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SHORT COMMUNICATION

Nd:YAG laser membranotomy treatment of premacular hemorrhage in two children with hematologic disease

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PURPOSE. *Nd:YAG laser membranotomy is considered a safe treatment of premacular hemorrhage (PMH) in adult patients, enabling rapid enhancement of visual functions. For children, however, pars plana vitrectomy (PPV) performed under general anesthesia has been the accepted treatment. In this report, the authors describe Nd:YAG laser membranotomy (LM) in two children with PMH complicated by hematologic disease.*
METHODS. *Size of lesions was measured in optic disc diameters (DD). The authors performed three openings in the anterior surface of PMH with immediate intravitreal drainage of blood in both patients.*
RESULTS. *Rapid enhancement of visual functions was followed. The authors observed no complications in 1 year of follow-up.*
CONCLUSIONS. *LM may be a safe method of treatment of PMH in children in selected cases. (Eur J Ophthalmol 2006; 16: 478-80)*

KEY WORDS. *Membranotomy in children, Nd:YAG laser, Premacular hemorrhage*

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INTRODUCTION

Premacular hemorrhage (PMH) may occur in persons with vascular disorders, in Valsalva retinopathy, or it may be associated with pathologic blood coagulability (1, 2). Spontaneous absorption of blood from the premacular space usually takes several months. In case of subhyaloid localization it usually takes even longer (1, 3). Besides temporarily decreased vision, PMH can have other adverse effects, such as toxicity of blood decomposition products or epiretinal membrane formation (4).

PMH in adult patients has been successfully treated by Nd:YAG laser membranotomy (1, 2). Pars plana vitrectomy (PPV) under general anesthesia is usually performed in children. The reason why PMH in children is treated differently from that in adults is mainly the risk of poor cooperation of children during laser treatment with risk of retinal damage.

Case reports

The first of our two patients was a 10-year-old girl who had hereditary spherocytosis. The other patient was a 13-year-old boy diagnosed with acute lymphoblastic leukemia.

The girl was hospitalized in our hospital because of he-

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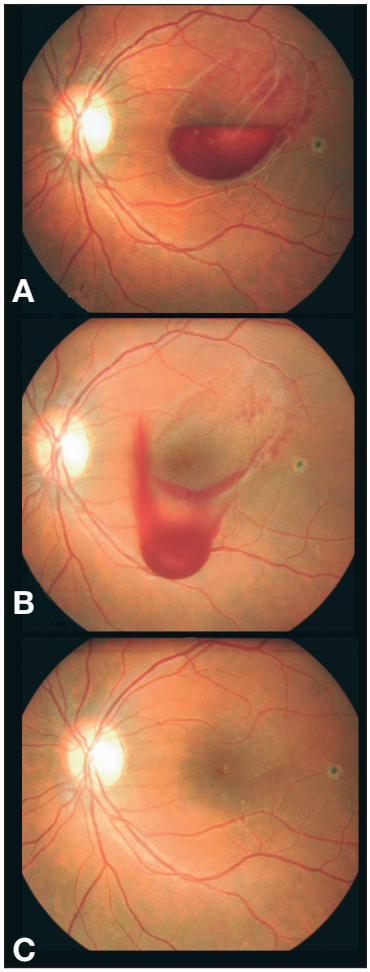

Fig. 1 - *Patient 1. (**A**) Premacular hemorrhagic detachment of internal limiting membrane (ILM). (**B**) Premacular hemorrhagic detachment of ILM immediately after laser treatment. (**C**) Fundus 1 month after laser treatment.*

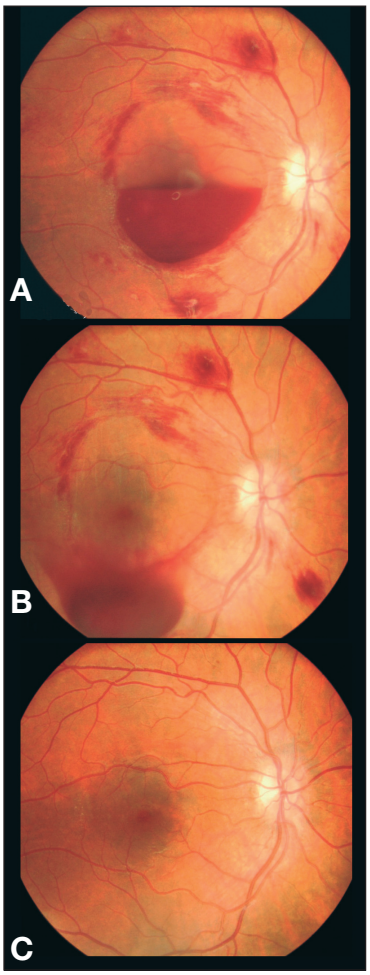

Fig. 2 - *Patient 2, right eye. (**A**) Large premacular subhyaloid hemorrhage. (**B**) Immediately after laser treatment. (**C**) Four months after laser treatment.*

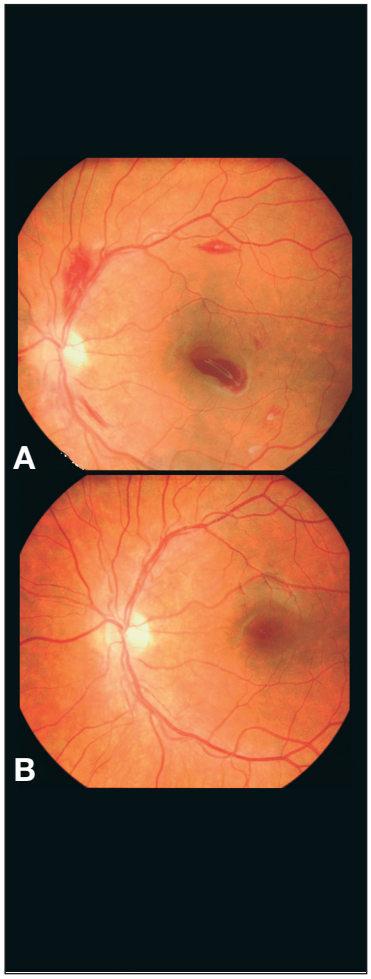

Fig. 3 - *Patient 2, left eye. (**A**) Small premacular hemorrhagic detachment of internal limiting membrane. (**B**) Four months after bleeding, after spontaneous absorption of premacular hemorrhage.*

molytic crisis that included states of unconsciousness and profuse vomiting with Valsalva effect. We performed ophthalmologic examination and confirmed premacular hemorrhagic detachment of internal limiting membrane (ILM) in her left eye, lesion size 3 x 2 DD, with visual acuity 0.1 (Fig. 1A). There was no pathology of her right eye, with visual acuity 1.0.

We performed laser membranotomy (LM) 11 days after hemolytic crisis using 10 pulses with maximal energy of 3.5 mJ and total energy of 26.5 mJ. We made three openings in the ILM, which resulted in immediate intravitreal drainage of the PMH (Fig. 1B).

Visual acuity in her affected eye improved to 0.3 immediately and was 1.0 three days later and remained stable (Fig. 1C).

The boy was a passenger in a car accident with no described injury, but he complained of visual disturbance. The boy was given pediatric and neurologic examinations including blood tests, which indicated pancytopenia. His platelet count was 8,000/udL and he was diagnosed with acute lymphoblastic leukemia. We performed ophthalmologic examination and found the following: in both eyes, unremarkable anterior segment, multiple retinal and preretinal hemorrhages in the equatorial and postequatorial retina; right eye, visual acuity 0.3, and a large premacular subhyaloid hemorrhage, lesion size 5 x 4 DD (Fig. 2A); left

eye, visual acuity 0.1, and premacular hemorrhagic detachment of the ILM, lesion size 1/3 DD (Fig. 3A). We performed LM on his right eye 12 days after the car accident. We used six pulses with maximal energy of 1.7 mJ, total energy of 16.1 mJ, making three openings in the posterior hyaloid membrane, which resulted in immediate intravitreal drainage of the PMH (Fig. 2B). Visual acuity in the operated-on right eye improved to 1.25 after 3 days and remained stable (Fig. 2C). In the left eye, we observed slow absorption of the PMH; visual acuity improved to 0.5 in 2 weeks and to 1.0 in 1 month (Fig. 3B).

We performed both LM on dilated eyes in local anesthesia, using a Goldmann contact lens, focusing the aiming beam and laser on the anterior surface of PMH as inferiorly as possible to drain the most blood. However, we maintained a sufficient thickness of blood to protect the retina and choroid from possible laser injury and created several focal openings in the anterior surface of the PMH. We used Q-switched Nd:YAG laser in fundamental mode and depending on the effect of each pulse we raised the initial energy of 1 mJ by increments of 0.2 to 0.5 mJ. We checked both patients regularly for 12 months and found no complications.

DISCUSSION

The basis for indication of LM in our children was their excellent cooperation during our investigations and their complicated health overall. Moreover, these children were under psychic stress, not only because of their disease, but also because of acute drop of visual acuity. We observed rapid draining of the PMH into the vitreous cavity and immediate improvement of vision after LM. Laser energy level was directly dependent on anatomic quality of the membrane. To puncture the ILM we had to use double the energy level than to open the posterior hyaloid membrane.

In the literature we found some disparity in energy levels (1 mJ up to 80 mJ) and in number of pulses (2 up to 334) used to achieve rupture of PMH surface (1, 2, 4-6). There was only one report about Nd:YAG laser treatment of PMH in a child (4). Compared to this report, we used lower energy levels and several openings in PMH surface in the same localization (inferior edge of PMH). We agree that this technique is safe in selected cases and in the hands of a practiced surgeon.

We found, as did some other authors, that the timing of LM is crucial (6). We find the optimum time to be 10 to 14 days from the onset of the hemorrhage, when the blood is unclotted liquid that can easily drain out from the premacular space. Membranotomy performed more then 14 days after the onset of hemorrhage may result in fibrotic organization of blood and bordering membrane.

The authors have no commercial or proprietary interest relevant to this report.

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