

Can Glaucoma Surgery be Controllable?

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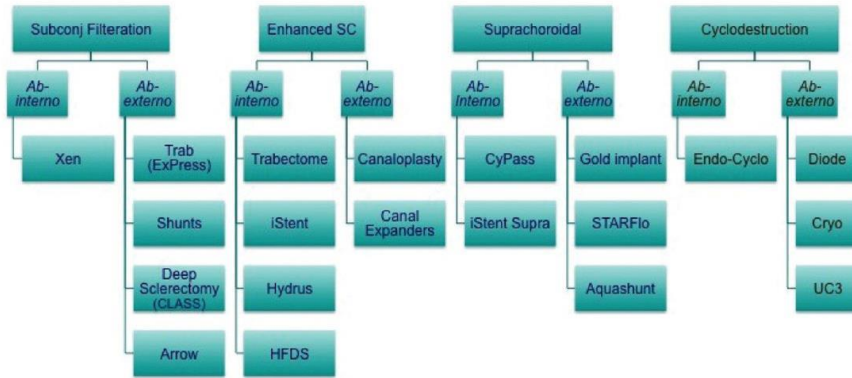


How about a controllable surgery is ?

- Individual preoperative design
- Biological markers or clear instructions for operating
- Accurate surgical operation
- orderly Postoperative maintenance
- Predictable good results

With the development of glaucoma surgery, the expectation of surgical efficacy improved, the controllability and predictability of glaucoma surgery are reemphasized.

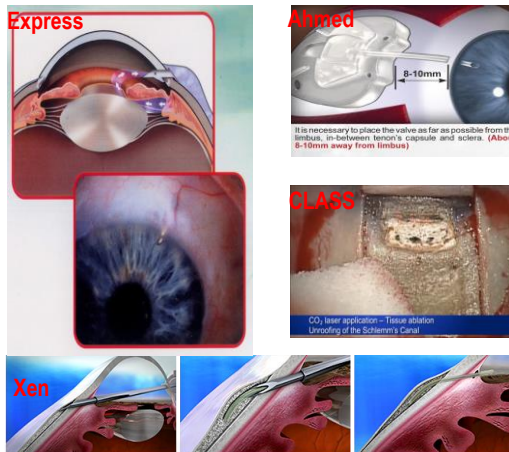
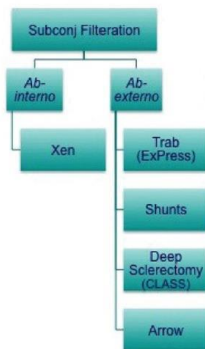
Are glaucoma surgeries controllable now



4 types of glaucoma surgery: subconjunctival filtration, enhanced SC, suprachoroidal surgery and cyclodestruction surgery.



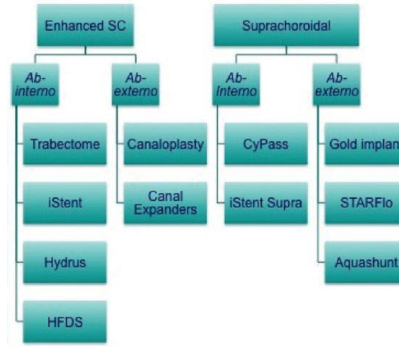
Subconjunctival filtration



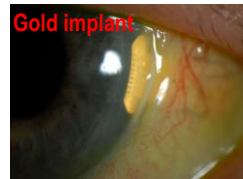
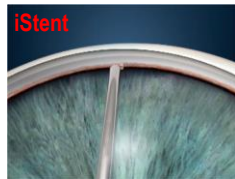
Aqueous humor outflows through the fistula to subconjunctival space (bleb)



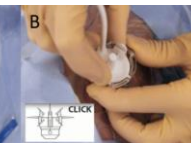
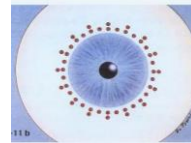
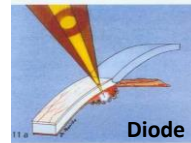
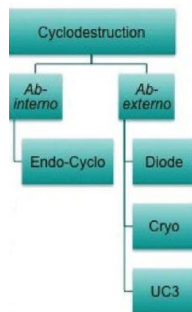
Enhanced SC and Suprachoroidal surgery



Improve outflow of aqueous humor through SC or suprachoroidal space



Cyclodestruction surgery



Destroy the ciliary body to reduce the secretion of aqueous humor. Used in late stage of glaucoma

Limitations of current glaucoma surgery

- **Focus on the normal structure of aqueous humor circulation pathway, not the lesion.**
- **Destroy the structure without reconstruction**
- **Lack of individual design and quantitative operation based on the targeted IOP**
- **Lack of clear instructions or biomarkers for Maintaining the reconstructed drainage postoperatively**
- **The surgical procedure is uncontrollable and the effect is unpredictable**



Is a controllable glaucoma surgery available?

Trabeculectomy may be the first candidate

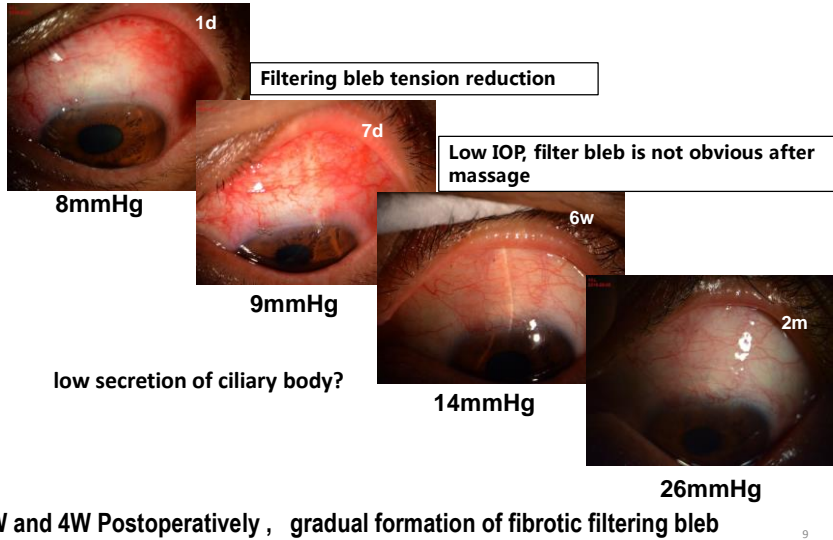
- **effective and safe**
- **easy to perform and cost-effective**
- **lots of ways to manage the complications**
- **suitable for almost all patients and doctors**

Unable to design individually, but possible to keep the early postoperative IOP at a high level and maintain the drainage orderly

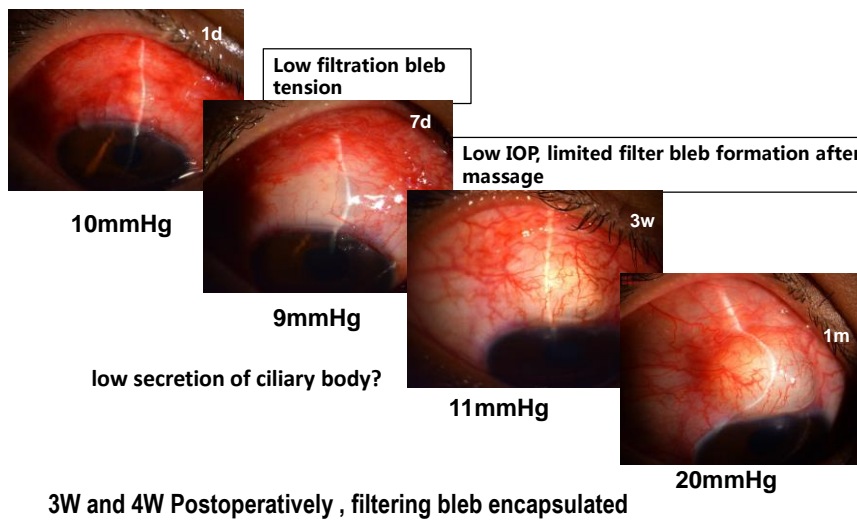
Then the surgery seems to be controllable.



Formation of fibrotic filtering blebs (over-filtration)



Formation of encapsulated filtering blebs (over-filtration)



Modified trabeculectomy to be controllable ?

1.Surgical design (watertight suture and aqueous humor release orderly)

Scleral flap making

Suture arrangement: key suture(in situ), releaseble suture

2.Filter bleb maintenance

Eye massage, the time of suture removal

3.Prevention and treatment of complications

To avoid ultrafiltration and use anti-scarring drugs

Design of scleral flap

- Shape: trapezoidal, rectangular, triangular, circular
- Size: $4 \times 3 \text{mm}^2$ (Scleral flap),
 $1 \sim 1.5 \times 1 \text{mm}^2$ (Trabeculectomy)
- Thickness: $1/2 \sim 2/3$ sclera, related to target IOP (thin-low)
avoid over-filtration (too thin) or self-closing (too thick)
- Scleral bed: even, smooth, hemostasis thoroughly but not excessively



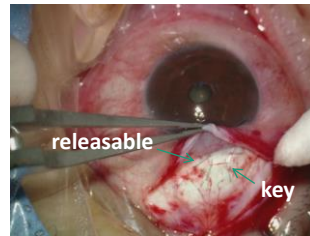
Sccleral flap suturing

- **Arrange the key sutures in situ**

Keep anterior chamber formation in normal tension by the peripheral corneal puncture, alternatively adjust the two sutures to make sure the aqueous humor leaking slowly with a dry cotton swab

Avoid shallow anterior chamber formation

- **Watertight closing**
with two releasable sutures



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Orderly maintaining the filtering drainage

- **Filtering bleb massage**

Insufficient filtration (high pressure, low pressure)

position: superior, the pressure increases gradually

- **Releasable sutures remove**

Observe the state of the filtered bleb(avoiding ultrafiltration)

limitation of the filtered bleb(2W):

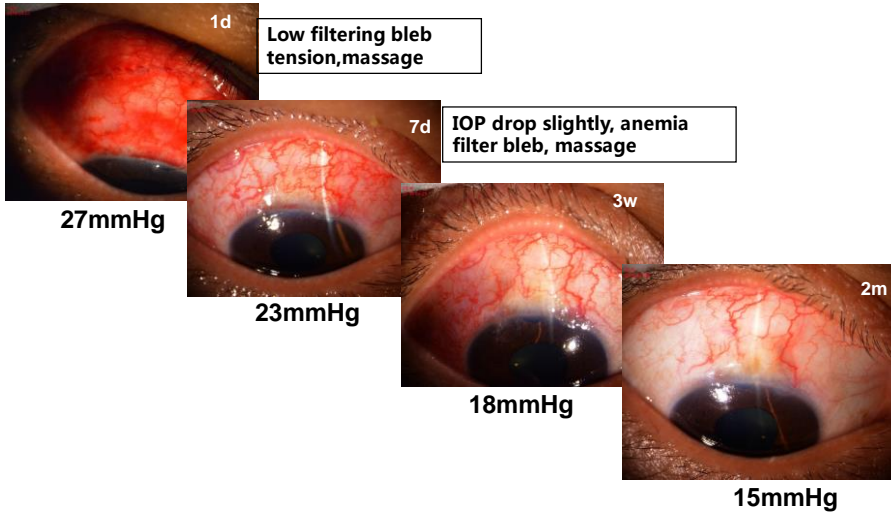
Low IOP: remove earlier

High IOP: massage, avoid removal within 1 week

- **Follow-up interval**

Close follow-up when filtration is insufficient

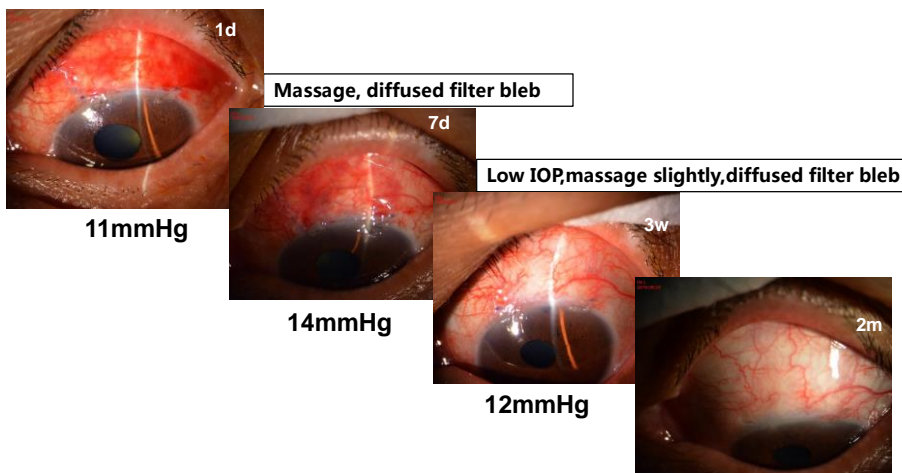
Formation of functional filter blebs



Postoperative suture removal in 4W and 6W, filter bleb formation

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Formation of functional filter blebs (early low secretion)



Postoperative suture removal in 8W, filtering bleb formation

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Our preliminary results

Int Ophthalmol
<https://doi.org/10.1007/s10792-019-01072-1>



ORIGINAL PAPER

One-month IOP in mitomycin C-augmented trabeculectomy can predict long-term IOP control in chronic primary angle-closure glaucoma

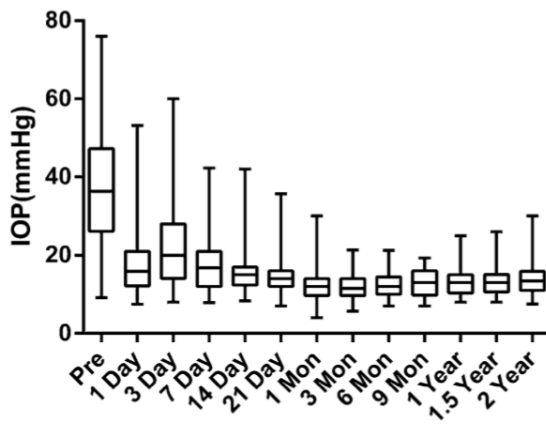
Chengguo Zuo · Shufen Lin · Keling Wu · Ruowen Gong · Yafen Liu · Mingkai Lin · Jian Ge

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The IOPs were controlled in early postoperatively in 89 PACG, less complications and more controllable results were observed.



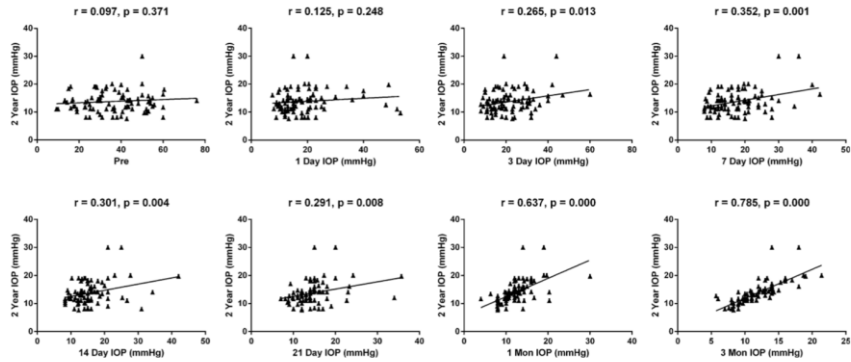
IOPs before and after surgery in PACG



Compared with baseline, IOP was significantly decreased at all time points postoperatively



Relationship between IOP at the 2-year follow-up and other perioperative time points



a significant positive correlation between IOP at 1 month and at 2 years postoperatively established (n=89, $r = 0.64$, $P = 0.001$, Simple linear regression analysis)

Conclusion

Trabeculectomy can be controllable

- Surgical design and treatment concept changes
- Watertight sutured and aqueous humor released orderly
- Filter bleb maintenance orderly
- Treatment of Insufficient filtration
- Need more data to confirm.

