Glaucoma surgery

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The goal of glaucoma surgery

- To lower the intraocular pressure!
  - to lower the risk of further glaucomatous visual damage
  - to reduce the need of medication

- Glaucomatous damage to the optic nerve head is unfortunately not reversible!
  - Need to do surgery before it's too late

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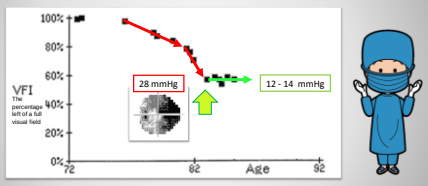
The goal of glaucoma surgery



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Indications for glaucoma surgery

- When medication or laser trabeculoplasty do NOT prevent a clinically significant loss of visual function

- When the treated intraocular pressure is at a level that inevitably will result in loss of visual function
- When the treatment stabilizing the visual function is not tolerated (local or systemic side effects)
- When the risk of losing visual function after surgery is not greater than the risk without surgery

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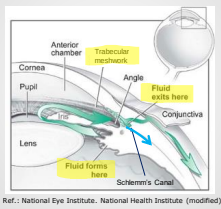
The physiological outflow



Ref.: National Eye Institute. National Health Institute (modified)

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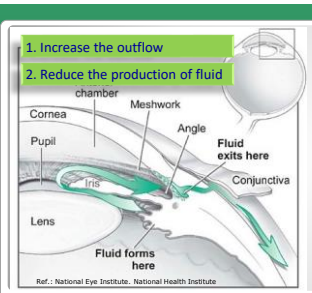
1. Increase the outflow
2. Reduce the production of fluid



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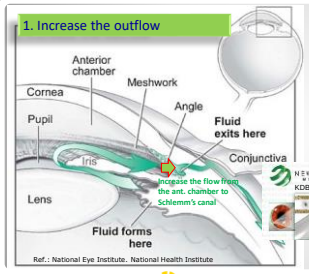
1. Increase the outflow



Micro Invasive Glaucoma Surgery (MIGS)

most often combined with cataract surgery

- **Implants/Stents**

Istent
Other: e.g. Hydrus

- **Tissue excision/disruption**

Other: e.g. Omni, Trabectome, GATT
+/- or just dilatation of the Schlemms canal

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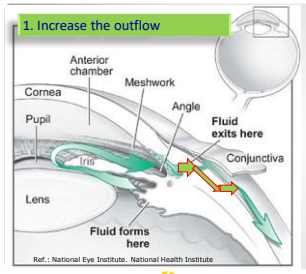
1. Increase the outflow



Non-penetration glaucoma surgery

Difficult surgery
Few surgeons in Sweden

Establish an outflow canal from the Schlemm's canal to drain the aqueous from the eye

Leaving the flow resistance of the meshwork reduce the risk for postoperative hypotony

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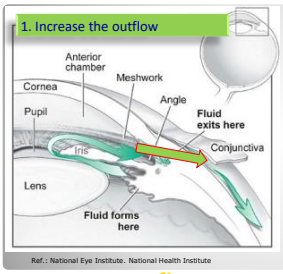
1. Increase the outflow

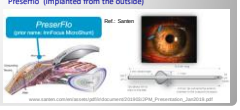


Ref.: National Eye Institute. National Health Institute

Filtering glaucoma surgery

- **Filtering stents/Minimally Invasive Bleb Surgery (MIBS):**
  - XEN45/63 (implanted from the inside)

  - Preserflo (implanted from the outside)



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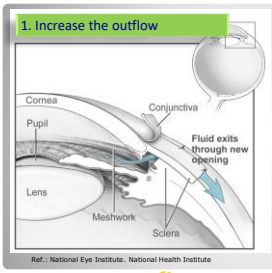

Ref.: National Eye Institute. National Health Institute

Traditional filtering glaucoma surgery

- **Trabeculectomy**

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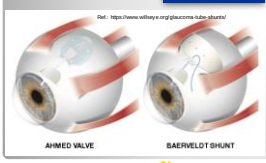
TUBE surgery

Ref.: https://www.wilseye.org/glaucoma-tube-shunts/



Tubes/shunts with a valve:

- Ahmed

Tubes/shunts without a valve:

Plate position under the muscles:

- E.g. **Baerveldt** and **Paul** (the thinnest tube diameter)

Plate position between the muscles

- E.g. Molteno

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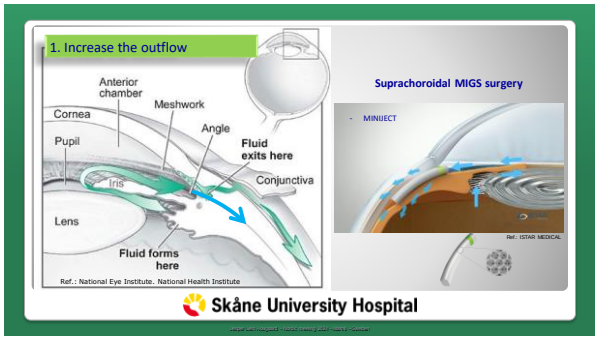
1. Increase the outflow
Anterior chamber
Meshwork
Cornea
Angle
Pupil
Fluid exits here
Conjunctiva
Iris
Lens
Fluid forms here
Ref.: National Eye Institute. National Health Institute
Suprachoroidal MIGS surgery
- MINIJECT
Ref.: ISTAR MEDICAL
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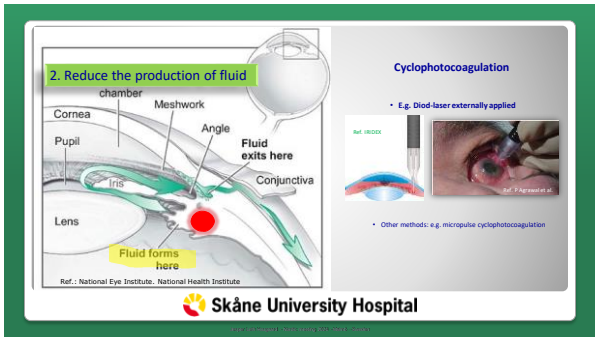
2. Reduce the production of fluid
chamber
Meshwork
Cornea
Angle
Pupil
Fluid exits here
Conjunctiva
Iris
Lens
Fluid forms here
Ref.: National Eye Institute. National Health Institute
Cyclophotocoagulation
• E.g. Diod-laser externally applied
Ref. IRIDEX
Ref. P Agrawal et al
• Other methods: e.g. micropulse cyclophotocoagulation
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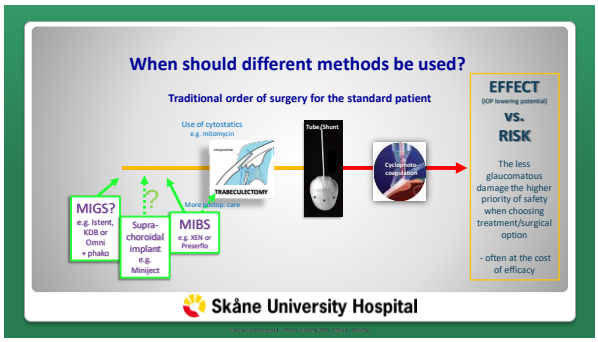
When should different methods be used?
Traditional order of surgery for the standard patient
Use of cytostatics e.g. mitomycin
TRABECULECTOMY
Tube/Shunt
Cyclophoto-coagulation
More glaucoma care
MIGS?
e.g. Istent, KDB or Omni + phako
Supra-choroidal implant e.g. Miniject
MIBS
e.g. XEN or Preserflo
EFFECT
(IOP lowering potential)
vs.
RISK
The less glaucomatous damage the higher priority of safety when choosing treatment/surgical option
- often at the cost of efficacy
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The major obstacle to surgical success

FIBROSIS = scar formation

To prevent it (in filtering surgery):

- use of cytostatic MMC at the site of surgery in filtering surgery
- many control visits after surgery
- intense cortisone drop treatment after surgery
- break down scar formation with "needling" and the use of cytostatic 5-FU
- pressure lowering eye drops in Shunt/Tube surgery if pressure rises

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Before the surgery

Important to plan the surgery in agreement with the patient

- What to expect - depending on the surgery!
- What are the patients able to manage on their own/with assistance?

NO improvement of visual function (if not combined with phako)!

Complication risks (balanced towards risk of glaucomatous damage)

Surgery is almost always done in local anaesthesia

± frequent steroid eye drops before and/or after the surgery?

± adjust anticoagulant medications preoperatively?

± reduced number of, or off IOP lowering medications?

± frequent control visits (and for how long)?

± physical restrictions?

Provide written information about the surgery

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Postoperative complications

Too low pressure (primarily a risk for damage to the retina):

Too much outflow/hyperfiltration? - Cycloplegia? Bandage contact lens? Reduce cortisone? Surgery?
Leakage? - Antibiotics and bandage contact lens? Cycloplegia? Reduce cortisone? Surgery?
Stent erosion though conjunctiva? - Antibiotics and surgery!
Ciliary body shutdown? - Cycloplegia? Wait and see?
(Cyclodialysis cleft?) – Wait and see? Laser? Surgery?

Too high pressure (a risk fo
Too little outflow/Hypofiltration? S
Massage/needling/pulling of relea
Malignant glaucoma? - Iridotomy? Press
Choroidal bleeding? - Pressure-lowering e.g. DIAMOX/MANNITOL/GLYCEROL? Surgical drainage??

Ocular changes may include:
Descemet Membrane folds
Shallow or flat anterior chamber
Retinal folds or macula edema
Choroidal detachment

gtic nerve head):
ent reasons?
g drops? Revision/new surgery?
L/GLYCEROL? Vitrectomy?

Infection:
In the drainage bladder/bleb (blebitis) - unusual
In the eye (endophthalmitis) - very rarely

Cataract formation:

Diplopia (Tubes/shunts):
often reversible

Corneal endothelia cell loss/decompensation:
Mostly a problem in tube surgery

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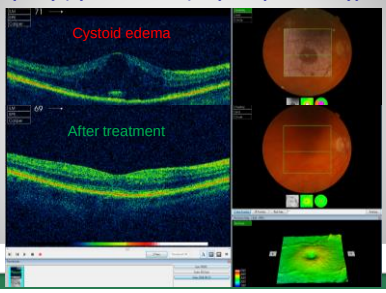
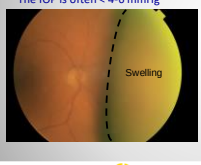
Maculopathy (cystoid edema) in postoperative hypotony



Leakage/hyperfiltration and hypotony

Below:
A patient with too much outflow and detachment of the choroid (swelling) after trabeculectomy
The IOP is often < 4-6 mmHg



Symptoms: A shadow in the visual field
A reversible condition!

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Too high pressure (a risk for damage to the glaucomatous optic nerve head):
Too little outflow/Hypofiltration? Stops at different levels for different reasons?
Massage/needling/pulling of releasable sutures? Pressure-lowering drops? Revision/new surgery?
Malignant glaucoma? - Iridotomy? Pressure-lowering e.g. DIAMOX/MANNITOL/GLYCEROL? Vitrectomy?
Choroidal bleeding? - Pressure-lowering e.g. DIAMOX/MANNITOL/GLYCEROL? Surgical drainage??

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TREAT even a simple conjunctivitis with AB in these patients!

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Important to identify significant postoperative complications!

- A focused anamnesis:

Constant or increasing pain and/or visual impairment

Foreign body sensation without constant visual impairment

+/- redness +/- infektion

- A reliable measurement of the visual acuity:
- A reliable intraocular pressure measurement:
  - USE GOLDMAN TONOMETRY in glaucoma patients!
    Remember that a very low IOP can be okay in patients with a thin cornea and that a pressure of e.g. 9 mmHg can be too low in patients with a thick cornea!
  - Remember to calibrate the tonometer!
  - DO NOT use different methods to measure the pressure from time to time!

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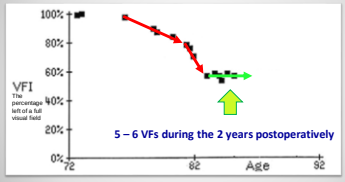
Evaluate the postoperative rate of visual field progression



Important to confirm that the new IOP level provide an acceptable ROP!

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Summery

- The many new techniques give surgeons multiple opportunities to help the glaucoma patient
- Important to personalize the surgery in agreement with the patient
- Important to identify postoperative complications as early as possible

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