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Case Report

Non-vitrectomizing vitreous surgery and adjuvant intravitreal tissue plasminogen activator for non-recent massive premacular hemorrhage

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Abstract

Massive premacular hemorrhage can cause sudden visual loss. We sought to evaluate the efficacy, safety and visual outcome of non-vitrectomizing vitreous surgery with intravitreal tissue plasminogen activator (t-pa) for long-lasting thick premacular hemorrhage. This retrospective, interventional study examined three consecutive eyes of three patients who received nonvitrectomizing vitreous surgery with intravitreal t-pa for the treatment of non-recent massive premacular hemorrhage. Detailed ophthalmoscopic examinations were performed pre- and postoperatively to evaluate the visual outcome, the resolution of premacular hemorrhage and the changes in lenticular opacity.In all three eyes, the premacular hemorrhage cleared after the procedure. Final best-corrected visual acuities improved from 6/30 to 6/10 in patient 1, 2/60 to 6/4 in patient 2, and 3/60 to 6/6 in patient 3. Operated and fellow eyes did not differ in terms of nuclear sclerosis. No complications from the procedure were noted.In these selected cases, nonvitrectomizing vitreous surgery with intravitreal t-pa was an effective and safe alternative treatment for non-recent massive premacular hemorrhage.

Keywords: intravitreal injection; nonvitrectomizing vitreous surgery; premacular hemorrhage; tissue plasminogen activator; vitrectomy

1. Introduction

Premacular hemorrhage, or hemorrhage into the subhyaloid or sub-internal limiting membrane (sub-ILM) space at the macular area, can cause sudden visual loss. It results from a variety of diseases, including diabetic retinopathy, retinal arterial macroaneurysm, Valsalva maculopathy, hematologic disorders, trauma and surgical complications.[1,2] Patients with premacular hemorrhage can be managed with observation, while vitrectomy is also an option for nonclearing hemorrhage. However, the hemorrhage may take a long time to clear spontaneously, and it may result in late macular traction and permanent macular damage.[1] Vitrectomy may result in post-vitrectomy nuclear sclerosis.[3]

In recent years, several alternative treatments have been proposed to accelerate blood clearance, such as membranotomy with different laser modalities, intravitreal injection of tissue plasminogen activator (t-pa) and pneumatic displacement.[2,4–6] Outcomes vary by approach. Laser membranotomy, which creates an opening to drain the hemorrhage, is reported effective in patients with premacular hemorrhage of no longer than 21 days' duration; however, it may have limited effects and take longer to drain in patients with hemorrhages of more than two weeks' duration.[7]

In 1999, Saito et al.[8] advocated nonvitrectomizing vitreous surgery for macular pucker to prevent postoperative nuclear sclerosis; the procedure consisted of epi-retinal membrane peeling without cutting or removing the vitreous. We applied this concept to manage premacular hemorrhage, and a bent needle was used to create a membranotomy to immediately drain the blood into the vitreous cavity. The results were favorable in patients with recent premacular hemorrhage;[9] however, we observed slow or no drainage through the

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opening in patients with non-recent hemorrhage longer than 2 weeks. Consequently, we added adjuvant intravitreal t-pa to promote blood drainage in sustained hemorrhage lasting longer than two weeks. In this retrospective series, we evaluated the resolution of hemorrhage, visual outcome and changes in lenticular opacity after surgery.

2. Case report

The study was approved by the hospital institutional review board (IRB) committee. Three eyes of three consecutive patients with thick premacular hemorrhage secondary to different causes were enrolled in this study between November 2007 and August 2008 (Table 1). Only massive, subhyaloid or subinternal limiting membrane (sub-ILM) hemorrhage blocking the view of the fovea was considered for treatment. Premacular hemorrhages along with other complicated situations were all excluded, including retinal detachment, vitreous hemorrhage, proliferative vitreoretinopathy, proliferative diabetic retinopathy and significant cataracts that interfered with intraoperative visibility.

Details from preoperative ophthalmological examinations were recorded, including visual acuity, intraocular pressure, slit lamp biomicroscopy, indirect ophthalmoscopy and fundus photographs after dilation of the pupils with 10% phenylephrine and 1% tropicamide. After the procedure was explained, informed consent was obtained from all patients, and all surgical procedures were performed by the same surgeon (TT Wu).

We performed the procedure with the patient in the supine position under local anesthesia. After prepping the eye with 5% betadine, nonvitrectomizing vitreous surgery was done using transconjunctival sutureless 25-gauge vitrectomy technique without creating an infusion port. The trocar puncture and cannula insertion were made at the pars plana, only in the superotemporal and superonasal quadrants. Through the cannula, a fiberoptic light source and a bent 25-gauge needle filled with 50 μg/0.1 ml t-pa were introduced while using a hand-held vitrectomy lens. Without cutting the vitreous or performing any other intraocular maneuver, we used the bent needle to perform the membranotomy directly. The created opening on the anterior surface of the membrane provided an access for subhyaloid or sub-ILM hemorrhage to enter the vitreous cavity. At the conclusion of the procedure, we injected 50 μg/0.1 ml t-pa through the needle. After the cannulas and their plugs were withdrawn one after the other, the scleral wounds sealed without wound leaks. All patients were examined at 1 day, 1 week, 3 weeks, 5 weeks, and 3 months postoperatively, and then every 3 months thereafter. Slit lamp examination and indirect ophthalmoscopy were performed at every visit. The efficacy and outcome of the procedure were assessed by the drainage and clearing of the premacular hemorrhage, visual improvement and changes in lenticular opacity.

The recorded data for all patients included the following: gender, age, lens status, cause and duration of hemorrhage, fundus photographs, preoperative best-corrected visual acuity and postoperative best-corrected visual acuity at each follow-up time point. We graded lens opacity using the scale reported previously by Thompson et al.[3] : 0, clear lens; 0.50, trace cataract; 0.75, minimal cataract; 1.00, mild (judged to have no effect on visual acuity); 2.00, moderate (decreasing visual acuity, but good view of retina by contact lens biomicroscopy); 3.00, moderately severe (impaired visual acuity and some distortion or impaired view of retina); and 4.00, severe (very poor view of retina).

Table 1 provides a summary of the collected data. Of the three patients, one was a 27-year-old female and two were 52-year-old males. All three eyes were phakic. Causes of premacular hemorrhage were retinal arterial macroaneurysm, head injury and ocular trauma. The time to surgery ranged from 15 to 35 days. Preoperative visual acuities ranged from 2/60 to 6/30. After nonvitrectomizing vitreous surgery with intravitreal t-pa, final vision improved to 6/10, 6/4, and 6/6.

Patient 1 was a 52-year-old male with a history of poorly controlled hypertension who was evaluated because of blurred vision in his left eye for more than one month. His best-corrected visual acuity was 6/6 in the right eye and 6/30 in the left eye, and grade of nuclear sclerosis was 0.5 in both eyes. Dilated fundus examination revealed retinal arterial macroaneurysm with premacular hemorrhage of 11 disc areas in the left eye (Fig. 1A). Faint vitreous hemorrhage was noticed soon after the operation (Fig. 1B), and the sclerotomy wound sealed well without signs of hypotony or endophthalmitis. Vision recovered to 6/10 in the left eye, and the residual vitreous hemorrhage disappeared completely in two months (Fig. 1C). Both vision and lens status remained stable during three years of follow-up.

Table 1
Clinical characteristics of patients with non-recent premacular hemorrhage before and after non-vitrectomizing vitreous surgery and intravitreal t-pa.

Patient	Sex/Age (years)	Eye	Cause	Duration of symptoms (days)	Size (DD)	BCVA		Grade of nuclear sclerosis*		Vitreous clear-up time (months)	Follow-up (months)
						Initial	Final	Initial	Final		
1	M/52	L	RAM	35	11	6/30	6/10	0.5	0.5	2	36
2	F/27	R	Terson syndrome	30	10	2/60	6/4	0	0	2	24
3	M/52	L	Ocular injury	15	9	3/60	6/6	0.75	0.75	2	30

F, female; M, male; R, right eye; L, left eye; RAM, retinal arterial macroaneurysm; DD, disc diameter; BCVA, best-corrected visual acuity.

* Degree of nuclear sclerosis was graded according to the scale reported by Thompson et al.[3] at initial and final examinations: 0, clear lens; 0.50, trace cataract; 0.75, minimal cataract.