

Outcomes of Double Frequency Nd:YAG Laser Membranotomy for Premacular Haemorrhage Secondary to Valsalva Retinopathy

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Abstract

Purpose: To determine the outcomes of double frequency Nd:YAG laser membranotomy for premacular hemorrhage secondary to Valsalva retinopathy.

Methods: Retrospective case series of 24 consecutive patients with premacular hemorrhage of duration less than two months between Jan 2008 and Dec 2012 were included. Patients with any other vascular diseases such as diabetic retinopathy were excluded. The main outcome measure was the best-corrected visual acuity (BCVA) at final follow up.

Results: Among 24 patients, majority 16 (67%) were men and all had unilateral Valsalva retinopathy. All patients underwent laser membranotomy using the double frequency Nd:YAG laser on the same day of presentation. The mean age of subjects was 44.03 ± 17.33 years (14-78 years) and the mean duration of symptoms was 10.29 ± 11.7 days. The mean follow-up duration was 4.72 ± 2.54 months. All patients presented with blindness or severe vision loss with a mean baseline visual acuity of 1.72 ± 0.58 logMAR (Snellen's equivalent 20/1050; range 0.17-2.3). Significant improvement of visual recovery was noted in 91.66% of patients at 1 month (mean final BCVA 0.20 ± 0.56 logMAR (Snellen's equivalent 20/30; range 0-2.3 logMAR). Twenty-two (91.66%) patients were successfully treated with laser alone. No complications were noted. Two patients underwent vitrectomy and achieved 20/20 visual acuity.

Conclusion: Prompt treatment using the frequency doubled Nd YAG laser appears to be safe and effective in achieving significant visual recovery in patients with premacular hemorrhage due to Valsalva retinopathy.

Keywords: Nd:YAG laser membranectomy; Hyaloidotomy; Premacular hemorrhage; Valsalva retinopathy

Summary Statement

Prompt treatment using the frequency doubled Nd:YAG laser for premacular hemorrhage due to Valsalva retinopathy is safe and effective in achieving significant visual recovery.

Introduction

Valsalva retinopathy is caused by valsalva maneuver, which produces a sudden increase in the venous blood pressure, secondary to a rise in intra-thoracic or intra-abdominal pressure. The consequent rise in intraocular venous pressure can lead to a spontaneous rupture of retinal peri-foveal capillaries and cause a sudden loss of vision in an otherwise healthy eye [1]. Although isolated, and more often than not, self-limited, it can take a considerable amount of time to clear and may be visually disabling to the patient. It is generally unilateral, but can occur bilaterally [2,3].

Valsalva retinopathy comprises generally of preretinal hemorrhages, either subhyaloid or sub internal limiting membrane (i.e. between the internal limiting membrane and nerve fiber layer). The condition has been stated to resolve on its own in certain cases over a period of several months, but may require treatment [1]. The

age profile generally consists of young adults who cannot afford long period of compromise in visual function, as would be the case with observation, and so treatment is often preferred in cases with significant visual impairment. The use of Nd YAG laser for evacuation of preretinal hemorrhage has been reported earlier [1,4]. However, laser is ineffective when the blood clots. In cases of small premacular haemorrhage, spontaneous resolution has also been reported within a month [5]. Still, in large non-resolving premacular haemorrhage surgery remains the only option.

There is however, no consensus regarding the most appropriate treatment or its timing. We evaluated the outcomes of frequency doubled Nd:YAG membranotomy in 24 consecutive patients of premacular hemorrhage secondary to Valsalva maneuver.

Methods

This was a retrospective case series of consecutive patients who underwent prompt treatment with the frequency doubled Nd:YAG laser (532 nm) for premacular hemorrhage due to valsalva retinopathy. The study included patients treated between Jan 2008 and December 2012. The institutional review board approved the retrospective analysis of charts for the study, and all the procedures adhered to the tenets of the declaration of Helsinki. The data collected included relevant history, demographics, baseline visual acuity, complete ocular exam including intraocular pressure, the treatment performed, final

visual acuity and the duration of follow up. This chart review adhered to previously set guidelines [6].

All patients underwent membranotomy with a frequency doubled Nd: YAG laser using the Area Centralis[®] lens (Volk Optical, Ohio, USA). Laser settings included a 50-100 micron spot size with the duration of 100 to 200 ms and power settings varying from 120 to 900 mW. Typically high power and duration with a small spot size was used to deliver a focused, concentrated burn. The area chosen for delivery of laser was the most dependent portion of the hemorrhage provided it was not at or immediately adjacent to the fovea. If the dependent part was near the fovea, the safest and the next most dependent area were chosen. Treatment was begun with a single spot and additional burns were delivered until the membrane ruptured. Patients in whom the membrane was successfully ruptured were explained about floaters and asked to review after two weeks. If the hemorrhage had settled, they were observed.

Statistical analysis included descriptive statistics, and the paired Student t-test was used for evaluating significance of visual improvement. Data analysis was performed using GraphPad Prism (San Diego, CA).

Results

A total of 24 eyes of 24 patients with premacular hemorrhage were included in the study. Among the 24 patients, 16 (67%) were men.

Four patients had diabetes mellitus and 9 had hypertension. However, none of these patients had evidence of hypertensive or diabetic retinopathy. The mean age was 44.03 ± 17.3 years (14-78 years). The mean duration of symptoms was 10.29 ± 11.7 days (range 1-60 days). The mean BCVA at baseline was 1.72 ± 0.58 logMAR (Snellen's equivalent 20/1550). Comprehensive ocular and systemic examination of these patients did not reveal any cause for the pre-retinal hemorrhage other than possible Valsalva retinopathy. All patients underwent laser membranotomy using the double frequency Nd:YAG laser on the day of presentation. Twenty-two out of 24 (91.66%) patients were successfully treated with laser alone. Laser procedure failed in two patients who underwent an uneventful suture-less pars plana vitrectomy for clearance of hemorrhage and achieved 20/20 visual acuity. The mean follow up period was 4.72 ± 2.54 months. No further treatment was required in these 22 patients till the end of the follow up period.

The mean final BCVA after laser was 0.20 ± 0.56 logMAR (Snellen's equivalent 20/30) The improvement in visual acuity was statistically significant ($p < 0.001$). There was a weak but statistically significant correlation between duration of symptoms and change in BCVA ($r = 0.47, p = 0.02$).

The ocular examination at the final follow up showed resolved premacular hemorrhage (Figure 1) with no retinal vascular changes in all the 22 eyes that underwent laser.

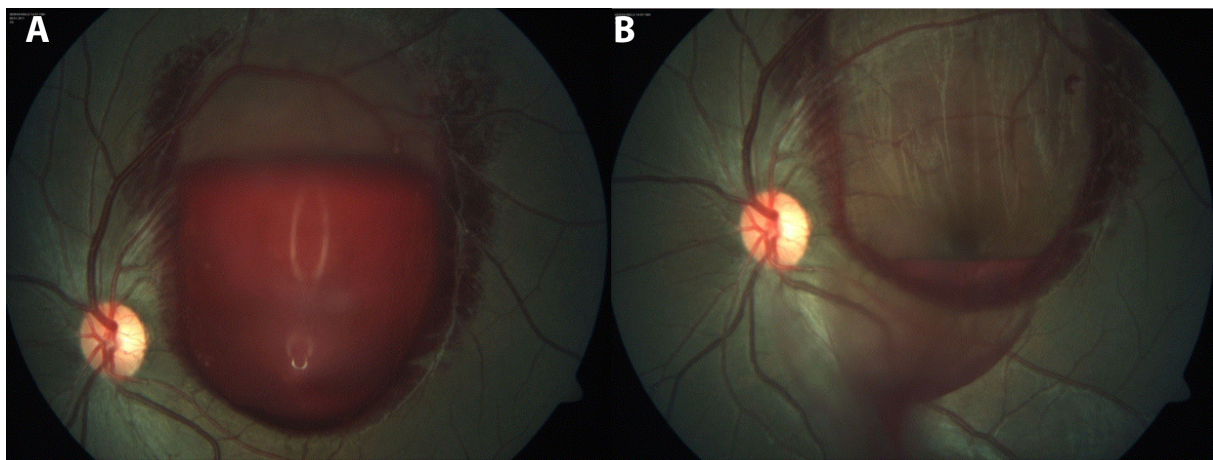


Figure 1: A 38-year old male presented to our outdoor patient department with a history of sudden painless loss of vision in the right eye since one day after lifting a heavy suitcase off the ground. The rest of his history and systemic examination was unremarkable. His corrected distance visual acuity was counting fingers close to face in the right eye and 20/20 in the left eye. Ocular examination was unremarkable except for the presence of a mound of subhyaloid hemorrhage, measuring approximately 3 disc diameters in the macular area in the right eye (A). Patient underwent laser membranotomy using the frequency doubled Nd:YAG laser. The settings used were as follows: Power: 450 mw. Duration: 100ms. Spot size: 100 microns. The most dependent area of the hemorrhage was chosen as the target site. Immediately upon successful rupture, a fundus photograph was taken (B). His visual acuity at final follow up was 20/20 in both eyes.

Discussion

Valsalva retinopathy results in blindness or severe visual impairment in healthy young adults. In our study, all subjects presented with severe visual impairment. We found that prompt laser resulted in significant visual recovery (20/30) in majority (92%) of patients at 1 month. Amongst all causes for macular preretinal hemorrhage, patients with Valsalva retinopathy have been shown to

have the best outcome, provided that there is no associated retinal pathology [7,8].

Numerous reports have advocated pulsed Nd: YAG or argon laser [9] for rapid clearance of the hemorrhage, whereas some authors have documented resolution with observation alone as well [10]. Observation, however, can lead to potential toxicity to the retina on account of degenerating heme [11]. Puthalath et al. [4] reported good outcomes with ten out the twelve patients demonstrating visual

improvement following laser. They did not study exclusively Valsalva retinopathy but rather a group of conditions that can lead to subhyaloid hemorrhage such as diabetic retinopathy or retinal arterial macroaneurysm. We looked exclusively at Valsalva retinopathy, and hence the visual outcomes were also better in our series, possibly due to absence of any retinal pathology in our series.

In our study we did not find any complications following laser therapy and all patients had significant visual recovery. Based on our results we recommend prompt laser therapy in patients with premacular hemorrhage following Valsalva retinopathy.

Our study has limitations of a retrospective study and we did not directly compare it with observation. In spite of this limitation, our study demonstrates that prompt therapy appears to be safe and effective in hastening the visual recovery process. Patients showed immediate visual recovery and none of the patients developed any complications till the end of the follow up period. To conclude, frequency doubled Nd:YAG laser is a useful and safe option for prompt evacuation of pre-macular hemorrhage and early restoration of visual function in Valsalva retinopathy. Surgery can be avoided in most cases.

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