and erythematous, and conjunctival edema was present. Fibrin membrane was observed in the anterior chamber and on the overlying on the chemotic conjunctiva. The right cornea was minimally edematous, but there was a large ulceration in the central part of left cornea (Figure 1). The posterior segment could not be evaluated. Globe motility was limited in all directions in both eyes. The patient was admitted, and a sample was sent to microbiology from the membranes overlying on the chemotic conjunctiva. A blood culture was taken from the patient, but no growth occurred. B-scan ultrasonography was performed by radiology, and it was reported in writing that there were widespread echogenicities in both globes and under the skin, but the image was not submitted. Magnetic resonance imaging (MRI) and MRI-angiography (MRI-A) were performed. There were diffuse edematous signal increases in bilateral cutaneous and subcutaneous tissues, more prominent on the left. An abscess was observed adjacent to the superior bulbus oculi on the left, and a loss of integrity was observed in the bulbus oculi

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at this level (Figure 2). No cavernous sinus involvement was observed in MRI-A. There was leukocytosis in blood tests (white blood cells (WBC): 19100, neutrophil (NE): 82%), and C-reactive protein (CRP) was 143 mg/L (n: 0-5 mg/L). The patient was evaluated by different specialties for multisystem involvement. In the otolaryngology consultation, it was learned that there was no sinusitis. Neurology consultation did not recommend any additional treatment as there was no cavernous sinus involvement. In the internal medicine consultation, blood sugar regulation was achieved, and there was no liver abscess in the imaging. A cyst was seen in her kidney; she was consulted with urology, but it was thought not to be infective.

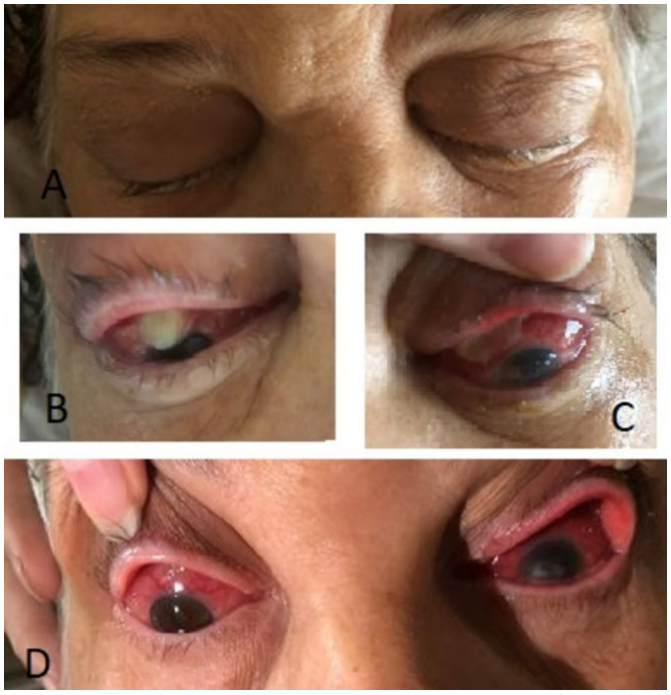

Figure 1. Clinical image of the patient, A) When the patient first applied, eyelid edema was present, B) Prominent fibrin membrane overlying on the chemotic conjunctiva of the patient's right eye was available. Conjunctival edema was seen, C) Fibrin membrane was present overlying on the chemotic conjunctiva and anterior chamber of the patient's left eye. Conjunctival edema was more prominent, D) In the first week of IV antibiotic treatment, a decrease in fibrin membranes and eyelid edema was observed. The right cornea was minimally edematous, but there was a large ulceration in the central part of left cornea

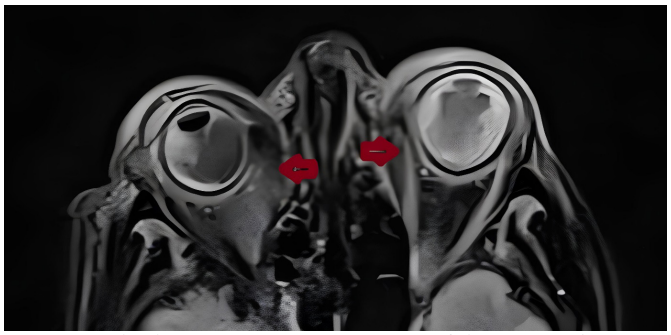

Figure 2. Orbital magnetic resonance imaging of the patient. There were diffuse edematous signal increases in bilateral cutaneous and subcutaneous tissues, more prominent on the left. An abscess was observed adjacent to the superior bulbus oculi on the left. There was an increase in signal in the intraconal area of the right eye (T2 squence)

The patient was thought to have orbital cellulitis with significant panophthalmitis. Empiric topical moxifloxacin 8x1 treatment was started rapidly for the anterior segment findings and topical dexamethasone 4x1 was added to the treatment because of the fibrin reaction. The patient was informed that empiric intravitreal antibiotic application and sample collection were required, but the patient did not accept any procedure requiring surgical intervention. The necessity of vitrectomy was explained to stop the disease progression and gain vision, and the patient insisted on not undergoing surgical intervention. Informed consent was obtained from the patient on this issue. Empiric ceftriaxone 2x1 gram IV was started until the result of the sample that could be taken from the conjunctiva surface was obtained. Since *K. pneumoniae* grew in the sample, the patient was asked for an infectious diseases consultation. Since the antibiogram showed carbapenem resistance but meropenem and linezolid sensitivity, systemic antibiotic treatment was changed to meropenem 3x2 grams IV and linezolid 2x600 mg orally with the recommendation of infectious diseases.

At the end of the 3rd week, the eyelid edema of the patient regressed, and the conjunctival edema had disappeared. The pain was lessened. Although her globe motility was limited in all directions, her movement was improved compared to the admission examination. There was no light perception in both eyes, and since there was no light perception at the time of first presentation and the patient could not undergo a surgical procedure, it was interpreted as not being a progression of the disease. The globes were hypotonous. The fibrin reaction in the anterior chamber had regressed. There was no leukocytosis in blood tests (WBC: 7000, NE: 40%), and CRP regressed to 0.64 mg/L (n: 0-5 mg/L). Her diabetes was under control. The patient's infection was controlled with medical treatment, and no further surgical intervention was required. However, phthisis bulbi developed in both eyes.

DISCUSSION

Specific virulence factors play a role in the pathogenicity of *Klebsiella* spp. The organism is an enteric, gram-negative bacillus whose composition is a polysaccharide capsule used to classify various *Klebsiella* serotypes. Capsule serotypes K1 and K2 show increased resistance to intracellular destruction by immune cells. This resistance increases in patients with uncontrolled diabetes mellitus. In addition, these serotypes are dominant especially in cases of ocular involvement and spread to other organs.[4] Although serotyping was not performed in this case, the pathogen may be one of these serotypes because the patient had uncontrolled diabetes mellitus and ocular involvement.

Orbital cellulitis associated with *K. pneumoniae* endogenous panophthalmitis or endophthalmitis is rare and has a poor visual and anatomical prognosis. Other known poor prognosis factors are immunosuppression, low visual acuity, delayed diagnosis and treatment, presence of hypopyon, and rapid progression of symptoms.[5] The presented patient had all of these poor prognostic findings.

Fungal infection should be excluded in all diabetic patients with orbital cellulitis because rhinocerebral mucormycosis often presents as orbital cellulitis; uncontrolled diabetic patients are susceptible to fungi and other unusual pathogens.[6] In this case, mucormycosis was not considered because the culture was negative.

There was only one reported case of concurrent endophthalmitis and orbital cellulitis caused by *K. pneumoniae,* where the patient was found to have a liver

abscess.[3] There is only one case of *K. pneumoniae* endogenous endophthalmitis with orbital cellulitis in a patient without liver abscess.[7] However, unilateral involvement is present in both these cases. Apart from these, a single case of bilateral endogenous endophthalmitis without accompanying orbital cellulitis caused by *K. pneumoniae* has been reported.[8] This is the first case reported as endophthalmitis/panophthalmitis with bilateral orbital cellulitis due to *K. pneumoniae* in a diabetic patient.

K. pneumoniae endogenous endophthalmitis with concomitant orbital cellulitis can be fatal in general, although the visual prognosis is poor. Early diagnosis and prompt and aggressive treatment are required.[9] IV antibiotic therapy should be given for at least 3 weeks, especially in cases with orbital cellulitis. In *K. pneumoniae* endophthalmitis, in addition to systemic antibiotics, repeated intravitreal antibiotic applications are required.[7] There are studies showing that performing vitrectomy in the early period has a positive effect on the prognosis as it reduces the bacterial load. Studies have shown that patients who underwent vitrectomy for endogenous *Klebsiella* endophthalmitis and those who were followed up with repeated intravitreal injections without vitrectomy had greater improvement in visual acuity. There is no information on the course of patients who did not undergo either vitrectomy or intravitreal injection. Early vitrectomy is recommended in patients with endogenous endophthalmitis if initial visual acuity is low, significant vitreous opacity and a highly virulent strain is considered. Intravitreal antibiotics can also be administered and a decision can be made according to the clinical response in 48-72 hours.[10] However, despite all these, *K. pneumoniae* endophthalmitis may require evisceration or enucleation to prevent fatal situations. Surgical intervention was not performed in this patient because the patient refused surgical treatment and clinically regressed with IV antibiotic therapy. It differs from other reported cases in terms of regression of clinical findings and absence of clinical worsening without surgical intervention. Although the disease was controlled with IV antibiotics, the patient's lack of light perception may be due to irreversible damage to the ocular structures.

Limitations

It is unclear if the infection began within the globe and extended outward to the orbital structures or conversely if the infection initially inoculated the orbit and spread inwardly. The authors think that the infection mainly started in the globe and spread outward to the orbit, as the patient first developed poor vision and then globe movement limitation and eyelid edema. However, this remains unclear.

CONCLUSION

As a result, ocular complaints suggesting endophthalmitis and/or orbital cellulitis should be considered, especially in immunosuppressive conditions such as diabetes. *K. pneumoniae* should be kept in mind, and the need for rapid and aggressive treatment should not be forgotten.

ETHICAL DECLARATIONS

Informed Consent

The patient signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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Archives of
Ophtalmological Research

Case Report

DOI: 10.51271/AOR-0026

Superior rectus transposition as a feasible surgical method for diplopia due to abducens paralysis with small angle esotropia: a case report and comprehensive perspective on other new trend surgical methods

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Cite this article: Çelik G, Karaçocuk T, Çiftci F. Superior rectus transposition as a feasible surgical method for diplopia due to abducens paralysis with small angle esotropia: a case report and comprehensive perspective on other new trend surgical methods. *Arch Ophthalmol Res.* 2025;2(1):17-19.

Received: 25/08/2024 ◆ **Accepted:** 25/10/2024 ◆ **Published:** 07/01/2025

ABSTRACT

A 57-year-old male with diplopia presented to our clinic due to sixth nerve palsy (SNP). His medical history encompasses a traffic collision and blunt head injuries from one year prior. This study addresses the appropriate surgical intervention for diplopia resulting from SNP that is a neuro-ophthalmologic disorder characterized by palsy of the lateral rectus (LR) muscle. This palsy leads to diplopia and head position owing to difficulties with lateral gaze in the affected eye. The medical management of SNP is determined by its underlying condition. Most individuals with SNP get spontaneous resolution within a period of six months, systemic treatment. However, a limited number of individuals may necessitate intervention owing to diplopia as their primary complaint. Especially in such cases, it is necessary to choose an appropriate surgical method by taking into account the amount of squint in order to minimize surgical complications such as anterior segment ischemia. The objective of this case presentation is to provide information on Superior rectus transposition (SRT) surgery, a viable technique for treating SNP. Additionally, this case seeks to review current treatment approaches by evaluating alternative trend surgical procedures.

Keywords: Sixth nerve palsy, superior rectus transposition, transposition surgery, augmentation suture, diplopia

INTRODUCTION

SNP is a neuro-ophthalmologic disorder characterized by the paralysis of the LR muscle. This palsy leads to diplopia and difficulties with lateral gaze in the affected eye.[1,2]

The medical management of sixth nerve palsy is determined by its underlying condition. The majority of individuals with sixth nerve palsy get spontaneous resolution within a period of six months, without the need for systemic treatment. However, a limited number of individuals may necessitate intervention owing to diplopia as their primary complaint.[3]

Possible treatments for individuals with sixth nerve palsy include prism therapy, strabismus surgery, and *Botulinum* toxin (BTx) injections.

The objective of this case presentation is to provide information on SRT surgery, a viable technique for treating sixth nerve palsy. Additionally, this case seeks to comprehensively review current treatment approaches by evaluating alternative trend surgical procedures.

CASE

A 57-year-old male with diplopia presented to our clinic. His history included a traffic accident and blunt head trauma one year ago. The beginning of diplopia came about after a trauma that was causally associated with it. Visual acuity is observed 20/20 in each eye. Anterior and posterior segment examinations were found within the normal limits, no distinct pathology was noted. In primary position, he had 20 prism diopter (PD) esotropia at far and 25 PD esotropia at near. (Figure 1). During an attempted lateral gaze, right eye cannot be moved beyond the midline and had -3 degree limitation of abduction in right eye on nine gazes examination (Figure 2). He had face turn 20° toward right side that affected side. In forced duction test, there was no restriction to horizontal, vertical or oblique plane. Medial rectus (MR) contraction was not observed. In a surgical intervention that superior rectus transposition (SRT) was planned.

During the surgery, a paralimbal incision was performed between between 9 and 12 o'clock, and then it was dissected

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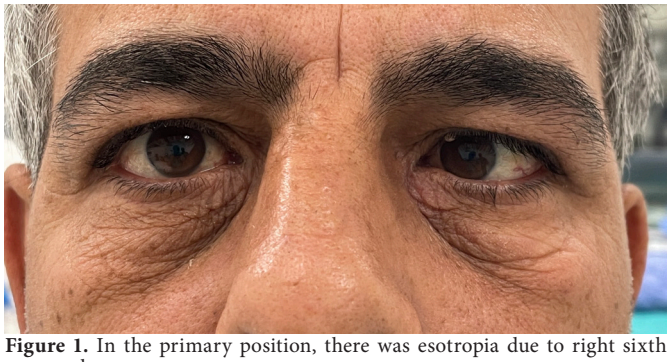

Figure 1. In the primary position, there was esotropia due to right sixth nerve palsy

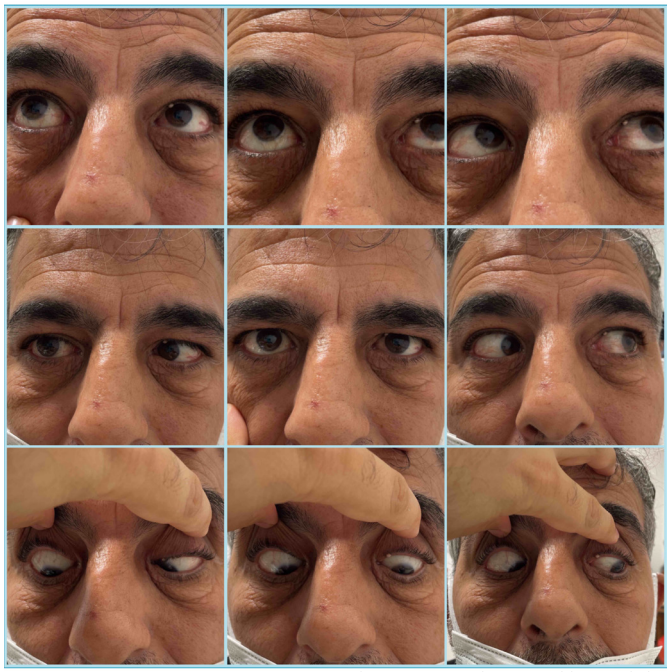

Figure 2. On nine gaze examination, right eye cannot be moved beyond the midline during an attempted right gaze

and become visible. The surgeon gained access to both the SR and LR. The superior oblique muscle fibers under the SR were completely separated and sutured with 6/0 prolene thread adjacent to the LR insertion, parallel to the spiral of Tillaux. Furthermore, an augmentation suture was placed from a distance of 8 mm to the spiral of Tillaux. The 5/0 ethibond suture passed through the border of the SR, LR muscles and sclera (Figure 3).

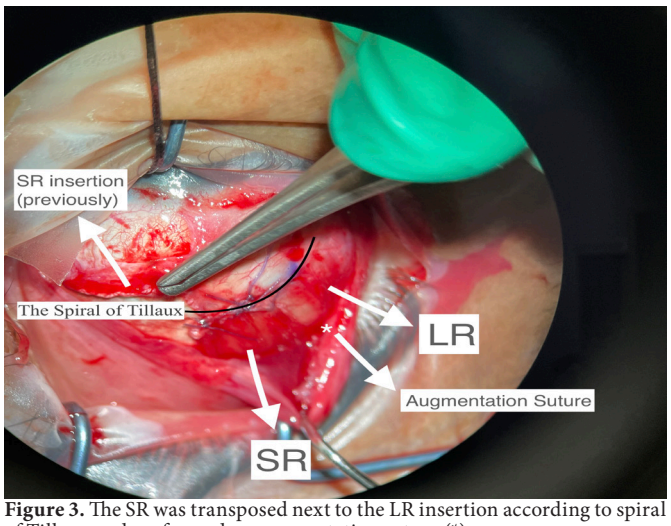

Figure 3. The SR was transposed next to the LR insertion according to spiral of Tillaux and performed an augmentation suture (*)

SR: Superior rectus, LR: Lateral rectus

One year following the surgery, we observed visual acuity at 20/20. There is no pathological finding in the anterior and posterior segments. Head position improved. There was not any surgical complication such as diplopia. There was no vertical or tortional squint on nine gaze examination (Figure 4).

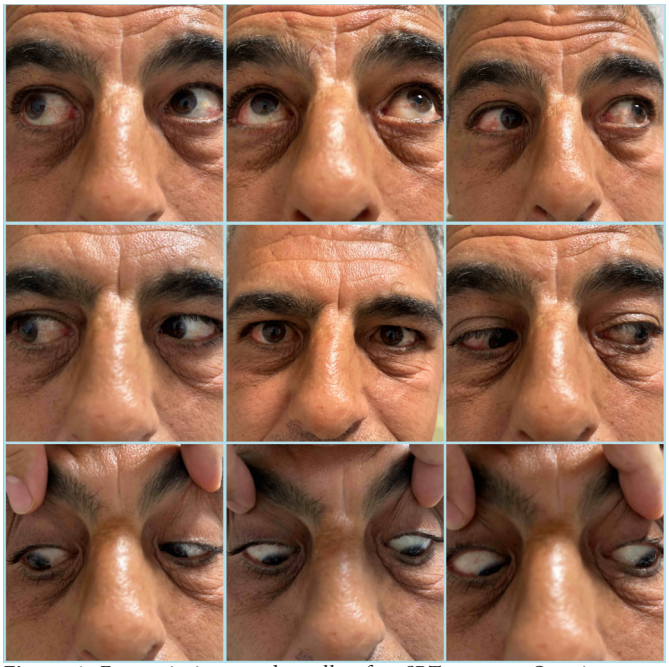

Figure 4. Esotropia improved totally after SRT surgery. On nine gazes examination, there was no limitation in right eye during abduction

SRT: Superior rectus transposition

DISCUSSION

The management of abducens nerve palsy is based on the underlying cause. Typically, the focus of treatment is on underlying or systemic conditions. The diplopia caused by abducens nerve dysfunction may be surgically treated, prescribed prisms, occluded, or alleviated by BTx injection.[4]

When deciding on surgery, the residual function of the LR is the most crucial factor. If there is currently residual function in the LR muscle, a surgical technique involving resection of the afflicted LR and recession of the corresponding MR also known as the "R and R" surgery is often carried out. If LR muscle function is absent, a several type of transpositions procedures such as full tendon transposition, Jensen, Hummelsheim, Nishida and their modified forms or SRT may be considered. When deciding on surgery, contraction of the MR is another important factor. If there is currently contraction in the MR muscle, a surgical technique involving effective ways of weakening procedures may be prefered such as recession.

Regarding to transposition procedures, Hummelsheim and Jensen procedures are two distinct but related surgical techniques used to treat sixth nerve palsy, a condition that causes weakness or paralysis of the LR muscle, leading to impaired horizontal eye movement and strabismus. Both procedures aim to improve eye alignment and function by redistributing the strength of adjacent muscles. The Hummelsheim procedure involves transposing part of the superior and inferior rectus muscles toward the lateral rectus to help restore abduction. The Jensen procedure, on the other hand, involves a partial transposition of the medial rectus

and adjacent rectus muscles, preserving the insertion of the muscles while relocating their lateral portions. Because of the numerous difficulties that have arisen, particularly anterior segment ischemia, these surgical treatments have been abandoned in recent times.[5]

Currently, modified Nishida and SRT are the most trending surgeries because they are pretty safer than other surgical procedures in terms of anterior segment ischemia. A new and current technique, developed by Hernandez-García et al.[6] in 2003, involves adjusting the vertical rectus muscles in the eye. The procedure includes hooking the vertical recti, and longitudinally splitting the vertical muscles of belly 14 mm from insertion. Following this, 6-0 nylon sutures are used to secure the temporal half of each muscle, 8-10 mm posterior to the insertion. The same sutures are then is passed through the sclera 8 mm posterior to the insertion of lateral rectus beside the superior or inferior margin. This method was afterward modified, and Muraki et al.[7] defined a muscle transposition procedure in which the vertical rectus muscles were not split, but rather the lateral margin of each vertical rectus muscle was transposed superotemporally or inferotemporally and sutured onto the sclera without tenotomy or muscle splitting.

In a comparative study, patients with sixth nerve palsy who underwent modified Nishida alone, modified Nishida with medial rectus recession (MRc), and modified Nishida with MRc and BTx injection. In summary, the average correction achieved with the modified Nishida approach alone was 29.4±6.6 PD. However, when an MR recession was added, the correction increased to an average of 62.6±23.8 PD. The combination of the modified Nishida technique with MRc and BTx corrected 95.0±18.0 PD esotropia. There were no observed postoperative issues such as anterior segment ischemia in any patients.[6] Tauscher describe adjustable modification of Nishida procedure. They present a modified version of the transposition that can be adjusted to address vertical or torsional abnormalities after surgery.[7,8]

As a novel technique, SRT is a method used especially in small-angle esotropia due to sixth nerve palsy that does not move beyond the midline. Regarding the SRT procedure, a study including 11 patients with sixth nerve palsy who had an average near deviation of 25.82±7.73 PD showed that after undergoing SRT surgery alone, the deviation amounts decreased to 7±6.15 PD during the postoperative period.[9] Particularly when esotropia exceeds 30 PD, MRc may be required in combination with SRT surgery. In another study, including 7 patients with sixth nerve palsy who had an average near deviation of 53.5 PD).[10] In another study, including 11 cases of sixth nerve palsy found that the average esodeviation was 55.7±23.8 PD before surgery. After undergoing SRT+MRc surgery, the esodeviation was 3.7±5.5 PD. In addition, there was no intraocular complication or vertical deviation requiring surgery.[9] Based on the examinations conducted, it was determined that SRT surgery was suitable for this case.

In conclusion, SRT is an adequate and reliable procedure in cases with sixth nerve palsy that does not move beyond the midline or does not have LR function and does not exceed 30 PD, while reliable methods such as SRT+MRc combined treatment or modified Nishida can be performed in cases with esotropia exceeding 30 PD.

ETHICAL DECLARATIONS

Informed Consent

The patient signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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Archives of
Ophtalmological Research

Erratum

DOI: 10.51271/AOR-0027

Erratum to "Dexamethasone implantation causing latrogenic lens injury: a review of literature with case series"

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Cite this article: Dal A, Turgut B, Aydemir O, et al. Erratum to "Dexamethasone implantation causing latrogenic lens injury: a review of literature with case series". *Arch Ophthalmol Res.* 2025;2(1):20.

Received: 30/11/2024 ◆ **Accepted:** 02/12/2024 ◆ **Published:** 07/01/2025

Dear Editor,

We are writing regarding our recently published article titled "Dexamethasone Implantation Causing Iatrogenic Lens Injury: A Review of Literature with Case Series" (doi:10.51271/AOR-0016).

Upon further review, we realized that three contributors-Dr. Burak Turgut, Dr. Orhan Aydemir, and Dr. Onur Çatak-were inadvertently omitted from the list of authors despite their significant contributions to the study. These individuals are:

Dr. Burak Turgut (Department of Ophthalmology, Faculty of Medicine, Fırat University; Department of Ophthalmology, Faculty of Medicine, Çanakkale Onsekiz Mart University)

Dr. Orhan Aydemir (Department of Ophthalmology, Faculty of Medicine, Fırat University; Elazığ Private Universal Eye Hospital)

Dr. Onur Çatak (Department of Ophthalmology, Faculty of Medicine, Fırat University)

These individuals were actively involved in the treatment and management of the cases described in the article and provided critical input during the preparation of the manuscript.

Additionally, one of the case reports included in this article was prepared in collaboration with Dr. Ali Dal, Dr. Burak Turgut, Dr. Onur Çatak, and Dr. Orhan Aydemir was presented as a poster at the 51st National Congress of the Turkish Ophthalmology Association (TOD), held from October 25-29, 2017.

To ensure that their contributions are appropriately recognized, we kindly request that their names and affiliations be added to the author list as follows:

Corrected Author List:

- Ali Dal[1,2]
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- Orhan Aydemir [1,4]
- Onur Çatak [1]
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We deeply regret this oversight and sincerely apologize for any inconvenience caused. Please let us know if additional documentation or further steps are required to facilitate this correction. We are committed to adhering to all authorship policies and ensuring the integrity of the publication process.

Thank you for your understanding and cooperation.

Sincerely,

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