Original Article

Vitrectomy Due to Vitreous Hemorrhage and Tractional Retinal Detachment Secondary to Eales' Disease

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Abstract

Objectives: To investigate visual and anatomical outcomes of vitreoretinal surgeries in patients with Eales' disease.

Materials and Methods: In this retrospective study, 22 eyes of 21 patients with vitreous hemorrhage (VH) or tractional retinal detachment (TRD) secondary to Eales' disease who underwent vitreoretinal surgery between January 1997 and December 2015 and had at least 1 year of follow-up were included.

Results: The mean best corrected visual acuity (BCVA) was significantly higher at final visit (0.6±0.9 logMAR) than the preoperative values (1.8±1.1 logMAR) (p<0.001). After surgery, BCVA was stable in 4 eyes (18.2%), increased in 16 eyes (72.7%), and decreased in 2 eyes (9.1%). Although the mean BCVA was better in the VH group (0.3±0.34 logMAR) than the TRD group (0.9±1.1 logMAR), the difference was not statistically significant (p=0.1). Multivariable linear regression analyses revealed that final BCVA was negatively associated with preoperative or postoperative proliferative vitreoretinopathy grade C (PVR-C), preoperative retinal detachment involving the macula, postoperative neovascular glaucoma, and long preoperative duration of disease, and positively associated with preoperative BCVA. Final BCVA was not associated with preoperative retinal and disc neovascularization, rubeosis iridis, total posterior hyaloid detachment, preoperative retinal laser photocoagulation, indication of surgery, diameter of sclerotomy (20 or 23 gauge), preoperative lens status, preoperative or postoperative epimacular membrane, peroperative iatrogenic retinal breaks, postoperative hypotony, cystoid macular edema, and new or recurrent retinal detachment. The primary anatomic success rate was 81.8% and the final anatomic success rate was 90.9%.

Conclusion: In Eales' disease, good visual results can be obtained with vitreoretinal surgery if the detachment area does not involve the macula and PVR-C does not develop pre- or postoperatively.

Keywords: Eales' disease, tractional retinal detachment, vitrectomy, vitreous hemorrhage

Introduction

Eales' disease is an idiopathic occlusive retinal vasculitis that mainly affects the peripheral retinal veins, usually in young men.[1] Findings that may be observed in Eales' disease include periphlebitis with or without arteritis, peripheral capillary nonperfusion, retinal neovascularization (NVE), disc neovascularization (NVD), central or branch retinal vein occlusion, vitreous hemorrhage (VH), tractional retinal detachment (TRD), combined TRD and rhegmatogenous retinal detachment (RRD), and neovascular glaucoma.[2] Active periphlebitis may be accompanied by anterior uveitis, posterior uveitis, and pars planitis.[1,3] Patients usually present with recurrent VH and involvement is generally bilateral.[3] Although defined as an idiopathic disease, it may be associated with *Mycobacterium tuberculosis* and hypersensitivity to tubercular antigen.[4,5]

Systemic steroid therapy is effective in controlling the active phase of Eales' disease.[3] Intravitreal steroids are useful in the treatment of periphlebitis and cystoid macular edema.[6,7]

Performing early retinal photocoagulation on non-perfused areas has a positive effect on visual outcomes.[3,8,9,10] Anti-vascular endothelial growth factor agents may be beneficial for the regression of cystoid macular edema, but they do not accelerate resolution of VH and can lead to the development of TRD and secondary RRD.[11,12,13] Vitreoretinal surgery is required in the presence of non-clearing VH and TRD affecting or threatening the macula.[14,15,16]

In this study, we aimed to investigate the visual and anatomical outcomes of vitreoretinal surgeries in patients with Eales' disease and the factors affecting final visual acuity.

Materials and Methods

Twenty-two eyes of 21 patients who underwent vitrectomy for VH or TRD due to Eales' disease between January 1997 and December 2015 and were followed up for at least 1 year were included in this retrospective study. The study protocol was designed in accordance with the Declaration of Helsinki and approved by the Şişli Memorial Hospital Ethics Committee. Medical history, systemic diseases, age, sex, previous ocular surgeries, surgical procedure, best corrected visual acuity (BCVA), intraocular pressure, preoperative and postoperative ophthalmic examination findings, and postoperative complication data were obtained by retrospective chart review. Eales' disease was diagnosed in the presence of occlusive periphlebitis in one or both eyes after ruling out diabetic retinopathy, hypertensive retinopathy, non-inflammatory retinal vein occlusion, sickle cell anemia, and infectious or inflammatory causes such as collagen tissue diseases, Behçet's disease, sarcoidosis, and syphilis. Indications for vitrectomy were BCVA of 0.52 logMAR or worse due to non-clearing VH persisting for at least 2 months, and presence of macula-involving/threatening TRD with or without RRD. Patients with less than 1 year of follow-up and those with previous vitrectomy for Eales' disease or any other reason were not included in the study.

Treatment

All surgical procedures were performed under general anesthesia by the same surgeon (M.K.). All patients underwent a 20-gauge or 23-gauge pars plana vitrectomy and panretinal laser photocoagulation. Posterior hyaloid dissection was performed by aspiration in all patients without posterior hyaloid detachment. In addition to these surgical procedures, tractional membrane removal, epimacular membrane peeling, internal limiting membrane peeling, pars plana lensectomy, phacoemulsification and intraocular lens (IOL) implantation, dislocated IOL removal, retinotomy/retinectomy (relaxing), and circumferential scleral buckling (style 287) were performed according to disease severity. Air, sulfur hexafluoride (SF_6), perfluoropropane (C_3F_8), or silicone oil tamponade was used when needed.

Postoperatively, all patients were prescribed topical antibiotic and corticosteroid drops 4 times a day for 1 month. The antibiotic drops were discontinued after 1 month and the corticosteroid drops were tapered and discontinued within 2 weeks. Patients who developed cystoid macular edema received intravitreal triamcinolone (4 mg/0.1 mL) or bevacizumab (1.25 mg/0.1 mL) injections.

Statistical Analysis

All statistical analyses were performed using the SPSS software package (version 21, IBM Corp, Armonk, NY, USA). A p value less than 0.05 was considered statistically significant. Paired samples t-test was used to compare preoperative and postoperative data. Factors affecting final visual acuity were investigated by multivariate linear regression analysis.

Results

Nineteen (90.5%) of the patients were men and 2 (9.5%) were women. The mean age was 34.6±10.8 (range, 19-65) years. Of the 21 patients, 16 (76.2%) had bilateral involvement. The mean time from symptom onset to surgery was 34.5±10.8 (range, 2-180) months. The mean postoperative follow-up time was 67.8±78.8 (range, 12-240) months.

Preoperative and intraoperative findings and surgical procedures are summarized in Table 1. None of the eyes had active periphlebitis during surgery. Ten (45.5%) of the 22 eyes had previously undergone laser photocoagulation. Additional laser was applied to these eyes and 360° laser photocoagulation was applied to the remaining eyes (54.5%) to achieve panretinal photocoagulation.

Revision surgery was required once in 3 eyes (13.6%) and twice in 1 eye (4.6%) due to recurrent/new retinal detachment. At last examination, retinal reattachment without tamponade was achieved in 3 (13.6%) of these eyes, while 1 eye (4.6%) developed grade C proliferative vitreoretinopathy (PVR-C) followed by phthisis bulbi. Other than the eyes that underwent revision surgery, 1 eye (4.6%) developed total retinal detachment that was considered inoperable after the first surgery. PVR-C was observed in this eye during the first surgery. Peroperative or postoperative PVR-C was detected in a total of 3 patients. In the third eye with PVR-C, a single revision surgery resulted in retinal attachment without tamponade and visual acuity of 1.0 logMAR. Final anatomic success was achieved in 20 eyes (90.9%). In one eye (4.6%), the epimacular membrane that developed after the first operation was peeled. During the first surgery, phacoemulsification and IOL implantation were performed in 1 eye (4.6%) and pars plana lensectomy was performed in 3 eyes (13.6%). One of the eyes that had pars plana lensectomy later underwent scleral-fixated IOL implantation. Three eyes that underwent pars plana lensectomy and 1 eye that underwent dislocated IOL removal were aphakic at final examination. Postoperative complications and final examination findings are summarized in Table 2.

The mean BCVA was significantly higher at final examination (0.6±0.9 logMAR) compared to the preoperative period (1.8±1.1 logMAR) (p<0.001). After surgery, BCVA remained stable (≤1 Snellen line change) in 4 eyes (18.2%), increased in 16 eyes (72.7%), and decreased in 2 eyes (9.1%). There was no significant difference in intraocular pressure

between preoperative (14.9±6.3 mmHg) and final examination (13.6±4 mmHg) (p=0.5).

When surgical indications were grouped as VH and TRD ± RRD, the mean final BCVA was better in the VH group (0.3±0.34 logMAR) than in the TRD ± RRD group (0.9±1.1 logMAR), but the difference was not statistically significant (p=0.1). In the multivariate linear regression analysis, presence of preoperative or postoperative PVR-C, macular detachment, postoperative neovascular glaucoma, and longer preoperative disease duration were negatively associated with postoperative visual acuity, while preoperative visual acuity was positively correlated with postoperative visual acuity (Table 3). Final BCVA was not associated with presence of preoperative NVE, NVD, rubeosis iridis, or total posterior hyaloid detachment; preoperative laser application; surgical indication (VH, TRD, TRD ± RRD), sclerotomy diameter (20-gauge/23-gauge); preoperative lens status; and presence of preoperative or postoperative epimacular membrane, perioperative iatrogenic retinal tear, and postoperative hypotony, cystoid macular edema, and new or recurrent retinal detachment.

Discussion

Among patients with Eales' disease, the proportion of males has been reported as 71-100% and the prevalence of bilateral involvement as 72-90%.[1,2,3,9,17] The rates of male patients and bilateral involvement in our study were consistent with the literature. The prevalence rates of NVE, NVD, and NVD + NVE have been reported as 33-73%, 1-4%, and 1-3%, respectively, in Eales' disease.[1,2,3] Consistent with the literature, these rates in the present study were 63.6%, 4.6%, and 4.6%, respectively. Recurrent VH attacks can be caused by these neovascular vessels, or may also be associated with necrosis in the vascular wall and leakage from the peripheral capillaries due to severe vasculitis.[18] Early vitrectomy results in better visual outcome in eyes with persistent VH.[14,19] Poor visual results have been observed in eyes that developed TRD, combined TRD + RRD, and neovascular glaucoma.[2] Shukla et al.[15] found that the mean final BCVA of eyes operated due to VH was higher than that of eyes operated due to retinal detachment, but the difference was not statistically significant. Similarly, although the visual outcome was better in the isolated VH group compared to the TRD ± RRD group in the present study, this difference was not significant. In addition, the presence of preoperative VH, TRD, and TRD ± RRD was not associated with final visual acuity in our study. The presence of PVR-C, macular detachment, postoperative neovascular glaucoma, preoperative low visual acuity, and longer preoperative disease duration were found to be associated with poor visual outcome.

There are marked differences among publications in the literature regarding post-vitrectomy visual results in Eales' disease. The proportion of eyes with decreased BCVA after vitrectomy was reported as 47% by Atmaca et al.[1], whereas Khanduja et al.[16] reported this rate to be 5%. Shukla et al.[15] determined that 60.6% of eyes had a final BCVA of 20/40

Table 1. Preoperative and intraoperative findings and primary surgical procedure	
Findings and surgical procedure	**n=22**
Findings	
BCVA	
LogMAR (mean ± SD)	1.8±1.1
Snellen (mean)	20/1262
Intraocular pressure, mmHg (mean ± SD)	14.9±6.3
Preoperative laser photocoagulation, n (%)	10 (45.4)
Total posterior hyaloid detachment, n (%)	2 (9.1)
NVE, n (%)	14 (63.6)
NVD, n (%)	1 (4.6)
NVE + NVD, n (%)	1 (4.6)
Rubeosis iridis, n (%)	1 (4.6)
Lens status, n (%)	
Clear lens	19 (86.4)
Cataract	2 (9.1)
Pseudophakic	1 (4.6)
Epimacular membrane, n (%)	4 (18.2)
Iatrogenic retinal tear, n (%)	5 (22.7)
PVR grade C, n (%)	1 (4.6)
Macula-involving detachment, n (%)	5 (22.7)
Surgical indications	
Isolated VH, n (%)	10 (45.4)
TRD, n (%)	9 (40.1)
TRD + RRD, n (%)	3 (13.6)
Surgical procedure	
23 gauge/20 gauge	4/18
PPV + retinal laser photocoagulation, n (%)	22 (100)
Phacoemulsification and IOL implantation, n (%)	1 (4.6)
Pars plana lensectomy, n (%)	3 (13.6)
Dislocated IOL removal, n (%)	1 (4.6)
Epimacular membrane peeling, n (%)	4 (18.2)
Internal limiting membrane peeling, n (%)	5 (22.7)
Retinotomy/retinectomy, n (%)	3 (13.6)
Circumferential scleral band	2 (9.1)
Tamponade, n (%)	
None	4 (18.2)
Air	10 (45.4)
SF_6	2 (9.1)
C_3F_8	1 (4.6)
Silicone oil	5 (22.7)

BCVA: Best corrected visual acuity, IOL: Intraocular lens, NVD: Disc neovascularization, NVE: Retinal neovascularization, PPV: Pars plana vitrectomy, PVR: Proliferative vitreoretinopathy, RRD: Rhegmatogenous retinal detachment, TRD: Tractional retinal detachment, VH: Vitreous hemorrhage, SD: Standard deviation

Table 2. Postoperative findings	
Findings	**n=22**
Follow-up time, months (mean ± SD, minimum-maximum)	67.8±78.8 (12-240)
Visual acuity	
LogMAR (mean ± SD)	0.6±0.9
Snellen (mean)	20/88
≥20/40, n (%)	12 (54.5)
≥20/200, n (%)	20 (90.9)
Light perception to 20/400, n (%)	2 (9.1)
Primary anatomical success, n (%)	18 (81.8)
Final anatomical success, n (%)	20 (90.9)
Intraocular pressure, mmHg (mean ± SD)	13.6±4
Recurrent/new VH, n (%)	0
Recurrent/new retinal detachment, n (%)	4 (18.2)
PVR grade C, n (%)	3 (13.6)
Epimacular membrane, n (%)	2 (9.1)
Cystoid macular edema, n (%)	5 (22.7)
Hypotension, n (%)	2 (9.1)
Neovascular glaucoma, n (%)	1 (4.6)
Cataract development, n (%) (Of 19 preoperatively phakic eyes)	7 (36.8)
Lens status, n (%)	
Clear lens	9 (40.9)
Pseudophakic	9 (40.9)
Aphakic	4 (18.2)
PVR: Proliferative vitreoretinopathy, VH: Vitreous hemorrhage, SD: Standard deviation	

Table 3. Multivariate linear regression analysis of factors affecting final BCVA

	B	P	95% CI
PVR grade C	0.58	<0.001	1.11, 1.79
Macula-involving detachment	0.42	<0.001	0.62, 1.09
Preoperative BCVA	0.28	<0.001	0.13, 0.32
Postoperative neovascular glaucoma	0.29	<0.001	0.65, 1.79
Preoperative disease duration	0.14	0.02	0.001, 0.006

B: Regression coefficient, BCVA: Best corrected visual acuity, PVR: Proliferative vitreoretinopathy, CI: Confidence interval
*As BCVA was analyzed as logMAR, positive B values indicate a negative relationship. In the preoperative BCVA and final BCVA relationship, positive B values indicate a positive relationship since they are both logMAR.

or better, while this rate was 26% in a study by El-Asar and Al-Kharashi.[19] Khanduja et al.[16] reported that 77.6% of eyes had a final BCVA of 6/9 or better. The proportion of eyes with final BCVA worse than 20/200 was 6.7% in the study by Al-Astrar and Al-Kharashi[19] and 22.5% in the study by Shukla et al.[15] Postoperative vision was increased in 72% of the eyes in our study and decreased in 9.1%. Final BCVA reached 20/40 or higher in 54.5% of the eyes and was lower than 20/200 in 9.1% of the eyes. This discrepancy between studies may be due to differences in disease severity. The proportion of patients operated for retinal detachment was 10.6% in the study by Khanduja et al.[16], 31% in the study by Shukla et al.[15], and 53.7% in our study.

As with visual results, there are also differences between studies in terms of anatomic results. The development of VH and retinal detachment after the first surgery was reported in 9.2% and 2.6% of cases in the study by Khanduja et al.[16] and in 7% and 9.8% of cases in the study by Shukla et al.[15], respectively. Shukla et al.[15] performed revision surgery on 18.3% of the eyes and the surgical failure rate was 15.5%. Khanduja et al.[16] reported a surgical failure rate of 6.5%. In our study, none of the patients developed VH after surgery. The prevalence of new or recurrent retinal detachment was 18.2%. Only these patients were reoperated, and the surgical failure rate was 9.1%. Considering that a larger proportion of eyes were operated for TRD ± RRD compared to other studies, these rates are comparable to those in the literature. Cataract development was reported at rates of 24-37% in similar studies.[15,16] Consistent with these studies, this rate was 36.8% in the present study.

Another difference among studies investigating vitrectomy results in Eales' disease is the presence of total posterior hyaloid detachment, which has been reported in previous studies at rates ranging between 11.5% and 85%.[14,15,16] Although Shukla et al.[15] determined the absence of total posterior hyaloid detachment to be a poor prognostic factor, it was not found to be associated with visual outcome in our study.

Study Limitations

Limitations of the study include the small number of patients, the retrospective design, and the long study period. Prospective studies including larger samples may elucidate controversial issues.

Conclusion

In Eales' disease, good visual results can be achieved with timely surgery if detachment does not involve the macula and PVR-C does not develop pre- or postoperatively. Performing 20-gauge or 23-gauge vitrectomy is not associated with visual outcome.

Ethics

Ethics Committee Approval: The study protocol was designed in accordance with the Declaration of Helsinki and approved by the Şişli Memorial Hospital Ethics Committee.

Informed Consent: Retrospective study.

Peer-review: Externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: M.K., Concept: M.G.E., M.K., S.A., Design: M.G.E., M.K., S.A., Data Collection or Processing: M.G.E., M.H., I.B.S.M., Analysis or Interpretation: M.G.E., M.K., S.A., Literature Search: M.G.E., M.H., I.B.S.M., Writing: M.G.E.

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

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