

CONTENTS

- 1) Anesthesia, IV solutions, disinfection 2**
- 2) Cataract 5**
- 3) Cornea 9**
- 4) Glaucoma 12**

1) ANESTHESIA, IV SOLUTIONS

Techniques

A) Local anesthesia

Marcaine 0.5 % : 2cc + Lidocaine 1% 2cc

- concentration of epinephrine: 1:100000

needle: retrobulbar or 25 G needle; 1½inch (37mm) or can use 13 mm needle

- depth:

Complications of Retrobulbar anesthesia

- 1) traumatic optic neuropathy
- 2) retrobulbar hemorrhage
- 3) CRVO
- 4) CRAO
- 5) Intra thecal injection (apnea, comea, hypotension)
- 6) globe perforation
- 7) pupil dysfunction
- 8) EOM paresis, diplopia (injection into muscle), contracture
- 9) lidocaine toxicity
- 10) orbital pseudotumor (1 case report - hyaluronidase allergy)

Globe Perforation

- 1) needle track
- 2) RD
- 3) VH

B) General anesthesia

i) depolarizing: succinylcholine, decamethonium

- non-competitive antagonists of ACh which are eliminated by pseudocholinesterase

- not to use in trauma or if patient is on anti-cholinesterase (Phospholine Iodide)

- wait 6 weeks after stopping topical anticholinesterases before giving this

ii) nondepolarizing: curare like: tubocurarine, pancuronium, atroconium, vecuronium

- competitive antagonists for ACh

- can use anti-cholinesterases to eliminate drug as they will increase ACh levels and thus eliminate the drug

iii) anesthetic effects on intraocular pressure

- Drugs that are CNS depressants usually depress IOP.

- The inhalational anesthetic agents in general use today all lower IOP.

- Nitrous oxide, when used alone, is questionable and may raise it slightly.

- It does increase pressure in an eye in which sulfur hexafluoride gas has been injected.

- The intravenous anesthetic agents including thiopental, etomidate, and propofol lower IOP.

- Ketamine was formerly thought to raise IOP by increasing muscle tone, but studies now suggest that it does not. However, it is not the induction agent of choice in patients with a ruptured globe.

- The narcotics, benzodiazepines, and droperidol all lower IOP.

- The nondepolarizing muscle relaxants d-tubocurarine, pancuronium, atracurium, and vecuronium do not increase IOP, and some cause marked decreases.

The following agents and maneuvers can increase IOP: succinylcholine, laryngoscopy and tracheal intubation.

The *anesthetic course* includes *the induction*, in which patients are "put to sleep" with an intravenous agent (adults) and *intubated*, usually with the aid of a muscle relaxant; and the *maintenance*, in which the patients are kept asleep, usually with an inhalational agent, and paralyzed with a nondepolarizing muscle relaxant and artificially ventilated.

iv) precautions:

- Sulfur hexafluoride (SF₆) is used intraocularly in retinal surgery to help hold the retina in place.
- In the presence of nitrous oxide, the bubble expands, causing a marked increase in IOP.
- Nitrous oxide be discontinued 15 minutes before gas injection to prevent this complication.

v) Atropine

- given prior to decrease secretions
- also used to block oculocardiac reflex
- don't give before looking for lost muscle (want this rxn)

C) IV Solutions

1) BSS for cataract surgery

- 0.3 to 0.5 ml of 1:1000 aqueous epinephrine (with 0.1% sodium bisulfite preservative) added to BSS bottle (500 cc) to maintain dilated pupil
- this becomes diluted to a concentration of 1:500,000 ?
- epinephrine still effective at this concentration and the preservative bisulfite is less toxic to corneal endothelium at this concentration

2) BSS Plus

has:

- 1) reduced glutathione
 - 2) bicarbonate
 - 3) glucose ?
- used in diabetics
 - Fortified BSS Plus can be prepared by adding 3 ml of a 50% dextrose solution
 - this is done to preserve clear lens in diabetics
 - before BSS plus was glutathione and adenosine in Ringer's lactate

Precautions in Sickle Cell surgery

- 1) no epi in local
- 2) don't remove EOM's
- 3) judicious cryo
- 4) adequate hydration
- 5) nasal oxygen
- 6) cautious expansile gases in vitreous surgery
- 7) avoiding encircling scleral buckle

Complications of local anesthesia

- 1) retrobulbar hemorrhage
- 1) canthotomy
- 2) cantolysis
- 3) conjunctival incision with blood drainage

II) Intraocular injection

- 1) if realize: draw back while in the eye
- 2) if don't realize: feel eye: if hard: pars plana tap until eye softens

D) Disinfection and prep

Preop drops

- preop garamycin or ofloxacin or polytrim or polysporin

Study:

- polymyxin B sulfate, neomycin sulfate, and gramicidin TID x 3 days before surgery = half-strength povidone-iodine solution given as part of the preoperative preparation
- conjunctival cultures showed that individually the antibiotic and povidone-iodine caused a similar and substantial decrease in the number of colonies and species of bacteria cultured
- when used together the decrease was even greater, making 83% of the conjunctival cultures negative.

Prep:

Eye

- half-strength (5%) povidone-iodine (Betadine) solution placed in the conjunctival cul-de-sac reduces the number of colonies and species of bacteria
- significantly lower incidence of culture-positive endophthalmitis in operating rooms using povidone-iodine (2 of 3489 [0.06%]) compared with those using silver protein solution (11 of 4594 [0.24%]).

Lids: cleansing of the eyelid margins with moistened cotton-tipped applicators

Face: povidone-iodine preparation (10%) of the periocular skin and face

Drapes: plastic occluding drapes with appropriate coverage of the eyelashes and eyelid margins,

Other:

- 1) external irrigation before opening the globe
- 2) reduction in pooling of irrigating solutions in the conjunctival fornix

2) CATARACT

Complications

I) Intraop

Causes of shallowing AC

a) *low IOP*

- 1) poor infusion (kink in line, tight line, bottle low, bottle empty)
- 2) Leakage of wound

b) *high IOP*

- 1) choroidal hemorrhage
- 2) irrigation entering posterior chamber
- 3) nucleus pupil block
- 4) slow retrobulbar hemorrhage

Causes of deepening of AC

- 1) aspiration blocked
- 2) zonule dehiscence
- 3) bottle too high

Causes of Deep AC

- 1) myope
- 2) perforation
- 3) lack of vitreous support (myope, vitrectomy)

Causes of shallow AC

- 1) hyperope
- 2) excessive anesthetic

Signs of poor aspiration

- 1) phaco dust
- 2) pieces not coming to tip

Associations with expulsive hemorrhage

- 1) COAG
- 2) systemic HTN
- 3) local anesth
- 4) patient "bucking"
- 5) increased axial length (myopia)
- 6) multiple surgeries
- 7) open wound (PKP, ECCE)

Treatment of PC tear

A) *No conversion (have already cracked)*

- 1) lower bottle
- 2) consider converting (if before cracking)
- 3) viscoat behind lens
- 4) consider lens glide

B) *Convert to ECCE (*

- 1) cut sides of flap
- 2) complete ECCE wound with corneoscleral scissors

- 3) DON'T press on globe (no expression)
- 4) elevate lens with Viscoat
- 5) pull lens out with lens vectus (loop)

Treatment of expulsive

- 1) finger to wound
- 2) close ASAP (9-0 nylon, 8-0 silk)
- 3) drain choroidals

II) Postop

a) *low IOP*

- 1) wound leak
- 2) choroidal effusion with c.b. disinsertion
- 3) cyclodialysis
- 4) RD

b) *high IOP*

- 1) pupil block (lens, vitreous)
- 2) inflammation
- 3) Healon in eye
- 4) aqueous misdirection
- 5) choroidal hemorrhage (pain)
- 6) hyphema
- 7) endophthalmitis
- 8) retained lens material
- 9) steroid use

Reasons to lower IOP preop

- 1) reduce bulging of the lens-iris diaphragm
- 2) reduce vitreous presentation and vitreous loss
- 3) reduce expulsive choroidal hemorrhage

Ways to lower IOP preop

- 1) globe massage
- 2) Honan (35 mm Hg)
- 3) IV mannitol 1-2 hours preop

Risk for choroidal hemorrhage occurrence at time of surgery

- 1) glaucoma
- 2) previous surgery
- 3) myopia
- 4) external pressure on globe
- 5) poor ocular akinesia
- 6) Valsalva's maneuver
- 7) Coughing and other symptoms
- 8) High blood pressure
- 9) Predisposition to bleeding
- 10) on aspirin
- 11) collapse of globe
- 12) hypotony

Maneuvers to decrease risk of choroidal hemorrhage

A) *All surgery*

- 1) Aggressive preoperative IOP control
- 2) Minimized surgical time
- 3) Avoidance of collapse of the globe during surgery
- 4) Prophylactic sclerostomies (Sturge-Weber and nanophthalmos)
- 5) Discontinuation of all anticoagulants 5 days prior to surgery
- 6) Superb control of blood pressure before, during, and after surgery
- 7) Injection of viscoelastic into anterior chamber
- 8) In very high risk eyes, injection of gas bubble into the vitreous cavity

B) *cataract surgery*

- 1) Small-incision surgery
- 2) Preplaced sutures if incision is greater than 6 mm

C) *Glaucoma surgery*

- 1) Recognition of postoperative choroidal effusions and vigorous treatment (drainage) of same (choroidal effusions are often the triggering event for hemorrhage)
- 2) Counseling of patients not to do those things that mimic a Valsalva maneuver
- 3) Use of stool softeners, encouraging liquid intake
- 4) Use of bandage contact lenses to tamponade the bleb and prevent hypotony
- 5) Return to OR to place additional scleral flap sutures if postop IOP is lower than anticipated

Treatment of wound leak post cataract

- 1) cycloplegia
- 2) pressure patching
- 3) aqueous suppressants
- 4) decrease steroids
- 5) therapeutic CL
- 6) tissue adhesive
- 7) cryo or diathermy to wound
- 8) resuture wound
- 9) patch graft to wound if fistula has formed

Indications for drainage of post op choroidal hemorrhage

- 1) kissing choroidals - time?
- 2) uncontrolled glaucoma
- 3) persistent flat AC - time?
- 4) wound disruption
- 5) persistent choroidal detachment - time?
- 6) lens-corneal touch

Management of post op choroidal hemorrhage

- 1) systemic steroids
- 2) topical and oral (Diamox) hypotensives
- 3) surgical drainage (use blade 5-7 mm behind limbus)

Treatment of post-op CME

- 1) topical NSAIDs

- 2) topical steroids
- 3) subtenon's steroids
- 4) oral NSAIDs
- 5) oral steroids

Treatment of vitreous to wound

- 1) topical NSAIDs for CME
- 2) topical steroids
- 3) Yag vitreous wick
- 4) anterior vitrectomy
- 5) posterior vitrectomy (may be better if cornea compromised)

Removing sutures post-op

- 1) may remove 1 or 2 at 4 weeks for astigmatism
- 2) At 3 months, wound should not gape; can remove more sutures
- 3) leave in nylon sutures when astigmatism is acceptable

ACIOL

- 1) measure limbus to limbus and add 1mm for length
- 2) power: subtract 1.5 from PCIOL or difference in A constant

IOLs: A - 2.5L - 0.9K

- 1) PCIOL: optic size: 5-6 mm; total size: 12mm?
- 2) sulcus lens: optic size: 6-6.5 mm; total length: 13mm?
- 3) ACIOL: total length: white to white + 1 mm

Combined procedure: cataract + trab

- patient needs cataract surgery and is on glaucoma meds

Factors for doing combined procedure

- 1) glaucomatous eyes are more susceptible to increased IOP damage (eg IOP post op of 40 for 1 day or 25 for 1 month):
- 2) glaucomatous eyes are more likely to have a prolonged pressure elevation postop than normals
- 3) patients with severe loss are at risk for "wipeout" with each event of hypotony (eg. open eye); 2 surgeries (separate procedures) means twice the risk
- 4) patient poorly compliant
- 5) patient worsening on current treatment (unsure?)
- 6) only one retrobulbar needed

Indications for combined (Avi) - good

- 1) 2 or more meds, moderate field loss
- 2) split fixation, well controlled
- 3) not controlled, has cataract: trab first

Factors for doing cataract only

- 1) If ALT was not yet done: ALT works better in phakic than pseudophakic
- 2) trabs do better when done alone (less inflammation, scarring) than when combined and actually combined procedures don't do that much better than ECCE alone (which lowers IOP a fair amount)

Indications for ICCE*A) General indications*

The need to remove all elements of the lens

The inability to perform the extracapsular procedure

B) Specific indications

1) subluxated or dislocated cataract (into AC)

2) cataract with severe phacodonesis, one in which zonular support of a PCIOL is in question

C) Acceptable indications

1) Severe lens-induced uveitis in which it is prudent to remove all remnants of the cataract and when the use of an intraocular lens is not contemplated

2) A second eye cataract operation when the first eye operation was successfully performed via ICCE, the patient being fully adapted to aphakic spectacles.

3) CORNEA

- a) PKP
- b) conj flap
- c) pterygium
- d) thinning cornea
- e) Descemetocoele / small perforation

a) PKP

- interrupted sutures for infected ulcers

Indications

- 1) optical (most)
- 2) tectonic
 - to restore altered corneal structure
 - to prevent loss of the globe after perforation
- 3) therapeutic
 - to remove active corneal disease such as persistent severe bacterial, fungal, or amebic keratitis
- 4) cosmetic (rare)
 - in an eye with a disfiguring corneal opacity (e.g., a central dermoid in an adult) in which there appears to be no hope of improving vision and the cosmetic benefit far outweighs the risk involved

PKP prognosis**Best**

- 1) localized corneal scars
- 2) keratoconus
- 3) corneal dystrophies
- 4) early Fuch's

In the Middle

- 1) uncontrolled glaucoma
- 2) uveitis
- 3) acne rosacea
- 4) OCP
- 5) dry eyes
- 6) large graft (>8mm)
- 7) pseudophakic bullous

Worst

- 1) stromal vascularization
- 2) extreme thinning at host-graft junction
- 3) active corneal inflammation
- 4) no corneal sensation
- 5) severe dry eye (Stevens Johnson, OCP)

b) Conjunctival (Gundersen) flap**Indications**

- 1) treatment of corneal infections resistant to medical therapy
- 2) control of resistant surface corneal disease

- 3) control of corneal pain
- 4) structural support.

Procedure

- remove all epithelium of cornea (with cocaine if necessary)
- incision of superior conj.
- balloon conj with subconj saline
- dissect conj flap without Tenon's
- tie with 8-0 vicryl to inferior limbus
- avoid buttonholes

c) pterygium

Indications

- 1) encroaching on visual axis
- 2)

Procedure

- 1) remove pterygium with blade and scissors (measure)
- 2) don't go posterioyly more than 4 mm medially (MR)
- 3) conj. will retract
- 4) remove conj graft (measured) from superior limbus (mark with methylene blue pen)
- 5) place graft over previous site
- 6) tie with 8-0 vicryl

d) thinning cornea

- 1) lamellar keratoplasty
- 2) scleral patch
- 3) partial-thickness scleral flaps reflected onto the cornea (peripheral only)
- 4) autologous half thickness corneal button (small perforation)
- 5) PKP

e) central Desmetocele / small perforation

- 1) patching
- 2) contact lens (need daily follow up)
- 3) cyanoacrylate
- 4) lamellar keratoplasty
- 5) scleral patch
- 6) partial-thickness scleral flaps reflected onto the cornea (peripheral only)
- 7) autologous half thickness corneal button (small perforation)
- 8) PKP

Steps for cyanoacrylate glue

- i) debridement of necrotic tissue and epithelium surrounding the perforation
- ii) drying of the area to which the glue is to be applied (Weck)
- iii) application of the least amount of glue that can cover the defect with special applicator
- iv) CL over glue

f) RK

A) *Complications*

- 1) cornea perforation
- 2) endophthalmitis

- 3) traumatic cataract
- 4) corneal ulcer (early and late)
- 5) retrobulbar complications if one given

B) *Side effects*

- 1) pain post-op
- 2) over or undercorrection
- 3) glare
- 4) astigmatism (15%)
- 5) inclusion cysts

g) excimer

A) *Complications*

- 1) cornea perforation
- 2) corneal ulcer (early and late)
- 3) decreased best corrected VA

B) *Side effects*

- 1) pain post-op
- 2) over or undercorrection
- 3) glare
- 4) astigmatism (15%)
- 5) halos

4) GLAUCOMA

a) trabeculectomy (filtering procedure)

Successful Trab Factors

- 1) success in other eye
- 2) white race
- 3) quiet eye
- 4) eye never operated upon
- 5) 30-60 years old
- 6) early glaucoma
- 7) experienced surgeon

Glaucoma surgery failure associations

A) *Ocular Causes*

- 1) secondary glaucoma
- 2) previously failed filtration
- 3) active ocular inflammation
- 4) NV changes
- 5) scarred conjunctiva
- 6) pseudophakic/aphakia
- 7) hyperope > 5 D
- 8) previous ocular surgery
- 9) low aqueous production

B) *Non Ocular Causes*

- 1) young age (< 16 years old)
- 2) black or Asian patients
- 3) no use of topical steroids postoperatively
- 4) prior use of topical glaucoma medications (especially miotics)
- 5) inexperienced surgeon
- 6) tendency to form keloids

Lower Final IOP (hypotony) After Filtration Procedure: Risk Factors

- 1) Minimal pigmentation of skin (pale)
- 2) Elderly age
- 3) Minimal preoperative use of glaucoma medications
- 4) No medications decreasing aqueous flow or predisposing to bleeding

Methods Thought to Help Achieve Lower Final IOP

- 1) Antimetabolites
- 2) Topical corticosteroids (up to equivalent of prednisolone 1% 4 times daily)
- 3) Minimal overlap of scleral flap (minimal guarding)
- 4) Nasally placed bleb
- 5) Use of releasable or laserable sutures in scleral flap
- 6) Spreading bleb at time of surgery or postoperatively (Simmons' shell or other)
- 7) Thin scleral flap
- 8) Systemic corticosteroids

	IOP lowering	lowest IOP
Mild medical management	20	14
Full medical management	20-30	11
Argon laser trabeculoplasty	30	11

Routine guarded filtration	40	11
Modified guarded filtration	50	9
Guarded filtration procedure with antifibrosis therapy	>50	4

Procedure

Limbal based procedure (fornix incision)

- 8-0 vicryl suture at 12:00 cornea 1mm from limbus to move eye down
- incision of conj superonasally (10mm incision)
- conj is insufflated with air using 30G needle (optional)
- conj and Tenon's are dissected from sclera using Wescott scissors
- episclera is buttonholed and sclera is visualized
- avoid buttonholes; judicious cautery
- mitomycin or 5 FU applied before any scleral incision is made
- scleral tunnel: 50% depth; or scleral flap 6 x 6 mm;
- go until clear cornea (too far: corneal striae)
- can do phaco at this point **
- inner trabeculectomy block (inner sclerostomy): 3 x 1.5 mm
- peripheral PI
- scleral flap closed with 10-0 nylon (up to 5 sutures)
- separate closure of Tenon's (8-0 chromic) - running locked
- conj closed (running unlocked) with 9-0 vicryl on b.v. needle

Intraop 5 FU:

- sponge is soaked in 0.1 to 0.2 ml of 5-FU (50 mg/ml = 5mg)
- The sponge is placed on the sclera over the area of the scleral flap and left in position for 5 minutes.
- Tenon's with conjunctiva are pulled over the sponge so that the Tenon's capsule side of the conjunctiva is in contact with the sponge impregnated with the 5-FU.

Postop 5 FU

- pledget of anesthetic for 5 minutes
- 0.1 ml of 5-FU (50 mg/ml) is drawn
- 30-gauge needle
- 1 cm tract (at least)
- total: 5-10 injections either Qday or Q2day

Mitomycin

- Concentrations of 0.2 to 0.5 mg/ml have been used.
- example: 0.3 mg/ml is used, sponge left on the sclera for 2 to 3 minutes.

Post-op massage

- applying pressure in a localized fashion directly over the radial edge of the scleral flap.
- This depression should be gentle and focal, and a sterile applicator should be used
- pressure will encourage aqueous to flow through the radial edge of the scleral flap
- It may be repeated three or four times daily for the first 3 or 4 days to encourage the development of a patent fistula
- After 2 weeks or so, it probably will not have a permanent effect on the outcome of surgery.
- the technique that has been used for generations to encourage aqueous to flow out of a sclerostomy involves pressing on the globe, which increases the IOP and causes the underlying

sclera and cornea to be pushed up against the overlying scleral flap, making the apposition between these two tissues even tighter.

Correcting flat AC

- 30G needle or cannula
- inject Healon

Correcting Flat AC with choroidal detachment (usually just reforming AC is enough)

- This technique carries greater risk to the patient than reformation of the anterior chamber alone with a viscoelastic substance.
- We believe that drainage of the choroidal detachment and reformation of the anterior chamber should be performed in the operating room under **general** anesthesia.
- A retrobulbar hemorrhage in an eye with excess filtration and a choroidal detachment can be a serious complication; consequently, retrobulbar injection is hazardous.
- The conjunctiva is excised over the area of the choroidal detachment, or if the detachment is extensive (as is usually the case), in the most convenient area, usually inferotemporally.
- The episclera is cleaned, and cautery is applied to the sclera approximately 4 to 7 mm posterior to the limbus.
- Balanced salt solution is injected into the anterior chamber through the previously placed paracentesis, raising the IOP. The anterior chamber should deepen as this maneuver is done.
- Once the pressure has been increased, the incision through the sclera is completed, and as much suprachoroidal fluid is allowed to drain as is feasible. The fluid drains slowly.
- After enough suprachoroidal fluid has been drained, the overlying conjunctiva is closed.
- Atropine should be instilled throughout the procedure to ensure that the patient's cycloplegia is as complete as possible. Phenylephrine also is helpful.

Post-op

Conjunctival tear repair

- 1) pursestring suture with 10-0 nylon; or horizontal mattress
- 2) bandage CL (if tear near limbus)
- 3) cyanoacrylate

Post-op shallow AC

A) Increased IOP

- 1) pupil block glaucoma (iris forward)
- 2) choroidal hemorrhage (iris + lens forward)
- 3) aqueous misdirection (iris + lens forward)
- 4) inadequate aqueous production (Day 2)

B) Decreased IOP

- 1) wound leak
- 2) choroidal detachment
- 3) hyperfiltration
- 4) inadequate aqueous production (inflamed eye)

** In these cases if lens may touch cornea, inject Healon to prevent touch

Post-op deep AC - early

A) increased IOP

- 1) blocked internal sclerostomy site (blood, fibrin, iris, ciliary process)
- 2) tight flap sutures

- 3) blocked tube (seton)
 - 4) tube withdrawn (seton)
 - B) *Decreased IOP*
- GREAT!

Normal bleb: whitish, microcysts

Late increase in IOP

- 1) failed bleb due to Tenon's cyst (no microcysts seen) "bleb encapsulation" -2-3 weeks later
- 2) failed bleb due to conj. fibrosis - 3 weeks later

Late decrease in IOP

- 1) cyclodialysis (clef weeks later)
- 2) RD

Treatment of blocked ostium

- 1) Yag
- 2) needling?

Treatment of failed bleb

- 1) needling (approach from conj. off to side)

Treatment of wound leak (hyperfiltration: 1-5)

- 1) cycloplegia (prevents AC shallowing by pulling lens back)
- 2) aqueous suppressants
- 3) Simmon's shell (scleral)
- 4) McCalister lens
- 5) soft CL
- 6) ABC drops to irritate conj.
- 7) nick vessel to bleed and scar
- 8) autologous blood
- 9) cyanoacrylate
- 10) cryo adjacent to bleb
- 11) suture leak
- 12) conj. graft to cover leak

Treatment of aqueous misdirection

- 1) topical cycloplegics (Atropine, cyclogyl, and phenylephrine) ; dilators for rest of life
- 2) aqueous suppressants (Diamox, B blocker)
- 3) shrink vitreous (glycerine, mannitol)
- 4) Yag to anterior hyaloid if pseudo or aphakic
- 5) vitrectomy if phakic
- 6) some have tried Yag through PI in phakic individuals
- 7) Chandler procedure

Problems with antimetabolites

- 1) overfiltering
- 2) thinning bleb
- 3) endophthalmitis
- 4) leak/ rupture may develop

- 5) blebitis
- 6) bleb ischemia
- 7) poorly healing epithelium (eg. cornea)

Indications to drain effusions or to intervene (Duanes')

- 1) 5-7 days have passed with no signs of improvement
- 2) when early signs of macular involvement are present
- 3) pupillary block
- 4) lens-corneal touch
- 5) retinal-lens apposition
- 6) with progressive corneal edema
- 7) persistent retinal apposition in kissing choroidal effusion (how long?) - can form adhesions

Procedure:

- scleral wound is made 6 mm to 8 mm behind the limbus
- and the wound lips may be held by sutures
- slow release of fluid is advisable, to guard against a rebound hypotony with reaccumulation of fluid
- sufficient fluid is released to deepen the anterior chamber and allow the ciliary body to assume a more normal position
- Additional fluid can be released by inserting an iris spatula into the wound and carefully running it forward in the suprachoroidal space with its convex edge against the choroid
- The scleral wound is not sutured
- Healon or saline or air may be added to the AC in pseudophakic eyes and to the vitreous cavity in phakic eyes to increase the intraocular pressure and tamponade the choroid and ciliary body against the sclera.

Problems due to chronic hypotony

- 1) *Poor Vision*
 - a) Macular edema
 - b) Unstable refraction
 - c) Irregular astigmatism
 - d) Photophobia
 - e) Cataract
 - f) Papilledema
- 2) *Discomfort*
 - a) Pain associated with soft eye
 - b) Foreign body sensation
 - c) Epiphora
- 3) *Complications*
 - a) Dellen
 - b) Choroidal effusion
 - c) Suprachoroidal hemorrhage
 - d) Flat anterior chamber
 - e) Failure of filtration procedure
 - f) Persisting inflammation
 - g) Corneal decompensation
 - h) Endophthalmitis
 - i) Phthisis

Pain post-trab

- 1) suprachoroidal hemorrhage
- 2) malignant glaucoma
- 3) endophthalmitis
- 4) from bleb (mild)

Complications of Glaucoma Surgery**Flat anterior chamber**

Excessive filtration
 Serous choroidal detachment
 Hemorrhagic choroidal detachment
 Diminished secretion of aqueous
 Pupil block
 Malignant glaucoma

Intraocular bleeding

Hyphema
 Suprachoroidal hemorrhage
 Retinal hemorrhage

Cataract

Immediately postoperative
 Late

Hypotony

Macular edema
 Pain
 Uveitis
 Choroidal detachment
 Decreased aqueous flow

Conjunctival flap

Tear
 Dehiscence
 Leak
 Extrusion of Tenon's capsule

Bleb

Encapsulation
 Excessive leakage
 Reduced visual acuity
 Corneal dellen
 Ptosis
 Late rupture or leak
 Blebitis
 Predisposition to endophthalmitis

Sudden rate of intraocular pressure

From increased inflow
 From blockage of outflow channels
 Filtering site
 Iris
 Ciliary processes
 Blood
 Inflammatory material
 Membrane

Trabecular meshwork
 Blood
 Inflammatory material
 Ghost cells
 Vitreous

Corneal decompensation

Secondary to flat chamber
 Secondary to stripping of Descemet's membrane
 Related to hypotony
 Wipe out (sudden loss of visual acuity)
 Progressive optic nerve damage despite intraocular pressure below 10 mmHg
 Vitreous loss
 Retinal detachment

b) surgical sclerostomy

- sclerotomies into the suprachoroidal space in both lower quadrants of the eye should be made to determine if suprachoroidal fluid or blood is present

c) Chandler Procedure

- 22 gauge needle

Chandler's vitreous operation.

(A) After a conjunctival incision, a radial scleral incision is centered 3.5 mm behind the external limbus.

(B) A Wheeler knife is used to pierce the uvea and enter the vitreous cavity. The knife is kept away from the lens by aiming it toward the optic nerve head.

(C) An 18-gauge needle is inserted 12 mm into the eye.

(D) A syringe is attached and 1 ml to 1.5 ml of fluid is aspirated.

(E) A very large air bubble is placed in the anterior chamber to deepen it to abnormal depth.

d) cyclocryotherapy

Complications (Duanes')

- 1) hypotony
- 2) cataract
- 3) choroidal hemorrhage
- 4) VH
- 5) pain
- 6) inflammation
- 7) scleral thinning
- 8) macular edema
- 9) phthisis
- 10) increased IOP
- 11) decreased vision
- 12) intraocular bleeding
- 13) anterior segment necrosis
- 14) scleral staphyloma

Indications for cyclodestructive procedure (Duanes')

Need to lower IOP and:

- 1) poor macular function

- 2) anticipated problem from performing intraocular surgery (medical status, choroidal hemorrhage)
- 3) anticipated inability to develop satisfactory conjunctival flap for filtration procedure
- 4) difficulty with patient related to hospitalization
- 5) **Not** neovascular glaucoma ??
 - For neovascular glaucoma (Shields - 1987): some feel the treatment for neovascular glaucoma is just for the pain and therefore cryo is not helpful; others feel pain is part of the problem and should be treated directly
 - commonly used in psudophakes with inflammation or neovascular changes
 - It rarely is used in phakic patients because it is highly cataractogenic
 - Cyclocryotherapy has been advocated as appropriate treatment for patients with blind, painful eyes and elevated IOP but this is rarely justified

Indications for cyclodestructive procedure (Jakobiec)

- the patient has uncontrolled IOP despite maximum tolerated therapy and:
 - 1) Has failed prior filtration surgery and is expected to fail further glaucoma surgery
 - 2) Has a type of glaucoma in which failure is the most likely outcome of filtration surgery (neovascular, inflammatory, post PKP, post scleral buckling)
 - 3) Has lost ambulatory level vision and is being treated for comfort or to prevent further visual loss
 - 4) Is not a surgical candidate for filtering surgery for general medical reasons

	Cyclocryo	Transscleral	Contact	Endoscopic Ultrasound	
Cost	Low	Moderate	High	High	High
Convenience	High	High	Moderate	Low	Moderate
Special Equip	No	Yes	Yes	Yes	Yes
Availability	Great	Fair	Poor	Low	Low
Portability of Equipment	Easy	Fair	Fair	No	No
Experience	Most	Great	Moderate	Small	Small
Morbidity	High	Low	Low	Low	Moderate
Ease	Easy	Easy	Easy	Hard	Hard
Effectiveness	Great	Good	Good	Good	Fair
Serious compl. Complications	Frequent	~5%-10%	~5%-10%	Uncommon	Common
External infl.	Marked	Mild	Mild	Moderate	Marked
Internal infl.	Marked	Moderate	Moderate	Moderate	Mild

Technique (cyclocryo)

- Can pick other quadrants (personal preference)
- 6-8 applications spread over the inferior two quadrants, avoiding the 3 and 9 o'clock positions.
- If IOP does not fall adequately within 1 week, the procedure is repeated, treating the two quadrants between 12 and 6 o'clock, and avoiding the 3 o'clock position.
- If pressure is still not lowered adequately, a third treatment is placed in the superior two quadrants.
- Applications should be centered over the ciliary body
- Because the position of the ciliary body relative to the limbus varies from eye to eye, an effort should be made to locate the ciliary body before the procedure is done (indirect or transillumination)

- if this site is close to the limbus, it is better to place the applications slightly more posteriorly to ensure that the iceball does not extend into the cornea, where it could damage the corneal endothelial cells

- 1) retrobulbar anesthesia
- 2) Calipers mark a point on the bulbar conjunctiva 4 mm from the limbus
- 3) Linde unit 2.5-mm probe straddles the mark made in the sclera
- 4) Probe temperature is lowered to -60°C and maintained in contact with sclera for 30-60 seconds after a 6 mm iceball forms

- cyclocryotherapy frequently is followed by a prompt rise in IOP

- 5) a carbonic anhydrase inhibitor and an osmotic agent should be given in full doses when cryotherapy is performed (if no contraindication)
- 6) IOP should be monitored carefully, especially for the first 4 hours

Postop:

- 1) atropine
- 2) steroids (a lot)
- 3) NO PILO

Less Treatment in Cyclodestructive procedure

- 1) < 10 years old
- 2) > 60 years old
- 3) previous good response to cyclo
- 4) only eye

More treatment with cyclodestructive therapy

- 1) blue eyes
- 2) previous poor response to cryo
- 3) need to lower IOP quickly
- 4) need to lower IOP markedly

e) goniotomy

- direct visualization

f) trabeculotomy

- scleral flap
- rotate Harm's? probe

h) intraocular inflammation: posterior Sub-Tenon's steroids

Indications

- when steroid drops cannot control inflammation in:
 - 1) Pars planitis - to prevent CME
 - 2) uveitic glaucoma - to prevent CME
- always see if patient is a steroid responder to topical steroids first
- a well placed posterior Sub-Tenon's is not likely to give glaucoma

Technique (like retrobulbar, fornix approach)

- 1) pledget with proparacaine to conj for 1-2 minutes
- 2) use 5/8 inch 25G needle
- 3) insert 2 mm above fornix through conj, at level of temporal limbus
- 4) insert entire needle (15mm)

- 5) draw back
- 6) inject 0.1 cc of long acting steroid (eg. Triamcinolone)
- 7) optional: inject with 0.1 cc of lidicaine minutes before steroids

IV) Instruments

- Kelly punch: used in phaco-trab