Improving the filtration of trabeculectomy surgery

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Glaucoma:

A multifactorial neurodegenerative disorder

Causing ganglion cell damage and specific type of optic neuropathy, characterized by

Progressive structural and functional injury of the optic nerve complex.

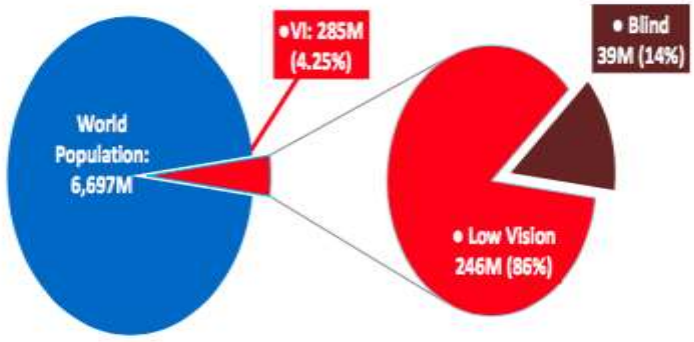
for which the elevated IOP is the primary risk factor.

The prevalence of glaucoma in the general population? 1.5-2%

Visual Impairment and Blindness 2010

World Health Organization

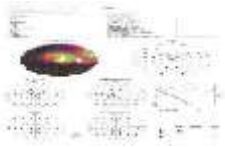
Global Estimates: 285 million people are affected by visual impairment*.



80% of Visual Impairment is avoidable
(can be prevented or cured)

***WHO 2002*, glaucoma is the second leading cause of blindness - 13.5 million people may have glaucoma and 5.2 million of those may be blind, *in 2020 will be 80 million*.**
Cataract 47.9% > Glaucoma 12.3% > ARMD 8.7%> D.R 4.8%

World Health Organization



Policy and Practice

Global data on visual impairment in the year 2002

Serge Resnikoff,[1] Donatella Pascolini,[1] Daniel Etya'ale,[1] Ivo Kocur,[1] Ramachandra Pararajasegaram,[1] Gopal P. Pokharel,[1] & Silvio P. Mariotti[2]

Abstract This paper presents estimates of the prevalence of visual impairment and its causes in 2002, based on the best available evidence derived from recent studies. Estimates were determined from data on low vision and blindness as defined in the International statistical classification of diseases, injuries and causes of death, 10th revision. The number of people with visual impairment worldwide in 2002 was in excess of 161 million, of whom about 37 million were blind.

The burden of visual impairment is not distributed uniformly throughout the world; the least developed regions carry the largest share. Visual impairment is also unequally distributed across age groups, being largely confined to adults 50 years of age and older. A distribution imbalance is also found with regard to gender throughout the world; females have a significantly higher risk of having visual impairment than males.

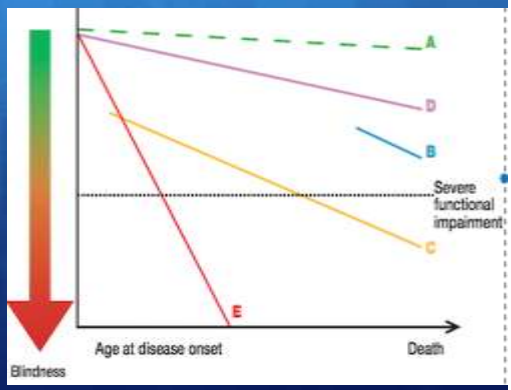
Notwithstanding the progress in surgical intervention that has been made in many countries over the last few decades, cataract remains the leading cause of visual impairment in all regions of the world, except in the most developed countries. Other major causes of visual impairment are, in order of importance, glaucoma, age-related macular degeneration, diabetic retinopathy and trachoma.

Glaucoma now second leading cause of blindness
(pp. 844–951)

The number of people globally with impaired sight in 2002 was more than 161 million, including some 37 million who were blind. In their paper, Resnikoff et al. report that new estimates for the prevalence of blindness and its causes show that glaucoma is no longer the third, but the second leading cause after cataracts. The authors estimate the prevalence of visual impairment and its causes in 2002 based on recent studies. This paper is accompanied by an *In focus* news feature in which Sharon Kingman reports how glaucoma has become more prevalent as populations grow older, in general, and examines a Swiss charity and its eye health care work in India and Africa.

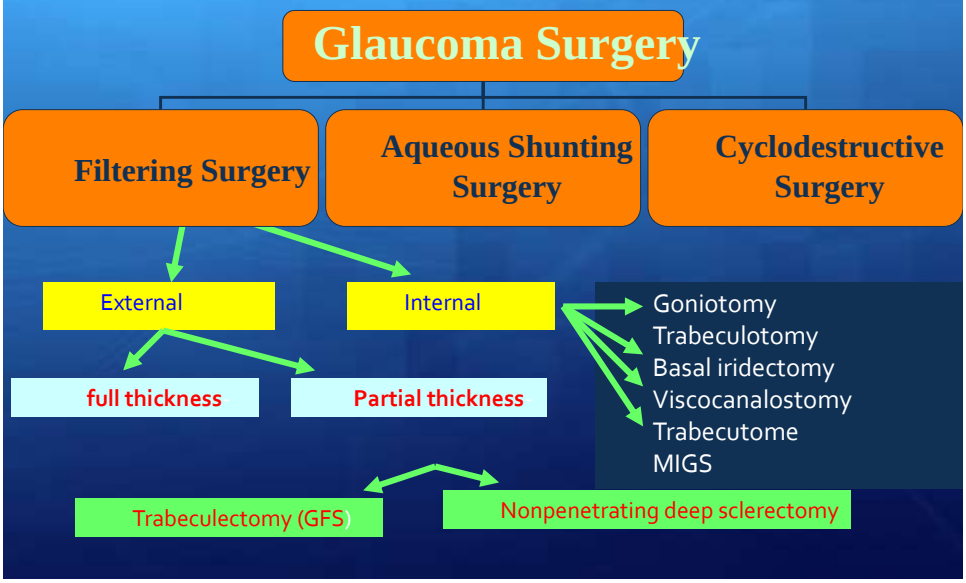
The decision to perform glaucoma surgery is based on:

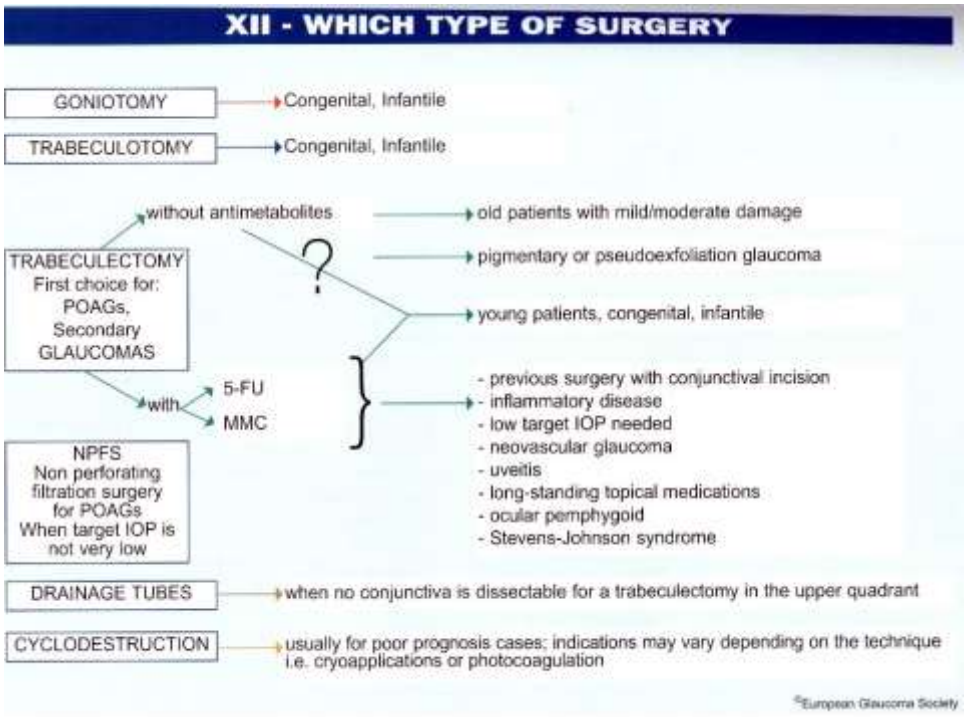
- Amount of loss in the nerve and field (Stage of glaucoma)
- Rate of progression
- Patient's own sense of visual function
- Magnitude & duration of pressure elevation
- General health and life expectancy of the patient
- The condition of the contralateral eye



European Glaucoma Society Guidelines, 2014

Types of Glaucoma Surgery





Evolution & chronolgic history of External filtering operations

Date	Surgeon	Procedure
1830	McKenzie	Sclerectomy
1869	DeWecker	Anterior Sclerotomy
1906	LaGrange	Sclerecto-iridectomy
1907	Holth	Iridencleisis
1909	Elliot	Limbal trephination
1958	Sheie	Thermal scleosotmy +iridectomy
1962	Ellif & Haas	Posterior lip sclerectomy
1968	Cairns	TRABECULECTOMY
1984	Zimmerman	Non-penetrating trabeculectomy
1989	Fydorov & Kozlov	Nonpenetrating deep sclerectomy
1991	Arenas	Trabeculotomy ab externo
1999	Stegmann	Viscocanalostomy

Patients' Selection

Chances of success of trabeculectomy with different types of glaucoma:

Good (>75%)	Fair (50%)	Poor (<25%)
POAG	Aphakia	Neovascular
PACG	Juvenile glaucoma	Congenital
XFG	ICE syndrome	Uveitic (active)
PG	Repeat filtration	> Two failed filters
Fuchs' heterochromia	Sturge-Weber syndrome	
Angle recession	Uveitic (inactive)	
Pseudophakia (PCIOL)	Pseudophakia (ACIOL)	

The main objectives:

Starts before the end of the surgical procedure

- Minimize cauterization
- Formation of AC
- Enhance bleb formation
- Adjustment of filtration
- Watertight closure of conjunctival flap
- Pupillary dilation ?

Trabeculectomy function

There are 2 basic components

How do we make it

Lower pressure

1. Resistance?
(scleral flap)

Flow resistor

look carefully at

2. Low pressure

the basic

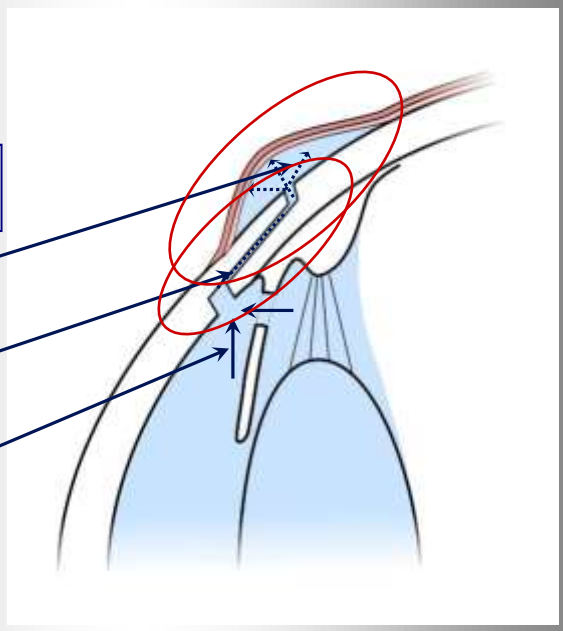
chamber

mechanism!

Higher

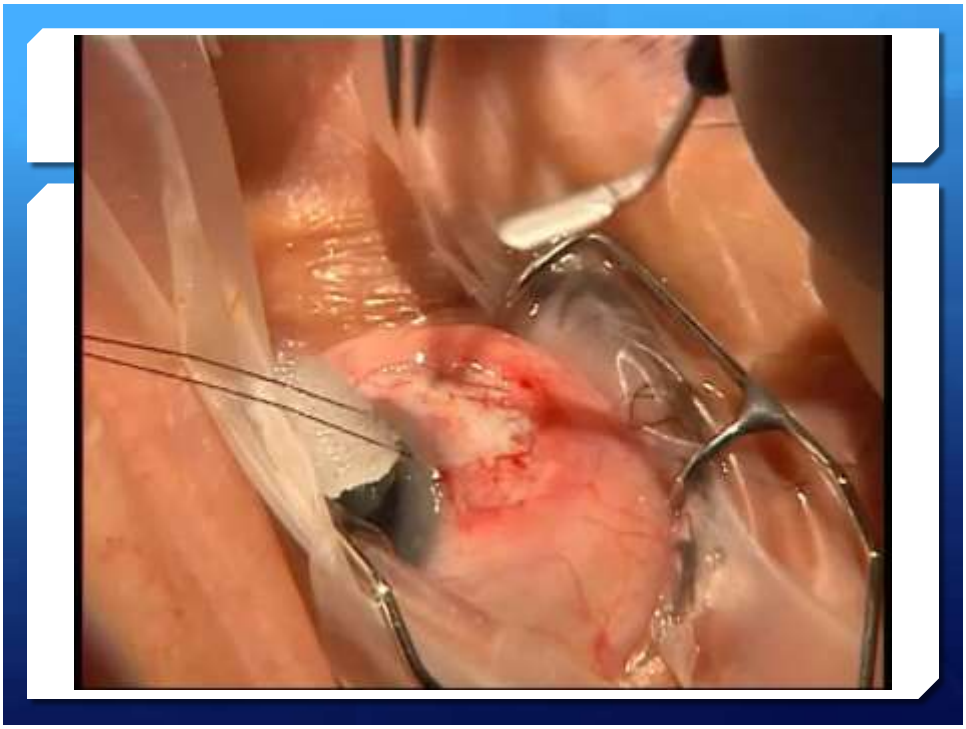
(bleb)

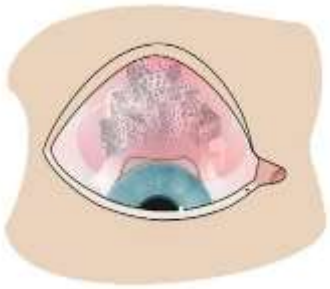
pressure

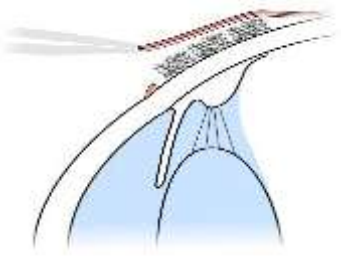


Trabeculectomy Dysfunction

- Pressure problems – too high / too low
  - Determined by resistance to flow through scleral flap
- Bleb problems – discomfort / infection
  - Determined by conjunctival healing







- ✓ 0.2 to 0.5 mg for 2 to 3 min according the condition of conj.
- ✓ Over wide area
- ✓ Good washing 30 ml BSS.

Early Postoperative Course:

- ➢ *Antibiotic drops (1 wk)*
- ➢ *Steroid drops (tapered over 6 wks)*
- ➢ *Cycloplegic drops*
- ➢ *Limit activity if IOP <6mmHg*
- ➢ *Patient seen in 1st postop day and 1st week*

- ✓ *YOU MUST CHECK*
  - ❑ The Bleb: extent, elevation, Leak
  - ❑ Anterior Chamber: depth & contents
  - ❑ Cornea.
  - ❑ IOP
  - ❑ choroidal effusion
  - ❑ Macula & Disc: edema

The functioning filtering bleb:

1. Limits:
2. Visibility of sutures
3. Presence of *microcysts*
4. Bleb elevation
5. Vascularity

Signs of poorly functioning blebs:

1. *flat bleb*
2. *Thick opaque wall*
3. *Lack of microcysts*
4. *Encapsulation*
5. *Vascularizat*
6. *Loculation*
7. *Scarring*

Postoperative Complications of Trabeculectomy

Early Postoperative Complications

1. Shallow Anterior Chamber
2. Hyphema
3. Wipe-out phenomenon
4. Corneal Decompensation
5. Hypotony Maculopathy
6. Early Blockage of Sclerosotmy
7. Complications related to use of MMC.

Late Postoperative Complications

1. Filtration Failure (nonfunctioning blebs)
2. Late Bleb Leak
3. Excessively Large Bleb
4. Blebitis/Endophthalmitis
5. Chronic Hypotony
6. Cataract Formation and Progression
7. Progressive Glaucomatous Damage

Shallow Anterior Chamber

With Low Postop IOP

1. Conjunctival leak
2. Choroidal Effusion
3. Cyclodialysis Cleft
4. Excessive Filtration

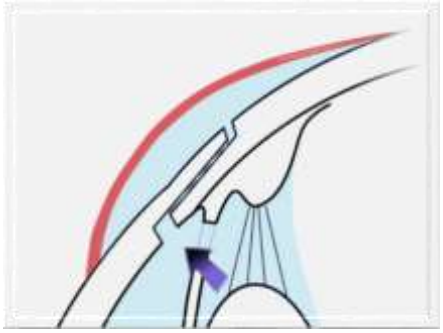
With High Postop IOP

1. Pupillary Block
2. Aqueous Misdirection (Malignant glaucoma)
3. Delayed suprachoroidal Hemorrhage

Unrecognized conj. hole or thin bleb.

Aqueous suppressants.

cycloplegics,antibiotics



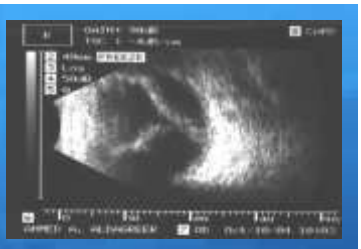
Large BCL

Autologus blood.

fibrin tissue glue.

Conjunctival advancement.

Choroidal Effusion



- Can be transient and resolved by medical treatment.

Surgical drainage:

- Kissing choroidals
- A failing bleb
- Extremely shallow AC

Bleb failure:

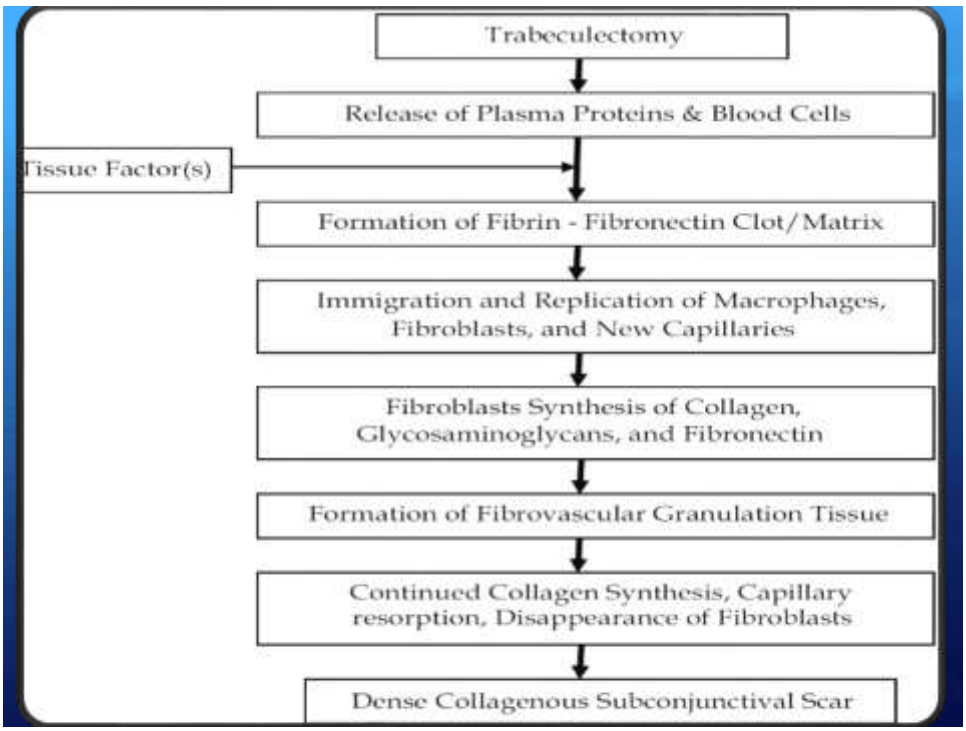
Late Bleb Failure occurs in:

- **23-51% of cases at 5 yrs (with MMC/5-FU).**

Jampel HD et al: Am J Ophthalmol. 2005;140:16-22

- **52-59% at 15 yrs (with MMC/5-FU).**
- **24-74% at 4 yrs (w/o MMC/5-FU) .**

- **The survival rate of successful blebs in 10 yrs:is 40-60%.**



Rescuing failing bleb:

Post operative:

- Sub-Tenon TA 1.2 mg.
- Subconjunctival Injections or topical use of antimetabolites or anti-angiogenesis agents
- Digital massage
- Suturlysis , release of adjustable sutures,
- Needling.
- Trab revisions with adjuvants.

Anand N et al J Glaucoma. 2009;18:515-20

Adjuvants in filtering surgery:

Several adjuvants were used in trabeculectomies to improve its success rate:

- Anti-metabolites (MMC,5-FU) has been used .

(5FU 50 mg/ml for 5 min / MMC 0.2-0.5 mg/ml For 2-5 min)

- angiogenesis agents anti-VEGF has been used in Trabs since 2006.

(1mg in 0.04ml).

Ologen implant:

+ Composed of 3D-collagen-glycosaminglycan copolymer forms porous structure provides a scaffold for fibroblast to grow randomly which reduce scar formation.

+ The collagen matrix is biodegradable around 90-180 days.

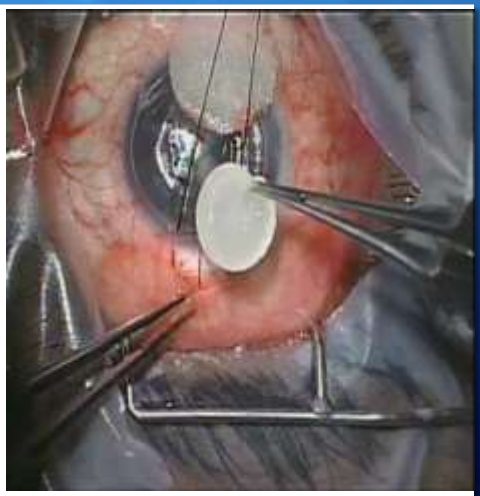
Product Shape	Model number	Specification
	830601	6 mm (D) x 2 mm (H)
	862051	12 mm (D) x 1 mm (H)
	870051	10 mm (W) x 10 mm (L) x 2 mm (H)

Advantage: improve the bleb morphology.

But you can have

+ **Tenon cyst.**

+ 



Conclusion:

- Trabeculectomy still the gold standerd glaucoma surgery.
- Primary mitomycin C trabeculectomy significantly lower IOP but associated with high incidence of ischemic blebs or delayed hypotony.
- Proper dealing with the postoperative complication can improve the success of filtration surgery.