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Visual Outcome after Pars Plana Vitrectomy in patients with Diabetic Tractional Macular Detachment

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Purpose: Diabetic retinopathy is a sight-threatening complication of Diabetes Mellitus. Fibrovascular proliferation occurs in advanced diabetic eye disease which later progress to tractional retinal detachment. Indeed, the macular detachment is most serious complication. This study evaluated efficiency of pars plana vitrectomy to remove the fibrovascular proliferative tractional bands.

Materials and Methods: Our study is a case series of 30 patients presenting to Outdoor of Institute of Ophthalmology, Mayo Hospital, Lahore between 1st March 2011 and 31st October 2011. Only those patients fulfilling the inclusion and exclusion criteria were selected after detailed ophthalmological assessment via convenient sampling. In patients with bilateral tractional retinal detachment, only the eye with the worse best corrected visual acuity was selected. Patients underwent simple pars plana vitrectomy, PPV with gas and PPV with oil with or without endolaser on clinical findings and or peroperative condition. Patients were followed up on 1st post-operative week and later after one month.

Results: A total of 30 patients were selected for the study. The pre-operative visual acuity ranged from 3/60 to 6/18 Snellen. 5 patients (18%) showed an improvement of 1 to 2 Snellen lines. The vision of 3 patients (10%) deteriorated and the rest 66% showed no increase or decrease in their pre and postoperative best corrected visual acuity.

Key Words:

Diabetic retinopathy, macular tractional RD,

Introduction:

Diabetes mellitus is systemic disease, the ocular manifestation of which is well known as diabetic retinopathy and which may eventually lead to blindness. The prevalence of retinopathy may be as high as 80% among diabetics with more than 10 years of the disease.[1] Although the picture looks very grim, there is evidence that as much as 90% of the incidence can be prevented by appropriate treatment along with regular follow up and monitoring.[2]

The hallmark of diabetic retinopathy is pathological changes in retinal microvasculature. Hyperglycemia causes death of pericytes lining the retinal capillaries and basement membrane thickening of the latter, resulting in leakage through microvascular walls. If the disease progresses, then severe nonproliferative diabetic retinopathy changes to proliferative, characterized by proliferation of neovessels. The ischemia in the retina causes neovascularization, in the retina which may proliferate into the vitreous humour. These new vessels are immature, quite friable and unless treated in time, can readily bleed, leading to intragel hemorrhage. Fibrovascular proliferation may also lead to tractional retinal detachment.

Shrinkage of the vitreous in diabetics is the main cause of tractional retinal detachment. The vitreous detachment is partial, and is compounded by shrinking of proliferating epiretinal membranes resulting in centripetal traction toward the vitreous base. On the other hand, this shrinking results in a tangential gathering of the retina. These two processes usually occur side by side during the pathogenesis of diabetic tractional retinal detachment.

Traction retinal detachment (TRD) is one of the most challenging situations for a vitreoretinal surgeon especially when it is involving the macula. Even in the hands of experienced surgeons intraoperative complications like iatrogenic breaks and intraocular bleeding can occur.[3] Segmentation and delamination of fibrovascular bands are the classic surgical techniques to release traction from retina as described by Charles [4], however, an enbloc technique has been described by Abrams. [5] development of safer and more efficient surgical instruments, especially microsurgical vitreoretinal instruments for bimanual vitrectomy greatly facilitate vitreoretinal procedures with fewer preoperative complications.

TRD is the main reason for profound visual loss in patients having proliferative diabetic retinopathy (PDR).[6,7] In fact it is one of the most common indication for pars plana vitrectomy (PPV) in patients with diabetes[8,9] so much so that immediate PPV is indicated when macula is threatened or involved.[8,10]

The technique of PPV involves the total excision of fibrovascular membranes with removal of all vitreoretinal traction. It is very important to avoid minimise intraoperative bleeding and avoid causing any iatrogenic retinal break.[6,8]

The PPV usually results in restoration of the anatomy but the visual prognosis seldom improves. The study is done to see the actual improvement or stability of visual acuity undergoing PPV for diabetic tractional macular detachment.

Objective:

- To assess the visual outcome after PPV for Diabetic Tractional Macular detachment.

Methods:

30 patients including 17 males and 13 females referred to Vitreo-retina clinic, Institute of Ophthalmology, Mayo Hospital, Lahore were included in the study. All patients were screened in a detailed ophthalmic evaluation including Best Corrected Visual Acuity measurement along with any refraction if needed, slit lamp bio-microscopy of the anterior segment, Intraocular pressure measurement by applanation tonometry, dilated fundus examination using slit lamp biomicroscopy as well as indirect ophthalmoscopy, and Optical Coherent Tomography. Informed consent was obtained verbally as well as in writing from all the people fulfilling the inclusion criteria and willing to participate after the procedure including the potential risks and benefits of the treatment were explained.

PPV was performed under peri-bulbar anaesthesia by a single experienced vitreoretina surgeon. Retinal reattachment was achieved in simple tractional retinal detachment by releasing anteroposterior and tangential tractions, and in cases of combined detachments, by draining the Sub retinal fluid and performing fluid air exchange in addition to releasing traction. Silicon Oil was injected in cases with iatrogenic retinal break.

Patients were examined on first post operative day and later after one month for anterior segment examination, intraocular pressure, detailed fundus examination and visual acuity.

Inclusion Criteria:

- Patients with PDR having Tractional Macular

Detachment.

- Macular TRD of recent onset.
- Patients with age between 40 and 60 years.
- Best Corrected Visual Acuity between 3/60 and 6/18.

Exclusion Criteria:

- Patients with Rhegmatogenous RD.
- Patients with media opacities
- previous history of a thromboembolic event
- haemodialysis, known coagulation disorders, or receiving anticoagulants other than aspirin
- Glaucoma
- clinically evident vitreous or preretinal haemorrhage

Results:

A total of 30 patients were enrolled for the study. The pre-operative visual acuity ranged from 3/60 to 6/18 Snellen. 5 patients (18%) showed an improvement of 1 to 2 Snellen lines. The vision in 3 patients (10%) deteriorated and the rest of the patients (66%) showed no increase or decrease in their pre and postoperative best corrected visual acuity. Of all the patients, 2 patients had post-operative vitreous hemorrhage, and 1 patient had retinal detachment.

#	Age/ Sex	Typel DM/ Type II DM	Pre - Operative BCVA	Macula Threatening/ Macula Involving	Per - Operative Complication	Operative Procedure	Post- Operative Complication	Post - Operative BCVA (one week)	Post- Operative BCVA (one month)
1	55y/ M	Type II	4/60	Thrt.	—n/a—	PPV	—n/a—	6/60	6/60
2	62y/ M	Type II	3/60	Thrt.	Iatrogenic Break	PPV + Oil + EL	—n/a—	2/60	3/60
3	37y/ M	Type I	3/60	Inv.	—n/a—	PPV	—n/a—	3/60	3/60
4	53y/ M	Type II	6/60	Thrt.	Hemorrhage	PPV + Gas + EL	Hemorrhage	1/60	1/60
5	56y/ F	Type II	5/60	Thrt.	Iatrogenic Break	PPV + Oil + EL	—n/a—	3/60	5/60
6	60y/ M	Type II	3/60	Thrt.	—n/a—	PPV	—n/a—	3/60	4/60
7	59y/ M	Type II	6/18	Inv.	Hemorrhage	PPV + Gas + EL	—n/a—	6/24	6/18
8	42y/ M	Type I	6/60	Thrt.	Hemorrhage	PPV + Gas + EL	—n/a—	3/60	6/60
9	62y/ F	Type II	6/36	Thrt.	—n/a—	PPV + EL	—n/a—	6/36	6/36
10	63y/ M	Type II	6/60	Inv.	—n/a—	PPV + Oil + EL	—n/a—	4/60	6/60
11	65y/ F	Type II	3/60	Inv.	Iatrogenic Break	PPV + Oil + EL	—n/a—	3/60	3/60
12	54y / F	Type II	6/24	Thrt.	Iatrogenic Break	PPV + Oil + EL	Hemorrhage	2/60	4/60
13	38y/ M	Type I	5/60	Thrt.	—n/a—	PPV	—n/a—	5/60	5/60
14	65y/ F	Type II	3/60	Thrt.	—n/a—	PPV	—n/a—	2/60	3/60
15	54y/ M	Type II	6/60	Thrt.	Hemorrhage	PPV + Gas + EL	—n/a—	2/60	6/36
16	62y/ M	Type II	6/18	Thrt.	—n/a—	PPV + EL	—n/a—	6/36	6/18
17	56y/ F	Type II	4/60	Inv.	—n/a—	PPV + EL	—n/a—	3/60	4/60
18	52y/ F	Type I	4/60	Thrt.	Hemorrhage	PPV + Oil + EL	—n/a—	2/60	4/60
19	56y/ M	Type II	6/60	Thrt.	—n/a—	PPV	—n/a—	6/36	6/36
20	40y/ F	Type I	3/60	Inv.	—n/a—	PPV + Gas + EL	—n/a—	1/60	3/60
21	65y/ M	Type II	6/24	Thrt.	Iatrogenic Break	PPV + Oil + EL	Retinal Detachment	4/60	3/60
22	61y/ M	Type II	6/60	Thrt.	—n/a—	PPV	—n/a—	6/60	6/60
23	53y/ F	Type II	6/36	Thrt.	—n/a—	PPV + EL	—n/a—	6/60	6/36
24	59y/ F	Type II	3/60	Inv.	—n/a—	PPV	—n/a—	2/60	3/60
25	62y/ M	Type II	3/60	Thrt.	Iatrogenic Break	PPV + Oil + EL	—n/a—	2/60	3/60
26	55y/ F	Type II	6/60	Thrt.	—n/a—	PPV + EL	—n/a—	4/60	6/60
27	64y/ M	Type II	4/60	Thrt.	—n/a—	PPV	—n/a—	4/60	4/60
28	59y/ M	Type II	6/36	Thrt.	Iatrogenic Bleed	PPV + Oil + EL	—n/a—	6/60	6/36
29	58y/ F	Type II	6/60	Thrt.	—n/a—	PPV	—n/a—	6/36	6/36
30	54y/ M	Type II	5/60	Thrt.	—n/a—	PPV	—n/a—	5/60	5/60

Discussion:

Proliferative diabetic retinopathy is one of the leading causes of blindness and visual impairment globally. Its pathogenesis is mainly associated with progressive retinal ischemia occurring as a result of diabetic retinopathy. The two main complications resulting in visual loss - tractional retinal detachment and vitreous hemorrhage – are dependent upon the close proximity between the neovascular tissue and the vitreous. Duration of diabetes and the level of glycemic control of the patient are the major contributing risk factors.[11]

One of the most serious complications of diabetic eye disease is tractional retinal detachment. The neovessels initially lay down fibrous tissue as they grow and then regress. This fibrous tissue during maturation contracts or shrinks. If the neovessels lie on the surface of the retina, the contraction of the fibrous scar produces distortion of part of the retina. However, vessels growing out into the vitreous cavity form adhesions between the fibrovascular tissue and the collagen fibers making up the vitreous body. During detachment of posterior vitreous or due to contraction of fibrous scar, pull is exerted on the retina causing traction that may lead to distortion or detachment of retina. Retinal detachments lying peripherally usually have little effect on vision, but may cause profound visual loss if they involve the macula. Visual prognosis, once macular detachment occurs, is usually poor even if the retina is surgically reattached, therefore, whenever possible, emphasis should be on prevention and early treatment.[12]

Although visual acuity outcome after vitrectomy in cases of Tractional macular detachment is favourable as compared to the natural course of the disease, it is still much poorer as compared with the potential efficacy of early institution of preventive measures like better glycemic control, and prompt and appropriate application of laser photocoagulation. After surgery, even though the anatomic objectives may be achieved the final visual outcome is still limited.

The high risk of intraoperative complications like bleed from fibrovascular tissue, optic nerve damage secondary to high intraocular pressure, and iatrogenic breaks that impair final visual outcomes, makes surgery for tractional retinal detachment secondary to proliferative diabetic retinopathy one of the most challenging procedures for a retinal surgeon. To achieve greater efficiency, the precise goals of surgery must be kept in mind to avoid complications.

Advances in ocular instrumentation permit bimanual surgery to be performed. Newer vitrector tips, such as the 23-gauge and the latest 25-guage, are designed to have their openings closer to the tip, which is a substantial advantage over 20-gauge vitrector tips.[13] The new vitrector tips permit working near the retina with less risk. Even fibrovascular proliferation can be delaminated using only the vitrector tip and no horizontal scissors. New vitrectomy machines represent significant advances in surgical instrumentation. High-speed cutting and duty cycle control, combined with advances in illumination and intraocular pressure stability, enable vitreoretinal surgeons to improve safety and efficiency in every procedure.

William et al operated 69 eyes with En bloc excision for diabetic traction retinal detachment. Initial retinal reattachment was accomplished in 100% (69/69) of the eyes. With a minimum of 6 months' follow-up, the retina remained completely attached in 83% (57/69) of eyes, while the macula was attached in 88% (61/69) of eyes. Final visual acuity was 5/200 or better in 71% (49/69) of eyes.[14]

Conclusion:

Pars plana vitrectomy with in patients with macular TRD or TRD threatening macula theoretically should improve the end visual outcome in patients however the results of this study do not give statistically significant results. The shortcomings in the study may be due to delayed presentation or small sample size. Studies with larger sample size and more selected samples including Early TRD should be undertaken to give better understanding.

References:

1. Kertes PJ, Johnson TM. Evidence Based Eye Care. Philadelphia, PA: Lippincott Williams & Wilkins;2007
2. Tapp RJ, Shaw JE, Harper CA, et al. The prevalence of and factors associated with diabetic retinopathy in the Australian population. Diabetes Care 2003 June 26;6: 1731–7.
3. Smiddy WE, Flynn HW. Vitrectomy in the management of diabetic retinopathy. Surv Ophthalmol. 1999;43(6):491–507.
4. Gündüz K, Bakri SJ. Management of proliferative diabetic retinopathy. Compr Ophthalmol Update. 2007;8(5):245–256.
5. Williams DF, Williams GA, Hartz A, Mieler WF, Abrams GW, Aaberg TM. Results of vitrectomy for diabetic traction retinal detachment using the en bloc excision technique. Ophthalmology. 1989;96(6):752–758.
6. Rice TA, Michels RG, Rice EF. Vitrectomy for diabetic traction retinal detachment involving the macula. Am J Ophthalmol 1983;95:22–33.
7. Fong DS, Ferris FL, Davis MD, et al. Causes of severe visual loss in the early treatment diabetic retinopathy study: ETDRS report no 24. Early Treatment Diabetic

Retinopathy Study Research Group. Am J Ophthalmol 1999;127:137–41.

8. Ho T, Smiddy WE, Flynn HW, Jr. Vitrectomy in the management of diabetic eye disease. Surv Ophthalmol 1992;37:190–202.
9. Aaberg TM, Abrams GW. Changing indications and techniques for vitrectomy in management of complications of diabetic retinopathy. Ophthalmology 1987;94:775–9.
10. Meier P, Wiedemann P. Vitrectomy for traction macular detachment in diabetic retinopathy. Graefes Arch Clin Exp Ophthalmol 1997;235:569–74.
11. Tapp RJ, Shaw JE, Harper CA, et al. The prevalence of and factors associated with diabetic retinopathy in the Australian population. Diabetes Care 2003 June;26 (6): 1731–7.
12. White NH, Sun W, Cleary PA, et al. Prolonged effect of intensive therapy on the risk of retinopathy complications in patients with type 1 diabetes mellitus: 10 years after the Diabetes Control and Complications Trial. Arch Ophthalmol. 2008;126(12):1707–1715.
13. Hubschman JP, Gupta A, Bourla DH, Culiat M, Yu F, Schwartz SD. 20, 23 and 25-gauge vitreous cutters: performance and characteristics evaluation. Retina . 2008;28(2):249–257.
14. Williams DF, Williams GA, Hartz A, Mieler WF. Results of vitrectomy for diabetic traction retinal detachments using the en bloc excision technique. Ophthalmology. 96(6):752-8.