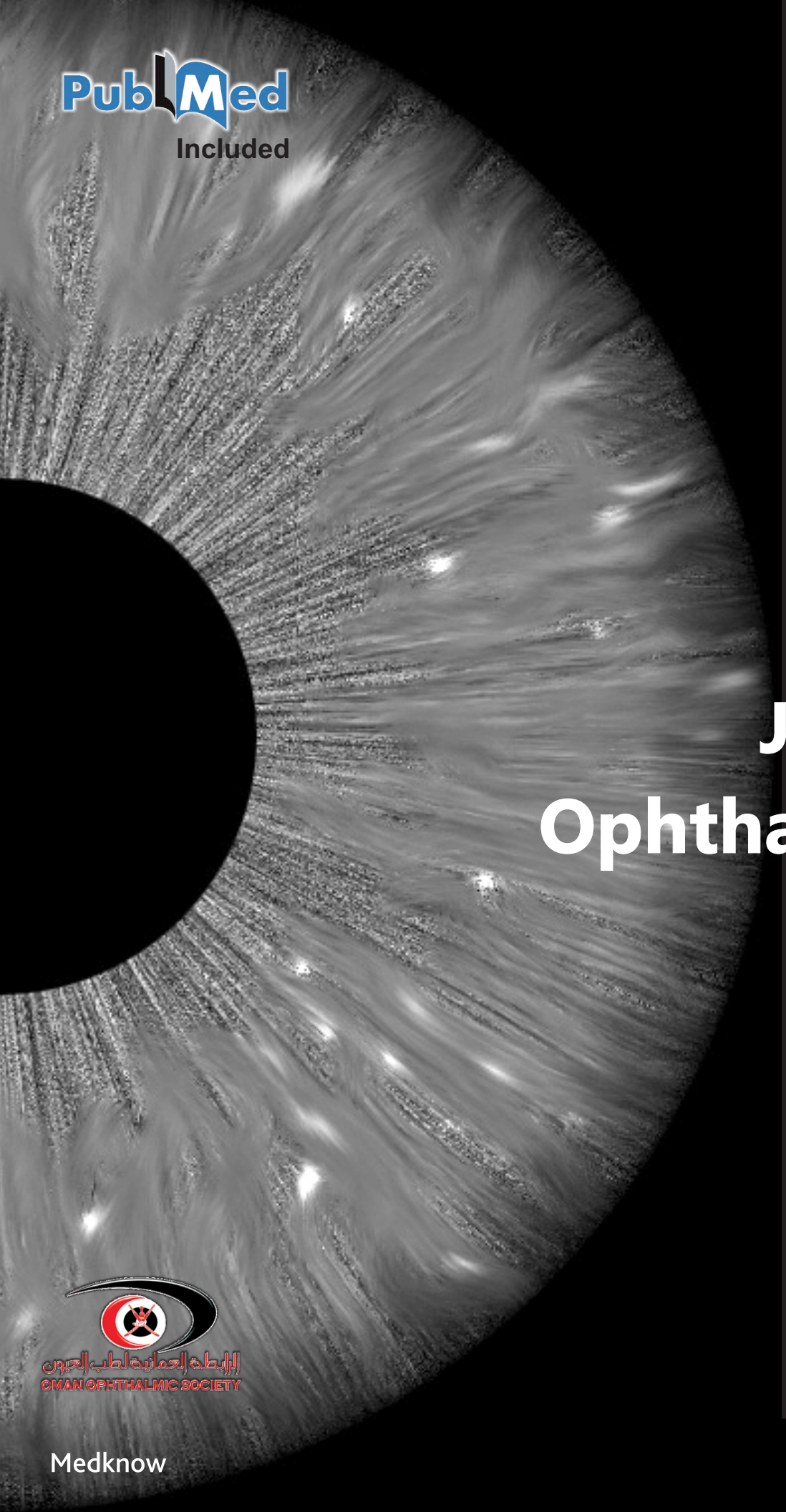

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Comparison of clinical outcome between 23-G and 25-G vitrectomy in diabetic patients

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Abstract:

PURPOSE: To compare the clinical outcomes and complications between 23-G and 25-G vitrectomy in patients with diabetic vitreous hemorrhage (VH).

MATERIALS AND METHODS: A retrospective comparative study comprising 69 eyes (36 eyes in 23-G group and 33 eyes in 25-G group) of 65 patients who underwent vitrectomy with air tamponade for diabetic vitreous hemorrhage (VH) with at least 6 months of follow-up was conducted.

RESULTS: There were no significant differences between the two groups in age, gender, bilaterality, type of diabetes, presence of hypertension, lens status, and previous argon laser photocoagulation state ($P > 0.05$). Best-corrected visual acuity (BCVA) of both groups at postoperative 1 month logarithm of the minimum angle of resolution (logMAR) (1.06 ± 0.99, 0.90 ± 0.96), 3 months logMAR (1.07 ± 0.93, 0.83 ± 0.85), and 6 months logMAR (1.03 ± 0.89, 0.83 ± 0.85) significantly improved from the preoperative BCVA logMAR (2.03 ± 0.83, 2.15 ± 0.99) for 23-G group, 25-G group, respectively ($P < 0.0001$). There was no significant difference in BCVA between the two groups preoperatively and at 1, 3, and 6 months postoperatively ($P = 0.566$, 0.506, 0.333, and 0.445, respectively), incidence of intraoperative wound suturing (21.4%, 15.2%), postoperative hypotony (0.0%, 0.0%), early postoperative VH (POVH) (11.1%, 15.2%), late POVH (5.6%, 0.0%), retinal detachment (2.8%, 6.1%), neovascular glaucoma (92.8%, 9.1%), and endophthalmitis (0.0%, 0.0%) for 23-G group, 25-G group, respectively ($P > 0.05$).

CONCLUSION: 25-G vitrectomy is as effective for PDR as 23-G vitrectomy.

Keywords:

23-G, 25-G, diabetic vitreous hemorrhage

Introduction

Vitrectomy surgery with sutureless, self-sealing sclerotomy was started in 1996 which consisted of beveled, tunnel-like tangential incision through sclera rather than right-angled incision.[1] Later, multiple modifications of this technique were reported but did not get wide acceptance as suturing of conjunctiva was still required. The 25-G vitrectomy system was proposed by Fujii *et al*.[2] Since then, 25-G vitrectomy has been reported to reduce the operating time and postoperative inflammation compared with the conventional 20-G vitrectomy.[1]

In 2005, Eckardt[3] introduced a 23-G transconjunctival sutureless vitrectomy (TSV) with less instrument flexibility allowing greater ocular rotation and ability to perform a more complete peripheral vitrectomy. Thus, the 23-G system has become an option for TSV.

Vitreous hemorrhage (VH) is the most common complication of proliferative diabetic retinopathy (PDR) that causes decreased visual acuity and also interferes

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with panretinal photocoagulation (PRP). Earlier studies suggested vitrectomy and endolaser photocoagulation for VH that was persistent and nonclearing for more than 3 months.[4]

However, the Diabetic Retinopathy Vitrectomy Study (DRVS) has shown a clear benefit from earlier surgery in patients with Type 1 diabetes as delay in the surgery may lead to development of aggressive fibrovascular proliferation with increased risk of tractional retinal detachment (TRD).[5] The DRVS results indicate that 25% of patients undergoing early vitrectomy regained visual acuity of 20/40 or better compared to 15% of patients who underwent conventional treatment.[5] Since the publication of the DRVS report, there is a trend toward earlier and lower threshold for vitrectomy for diabetic VH. With improved surgical techniques, the results of vitrectomy for nonresolving VH have improved compared to DRVS with a recent study, indicating 87% of patients showing improvement by at least three Early Treatment Diabetic Retinopathy Study lines at 12 months.[6]

Factors influencing the decision to perform vitrectomy include degree of improvement or progression of anterior segment neovascularization, previous PRP, visual acuity, and preference or needs of the patient.[6] Simple VH clears spontaneously through the zonules through aqueous outflow. The presence of red blood cells in the anterior chamber indicates the patency of this outflow channel. The presence of anterior chamber neovascularization or longstanding VH with vitreous base fibrosis blocks this pathway for spontaneous drainage and thus is the indication for early vitrectomy.

The purpose of this study was to compare the clinical outcomes and complications between 23-G and 25-G TSV in patients with diabetic VH.

Materials and Methods

The study was approved by the Research and Ethics Committee of Retina Foundation and Asopalav Eye Hospital, Ahmedabad, India. The study was performed in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and concurred with the Declaration of Helsinki, 1975 as revised in 2000. The risk of the surgery was fully explained to the patients in accordance with the Declaration of Helsinki.

This was a retrospective comparative study on medical records of all patients who underwent vitrectomy for diabetic VH with air tamponade from December 2010 to March 2014. All patients were informed of the procedure, and informed consent was obtained. Patients who had 23-G TSV were assigned to Group A, and patients who underwent 25-G TSV were assigned to Group B. Only patients who had diabetic vitrectomy due to nonclearing VH (NCVH) for more than 1 month and who had a postoperative follow-up for minimum 6 months were included in the study. The presence of coincidental ocular pathologies (e.g., glaucoma, uveitis, retinal degenerations, and dystrophies) and retinal detachment (RD) and blood dyscrasias associated with abnormal coagulation were excluded from the study. Individuals who underwent silicone oil injection or simultaneous vitrectomy with any other surgery were also excluded from the study.

Patient examinations

The patients' medical records were reviewed for age, gender, systemic statuses such as type of diabetes and hypertension, lens status, presence of TRD, preexisting complications of diabetic retinopathy such as diabetic macular edema and any previous argon laser photocoagulation. The presence of hypertension was confirmed by the patients' use of any antihypertensive medication. Each patient underwent complete preoperative ophthalmic examinations including best-corrected visual acuity (BCVA) using the Snellen chart, slit lamp biomicroscopy, intraocular pressure (IOP) measurement using noncontact tonometer, fundus examination by indirect ophthalmoscopy, and B-scan ultrasonography. Follow-up examinations were done at postoperative day 1 and postoperative months 1, 3, and 6.

For statistical analysis, Snellen visual acuity was converted to the logarithm of the minimum angle of resolution (logMAR). Improvement or deterioration of the postoperative visual acuity was defined as a decrease or increase of logMAR units by 0.3 or more. Early postoperative VH (POVH) was defined as VH occurring within 1 month after the surgery, and late POVH was defined as VH occurring more than 1 month after the surgery.

Surgical procedures

The surgical procedures were done by a single surgeon. All the patients in both 23-G and 25-G groups were operated under peribulbar anesthesia. The operative technique was 3-port 23-G or 25-G using self-sealing sclerotomies. Immediately before making the incisions, the eye was washed with a jet of saline and a few drops of povidone-iodine drops were instilled to address conjunctival flora. Sclerotomies were created between 3.5 mm and 4 mm posterior to the limbus for pseudophakic and phakic patients, respectively, in the superonasal, superotemporal, and inferotemporal quadrants. Initially, the blade was inserted obliquely into the sclera at an angle of about 30°–45° up to the cannula mark. Then, the direction of the blade was

adjusted perpendicular to the sclera as it is inserted into the vitreous cavity. The biplanar incision not only holds the cannula in place but also prevents egress of fluid in the postoperative period.

After core vitrectomy using the Constellation Vitrectomy System, wherever indicated, posterior vitreous detachment was induced followed by peripheral vitrectomy. The areas of active neovascularization were recognized and cauterized before dissection. To tackle the intraocular bleeding, IOP was raised instantly to control intraocular bleeding. If required, meticulous endodiathermy was carried out using the unipolar cautery. Supplementary laser PRP extending beyond the level of the equator was performed. After the vitrectomy, fluid-air exchange was done and the eye had been lifted with air tamponade; then, the infusion pressure was lowered to 15 mm Hg. The cannulae were removed and then the wound area was massaged with a blunt tip applicator for 10–15 s, which allows a better sealing of the scleral fibers and prevents any inadvertent vitreous incarceration. Suturing of wound was done wherever required. A drop of povidone-iodine is then instilled, followed by a subconjunctival antibiotic injection in the inferonasal quadrant.

The postoperative regimen included topical 0.3% moxifloxacin eye drops 6 times per day for 1 week and 1% topical prednisolone acetate eye drops 6 times per day that was usually tapered off over 4 weeks. During the follow-up period, antiglaucoma eye drops such as beta-blockers or carbonic anhydrase inhibitors or prostaglandin analogs were prescribed when IOP was higher than 22 mmHg.

All patients with recurrent or NCVH on 1-month follow-up underwent ultrasound B-scan to rule out an RD. Usually, they were asked to follow-up with conservative management for another month (2 months from surgery). At this stage, intervention in the form of air-blood exchange or revitrectomy was carried out in eyes with persisting hemorrhage. Eyes which showed low-intensity uniform echoes on ultrasound suggestive of VH underwent air-blood exchange while those where there were multiple dense echoes or any signs of proliferations or membranes were posted for revision vitrectomy.

A standard 23-G vitrectomy was carried out. The residual hemorrhage was cleared and the retinal status was evaluated. Additional laser and/or diathermy procedures were carried out as required. Air-blood exchange was carried out through the pars plana, done in the operating room using a 24-G needle attached to a three-way cannula and 10 cc syringe. Air was first injected, followed by drainage of some fluid passively; this was repeated until the entire vitreous cavity is filled with air, at which the needle is withdrawn.

Statistical analysis

Mean was used for description of quantitative data, and percentages were used for qualitative data. Univariate analyses, such as the Chi-square test and Fisher's exact test, were used to compare qualitative data, whereas the two-sample *t*-test was used to compare quantitative data. Repeated measures analysis of variance (ANOVA) corrected by the Bonferroni method was used to compare the mean BCVA and IOP among each postoperative period in the same group. Two-sample *t*-test was calculated to compare mean BCVA and IOP at each postoperative period between the two groups. Statistical analyses were done using SPSS statistical software (version 19.0; SPSS, Inc., Chicago, IL, USA). For all statistical tests, $P \leq 0.05$ was considered statistically significant.

Results

A total of 69 eyes from 65 patients met the study criteria including 36 eyes from the 23-G group and 33 eyes from the 25-G group. The mean age was 55.085 years (range: 34–75 years). Demographics and clinical data of the patients are summarized in Table 1. Mean age was 56.2 ± 8.84 years (range: 34–73 years) in the 23-G group and 53.97 ± 9.99 years (range: 37–75 years) in the 25-G group. The mean follow-up period was 28.7 ± 10.7 months (range: 7–40 months) in the 23-G group and 13.6 ± 6.92 months (range: 6–39 months) in the 25-G group. There were no statistically significant differences between the two groups in age, gender, bilaterality, type of diabetes, presence of hypertension, lens status, and previous argon laser photocoagulation state [Table 1].

Changes of visual acuity

Statistical analysis by repeated measures ANOVA showed that BCVA of the 23-G group at postoperative months 1, 3, and 6 significantly improved from

Table 1: Demographics and clinical data

	23-G group	25-G group	*P*
Number of eyes (patients)	36 (33)	33 (32)	0.67*
Gender (male/female)	28/5	27/5	0.77*
Age (years), mean±SD	56.61±8.84	53.97±9.99	0.248**
Type of diabetes (Type 1/Type 2)	1/32	2/30	0.97*
Hypertension, *n* (%)	23 (69.69)	20 (62.50)	0.72*
Bilaterality, *n* (%)	3 (9.90)	1 (3.12)	0.62*
Lens status			
Phakic/pseudophakic	29/7	27/6	0.893*
Previous PRP			
None	11	9	0.351*
Incomplete	2	0	
Complete	23	24	

*Chi-square test at 95% significance level, **Two sample *t*-test at 95% significance level. PRP: Panretinal photocoagulation, SD: Standard deviation

the preoperative BCVA ($P < 0.0001$, respectively). BCVA (logMAR) of the 25-G group at postoperative months 1, 3, and 6 also significantly improved from the BCVA preoperatively ($P < 0.0001$, respectively). However, BCVA did not differ between the two groups preoperatively and at 1, 3, and 6 months postoperatively ($P = 0.566$, 0.506, 0.333, and 0.445, respectively) [Table 2 and Figure 1].

In 23-G group, BCVA of 23 eyes (76.7%) improved at 6 months postoperatively by 0.3 logMAR or more, 4 eyes (13.3%) unchanged, and 3 eyes (10%) decreased by 0.3 logMAR or more. In 25-G group, BCVA of 24 eyes (77.4%) improved at 6 months postoperatively by 0.3 logMAR or more, 5 eyes (16.1%) unchanged, and 2 eyes (6.5%) decreased by 0.3 logMAR or more. There was no significant difference between the two groups ($P = 0.331$).

Surgical methods and intraoperative complications

The surgical techniques for vitrectomy were similar for the two groups. During the surgery, there were no retinal tears intraoperatively. Both groups were treated with endolaser photocoagulation. Air was used as a tamponade for all patients in both groups. None of the cases had silicone oil tamponade. In 23-G group, 22 eyes (78.6%) required no suturing of the sclerotomy site and 6 eyes (21.4%) required suturing of the sclerotomy; and in 25-G group, 28 eyes (84.4%) required no suturing and 5 eyes (15.2%) required suturing, with no significant difference between the two groups ($P = 0.54$) [Table 3 and Figure 2].

Postoperative complications

No postoperative hypotony occurred in both groups with no related complications such as choroidal detachment or hypotony maculopathy. Early POVH within 1 month after the surgery occurred in 4 eyes (11.1%) in the 23-G group and in 5 eyes (15.2%) in the 25-G group.

The rate of early POVH was not significantly different between the two groups ($P = 0.68$) [Figure 3]. In 23-G group, two eyes with early POVH resolved spontaneously within less than 1 month and two eyes had been managed by air-blood exchange, one of them also underwent 23-G revision vitrectomy. In 25-G group, three eyes with early POVH resolved spontaneously within less than 1 month and one eye treated with air-blood exchange.

Table 2: Changes of visual acuity

	23-G group	25-G group	*P*
BCVA (logMAR)			
Preoperative	2.03±0.83	2.15±0.99	0.566*
Postoperative (months)			
1	1.06±0.99	0.90±0.96	0.506*
3	1.07±0.93	0.83±0.85	0.333*
6	1.03±0.89	0.83±0.85	0.445*
Improvement of BCVA (%)			
≥0.3 logMAR	25 (69.4)	25 (78.1)	0.272**
Unchange	7 (19.4)	6 (18.8)	
Deterioration ≥0.3 logMAR	4 (11.1)	1 (3.1)	

*Chi-square test at 95% significance level, **Two sample *t*-test at 95% significance level. BCVA: Best-corrected visual acuity, LogMAR: Logarithm of the minimum angle of resolution

Table 3: Surgical methods and intraoperative complications

	23-G group (%)	25-G group (%)	*P*
Simultaneous cataract extraction	0	0	1*
Scleral buckle	0	0	1*
C3F8 tamponade	0	0	1*
Silicon tamponade	0	0	1*
Air tamponade	36 (100)	33 (100)	0*
Retinal tear during operation	0	0	1*
Ports suturing			
No	22 (78.6)	28 (84.8)	0.54*
Yes	6 (21.4)	5 (15.2)	

*Chi-square test at 95% significance level

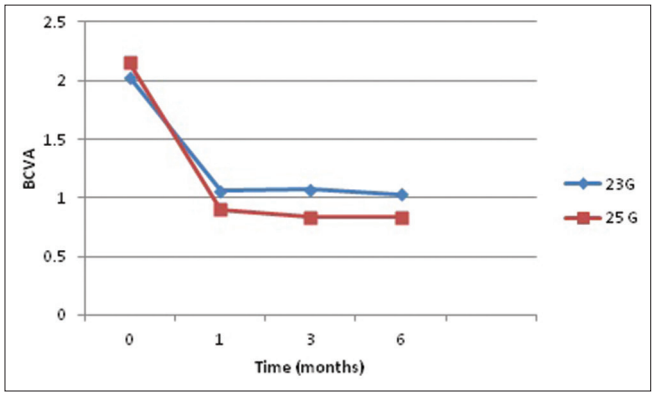

Figure 1: Changes of best-corrected visual acuity for patients who had 23-G transconjunctival sutureless vitrectomy (23-G group) and 25-G transconjunctival sutureless vitrectomy (25-G group). Best-corrected visual acuity was converted to logarithm of the minimum angle of resolution. Statistical analysis by repeated measures analysis of variance showed that best-corrected visual acuity of the two groups at postoperative months 1, 3, 6, 9, and 12 significantly improved from the best-corrected visual acuity preoperatively (P= 0.01). Mean values 6 ± standard error are shown

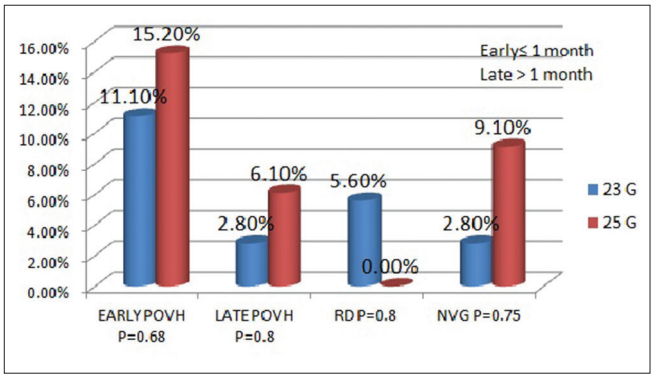

Figure 2: Postoperative complications

Late POVH occurred in 1 eye (8.3%) in 23-G group which treated by vitrectomy and in 2 eyes (6.1%) in 25-G group, one eye treated only with avastin and the hemorrhage resolved completely after 1 month, and for the second eye, we advised the patient for revision of vitrectomy and silicone injection under guarded prognosis, but the patient refused, and after 6 months, he lost his eye due to neovascular glaucoma (NVG). There was no difference between the two groups ($P = 0.645$).

RD developed in 2 eyes (5.6%) in 23-G group and no eyes (0.0%) in 25-G, and there was no difference between the two groups ($P = 0.796$). The two eyes had revision of vitrectomy with silicone oil tamponade.

NVG occurred in 1 eye (2.8%) in 23-G group and in 2 eyes (9.1%) in 25-G group, and there was no significant difference in between the two groups ($P = 0.748$). Three eyes with NVG in both groups are lost eyes with BCVA being less than hand motion. No major complications such as endophthalmitis or phthisis were observed [Table 4 and Figure 3].

Discussion

TVS has become increasingly popular since 2004 because of its advantages such as reduced patient discomfort, rapid recovery, protection of the conjunctiva, and reduced operation time compared with standard three-port vitrectomy.[7]

Serious proliferative diabetic vitrectomy was a relative contraindication for 25-G TSV because of flexibility, fragility, and small bite size of the instruments.[7]

The significant difference between 23- and 25-G systems becomes discernible at the high-flow fluidics; for instance, in the ability to grasp and remove the posterior hyaloid; or in dense vitreous opacity, which depends on the amount of suction, directly related to the cutter opening. The peak of flow rates in 25-G vitrectomy is directly limited by the lumen size of the cutter and the infusion microcannula. On the other hand, this does not happen in the 23-G system, where its design affords higher flow rates.[8]

Thus, the 23-G TSV system using sturdier and more stable instruments was introduced to overcome these drawbacks.[3]

However, today, with the progression of 25-G technology, both instrument and flow properties have improved. The 25-G TSV is also gaining popularity in the management of diabetic complications, even in complex cases, such as diabetic TRD.[9] To the best of our knowledge, no study has specifically compared between 23-G and 25-G vitrectomy. In this study, we compare the clinical outcomes and the postoperative complication between 23-G and 25-G vitrectomy in diabetic patients.

Park *et al*.[1] reported that intraoperative retinal tear during posterior manipulations occurred in 3 eyes (8.6%) from the 23-G group. In the present study, there were no reported cases of retinal tear in both 23-G and 25-G groups. The relatively high incidence of retinal tear in their study was probably because of the difference in population of the enrolled patients. In the study by Dong Ho Park *et al.*,[1] they include both VH and TRD, whereas in our study, we include only diabetic VH.

Previous studies reported that transient postoperative hypotony was the most common complication of 23-G TSV with 21.1%–26.6% of incidence.[10,11] Regardless 25-G TSV, several investigators reported their postoperative IOP values and hypotony rates on the 1st post-operative day with the standard technique (20-G).[12,13] No suture placement was necessary in most of the previous studies.[13] However, Shimada *et al*.[14] reported that they observed leakage in 9% of eyes with standard straight incisions, and they sutured sclerotomies in 3.6% of eyes. Oshima *et al*.[12] reported a suture rate of 8%. Lakhanpal *et al*.[7] reported suturing 7% of eyes due to leakage.

In a previous study that studied the factors that increased the rate of sclerotomy suturing in 23-G vitrectomy, they concluded that absence of tamponade agent, higher complexity of the procedure, prior vitrectomy, a young age at operation, and vitreous base dissection were the main factors. Furthermore, they found a high variability in the rate of suturing between the surgeons.[15] In our study, we observed clinically prominent leakage or bleb formation at the end of surgery, and we placed suture in about 6 eyes (21.4%) in 23-G and 5 eyes (15.2%) in

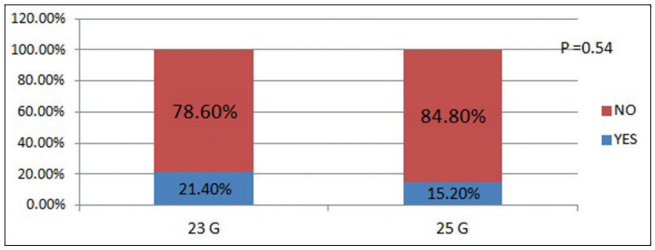

Figure 3: Intraoperative ports suturing

Table 4: Postoperative complications

	23-G group (%)	25-G group (%)	*P*
Early POVH	4 (11.1)	5 (15.2)	0.68*
Late POVH	1 (2.8)	2 (6.1)	0.796*
RD	2 (5.6)	0	0.796*
NVG	1 (2.8)	2 (9.1)	0.748*
Endophthalmitis	0	0	1*

*Chi-square test at 95% significance level, POVH: Postoperative vitreous hemorrhage, RD: Retinal detachment, NVG: Neovascular glaucoma

25-G sutures. The incidence of intraoperative suturing in our study was relatively higher than the previous studies although we included VH vitrectomy with air tamponade only. This is maybe because the surgeon in our study prefers to put sutures of any suspicious case as most of our patients were referred from far distance places.

In this study, we did not observe any choroidal detachment or folds due to hypotony as reported in previous series.[7,13,15]

The incidence of endophthalmitis following 20-G positive predictive value (PPV) is rare, ranging between 0.039% and 0.07%.[16] However, the incidence of postoperative endophthalmitis after 25-G vitrectomy has only recently been determined.[16] Recently, two consecutive case series were published examining endophthalmitis rates in eyes undergoing 20-G PPV and 25-G PPV. Scott *et al*.[17] in a multicenter study reported an endophthalmitis rate of 0.03% (1/3188) for 20-G PPV and 0.84% (11/1307) for 25-G TVS. Kunimoto and Kaiser and the Wills Eye Retina Service reported a 20-G vitrectomy endophthalmitis rate of 0.018% (1/5498) and a 25-G TVS endophthalmitis rate of 0.23% (7/3103).[16] They reported a 12-fold higher incidence of endophthalmitis with 25-G TVS compared with 20-G vitrectomy; however, the authors noted that the majority of 25-G cases were performed with "nonbeveled wounds."

In our study, the incidence of endophthalmitis in both 23-G and 25-G groups was 0%. This is maybe due to low number of patients in our study and using 25-G and 23-G beveled wounds.

Because POVH is the most common postoperative complication after surgical management for PDR and reported in up to 63% on the 1st postoperative day,[18] this may be an important factor that impairs early visual recovery.

Moreover, the proportion of patients requiring vitreoretinal reoperation for POVH after diabetic vitrectomy has been reported to be 4%–38%.[18]

Soto-Pedre *et al*.[19] suggested two peaks of POVH after diabetic vitrectomy. The first peak occurs at the end of the 1st week, which is because of dispersion of remaining blood and bleeding from vascular stumps. The second peak occurs between the 2nd and 3rd months, which could be attributed to fibrovascular ingrowth at the sclerotomy sites. After the early postoperative period, several investigators have insisted that fibrovascular ingrowth of the sclerotomy site is a major source of POVH. Bhende *et al*.[20] reported a high prevalence of sclerotomy site neovascularization 6–8 weeks after surgery in patients with POVH after pars plana vitrectomy for diabetic VH. In our study, we consider POVH which occurred during the 1st month as early POVH and after 1 month as late POVH and we found that the incidence of late POVH in both 23-G and 25-G groups is less than early POVH. This result might suggest that the sclerotomy site neovascularization may be less prominent in diabetic vitrectomy using a 25-G or 23-G TSV system; however, direct evidence is missing because we did not perform ultrasound biomicroscopy for identifying sclerotomy neovascularization. Krieger[21] suggested that a large sclerotomy incision and severe postoperative inflammation at the sclerotomy site are risk factors for fibrovascular proliferation of the sclerotomy site. The present study showed that there was no significant difference in the rate of the early and late POVH between the two groups.

In addition, Park *et al*.,[1] in their comparative study between 20-G and 23-G groups in diabetic patients, found no significant difference in the rate of the early and late POVH between the two groups (12.1% in 20-G group and 11.1% in 23-G group). The incidence rate was comparable to our incidence rate of early POVH (11.1% in 23-G group and 15.2% in 25-G group). In Park *et al*.'s[1] study, the late POVH in 20-G group was 13.6% and 5.7% in 23-G group, whereas in our study, it was 2.8% in 23-G group and 6.1% in 25-G group.

Considering that an inadequate peripheral vitrectomy at the vitreous base because of the more flexible instruments was suggested as a disadvantage of a 25-G system, the presence of preoperative VH may affect the incidence of POVH. In our series and also Lee and Yu,[22] we found that the presence of preoperative VH did not increase the risk of immediate POVH significantly, the result of which could be interpreted that an acceptable peripheral vitrectomy has been accomplished with 25-G instruments. Lee and Yu[22] in their series about POVH after 25-G TSV in diabetic patients found that postoperative hypotony and the need for tamponade increased the rates of immediate and recurrent POVH, respectively. Immediate POVH occurred in 45.2% of the patients but did not affect early visual recovery. A 25-G TVS resulted in a favorable incidence of recurrent POVH (11.8%) during the first 6 months. The high incidence of immediate POVH in their study because they considered any minor bleeding as POVH, whereas in our study, we consider only those who have significant visual loss.

NVG is the most serious postoperative complication of vitreous surgery for PDR. The incidence of postoperative rubeosis of the iris and NVG after vitrectomy as complications of diabetic retinopathy ranges from 10% to 23%.[1] In the present study, NVG occurred in 1 eye (2.8%) from the 23-G group and 2 eyes (9.1%) from the 25-G

group and the rate was not different between the two groups which is also comparable to Park *et al*.[1] results.

Honjo and Ogura[23] reported that visual acuity improved by 2 lines or more in 78% of the eyes after 20-G vitrectomy combined with phacoemulsification and intraocular lens implantation for complications of PDR. Furthermore, Park *et al*.[1] found that BCVA at 6 months postoperatively improved by 0.3 logMAR or more in 29 eyes (82.9%) in the 23-G group. In the present study, although we included patients who underwent vitrectomy (no associated cataract surgery), BCVA improved at 6 months postoperatively by 0.3 logMAR or more in 23 eyes (76.7%) in the 23-G group and 24 eyes (77.6%) in 25-G group. In addition, BCVA did not differ between the two groups preoperatively and at months 1, 3, and 6 postoperatively.

The present study has several limitations including its retrospective nature, the small number of cases that are not sufficient to evaluate safety, and the possible underestimation of macular edema because of VH.

Conclusion

The efficacy of 25-G TSV for PDR appears to be as effective as 23-G vitrectomy. In addition, complications are similar between the two systems. Although further randomized and prospective studies are necessary, patients with PDR may be good candidates for 25-G TSV and indications for this technique are expanding.

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Conflicts of interest

There are no conflicts of interest.

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