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LETTER TO THE EDITOR

Multimodal Imaging Findings and Long-Term Surgical and Non-Surgical Treatment Outcomes of Retinal Vasoproliferative Tumours in Korean Patients

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Retinal vasoproliferative tumours (RVPTs) are benign retinal vascular lesions characterised by elevated, reddish-pink masses, primarily located in the pre-equatorial region of the retina [1]. These tumours, although generally considered non-malignant, pose significant clinical challenges due to their potential to cause secondary complications that may impair vision. The condition was first described as presumed acquired retinal haemangiomas by Shields et al. in 1983 and was formally named RVPTs in 1995 [2, 3]. Since then, our understanding of RVPTs has evolved, yet gaps remain regarding their aetiology, optimal treatment strategies and long-term visual outcomes. Although typically idiopathic, RVPTs can also arise secondary to systemic conditions or ocular diseases such as Coats' disease, uveitis and toxoplasmosis [3]. Despite their benign classification, RVPTs may require invasive treatment when vision-threatening complications such as macular oedema, vitreous haemorrhage, or retinal detachment develop [4].

Our study retrospectively analysed the clinical characteristics, treatment modalities and long-term outcomes of RVPTs in Korean patients from two tertiary referral hospitals. Given the limited number of studies focusing on RVPTs in Asian populations, our research contributes valuable insights into this condition. Data from 18 eyes of 17 patients over a median follow-up of 33.34 months were reviewed (Table 1). The study identified a predominance of solitary tumours (88.9%), primarily located in the inferior and superotemporal quadrants, with most tumours being peripherally located (85.0%). These findings are consistent with previously published reports in Western populations [4], suggesting that the anatomical distribution and prevalence of RVPTs may be relatively uniform across different ethnic groups.

Notably, tumour regression was observed in 77.8% (14 out of 18 eyes) of treated eyes, whereas stationary tumours were noted in 22.2% (4 out of 18 eyes) of cases under observation (Table 2). This underscores the natural variability in disease progression, with some lesions remaining stable over extended periods, whereas others respond well to intervention. Treatment approaches varied, with 22.2% of eyes (4 out of 18 eyes) requiring no intervention, 27.8% (5 out of 18 eyes) receiving non-surgical management, and 50.0% (9 out of 18 eyes) undergoing surgical treatment. The decision to proceed with surgery was guided by the presence of vision-threatening complications such as epiretinal membrane, vitreous haemorrhage and retinal detachment, which were consistent with the findings of previous studies [5]. The mean interval between diagnosis and surgical intervention was 5.65 months, highlighting the importance of timely identification of high-risk cases to optimise visual outcomes.

Surgical management predominantly involved pars plana vitrectomy, sometimes requiring scleral encircling or Ruthenium-106 plaque brachytherapy. Although these interventions were generally effective in addressing the underlying pathology, postoperative complications were not uncommon. During follow-up,

TABLE 1 | Ocular and tumour characteristics of 18 eyes from 17 patients with retinal vasoproliferative tumours.

Patient/eye number	Laterality	Tumour number	Aetiology type	Tumour location	Tumour quadrant	Tumour maximal basal diameter, mm	Tumour thickness, mm	CMT at initial, μm	CMT after treatment, μm	Associated findings
1/1	UL	1	Idiopathic	Equator	Inferior	3.89	1.63	268	280	Exudation
2/2	UL	2 3	Secondary (Uveitis)	Periphery Equator	Inferonasal Inferonasal	6.21 2.52	N/A N/A	276	282	Dilated vessels, preretinal fibrosis
3/3	UL	4	Idiopathic	Periphery	Superotemporal	2.85	1.72	271	284	Retinal haemorrhage, exudation, epiretinal membrane
4/4 4/5	BL	5 6	Idiopathic Idiopathic	Periphery Periphery	Temporal Temporal	4.79 3.44	1.94 1.28	281 275	283 276	Peripheral degeneration peripheral degeneration
5/6	UL	7	Idiopathic	Periphery	Superotemporal	4.54	1.24	309	314	RPE proliferation, exudation
6/7	UL	8	Idiopathic	Periphery	Inferonasal	5.73	N/A	345	391	Retinal haemorrhage, exudation
7/8	UL	9	Idiopathic	Periphery	Inferior	4.19	2.2	404	402	Exudation, epiretinal membrane, dilated vessels
8/9	UL	10	Idiopathic	Equator	Inferior	2.6	N/A	263	260	Dilated vessels, tortuous vessels, epiretinal membrane
9/10	UL	11	Idiopathic	Periphery	Inferotemporal	6.95	N/A	583	245	Retinal haemorrhage, preretinal fibrosis, vitreous haemorrhage, macular oedema, epiretinal membrane

(Continues)

TABLE 1 | (Continued)

Patient/ eye number	Laterality	Tumour number	Aetiology type	Tumour location	Tumour quadrant	Tumour maximal basal diameter, mm	Tumour thickness, mm	CMT at initial, μm	CMT after treatment, μm	Associated findings
10/11	UL	12	Secondary (Toxo)	Periphery	Inferotemporal	10.85	2.52	673	564	Vitreous haemorrhage, exudation, RPE proliferation
11/12	UL	13	Idiopathic	Periphery	Inferior	4.27	1.94	908	384	Macular oedema, epiretinal membrane, tortuous vessels
12/13	UL	14	Secondary (Coats)	Periphery	Superotemporal	7.6	1.07	299	363	Retinal atrophy, VMTS
13/14	UL	15	Secondary (Uveitis)	Periphery	Superotemporal	2.21	5.77	336	281	Exudation, epiretinal membrane, macular oedema
14/15	UL	16	Idiopathic	Periphery	Inferior	5	N/A	425	338	Preretinal fibrosis, subretinal fluid
15/16	UL	17	Idiopathic	Periphery	Superotemporal	5.1	N/A	298	290	Retinal haemorrhage, exudation, dilated vessels, tortuous vessels, subretinal fluid
16/17	UL	18 19	Secondary (Coats)	Periphery Periphery	Temporal Temporal	4.16 4.08	N/A N/A	480	286	Retinal haemorrhage, subretinal fluid, retinal tear, epiretinal membrane
17/18	UL	20	Idiopathic	Periphery	Superior	4.3	2.75	299	319	Vitreous opacity, subretinal fluid, exudation, exudative retinal detachment

Note: Some eyes and tumours showed more than one finding.
Abbreviations: BL, bilateral; CMT, central macular thickness; N/A, not applicable; RPE, retinal pigment epithelium; UL, unilateral; VMTS, vitreomacular traction syndrome.

TABLE 2 | Treatment modality and anatomical outcomes related to tumour activity of 18 eyes from 17 patients with retinal vasoproliferative tumours.

Patient/ Eye number	Laterality	Tumour number	Nonsurgical treatment administered	Surgical treatment administered	Indication for surgical treatment	Time to surgical treatment (months)	Tumour-activity-related anatomical outcome	Complication	Additional treatment d/t complication
1/1	UL	1	IVAI, FLP	—	—	—	Regressed	ERM w/o foveal flattening	—
2/2	UL	2 3	Observation Observation	—	—	—	Stationary Stationary	ERM w/o foveal flattening	—
3/3	UL	4	IVAI, FLP	—	—	—	Regressed	—	—
4/4 5	BL	5 6	Observation Observation	—	—	—	Stationary Stationary	—	—
5/6	UL	7	Observation	—	—	—	Stationary	—	—
6/7	UL	8	FLP	—	—	—	Regressed	ERM w/o foveal flattening	—
7/8	UL	9	CrT, IVAI	—	—	—	Regressed	ERM w/o foveal flattening	—
8/9	UL	10	IVAI	—	—	—	Regressed	—	—
9/10	UL	11	IVAI, FLP, CrT, PSTI	PPV	VH, ERM, TRD	1.61	Regressed	MH	PPV
10/11	UL	12	—	PPV	VH	1.94	Regressed	ERM (fibrotic change)	
11/12	UL	13	CrT	PPV	ERM	1.25	Regressed	CME	—
12/13	UL	14	CrT	PPV	VMTS, ERD	2.10	Regressed	ERM w/o foveal flattening	—
13/14	UL	15	IVTI, IVAI	PPV	VO	27.00	Regressed	—	—
14/15	UL	16	CrT, FLP, IVAI	PPV	ERM	0.66	Regressed	—	—
15/16	UL	17	CrT, IVAI, IVDI	PPV, SE	ERM. PVR	0.89	Regressed	ERM w/o foveal flattening	—
16/17	UL	18 19	IVAI, IVDI, CrT IVAI, IVDI, CrT	PPV PPV	ERM ERM	11.41 11.41	Regressed Regressed	ERM w/o foveal flattening	—
17/18	UL	20	IVAI, CrT	Ru-106	Tumour progression control	9.73	Regressed	ERM w/o foveal flattening	—

Note: Some eyes and tumours showed more than one finding.
Abbreviations: BL, bilateral; CME, cystoid macular oedema; CrT, cryotherapy; ERD, exudative retinal detachment; ERM, epiretinal membrane; FLP, focal laser photocoagulation; IVAI, intravitreal anti-vascular endothelial growth factor injection; IVDI, intravitreal dexamethasone implant injection; IVTI, intravitreal triamcinolone injection; MH, macular hole; PPV, pars plana vitrectomy; PSTI, posterior subtenon triamcinolone injection; PVR, proliferative vitreoretinopathy; Ru-106, Ruthenium-106 plaque brachytherapy; SE, scleral encircling; UL, unilateral; VH, vitreous haemorrhage; VMTS, vitreomacular traction syndrome; VO, vitreous opacity.

five eyes out of 9 (55.6%) in the non-surgical group remained complication-free, whereas four eyes (44.4%) developed epiretinal membrane without foveal distortion. In the surgical group, seven eyes out of 9 (77.8%) developed complications, including epiretinal membrane, cystoid macular oedema and macular hole. Only two eyes (22.2%) in the surgical group remained complication-free. Figures S1 and S2 present the overall treatment outcomes of RVPTs in two representative cases.

The surgical group had a notably higher initial central macular thickness (CMT) ($477.89 \pm 210.18\,\mu m$) compared to the non-surgical group ($299.16 \pm 47.05\,\mu m$; $p = 0.008$), which was associated with macular structural abnormalities. Although CMT values were similar at the final follow-up (surgical: $341.11 \pm 94.21\,\mu m$; non-surgical: $308.00 \pm 52.14\,\mu m$; $p = 0.340$), visual outcomes in the surgical group remained inferior (surgical: logMAR 0.59 ± 0.38, Snellen 20/48; non-surgical: logMAR 0.30 ± 0.14, Snellen 20/45; $p = 0.006$). This can be attributed to pre-existing macular pathology and a higher rate of complications (77.8% versus 44.4%), including macular distortion. Despite this, the surgical group still achieved a relatively favourable visual outcome, indicating the benign nature of the tumours.

Our findings align with previous literature on RVPTs regarding demographic trends and clinical presentations. However, we emphasise the necessity of surgical intervention in cases complicated by macular pathology, given its significant impact on visual prognosis. Patients who developed macular complications experienced greater degrees of vision loss, underscoring the critical role of close monitoring and timely surgical decision-making. Although our study provides valuable insights, we acknowledge certain limitations, including the relatively small sample size and retrospective design. Further studies with larger cohorts and prospective methodologies are required to establish optimal treatment strategies and refine clinical guidelines for managing RVPTs effectively.

In conclusion, RVPTs in Korean patients tended to manifest around the age of 50 years and were typically solitary and located in the inferonasal to superotemporal quadrants in a clockwise manner and at the periphery of the retina. RVPTs generally do not negatively affect vision, and they follow a benign course. However, 5.6% of cases required additional surgical treatment during the 48-month follow-up, highlighting the importance of sustained long-term monitoring for this tumour.

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Ethics Statement

This study was conducted in accordance with the tenets of the Declaration of Helsinki and was approved by the Institutional Review Board of Gangnam Severance Hospital (No. 3–2024-0481). The requirement for informed consent was waived by the Gangnam Severance Hospital Institutional Review Board because of the retrospective design of the study.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.