

Pars Plana Vitrectomy Combined with Endoresection of Choroidal Melanoma in 6 Cases

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Background

Recently enucleation has become uncommon as the first-choice therapy of choroidal melanoma (CM), because many kinds of eye-preservation therapies are available. They include several radiotherapies, transpupillary thermotherapy using semiconductor laser and surgeries (transscleral tumor resection and endoresection).^{1,2)} However complications such as vitreous hemorrhage, retinal detachment and neovascular glaucoma are not infrequent and they are important causes of visual loss, phthisis bulbi or enucleation.

Purpose

To report our pars plana vitrectomy combined with endoresection of CM in 6 cases with favorable results in order to preserve visual functions as much as possible and avoid enucleation.

TABLE 1. Clinical Features of the Patients Before Vitrectomy

Case	Age	Sex	Eye	VA (log MAR)	Eye-preservation therapy	Complications	Time until Vitrectomy (months)	Metastasis
1	25	F	Left	LP (+)	CPR	MC + SRD + Hypotony	39	No
2	29	F	Left	LP (-)	TTT×3 + Plaque (Ru)	MC + NVG + PVR	24	No
3	47	M	Left	HM	Plaque (Ru) + PEA-IOL+Vit×2	PVR (Silicon Oil Tamponade)	34	No
4	57	F	Right	LP (+)	Plaque (Ru) + TTT×2 + PEA-IOL	VH	25	No
5	49	M	Left	0.4	TTT×6	VO (pigments dispersion) + SRD	15	No
6	47	M	Right	CF	PC (around Tumor)	VH	11	No

F=female, M=male, VA=corrected visual acuity, LP=light perception, HM=hand motions, CF=counting fingers, CPR=charge particle radiotherapy, TTT=transpupillary thermotherapy, Plaque (Ru)=Ruthenium106, PEA-IOL=phacoemulsification+intraocular lens implantation, Vit=vitreotomy, PC=photocoagulation, MC=Mature Cataract, SRD=serous retinal detachment, NVG=neovascular glaucoma, PVR=proliferative vitreoretinopathy, VH=vitreous hemorrhage, VO=vitreous opacity

TABLE 2. Tumor Location and Size Before Vitrectomy

Case	Tumor location	Tumor size Diameter×Thickness (mm)
1	Anterior (T.S)	9×6.5
2	Anterior (T.I)	9×6
3	Anterior (T.S)	7.5×5
4	Anterior (T.S)	12×8
5	Posterior (N.I)	10×7
6	Anterior (N.S)	3×3

T.S=temporal superior, T.I=temporal inferior, N.S=nasal superior, N.I=nasal inferior

TABLE 3. Summary of Vitrectomy

Case	Additional procedures at vitrectomy	Pathological findings of vitreous body and tumor
1	① : PPL+ER+FAE+PC+SO ② (Re-RD): SOR+EC+LB+FAE+PC+SO	① : Cytology; Class I
2	① : PPL+MR+ER+PC+FAE+EC+SO ② (Re-RD): SOR+ER+MR+FAE+PC+SO	① : Cytology; Class I ② : Cytology; Class V
3	① : MR+ER+FAE+PC+SO ② : SOR+ER+FAE+PC+SF ₆	① : Cytology; Class I
4	① : ER+FAE×3+PC+EC+SO ② : SOR+PEA-IOL	① : Cytology; Class V ② : Cytology; Class I
5	① : none ② (Re-VH): ER+FAE+PC+SF ₆	① : Not Done ② : Biopsy; Spindle A cell type

PPL=Pars plana lensectomy, ER=endoresection, FAE=fluid-air exchange, PC=endolaserphotocoagulation, SO=silicone oil tamponade, SOR=SO-silicone oil removal, EC=encircling, LB=local scleral buckling, MR=membrane removal, ID=intraocular diathermy, SF₆=sulfur hexafluoride gas, PEA-IOL=phacoemulsification+intraocular lens implantation, Re-RD=recurrence of retinal detachment, Re-VH=recurrence of vitreous hemorrhage

TABLE 4. Latest Features of the Patients

Case	VA (log MAR)	Follow up after endoresection (months)	Tamponade	Intraocular recurrence of the tumor	Metastasis
1	LP(-)	20	SO	No	No
2	LP(-)	19	SO	No	No
3	2	18	SO	No	No
4	1.22	20	-	No	No
5	0.15	6	-	No	No
6	-0.08	123	-	No	No

VA=corrected visual acuity, LP=light perception, SO=silicone oil

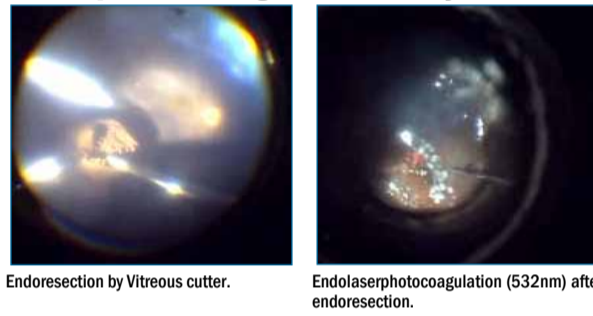
Case 1: 25-year-old woman

Chief complaint: OS) Visual field defect

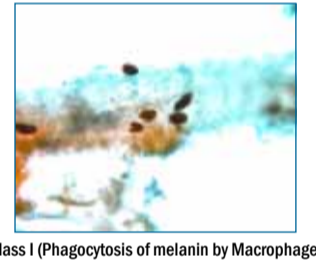
History:

- May 2002 She noticed CC and was diagnosed as CM
- July 2002 A charge particle radiotherapy using carbon ion was performed 70Gy.
- Sep 2005 During the follow-up following the charge particle radiotherapy, a hypotony caused by a retinal detachment and mature cataract were found. Vitrectomy was performed to prevent development of phthisis bulbi.
Pars plana lensectomy +endoresection +fluid-air exchange +endolaserphotocoagulation (532nm) +silicone oil tamponade
Cytology: Class I
- Feb 2006 A rhegmatogenous retinal detachment recurred and it was successfully cured.
Silicone oil removal +encircling +local scleral buckling +fluid-air exchange +endolaserphotocoagulation (532nm) +silicone oil tamponade
- Apr 2007 Neither metastasis nor recurrence of the tumor was found.

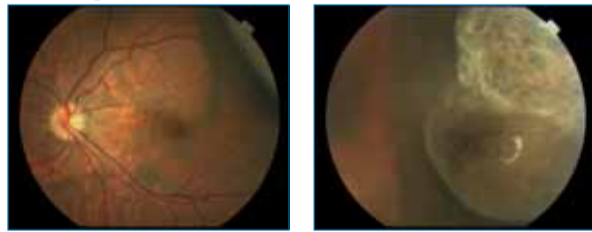
Fundus photos during the vitrectomy



Cytology at the first vitrectomy

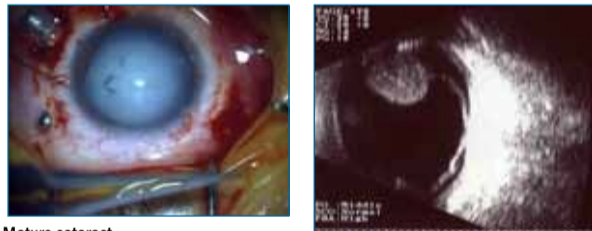


Fundus photos at the first visit



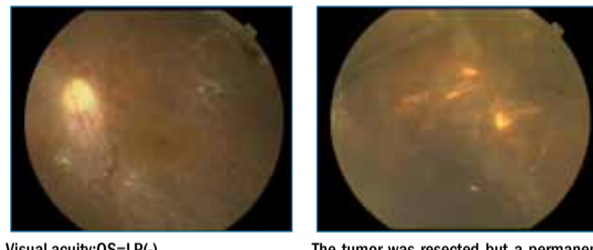
Visual acuity (log MAR): OS=0
Intraocular pressure: Td/Ts=14/16 mmHg
A tumor rich in melanin was observed in the temporal superior area. 9×6mm (Diameter×Thickness).

Findings before the vitrectomy



Mature cataract
A tumor of the similar size as the initial one and a retinal detachment continuous with it were observed.

Fundus photos at the latest visit (20 months after the procedure)



Visual acuity: OS=LP(-)
Intraocular pressure: Td/Ts=12/7 mmHg
Optic atrophy & A diffuse pigments dispersion on the retina.

Case 5: 49-year-old Man

Chief complaint: OS) Decreased vision & Metamorphopsia

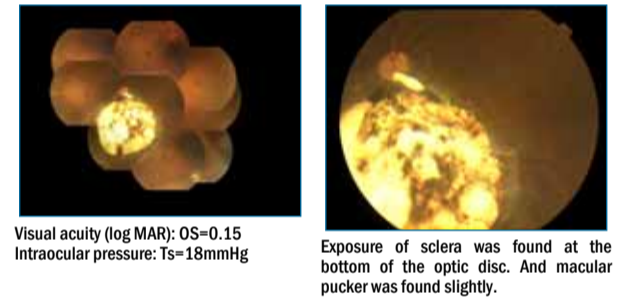
History:

- Sep. 2005 He noticed CC and was diagnosed as CM
- Oct. 2005~Sep. 2006 Transpupillary thermotherapy (TTT) was performed 6 times.
- Mar. 2006 Pigment dispersions from the tumor
- Dec. 2006 Because of growing tumor and decreasing vision, Vitrectomy was performed.
Endoresection +fluid-air exchange (3times) +endolaser photocoagulation (810nm) +encircling +silicone oil tamponade
cytology: class V
- Apr. 2007 Removal of silicone oil + PEA +IOL
cytology: class I
- May 2007 Neither metastasis nor recurrence observed.

Cytology at the first vitrectomy



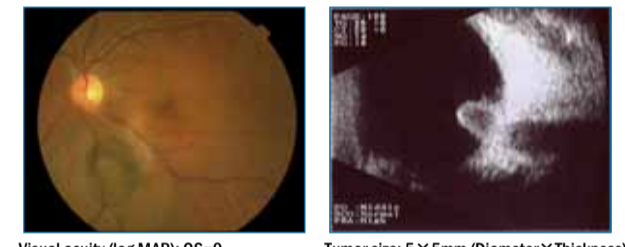
Fundus photos at the latest visit (6 months after the procedure)



Visual acuity (log MAR): OS=0.15
Intraocular pressure: Ts=18mmHg

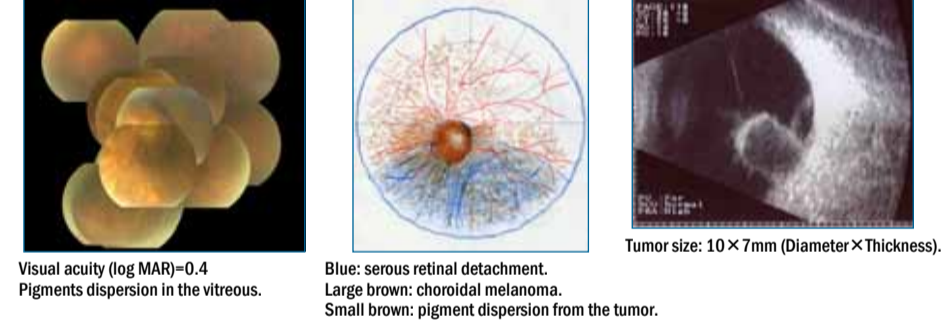
Exposure of sclera was found at the bottom of the optic disc. And macular pucker was found slightly.

Fundus photo and ultrasound examination at the first visit



Visual acuity (log MAR): OS=0
Intraocular pressure: Td/Ts=11/12 mmHg
A tumor rich in melanin was observed at the bottom of the optic disc.

Findings before the vitrectomy



Visual acuity (log MAR)=0.4
Pigments dispersion in the vitreous.
Blue: serous retinal detachment.
Large brown: choroidal melanoma.
Small brown: pigment dispersion from the tumor.

Tumor size: 10×7mm (Diameter×Thickness).

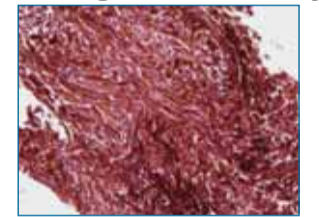
Case 6: 47-year-old Man

Chief complaint: OD) Decreased vision & Floaters

History:

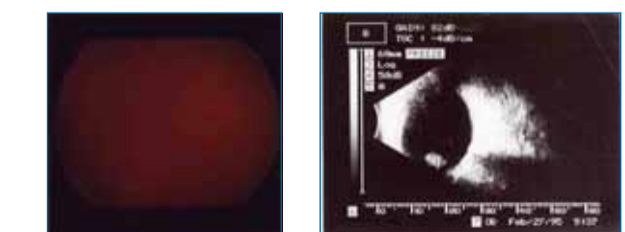
- Feb. 1995 He noticed CC and was diagnosed as vitreous hemorrhage and an intraocular tumor.
- Apr. 1995 A photocoagulation (590 nm) was performed around the tumor, when vitreous hemorrhage was partly cleared.
- Feb. 1996 A vitrectomy was performed to remove vitreous hemorrhage because of frequent recurrence of hemorrhage and decreased vision.
- May 1996 Recurrence of vitreous hemorrhage.
- Jun. 1996 Endoresection +fluid-air exchange +endolaserphotocoagulation (810nm) +SF₆ gas tamponade
Biopsy: Spindle A cell type
- Aug. 1998 PEA-IOL
- Aug. 2006 At 10 years after the endoresection, neither metastasis nor recurrence of the tumor has been found until the last observation.

Pathological Finding at 2nd vitrectomy



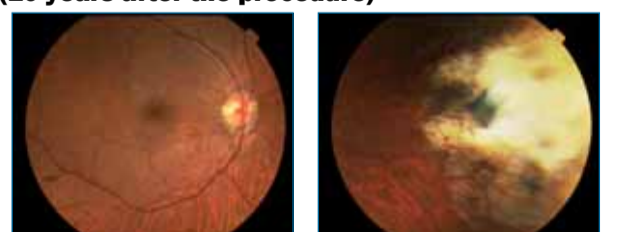
Spindle A cell type of malignant melanoma of the choroid. (H&E stain)

Fundus photo and ultrasound examination at the first visit



Visual acuity: OD=Counting fingers
Intraocular pressure: Td/Ts=15/15 mmHg
Extensive vitreous hemorrhage was found.

Fundus photos at the latest visit (10 years after the procedure)



Visual acuity (log MAR): OD=0.2
Intraocular pressure: Td/Ts=12/12mmHg
A part of the sclera was found at the area occupied by the tumor.

Summary

- ◆ Pars plana vitrectomy combined with endoresection of choroidal melanoma not involved with the macula was performed in 6 patients before or after eye-preservation therapies.
- ◆ Five of 6 patients underwent preoperative radiotherapy and/or laser therapy.
- ◆ The cytological results of 4 patients treated with preoperative radiotherapy were class I in 3 patients and class V in 1 patient.
- ◆ Viable malignant cells were found in all 2 patients treated with only preoperative laser therapy.
- ◆ Five of 6 patients required one or two times of vitrectomy to stabilize the intraocular condition.
- ◆ Three of 4 patients treated with preoperative radiotherapy required permanent silicone oil tamponade.
- ◆ Patients treated without preoperative radiotherapy tended to recover better visual acuities than those with it.
- ◆ In all 6 patients, their eyeballs were preserved successfully without recurrence and metastasis after the surgery.

Discussion

Pars plana vitrectomy for complications after eye-preservation therapy for CM. – Right or Wrong ?

1. The tumor resection by pars plana vitrectomy as the first treatment has been previously reported.⁴⁾
2. Pars plana vitrectomy with favorable prognosis was reported by Harbour et al.³⁾
3. Resection of large tumor in pars plana vitrectomy at early stages after the proton beam radiotherapy was reported to be associated with favorable prognosis by Bechrakis et al.⁶⁾
4. It has been almost fully understood that the pattern of chromosomal aberration in tumor cell is associated with the prognosis and recurrence, regardless of the therapy.⁷⁾
5. Quality of life (QOL) can be improved, even if the eyeballs are preserved without visual functions. And if visual functions can be restored, the patients must be much more happy.

Resection of tumor during pars plana vitrectomy. – Right or Wrong ?

1. Cytokines from the tumor combined with vitreous hemorrhage may increase the risk of retinal detachment with proliferative vitreoretinopathy and glaucoma.
2. Residual tumors may cause severe vitreous hemorrhage.
3. The tumor structure may make it difficult to perform retinopathy.
4. Complete removal of the tumor cells may make possible to prevent recurrence and complications.
5. It remains to be determined whether the current techniques and instruments for pars plana vitrectomy are enough to completely remove tumor cells and prevent recurrence.

Conclusion

By the vitrectomy combined with endoresection of choroidal melanoma, we might eradicate choroidal melanoma without causing metastasis, as well as preserve the eyeballs with various complications after eye-preservation therapies.

Acknowledgement

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References

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