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27-gauge vitrectomy for posterior segment eye disease: experience at a tertiary care center in Kashmir, India

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ABSTRACT

BACKGROUND: The aim of this work was to study the clinical outcomes, operative time, and complications of 27-gauge (27G) microincision vitrectomy surgery in posterior segment eye disease (PSED).

MATERIAL AND METHODS: This prospective observational study was conducted at a tertiary care hospital in Kashmir, India. 27G transconjunctival sutureless vitrectomy was performed on 101 eyes of 101 patients with PSED.

RESULTS: Of 101 patients, pars plana vitrectomy was indicated for retinal detachment (RD) (n = 36, 35.7%), vitreous hemorrhage (n = 35, 34.7%), epiretinal membrane (ERM)/vitreomacular traction (VMT) (n = 16, 15.9%), macular hole (n = 7, 6.9%), endophthalmitis (n = 4, 3.9%) and intraocular lens drop (n = 3, 2.9%). We observed significant improvement in mean logMAR visual acuity for all indications ($p < 0.05$ each). Tamponade agents used were fluid (n = 51, 50.5%), silicone oil (n = 30, 29.7%), SF6 gas (n = 15, 14.85%), C3F8 gas (n = 3, 2.97%) and air (n = 2, 1.98%). The intraocular pressure (IOP) increased significantly in cases where silicone oil and SF6 gas were used as tamponade agents ($p < 0.05$ each). Mean IOP initially increased on the first postoperative day followed by a gradual decline. Overall, the mean operating time was 37.08 minutes and duration of vitreous removal 22.41 minutes. Intraoperative complications included suprachoroidal hemorrhage (n = 1, 0.99%) and inadvertent retinal breaks (n = 1, 0.99%). Postoperative complications included transient hypotony (n = 2, 1.98%), transient ocular hypertension (n = 12, 11.88%), postoperative vitreous hemorrhage (n = 3, 2.97%), recurrent RD (n = 1, 0.99%) and emulsification of silicone oil (n = 3, 2.97%).

CONCLUSIONS: The 27G system was safe and effective for treating a broad spectrum of PSED. Minimal complications and good visual outcomes warrant a wider adoption of this technique.

KEY WORDS: pars plana vitrectomy; diabetic retinopathy; epiretinal membrane; macular hole; retinal detachment

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INTRODUCTION

Pars plana vitrectomy (PPV) is a sight-saving surgical procedure for posterior segment eye diseases (PSED). First introduced in 1990, small-gauge vitrectomy has revolutionized treating such disorders [1]. Eckardt introduced 23-gauge (23G) vitrectomy as an alternative to 25-gauge (25G) vitrectomy in 2005 [2]. The sclerotomies in 23G and 25G vitrectomies are only 0.65 mm and 0.5 mm in diameter, respectively. Such micro-incisional vitrectomy sur-

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gery is intended to be transconjunctival, self-sealing, and sutureless. It has theoretical advantages, including decreased ocular trauma and inflammation, decreased corneal astigmatism, reduced operating times, faster postoperative recovery, increased patient comfort, reduced conjunctival scarring, and conjunctival preservation, especially in patients with prior or pending glaucoma surgery [3–5]. Smaller gauge vitrectomy instruments are also better suited to the narrower spaces of pediatric eyes.

27-gauge (27G) instrumentation for small-gauge vitrectomy was introduced in 2010, and its efficacy and safety are still being assessed [6]. The internal diameter of a 27G sclerotomy is 0.4 mm. Owing to initial issues like limited instrument arrays and increased flexibility, indications for small-gauge vitrectomy were limited to those not requiring extensive vitrectomy, membrane dissection, or phacofragmentation. These handicaps have been overcome with advances in wound construction, instrumentation, fluidics, cutter technology, illumination, and wide-angle viewing systems [7]. 27G vitrectomy system now includes a broad, comprehensive instrument portfolio including valved trocars, light pipe, cutter, backflush cannulas, forceps, straight scissors, laser, and diathermy. With stiffer instrumentation, it has been possible to include indications like simple and complex retinal detachments (RD), macular surgeries, and tractional RD [8–10].

27G being the latest in small-gauge instrumentation, there was a need to evaluate this instrument system's feasibility, safety, and efficiency for microincision vitrectomy surgeries being undertaken in our hospital. We, therefore, studied the clinical outcomes, operating time, and complications of 27G microincision vitrectomy surgery in PSED in the Kashmiri population.

MATERIAL AND METHODS

This prospective interventional case series was conducted from December 2018 to September 2020 at Govt. Medical College, Srinagar which is a tertiary care hospital in Kashmir, India. The study was approved by the ethical clearance committee of Govt. Medical College, Srinagar (Ref. no.139/ETH/GMC dated 20.10.2018).

Patients with PSED who had to undergo 27G transconjunctival sutureless vitrectomy were included in the study after obtaining their written informed consent. Patients with hybrid gauge surgeries, previous vitreoretinal surgery or penetrating ocular trauma, proliferative vitreoretinopathy (PVR), and ocular comorbidities like corneal opacities, uveitis, uncontrolled glaucoma, age-related macular degeneration, retinal degenerations, and dystrophies affecting visual outcome significantly, were excluded. All eyes were operated on by the same surgeon.

Study protocol

Patients with PSED, satisfying the inclusion criteria, were selected. The preoperative evaluation consisted of complete medical, surgical, and ophthalmic history and a thorough ophthalmic examination.

Preoperative data included age, gender, operative eye, best-corrected visual acuity (BCVA), intraocular pressure (IOP), lens status, slit-lamp examination, dilated fundus evaluation, and indication for vitreoretinal surgery.

BCVA was recorded as a Snellen visual acuity (VA) and converted to logarithm of minimal angle of resolution (logMAR) units for statistical analysis. Counting finger (CF) vision and hand movements (HM) were defined, respectively, as 1.98 logMAR and 2.28 logMAR [11]. IOP was measured using Goldmann applanation tonometry.

Operating time, vitrectomy time, and intraoperative complications were recorded. Data concerning the use of air, gas, fluid, or silicone oil tamponade, the presence of sclerotomy site retinal tears, and the need for sclerotomy site suturing were noted. Postoperative complications were detailed, if present. Severe postoperative hypotony and hypertony were defined, respectively, as IOP < 6 mm Hg and IOP > 30 mm Hg.

The postoperative examination was performed on day 1, 1 week, 1 month, and 6 months. All the patients were followed up with BCVA, IOP measurement, slit-lamp examination, and dilated fundus examination.

The outcome measures were the postoperative BCVA, intraoperative and postoperative complications, the operating time, and actual vitrectomy time.

Vitrectomy time was defined as the time period when the cutter was activated for removing the vitreous and was recorded by the vitrectomy machine."

Surgical procedure

Three sclerotomies were made in the pars plana at the inferotemporal, superotemporal, and superonasal positions using valved cannulas, 3.5 mm posterior to the limbus. For inserting the trocar cannulas, an angled approach was used.

Three port 27G total PPV was performed using the Constellation Vision System (Constellation Vitrectomy 27+ Total Plus Pak, Alcon Laboratories, USA). A noncontact wide-angle viewing system (BIOM II; Oculus, Germany) was used for visualization during surgery. In cases with visually significant cataracts, phacoemulsification was performed along with posterior chamber intraocular lens (IOL) implantation before vitrectomy. A cut rate of 7500 cuts per minute (cpm) and linear aspiration of 0-650 mm Hg was used for 27G vitrectomy. Core vitrectomy was performed in all cases, followed by peripheral vitreous shaving, if necessary.

If posterior vitreous detachment had not occurred already, it was performed at the optic disc by aspiration, using a vitrectomy probe. The surgeon used internal limiting membrane (ILM) forceps, scissors, and the vitreous cutter for membrane dissection, membrane peeling, and membrane segmentation as required. A diathermy probe was used to mark retinotomy sites. Where needed, a silicone-tipped needle was used for fluid-air exchange, fluid-gas exchange, and subretinal fluid drainage. Perfluorocarbon liquid (PFCL) was injected to help flatten the retina in complex rhegmatogenous retinal detachments (RRD). Base excision was done with local indentation while managing RD. A laser probe was used to seal off retinal injuries, like tears or holes in cases of RD and for scatter photocoagulation of ischemic retinas in patients with proliferative diabetic retinopathy (PDR) and vascular occlusions [12]. Visualization during vitrectomy was improved by using vital dyes like triamcinolone and brilliant blue-green (“chromovitrectomy”) [13]. In cases of macular hole and the epiretinal membrane (ERM), membrane and/or ILM peeling was performed. In cases of dislocated IOL, a superior scleral incision was used to deliver the IOL out of the eye.

Saline, air, a gas bubble (16–18% sulfur hexafluoride/SF6 or 12–16% perfluoropropane/C3F8), or silicone oil (1000 centistokes, Aurolab) was injected into the vitreous gel to help hold the retina in position, according to the indication [14]. Once the surgery was complete, the peripheral retina was screened for retinal breaks through scleral depression and wide-field viewing. The sclerotomies were assessed for leakage and need for sclerotomy site suturing.

The patients with RRD were asked to maintain prone or lateral positioning for 7 days, depending on the position of the break. Eyes developing ocular hypertension (IOP > 30 mm Hg) in the follow-up period were treated with anti-glaucoma eye drops, like carbonic anhydrase inhibitors (2% dorzolamide) and beta-blockers (0.5% timolol).

Statistical methods

Statistical analysis of the data was done by the SPSS software version 21. The Student’s *t*-test was used for comparing the quantitative data. A p-value of < 0.05 was considered statistically significant.

RESULTS

The general characteristics of the study group are shown in Table 1. Female:male ratio was 1.40:1. The mean age of the patients was 53.17 ± 14.71 years (age range 10–80 years).

Of the 101 eyes operated, 51 (50.5%) were right and 50 (49.5%) left eyes. History of phaco/small incision cataract surgery (SICS) and PDR were the commonest findings in the ocular history. The majority (72.3%) of the study eyes were phakic, while 24.7% were pseudophakic. Fifty-one patients had a cataractous lens, and of these, 30 (29.7%) underwent concurrent cataract extraction and IOL implantation during surgery.

Retinal detachment (n = 36) was the commonest indication for vitrectomy followed by vitreous hemorrhage (VH) (n = 35) and ERM/vitreomacular traction (VMT) (n = 16). Eight (22.22%) patients with RD had underlying high myopia. The majority (72.22%) of the eyes operated for RD had RRD. Nine (25%) eyes were pseudophakic at the time of vitrectomy. There were 8 patients of RD with concomitant cataracts requiring combined surgeries. Six patients underwent cataract extraction followed by placement of an IOL and repair of the RD. Two patients underwent lensectomy and vitrectomy.

Macula was off in 15 (41.66%) eyes. Of 17 (48.57%) patients having VH with PDR, 1 (2.85%) patient had a central retinal vein occlusion with PDR, 1 (2.85%) Eales disease, and 14 (40%) patients had VH secondary to retinal vascular occlusions. Fluid (n = 51) and silicone oil (n = 35) were the most frequently used tamponade agents.

The mean VA improved significantly overall and in patients with various posterior chamber disorders viz., VH, RD, ERM/VMT, macular hole, endophthalmitis, and IOL drop (p < 0.05 each) (Tab. 2). The follow-up of visual outcomes has been recorded

Table 1. General characteristics of patients undergoing vitrectomy (n = 101)

Characteristics	Frequency	Percentage (%)
Gender		
Male	42	41.58
Female	59	58.41
Age group (years)		
10–21	5	4.95
22–42	16	15.84
43–65	62	61.38
> 65	18	17.82
Place of residence		
Urban	51	50.49
Rural	50	49.50
Laterality of study eye		
Right	51	50.49
Left	50	49.50
Ocular history		
PDR	24	23.76
Moderate-Severe NPDR with CME	8	7.92
CRVO	2	1.98
BRVO	15	14.85
High Myopia	8	7.92
Trauma	10	9.90
POAG	5	4.95
Intravitreal anti-VGEF	12	11.88
Yag capsulotomy	1	0.99
Laser	7	6.93
Phaco-/SICS	28	27.72
Lens status		
Phakic clear	22	21.78
Phakic cataractous	51	50.49
Pseudophakic	25	24.75
Aphakic	3	2.97
Indication for PPV		
ERM/VMT	16	15.84
Macular hole	7	6.93
RD (macula off)	15	14.85
RD (macula on)	21	20.79
VH	35	34.65
Endophthalmitis	4	3.96
IOL drop	3	2.97

PDR — proliferative diabetic retinopathy; NPDR — nonproliferative diabetic retinopathy; CME — cystoid macular edema; CRVO — central retinal vein occlusion; BRVO — branch retinal vein occlusion; POAG — primary open-angle glaucoma; SICS — small incision cataract surgery; anti-VEGF — anti-vascular endothelial growth factor; PPV — pars plana vitrectomy; ERM — epiretinal membrane; VMT — vitreomacular traction; RD — retinal detachment; VH — vitreous hemorrhage; IOL — intraocular lens

as mean logMAR visual acuities by indication in Figure 1.

A significant increase occurred in IOP with silicone oil and SF6 gas as tamponade agents ($p < 0.05$ each) but not with fluid, air, or C3F8 gas. The increase in IOP was significant overall. There was an initial increase in mean IOP on the first postoperative day (19.09 mm Hg) from a preoperative mean IOP of 16.16 mm Hg. This gradually declined during the follow-up period (Tab. 3).

Overall, the mean operating time was 37.08 minutes, and the mean duration of vitreous removal was 22.41 minutes. The average operating time was the shortest for ERM/VMT at 26.16 minutes (range 16–35 minutes) and the longest for RD at 46.36 minutes (range 36–62 minutes) (Fig. 2).

Operative time was evaluated every four months. Initially, the average operating time was 39.94 minutes, and it decreased to 35 minutes over the next 8 months and increased to 37.1 minutes towards the end (Fig. 3).

Intraoperative complications occurred in 2 (1.98%) patients: suprachoroidal hemorrhage in 1 (0.99%) eye and inadvertent retinal breaks in 1 (0.99%) eye. Postoperative complications occurred in 21 (20.79%) patients. Transient hypotony was noted in 2 (1.98%) eyes with endophthalmitis. Transient ocular hypertension occurred in 12 (11.88%) eyes and was managed conservatively. Of these, 7 were silicone oil-filled, 3 SF6 gas-filled, 1 fluid-filled, and 1 air-filled. None of the eyes required subsequent IOP lowering surgery. Postoperative VH occurred in 3 (2.97%) eyes with diabetic retinopathy. Of these, 2 had to undergo vitreous cavity lavage. Recurrent RD occurred in 1 (0.99%) eye with diabetic tractional RD. Three (2.97%) cases had emulsification of silicone oil and underwent subsequent silicone oil removal.

DISCUSSION

27G vitrectomy is a relatively new procedure. Oshima et al. [6] initially used it for relatively easy indications like eyes with macular holes, ERM, VMT, macular edema, VH, focal tractional RD, and vitreous opacities. Consequently, several studies evaluated the surgical outcomes of 27G vitrectomy for a wide range of indications [15–23]. Khan et al. [21] expanded the known range of indications to include cases of vitreous opacities, diabetic tractional RD, dislocated IOL, submacular hemorrhage, endophthalmitis, and retained lens material. In our

Table 2. Comparison of preoperative visual acuity with vision at the final follow-up visit after 27-gauge pars plana vitrectomy				
Surgical indication	**Pre-Op VA (logMAR ± SD)**	**Post-Op VA (logMAR ± SD)**	**p-value**	**95% CI**
Vitreous hemorrhage	1.86 ± 0.50	0.79 ± 0.38	< 0.0001	0.85–1.28
Retinal detachment	1.92 ± 0.53	1.08 ± 0.44	< 0.0001	0.60–1.07
ERM/VMT	0.82 ± 0.14	0.39 ± 0.14	< 0.0001	0.32–0.53
Macular hole	0.74 ± 0.15	0.37 ± 0.12	0.0003	0.20–0.53
Endophthalmitis	1.90 ± 0.56	1.04 ± 0.09	0.0243	0.15–1.56
IOL drop	2.08 ± 0.17	0.82 ± 0.24	0.0019	0.77–1.72
Overall	1.65 ± 0.65	0.81 ± 0.44	< 0.0001	0.68–0.99

VA — visual acuity; ERM — epiretinal membrane; VMT — vitreomacular traction; IOL — intraocular lens; CI — confidence interval

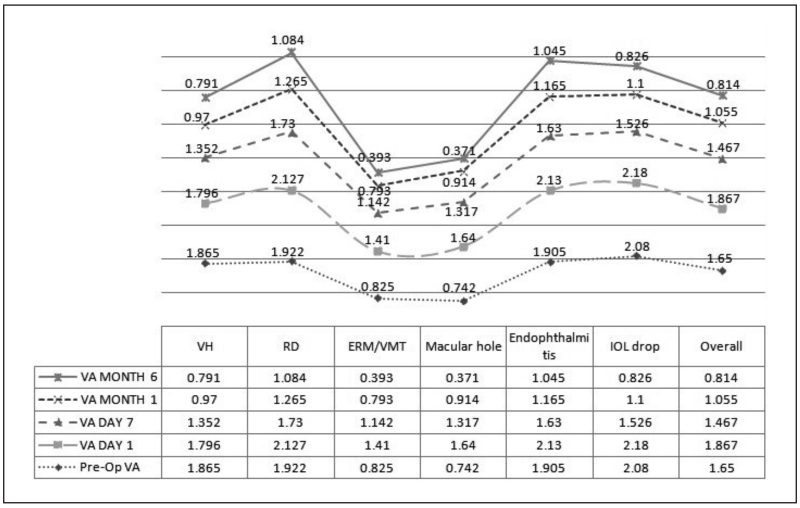

FIGURE 1. Follow up of visual outcomes (Mean logMAR VA) indication wise

Table 3. Preoperative and postoperative mean IOP values according to the tamponade agent used						
Tamponade agent	**IOP Mean ± SD**					**p-value Pre-op *vs.* 6-month IOP**
	Pre-Op	**Day 1**	**Day 7**	**Month 1**	**Month 6**	
Fluid (n = 51)	16.37 ± 3.37	17.68 ± 4.58	17.45 ± 2.94	17.17 ± 2.62	17.31 ± 2.28	0.102
Air (n = 2)	16.50 ± 0.70	17.50 ± 0.70	17 .0 ± 0.0	17.0 ± 1.41	16.50 ± 0.70	1
Silicone oil (n = 30)	16.36 ± 1.93	19.76 ± 2.26	20.56 ± 4.19	19.2 ± 1.78	18.66 ± 1.66	< 0.0001
SF6 gas (n = 15)	14.66 ± 2.05	22.0 ± 5.58	19.26 ± 2.05	18.20 ± 1.93	17.73 ± 1.87	0.0002
C3F8 gas (n = 3)	17.66 ± 1.52	23.0 ± 4.35	19.66 ± 0.57	19.66 ± 0.57	18.33 ± 1.15	0.578
Overall (n = 101)	16.15 ± 2.80	19.09 ± 4.43	18.70 ± 3.46	18.0 ± 2.40	17.79 ± 2.08	< 0.0001

IOP — intraocular pressure

study, a single operating surgeon performed 27G vitrectomy on 101 eyes for various PSED. Operative indications included RD, VH, macular hole, ERM, VMT, endophthalmitis, and IOL drop. We also included cases of VH due to PDR, endophthalmitis, IOL drop, and extensive RD.

We observed significant improvement in logMAR VA for all indications ($p < 0.05$ each). Overall, the BCVA for various indications improved from a mean logMAR of 1.65 ± 0.65 preoperatively to 0.81 ± 0.44 at final follow-up at 6 months ($p < 0.0001$). Similarly, Khan et al. [17] reported

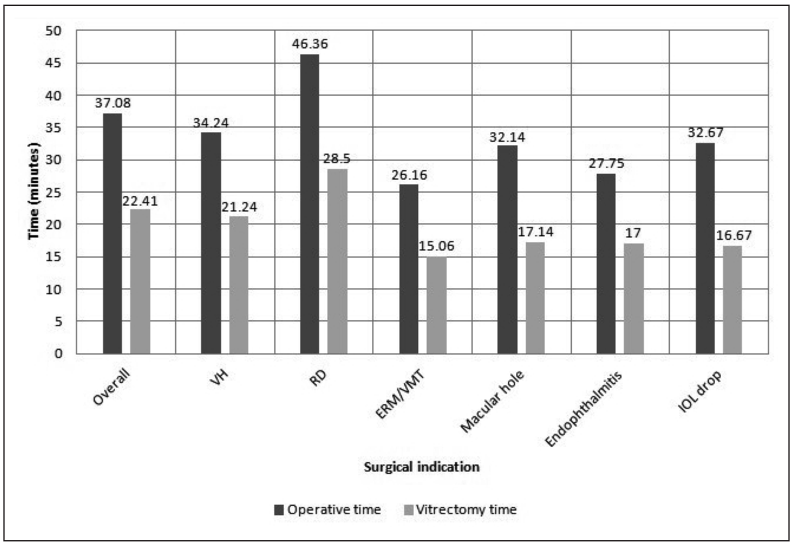

FIGURE 2. Mean operating time and vitrectomy time indication wise

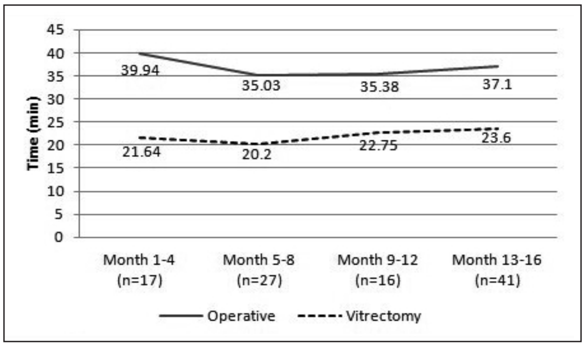

FIGURE 3. Change in operative time

a significant improvement in VA from 1.08 ± 0.71 to 0.53±0.65 after the surgery ($p < 0.001$) and a significant improvement in logMAR VA in patients with ERM, VH, RRD without PVR, endophthalmitis, and full-thickness macular hole (FTMH). Li et al. [15] reported that overall logMAR VA improved significantly from 1.7 ± 1.1 preoperatively to 1.2 ± 1.0 at final follow-up. Significant improvement in VA was noted in cases with RRD and FTMH only. Our overall results are comparable with the above studies. Yoneda et al. [19] observed an overall mean BCVA improvement from 0.46 ± 0.64 preoperatively to 0.20 ± 0.40 postoperatively ($p < 0.001$). Notably, they had 74 cases of ERM, which could account for the better preoperative and postoperative VA while our series had 16 cases with ERM/VMT.

Our results are comparable with older studies on 23G and 25G instrumentation [1, 24, 25]. Overall, we accomplished the surgical aim in every case, which included removal of ERM, anatomic closure of macular holes, relieving traction on the retina, and anatomic reattachment of RD. No case required conversion to larger gauge instrumentation. Other studies also showed comparable surgical results for 27G and 25G vitrectomy for indications like TRD in PDR patients [26] and RRD [27] and better results with 27G PPV for ERM [28].

We observed a low intraoperative complication rate. None of the cases needed a sclerotomy site suture or experienced sclerotomy site leakage. Previous studies on the 27G system have reported similarly [16–18, 21–25, 29]. Sclerotomy suture rates ranging from 0 to 7.1% have been reported in 23G and 25G studies [24, 25]. None of the cases developed postoperative hyphema, endophthalmitis, or sclerotomy-related retinal breaks. Khan et al. [17] also reported a 0% rate for the occurrence of sclerotomy-related breaks.

Limited postoperative complications were noted. Transient hypotony was documented in 2 cases (1.98%) with endophthalmitis, which resolved spontaneously by the next follow-up visit at 1 week. This hypotony rate lies in the previously reported range of 0–9.2% [15, 17, 19]. For 25G studies, the hypotony rate lies in the range of 0–25.6% [25, 30, 31].

Of 12 (11.88%) eyes that developed transient ocular hypertension, 7 were filled with silicone, 3 with SF6, 1 with BSS, and 1 with air. All of these were managed with topical antiglaucoma medication. This rate of transient ocular hypertension is more comparable with 8% [17] than a rate of 31.1% [15] reported by other studies.

Three eyes with diabetic eye disease developed postoperative VH and underwent vitreous cavity lavage. Of 36 eyes that underwent repair of RD, one eye with advanced diabetic eye disease and tractional RD experienced recurrent detachment in the postoperative period due to PVR (2.77%). Anatomic reattachment of the retina was achieved after the resurgery. Our rate for resurgery for RD is lower than in previous studies [15–17, 29], perhaps because we excluded cases of PVR, which is a major factor behind recurrent RD.

We observed a significant increase in IOP at final follow-up in cases overall ($p < 0.0001$) and also where silicone oil ($p < 0.0001$) and SF6 gas ($p = 0.0002$) were used for tamponade. However, Khan et al. [17] did not observe a significant change in IOP according to the tamponade agent used, while Li et al. [15] reported a significant increase in IOP at the last visit in eyes with silicone oil ($p < 0.001$) and also overall ($p < 0.001$).

We observed a decrease in the operating time after the first four months, followed by an increase towards the end of the study period. This paradoxical finding can be explained based on the distribution of the cases. Seven RD were operated during months 9 to 12, followed by 15 during the last four months. Nineteen cases of VH were operated during months 13 to 16. As these indications took longer operating times, our average operating time reflects case distribution and not the surgeon's learning curve. Our mean operative time was 37.08 minutes, which lies in the range reported by recent studies on the 27G system (32–49.9 minutes [15–17, 19, 29]. Initial studies on the 23G system reported mean operating times of 27.1 minutes [14] and 31.9 minutes [32], respectively. Mitsui et al. [18] reported that overall operating time for ERM was not different between 27G and 25G systems while the mean vitrectomy time was longer in the 27G group.

A significant concern about small-gauge vitrectomy is the reduced flow rates and, consequently, reduced efficiency and longer operating time during surgery. Dual pneumatic probes address this concern effectively, preserving flow rates at the highest possible cut rates. We achieved cut rates of 7500 cpm by the dual pneumatic probe. Vitreoretinal traction is reduced at high cut rates and lower aspiration rates. Dugel et al. found that smaller-gauge instruments have a 'reduced sphere of influence' that limits the involvement of the surrounding tissue during membrane dissection at high cut rates [33, 34]. It has been postulated that using the 27G vitrector as a dissection tool may help offset delays caused by decreased flow rates. This is possible because the port is a 27G cutter placed 0.2 mm away from the probe's tip. We found that the 27G cutter could be used as a soft tip needle also, helping in the removal of preretinal blood. It could also be used as a membrane pick, which was useful in diabetic vitrectomy surgeries where segmentation and delamination of the membranes have to be done. The smaller gauge helped introduce the vitrector into the space between the tissue planes without much traction and iatrogenic breaks [26]. Moreover, almost the entire subretinal fluid can be drained without unnecessary instrumentation exchange and heavy liquid insertion [6]. Also, the smaller grasping area of the 27G forceps leads to relatively atraumatic removal of epiretinal membranes [35].

Despite these advantages, the adoption of 27G instruments has been slow. The instruments available cannot be reused multiple times, which increases the cost of the surgery. As 23G and 25G sclerotomies can also be closed in a sutureless manner, except in cases requiring membrane dissection, 27G would not offer many advantages.

Insertion of silicone oil and removal takes longer with 27G instruments. Operating times are relatively longer.

We recommend that as silicone oil insertion takes longer with 27G instruments, IOP should be kept lower and infusion pressure increased to decrease the injection time. Fluid-air exchange can be performed with the vitrectomy probe itself, reducing the instrumentation exchanges.

The strengths of our study are that we performed a prospective study eliminating limitations encountered with retrospective designs. We included a variety of indications with a decent-sized cohort, thus eliminating the selection bias. A single surgeon performed all surgeries, thus standardizing the surgical technique and decisions like the choice of tamponade agents.

Study limitations include the absence of a comparative arm of 23/25G vitrectomy. The inclusion of some indications like PVR-related RRD and revitrectomy would have given a better picture of the outcomes of the surgery.

CONCLUSIONS

The 27G system was safe and effective for treating a broad spectrum of PSED. Overall, the surgery provided perfect self-sealing wounds and increased patient comfort postoperatively. Minimal complications were encountered with this system. The significant rise in IOP was attributable to the tamponade agents used.

Operative time was longer with the 27G vitrectomy system due to the smaller gauge and decreased flow rates. Using the 27G cutter as a dissection tool and vertical scissors may help offset these delays in operative time.

Favorable visual and anatomic outcomes with this surgery should lead to broader adoption of this technique in the near future.

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Conflict of interests

None declared.

Availability of data and materials

Data available on reasonable request.

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