Original article

Surgical Outcomes of 23 Gauge Pars Plana Vitrectomy for Non Clearing Diabetic Vitreous Hemorrhage

Riffah Razzaq Wattoo[1], Usama Iqbal[2], Zeeshan Hameed[3]

[1]PGR Vitroretina, Faisalabad Medical University / Allied Hospital, Faisalabad, [2]Assistant Professor, Khawaja Muhammad Safdar Medical College, Sialokt, [3]Postgraduate Resident, Gujranwala Medical College / Teaching Hospital, Gujranwala

Corresponding author: Zeeshan Hameed, Email: zeeshanhameed097@gmail.com

ABSTRACT

Background: Vitreous hemorrhage (VH) is one of the main causes of visual loss in patients with Diabetic Retinopathy. Initial management of VH is observation for 4-6 weeks. Non-clearing vitreous hemorrhage (NCVH) remains the most common indication for vitrectomy in such patients. The objective of the study was to investigate the surgical outcomes of 23-gauge vitrectomy with prior intravitreal bevacizumab for non-clearing diabetic vitreous hemorrhage.

Patients and Methods: This was a prospective interventional case series conducted at Ophthalmology Department, Allied Hospital, Faisalabad from 1st January 2022 to 31st December 2022 (1 year). After obtaining IRB approval and informed consent, 50 patients with non-clearing vitreous hemorrhage (VH) were included in this study. Patients with any type of retinal detachment and previous retinal surgery were excluded. After initial detailed pre-op assessment, all patients underwent 3-port pars plana vitrectomy with 23G instrumentation using Binocular Indirect Operating Microscope (BIOM) system. Patients were followed up at one week, one month and three months to note visual acuity and any early or late post-operative complication. Data was analyzed by SPSS v. 25.0.

Results: Out of 50 patients, 35 (70%) were female and 15 (30%) were male. Age ranged from 32 to 78 years with mean age of 55.5 years. Only 4 (8%) patients were type I diabetics. Mod pre-operative best corrected visual acuity was 3/60 and it improved to mode BCVA of 6/36 on Snellen chart. Complete resolution of VH occurred in 42 (84%) patients while 6 (12%) patients had recurrent VH. Most common postoperative complication noted was raised intraocular pressure in 19 (38%) patients.

Conclusion: Our study suggested that 23-G vitrectomy is a safe option for patients with non-resolving diabetic vitreous hemorrhage. Mean BCVA improves after vitrectomy (depending on retinal status) and postoperative surgical complications also remain minimal.

Keywords:

Diabetes Mellitus, Vitreous Hemorrhage, 23-guage Vitrectomy

INTRODUCTION

Pakistan is the 5th largest country on the basis of population (220 million recent census). Diabetes mellitus (DM) affects a large proportion of population with prevalence reported to be around 14% in Pakistan.[1] Diabetic retinopathy (DR) is a vision threatening and potentially blinding complications of DM. DR is reported to affect 28.78% of the population with DM, with range reported from 10.6% to 91.3%. In Pakistan, the prevalence of vision-threatening diabetic retinopathy (VTDR), is thought to be 28% among patients with DR .[2] DR has two gradings i.e. non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). Prevalence of proliferative diabetic retinopathy (PDR) in Pakistan is 2.65–5%.[3] Complications of PDR is advanced diabetic eye disease which includes vitreous hemorrhage (VH), tractional retinal detachment (TRD), combined tractional and rhegmatogenous retinal detachment, macular oedema, macular detachment and macular ischemia.[4]

Vitreous hemorrhage (VH) is one of the major causes of visual loss in patients with PDR. Initial management of VH is observation for 4-6 weeks.[5] Non-clearing vitreous hemorrhage (NCVH) remains the most common clue for vitrectomy in diabetic patients. Timing of vitrectomy depends on many factors including status of the fellow eye, professional and lifestyle requirements, the degree of visual impairment, necessity for a clear media to monitor the retinal pathology. Besides hemorrhage removal, the pro-inflammatory and angiogenic mediators present in vitreous, which are responsible for macular edema, neovascularization and fibrous proliferation, are also cleared by vitrectomy.[6] It also facilitates the access to retina for pan-retinal photocoagulation (PRP). PRP prevent further episodes of vitreous hemorrhage. It also

Conflict of interest: The authors declared no conflict of interest exists.
Citation: Wattoo RR, Iqbal U, Hameed Z. Surgical Outcomes of 23 Gauge Pars Plana Vitrectomy for Non Clearing Diabetic Vitreous Hemorrhage. J Fatima Jinnah Med Univ. 2023; 17(2):45-48.

DOI: https://doi.org/10.37018/JFJMU/ZEE/1997

prevents the progression to TRD by interrupting fibrous tissue proliferation.

The conventional three ports 20-Gauge (G) vitrectomy was developed in 1974 by Heintz. 20G vitrectomy remained a standard procedure for over 3 decades after its introduction. Conventional 20G vitrectomy requires conjunctival peritomy and sclerotomy of 0.9 mm diameter.[7] This leads to significant post-operative corneal astigmatism and topographic changes. Also there is more ocular trauma, post-operative inflammation and conjunctival scarring. With more advanced micro-incision vitrectomy system (MIVS), there is less need for peritomy and stitching of port sites.[8] Fuiji et al, first introduced 25G vitrectomy in 2002.[9] Scleral incision diameter required for 25G vitrectomy is 0.51 mm.[7] Decreasing the gauge of instrument limits diameter of the instrument and its lumen. This has less desired effects on instrument performance. In 2005, Eckardt introduced 23G vitrectomy (0.64 mm scleral incision) with less instrument flexibility and greater ability to perform a more complete peripheral vitrectomy.[9] Benefits of MIVS include its trans-conjunctival approach, self-sealing, and suture-less. It has advantage of reduced ocular trauma, post-operative inflammation, minimal corneal astigmatism, more patient comfort and less conjunctival scarring. There is benefit of conjunctival preservation in patients with glaucoma. MIVS is reported to have lower incidence of per-operative retinal breaks. There is also reduced risk of postoperative neo-vascular glaucoma.[10]

Vitrectomy in diabetic patients can be associated with the risk of peri-operative bleeding or early recurrent vitreous hemorrhage. Use of anti- vascular endothelial growth factors (anti-VEGF) prior to vitrectomy decreases the risk of per-operative bleeding.[11,12] It has also shown to lessen the risk of post-operative recurrent vitreous hemorrhage and other surgical complications.[13]

This study is designed to investigate the surgical outcomes of 23-gauge vitrectomy with prior intravitreal bevacizumab for non-clearing diabetic vitreous hemorrhage.

PATIENTS AND METHODS

Approval from institutional review committee was obtained. A prospective interventional case series study was conducted at Ophthalmology Department, Allied Hospital, Faisalabad from 1st January 2022 to 31st December 2022 (1 year). 50 patients with non-resolving diabetic vitreous hemorrhage, as per inclusion criteria were included in the study. Sampling was done by non-probability purposive sampling technique. Patients with tractional, rhegmatogenous or combined retinal detachment, previous PPV, vitreous hemorrhage due to other oocular pathologies, retinal vasculitis or posterior uveitis were excluded. Sample size of 50 was estimated using 90% power of study and 5% level of significance.

Patients were recruited from outpatient department. Informed consent was obtained from all participants. Detailed pre-operative assessment was done on all patients including best corrected visual acuity testing by Snellen acuity chart, Slit lamp examination of anterior segment followed by dilated posterior segment examination. Binocular indirect ophthalmoscopy was done. B-Scan was done when fundus view was found to be hazy to rule out tractional retinal detachment and rhegmatogenous retinal detachment. Laboratory investigations including glycosylated hemoglobin level (HbA1c) and viral markers were carried out. All the patient were given intravitreal bevacizumab one week before surgery to reduce the risk of per-operative retinal hemorrhage.

Surgery was performed both under local/ general anesthesia. 3-port pars plana vitrectomy using 23-gauge (23G) instrumentation with a bimanual technique and using Binocular Indirect Operating Microscope system (BIOM) was performed. Vitrectomy was done to clear the vitreous hemorrhage. Endo-laser pan retinal photocoagulation with up to 1000 spots was applied to all patients. In patients with hazy fundus view due to cataract, phacoemulsification with implantation of foldable posterior chamber intraocular lens was done prior to vitrectomy. No endo-tamponade was used in the study participants. Patients were followed up at day 7, one month and then at three month to note visual acuity and any early or late post-operative complication. Patient's data was entered on a pre-designed proforma. Data analysis was done by SPSS version 25.0. Paired sample t-test was applied for comparing pre-operative and post-operative visual acuity. P-value of ≤ 0.05 was taken as significant.

RESULTS

Out of 50 patients, 35 (70%) were female and 15 (30%) were male. Age ranged from 32 to 78 years with mean age of 55.5 ± 5.7 years. 4 (8%) patients were type I diabetics while rest of 46 (92%) were type II diabetics. 12(24%) patients had combined phacoemulsification with pars plana vitrectomy while 38 (76%) patients had pars plana vitrectomy only.

Median pre-operative BCVA was 3/60 and it improved to median postoperative BCVA of 6/36 on Snellen chart at one month. (Table 1 Complete resolution of VH occurred in 42 (84%) patients while 6 (12%) patients had recurrent VH. 4 (8%) patients needed second surgery. Most common postoperative complication noted was Corneal Edema 24(48%) and raised intraocular pressure in 19 (38%) patients. (Table 2).

Table 1: Comparison of Pre-op and Post-op BCVA

BEST CORRECTED VISUAL ACUITY	PRE-OP BCVA	POST-OP BCVA		
	N (%)	DAY 1	1 WEEK	1 MONTH
Hand Movement (HM)	2 (4%)	1 (2%)	0 (0%)	0 (0%)
Finger Counting (FC)	4 (8%)	2 (4%)	0 (0%)	0 (0%)
3/60	15 (30%)	5 (10%)	3 (6%)	0 (0%)
4/60	14 (28%)	8 (16%)	5 (10%)	2 (4%)
5/60	6 (12%)	12 (24%)	8 (16%)	6 (12%)
6/60	9 (18%)	9 (18%)	7 (14%)	7 (14%)
6/36	0(0%)	9 (18%)	19 (38%)	14 (28%)
6/24	0 (0%)	3 (6%)	4 (8%)	12 (24%)
>6/24	0 (0%)	1 (2%)	4 (8%)	10 (20%)
Mode VA (HM-6/24)	3/60	6/60	6/60	6/36

Table 2: Postoperative Complications of Vitrectomy

Postoperative Complication	NUMBER (n)	PERCENTAGE (%)
No Complication	3	6 %
PER-OP COMPLICATIONS		
Bleeding from sclerotomies	4	8 %
EARLY COMPLICATIONS		
Corneal Edema	24	48 %
Transient Raised IOP	19	38 %
Vitreous Hemorrhage (VH)		
Complete resolution of VH	42	84%
Recurrent VH	6	12%

DISCUSSION

Vitreous hemorrhage is a very prevalent ocular complication in patients with uncontrolled diabetes mellitus. Once it occurs, the ETDRS labels it as advanced diabetic eye disease.[14] Although, without strict glycemic treatment modalities tend to fail but still a variety of treatment options are there for diabetic vitreous hemorrhages. Anti-VEGF drugs are considered now as first choice treatment option which include Ranibizumab, Bevacizumab and Aflibercept.[15] These are being used both as primary therapy as well as adjuvant therapy before surgical options for non-resolving hemorrhages like vitrectomy can be undertaken. Chen et al showed in his study that vitrectomy done for vitreous hemorrhage with adjuvant Anti-VEGF given before surgery has better outcomes and lesser surgical complications especially in posterior segment.[16]

Our study had higher male to female ratio as shown by Flarence et al in his research.[17] Presentation age was 55.5 years which was close to many other authors.[18] Although complicated diabetic retinopathy is more common in type 1 diabetics but our study showed more population from type 2 diabetics.[19]

In literature, visual acuity improvement after vitrectomy is highly variable. Our study revealed improvement from mean pre-op BCVA of Hand Movement to mean post-op BCVA of 6/60. Glassman noted no vision improvement in his patients.[20] While Rush et al revealed significant improvements in visual status after vitrectomies.[21] Damian et al also showed that patients with type 2 diabetes and those with prior PRP/Anti-VEGF injections had better visual outcomes and conversely, fibrovascular proliferation and neovascular glaucoma were negative prognostic factors.[22]

Kumar et al reported raised IOP as most common postoperative complication of vitrectomy in diabetic vitreous hemorrhage.[23] his finding was augmented by many authors. Shakeel et al noted iatrogenic break during procedure in 10 out of his 50 patients and similar proportion had raised IOP postoperatively.[24] He also described recurrent vitreous hemorrhage in 7 of his patients while our number was 6 out of 50. Li et al noted neovascular glaucoma as a major poor prognostic factor for reduced postoperative visual acuity.[25] Majority of these complication are manageable and some may require redo-vitrectomy.

CONCLUSION

Our study suggested that 23-G 3-port PPV is a safe and feasible option for patients with non-resolving diabetic vitreous hemorrhage. Although the mean BCVA does improve after vitrectomy but it largely depends on the retinal status and extent of retinal abnormalities due to diabetes mellitus. Postoperative surgical complications although occur after 23-G vitrectomy but they remain minimal and are mostly manageable.

REFERENCES

1 Akhtar S, Nasir JA, Abbas T, Sarwar A. Diabetes in Pakistan: A systematic review and meta-analysis. Pak J Med Sci. 2019;35(4):1173-8.

2 Mumtaz SN, Fahim MF, Arslan M, Shaikh SA, Kazi U, Memon MS. Prevalence of diabetic retinopathy in Pakistan; A systematic review. Pak J Med Sci. 2018;34(2):493-500.

3 Memon WU, Jadoon Z, Qidwai U, Naz S, Dawar S, Hasan T. Prevalence of diabetic retinopathy in patients of age group 30 years and above attending multicentre diabetic clinics in Karachi. Pak J Ophthalmol.2012;28(2).19-25

4 Gupta B, Wong R, Sivaprasad S, Williamson TH. Surgical and visual outcome following 20-gauge vitrectomy in proliferative diabetic retinopathy over a 10-year period, evidence for change in practice. Eye. 2012 Apr;26(4):576-82.

5 De Maria M, Panchal B, Coassin M. Update on indications for diabetic vitrectomy and management of complications. Ann Eye Sci. 2018;3(9):1-0.

6 Okonkwo ON. Diabetic Vitrectomy. The Eye and Foot in Diabetes: IntechOpen; 2020. 30-90

7 Mohamed S, Claes C, Tsang CW. Review of Small Gauge Vitrectomy: Progress and Innovations. J of Ophthalmol. 2017;1-9.

8 Khan BA, Rizvi SF, Mahmood SA, Mal W, Zafar S. Visual outcome of 25-gauge microincision vitrectomy surgery in diabetic vitreous haemorrhage. Pak J Med Sci. 2015;31(5):1197-200.

9 Taleb EA, Nagpal MP, Mehrotra NS, Bhatt K, Goswami S, Babalola YO, et al. Comparison of clinical outcome between 23-G and 25-G vitrectomy in diabetic patients. Oman J ophthalmol. 2017;10(3):213-9.

10 Yokota R, Inoue M, Itoh Y, Rii T, Hirota K, Hirakata A. Comparison of microinsicion vitrectomy and conventional 20-gauge vitrectomy for severe proliferative diabetic retinopathy. Jpn J Ophthalmol. 2015;59(5):288-94.

11 Khan A, Qidwai U, Kazi U, Rabbani A. Role of Intravitreal Bevacizumab before Pars Plana Vitrectomy in Patients with Vitreous Hemorrhage Due to Proliferative Diabetic Retinopathy. Pak J Ophthalmol. 2013;29(3).1-7

12 Sultan Z, Rizvi SF, Qureshi FM, Mahmood SA. Role of bevacizumab in the prevention of early postoperative haemorrhage after 25-gauge microincision vitrectomy surgery. Pak J Med Sci.. 2016;32(5):1184-7.

13 Sultan EI, Fawzy AM, El-Khouly SE, Gad MA. Vitreous Base Shaving in Diabetic Vitreous Haemorrhage. 2019.1(1):7-11.

14 Chaudhary S, Zaveri J, Becker N. Proliferative diabetic retinopathy (PDR). Disease-a-Month. 2021;67(5):101140.

15 Lim JW, Lee SJ, Sung JY, Kim JS, Nam KY. Effect of prophylactic anti-VEGF injections on the prevention of recurrent vitreous hemorrhage in PDR patients after PRP. Scientific Reports. 2022 ;12(1):14484.

16 Chen L, Qu L, Gui Q, Wang S, Mao J, Fu X, et al. Effects of anti-vascular endothelial growth factor drugs before and after pars plana vitrectomy in patients with polypoidal choroidal vasculopathy and vitreous hemorrhage. J Ocul Pharmacol Ther. 2021;37(10):591-6.

17 Flarence MR, Harika G, Sreekumar V, Sreekavitha KN. A Study of the Etiology of Vitreous Hemorrhage in a Tertiary Care Eye Hospital. Eur J Mol Clin Med. 2022;9(3):12146-52.

18 Tandias R, Lemire CA, Palvadi K, Arroyo JG. Posterior vitreous detachment status as a predictive factor for outcomes of vitrectomy for diabetic vitreous hemorrhage. Retina. 2022;42(6):1103-10.

19 Morein J, Uvarov A, Spaic T, Mahon JL, Hramiak I, Liu SL. Low prevalence of fibrate use in adults with type 1 and type 2 diabetes and established diabetic retinopathy. Can J Ophthalmol. 2021;56(6):394-5.

20 Glassman AR, Beaulieu WT, Maguire MG, Antoszyk AN, Chow CC, Elman MJ, et al. Visual acuity, vitreous hemorrhage, and other ocular outcomes after vitrectomy vs aflibercept for vitreous hemorrhage due to diabetic retinopathy: a secondary analysis of a randomized clinical trial. JAMA ophthalmology. 2021;139(7):725-33.

21 Rush RB, Penella AD, Reinauer RM, Rush SW, Bastar PG. Internal limiting membrane peeling during vitrectomy for diabetic vitreous hemorrhage: a randomized clinical trial. Retina. 2021 ;41(5):1118-26.

22 Damian I, Nicoară SD. Visual outcomes and prognostic factors following 23G vitrectomy for vitreous hemorrhage in eyes with proliferative diabetic retinopathy. Arquivos Brasileiros de Oftalmologia. 2022;86:105-12.

23 Kumar A, Saswade NS, Murade SM, Rathod DB, Meshram B, Shah ST. A Study Of Clinical Profile And Visual Outcome In Patients Undergoing Vitrectomy For Vitreous Hemorrhage. Natl J Integr Res Med. 2021 ;12(5).7-10

24 Shakeel A, Khanzada MA, Zaman Y, Kamil Z, Waris N. Surgical outcomes of vitrectomy in patients with complications of diabetic retinopathy at a tertiary care center. J Liaquat Univ Med Health Sci. 2021 ;20(3):187-92.

25 Li XJ, Yang XP, Li QM, Wang YY, Lyu XB. Ranibizumab plus combined surgery for treatment of neovascular glaucoma with vitreous hemorrhage. Chinese Medical Journal. 2015;128(15):2078-83.