

**Original Research Article**  
**Evaluation of the Efficacy and Safety of  
Affordable Glaucoma Drainage Device  
Implantation in Refractory Glaucomas: A  
Prospective Longitudinal Study**

**ABSTRACT**

**Aims:** This study aimed to assess the efficacy and safety of implanting an affordable glaucoma drainage device in patients with refractory glaucoma.

**Methodology:** A prospective longitudinal study was conducted involving 30 patients diagnosed with refractory glaucoma who underwent implantation of the Aurolab Aqueous Drainage Implant (AADI) between November 2021 and April 2022. All surgeries were performed by a single surgeon using a consistent technique. Patients were followed up for three months postoperatively. Outcome measures included postoperative intraocular pressure (IOP), best-corrected visual acuity (BCVA), the number of anti-glaucoma medications, and post-surgery complications. Complete success was defined as an IOP between  $\geq 5$  and  $\leq 21$  mm Hg, without the need for additional glaucoma medications.

**Results:** The majority of the patients were male (56.7%), while females comprised 43.3%. The mean age was 24.97 ( $\pm 16.5$ ). A significant decrease in the mean preoperative IOP from 31.67 ( $\pm 9.8$ ) mmHg to 12.7 ( $\pm 4.0$ ) mmHg was observed at the three-month follow-up, with a mean percentage reduction of 59.9% (P value  $< 0.001$ ). The mean number of preoperative topical anti-glaucoma medications (AGM) decreased from 3.17 ( $\pm 0.59$ ) to 0.17 ( $\pm 0.53$ ) at the three-month follow-up. Visual acuity remained stable in 10 (33.3%) eyes, improved in 9 (30%) eyes, and deteriorated in 11 (36.7%) eyes. Complications occurred in 4 patients (13.3%), including hyphema in 1 (3.3%) patient, choroidal detachment (CD) in 1 (3.3%) patient, and choroidal detachment with retinal detachment in 2 (6.6%) patients. The overall success rate was 96.6%.

**Conclusion:** The non-valved affordable glaucoma drainage device (AADI) demonstrated efficacy and safety in patients with refractory glaucoma, exhibiting good intraocular pressure control. Further follow-up is recommended to assess sustainability over time.

*Keywords: Non valved Glaucoma Drainage Device (GDD), Refractory glaucoma, Aurolab Aqueous Drainage implant (AADI)*

**1. INTRODUCTION**

Refractory glaucomas pose a treatment challenge as medical therapies often prove ineffective. Moreover, these conditions either exhibit poor responsiveness to conventional filtering surgeries or exhibit high failure rates. Aqueous drainage implants have become

**Comment [k1]:** Should mention the statistical tool which were used to analyze the data

pivotal in managing refractory glaucoma, particularly in eyes with previously failed trabeculectomy or high-risk secondary glaucomas, such as neovascular or uveitic glaucoma [1, 2]. The increased severity of glaucoma usually translates to elevated medication use and escalating treatment costs [3].

Generally, Glaucoma Drainage Devices (GDDs) establish alternative pathways by directing aqueous humor from the anterior chamber through a lengthy tube to an equatorial plate, promoting posterior bleb formation [4]. The commonly utilized drainage devices include the Baerveldt glaucoma implant lacking a valve mechanism and the Ahmed glaucoma implant, which incorporates an intrinsic valve mechanism to prevent overfiltration and subsequent hypotony [5]. Randomized control trials comparing Baerveldt versus Ahmed valve implants in refractory glaucoma treatment demonstrated lower failure rates with Baerveldt at 5 years, albeit with a slightly increased risk of hypotony [5–7].

Despite their proven efficacy in managing complicated glaucomatous eyes, the cost implications limit widespread application, especially in developing nations where patients' socioeconomic status heavily influences treatment choices. Most devices, predominantly imported from the West, remain expensive and unaffordable for a majority of refractory glaucoma patients.

There exists a pressing need for newer, more cost-effective drainage implants to address this situation and meet the increasing demand. The Aurolab Aqueous Drainage Implant (AADI; Aurolab, Madurai, India) is a novel, affordable drainage implant based on principles akin to the Baerveldt implant, lacking a valve mechanism. Recent studies have demonstrated its efficacy in reducing intraocular pressure (IOP) [8–10].

Professor George Baerveldt authorized the use of his highly successful design, leading to collaboration with the Bascom Palmer Eye Institute, Miami, Florida, for manufacturing the AADI. This implant became commercially available in India in June 2013 [11]. The 32-mm long end plate extends beyond 2 clock hours of circumference on the equatorial sclera. Despite its availability in India, there are only limited published data regarding the safety or efficacy of this implant [12, 13].

Evidence suggests that non-valved implants perform better, achieving lower target IOP with fewer anti-glaucoma medications and a reduced failure rate [14].

## **2. MATERIAL AND METHODS**

This prospective longitudinal study involved 30 patients diagnosed with refractory glaucoma who underwent AADI surgery between November 2021 and April 2022, followed by a 3-month postoperative observation period. Informed consent was obtained from all eligible participants before surgery, and ethical approval was granted by the institutional review board of Ispahani Islamia Eye Institute and Hospital, Dhaka, Bangladesh. Inclusion criteria encompassed eyes with uncontrolled intraocular pressure (IOP) refractory to medical treatment and conventional filtering surgery, as well as eyes considered at high risk of failure following conventional filtering surgery. Exclusion criteria comprised eyes where Goldmann applanation tonometry was hazardous, such as those with keratoprosthesis, uncontrolled systemic disease, active ocular disease, poor compliance, or those unable to follow up.

Patient demographics including age, gender, and residence were recorded, followed by a comprehensive ophthalmological examination. This examination involved baseline assessment of best-corrected visual acuity (BCVA), IOP, preoperative glaucoma

parameters, etiology of glaucoma, previous history of failed filtering surgery, visual field assessment, number of antiglaucoma medications (AGM), and post-surgery complications. The main outcome variable assessed was postoperative intraocular pressure (IOP), while secondary outcome measures included the number of AGMs, BCVA, and complications. Complete success was defined as achieving an IOP between  $\geq 5$  and  $\leq 21$  mm Hg without the use of AGM. Qualified success was defined as meeting the aforementioned IOP criteria while using AGM. Total success included both complete and qualified success. Failure was characterized by an inability to fulfill IOP criteria, loss of light perception, device explantation, or the need for additional glaucoma surgery (such as a second glaucoma drainage device, transscleral diode laser, or endoscopic diode laser) to reduce IOP.

The surgical procedure, performed by a single surgeon, involved selecting the quadrant for implantation based on conjunctival condition (superotemporal, inferior temporal, inferior nasal, or superonasal quadrant)(Fig 1). A 3 to 5-hour conjunctival peritomy was conducted, followed by blunt dissection to free adhesions of conjunctiva and Tenon's capsule from the sclera in the chosen quadrant. The AADI wing was positioned beneath adjacent muscle bellies, and tube patency was verified before ligating the tube with 6-0 vicryl. The explant was secured to the sclera posterior to the limbus using two interrupted sutures of 9-0 nylon through fixation holes, with suture knots rotated into these holes to prevent conjunctival erosion. Additionally, a non-compressing 9-0 nylon suture was utilized to stabilize the tube to the sclera. The tube length was adjusted, and a beveled tip was created opening toward the cornea. A 23-gauge needle was then used to create a track behind the limbus for tube insertion either into the anterior chamber or behind the iris, covered with a partial-thickness scleral patch graft. Conjunctiva and Tenon's capsule were reapproximated to the limbus and closed with 8-0 vicryl. At the conclusion of the procedure, a subconjunctival injection of steroid (Dexamethasone 2mg) was administered.

Postoperative antibiotics were prescribed six times daily for four weeks, while topical corticosteroids were prescribed six to eight times daily for 6–8 weeks and tapered gradually. Topical cycloplegic eye drops were administered as required for 1-2 weeks. Antiglaucoma medications were continued based on postoperative IOP status. Follow-up visits were scheduled at 1 day, 7 days, 1 month, and 3 months postoperatively. Data collected for the various outcome measures were analyzed using SPSS version 22 to generate summary statistics (mean, median, range), percentages, and proportions for the listed outcome measures.

**Comment [k2]:** Kindly mention the test parameters.

### 3. RESULTS

The study involved 30 patients with refractory glaucoma. The mean age was 24.97 ( $\pm 16.5$ ) years, comprising 13 males (43.3%) and 17 females (56.7%). Approximately 23.3% of patients were illiterate, while the majority (33.3%) completed primary education. A smaller percentage completed graduation (3.3%) or post-graduation (10%). Regarding occupation, 36.7% were students, 26.7% housewives, 16.7% day laborers, 13.3% businessmen, and only 6.7% were in service. Most patients (76.7%) came from rural areas, while 23.3% came from urban areas. The demographic are shown in the table 1.

**Table 1: Demographic Data of the respondents**

| <b>Demographic Variables</b>                             | <b>Frequency (n)</b> | <b>Percent (%)</b> |
|----------------------------------------------------------|----------------------|--------------------|
| <b>Age group of the Respondents</b> Mean Age= 24.97±16.5 |                      |                    |
| 1 -16 Years                                              | 11                   | 36.7               |
| 17 - 40 Years                                            | 14                   | 46.7               |
| 41 - 60 Years                                            | 4                    | 13.3               |
| Above 60 Years                                           | 1                    | 3.3                |
| <b>Sex</b>                                               |                      |                    |
| Female                                                   | 13                   | 43.3               |
| Male                                                     | 17                   | 56.7               |
| <b>Level of Education</b>                                |                      |                    |
| Illiterate                                               | 7                    | 23.3               |
| Primary                                                  | 10                   | 33.3               |
| Secondary                                                | 6                    | 20.0               |
| Higher Secondary                                         | 3                    | 10.0               |
| Post-graduation                                          | 3                    | 10.0               |
| Graduation                                               | 1                    | 3.3                |
| <b>Occupation</b>                                        |                      |                    |
| Business                                                 | 4                    | 13.3               |
| Day labor                                                | 5                    | 16.7               |
| Housewife                                                | 8                    | 26.7               |
| Service                                                  | 2                    | 6.7                |
| Student                                                  | 11                   | 36.7               |
| <b>Location of Address</b>                               |                      |                    |
| Rural                                                    | 23                   | 76.7               |
| Urban                                                    | 7                    | 23.3               |

Etiologies of glaucoma varied, including different types and post-operative statuses (Table 2). Visual acuity remained stable in 33.3% of eyes, improved in 30% of eyes, and deteriorated in 36.7% of eyes following surgeries (Table 3).

**Table2: Etiology of glaucoma**

| <b>Etiology of glaucoma</b>                | <b>Frequency (n)</b> | <b>Percentage (%)</b> |
|--------------------------------------------|----------------------|-----------------------|
| Absolute Glaucoma + Post DLCP              | 1                    | 3.3                   |
| Post Trabeculectomy+ IOID                  | 2                    | 6.7                   |
| Congenital Glaucoma + Post Trabeculectomy  | 1                    | 3.3                   |
| Post Trauma + RD Surgery                   | 1                    | 3.3                   |
| ICE Syndrome +Post Trabeculectomy          | 1                    | 3.3                   |
| ICE Syndrome                               | 4                    | 13.3                  |
| PACG + NVG                                 | 1                    | 3.3                   |
| Lasered PDR + NVG                          | 2                    | 6.7                   |
| POAG + Post Trabeculectomy+ Pseudophakia   | 1                    | 3.3                   |
| Pseudophakia + Secondary Glaucoma          | 3                    | 10                    |
| Pseudophakia + Post RD Surgery             | 1                    | 3.3                   |
| ROP + Post PPV                             | 1                    | 3.3                   |
| Post PPV+ Ciliary Staphyloma               | 1                    | 3.3                   |
| Post Repair Corneal Injury + RD+ Aphakia   | 1                    | 3.3                   |
| Post SFIOL                                 | 2                    | 6.7                   |
| Sturge-Weber syndrome                      | 3                    | 10                    |
| Viral Uveitis                              | 1                    | 3.3                   |
| VKH +Post Trabeculectomy with Pseudophakia | 1                    | 3.3                   |
| POAG+ Post Trabeculectomywith Ologen       | 1                    | 3.3                   |
| Post PPV with Trabeculectomy               | 1                    | 3.3                   |

[DLCP= Diode Laser Cyclophotocoagulation; IOID= Idiopathic Orbital Inflammatory Disease; ICE= Iridocorneal Endothelial Syndrome; PDR= Proliferative Diabetic Retinopathy; PACG= Primary Angle Closure Glaucoma; POAG= Primary Open Angle Glaucoma; NVG= Neovascular glaucoma; RD= Retinal Detachment; PPV= Pars plana vitrectomy; SFIOL= Scleral Fixation Intraocular Lens; VKH= Vogt-Koyanagi-Harada disease]

**Table 3: Status of Visual Acuity following after Surgeries**

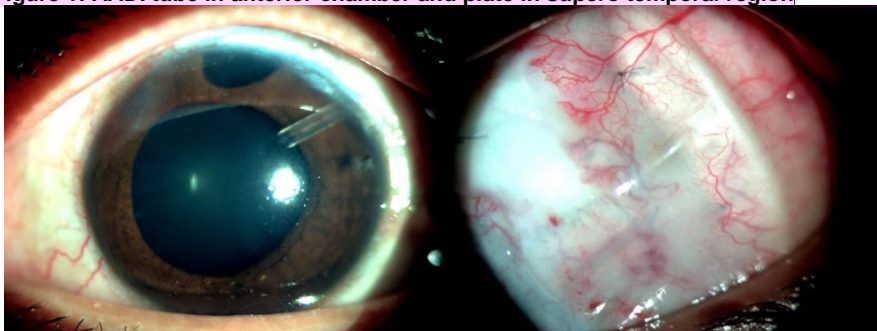
| Visual Acuity Status | Frequency | Percent |
|----------------------|-----------|---------|
| Deteriorated         | 11        | 36.7    |
| Improved             | 9         | 30.0    |
| Stable               | 10        | 33.3    |
| Total                | 30        | 100.0   |

Preoperative mean IOP was 31.67 ( $\pm 9.8$ ) mmHg, decreased to 12.7 ( $\pm 4.0$ ) mmHg at 3 months follow-up. Preoperative LogMAR visual acuity was 1.42 ( $\pm 0.72$ ), and at 3 months follow-up, it was 1.37 ( $\pm 0.75$ ). The number of preoperative antiglaucoma medications reduced from 3.17 ( $\pm 0.59$ ) to 0.17 ( $\pm 0.53$ ) at 3 months postoperatively (Table 4). Complications included hyphaema (3.3%), choroidal detachment (3.3%) and choroidal and retinal detachment (6.6%) (Fig 2).

**Table 4: Preoperative and 3 Months follow up**

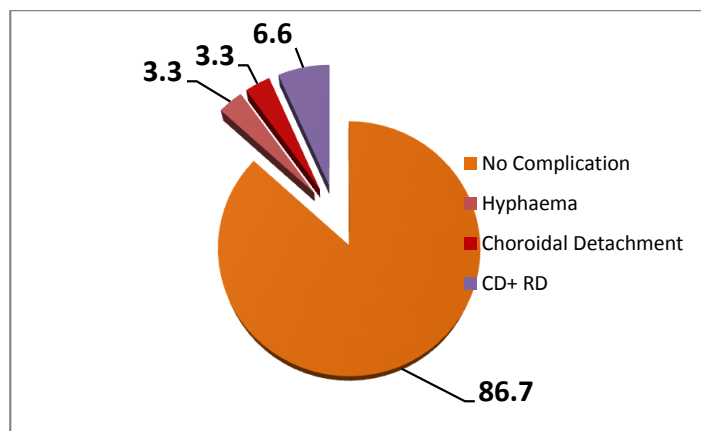
| Parameters           | Preoperative (n=30) | 3 Months follow up (n=30) | P value |
|----------------------|---------------------|---------------------------|---------|
| IOP                  | 31.67 ( $\pm 9.8$ ) | 12.7 ( $\pm 4.0$ )        | <0.001  |
| LogMAR Visual Acuity | 1.42 ( $\pm 0.72$ ) | 1.37 ( $\pm 0.75$ )       | 0.627   |
| AGM                  | 3.17 ( $\pm 0.59$ ) | 0.17 ( $\pm 0.53$ )       | <0.001  |

**Figure 1: AADI tube in anterior chamber and plate in supero temporal region**



**Comment [k3]:** Figure outline should mention below the figures.

Figure 2: Complication Status of the respondents



## DISCUSSION

Glaucoma drainage devices are widely used in treating refractive glaucoma, often serving as primary glaucoma procedures [15]. The Aurolab Aqueous Drainage Implant (AADI) is a recently introduced, affordable GDD inspired by the non-valved Baerveldt Glaucoma Implant (BGI) [16]. AADI, a valveless drainage device without a flow restrictor [17, 18], requires intraoperative tube ligation to prevent postoperative hypotony. This results in persistent high IOP postoperatively until the ligation suture dissolves or is removed. Once patent, non-valved implants achieve substantial IOP reduction owing to their large filtration surface area [19]. However, hypotony and its complications are more common without flow restriction using a suture ligature [6, 20-21]. This suture typically dissolves 5–6 weeks postoperatively.

This prospective longitudinal study, conducted at a tertiary eye hospital in Bangladesh, evaluated 30 patients with refractory glaucoma treated with the Aurolab Aqueous Drainage Implant. Surgeries were performed by a single surgeon using consistent techniques in the glaucoma department. In our study, the mean age was 24.97 ( $\pm 16.5$ ) years, with the majority being female at 56.7%, and male patients were 13 (43.3%). The preoperative mean IOP was 31.67 ( $\pm 9.8$ ) mmHg, which decreased to 12.7 ( $\pm 4.0$ ) mmHg at the 3-month follow-up. The number of preoperative antiglaucoma medications decreased from 3.17 ( $\pm 0.59$ ) to 0.17 ( $\pm 0.53$ ) at the final follow-up. Our study's results differ from others. For instance, George V. Puthuran, Paul Palmberg found different mean preoperative IOP and medication usage [21]. Another study by Sushmita Kaushik, Pankaj Kataria reported different IOP reductions at various postoperative intervals [11].

At the last follow-up, none of the patients required oral acetazolamide for IOP control. The preoperative LogMAR visual acuity was 1.42 ( $\pm 0.72$ ), and at 3 months follow-up, it became 1.37 ( $\pm 0.75$ ). Visual acuity remained stable in 10 (33.3%) eyes, improved in 9 (30%) eyes, and deteriorated in 11 (36.7%) eyes. The most common causes for vision loss were glaucoma, followed by corneal edema or cataract. Our study differs from another study by Vanita Pathak Ray, Divya P Rao, where median LogMAR BCVA did not change pre- and

postoperatively [23]. Approximately 70% of eyes in their study showed stable or improved VA. In a study by Sirisha Senthil, VA outcomes varied [24].

Complete success was 90%, and qualified success was 96.6%. Our study's results differ from other studies, such as Vanita Pathak Ray and Divya P Rao, who found overall success to be 87.5% [23]. Another study by Sushmita Kaushik, Pankaj Kataria reported different probabilities of success at various intervals [11].

Complications occurred in 4 patients after AADI implantation. Choroidal detachment (3.3%) due to hypotony occurred in the early postoperative period. Hyphema occurred in 1 (3.3%) patient, and choroidal detachment with retinal detachment occurred in 2 (6.6%). In our study, no eyes developed other serious sight-threatening complications like endophthalmitis or aqueous misdirection. A study by Paul Palmberg, George V. Puthuran reported various complications during their study period [22].

However, this study has limitations, including its small sample size and relatively shorter follow-up period. Prospective, randomized trials with longer follow-up periods are necessary to validate this technique. Despite these limitations, the surgical outcomes of this study show that the valveless AuroLab Aqueous Drainage Implant is effective in lowering IOP from baseline.

## CONCLUSION

Our findings suggest that the utilization of a non-valved, affordable glaucoma drainage device demonstrates effectiveness in managing intraocular pressure among patients with refractory glaucoma. This cost-efficient solution presents promising potential for addressing the needs of individuals afflicted with this condition. The observed control of intraocular pressure signifies the device's efficacy in providing a viable alternative for patients seeking treatment for refractory glaucoma. However, to comprehensively assess its long-term viability and durability, further extensive follow-up studies are recommended. These subsequent evaluations would serve to elucidate the device's failure rate over extended periods, providing essential insights into its sustained efficacy and reliability as a treatment option for refractory glaucoma.

## ETHICAL APPROVAL

The study was approved by the institutional review board of Ispahani Islamia Eye Institute and Hospital, Dhaka, Bangladesh and has therefore been performed in accordance with the ethical standards laid down in the 1964 declaration of Helsinki.

**Comment [k4]:** Kindly mention the ethical approval reference numbers & also mention the patient's consent details

**Comment [k5]:** Should mention the source of funding (if applicable) & conflict of interest (if any)

## REFERENCES

1. Pathak Ray V, Rao DP. Surgical Outcomes of a New Low-Cost Non-valved Glaucoma Drainage Device in Refractory Glaucoma: Results at 1 Year. J Glaucoma. 2018 May;27(5):433-439. doi: 10.1097/IJG.0000000000000930. PMID: 29505439.

**Comment [k6]:** Should follow the standard criteria only for the all references. E.g. Vancouver or APA, check once and correct accordingly.

2. Ramulu PY, Corcoran KJ, Corcoran SL, Robin AL. Utilization of various glaucoma surgeries and procedures in Medicare beneficiaries from 1995 to 2004. *Ophthalmology*. 2007 Dec;114(12):2265-70. doi: 10.1016/j.ophtha.2007.02.005. Epub 2007 Apr 27. PMID: 17466376.
3. Chakravarti T. The Association of Socioeconomic Status with Severity of Glaucoma and the Impacts of Both Factors on the Costs of Glaucoma Medications: A Cross-Sectional Study in West Bengal, India. *J OculPharmacolTher*. 2018 Jul/Aug;34(6):442-451. doi: 10.1089/jop.2017.0135. Epub 2018 May 15. PMID: 29762073.
4. Rathi SG, Seth NG, Kaur S, Thattaruthody F, Kaushik S, Raj S, Pandav SS, Ram J. A prospective randomized controlled study of Aurolab aqueous drainage implant versus Ahmed glaucoma valve in refractory glaucoma: A pilot study. *Indian J Ophthalmol*. 2018 Nov;66(11):1580-1585. doi: 10.4103/ijo.IJO\_427\_18. PMID: 30355865; PMCID: PMC6213703.
5. Christakis PG, Zhang D, Budenz DL, Barton K, Tsai JC, Ahmed IIK; ABC-AVB Study Groups. Five-Year Pooled Data Analysis of the Ahmed Baerveldt Comparison Study and the Ahmed Versus Baerveldt Study. *Am J Ophthalmol*. 2017 Apr;176:118-126. doi: 10.1016/j.ajo.2017.01.003.
6. Christakis PG, Kalenak JW, Tsai JC, Zurakowski D, Kammer JA, Harasymowycz PJ, Mura JJ, Cantor LB, Ahmed II. The Ahmed Versus Baerveldt Study: Five-Year Treatment Outcomes. *Ophthalmology*. 2016 Oct;123(10):2093-102. doi: 10.1016/j.ophtha.2016.06.035.
7. Budenz DL, Barton K, Gedde SJ, Feuer WJ, Schiffman J, Costa VP, Godfrey DG, Buys YM; Ahmed Baerveldt Comparison Study Group. Five-year treatment outcomes in the Ahmed Baerveldt comparison study. *Ophthalmology*. 2015 Feb;122(2):308-16. doi: 10.1016/j.ophtha.2014.08.043. Epub 2014 Oct 17. PMID: 25439606; PMCID: PMC4306613.
8. Pathak Ray V, Rao DP. Surgical outcomes of a new affordable non-valved glaucoma drainage device and Ahmed glaucoma valve: comparison in the first year. *Br J Ophthalmol*. 2018 Jun 26;bjophthalmol-2017-311716. doi: 10.1136/bjophthalmol-2017-311716.
9. Ayyala RS, Zurakowski D, Smith JA, Monshizadeh R, Netland PA, Richards DW, Layden WE. A clinical study of the Ahmed glaucoma valve implant in advanced glaucoma. *Ophthalmology*. 1998 Oct;105(10):1968-76. doi: 10.1016/S0161-6420(98)91049-1. PMID: 9787371.
10. Rao DP, Pathak-Ray V. Combined cataract extraction with a new nonvalved glaucoma drainage device in adult eyes with cataract and refractory glaucoma. *Indian J Ophthalmol*. 2018 Sep;66(9):1278-1283. doi: 10.4103/ijo.IJO\_195\_18. PMID: 30127140; PMCID: PMC6113813.

**Comment [k7]:** Kindly follow the punctuation

11. Kaushik S, Kataria P, Raj S, Pandav SS, Ram J. Safety and efficacy of a low-cost glaucoma drainage device for refractory childhood glaucoma. *Br J Ophthalmol*. 2017 Dec;101(12):1623-1627. doi: 10.1136/bjophthalmol-2017-310276.
12. Ray VP, Rao DP. Surgical Outcomes of a New Low-Cost Nonvalved Glaucoma Drainage Device in Refractory Glaucoma: Results at 1 Year. *J Glaucoma* 2018;27:433-9.
13. Panos G, Christakis, David Zurakowski, James C. Tsai, Jeffrey W. Kalenak, Jeffrey A. Kammer, Louis B. Cantor, Paul J. Harasymowycz, Ike K. Ahmed; The Ahmed Versus Baerveldt (AVB) Study: 2 Year Results. *Invest. Ophthalmol. Vis. Sci*. 2011;52(14):2626.
14. Schwartz AL, Anderson DR. Trabecular surgery. *Arch Ophthalmol*. 1974 Aug;92(2):134-8. doi: 10.1001/archophth.1974.01010010140012. PMID: 4847504.
15. Molteno AC. New implant for drainage in glaucoma. *Clinical trial*. *Br J Ophthalmol*. 1969 Sep;53(9):606-15. doi: 10.1136/bjo.53.9.606. PMID: 4900144; PMCID: PMC1207524.
16. Sisodia VPS, Krishnamurthy R. Aurolab Aqueous Drainage Implant (AADI): Review of Indications, Mechanism, Surgical Technique, Outcomes, Impact and Limitations. *Semin Ophthalmol*. 2022 Oct-Nov;37(7-8):856-868. doi: 10.1080/08820538.2022.2082254. Epub 2022 Jun 3. PMID: 35656796.
17. Philip R, Chandran P, Aboobacker N, Dhavalikar M, Raman GV. Intermediate-term outcome of Aurolab aqueous drainage implant. *Indian J Ophthalmol*. 2019 Feb;67(2):233-238. doi: 10.4103/ijo.IJO\_675\_18. PMID: 30672476; PMCID: PMC6376828.
18. Britt MT, LaBree LD, Lloyd MA, Minckler DS, Heuer DK, Baerveldt G, Varma R. Randomized clinical trial of the 350-mm<sup>2</sup> versus the 500-mm<sup>2</sup> Baerveldt implant: longer term results: is bigger better? *Ophthalmology*. 1999 Dec;106(12):2312-8. doi: 10.1016/S0161-6420(99)90532-8. PMID: 10599663.
19. Krishna R, Godfrey DG, Budenz DL, Escalona-Camaaño E, Gedde SJ, Greenfield DS, et al. Intermediate-term outcomes of 350-mm<sup>2</sup> Baerveldt glaucoma implants. *Ophthalmology* 2001;108:621-6.
20. Roy S, Ravinet E, Mermoud A. Baerveldt implant in refractory glaucoma: Long-term results and factors influencing outcome. *IntOphthalmol* 2001;24:93-100
21. Budenz DL, Barton K, Feuer WJ, Schiffman J, Costa VP, Godfrey DG, et al. Ahmed Baerveldt Comparison Study Group. Treatment outcomes in the Ahmed Baerveldt Comparison Study after 1 year of follow-up. *Ophthalmology* 2011;118:443-52.
22. Palmberg, Paul & Wijesinghe, Hiruni & Krishnadas, Subbaiah & Robin, Alan & Puthuran, George. (2019). Intermediate term outcomes of Aurolab Aqueous Drainage Implant in adults with Refractory Glaucoma. *Ophthalmology Glaucoma*. 2. 10.1016/j.ogla.2019.03.009

23. Ray VP, Rao DP. Two-Year Outcomes of the New Low-cost Nonvalved Aurolab Aqueous Drainage Implant in Refractory Glaucoma. *J Glaucoma*. 2020 Sep;29(9):767-772. doi: 10.1097/IJG.0000000000001532. PMID: 32366777.
24. Senthil S, Gollakota S, Ali MH, Turaga K, Badakere S, Krishnamurthy R, Garudadri CS. Comparison of the New Low-Cost Nonvalved Glaucoma Drainage Device with Ahmed Glaucoma Valve in Refractory Pediatric Glaucoma in Indian Eyes. *Ophthalmol Glaucoma*. 2018 Nov-Dec;1(3):167-174. doi: 10.1016/j.ogla.2018.07.001. Epub 2018 Aug 17. PMID: 32672650.

UNDER PEER REVIEW