

# A Novel Technique of Suturing Sclerotomy in Pars Plana Vitrectomy

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## ABSTRACT

**Purpose:** To describe a new technique of suturing sclerotomy after 23-gauge pars plana vitrectomy using 10 – 0 nylon suture with releasable knot.

**Study Design:** Quasi experimental study.

**Place and Duration of Study:** Sahiwal Teaching Hospital, Sahiwal, from January 2022 to June 2022.

**Methods:** 10 – 0 nylon sutures with releasable knots were applied to close the sclerotomy after 23 – gauge pars plana vitrectomy in 100 cases. Complications like hypotony and wound leakage were recorded. Intra ocular pressures on 1st post-operative day and after 1 week were monitored. Inflammation at suture site, pain experienced by the patient and surgeon's convenience of suture removal under a slit lamp after 1 week were documented.

**Results:** Patients included 58 women and 42 men. Post-operatively, there was no wound leakage and hypotony in any patient, with mean intra ocular pressure of  $13.5 \pm 2.0$  mmHg on 1st post-operative day and  $17.6 \pm .0.5$  mmHg after 1 week of surgery. In 4% cases inflammation was observed at suture site. The mean pain score, measured according to visual analogue scale, at post-operative day 1 and day 7 was  $1.25 \pm 1.19$  and  $1.08 \pm 0.99$  respectively. No discomfort was reported during removal of releasable sutures in 96% of the patients. Surgeon found it convenient to remove the sutures under slit lamp illumination.

**Conclusion:** Closure of 23 – gauge sclerotomy using nylon 10 – 0 suture with releasable knot is a useful option. It prevents post-operative wound leakage and hypotony.

**Key Words:** Hypotony, Pain, Sclerostomy, Suture, Vitrectomy.

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## INTRODUCTION

Pars plana vitrectomy is a commonly performed procedure used as a treatment for many retinal and vitreous diseases. Retinopexy around retinal breaks is achieved by endo-laser or cryopexy. Post-operative

tamponade is achieved by silicon oil, gas or air.<sup>1-4</sup> Introduction of small gauge vitrectomy has revolutionized the technique. 23-gauge pars plana vitrectomy is most commonly performed small gauge vitrectomy these days. Less surgical time and early rehabilitation of patients are few of the reasons for its popularity.<sup>5</sup> Moreover, it causes less damage to the ciliary body while making sclerotomy as compared to large gauge sclerotomy.<sup>6</sup> Although claimed to be self-sealed, port of 23 – gauge sclerotomy does leak. It results in post-operative hypotony and further complications like endophthalmitis.<sup>7,8</sup> Different techniques have been adapted to address the sclerotomy leak.<sup>9,10</sup> Some of the techniques include

suturing of sclerotomy with vicryl8-0, nylon8-0 and plain gut 6 – 0 suture.<sup>11</sup> Some surgeons get the help of interfacial surface tension of air or gas in the vitreous cavity and avoid suturing sclerotomy altogether.<sup>12</sup> However, use of this technique is limited by the often-encountered leaky sclerotomies that follow prolonged surgery. In such cases construction of sclerotomy is altered and it is no more self-sealed which leads to leakage of air or gas. All the existing techniques of suturing sclerotomy have their limitations. Absorbable sutures tend to cause inflammation at the site, they cause irritation and need to be removed.<sup>13</sup> Suturing with 10 – 0 nylon using a conventional technique leads to irritation to the patient if knot is not buried or suture ends are pouting out. Moreover, conventional sutures are needed to be removed in more invasive way leading to collateral local trauma to conjunctiva.

We describe a novel technique of suturing the 23-gauges sclerotomy using 10 – 0 nylon with releasable knots. Our technique gives all the benefits of conventional suturing while preventing drawbacks of old suturing techniques. Besides preventing sclerotomy leak and post-operative hypotony, it would be easy to apply the suture. Releasable sutures are easy to remove in OPD settings with minimal manipulation and no discomfort to the patient. Objective of our study is to verify the usability of a new technique of suturing sclerotomy after 23 – gauge pars plana vitrectomy using 10 – 0 nylon suture with releasable knot.

## METHODS

The Quasi experimental study was conducted at the department of ophthalmology, Sahiwal Teaching Hospital Sahiwal during the period of January 1, 2022, to June 30, 2022. Institutional Review Board approval was obtained for this study. All participants gave informed consent.

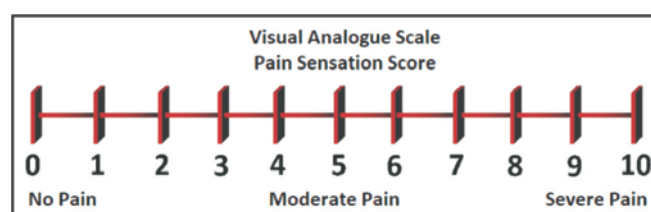
One hundred Patients, 18 years or older, of either gender and undergoing 23 – gauge pars plana vitrectomy for any reason were recruited for the study. Patients with history of previous pars plana vitrectomy, scleral buckling or glaucoma surgery in the operative Eye history of collagen vascular diseases, history of conjunctival, episcleral or scleral inflammation or scarring were excluded.

All patients enrolled in the study underwent 23-Gauge pars plana vitrectomy. Single surgeon performed all the surgeries and follow up visits.

Visalis 500 vitrectomy machine was used. Surgery was performed in standard fashion. Sclerotomies were sutured regardless of the nature of vitreous substitute. 10-0 nylon suture with releasable knot was used to secure the sclerotomy. Point spatulated needle was passed through partial thickness of sclera engaging both lips of sclerotomy at right angle to the axis of sclerotomy.

Three throws of head end of suture were passed around the loop of tail end of suture to make a knot. Knot was tightened adequately. Ends of the suture were trimmed leaving tail end longer than the head end. Pulling the tail end would result in release of knot while pulling head end would result in tightening of the knot. All patients were followed up on first and seventh post-operative day. Detailed slit lamp examination was performed. Intra ocular pressure was measured with applanation tonometer and dilated fundus examination was performed. Intraocular pressure less than 8 mmHg was considered as ocular hypotony. Suture site was examined for the presence of signs of inflammation. Suture site inflammation was graded according to the criteria shown in table number 1. Fluorescein dye was used to check leakage of sclerotomy sites. Patients were asked to grade postoperative pain using visual analogue scale (Figure 1).

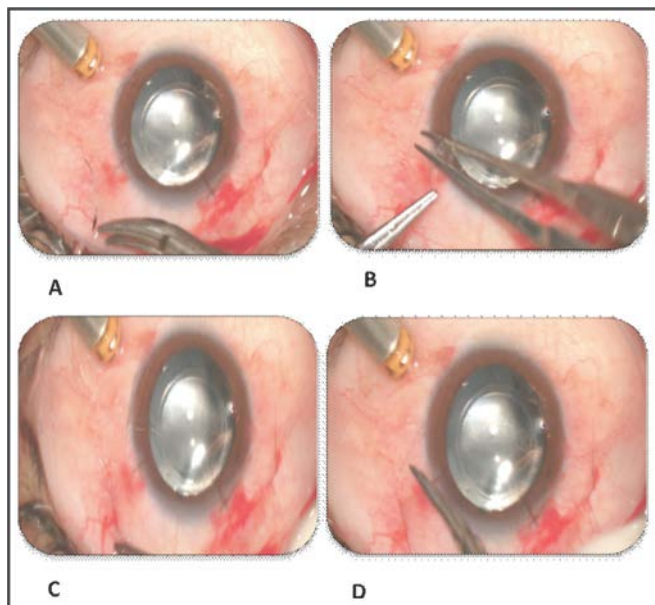
One drop of proparacaine 0.5% was instilled into the patient's eye and repeated 5 minutes later to get topical anesthesia before proceeding for suture removal. Removal of sutures by pulling the tail end of the suture was carried out under slit lamp illumination 1 week after surgery. Patient's perception of pain during suture removal was recorded. Surgeon was asked how convenient he was while removing suture under slit lamp in OPD setting. All the information was recorded in a proforma. Data was analyzed using SPSS version 23.



**Figure 1:** Visual Analogue Scale. '0' indicates no pain. '10' indicates worst pain.

## RESULTS

The study was conducted on 100 eyes of 100 patients. There were 58 women and 42 men included in the study. The mean age of study participants was 55.30 years ± 9.28. The most common surgical indication was tractional retinal detachment 37 (37%), followed by vitreous hemorrhage 23 (23%), rhegmatogenous retinal detachment 20 (20%) and macular hole 20 (20%). Vitreous substitutes used during surgery were in the following order: silicon oil in 57 (57%) cases, air in 23 (23%) cases and sulphur hexafluoride gas in 20 (20%) cases. Patients were examined with slit lamp on post-operative day 1 and 7. There was no wound leak or postoperative hypotony in any eye. Mean intraocular pressure measurements were 13.55 ± 2.0 mmHg at day 1 and 17.67 ± 1.05 mmHg at day 7.



**Figure 2:** Suture application at sclerotomy site using 10-0 nylon suture with releasable knot. (A) Passage of needle through both lips of sclera. (B) Head end of suture is turned three times over the suture tying forceps. (C) Making the loop of knot by engaging tail end of the suture. (D) Final knot. Suture ends are cut such that tail end is longer than head end.

**Table 1:** Suture site inflammation grading.

Grade	Inflammation	Clinical Features
0	No Inflammation	No hyperemia at suture site
1	Mild Inflammation	Conjunctival hyperemia at suture site
2	Moderate Inflammation	Hyperemia involving episclera at suture site
3	Severe Inflammation	Hyperemia involving sclera at suture site

There was no inflammation in 96 (96%) patients, while 3 (3%) had mild and 1 (1%) had moderate inflammation. Mean pain score at post-operative day 1 and day 7 was 1.25 ± 1.19 and 1.08 ± 0.99 respectively. Mean pain score was mild at both follow up visits. During suture removal only 4% of patients felt mild pain. In all cases surgeon found it convenient to apply and remove suture using releasable knot.

## DISCUSSION

This Quasi experimental study highlights the usability of novel technique of suturing sclerotomy using nylon 10 – 0 with releasable knot. Suturing with nylon 10 – 0 using a releasable knot technique may carry the advantage of ease of application, minimal inflammation at suture site, and improved patient comfort by causing less suture irritation along with convenient removal with minimal manipulation using slit lamp illumination in outdoor settings while preventing post-operative hypotony and wound leakage.

In the current study, there were no cases of post-operative hypotony and sclerotomy leak. Our results are comparable to the results of a study conducted by Song et al. In their study, sclerotomies were closed using Nylon 8 – 0 suture. There were no wound leakage and post-operative hypotony.<sup>14</sup> Arana and colleagues conducted a study to see the effects of suturing sclerotomies on postoperative hypotony. Their study showed that the cases in which sclerotomies were not sutured, they were more likely to present with hypotony on 1st post-operative day as compared to those in which sclerotomy were sutured with 7 – 0 vicryl.<sup>15</sup>

In the current study, mean pain score at post-operative day 1 was 1.25 ± 1.19 and at day 7 was 1.08 ± 0.99. The study of Sridhar et al using vicryl8-0 and plain gut 6 – 0 sutures reported mean pain score of 2.86 ± 2.70 and 1.78 ± 1.64 at day 1, while mean pain score at day 7 was 1.55 ± 1.71 and 1.44 ± 1.42 respectively. Pain score in our study is lower as compared to the pain score of Sridhar et al study.<sup>12</sup> Plausible reason for less pain in our study participants may be due to inert nature and thinner diameter of suture. Vicryl and plain gut being thicker in diameter and degradable in nature, induce more inflammation and pain.<sup>16</sup> Moreover, plain gut suture, although claimed to be absorbable may not dissolve completely even after a long-time following surgery which can

lead to discomfort to the patient as well as cause inflammation.<sup>17,18</sup>

In the present study, mean IOP was  $13.55 \pm 1.05$  at day 1 and no hypotony was encountered. In a study done by Khaqan and co-authors, mean IOP at day 1 was  $9.41 \pm 3.12$  and post-operative hypotony was seen in 48.0% cases.<sup>19</sup> Possible reason for no incidence of hypotony in our study is the application of sutures in all cases. In another study conducted by Zaheer and co-authors, they used Nylon 10 – 0 in suturing 23 – gauge sclerotomy. Their mean IOP at day 1 was  $18.38 \pm 2.54$  and at day 7, it was  $18.45 \pm 2.42$ .<sup>20</sup> Although, mean IOP at day 1 and day 7 of our study were lower than the study conducted by Zaheer and co-authors, but there was not a single case of hypotony in our study.

In the study conducted by Croskery and colleagues, suture site inflammation was noted in 2% cases of plain gut suture use, 30% cases of polyglycolic acid suture use and 14% cases of polyglactin 910 (Vicryl) suture use. In the current study, there was minimal inflammation and less suture irritation to the patients on 1st day and 1<sup>st</sup> week post-operative follow up visits. All sutures were removed on week one post-operative visit, leading to improved comfort. Early suture removal results in avoiding unwanted suture related complications.<sup>21</sup>

Our limitations are; it was a single center study with small sample size and it lacked comparison. In future, comparison of sclerotomy closure using releasable suture knot with conventional knot by employing different suture materials can be done.

Nevertheless, no complications including wound leak and post-operative hypotony were noted and intraocular pressure measurements were within normal range. With ease of suture application, patient's comfort, minimal suture site inflammation and convenient removal of suture in OPD setting make releasable knot suturing with 10 – 0 nylon suture a promising technique of sclerotomy closure.

## CONCLUSION

Employment of 10 – 0 nylon sutures with releasable knot to close sclerotomies offers several benefits. These include better tolerability, minimal inflammation at suture site, good sclerotomy closure with no post-operative hypotony and convenient removal on slit lamp illumination in OPD.

## Conflict of Interest

Authors declared no conflict of interest.

## Ethical Approval

The study was approved by the Institutional review board/Ethical review board (S.No-48--/IRB/SLMC/SWL).

## REFERENCES

1. **Popovic MM, Muni RH, Nichani P, Kertes PJ.** Pars plana vitrectomy, scleral buckle, and pneumatic retinopexy for the management of rhegmatogenous retinal detachment: a meta-analysis. *Surv Ophthalmol.* 2022; **67** (1): 184-196. Doi:10.1016/j.survophthal.2021.05.008
2. **Borowicz D, Nowomiejska K, Nowakowska D, Brzozowska A, Toro MD, Avitabile T, et al.** Functional and morphological results of treatment of macula-on and macula-off rhegmatogenous retinal detachment with pars plana vitrectomy and sulfur hexafluoride gas tamponade. *BMC Ophthalmol.* 2019; **19** (1): 1-8. Doi:10.1186/s12886-019-1120-3
3. **Bhardwaj G, Connell PP, Campbell WG.** Management of giant retinal tears using trans-scleral diode laser retinopexy and short-term postoperative tamponade with perfluoro-n-octane. *Retina,* 2020; **40** (3): 546-551. DOI: 10.1097/IAE.0000000000002424
4. **Li Y, Cheung N, Jia L, Zhang H, Liu N.** Surgical outcomes of 25-gauge pars plana vitrectomy using air as an internal tamponade for primary rhegmatogenous retinal detachment. *Retina,* 2020; **40** (11): 2077-2082. DOI: 10.1097/IAE.0000000000002744
5. **Scholz P, Müther PS, Schiller P, Felsch M, Fauser S.** A randomized controlled clinical trial comparing 20 gauge and 23 gauge vitrectomy for patients with macular hole or macular pucker. *Adv Ther.* 2018; **35** (12): 2152-2166. Doi:10.1007/s12325-018-0826-6
6. **Tang MS, Zhang SQ, Ma LW.** Comparison of postoperative ciliary body changes associated with the use of 23-gauge and 20-gauge system for pars plana vitrectomy. *BMC Ophthalmol.* 2018; **18** (1): 1-6. Doi: 10.1186/s12886-018-0925-9
7. **Tosi GM, Malandrini A, Bacci T, Posarelli M, Oddone C, Virgili G.** Vitreous incarceration in sutured vs. non-sutured sclerotomies after 25-gauge macular surgery. *Eye,* 2021; **35** (8): 2246-2253. Doi: 10.1038/s41433-020-01234-x
8. **Lin Z, Feng X, Zheng L, Moonasar N, Shen L, Wu R, et al.** Incidence of endophthalmitis after 23 – gauge pars plana vitrectomy. *BMC Ophthalmol.* 2018; **18** (1): 1-5. Doi: 10.1186/s12886-018-0678-5

9. **Rizzo S, Pacini B, De Angelis L, Barca F, Savastano A, Giansanti F, Caporossi T.** Intrasclear hydration for 23-Gauge Pars Plana Vitrectomy Sclerotomy Closure. *Retina*, 2022; **42 (12)**: 2414-2418. Doi: 10.1097/IAE.0000000000002703. Epub 2020 Jan 10.
10. **Zhang Y, Zhu D, Zhou J.** Needle infusion avoids using sutures and prevents hypotony in the 23 – gauge sutureless vitrectomy. *Int J Clin Exp Med*. 2015; **8 (10)**: 19176-19179. PMID: 26770552; PMCID: PMC4694452.
11. **Sridhar J, Kasi S, Paul J, Shahlaee A, Rahimy E, Chiang A, et al.** A prospective, randomized trial comparing plain gut to polyglactin 910 (Vicryl) sutures for sclerotomy closure after 23-gauge pars plana vitrectomy. *Retina*, 2018; **38 (6)**: 1216-1219. Doi: 10.1097/IAE.0000000000001684
12. **Li Y, Cheung N, Jia L, Zhang H, Liu N.** Surgical outcomes of 25-gauge pars plana vitrectomy using air as an internal tamponade for primary rhegmatogenous retinal detachment. *Retina*, 2020; **40 (11)**: 2077-2082. Doi: 10.1097/IAE.0000000000002744
13. **Croskrey JA, Han DP.** Adverse reactions to plain gut, polyglycolic Acid, and polyglactin 910 sutures for sclerotomy closure at pars plana vitrectomy. *Retina Cases Brief Rep*. 2013; **7 (3)**: 297-299. Doi: 10.1097/icb.0b013e31828ef096
14. **Song Y, Shin YW, Lee BR.** Adjunctive use of a novel releasable suture technique in transconjunctival vitrectomy. *Retina*, 2011; **31 (2)**: 243-249. Doi: 10.1097/IAE.0b013e3181e586ce
15. **Arana LA, Moreira AT, Grandinetti AA, Moreira H, Moreria Jr CA.** Novel vicryl releasable suture technique to close leaking sclerotomies in a transconjunctival vitrectomy. *Retina*, 2019; **39**: S108-111. Doi: 10.1097/IAE.0000000000002115
16. **Titley-Diaz WH, De Cicco FL.** Suture Hypersensitivity. In: *StatPearls*. StatPearls Publishing, Treasure Island (FL); 2022. PMID: 32965959.
17. **Anderson H, Lynn K, Mahmoudzadeh R, Milman T, Jain M, Garg SJ.** Immortal plain gut sutures: A case report. *Am J Ophthalmol Case Rep*. 2022; **26**: 101461. doi.org/10.1016/j.ajoc.2022.101461
18. **Hughes WL.** The evolution of ophthalmic sutures. *Ann. Plast. Surg*. 1981; **6 (1)**: 48-65.
19. **Khaqan HA, Imtiaz U, Buksh HM, Rehman HA, Naz R.** Frequency of Post-Operative Hypotony in 23 Gauge and 25 Gauge Pars Plana Vitrectomy in Advanced Diabetic Eye Disease. *Pak J Ophthalmol*. 2020; **36 (4)**. Doi: 10.36351/pjo.v36i4.1016
20. **Zaheer B, Zaheer W.** Outcomes after 23G transconjunctival parsplana vitrectomy and suturing of sclerotomy using 10/0 Nylon in patients with diabetic retinopathy in private hospital of Sargodha. *J Pak Med Assoc*. 2020; **70 (8)**: 1390-1392. Doi: 10.5455/JPMA.33125.
21. **Yip C, Bowen K, Chew BK.** A report of rare adverse tissue reaction to Ethilon® Nylon Suture. *J Surg Case Rep*. 2018; 2018 **(3)**: rjy037. Doi: 10.1093/jscr/rjy037.

### Authors' Designation and Contribution

Abdullah Muaz; Post Graduate Resident: *Concepts, Design, Literature search, Data acquisition, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing, Manuscript review.*

Ahmad Zeeshan Jamil; Professor: *Concepts, Design, Literature search, Data acquisition, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing, Manuscript review.*

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