

## SAFETY AND EFFECTIVENESS OF 20G SUTURELESS PARS PLANA VITRECTOMY: A PROSPECTIVE STUDY AT SAROJINI DEVI HOSPITAL, HYDERABAD

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**ABSTRACT: AIM:** To study the safety and effectiveness of 20G Sutureless Pars plana vitrectomy and compare it with Conventional 20G Sutured Pars Plana vitrectomy **METHODS:** This study was a prospective comparative interventional case series study of 40 eyes of 40 patients, who underwent Pars Plana Vitrectomy for various indications like Non absorbing Vitreous Hemorrhage, Diabetic Macular edema,, Nucleus/IOL drop, Proliferative Vitreo Retinopathy, Primary Rhegmatogenous RD in a tertiary care centre, by a single surgeon between November 2011 to May 2013 were selected. **RESULTS:** 20G Sutureless Pars plana Vitrectomy is as effective as 20G sutured PPV with good safety profile. **CONCLUSION:** 20G Sutureless Pars Plana Vitrectomy is an economical and safe procedure for various indications of PPV.

**KEYWORDS:** 20G Vitrectomy, 20G Sutureless PPV, Sutureless Vitrectomy, Pars plana Vitrectomy.

**INTRODUCTION:** Pars plana vitrectomy (PPV) is a surgical procedure that involves removal of vitreous gel from the eye and the instruments are introduced into the eye through the pars plana. 20G Conventional Vitrectomy is a standard technique for Vitreo retinal surgery since its inception in 1970 and is accepted worldwide.<sup>1</sup> Conjunctiva is opened, three sclerotomy ports are made with MVR blade by a stab incision inferotemporally, superotemporally and superonasally. Infusion cannula is inserted and sutured to the inferotemporal sclerotomy port and remaining two sclerotomy ports are used for endoillumination and vitrectomy cutter. In 2002, Fujii et al introduced 25G vitrectomy with instruments of lumen diameter 0.5mm. Self-retained trocars are used for infusion cannula and other instruments. The trocars are inserted trans-conjunctivally and trans-sclerally and remained in place during the entire surgical procedure without the need for suturing them to sclera.<sup>2</sup> In 2004, 23G vitrectomy with instruments of lumen diameter 0.65mm were developed by Eckhardt et al.<sup>3</sup>

The quest to find new ways to shorten surgical time and minimize trauma to the eye led to the development of 20G sutureless technique by Chen et al in 1996,<sup>4</sup> where a tunnel incision is used instead of a stab incision used in Conventional 20G vitrectomy and there by incision is made self-sealing and left without sutures.

Yeshuran et al reported that 33 out of 35 eyes that underwent 20G sutureless vitrectomy had uneventful operations and only 2 eyes required suture placement at the end of the surgery.<sup>5,6</sup> Saad et al concluded from the 183 20G Sutureless sclerotomies performed, 10(6%) required suture placement.<sup>7</sup> Kim et al reported that in a series of 164 20G sutureless Vitrectomies, suture placement at the end of the procedure was required in 63 (38%) patients to close leaking sclerotomies.<sup>8</sup> In a comparative series of 21 consecutive eyes undergoing 20G sutureless Vitrectomies using self-sealing wedge shaped pars plana sclerotomies, Theelan et al reported no cases of hypotony.<sup>9</sup>

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In a retrospective case series study on 20G sutureless Vitrectomies by Sangeet Mittal et al on 53 eyes of 45 patients, 2 patients had post-operative hypotony and 2 patients required suturing at the end of the surgery.<sup>10</sup>

### **Indications of Pars Plana Vitrectomy:**

1. Macular Diseases: Macular epi-retinal membrane, Vitreo macular traction (VMT) syndrome, Macular Holes.
2. Complications of Diabetic Retinopathy: Vitreous hemorrhage, Tractional RD, Combined tractional and rhegmatogenous RD, Premacular subhyaloid haemorrhage.
3. Retinal Detachment.
4. Post-operative Endophthalmitis.

**AIMS AND OBJECTIVES OF THE STUDY:** To study the safety and effectiveness of 20G Sutureless PPV by comparing the change in BCVA and Intra ocular pressure in both the groups after surgery;

- To study the post-operative rehabilitation in both the groups and
- To study complications, if any like Endophthalmitis, Choroidal detachment, in both the groups.

**MATERIALS AND METHODS:** This study was a prospective comparative interventional case series study of 40 eyes of 40 patients, who underwent Pars Plana Vitrectomy for various indications like Non absorbing Vitreous Hemorrhage, Diabetic Macular edema,, Nucleus/IOL drop, Proliferative Vitreo Retinopathy, Primary Rhegmatogenous RD in a tertiary care centre, by a single surgeon between November 2011 to May 2013 were selected.

### **Patients were divided into 2 groups;**

1. Patients undergoing Sutureless 20G vitrectomy.
2. Patients undergoing Conventional Sutured 20G vitrectomy.

Patients were explained about the diagnosis, various treatment options and possible complications and prognosis of the condition before enrolment.

### **Inclusion Criteria:**

1. Patients above 20 years of age.
2. Patients undergoing vitrectomy for various indications as a primary procedure.

### **Exclusion Criteria**

1. Patients with thin sclera.
2. Patients with corneo scleral injuries & retained intraocular foreign bodies.
3. Patients with repeated surgical procedures.
4. Patients with Glaucoma.

Evaluation included complete comprehensive ocular examination at baseline and at each follow up visit.

1. Slit lamp examination of anterior and posterior segment (Using 90D lens).
2. BCVA by Snellen's chart.
3. Indirect Ophthalmoscopy.
4. IOP with Goldmann applanation tonometry.
5. B-Scan (When required).
6. OCT (When required).

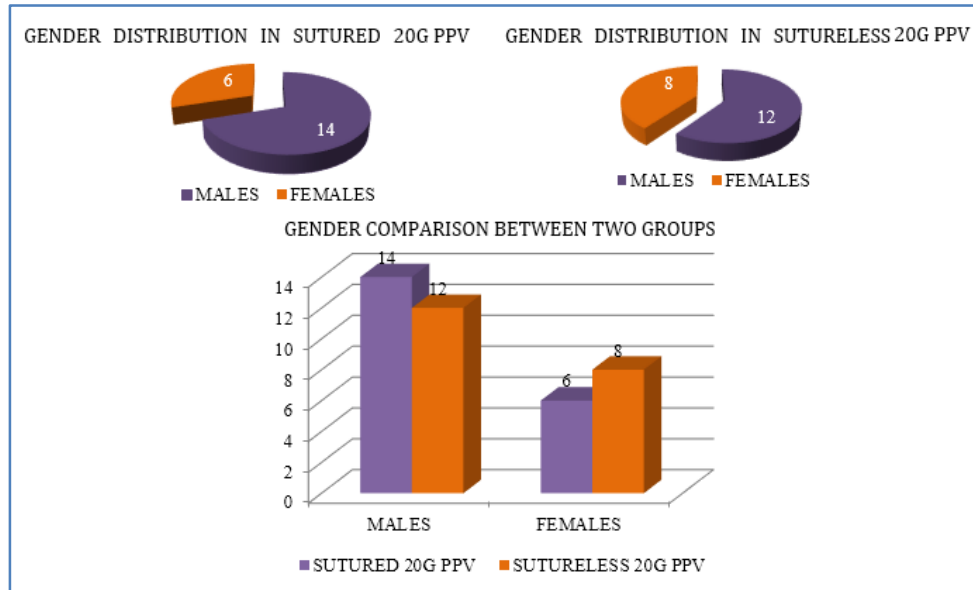
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**OBSERVATIONS AND ANALYSIS:** The total no of patients included in the study were 40. These patients were divided into two groups:

1. 20 cases underwent Sutureless 20G Pars Plana Vitrectomy.
2. 20 cases underwent Sutured 20G Pars Plana Vitrectomy.

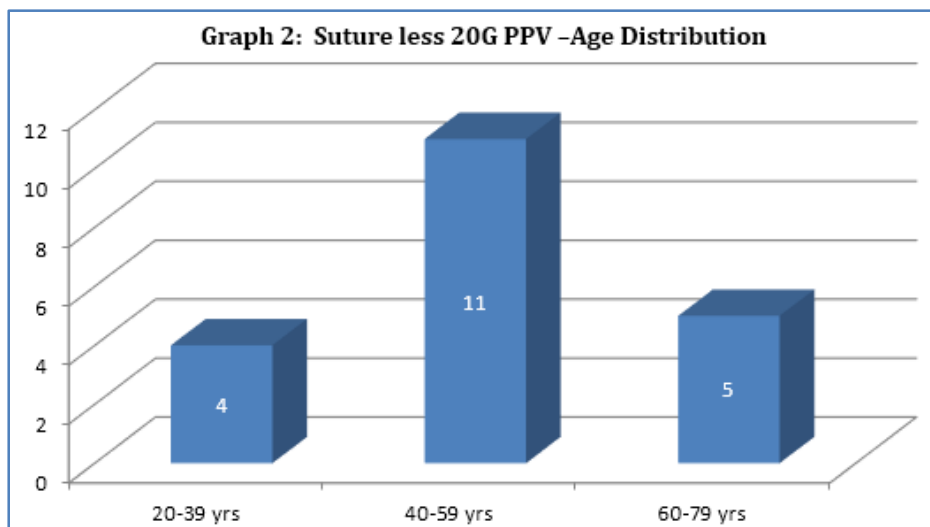
The follow up period for both the groups was 6 months.

**DEMOGRAPHIC PROFILE: Graph 1: Gender distribution in both the groups:**

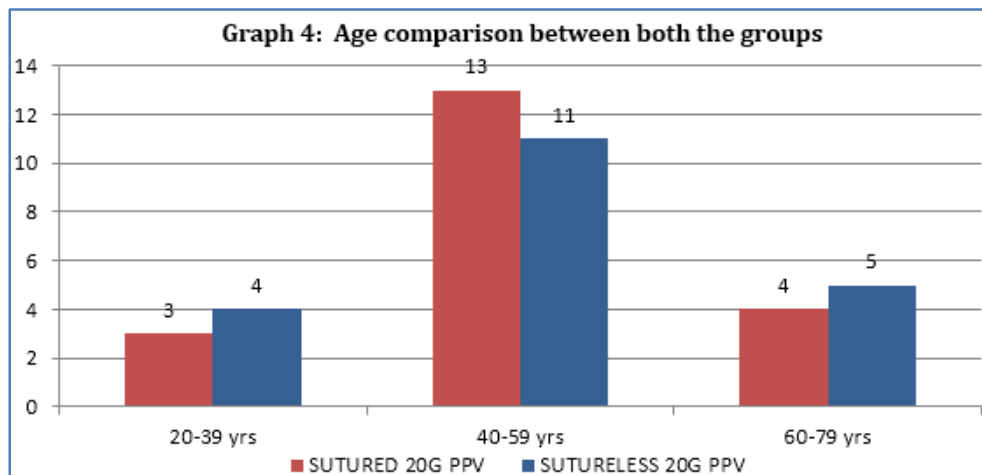
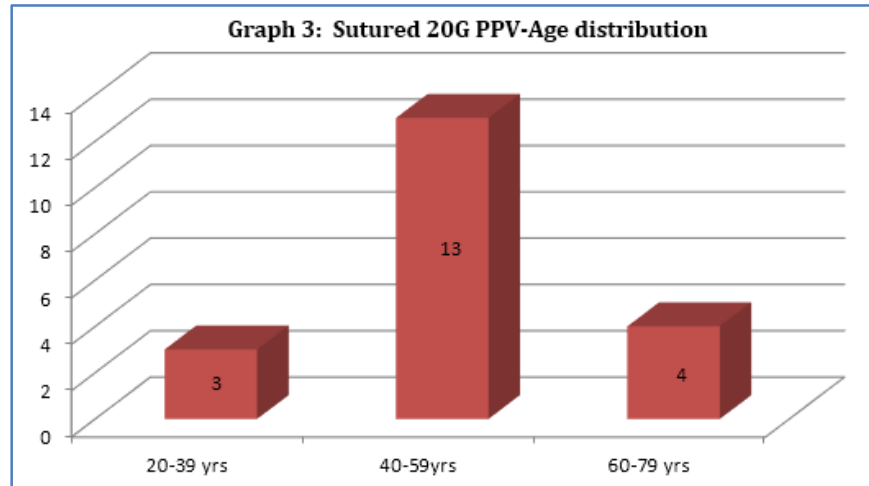


The mean Age of the patients in Sutureless 20G PPV was  $49.65 \pm 13.57$  yrs Most of the patients falling in the age group of 40-59 years.

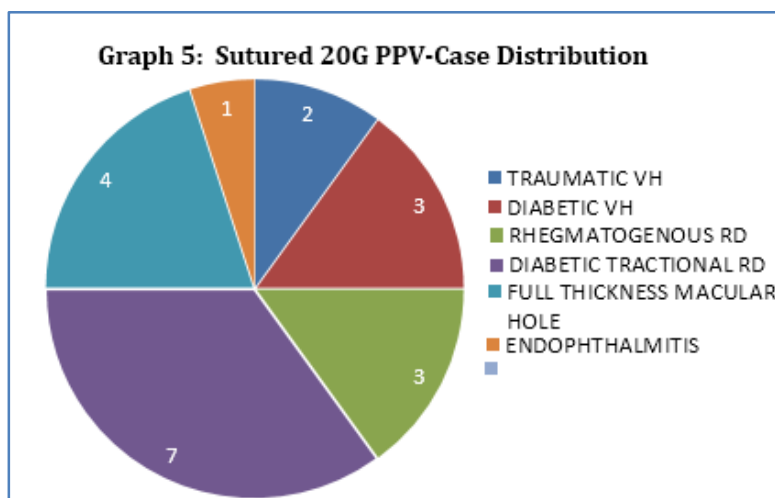
The mean age of patients in Sutured 20G PPV was  $51.15 \pm 10.68$  years, Most of the patients belonging to age group of 40-59 years.



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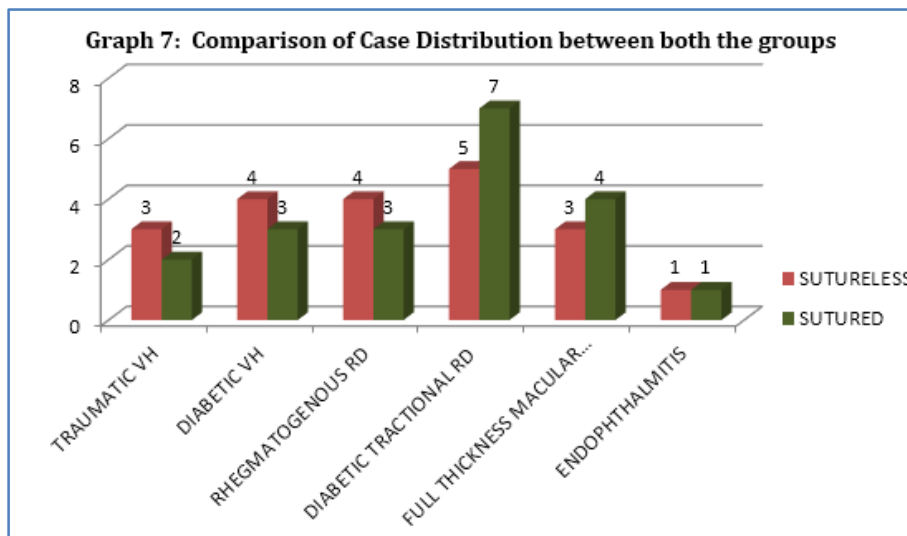
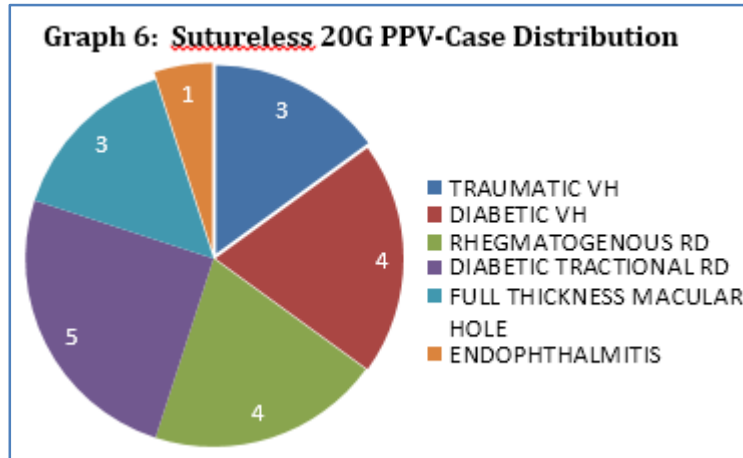


The distribution of cases in both the groups were, In Sutured 20G Group, there were 2 cases of Traumatic Vitreous Hemorrhage, 3 cases of Diabetic Vitreous Hemorrhage, 3 cases of Rhegmatogenous RD, 7 cases of Diabetic Tractional RD, 4 cases of Full thickness macular hole and 1 case of Endophthalmitis.



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In Sutureless 20G group, there were 3 cases of Traumatic VH, 4 cases of Diabetic Vitreous hemorrhage, 4 cases of Rhegmatogenous RD, 5 cases of Diabetic Tractional RD, 3 cases of Full thickness Macular hole, 1 case of Endophthalmitis.

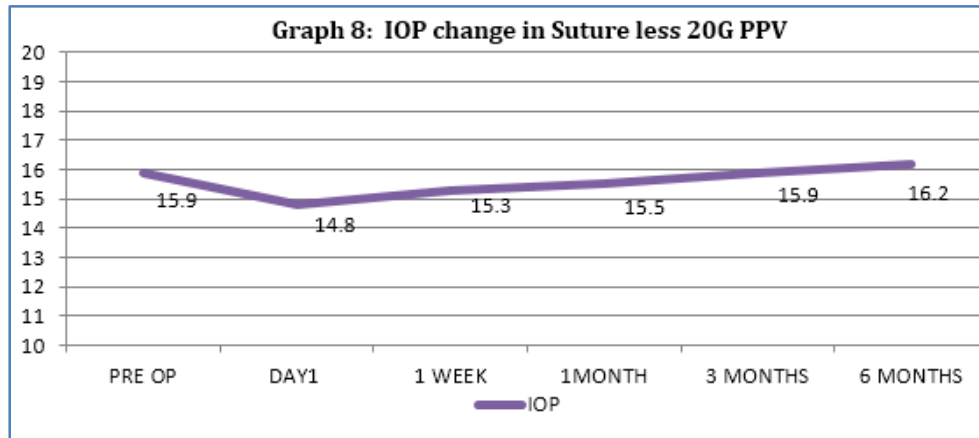


**INTRA OCULAR PRESSURE:** The average preoperative IOP in Sutureless 20G PPV was  $15.9 \pm 2.19$  mm Hg.

IOP	SUTURELESS 20G PPV	
	Mean $\pm$ SD	p value
Pre op	15.9 $\pm$ 2.19	
Day1	14.6 $\pm$ 3.16	0.13
1 week	15.3 $\pm$ 2.17	0.38
1 month	15.5 $\pm$ 1.39	0.68
3 months	15.9 $\pm$ 1.20	0.99
6 months	16.2 $\pm$ 1.28	0.59

**Table 1: IOP Change in Sutureless 20G PPV**

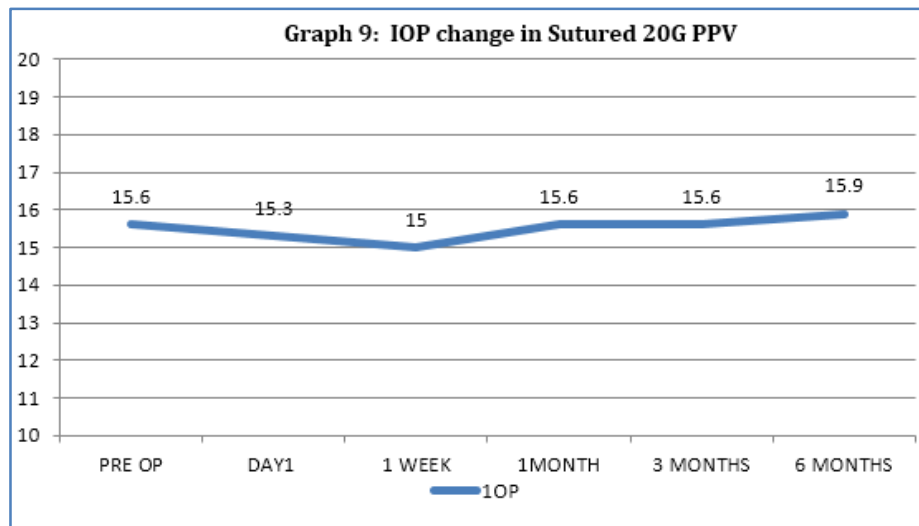
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The mean baseline IOP in 20G Sutured group changed from  $15.6 \pm 2.47$  mm Hg to  $15.3 \pm 1.49$  mm Hg. The difference between the pre op and day1 post op IOP is not statistically significant. The difference between the mean IOP in Sutured 20G PPV remained statistically insignificant on all follow up visits compared to mean baseline preoperative IOP ( $p > 0.05$ ). There were no cases of Hypotony in Sutured 20G PPV.

IOP	SUTURED 20G PPV	
	Mean $\pm$ SD	p value
Pre op	15.6 $\pm$ 2.47	
Day1	15.3 $\pm$ 1.86	0.64
1 week	15 $\pm$ 2.20	0.40
1 month	15.7 $\pm$ 1.49	0.87
3 months	15.6 $\pm$ 2.11	0.99
6 months	15.7 $\pm$ 2.07	0.89

**Table 2: IOP Change in Sutured 20G PPV**

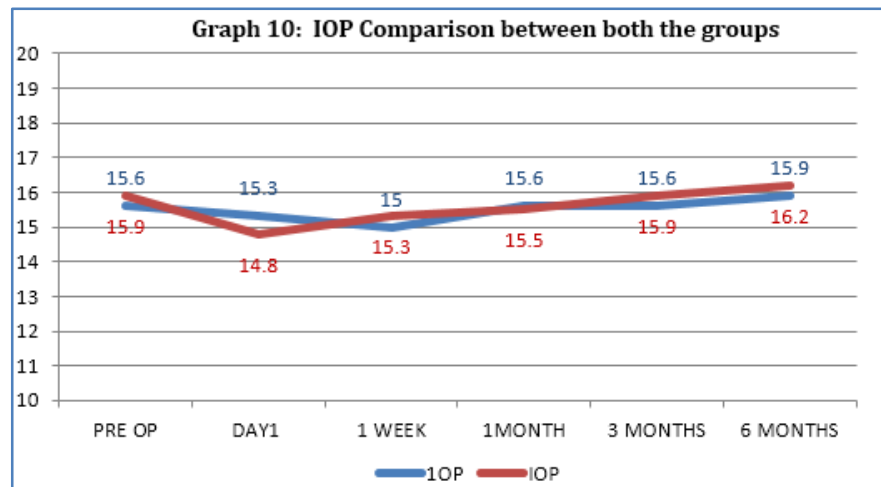


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The mean base line IOP in both the groups was compared and there was no statistically significant difference between them. The mean IOP on all follow up visits also did not differ in both the groups (Statistically insignificant difference between them.i.e,  $p>0.05$ )

IOP	SUTURELESS 20G PPV	SUTURED 20G PPV	P Value
	Mean±SD	Mean±SD	
Pre op	15.9±2.19	15.6±2.47	0.68
Day1	14.6±3.16	15.3±1.49	0.27
1 week	15.3±2.17	15±2	0.65
1 month	15.5±1.39	15.7±1.49	0.66
3 months	15.9±1.20	15.6±2.11	0.58
6 months	16.2±1.28	15.7±2.07	0.36

**Table 3: IOP Comparison between both the groups**



### VISUAL ACUITY:

The mean base line Log Mar BCVA in Sutureless 20G PPV was  $1.61\pm 0.26$ .

The mean base line Log Mar BCVA in Sutured 20G PPV was  $1.57\pm 0.32$ .

In Sutureless 20G Group, The mean Log Mar Visual acuity compared to the pre op levels changed significantly since 1 week and remained significant on all subsequent follow up visits.

	Suture less 20G PPV	
Log Mar BCVA	MEAN±SD	p value
PRE OP	1.61±0.26	
DAY 1	1.53±0.27	0.34
1 WEEK	1.18±0.22	0.0001
1 MONTH	0.98±0.22	0.0001
3 MONTHS	0.90±0.18	0.0001
6 MONTHS	0.88±0.20	0.0001

**Table 4: Suture less 20G PPV-Change in BCVA**

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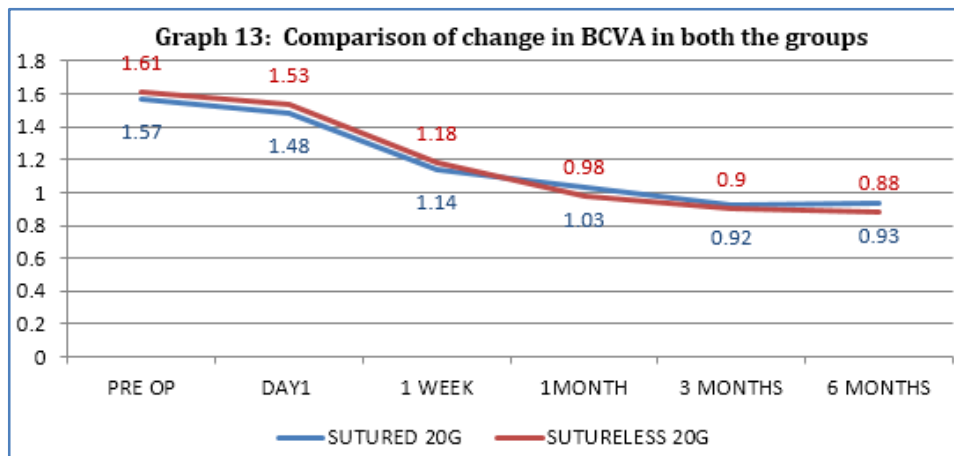
	Sutured 20G PPV	
	MEAN±SD	p value
PRE OP	1.57±0.32	
DAY 1	1.48±0.28	0.48
1 WEEK	1.14±0.25	0.0001
1 MONTH	1.03±0.25	0.0001
3 MONTHS	0.92±0.22	0.0001
6 MONTHS	0.93±0.22	0.0001

**Table 5: Change in BCVA in Sutured 20G PPV**

There was no difference observed in the change in BCVA on all follow up visits in both the groups. The difference remained statistically insignificant ( $p>0.05$ )

Log Mar BCVA	SUTURELESS 20G PPV	SUTURED 20G PPV	p value
Pre op	1.61±0.26	1.57±0.32	0.65
Day1	1.53±0.25	1.48±0.28	0.56
1 week	1.18±0.22	1.14±0.25	0.56
1month	0.98±0.12	1.03±0.25	0.40
3 months	0.90±0.18	0.92±0.22	0.74
6 months	0.88±0.20	0.93±0.22	0.47

**Table 6: Comparison of Change in BCVA in both the groups**



**PAIN SCORE:** When asked from 0-10 to grade the pain according to Fekrat et al<sup>11</sup>, the mean pain score on day1 in Sutureless 20G PPV was  $2.7\pm0.7$ .

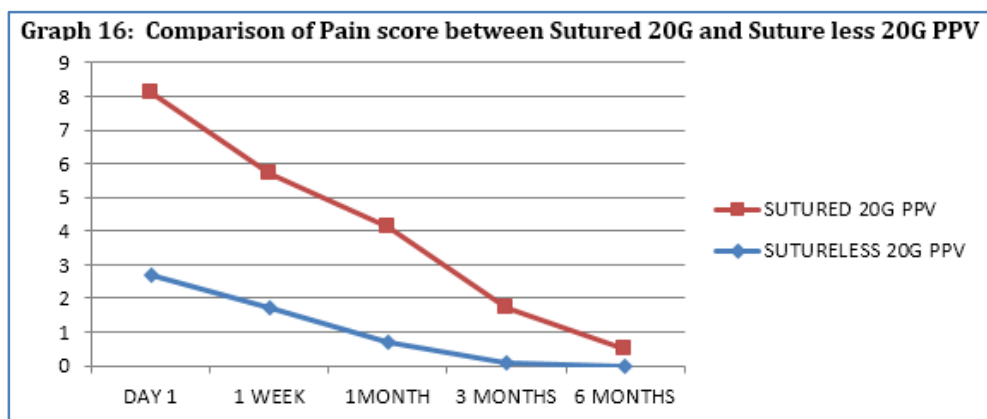
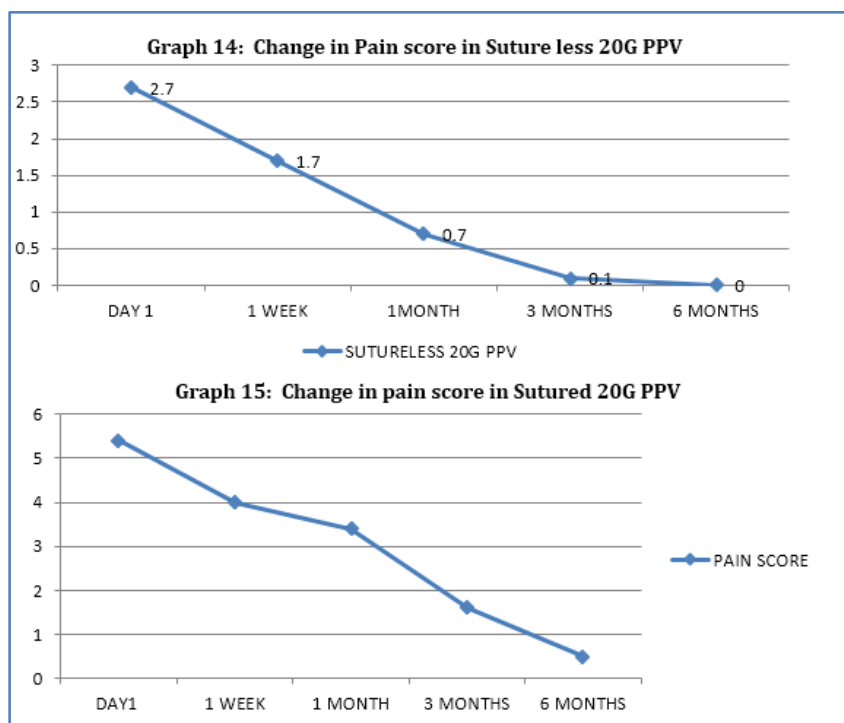
The mean pain score in Sutured 20G PPV on Day 1 was  $5.2\pm1.2$ . The difference between the pain scores in 2 groups was statistically significant ( $p<0.05$ ). The difference in the pain between both the groups remained statistically significant at all follow up visits. The pace of slowdown in the pain also remained higher in Sutureless 20G PPV group.



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Pain score	20G Suture less PPV	20G Sutured PPV	P value
Day 1	2.7+0.7	5.2 + 1.2	<0.001
1 week	1.8 + 0.7	4.0 + 0.9	<0.001
1 month	0.7 + 0.7	3.4 + 1.0	<0.001
3 months	0.1 + 0.3	1.6 + 0.8	<0.001
6 months	0.0 + 0.0	1.6 + 0.8	0.001

Table 7: Comparison of Pain score between both the groups



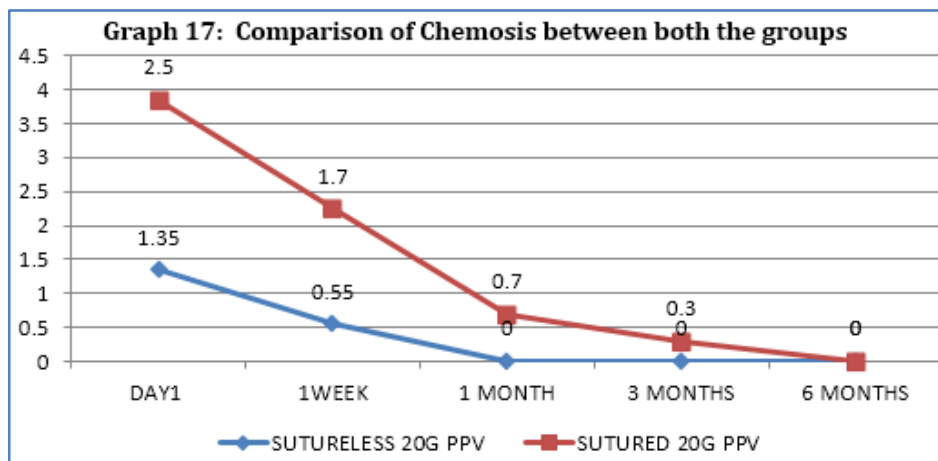
**CHEMOSIS:** It is graded from 0-3 depending on the no of quadrants of the eye involved.

- The mean Chemosis score on Day1 in Sutureless 20G PPV was  $1.35 \pm 0.48$ .
- The mean Chemosis score on Day 1 in 20G Sutured PPV was  $2.5 \pm 0.51$ .
- The mean Chemosis score on all follow up visits remained less in Sutureless 20G PPV group.

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Chemosis	Suture less 20G PPV	Sutured 20G PPV	p value
Day 1	1.35±0.489	2.5±0.51	<0.001
1 week	0.55±0.51	1.7±0.65	<0.001
1 month	0	0.7±0.47	<0.001
3 months	0	0.3±0.45	0.006
6 months	0	0	

Table 8: Comparison of Chemosis between both the groups



One case in Sutureless 20G group required suturing at the end of the surgery as the wound integrity was doubtful. No other complications like lens touch, Endophthalmitis were observed in both the groups.

**DISCUSSION:** Suture less 20G PPV is a modified variant technique of 20G Conventional Vitrectomy. It causes minimal surgical trauma to conjunctiva and Tenon's capsule. Post-operative inflammation and patient discomfort were reduced compared to the Sutured 20G Pars plana Vitrectomy.

One patient (5%), out of 20 patients included in Sutureless 20G PPV required suture at the end of surgery in our study.

In our study, BCVA improved post operatively compared to preoperative BCVA in both the groups. The mean BCVA 3 months post operatively in Suture less 20G group was  $0.90 \pm 0.18$ , in Sutured 20G group was  $0.92 \pm 0.22$ . There was no statistically significant difference in the improvement of BCVA between both the groups i.e., there was improvement in BCVA in both the groups after surgery.

The pain score on Day1 in Suture less 20G group was  $2.7 \pm 0.7$ . The pain score on Day 1 in Sutured 20G PPV was  $5.2 \pm 1.2$ . The p value between both the groups was statistically significant ( $p < 0.05$ ). The p value for pain on all subsequent follow up visits was statistically significant between both the groups. This shows that less pain was experienced by the patients in Suture less group compared to Sutured 20G PPV. The chemosis observed in Suture less 20G PPV group on Day 1 was  $1.35 \pm 0.489$  and in the Sutured 20G group on Day 1, it is  $2.5 \pm 0.51$ . The difference in the Chemosis between both the groups was statistically significant. The chemosis observed on subsequent follow up visits was less in the Suture less 20G PPV compared to Sutured 20G PPV.

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**CONCLUSION:** The results of our study show that 20G Suture less Pars plana Vitrectomy is as effective as 20G sutured PPV with good safety profile. There were 2 cases of Hypotony which normalized in 3 days. There was no statistical difference in the mean post-operative day1 IOP compared to mean preoperative IOP in both the groups. The BCVA improved in both the groups and there was no statistical difference between the two groups. The pain and chemosis experienced by 20G Suture less group was statistically less than the pain and chemosis experienced by 20G sutured group. It makes the surgery well tolerated by the patients due to reduced post-operative inflammation and facilitates early post-operative rehabilitation of the patients. However, a Small percentage of cases may require suture for better wound integrity.

20G Sutureless Pars Plana Vitrectomy is an economical and safe procedure for various indications of PPV. It can be considered as a viable option between Conventional 20G PPV and 23G, 25G PPV. However, a study with a larger sample size is required to determine the safety for a wider acceptance of the procedure.

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