Visual prognosis and pars plana vitrectomy indication in preretinal hemorrhages

Unal M\textsuperscript{1}, Ayata A\textsuperscript{1}, Sonmez M\textsuperscript{2}, Tatlipinar S\textsuperscript{1}, Ersanli D\textsuperscript{1}

Gulhane Military Medical Academy, Haydarpasa Training Hospital, Department of Ophthalmology\textsuperscript{1}, Istanbul, Turkey
Eskisehir Military Hospital, Departments of Ophthalmology \textsuperscript{2}, Eskisehir, Turkey

Abstract. The aim of this study is to determine the indications of primary pars plana vitrectomy and clinical and visual prognosis of preretinal hemorrhages. Primary pars plana vitrectomy was done to 14 diabetic retinopathy patients with preretinal hemorrhage during the laser photocoagulation and 8 patients with traumatic preretinal hemorrhages which were not resolved in 3 to 6 weeks period. The patients were interpreted by means of surgical and hemorrhagic complications, hematological diseases and visual prognosis postoperatively. Clear vitreous was obtained in all cases while macular edema in 12 cases, retinal ischemic places and neovascularization in 6 of 14 diabetic cases were seen. Laser photocoagulation was applied to all cases. Hematological disease was not seen in any traumatic cases. Preoperative visual acuities were between P+, P+ and 0.1 while 0.2 and 0.9 postoperatively. Primary pars plana vitrectomy is a good alternative in traumatic persistent preretinal hemorrhages to prevent blood toxicity and in diabetic retinopathies with preretinal hemorrhages to allow laser photocoagulation.

Keywords: Preretinal hemorrhage, pars plana vitrectomy.

Sub-innerlimiting membrane (sub-ILM) or subhyaloid hemorrhages may appear secondary to retinal vascular diseases (e.g., diabetic retinopathy, retinal macroaneurysms, and retinal vein occlusions), Valsalva maneuver and trauma [1-10]. Main symptom of all these disorders is the acute central visual loss. Resorption of the blood may take months although it may be relatively faster in subhyaloid hemorrhages compared to sub-ILM ones [5,8-10].

Prognosis is better in hemorrhages caused by valsalva retinopathy, traumatic vascular rupture and Terson’s syndrome, i.e. mechanical causes rather than primary vascular pathologies, compared to diabetes and macroaneurysms. Approach to patients with proliferative diabetic retinopathy is particularly more critical because tractional macular detachment may occur as early as 5 weeks, and hemorrhage may mask neovascularization, diabetic macular edema and epiretinal membrane. Moreover, toxic effect of long-standing preretinal hemorrhage may result in permanent visual loss [1,2,8,10].

Nd-YAG laser which has been started to use since early 1980’s for puncturing ILM or posterior hyaloid especially in valsalva retinopathy or Terson’s syndrome is accepted as the primary choice of treatment compared to observation [1,2,9-13]. On the other hand primary pars plana vitrectomy is treatment of choice in diabetic patients with dense premacular hemorrhages because blood may mask retinal neovascularizations, macular edema, and capillary nonperfusion and may cause tractional macular detachment.

Materials and methods

Twenty-two patients who referred to our retina clinic between 1996 and 2007 were included in this study. Inclusion criteria were;

a. Preretinal hemorrhages (subhyaloid and sub-ILM) and diagnosis of PDR

b. A premacular hemorrhage persisting longer than one month duration.

Out of the 14 cases in group 1, ten had follow-up in our retina clinic as PDR; rest of the cases did not follow up although they had DR diagnosis. Dia-
abetic premacular hemorrhage patients with accompanying tractional retinal detachment, rhegmatogenous retinal detachment, recurrent vitreous hemorrhage, macular hole or age-related macular degeneration were not included. Traumatic premacular hemorrhages with associated penetrating trauma, lens damage was not included in the study. Preoperative visual acuity, fundus photographs and fluorescein angiographies were obtained at presentation and follow-up visits.

All patients underwent three-port PPV, removal of posterior hyaloid and preretinal hemorrhage. One case had additional ERM removal. Endolaser was applied when indicated. All patients received topical steroid and antibiotic drops postoperatively. All postoperative complications were recorded. Macular edema detected shortly after surgery were treated with laser photocoagulation.

**Results**

Average age of 14 cases with premacular hemorrhage associated with DR was 65.3 (range; 62-71) years. There were 10 male and 4 female patients. Pre- and postoperative visual acuities are shown in Table 1.

| Table 1. Preoperative and postoperative visual acuity of the diabetic cases |
|-----------------------------|-----------------------------|
|                            | Preoperative | Postoperative |
| FC                          |    4          |      -        |
| 0,1                         |    4          |      -        |
| 0,2                         |      -        |        2      |
| 0,4                         |      -        |        2      |
| 0,5                         |      -        |        1      |
| 0,6                         |      -        |        1      |
| 0,9                         |      -        |        2      |

Twelve patients had proliferative diabetic retinopathy treated with panretinal Argon laser photocoagulation in their other eyes except two cases. Other eye of one case was phthisic and the other one had non-proliferative diabetic retinopathy. Except unilobar cases we preferred to delayed surgery for three to six weeks in order to observe spontaneous resorption. All patients underwent uncomplicated 3-port PPV and had uneventful postoperative period with resulting clear media.

Twelve patients had DME. Eight patients out of 12 had only DME, two patients had both DME and NVD, and four patients had NVD and NVE. Intraoperative PRP was performed for cases with neovascularisation disc or others. Macular grid laser was performed for cases with DME at early postoperative days (Figure 1).

**Table 2. Preoperative and postoperative visual acuity of the traumatic cases**

<table>
<thead>
<tr>
<th>Case</th>
<th>Preoperative</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>P+P+</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>HM</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>FC</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>0,1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>0,2</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>0,3</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>0,4</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

Eight traumatic or idiopathic premacular cases had PPV and removal of posterior hyaloid and aspiration of blood with silicon tip cannula (Figure 2). Pre- and postoperative visual acuities of these cases are given in Table 2. Hematological and systemic evaluation did not reveal any pathology in these cases.

**Discussion**

Diabetic retinopathy, retinal macroaneurysms, trauma and valsalva retinopathy are the most common causes of premacular hemorrhages [1,2,3,6,7,10]. Spontaneous resolution of the blood is possible particularly in Terson syndrome, traumatic cases and Valsalva retinopathy. However,
resolution may take months [1,2,5,10]. Slow recovery in young patients may cause social problems due to monocular vision. Toxic effect of blood, particularly the iron component, and formation of tractional membranes may result in permanent and severe visual loss [1,4,14-17]. It was claimed in some studies, as waiting 4 weeks for spontaneous reabsorption will not increase complication rate, however intervention is needed after this period. O’Hanley et al reported that patients who did not undergo PPV within 4 week period had limited vision (6/30) due to late macular traction. Vitrectomized eyes did not suffer from late macular traction and had better visual outcomes (6/12 or better) [2-8].

Early visual rehabilitation was obtained by puncturing the anterior wall (ILM or posterior hyaloid face) of hemorrhagic cavity by argon laser in early 1980’s. However, it was emphasized that chronic cases would need PPV [12,13,18,19]. Nd-YAG laser membranotomy, which was developed as an alternative to argon laser in Valsalva retinopathy, retinal macroaneurysm, and shaken baby syndrome, is commonly used in early cases [1,5,6,14]. The most important parameters for selection of cases for YAG laser include the height and the time of the development of the hemorrhage. After the formation of the fibrinoid clot, the evacuation of blood into vitreous may not be satisfactory following YAG laser. If the hemorrhage is shallow, then the laser may cause retinal damage, e.g. macular hole or retinal detachment [2,9,20]. Puliafito et al. demonstrated vascular damage and retinal holes in animal studies [21]. Hence, YAG laser should be selectively applied in dome shaped hemorrhages where retinal damage chance is low, and in early cases [2,20]. Dunesh et al. recommended argon laser to avoid the complications of YAG laser [4].

The major indications for PPV in our traumatic and non-diabetic cases were the delayed presentation of 6 cases more than 4 weeks and the shallow hemorrhage, which precluded YAG laser. All cases had increased vision postoperatively and none had macular or vascular pathologies.

Dense premacular hemorrhage makes up 6% of the vitrectomy indications in diabetic cases [9]. Premacular hemorrhage may result in permanent macular damage by neovascular proliferation in hemorrhagic cavity, and tractional detachment. The posterior fundus covered by hemorrhage is the most common area for neovascular proliferation. Retrospective studies indicated the importance of early vitrectomy for preserving vision and to avoid fibrovascular proliferation [8,22].

O’Hanley et al reported that hyaloid membrane excision was easier in premacular hemorrhage cases of less than 4 week duration before fibrovascular proliferation, and the visual prognosis was found to be better [8]. In delayed cases, membrane formation on the retinal surface was reported to cause macular traction, and more extensive membrane excision and segmentation were needed in these cases [22,23].

Preretinal hemorrhages are more commonly localized between posterior hyaloid and ILM, however sub-ILM hemorrhages (between ILM and retinal nerve fiber layer) are also seen. Since spontaneous resorption is late and the macula is the favorite area of involvement in sub-ILM hemorrhages, surgical removal with PPV should be primary choice of treatment and results were satisfactory in these cases [24].

YAG-membranotomy is widely used in diabetic premacular hemorrhages for early resorption, and these results in opportunity of early retinal examination. If macular edema is detected, macular laser is recommended followed by PRP.

Ten out of 14 cases previously had PRP in our clinic. Six cases were detected to have NVD or NVE during PPV, and these cases received endolaser. Ten patients with macular edema were treated with laser photocoagulation within 10 days after the surgery. Only one case had epiretinal membrane excision. These findings were suggesting that these patients had PDR in their hemorrhagic eyes. However after the surgical removal of the hemorrhage PDR was observed almost all of the patients and treated with laser photocoagulation peroperative and postoperatively.

Postoperative vision was found to be significantly increased compared to preoperative vision (p<0.05). Regression of the neovascularization and macular edema was observed following PRP in cases with NV.

Observation for spontaneous resorption, YAG or argon laser membranotomy and PPV are the treatment options for premacular hemorrhages. In cases with PDR and in patients no spontaneous resorption following 4 weeks, PPV should be the treatment choice to avoid complications.
References


