# Comparison of the Ahmed Glaucoma Valve and Baerveldt Glaucoma Implant in Combined Cataract Extraction – 2 year results

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## INTRODUCTION:

- The Ahmed glaucoma valve (AGV) and the Baerveldt glaucoma implant (BGI) are commonly used glaucoma drainage devices
- Both devices shunt aqueous humour to a bleb overlying the implant end-plate
- The AGV contains a valve designed to limit flow at low pressures[1]
- The BGI requires placement of external ligation intraoperatively to prevent unpredictable early aqueous flow[2,3]
- The AVB[4] and ABC[5] studies have compared these devices as solo procedures and found that the BGI had lower failure rates and lower medication requirements at 3-years
- Cataract extraction with combined glaucoma procedures are becoming more popular as cataracts and glaucoma commonly co-exist[6]

## PURPOSE:

- To compare the surgical outcomes of combined phacoemulsification with either Ahmed Glaucoma Valve (AGV) or Baerveldt Glaucoma Implant (BGI)

## METHODS:

- Retrospective chart review of 104 eyes of 92 patients that underwent cataract extraction with combined AGV or BGI implantation

**Primary outcome measure**

- Failure, defined as any of the following:
  - IOP ≥ 18 mmHg, < 5 mmHg, or < 20% reduction from baseline at 2 consecutive visits on or after 3 months
  - Additional glaucoma procedures or removal of the implant
  - Progression to no light perception vision
  - Vision threatening complications
- Alternative upper-limits of 14 mmHg and 21 mmHg

**Secondary outcome measures**

- Intraocular pressure
- Glaucoma medication requirements
- Visual acuity
- Complications and interventions

## RESULTS:

| | Ahmed (n= 57) | Baerveldt (n= 47) | P-Value |
|---|---|---|---|
| **Mean Age (years) ± SD** | 68 ± 11 | 57 ± 15 | **0.03[a]** |
| **Women (%)** | 44% | 47% | 0.76[b] |
| **Race (%)** | | | **0.003[b]** |
| White | 40% | 34% | |
| Black | 12% | 34% | |
| South Asian | 26% | 9% | |
| East Asian | 9% | 0% | |
| Other/Unknown | 12% | 23% | |
| **Mean IOP (mmHg) ± SD** | 26.4 ± 8.3 | 25.7 ± 7.3 | 0.66[a] |
| **Mean glaucoma medications ± SD** | 3.8 ± 1.0 | 3.6 ± 1.5 | 0.54[a] |
| **Visual Acuity** | | | |
| Median (Snellen) | 20/200 | 20/60 | **0.001[c]** |
| Min-Max (Snellen) | 20/25 – LP | 20/20 – CF | |
| Mean logMAR (converted) ± SD | 1.0 ± 0.8 | 0.6 ± 0.5 | **0.001[a]** |
| **Visual Field** | | | |
| Mean Deviation ± SD | -17.2 ± 7.9 | -17.5 ± 8.6 | 0.86[a] |
| Pattern Standard Deviation ± SD | 7.3 ± 3.3 | 7.4 ± 3.1 | 0.91[a] |
| **Diagnosis (%)** | | | 0.18[b] |
| POAG | 28% | 36% | |
| CACG | 18% | 11% | |
| Uveitic Glaucoma | 11% | 17% | |
| Neovascular Glaucoma | 4% | 4% | |
| PXF Glaucoma | 7% | 2% | |
| Combined Mechanism | 28% | 15% | |
| Other | 5% | 15% | |
| **Previous laser therapy (%)** | 49% | 38% | 0.32[d] |
| **Previous glaucoma surgery (%)** | 23% | 43% | **0.04[d]** |

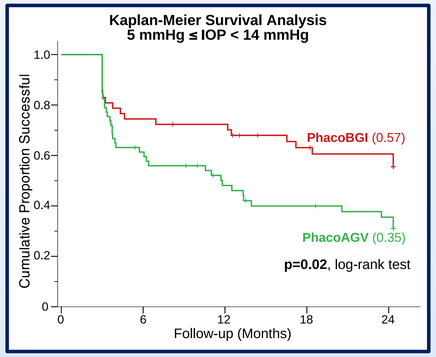
Previous glaucoma surgery includes trabeculectomy, tube shunt and minimally invasive glaucoma stent; a-Independent t test; b-Pearson chi-square; c-Mann-Whitney U test; d-Fisher's exact test

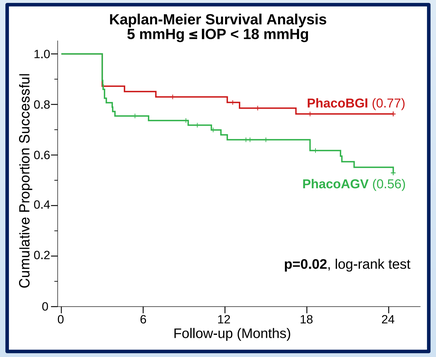
**Table 1.** Baseline demographic and ocular characteristics

| | Ahmed (n= 57) | Baerveldt (n= 47) | P-Value |
|---|---|---|---|
| **Complications** | | | |
| Hypotony | 25% | 30% | 0.66[a] |
| Cystoid Macular Edema | 4% | 11% | 0.24[a] |
| Choroidal/Hypotony Maculopathy | 2% | 9% | 0.17[a] |
| Persistent Corneal Edema/ Decompensation | 0% | 6% | 0.09[a] |
| Other[b] | 4% | 4% | 1.00[a] |
| Total | 32% | 43% | 0.31[a] |
| **Interventions** | | | |
| AC Paracentesis | 16% | 53% | **0.0001[a]** |
| Tube revision | 5% | 13% | 0.29[a] |
| Iridozonularhyaloidotomy | 4% | 4% | 1.00[a] |
| Vitrectomy | 2% | 4% | 0.59[a] |
| Keratectomy | 0% | 2% | 0.45[a] |
| Enucleation | 0% | 2% | 0.45[a] |
| Total | 21% | 60% | **0.0001[a]** |

Persistent corneal edema was defined as occurring on 2 consecutive visits at or after the 3-month follow-up visit; a-Fisher's exact test; b-Other includes corneal ulcer, hyphema and tube occlusion.

**Table 2.** Postoperative complications and interventions



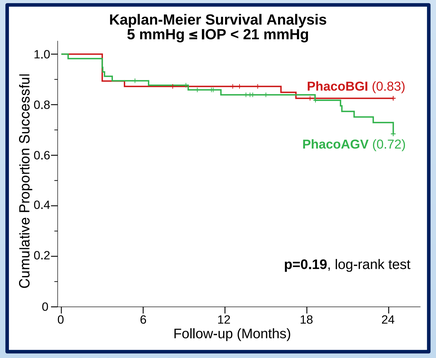




**Figure 1.** Kaplan-Meier survival analysis for our three IOP limits. The two-year cumulative proportion of success is recorded in parentheses. Censoring is denoted by hash marks.

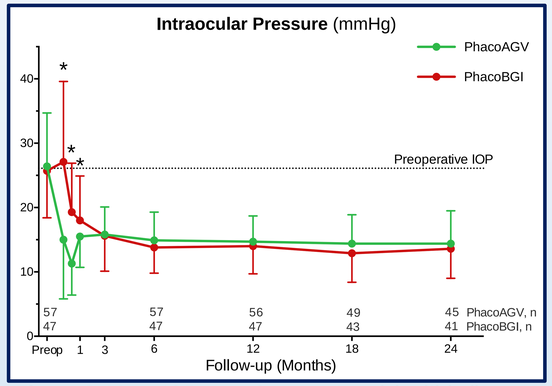



**Figure 2.** Mean IOP up to 2-years. Asterisks (*) indicate statistically significant differences.

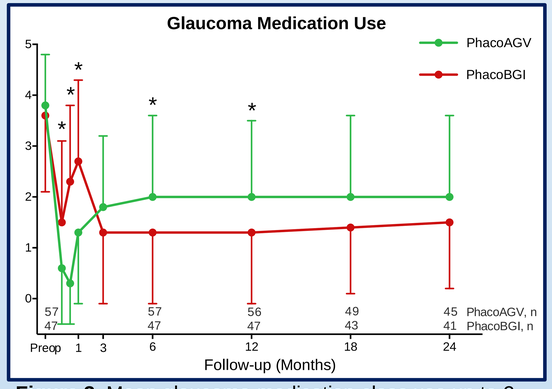



**Figure 3.** Mean glaucoma medication class use up to 2-years. Asterisks (*) indicate statistically significant differences.

| Measurement | Group | Change from baseline | P-Value |
|---|---|---|---|
| **IOP** | Ahmed | 45% decrease | **< 0.0005[a]** |
| | Baerveldt | 47% decrease | **< 0.0005[a]** |
| **Medication** | Ahmed | 47% decrease | **< 0.0005[a]** |
| | Baerveldt | 58% decrease | **< 0.0005[a]** |
| **Visual Acuity** | Ahmed | 20/200 to 20/50 | **0.02[b]** |
| | Baerveldt | 20/60 to 20/30 | **0.03[b]** |

a-Paired t test; b-Wilcoxon signed-rank test

**Table 3.** IOP, medication use and visual acuity change from baseline

## CONCLUSIONS:

- PhacoAGV had higher failure rates at 2 years for IOP limits of 18 mmHg and 14 mmHg (Figure 1)
- No difference in failure rates for an IOP limit of 21 mmHg (Figure 1)
- Both devices significantly reduced IOP and glaucoma medication requirements from baseline to 2 years. (Table 3)
- Both groups had similar IOP and medication use at 2-years (Figures 2 and 3) despite the BGI being implanted into higher risk for failure eyes (Table 1)
- PhacoAGV had lower IOP and medication requirements in the early post-operative period (<3 months) (Figures 2 and 3)
- Both groups had significant improvement in visual acuity, in keeping with cataract extraction (Table 3)
- Complication rates were similar (Table 2)
- PhacoBGI required more interventions, however these were primarily anterior chamber paracenteses that occurred in the early postoperative period prior to the ligating suture dissolving (Table 2)

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