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Comparative Study of 23 Guage and 25 Guagesutureless Vitrectomy

Dr. Sagar Aghadate[1], Dr. Sayalee Lahane[2], Dr. Preetam Samant[3], Dr. Ragini Parekh[4], Dr. T. P. Lahane[5]

[1, 2, 3, 4, 5]MS Ophthal

Abstract: ***Introduction: The present study is concerned with difference of 23 - gauge and 25 - gauge vitrectomy for cases like Vitreous haemorrhage, retinal detachment, subluxated cataract or IOL, Macular hole or PDR. There are very few studies comparing difference between 23 - gauge and 25 - gauge vitrectomy. Aims and objectives: To compare thevisual acuity, surgically induced astigmatism, post op hypotony, post op infection, success rate following 23 - Gauge sutureless vitrectomy versus 25 - Gauge sutureless vitrectomy. Materials and methods: Randomised controlled trial comparing 100 pts undergoing 23 g and 25 g pars plana vitrectomy for various indication of Vitreo retinal surgery. Observation and result: There was no significant difference found in surgery induced astigmatism, pre and post operative intraocular tension. Summary and conclusion: In conclusion, the 23 gauge and 25 gauge TSV system are equally feasible, effective, safe, and practical procedure for a variety of vitreoretinal disorders. The TSV allows for completely sutureless closed vitrectomy, obviates the need for conjunctival peritomy and suturing, and decreases surgically induced trauma, operation time, convalescence period, and postoperative inflammatory response. So, this study indicates 23 - gauge and 25 - gauage vitrectomy surgery are equally effective in almost all the type of surgeries.***

Keywords: 23 Gauge, 25 Gauge, Vitrectomy, Sutureless

1. Introduction

In 1971, Machemer et al [1], described the use of a 17 - gauge vitreous cutter utilized in an eye with vitreous hemorrhage secondary to diabetic retinopathy. The approach was modified in 1974, with the introduction of a 20 - - gauge vitrector (0.9 mm diameter) by O′Malley and Heintz. This was the origin of the three port, pars plana sclerotomy system that became the gold standard in vitrectomy surgery.

However, it was only in 2002the 25 - gauge transconjunctival sutureless vitrectomy (TSV) system was introduced by Fujii et al (Fujii et al, 2002). [2] This was followed by the introduction of a 23 - gauge system by Eckardt in 2005.

The present study is concerned with difference of 23 - gauge and 25 - gauge vitrectomy for cases like Vitreous haemorrhage, retinal detachment, subluxated cataract or IOL, Macular hole or PDR. There are very few studies comparing difference between 23 - gauge and 25 - gauge vitrectomy.

2. Aims and Objectives

To compare the

- Visual acuity following 23 - Gauge sutureless vitrectomy versus 25 - Gauge sutureless vitrectomy
- Incidence of post operativehypotomy
- Incidence of post operative infection
- Success rate of achieving the goal of vitrectomy
- Surgically induced astigmatism

3. Material and Methods

- Patients were screened from the ophthalmic department of a Tertiary care centre.
- Total 100 Cases were included in the study. The study design was cohort study.
- Patient of age >1yr and both sexes are recruited.
- Randomisation: all pt were randomized equally into two groups (23 - gauge and 25 - gauge vitrectomy group). Patients coming in odd sequences were considered as 23 - gauge groups while those coming in even sequences as 25 - gauge group.
- In 23 - gauge vitrectomy group vitrectomy done in patients by making three 23 - gauge ports while in 25 - gauge vitrectomy group vitrectomy done in patients by making three 25 - gauge ports.
- Blinding: Patients were unaware of which group they were allocated.

Inclusion criteria:

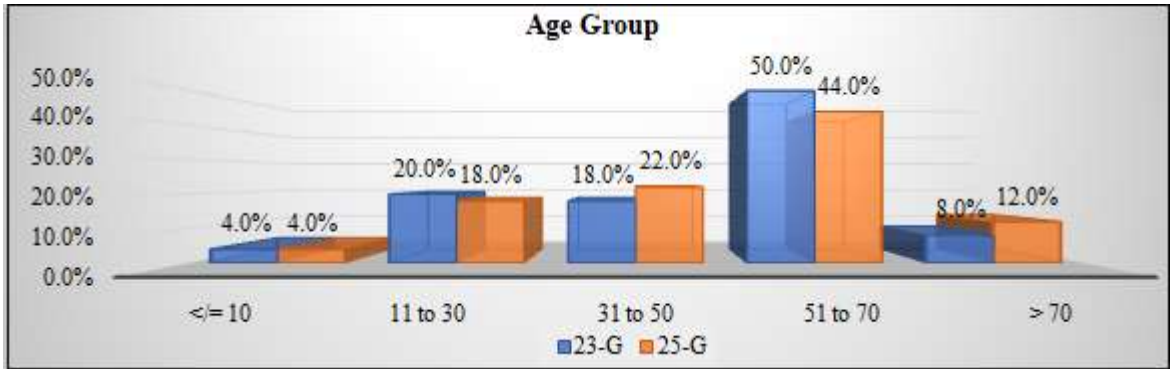
Patients with preoperative diagnoses of

- Vitreous haemorrhage (either diabetic or non - diabetic),
- Diabetic traction retinal detachment classed as moderate or below,
- Cystoid macular oedema, macular pucker,
- Full - thickness macular hole,
- Vitreous opacities,
- Rhegmatogenous retinal detachment,
- Subluxated cataract
- Nucleus drop in Vitreous
- Other less - complicated vitreoretinal pathologies

Exclusion criteria:

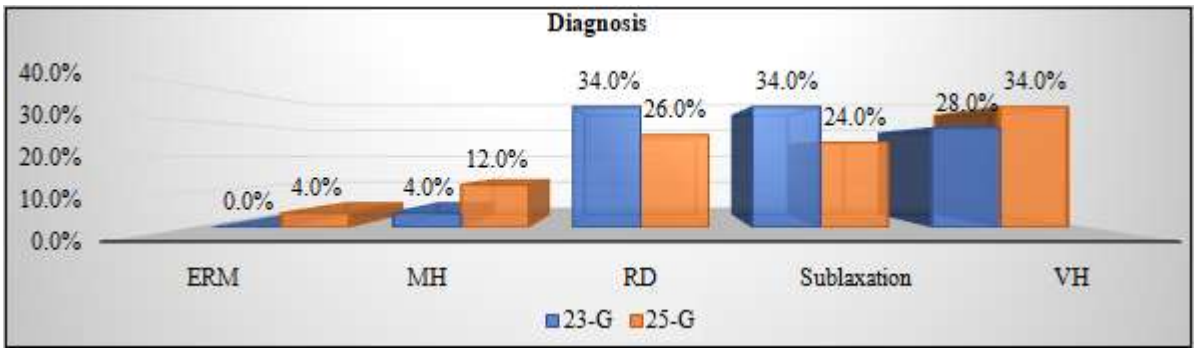
- Pts who have under gone prior scleral buckling and pars plana vitrectomy
- Previous vitrectomy
- High myopia >6D
- Sever grade 3 cataract
- Combined pars plana vitrectomy and scleral buckling surgery done

4. Observations and Results



Graph 1: Age wise distribution in 23 G and 25 G group

Mean age of distribution in 23 - gauge group is 49.04yrs and 49.92 in 25 - gauge group with p value of 0.828 which is statistically insignificant.



Graph 2: Etiology wise distribution of cases in 23G and 25G group

Table 1: Preoperative distribution of vision in 23G and 25G group

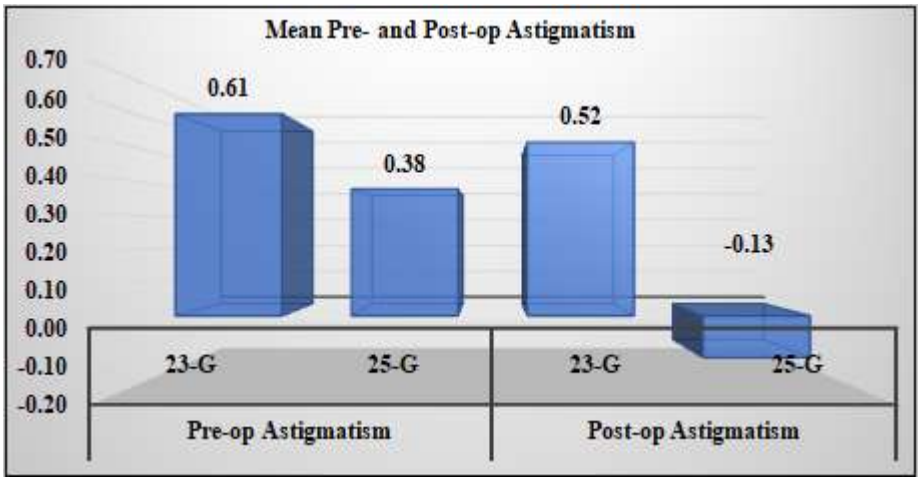
Pre – op Vision	Group		Total
	23 - G	25 - G	
6/18 - 6/60	4	6	10
	8.0%	12.0%	10.0%
FC	31	31	62
	62.0%	62.0%	62.0%
HMCF	9	9	18
	18.0%	18.0%	18.0%
PL+	6	4	10
	12.0%	8.0%	10.0%
Total	50	50	100
	100.0%	100.0%	100.0%
p - value - 0.849			

There was no significant difference in BCVA between the two groups preoperatively and at 4 weeks postoperatively. P value is 0.849 for Pre operative vision in 23 - gauge and 25 - gauge and P value is 0.735 in post operative vision in 23 - gauge and 25 - gauge vitrectomy groups i. e. statistically insignificant

Table: Post operative distribution of vision in 23G and 25G group

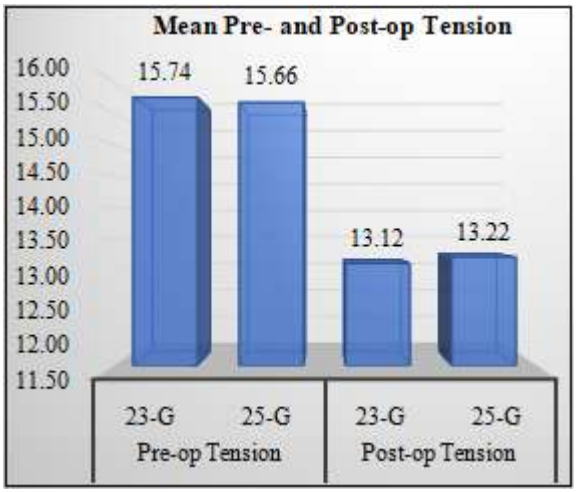
Post - op Vision	Group		Total
	23 - G	25 - G	
6/9 - 6/12	3	3	6
	6.0%	6.0%	6.0%
6/18 - 6/60	19	22	41
	38.0%	44.0%	41.0%
FC	25	20	45
	50.0%	40.0%	45.0%
HMCF	3	5	8
	6.0%	10.0%	8.0%
PL+	0	0	0
	0.0%	0.0%	0.0%
Total	50	50	100
	100.0%	100.0%	100.0%
p - value - 0.735			

P value for pre operative to post operative vision in 23 - gauge and 25 - gauge is <0.05 i. e. there is definite improvement in vision and endophthalmitis (0.0%, 0.0%) for 23 - G group, 25 - Ggroup, respectively ($P > 0.05$).



Graph 3: Pre and post operative astigmatism in 23 - G and 25 - G group

Preoperative and postoperative 23 - G and 25 - G astigmatism has P VALUE of 0.54 and 0.07 respectively which is not statistically significant. We anticipated less surgically induced astigmatism with the use of the 25G than with the 23G system, although that was not the case



Graph 4: Pre and post operative intraocular pressure in 23 G and 25 - G group

Mean pre operative intraocular tension is 15.74 mm of hg and 15.66 mm of hg in 23 - gauge and 25 - gauge vitrectomy groups respectively. While Mean post operative intraocular tension is 13.12 mm of hg and 13.22 mm of hg in 23 - gauge and 25 - gauge of vitrectomy group.

5. Discussion

A total of 100 patients with posterior segment disease were included in this study and result obtained using appropriate statistics [chi square test].

Entry site retinal tears were not seen in either group. This compares well with published data. Fine et al reported no intraoperative sclerotomy site tears in 77 patients undergoing 23 - gauge vitrectomy.

In comparison to 23 - gauge, 25 - gauge PPV is much more tedious and requires careful handling. The instruments are thin, flexible and bend easily with threat of breakage. Luckily, no instrument broke but bending of 25 - gauge fiberoptic light occurred during surgery in few cases. Also, peripheral vitreous shaving was incomplete in 25 - gauge series as globe rotation was difficult due to flexible instruments and scleral indentation helped complete the work. Inoue M et al in his case series reported intra - operative breakage of 25 - gauge cutter during vitrectomy, while Tomic et al reported bending of 25 - gauge light pipe during surgical procedure. No such problems arose in 23 - gauge series. The instruments were rigid, allowing easy rotation of globe and complete peripheral vitreous shaving.
On completion of pars plana vitrectomy, suture closure was not needed in any case in either series. Though scanty leakage of silicone oil was observed in 7 eyes (14%) in 23 - gauge series, suture closure wasn't required as IOP was maintained within normal range. Misra et al [3] also reported similar findings with only one out of one hundred and fifty cases requiring suturing of a sclerotomy port while Eckardt's[3] series of forty four patients needed no port sutured. Lakhanpal et al[8] in his 25 - gauge series reported 10 cases (7.1%) requiring suture placement at a single sclerotomy site.

Post - operative hypotony following both 23 - gauge and 25 - gauge suture less vitrectomy has been raised as a concern in the literature. [4, 5, 6] Mean pre operative intraocular tension is 15.74 mm of hg and 15.66 mm of hg in 23 - gauge and 25 - gauge vitrectomy groups respectively. While Mean post operative intraocular tension is 13.12 mm of hg and 13.22 mm of hg in 23 - gauge and 25 - gauge of vitrectomy group. Out of 50 cases of 23 - gauge of vitrectomy only 2 cases (4%) had IOP less than 8 and 1 case (2%) out of all 25 - gauge vitrectomy cases had IOP less than 8 on post operative day 1 which increased to normal within 3 to 4 days. Postoperative hypotony is reported in 0–25% of sutureless vitrectomy cases. [7, 8] Majority of non silicone oil filled eyes received fluid (internal) tamponade. None of these patients developed hypotony related complications like choroidal detachment. IOP returned to normal range within first 48 – 72 hours with no adverse outcome on visual acuity. Similar data was published by Misra et al, reporting transient hypotony (IOP < 10 mm Hg) in four (out of fifty) eyes in 23 - gauge series on first postoperative day which normalized within 2 weeks of surgery with no complications and stable vision. However their study was between 23 - gauge and 20 - gauge series and not 25 - gauge vitrectomy. Tomic et al [9] published their comparative study between 23 - gauge and

25 - gauge PPV and reported a higher rate (41%) of transient hypotony in their 25 - gauge series compared to 14% in 23 - gauge group. We assume that slight displacement of the conjunctiva, overlying the sclerotomies while inserting and removing the trocars, prevents intraocular air or fluid leakage.

Localized minor sub - conjunctival hemorrhage occurred in a few patients in either group [8 of 50 (16%) in 25 - gauge and 11 of 50 (22%) in 23 - gauge group]. This happened as a result of accidental puncture of conjunctival vessels by trocar during sclerotomy. Another author has also reported similar finding. The hemorrhage cleared spontaneously within a few days.

Out of all 100 cases of vitrectomy, all cases achieved desired effect, i.e. 100% success rate achieved with both 23 - gauge and 25 - gauge sutureless vitrectomy. However, the study period is very small to define further failure or need of re - surgery.

6. Summary & Conclusion

In summary, 25 and 23 – gauge suture less vitrectomies are safe and minimally invasive. They enhance post - operative recovery. In our experience, 23 - gauge vitrectomy system offers advantages of suture less system, larger and stiffer instrumentation and is suitable for a wider variety of indications. For 25 – gauge vitrectomy, we need to select vitreo - retinal conditions requiring minimal tissue manipulations and dissection. Overall, both procedures induce minimal ocular trauma, decrease inflammatory response and allows faster patient and visual recovery. Numerous studies have shown that sutureless small - incision cataract surgery reduces the postoperative inflammatory response, Similarly, it has been proposed that there is a reduced postoperative inflammatory reaction and faster postoperative recovery with the 23 - gauge and 25 - gauge TSV system, compared with the conventional method of PPV [10, 11]. In addition, there would be no suture - related irritation or local inflammatory reaction at the sclerotomy sites [12]. The frequency of local inflammatory reaction has been reported as 32% with Dacron, and 5% with polyglycolic acid suture. [13] Eyes operated with the TSV system have been observed to be less - injected on the first postoperative day when compared with conventional PPV. Furthermore, there is no limbal stem cell damage due to conjunctival dissection, so it may be advantageous in eyes with corneal or conjunctival diseases such as dry eye. Further studies with longer follow - ups are warranted to determine if procedures involving more extensive fibrovascular proliferation should be performed especially with 25 – gauge instruments.

Small gauge vitrectomy systems are gaining popularity among vitreoretinal surgeons owing to a decreased operation time, faster visual recovery and less patient discomfort. [14, 15] The advances in vitrectomy cutters, illuminating probes and accessory instruments allow the surgeons for an easier access to the vitreous base, and surgical maneuvers can be performed in a greater range of motion.

In conclusion, the 23 gauge and 25 gauge TSV system are equally feasible, effective, safe, and practical procedure for a variety of vitreoretinal disorders. The TSV allows for completely sutureless closed vitrectomy, obviates the need for conjunctival peritomy and suturing, and decreases surgically induced trauma, operation time, convalescence period, and postoperative inflammatory response. So, this study indicates 23 - gauge and 25 - gauage vitrectomy surgery are equally effective in almost all the type of surgeries.

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