

# Incidence, Risk Factors, and Outcomes of Hypotony Following Preserflo MicroShunt Surgery

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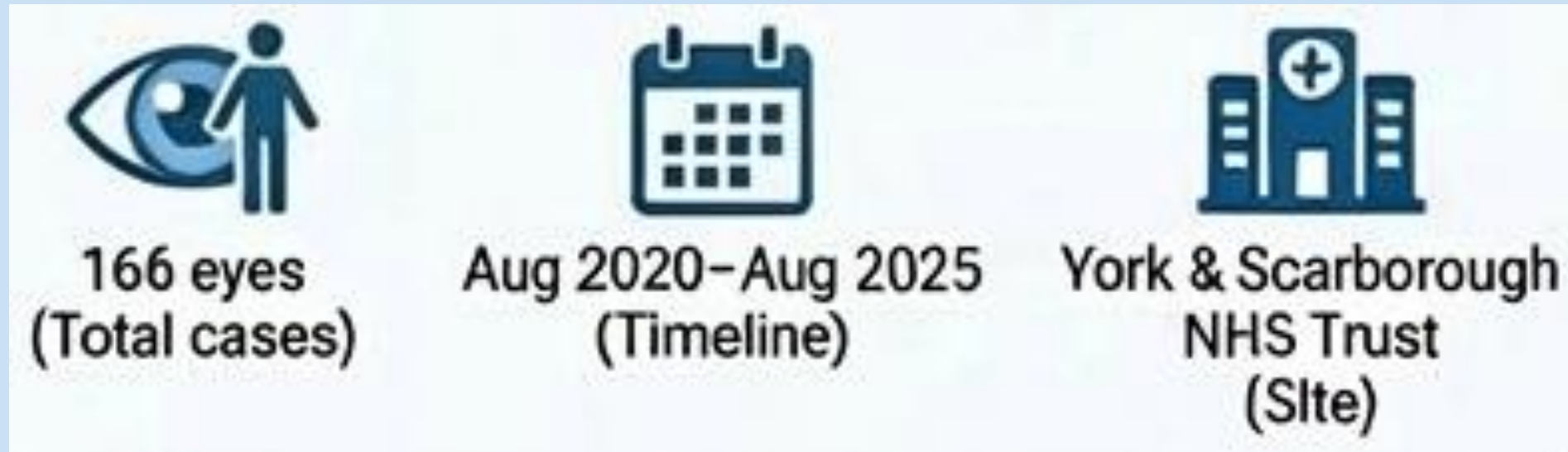
## Purpose

The purpose of this study was to:

- Determine the incidence of postoperative hypotony defined as an IOP 6mmHg or less with Goldmann applanation tonometry following Preserflo MicroShunt implantation
- To identify risk factors associated with hypotony
- To evaluate the clinical prognosis for patients experiencing hypotony post Presserflo MicroShunt implantation.

## Methods

This retrospective, real-world observational study included all patients who underwent Preserflo MicroShunt implantation with adjunctive Mitomycin-C. All procedures were performed using a standardized surgical technique by two glaucoma fellowship–trained consultant ophthalmologists (DB, PA).



## Analysis Method

The Intraclass correlation coefficient was calculated using a two-way mixed effects with absolute agreement. The ICC value was 0.11 (confidence intervals: -0.334–0.537). Thus indicating poor reliability.

Accordingly, we employed a linear mixed model using patient ID as a random effect. Hypotony was the dependent variable, with eye [right or left], glaucoma diagnosis, Surgeon [one, two], pre-op IOP, Highest IOP, age and sex [male or female], Lens Status [phakic/ pseudophakic], Central Corneal Thickness, Pre op Visual Field MD, Number of glaucoma medication, taking of acetazolamide [yes, no] as fixed effects.

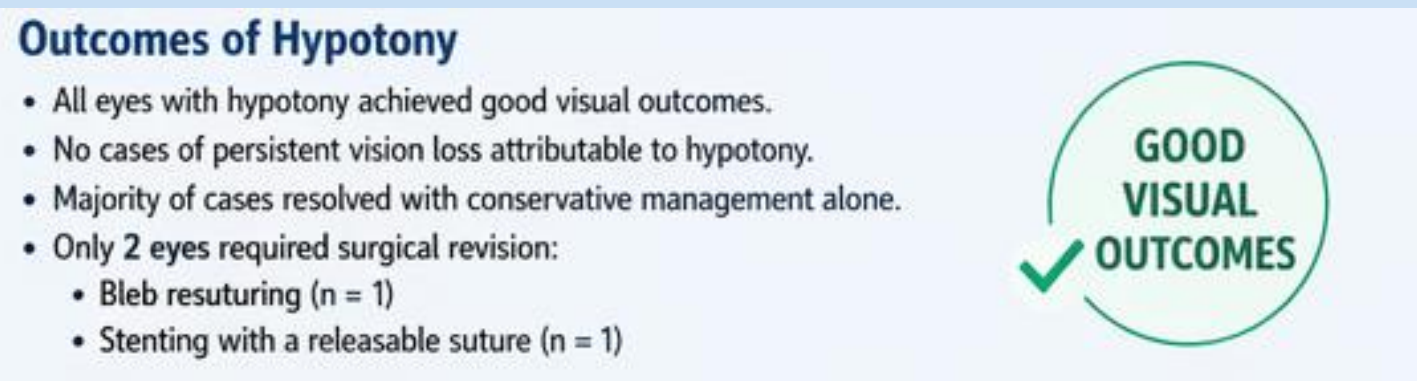
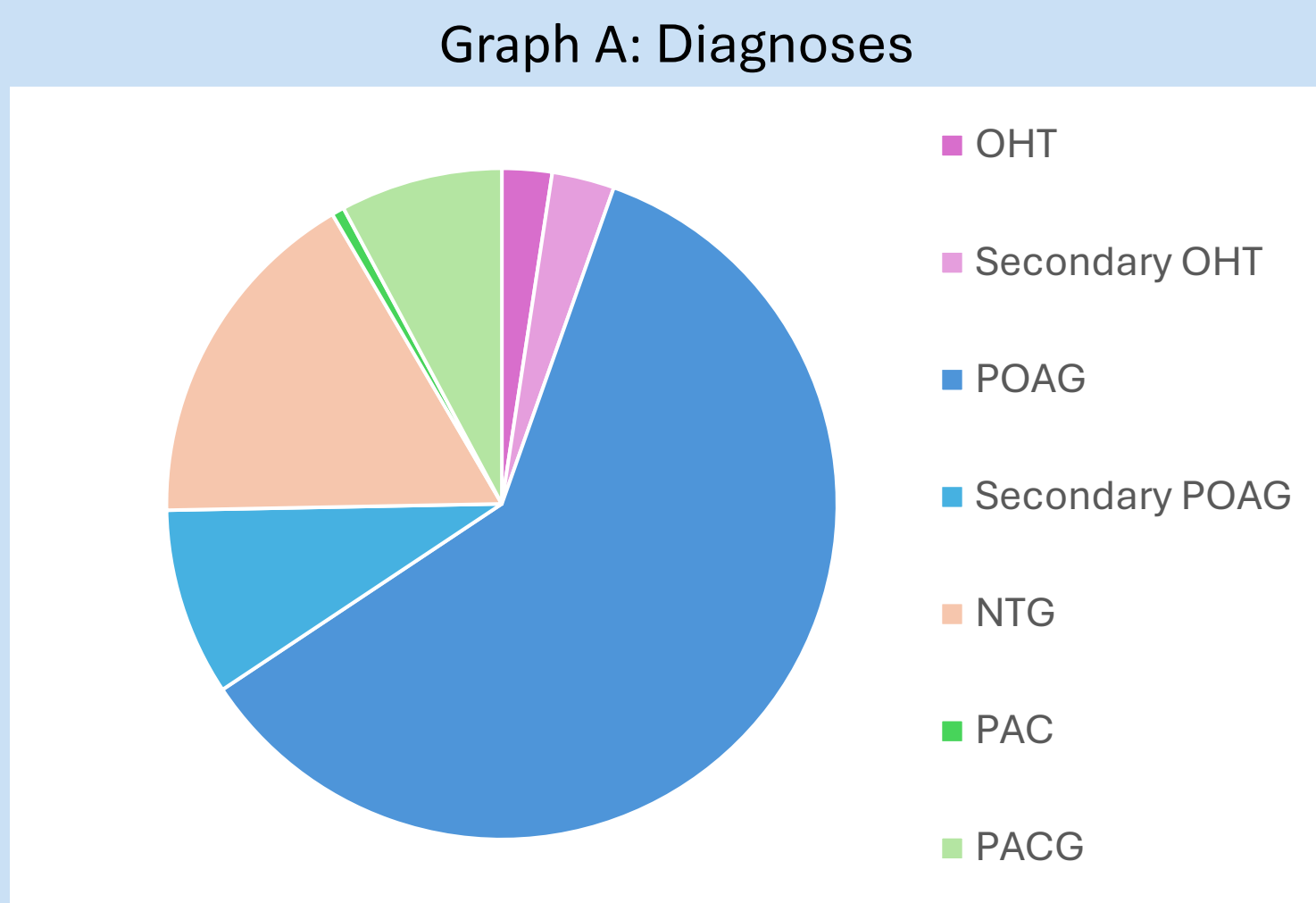
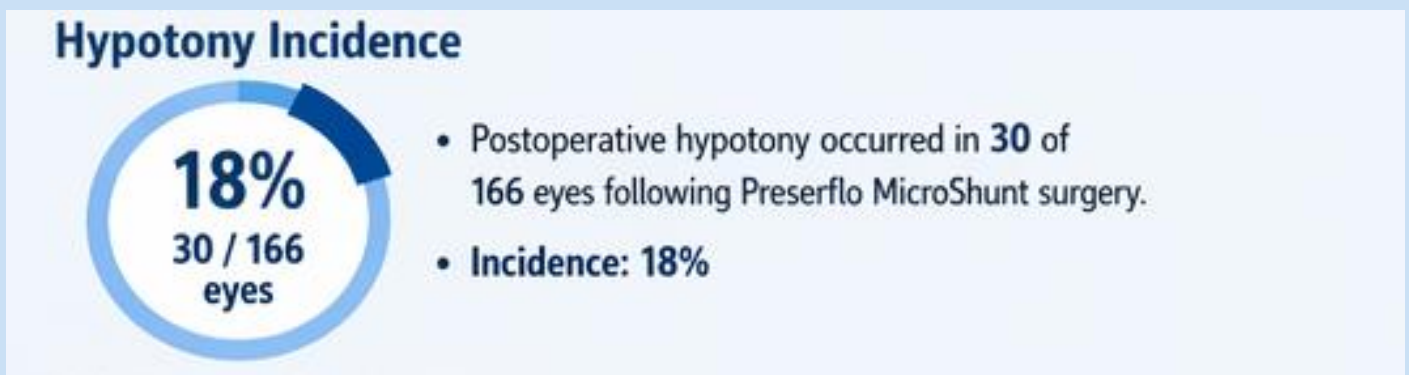
| Diagnosis                             | Count |
|---------------------------------------|-------|
| Normal Tension Glaucoma               | 28    |
| Ocular Hypertension                   | 4     |
| Primary Angle Closure                 | 2     |
| Primary Angle Closure Glaucoma        | 11    |
| Pigmentary Glaucoma                   | 3     |
| Pigmentary Ocular Hypertension        | 1     |
| Plateau Iris                          | 2     |
| Primary Open Angle Glaucoma           | 97    |
| Pseudoexfoliation Glaucoma            | 5     |
| Secondary Glaucoma (Other)            | 11    |
| Secondary Ocular Hypertension (Other) | 2     |
| Total                                 | 166   |

| Baseline Patient Characteristics  | Mean ± Standard Deviation |
|-----------------------------------|---------------------------|
| Age                               | 72.5 ± 11.8 years         |
| Intraocular Pressure (Pre-op)     | 22.5 ± 8.8 mmHg           |
| Intraocular Pressure (Peak)       | 30.5 ± 10.2 mmHg          |
| Intraocular Pressure (Post-op)    | 8.4 ± 4.7 mmHg            |
| Central Corneal Thickness         | 534.1 ± 37.2 µm           |
| Pre Operative Glaucoma Medication | 2.8 ± 1.2                 |
| Pre Operative Mean Deviation      | -11.0 ± 6.6 dB            |
| Axial length                      | 24.2 ± 1.7 mm             |

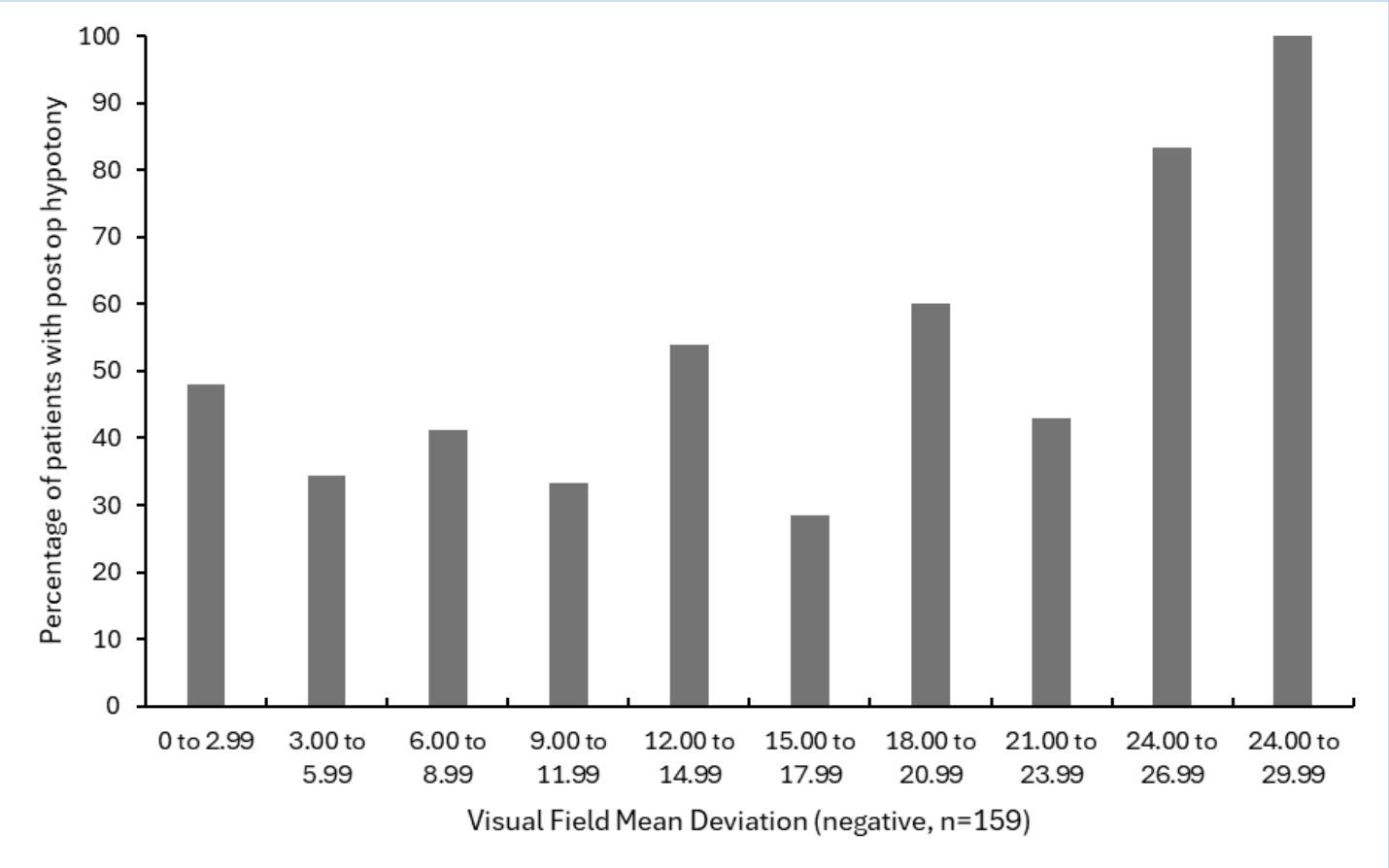
## Results

There was a significant main effect of Age (p = .019) and Visual Field Mean Deviation (p < .001).

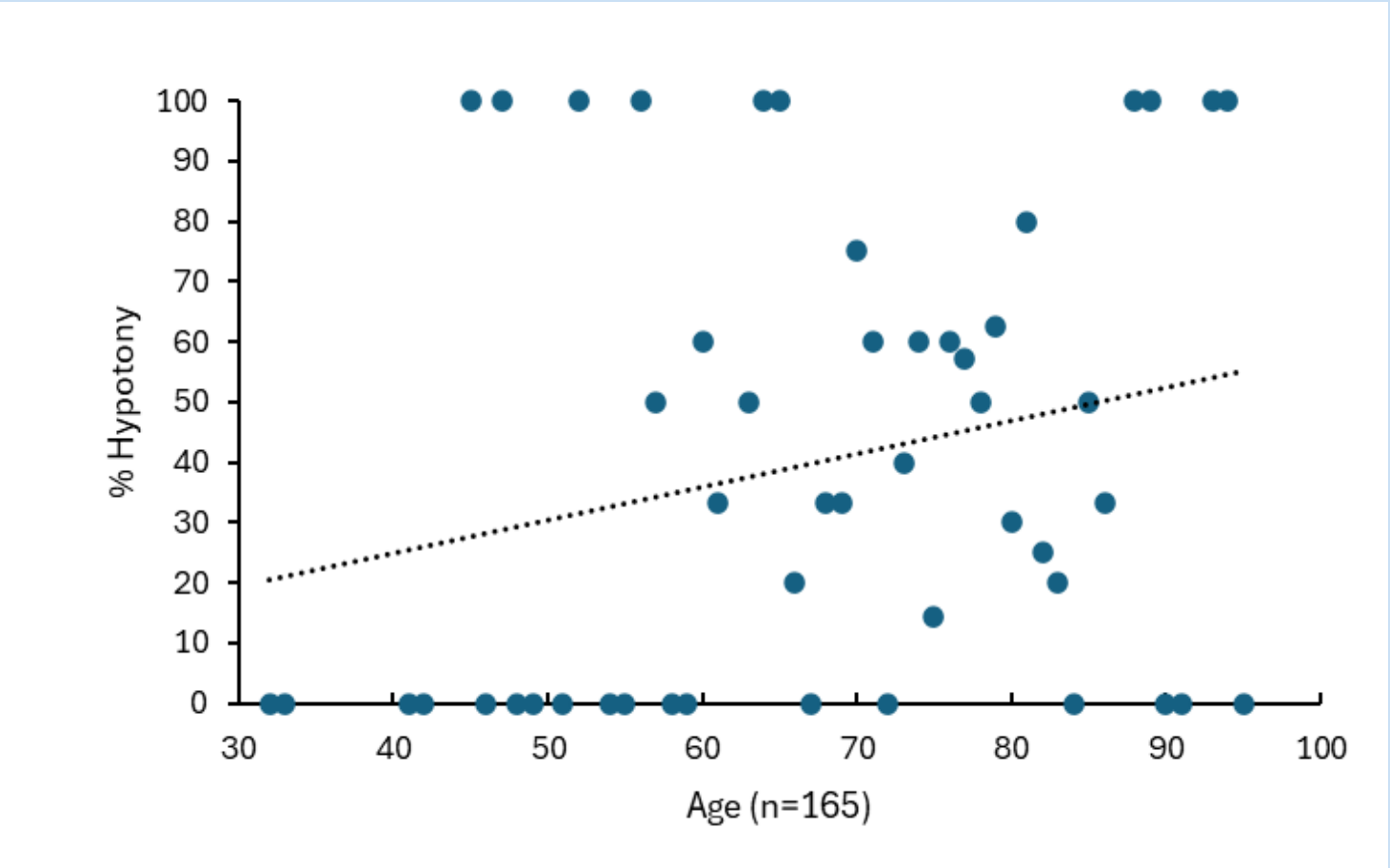
| Risk Factors for Hypotony                                                                                                |                                             |         |                         |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------|-------------------------|
| Risk Factor                                                                                                              | Effect on Hypotony Risk (Per Unit Increase) | p-value | 95% Confidence Interval |
|  Increasing Age                       | +1.1% per year                              | 0.02    | 0.2% – 2.0%             |
|  More Advanced VF Loss (Worsening MD) | +1.7% per 1 dB decrease                     | < 0.001 | 0.8% – 2.7%             |
| No other collected variables showed a statistically significant association with hypotony.                               |                                             |         |                         |



Graph B: Age Vs percentage hypotony



Graph C: Visual field vs hypotony



## Conclusion

- Hypotony occurred in nearly one-fifth of Preserflo MicroShunt procedures; however, most cases were self-limiting and did not result in adverse visual outcomes.
- Increasing age and more advanced visual field loss were significant predictors of postoperative hypotony.
- These findings, that require further larger sample size validation, may assist in preoperative risk stratification and patient counseling.

## Discussion

- Consistent with reported real-world rates for hypotony in patients having undergone Presserflo MicroShunt implantation, hypotony occurred in 18% of cases.<sup>1</sup>
- In line with previous research, increasing age and more advanced visual field loss were significant risk factors for hypotony<sup>1,2</sup>, suggesting that both ocular biomechanics and disease severity influence postoperative aqueous dynamics.
- Most cases were not clinically significant, transient and resolved with conservative management, supporting the overall favorable safety profile of the device. However, this incidence highlights the importance of careful preoperative risk stratification and intraoperative strategies (intraluminal stenting)<sup>3</sup> to minimise hypotony in higher-risk patients.

## References:

- Mieno H, Mori K, Yoshii K, Okada Y, Ikeda Y, Ueno M, Sotozono C. Risk factors and protective strategies for hypotony following Preserflo MicroShunt implantation. *Sci Rep.* 2025;15:8344.
- Nasyrov, E., Kommerell, I., Schleicher, I., Merle, D.A., Wenzel, C.J. and Bogomil Voykov (2025). Incidence, risk factors, and outcomes of numerical hypotony and choroidal effusion following PRESERFLO MicroShunt implantation. *Acta Ophthalmologica*. doi:https://doi.org/10.1111/aos.70018.
- Verma-Fuehring, R., Dakroub, M., Bamousa, A., Kann, G., Hillenkamp, J. and Kampik, D. (2024). The use of intraluminal PRESERFLO stenting in avoiding early postoperative hypotony. *Graefe's archive for clinical and experimental ophthalmology = Albrecht von Graefes Archiv fur klinische und experimentelle Ophthalmologie*, [online] 262(12), pp.3925–3932. doi:https://doi.org/10.1007/s00417-024-06567-x.



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