

Neodymium: YAG Laser Treatment for Dense Premacular Subhyaloid Hemorrhage

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ABSTRACT

OBJECTIVE: To assess the efficacy of Neodymium: YAG laser membranotomy and posterior hyaloidotomy in achieving rapid intravitreal drainage of dense premacular hemorrhage and rapid visual rehabilitation.

METHODS: Eight eyes of eight patients had Nd: YAG laser treatment to release trapped hemorrhage overlying the macula. Two to five laser membranotomies were performed. Colored fundus photographs were taken. Patient with diabetes had panretinal photocoagulation prior to YAG laser treatment.

RESULTS: The premacular hemorrhage originated from proliferative diabetic retinopathy in four eyes, from a retinal macroaneurysm in two eyes, from leukemic retinopathy one eye and from valsalva retinopathy in one eye. Complete intravitreal dispersion was achieved in all eyes within one week with marked improvement of vision. One diabetic eye showed less improvement in vision due to diffuse dispersion of hemorrhage in the vitreous.

CONCLUSION: Nd: YAG laser membranotomy seems helpful in rapid clearing of premacular hemorrhage and improvement of vision in certain eyes.

KEY WORDS: Subhyaloid Hemorrhage. Treatment. Neodymium: YAG Laser.

INTRODUCTION

Proliferative diabetic retinopathy, retinal artery macroaneurysms, leukemic retinopathy or retinal vessel rupture due to physical exertion (Valsalva retinopathy) may cause hemorrhagic detachment of the internal limiting membrane or subhyaloid hemorrhage in the macula.¹ This leads to significant loss of central vision. Spontaneous resolution of premacular hemorrhage usually occurs but may take several months.² Most of the premacular hemorrhages in proliferative diabetic retinopathy occur in the presence of partial detachment of posterior hyaloid face (PHF). These assume a shallow configuration and resolve spontaneously. If they occur in the presence of fully attached PHF, or below the internal limiting membrane (ILM), a localized detachment of ILM and PHF over the area of hemorrhage creates a tense dome like configuration. These are usually slow to resolve and may result in rapid neovascular proliferation within the blood filled cavity leading to epimacular membrane and macular traction retinal detachment.³ Early vitrectomy is advocated to avoid these sequelae but may be associated with high incidence of surgical and postoperative complications.⁴ Nd: YAG laser membranotomy has been used to cause rapid intravitreal drainage of premacular hemorrhage in certain cases. It allows rapid visual rehabilitation and may avoid the need for vitrectomy.⁵

PATIENTS AND METHODS

Eight eyes in which premacular hemorrhage developed without vitreous hemorrhage between January 2003 and June 2006 had Nd: YAG membranotomy at Al Shifa Trust Eye Hospital, Rawalpindi - Pakistan. Color fundus photographs were obtained. The Zeiss Visualas YAG II laser was used in all the patients. The pupil was dilated maximally with 1% Tropicamide and 10% Phenylephrine eye drops before the laser. A Goldman fundus contact lens was used for focusing the Nd: YAG aiming beam and laser. An opening with the laser in the anterior surface of the premacular hemorrhage at its inferior margin away from the fovea and retinal vessels was made. This allowed a rapid stream of trapped blood to enter the vitreous cavity. Sometime multiple focal openings were made over the premacular hemorrhage if little blood entered the vitreous cavity from the initial membranotomy. The highest energy to perforate the membrane overlying the hemorrhage varied from 6.2 and 11.5 mJ. Starting with low energies, mJ increments were used until the desired end point of rapid entry of blood into vitreous cavity was reached. The total number of laser bursts was recorded including the lowest energy levels used. All patients were re-examined on several occasions with the first 14 days of the treatment. In all patients peripheral retina was examined in detail to exclude rhegmatogenous complications.

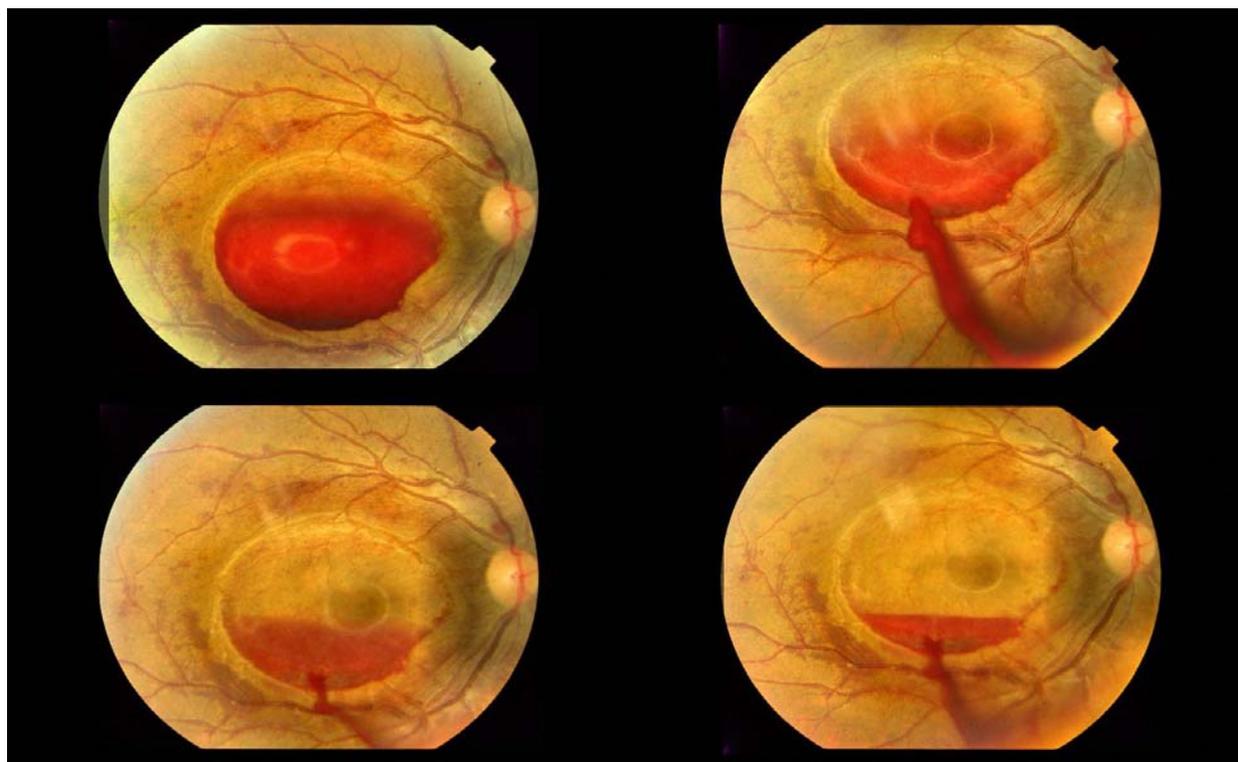
RESULTS

Eight eyes of 8 patients with dens premacular subhyaloid hemorrhage were treated with Nd: YAG membranotomy. The premacular hemorrhage originated from proliferative diabetic retinopathy in four eyes, from a retinal macroaneurysm in two eyes, from leukemic retinopathy in one eye and from valsalva retinopathy in one eye. Complete intravitreal dispersion was achieved in all eyes within one week with substantial improvement of vision. One diabetic eye showed less improvement in vision due to diffuse dispersion of hemorrhage in the vitreous. Individual energy levels required to perform posterior hyaloidotomy varied from 8 to 11 milli Joules. Complete drainage of blood occurred in all eyes within 1 week. There were no post treatment retinal and choroidal complications in any eye. Iatrogenic complications and recurrent bleeding did not occur in any of the eyes. **Table I** shows the pre and post treatment visual acuity of the patients in the affected eye. **Figure I** shows the pre and post treatment fundus pictures of a patient with premacular subhyaloid hemorrhage.

**TABLE I:
PRE AND POST TREATMENT VISUAL ACUITY IN
THE AFFECTED EYE**

Type of retinopathy	Pre-operative vision	Post-operative vision
Proliferative DR	CF	6/24
Proliferative DR	CF	6/18
Proliferative DR	3/60	6/36
Proliferative DR	CF	6/24
Macro-aneurysm	6/60	6/12
Macro-aneurysm	6/60	6/7.5
Valsalva retinopathy	CF	6/6
Leukemic retinopathy	5/60	6/9

**FIGURE I:
SEQUENTIAL DRAINAGE OF SUBHYALOID HEMORRHAGE**



DISCUSSION

Nd: YAG laser treatment has been reserved mostly for various anterior segment procedures. Posterior segment Nd: YAG laser membranotomy has been used in

situations where vitreous membranes are away from the retina.⁶ Retinal or choroidal hemorrhage, retinal hole or vitreous hemorrhage are complications reported when treating vitreal membranes.⁷ These inju-

ries become more likely when the fundamental mode beam is focused closer than 3 to 5 mm from the retina.⁸ In this series, all eyes underwent membranotomy, a relatively simple outdoor procedure, within two to three weeks of the onset of hemorrhage. In all eyes complete intravitreal drainage occurred within 1 week of hyaloidotomy and thus preventing early vitrectomy and its complications. A delay in the procedure may result in organization of subhyaloid blood, making intravitreal drainage via a membranotomy more difficult.⁹ This fact suggests that Nd: YAG posterior hyaloidotomy is most effective and requires a lower mean total energy if delay between hemorrhage and treatment is avoided. Although in the early attempts to drain subhyaloid blood using Xenon arc and Argon photocoagulation, a significant risk of retinal and choroidal injury was reported. There has been no such complication reported with Nd: YAG membranotomy. None of the eyes in this series appears to have had injury to retina or choroids from Nd: YAG laser treatment. No retinal or choroidal hemorrhage or retinal hole was observed on clinical examination. Gabel, et al have speculated that the dense premacular blood protected the underlying retina from the laser-induced damage, even at high pulse energies. In proliferative diabetic retinopathy, it is important to complete the panretinal photocoagulation as much as possible before dispersion of premacular hemorrhage into the vitreous cavity through Nd: YAG membranotomy.¹⁰ The rapidity of visual rehabilitation through this technique is particularly valuable in those patients in whom premacular hemorrhage has occurred in the better seeing or the only eye.

CONCLUSION

With a limited and short term view of this series, selected case would seem to benefit from rapid improvement of vision. Nd: YAG membranotomy may be indi-

cated as an alternative to treating a slowly clearing or a persistent premacular hemorrhage.

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