

## Trans-scleral diode laser application, other potential benefits

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**Abstract:** Background: Recurrent vitreous hemorrhage after vitrectomy procedure is a devastating event. The aim of this study was to determine the potential rule of trans-scleral diode laser in reducing the risk of late recurrent vitreous hemorrhage. Patients and methods: A prospective study was conducted on 32 eyes of 32 patients (19 males and 13 females) presented for the first time with diabetic vitreous hemorrhage and was enrolled to have primary vitrectomy and pan retinal photocoagulation with or without silicon oil injection. Trans-scleral diode laser was applied around the enter sites and over the retinal periphery posterior to vitrectomy entry sites. Patients were followed at least for 12 months postoperatively. Results: There were 4 eyes in total with postoperative vitreous cavity hemorrhage (POVCH): two eyes had non-resolving of vitreous cavity hemorrhage that required vitreous cavity washout. One eye had recurrent POVCH 6 weeks after surgery and another eye had POVCH 3 months after surgery. Conclusions: Trans-scleral diode laser application should be considered during vitrectomy for diabetic vitreous hemorrhage.

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**Keywords:** trans-scleral diode laser, diabetic vitreous hemorrhage, vitrectomy entry sites, fibrovascular proliferation.

### 1. Introduction

Diabetes is considered to be the most important cause of new cases of blindness among adults aged 20–74 years. Within 10–15 years, 25–50% of patients with type I diabetes show some signs of retinopathy and approaches 100% after 30 years while 60% of patients with type II diabetes show signs of non-proliferative diabetic retinopathy after 16 years [1,2].

Diabetic retinopathy is diagnosed by the presence of microaneurysms, haemorrhages, exudates (hard, soft exudates), venous changes, new vessel formation, retinal thickening and late vitreous hemorrhage and traction detachment. The occurrence of vitreous hemorrhage causes marked reduction of visual acuity and so prevention of vitreous hemorrhage is very important and this is done by early detection of optic disc and/or retinal Neovascularization with prompt management. Anti-vascular endothelial growth factor agents may be used as an adjunct to reduce the risk of neovascularization. Vitreous hemorrhage may clear spontaneously. Surgical intervention by vitrectomy operation is indicated when vitreous hemorrhage persists [3-5].

Recurrence of vitreous hemorrhage after vitrectomy may occur early or late postoperatively and in many cases may require recurrent surgical intervention. Late recurrent vitreous hemorrhage was attributed mainly to bleeding from residual fibrovascular tissue, fibrovascular proliferation from sclerotomy sites and the vitreous base [6]. Trans-scleral diode was reported previously to be successful

in managing retinal neovascularization in retinopathy of prematurity [7,8].

The aim of this study was to determine the potential rule of trans-scleral diode laser in reducing the risk of late recurrent vitreous hemorrhage secondary to vascularization around vitrectomy entry sites and in preventing postoperative retinal detachment secondary to vitrectomy entry site breaks.

To our knowledge, the use of trans-scleral diode laser at vitrectomy entry sites during diabetic vitrectomy for prevention of late POVCH has not been reported previously.

### 2-Patients and Methods

A prospective study was conducted on 32 eyes of 32 patients (19 males and 13 females) presented with persistent diabetic vitreous hemorrhage and was enrolled to have primary vitrectomy and pan retinal photocoagulation with or without silicon oil injection. Trans-scleral diode laser was applied around the enter sites and over the retinal periphery posterior to vitrectomy entry sites. Patients were followed at least for 12 months postoperatively. This prospective study was conducted at Al-Azhar University Hospitals, Cairo, Egypt. Thirty two eyes of thirty two patients (19 males and 13 females) presented for the first time with diabetic vitreous hemorrhage were included. Patients age ranged from 49 to 67 years (mean  $58.1 \pm 4.9$  years). Exclusion criteria included eyes with previous ocular surgery, eyes presented with penetrating ocular injuries, non diabetic vitreous

hemorrhage, eyes with rhegmatogenous retinal detachment and less than 12 months of follow-up. All patients underwent full preoperative systemic medical and ocular examination. The mean duration of vitreous hemorrhage to operation day was  $48.5 \pm 16.5$  days. Preoperative assessments included evaluation of visual acuity, intraocular pressure and the anterior segment under slit lamp. B-scan ultrasonography was also performed to exclude retinal detachment or tears or intraocular tumors. History of previous retinal laser photocoagulation was reported in 12/32 patients. All patients were intended to have a standard 20 gauge three-port Pars plana vitrectomy. Special care was taken to remove vitreous hemorrhage near the vitreous base under a wide-angle viewing system with sclera depression. Any tractional membranes were removed and Pan retinal photocoagulation was done at the conclusion of surgery. Silicon oil was injected in 8/32 eyes where tractional detachment was repaired. Concurrent cataract surgery was planned in 5/32 eyes. A progression of lens opacity that obscured the view occurred in another 2/23 eyes and cataract surgery was performed. Transscleral scleral diode laser application around the vitrectomy entry sites was performed at completion of surgery as well as at the peripheral retina posterior to vitrectomy entry sites. Diode laser (Oculight SLx Iris Medical Diode Laser) parameters used were 0.2-0.3s duration and 0.8-1.2w power.

### 3-Results

No major operative complications were encountered e.g. iatrogenic breaks, choroidal hemorrhage. Performing trans-scleral diode was definitively a quicker procedure as compared to cryo application that requires a defrosting period. Postoperative complications included cataract formation in 4 eyes and cataract surgery was done later, opacity of the posterior lens capsule in 3 eyes, glaucoma in one siliconized eyes and rebuosis iridis in 3 eyes and hence further argon laser session was performed. The aided visual outcome 4 weeks after the first surgery was equal to 5/60 or better in 30/32 eyes. 2/32 eyes had non-resolving of vitreous cavity hemorrhage consequently another operation was performed. One eye had recurrent POVCH after 6 weeks and another eye had POVCH 3 months after surgery, both had a second session intervention. It is important to mention that neither eye with late POVCH acquired bleeding during re-intervention surgery from the new entry sites.

### 4-Discussion

Postoperative vitreous cavity hemorrhage was previously reported to occur up to 75% following

pars plana vitrectomy (PPV) for diabetic vitreous hemorrhage [9-12]. Preoperative Bevacizumab intravitreal injection for diabetic vitrectomy did not influence rates of late POVCH [6]. Fibrovascular proliferation from the sclerotomy sites was considered as the most important cause for late postoperative recurrent vitreous cavity hemorrhage. One study reported that 57.9% of eyes had definite fibrovascular in growth from one or more of the original pars plana sclerotomies [13]. The appearance of a trapezoidal image on 20-MHz high-resolution anterior segment ultrasonography at a sclerostomy site after vitrectomy for proliferative diabetic retinopathy was a pathognomonic sign and highly correlated with the occurrence of non-clearance of POVCH and need for vitreous cavity washout [14]. Hence sclerostomy site treatment is considered an essential step in prevention of late POVCH.

Sclerostomy site treatment was reported to be effective in reducing the occurrence of recurrent late POVCH in patients undergoing vitrectomy for proliferative diabetic retinopathy. In a study conducted on 164 eyes presented with diabetic vitreous hemorrhage and treated by vitrectomy, the sclerotomy sites in 82 eyes were treated by cryo or argon laser and they reported a significant reduction in the incidence of late recurrent POVCH i.e. 6% of eyes [15]. Another study conducted on 124 eyes of which 42 eyes were reported to have cryotherapy (two cryotherapy spots) for the sclerotomy sites at the end of the operation and their results showed that cryotherapy is not helpful for prevention of late post-vitrectomy diabetic hemorrhage, and it may even increase this risk [16].

The risk of retinal detachment from Iatrogenic retinal breaks related to sclerotomy entry was reported to occur up to 15.2% of cases. So, prevention is essential by applying cryo around the entry sites [17,18]. Transscleral diode laser retinopexy proved to be a safe and effective means of creating chorioretinal adhesion during retinal reattachment surgery [19,20].

The results of diode laser trans-scleral application around the sclerotomy entry sites, in the current study, were comparable to the results reported by Steel and his colleague in 2010 [15]. Late POVCH occurred in the current study in 6.7% of eyes. Neither eye of the current study acquired postoperative retinal detachment.

### 5. References

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