

A Comparison of the Effectiveness Between Trabeculectomy and Minimally Invasive Glaucoma Surgeries

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Background and Hypothesis: Glaucoma affects 3 million Americans and is the second most common cause of blindness globally, after cataracts. It involves the degeneration of the optic nerve, often associated with increased eye pressure, leading to vision loss. Trabeculectomy was traditionally the standard surgical approach for managing glaucoma progression once medication and laser had failed. Recently, minimally invasive glaucoma surgeries (MIGS) have gained FDA approval for mild and moderate cases and are being implemented in practice. We hypothesize that MIGS procedures are just as effective as trabeculectomy in mild, moderate, and severe cases of glaucoma.

Experimental Design or Project Methods: Using data from IU Health, patients that underwent either a MIGS procedure or a trabeculectomy for open-angle glaucoma at least a year ago were identified. Visual field data was used to stage their glaucoma. Any future glaucoma surgery was noted. Using this information, three separate Kaplan-Meier curves at 95% confidence intervals were created corresponding to each stage of glaucoma with a second surgery defined as a failure and a survival analysis was done to visualize the difference between these surgical approaches.

Results: The sample included 119 patients and 179 eyes with a mean age of 80 and 57% females. The study had 80% power at a two-sided 5% significance level. Based on the survival analysis, there were no significant differences between trabeculectomy and MIGS in mild and moderate glaucoma ($p=0.69$ and 0.97 respectively). In severe glaucoma, MIGS had a lower failure rate compared to trabeculectomy ($p=0.026$).

Conclusion and Potential Impact: The research comparing trabeculectomy to MIGS is still relatively new and this study shows the safety and efficacy of MIGS procedures. If confirmed, this study could potentially change the standard of care to MIGS for all stages of open-angle glaucoma.