

# THE COMPARISON OF CORNEAL ASTIGMATISM AFTER 20-GAUGE AND 23-GAUGE PARS PLANA VITRECTOMY

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Aqsa Iqbal<sup>1</sup>

Syed Raza Ali Shah<sup>2</sup>

Muhammad Rizwanullah<sup>3</sup>

**For Authors' affiliation & contribution  
see end of Article**

## Corresponding Author:

Aqsa Iqbal

Trainee Optometrist

College of Ophthalmology & Allied Vision Sciences,  
Lahore.

## ABSTRACT

**PURPOSE:** The purpose of study was to evaluate and compare surgically induced corneal astigmatism after 20-gauge and that after 23-gauge pars plana vitrectomy (PPV).

**METHOD:** This was a quasi experimental study that was done at College of Ophthalmology and Allied Vision Sciences (COAVS), Lahore from August 2018 till November 2018. Ethical approval was also taken from COAVS Ethical Review Board (ERB), Mayo Hospital, Lahore. 80 patients were selected and divided into two groups. There were 40 patients in each group. Group I patients underwent 20-gauge conventional pars plana vitrectomy while patients in group II were operated by trans-conjunctival 23-gauge pars plana vitrectomy. Evaluation was done pre-operatively and the follow-up visit was after one week (post-operative). Keratometry by (Righton Speedy-K) Keratometer was done pre-operatively and on first follow up visit after one week to measure and compare the amount of surgically induced corneal astigmatism pre and post operatively in both groups.

**RESULTS:** In group 1 there were 12 females (30%), 28 males (70%) and in group 2 there were 14 females (35%) and 26 males (65%). Most of the patients were belonging to the age group of 40-60 years. Group 1 was operated by 20 gauge vitrectomy procedure and group 2 was operated by 23 gauge vitrectomy procedure. Results were affirmed by paired sample t-test. The surgically induced corneal astigmatism was lower at one week post-operatively in the 23-gauge PPV group with p-value =0.609 compared with the 20-gauge PPV group (P<0.001).

**CONCLUSION:** 23-gauge pars plana vitrectomy induces much less surgically induced corneal astigmatism in comparison to 20 gauge pars plana vitrectomy and it is a safer technique than 20 gauge vitrectomy.

**KEYWORDS:** Astigmatism, Pars Plana Vitrectomy, Trans-conjunctival, Conventional.

## INTRODUCTION

Pars plana vitrectomy (PPV) was developed by Robert Machemer. In ophthalmic surgery introduction of pars plana vitrectomy was a revolution and gave a solution to many conditions that were untreatable in the past. Commonly, most vitrectomy surgical systems use the 20 gauge pars plana vitrectomy that includes many incisions like peritomy (opening of the conjunctiva) and sclerotomy (incision in sclera). But due to advancement in the development of surgical instruments have enabled the performance of vitrectomies by using small gauge instruments such as 23, 25 and 27 gauge, and that allows the performance of vitrectomies without sutures. Many studies have evaluated corneal surface changes and post-operative astigmatism after vitreo-retinal surgical procedures such as 20 gauge PPV and scleral buckling. In Pars plana vitrectomy changes in

corneal shape are due to incisions made on sclera. Although the sutureless 23 gauge vitrectomy technique is being increasingly used, a significant number of Pars Plana Vitrectomies are still conducted using the 20-G technique. This work shows the clinical experience with 23 gauge Pars Plana Vitrectomy and Conventional 20 gauge Pars Plana Vitrectomy and comparing the changes in corneal astigmatism that are measured by Keratometric readings.

## MATERIALS AND METHODS

The study was carried out at College of Ophthalmology and Allied Vision Sciences (COAVS) / King Edward Medical University, Mayo Hospital, Lahore. The patients were admitted from Eye OPD of Mayo Hospital, Lahore. Study was of three months duration from August 2018

till November 2018. There were 80 eyes included in this study and 40 each were assigned to 20G & 23G group. Study design was a comparative, cross-sectional study. Patients included in study were of Rhegmatogenous retinal detachment (RRD), Epiretinal membrane (ERM), Tractional retinal detachment (TRD), Vitreous hemorrhage, Macular hole, and Diabetic related vitrectomy. Patients with history of penetrating trauma and who required cataract surgery or had any pathology of cornea and sclera such as rigid contact lens use, refractive surgery, corneal trauma, corneal transplant, keratoconus, or corneal ulcers, were excluded from this study. Examination of the eyes included the recordings of corneal astigmatism, keratometric readings, slit lamp examination of anterior segment and fundus examination. All data including preoperative and post-operative recordings were collected. Follow up period was of one week. All the data was entered and analyzed using statistical package for social science (SPSS version 20.00) p values equal to or less than 0.05 were considered statistically significant. All continuous variables were tested for normality.

**RESULTS**

The post-operative corneal astigmatism was less in 23G group as compared to 20G group.

**Table 1:** Paired Samples Statistics 20 Gauge

		Mean	N	Std. Deviation	Std. Error Mean	P value
pair 1	Pre	0.8603	40	0.45904	0.07258	<0.001

Mean pre-operative astigmatism in 20-G was 0.86±0.45 and post-operative astigmatism was 1.50±0.57 and in 23-G group was 0.45±0.32 pre-operatively and 0.47±0.38 post-operatively.

**Table 2:** Paired Samples Statistics 23 Gauge

		Mean	N	Std. Deviation	Std. Error Mean	P value
pair 2	Pre	.4568	40	.32867	.05197	0.609
	Post	.4723	40	.38064	.06018	

**DISCUSSION**

Suture less vitrectomy was first introduced by Chen after that 23 gauge pars plana vitrectomy was introduced by Eckardt.<sup>6,7</sup> In vitreo-retinal surgery this technique has been increasingly used and becoming

more and more popular because it has many advantages including faster post-operative recovery and faster restoration of vision due to reduced surgically induced astigmatism. In past few years many studies had reported that corneal shape changes in 20 gauge vitrectomy thus inducing astigmatism after surgery. This study shows the similar results because the post-operative astigmatism was much less in 23 gauge vitrectomy as compared to 20-G vitrectomy thus allowing maximum efficiency and faster vision rehabilitation. Wirbelauer et al<sup>4</sup> reported that there was a continuous increase in keratometric astigmatism values one week after performing pars plana vitrectomy. The surgically induced astigmatism was less severe in 23 gauge group as compared to 20 gauge group. This study shows same results the post-operative astigmatism was higher in both the groups but was less severe in 23 gauge group. For early recovery of visual acuity after vitrectomy surgically induced astigmatism is a main factor. Kadonosono et al reported in a study that in patients undergoing 20 gauge vitrectomy, irregular astigmatism occurred in 67 eyes. Wirbelauer et al<sup>9</sup> reported in a study of 10 eyes that sutures on sclera are responsible for increase in astigmatism after 20 gauge vitrectomy. This study shows some similar results as post-operative astigmatism increases in both groups but was much higher in 20 gauge vitrectomy group as compared to 23 gauge pars plana vitrectomy. Schweitzer et al<sup>12</sup> reported that 23 gauge vitrectomy does not induce corneal astigmatism but this study shows different results as astigmatism was induced in 23 gauge group after vitrectomy.

**CONCLUSION**

This comparative study shows advantage of the 23 gauge vitrectomy procedure over the 20 gauge pars plana vitrectomy procedure. Both the vitrectomy groups induce astigmatism but 23 gauge vitrectomy group induces significantly less surgically induced astigmatism and gives a more predictable and precise refractive results. If vitrectomy induced astigmatism can be minimized, additional refractive corrections are not needed. Thus 23-gauge vitrectomy is the procedure of choice for patients who are likely to achieve a good visual outcome after the vitrectomy and it improves post-operative outcomes.

**RECOMMENDATIONS**

This study on topic “ The comparison of corneal astigmatism after 20-gauge and 23-gauge PPV” reveals that on comparison between two surgical procedures, 20-gauge PPV shows more surgical astigmatism post-operatively than 23 gauge pars plana vitrectomy. After study this is recommended that, unless otherwise contra-indicated, 23-gauge PPV should be a procedure of choice to achieve best visual outcomes after surgery thus 23 gauge pars plana vitrectomy is superior than conventional 20 gauge vitrectomy regarding surgically induced post-operative corneal astigmatism. There was one limitation of this study, however. The study duration and follow-up time was short in this study and hence further studies with longer duration and follow up should be done for proper authentication

**Authors' Affiliation & Contribution**

<sup>1</sup>Aqsa Iqbal

Trainee Optometrist

College of Ophthalmology & Allied Vision Sciences, Lahore.

*Data collection, write up, Results*

<sup>2</sup>Dr. Syed Raza Ali Shah

Associate Prof Ophthalmology

FJ Medical University, Lahore.

*Analysis, Discussion*

<sup>3</sup>Dr. Muhammad Rizwanullah

Associate Prof Ophthalmology

PGMI/ Ameeruddin Medical College & Lahore General Hospital Lahore.

*Methods, Results*

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