Best Practices for Retinal Detachment Repair

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Retinal Detachment Repair

• indications & complications
  – pneumatic retinopexy
  – scleral buckle
  – vitrectomy
  – vitrectomy / buckle
Pneumatic Retinopexy

- uncomplicated retinal detachments
  - retinal break located superior 8 clock hours
  - able to maintain specific head posture

Pneumatic Retinopexy

- procedure
  - retinopexy
    - cryo
    - laser
  - gas injection
    - 0.3cc 100% C3F8
    - 1cc covers 4 clock hours

Pneumatic Retinopexy

- review of >4,000 eyes over 21-year period
  - single operation success 75%
    - new retinal breaks 12%
    - PVR 5%
  - final operation success 96%
    - final anatomic and visual outcomes are not disadvantaged by initial pneumatic retinopexy

Factors affecting single operation success

- lens status
  - phakic 71-84%
  - pseudophakic 41-67%
- extent of detachment
  - inverse relationship
- number of breaks
  - inverse relationship
Pneumatic Retinopexy

- largest series by one surgeon (302 eyes)
  - subgroup had 97% single operation success
    - lens status - phakic
    - extent of detachment - one quadrant
    - number of breaks - one
    - location of break - upper two-thirds

Pneumatic Retinopexy

- especially useful for
  - phakic
  - one quadrant detachment
  - one break
  - located upper 8 clock hours

- must have a PVD

Pneumatic Retinopexy

- reported success with more complex detachments
  - large breaks
  - multiple breaks
  - posterior breaks
  - inferior breaks
  - giant retinal tears/dialyses
  - PVR
Pneumatic Retinopexy

• reported success with more complex detachments
  – multiple breaks

Pneumatic Retinopexy

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  – multiple breaks

Pneumatic Retinopexy

• reported success with more complex detachments
  – inferior breaks

Pneumatic Retinopexy

• reported success with more complex detachments
  – inferior breaks
Pneumatic Retinopexy

- reported success with more complex detachments

  giant retinal tear
dialysis

- early PVR

  A - pigment clumps
  B - rolled edge
Pneumatic Retinopexy

• reported success with more complex detachments
  – early PVR

A - pigment clumps
B - rolled edge
C - star fold

• other arguments for pneumatic retinopexy
  – avoids complexities and complications of scleral buckling surgery

ouch!
does anybody really use all of these?
courtesy of Karen Gehrs

Pneumatic Retinopexy

• despite occasional reported success, **bad** procedure for
  • large breaks
  • multiple breaks
  • posterior breaks
  • inferior breaks
  • giant retinal tears/dialyses
  • early PVR

Pneumatic Retinopexy

• other arguments for pneumatic retinopexy
  – avoids complications of vitrectomy surgery

subretinal PFCL
retained anterior chamber PFCL
Pneumatic Retinopexy

- Despite occasional reported success, **bad** procedure for
  - large breaks
  - multiple breaks
  - posterior breaks
  - inferior breaks
  - giant retinal tears/dialyses
  - early PVR

- Avoid eyes with high risk of redetachment
  - Retinal detachments associated with high myopia, trauma, uveitis, vitreous hemorrhage, choroidal detachment

Pneumatic Retinopexy

- Highest single operation success
  - Phakic
  - One quadrant detachment
  - One break
  - Located upper 8 clock hours

Scleral Buckle

- Especially useful for
  - Phakic eyes
  - Absence of PVD
Scleral Buckle

- especially useful for
  - phakic eyes
  - absence of PVD

- not ideal for
  - very large breaks
  - very bullous detachments

Retinal Dialysis

- especially useful for
  - phakic eyes
  - absence of PVD

- not ideal for
  - very large breaks
  - very bullous detachments

- bad procedure for
  - posterior break(s)
  - coexisting vitreous hemorrhage
  - coexisting choroidal detachment
Scleral Buckle

- especially useful for
  - phakic eyes
  - absence of PVD

Young Myope, Round Holes, No PVD

edge of RD
subretinal bands

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peripheral holes all quadrants
Scleral Buckle
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  - phakic eyes
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Young Myope, Round Holes, No PVD

edge of RD
subretinal bands
subretinal bands
peripheral holes all quadrants
fovea attached

post-op year #1
20/20

Scleral Buckle
- for almost all detachments
  - #42 encircling band

- for myopes with severe pathology
  - #220 / #240 encircling

avoid complications
- adjust buckle to achieve appropriate height

courtesy of Karen Gehrs
Scleral Buckle

- avoid complications
  - subconjunctival lashes

- Once exposed, likely will need to be removed
  - Exposed SB
  - Coag neg staph 50%, atypical mycobacteria

- hypotonia
  - fungus
  - 220/240

- Pseudallescheria boydii
  - 12 yrs prior
  - 9 mos sx
  - Many antibx

Scleral Buckle

- avoid complications
  - exposed buckle
  - infected buckle
    - Pseudallescheria boydii

- manage complications
  - infected buckle
  - orbital cellulitis
Scleral Buckle

• manage complications
  – Miragel buckle
  • cryoprobe
  • curette
  • suction cannula
Vitrectomy

- most common procedure for RRD
  - advances
    - wide angle viewing
    - chandelier lighting
    - high speed cutter
    - illuminated / articulating laser
    - small gauge surgery
    - valved cannulas

Vitrectomy

- wide angle viewing – non-contact
  - BIOM
    - 120 degrees

If view becomes compromised while using BIOM, switch to Avi lens

Vitrectomy

- wide angle viewing - contact
  - AVI
    - 130 degrees
  - Volk

Vitrectomy

- wide angle viewing - contact
  - AVI
    - 130 degrees
  - Volk

If view becomes compromised while using BIOM, switch to Avi lens
Vitrectomy

- chandelier illumination
  - 4th sclerotomy
  - 23 or 25 ga cannula
  - wide cone angle
  - enables scleral depression without an assistant
    - vitreous cutter
    - diathermy

Vitrectomy

- high speed cutter
  - 5000 cuts / min
  - improved surgeon control

Vitrectomy

- illuminated / articulating laser
  - 20 & 23 ga
  - enables scleral depression without an assistant

Vitrectomy

- valved cannulas
  - 23 & 25 ga, length 4 mm
  - low friction silicone septum

23ga  25ga
**Vitrectomy**

- especially useful for
  - pseudophakic eyes
  - superior breaks
  - very large breaks
  - bullous detachments
  - posterior breaks
  - coexisting vitreous hemorrhage
  - coexisting choroidal detachment

- avoid retained subretinal perfluorocarbon
  - incidence 11% of cases (in tertiary referral practice)
  - risk factors
    - large break(s)
Vitrectomy

- avoid retained subretinal perfluorocarbon
  - incidence 11% of cases (in tertiary referral practice)
  - risk factors
    - large break(s)
    - large retinectomy
      - 360 degree, 40%

S/P PVR Surgery

- subretinal PFCL

6 months later – migration of subretinal PFCL

Subretinal PFCL

- absolute scotoma over PFCL
- relative scotoma at site of vacated PFCL

CHANGES IN RETINAL SENSITIVITY FROM RETAINED SUBRETINAL PERFLUOROCARBON LIQUID

high stimulus

low stimulus
Vitrectomy
- subretinal perfluorocarbon bubbles
  - consider removal since subfoveal

Vitrectomy
- subretinal perfluorocarbon bubbles
  - no intervention, but watch for migration

Vitrectomy
- subretinal perfluorocarbon bubble

Vitrectomy
- s/p subretinal perfluorocarbon removal
  - soft tipped cannula
Vitrectomy

• Prevention of retained subretinal perfluorocarbon
  – decrease turbulence
  • lower infusion pressure

• 20-gauge better than 23-gauge
  – 20-gauge: 2%
  – 23-gauge: 10%

• valved cannulas

• saline rinse

23ga 25ga
Vitrectomy

- Prevention of retained subretinal perfluorocarbon
  - saline rinse after fluid-air exchange
    - 25 gauge needle, TB syringe
    - 10 drops of BSS on macula
    - aspirate with soft tipped cannula

Vitrectomy

- avoid complications
  - attempted removal during fluid-air exchange but view became compromised

Vitrectomy

- alternative to perfluorocarbon liquid
  - drainage retinotomy
    - increasing in popularity

Perfluorocarbon Liquid

- summary
  - avoid retained PFCL
    - saline rinse, especially in cases with large breaks / retinectomy
  - remove subretinal PFCL when subfoveal or perifoveal
    - PFCL causes absolute scotoma
    - PFCL can migrate
  - alternative
    - drainage retinotomy
Vitrectomy

• avoid complications
  – aim for oil at pupil plane
  – avoid oil in anterior chamber
  – do not overfill !!!

Vitrectomy

• watch for silicone oil emulsification

Vitrectomy

• caution if silicone IOL
  – emulsification: inverse hypopyon

Vitrectomy

• caution if silicone IOL
  – same patient, after oil removal
Vitrectomy
• possible new way to remove oil from IOL
  – polydimethylsiloxane
    • hydrophobic
    • in vitro experiment

Vitrectomy
• possible new way to remove oil from IOL
  – polydimethylsiloxane
    • hydrophobic
    • ex vivo

Vitrectomy
• possible new way to remove oil from IOL
  – polydimethylsiloxane
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Vitrectomy
• avoid complications
  – suture the sclerotomies
    • sunconjunctival oil droplets
**Vitrectomy**

- Avoid oil leakage from sclerotomies
  - Granulomatous reaction to subconjunctival oil

**Vitrectomy / Buckle**

- Especially useful for
  - Inferior breaks
  - Eyes at high risk for PVR
    - Post-trauma (especially open globe injuries)
    - Uveitis
    - High myopia
    - Large breaks (giant retinal tears)
    - Multiple breaks
    - Vitreous/subretinal hemorrhage
    - Choroidal detachment
    - Early PVR (pigment clumps, rolled edges)

**Redetachment due to PVR after Open Globe Injury**

- Risk factors:
  - Vitrectomy-buckle protected from RD-PVR compared with vitrectomy alone
    (adjusted HR: 0.58, p=0.04)

**Time to Redetachment due to PVR by Risk Factor**

- Time to detachment by buckle status
Vitrectomy / Buckle

- avoid complications
  - retinal fold

Retinal Detachment Repair

- pneumatic retinopexy
  - phakic, one quadrant, one break, superior break, PVD

- scleral buckle
  - phakic, absence of PVD (dialysis, myope with holes)
  - can also be used for most detachments

- vitrectomy
  - pseudophakic, superior breaks, large breaks, multiple breaks, posterior breaks, bullous, hemorrhage, choroidal detachment

- vitrectomy / buckle
  - inferior breaks, eyes at high risk for PVR (trauma, etc.)