

Research Article

Comparative study of Treatment of Premacular subhyaloid Haemorrhage between conservative Vs Nd-YAG Laser Hyaloidectomy in tertiary care Centre

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Abstract: Premacular subhyaloid hemorrhage is one of the etiologies of sudden visual loss. It might be due to vascular or blood abnormalities or Valsalva retinopathy. Spontaneous absorption of blood may take months and result in macular complications and permanent impairment of vision as stated in my study. Posterior hyaloidectomy by Nd-YAG laser is an outpatient procedure which may avoid the need for complex surgical interventions. This study evaluates the success of this approach in patients with premacular subhyaloid hemorrhage of different etiologies as compared to patients treated conservatively. The study was conducted in Rama Medical College Hospital and Research Centre (RMCH & RC) from August 2012 to December 2013. It includes 14 eyes of 14 patients. We divided patients in two groups of seven patients in each group. One group of seven patients for conservative treatment while other group had Nd -YAG laser hyaloidectomy. The mean pretreatment hemorrhage measured 2.28 disc diameters (range 1.0-3.0) and mean duration of haemorrhage is 1.85 days both in conservatively treated patients as well as in patients who had undergone Nd- YAG laser hyaloidectomy. Visual acuity in all cases before treatment was hand movement to 3/60. Conservatively treated patients could not regain visual acuity 6/6 while patients who had undergone Nd-Yag hyaloidectomy regained visual acuity 6/6 after treatment. No retinal damage or rebleeding occurred due to the laser treatment. Nd- YAG laser hyaloidectomy is very much useful for treating sub macular hyaloid haemorrhage as compared to conservative treatment.

Keywords: Nd-YAG laser, Premacular subhyaloid hemorrhage, Nd-YAG laser posterior hyaloidectomy, Proliferative diabetic retinopathy

INTRODUCTION

Subhyaloid hemorrhage is defined as a localized detachment of vitreous from the retina caused by the accumulation of blood, which can lead to sudden and severe loss of vision, when it takes place in the macular area. Subhyaloid hemorrhage may occur in retinal vascular disorders such as proliferative diabetic retinopathy, branch retinal vein occlusion, macro aneurysm, and age related macular degeneration; in hematological disorders such as leukemia [1] and chemotherapy, induced pancytopenia [6]; following laser keratomileusis (LASIK) because of rapid release of the microkeratome vacuum pressure; or after retinal vascular rupture associated with physical exertion (Valsalva retinopathy) [1-6]. Valsalva retinopathy often occurs in healthy young adults as a result of heavy lifting, straining on toilet, vomiting, coughing. Spontaneous resorption of the blood entrapped in subhyaloid space may take months and may result in permanent visual impairment due to pigmentary macular changes or formation of epiretinal membranes

[7] and toxic damage to the retina due to prolonged contact with hemoglobin and Iron⁴. Different techniques have been used to treat premacular hemorrhage. These include conservative treatment, Nd-Yag laser hyaloidectomy, pars plana deep vitrectomy [8, 9] and pneumatic displacement of hemorrhage by intravitreal injection of gas and tissue plasminogen activator [10]. Puncturing the posterior hyaloid face with Nd-YAG or green argon laser is a safe and easy alternative for releasing the entrapped subhyaloid blood into the vitreous [11-13]. Consequently, the obscured macular area is cleared and resorption of blood cells is facilitated.

MATERIAL AND METHODS:

The study was conducted in Rama Medical College Hospital and Research Centre (RMCH&RC) from August 2012 to December 2014. It includes 14 eye patients. Patient was registered in Retina Clinic. We only include cases of premacular subhyaloid hemorrhage. We divided patients in two groups of

seven patients in each group. One group of seven patients had conservative treatment while other group of seven patients had Nd-YAG laser hyaloidectomy. Proper history and ocular examination like best corrected visual acuity, tonometry, slit lamp examination and fundoscopy was done. Thorough systemic examination was done to exclude any systemic illness. Complete blood counts including haemoglobin, total and differential leucocyte count, platelets count, liver function test, renal function test including serum creatinine and blood sugar(fasting and postprandial)was done. Fundus photograph was taken and repeated visual acuity was taken .Seven patients are conservatively treated and rest 7 patients were included for Nd- YAG laser hyaloidectomy. We give conservative treatment in form of steroid, nonsteroidal anti-inflammatory drug, vitamin C and topical nepafenic etc. This treatment was continued at least for three to six months and they were

reviewed time to time as per schedule. Patients included for Yag Laser Hyaloidectomy proper consent was taken and one drop of tropic amide 1% was instilled in affected eye. After dilatation Nd- YAG laser hyaloidectomy was done and fundus photograph was taken (Figure 1&2). Laser was applied to the lowermost dependent part of the blood-containing subhyaloid pocket in order to enhance the blood release process and better protection of the underlying retina. Rest 7 patients were treated conservatively and medical treatment was given. The main outcome measures including success rate in performing hyaloidectomy, releasing the entrapped blood into the vitreous cavity and its resorption, postoperative improvement in visual acuity, and postoperative complications were recorded and analyzed subsequently best visual acuity was taken at 1 week, 4 weeks and after 12 weeks.

Table-1 Age Distribution

Age distribution	No. of patients	
	N	%
20 – 30 years	3	21.43
31 – 40 years	7	50.00
41 - 50 years	4	28.57
Total	14	100

Table – 2Sex Distribution

Sex Distribution	No. of patients	
	N	%
Male	6	42.86
Female	8	57.14
Total	14	100

Table-3 Patients on conservative treatment

S.No	Age/sex	OD/OS	Diagnosis	Size of h'ge	Duration of h'ge	Pretreatment V.A	1wk	4wk	12wk
1.	50/F	OD	PDR	2DD	2 DAYS	H.M	H.M	CF 1feet	6/60
2.	28/M	OD	Valsalva	2DD	1 DAYS	6/60	6/36	6/18	6/9 ²
3.	36/M	OS	Traumatic	2DD	2 DAYS	6/60	6/18	6/9	6/6 ¹
4.	37/M	OD	Valsalva	2DD	2 DAYS	6/60	6/24	6/9 ³	6/6 ²
5.	39/F	OS	PDR	3DD	3 DAYS	H.M	CF 2feet	CF 4feet	3/60
6.	23/M	OD	Idiopathic	2DD	1 DAYS	6/60	6/36	6/18	6/9
7.	45/F	OS	CRVO	3 DD	2 DAYS	3/60	4/60	6/60	6/18

Table-4 Patients on Nd-Yag laser hyaloidectomy

S.No	Age/sex	OD/OS	Diagnosis	Size of a h'ge	Duration of h'ge	Pre-laser V.A	Post-laser V.A(1wk)	4wk	12wk	Energy (mj)	No. of Spots
1.	37/F	OS	Valsalva	1DD	1 DAY	6/60	6/18	6/9	6/6	5.6	2
2.	46/M	OD	PDR	3DD	3 DAYS	HM	6/60	6/36	6/24	5.8	6
3.	38/F	OD	PDR	2DD	3DAYS	3/60	6/36	6/18	6/9	5.2	4
4.	25/F	OD	Traumatic	2DD	2DAYS	6/60	6/18	6/9	6/6	4.8	4
5.	32/M	OS	idiopathic	2DD	1 DAY	6/36	6/9	6/6	6/6	5.0	3
6.	39/F	OS	idiopathic	3DD	2DAYS	6/60	6/12	6/6	6/6	5.0	4
7.	43/F	OD	CRVO	3DD	1 DAY	H.M	6/60	6/18	6/6 ³	5.2	5



Fig-1: Subhyaloid hemorrhage



Fig-2: Post Laser Hyaloidectomy

RESULTS

The success of laser treatment was defined by clearing of premacular haemorrhage as soon as possible. Fourteen eyes of 14 patients with different diagnosis were enrolled in this interventional series. These included 8 females and 6 males, with an average age of 37 years (range: 23 to 50 years). Four (28.57 %) had proliferative diabetic retinopathy and three patients (21.42 %) had macular subhyaloid haemorrhage due to Valsalva maneuver & idiopathic. 2(14.29%) patients had macular subhyaloid haemorrhage due to trauma and CRVO. The seven eyes of seven patients in whom 2(28.57%) cases of proliferative diabetic retinopathy, Valsalva maneuver and of trauma while 1(14.29%) case of CRVO were treated conservatively. The mean pretreatment haemorrhage as judged by fundus photography was 2.28 disc diameters in conservatively

treated patients as well as in patients who had undergone Nd- YAG laser hyaloidectomy and mean duration of haemorrhage also is 1.85 days in both categories.

Among conservatively treated patients of proliferative diabetic retinopathy, they regain visual acuity from Hand movement (pretreatment) to 3/60(after 12 weeks of treatment) while CRVO patient regained good visual acuity from 6/60(pretreatment) to 6/18 (after 12 weeks of treatment). Because both eyes with proliferative diabetic retinopathy that were treated conservatively develop diffuse macular oedema for which green laser photocoagulation and intravitreal Avastin were given while in eyes with CRVO also develop macular oedema for which also intravitreal Avastin was given. The eyes with Valsalva maneuver,

traumatic or idiopathic develop mild macular oedema which later on subside After three months patients suffering from traumatic or Valsalva maneuver got very good visual acuity up to 6/6⁻¹ (Table-3).

Drainage of premacular subhyaloid haemorrhage with Nd: YAG posterior hyaloidectomy among proliferative diabetic retinopathy causes good visual acuity recovery (from hand movement to 6/24). In this also one case needs green laser photocoagulation followed by intravitreal Avastin injection. CRVO patient also regained good visual acuity hand movement (prelaser) to 6/6⁻³. That patients could not gain 6/6 vision due to mild macular oedema which subsides later on. Other patients e.g. traumatic, idiopathic or Valsalva maneuver got full visual acuity 6/6. The mean power required to perform posterior hyaloidectomy was 5.22mJ and the mean spot size is 4.

Conservatively, One, four and twelve weeks after treatment, visual acuities ranged respectively from Hand movement to 6/18, Counting figure to 6/9 and 3/60 to 6/6⁻¹. Overall, visual improvement was best in eyes with Valsalva retinopathy and trauma irrespective of treatment whether patients were treated conservatively or Nd -YAG laser hyaloidectomy were done. Eyes with proliferative diabetic retinopathy or central retinal vein occlusion also regained vision, but recovery was usually limited by the macular or retinal disease and eyes with Valsalva, trauma or idiopathic reason gained visual acuity 6/9-6/18 after one week & 6/6 after 12 weeks.

The hemorrhage usually clears spontaneously, but it may take several months if [7, 14, 15] treated conservatively. There is controversy on the effects of preretinal blood on the retina itself, as epiretinal membrane may be induced and a toxic effect of dissolving hemoglobin has been suggested after long contact between blood and retina [7, 11, 14]. In other words, spontaneous resolution of a subhyaloid hemorrhage may leave the eye with permanent macular changes [7, 14]. Rupturing the posterior hyaloid requires accurate focusing over the anterior surface of the hemorrhage; otherwise optical breakdown will not occur, since the irradiance needed to start plasma formation cannot be achieved [14]. Serious complications such as hemorrhage, retinal holes and macular injuries can result from Nd-YAG laser application of the posterior segment [11,16] and these may be important for small premacular subhyaloid hemorrhage, which is considered self-limiting [1, 11]. Therefore, Ulbig *et al.*; advocate laser drainage only if the hemorrhage is bigger than three disc diameters [11]. The mean size of the premacular subhyaloid hemorrhages here was 4.0 disc diameters and no retinal injury was observed in any of our cases.

One eye with proliferative diabetic retinopathy had neovascularization and green laser photocoagulation was done. The other cases had no evident new vessels or macular edema after posterior hyaloidectomy and needed no further treatment. Other patients who had undergone Nd-Yag laser hyaloidectomy develop no macular complications unlike patients with conservative treatment.

DISCUSSION

Subhyaloid hemorrhage is defined as a localized detachment of vitreous from the retina lead to sudden and severe loss of vision when it takes place in the macular area [1-3]. Subhyaloid hemorrhage or subinternal limiting membrane hemorrhage in the macula may occur membrane hemorrhage in the macula may occur (Valsalva retinopathy) or in retinal vascular diseases, such as proliferative diabetic retinopathy, and retinal macro aneurysm [2, 11, 13]. Ulbig *et al* studied 21 patients with premacular subhyaloid hemorrhage of different etiologies. Hyaloidotomy was successful in 16 (76.2%) of their patients, with visual improvement in all. Final BCVA was better in patients with Valsalva retinopathy compared with other etiologies and approached normal levels after treatment [12]. Gabel *et al.*; evaluated 3 patients with premacular subhyaloid hemorrhage. Nd-YAG laser hyaloidotomy was successful in all cases, and one patient with Valsalva retinopathy after military operation gained full vision postoperatively [13].

Considering the results of this investigation and that of previous studies, we may conclude that Nd YAG laser hyaloidotomy is a simple, inexpensive outpatient procedure which is relatively safe compared with other more complex operations such as deep vitrectomy and its potentially serious complications. It results in rapid visual recovery and especially very good outcomes in patients with Valsalva retinopathy. This technique can prevent long-term entrapment of blood and its adverse effects on macula including potential permanent loss of vision. Further studies including controlled clinical trials to compare this treatment with other modalities (e.g. deep vitrectomy) or spontaneous absorption of subhyaloid blood are warranted before drawing more definite conclusions.

CONCLUSION

From the above study, it is clear that Nd-YAG laser hyaloidectomy much beneficial in treatment of macular hyaloid haemorrhage as compared to conservative treatment.

REFERENCES

1. Gass JDM; Stereoscopic Atlas of Macular Diseases. 3rd ed. St Louis: CV Mosby; 1987.
2. Khairallah M, Ladjimi A, Messaoud R, Ben Yahia S, Hmidi K, Jenzeri S; Retinal venous macro

- aneurysm associated with premacular hemorrhage. *Ophthalmic Surg Lasers*. 1999; 30: 226 – 228.
3. Duane TD; Valsalva hemorrhagic retinopathy. *Trans Am Ophthalmol Soc*. 1972; 70: 298 – 313.
 4. Rennie CA, Newman DK, Snead MP, Flanagan DW; Nd-YAG laser treatment for premacular subhyaloid hemorrhage. *Eye*. 2001; 15: 519 – 524.
 5. Cheung CM, Benson MT; Post chemotherapy premacular subhyaloid hemorrhage. *Eye*. 2003; 17: 97 – 99.
 6. Mansour AM, Ojeimi GK; Premacular subhyaloid hemorrhage following laser in situ keratomileusis. *J Refract Surg*. 2000; 16: 371– 372.
 7. O'Hanley GP, Canny CL; Diabetic dense premacular hemorrhage. A possible indication for prompt vitrectomy. *Ophthalmology*. 1985; 92: 507 – 511.
 8. Zhao P, Hayashi H, Oshima K, Nakagawa N, Ohsato M; Vitrectomy for macular hemorrhage associated with retinal arterial macro aneurysm. *Ophthalmology*. 2000; 107: 613 – 617.
 9. Ramsay RC, Knobloch WH, Cantrill HL; Timing of vitrectomy for active proliferative diabetic retinopathy. *Ophthalmology*. 1986; 93: 283 – 289.
 10. Conway MD, Peyman GA, Recasens M; Intravitreal TPA and SF6 promote clearing of premacular subhyaloid hemorrhages in shaken and battered baby syndrome. *Ophthalmic Surg Lasers*. 1999; 30: 435 – 441.
 11. Ulbig MW, Mangouritsas G, Rothbacher HH, Hamilton AM, McHugh JD; Long-term results after drainage of premacular subhyaloid hemorrhage into the vitreous with a pulsed Nd: YAG laser. *Arch Ophthalmol*. 1998; 116: 1465 – 1469.
 12. Celebi S, Kukner AS; Photo disruptive Nd-YAG laser in the management of premacular subhyaloid hemorrhage. *Eur J Ophthalmol*. 2001; 11: 281– 286.
 13. Gabel VP, Birngruber R, Gunther-Koszka H, Puliafito CA; Nd-YAG laser photodisruption of hemorrhagic detachment of the internal limiting membrane. *Am J Ophthalmol*. 1989; 107: 33 – 37.
 14. Kaynak S, Eryildirim A, Kaynak T, Durak I, Saatçi O, Eryildirim S *et al.*; Nd: YAG laser posterior hyaloidotomy in subhyaloid hemorrhage. *Ophthalmic Surg* 1994; 25(7): 474-6.
 15. Raymond LA; Neodymium: YAG laser treatment for hemorrhages under the internal limiting membrane and posterior hyaloid face in the macula. *Ophthalmology* 1995; 102: 406-11.
 16. Thach AB, Lopez PF, Snady-McCoy LC, Golub BM, Frambach D; Accidental Nd: YAG laser injuries to the macula. *Am J Ophthalmol* 1995; 119: 763-73.
 17. Schipper T; Valsalva's maneuver: not always benign. *Klin Monatsbl Augenheilkd* 1991; 198: 457-9.