WHAT COULD POSSIBLY GO WRONG? UNEXPECTED COMPLICATIONS FOLLOWING OPHTHALMIC PROCEDURES

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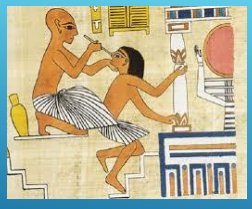


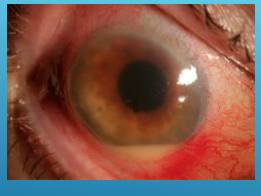
EYE SURGERY HAS A LONG HISTORY

WHAT DOES **SUCCESSFUL** CATARACT SURGERY LOOK LIKE?

- Excellent outcome for the patient, family, and staff
- Primary prevention of pain/infection/inflammation
- Perfect vision with no need for glasses and no side effects
- Pleasant memories of a warm and positive experience

GOALS OF CATARACT SURGERY

WHAT COULD POSSIBLY GO **WRONG**?



Two very serious post operative complications…

ENDOPHTHALMITIS

TOXIC ANTERIOR SEGMENT SYNDROME (TASS)

A BAD DAY IN THE OFFICE!

PREVENTION IS POSSIBLE:

- Povidone iodine
- Antibiotic prophylaxis - current trend is toward injection of antibiotic at the end of cataract surgery
- Sterile processing and technique

ENDOPHTHALMITIS AND TASS

LET'S START WITH ENDOPHTHALMITIS…

- The patient's own ocular surface
- Contaminated surgical instruments
- Surgical complications and increased instrumentation – particularly cases involving broken posterior capsule and/or vitrectomy
- Type of incision – clear corneal incisions require good construction and sealing to avoid leakage
- Poor or delayed wound healing
- Preoperative blepharitis or other ocular surface inflammation
- Older patient age
- Diabetes mellitus
- Male gender

ENDOPHTHALMITIS RISK FACTORS

CAUSES OF ENDOPHTHALMITIS

- Mainly bacterial, particularly gram positive cocci
- Severity of infection correlates to size of inoculum, virulence of bacteria and host immune response
- Worse outcome if streptococci (exotoxins) or gram negative bacteria such as Pseudomonas aeruginosa
- Occasional infection with fungi (especially filamentous fungi such as Aspergillus)
- Rarely parasitic
- Newer technologies such as polymerase chain reaction (PCR) are now implicating a causative role for certain viruses (torque teno virus) in cases of culture-negative endophthalmitis

ENDOPHTHALMITIS

- Historically, intraocular surgery had a rather high rate of infection (~10%)
- Usually presents in first week postoperatively (usually day 3-4), but can present much later with certain bacteria (e.g. P. acnes)
- Outbreaks can occur and need prompt investigation.

HOWEVER – There is good news!

- Advances in surgery and universal use of povidone iodine have now reduced the rate of endophthalmitis to around 1/1000-2000
- Newer use of intracameral/intravitreal antibiotics at the end of cataract surgery has been proven to reduce the rate further to about 1/2000-4000

ESCRS STUDY – BARRY, ET AL (2007)

- European study looked at the value of intracameral (within the anterior chamber) cefuroxime in preventing endophthalmitis
- Approximately 16,000 cases enrolled in study
- Prospective longitudinal study – only one on this topic
- Four arms involved (all used pre and postop povidone iodine and levofloxacin 0.5% drops QID for 6 days postop):
  1. No intracameral injection and placebo drops x 5 pre and postop
  2. Intracameral cefuroxime and placebo drops x 5 pre and postop
  3. No intracameral injection and levofloxacin 0.5% drops x 5 pre and postop
  4. Intracameral cefuroxime and levofloxacin 0.5% drops x 5 pre and postop

ESCRS STUDY RESULTS

- Generally five times more endophthalmitis risk in the groups without intracameral cefuroxime vs the groups with intracameral
- Pre and postop levofloxacin x 5 had a mild effect on preventing endophthalmitis (laborious schedule – one hour preop, half hour preop, immediately postop, 5 minutes postop, 10 minutes postop)
- Recommendations include universal use of povidone iodine pre and postop, intracameral antibiotic at the end of surgery, proper sterilization techniques, single-use equipment

ESCRS STUDY

ALSO WORTH NOTING…

- Microbial spectrum of culture-positive endophthalmitis varies depending on use of intracameral antibiotics and geographic location
- Enterococci predominate over staphylococci in Sweden due to routine intracameral cefuroxime use and gram negative bacterial infections are more common in India and China
- No MRSA cases were reported in the ESCRS study, but they did recommend vancomycin injections in confirmed MRSA carriers
- More recent reports of intracameral vancomycin causing hemorrhagic occlusive retinal vasculitis (rare event)

KAISER PERMANENTE STUDY – HERRINTON, ET AL (2013)

- Longitudinal, observational study of 315K eyes of 204K patients
- Looked at incidence of endophthalmitis with and without intracameral antibiotic (either moxifloxacin or cefuroxime)
- In the topical antibiotic only group - gatifloxacin, ofloxacin, and polymyxin B/trimethoprim all performed equally well, but aminoglycosides (neomycin, gentamicin, tobramycin) were associated with a higher rate of endophthalmitis
- Posterior capsule rupture associated with 3.7 fold increase in risk of endophthalmitis (no differences between intracameral and topical groups)
- Twofold decrease in risk of endophthalmitis with intracameral injection with or without topical antibiotic (no significant differences based on moxifloxacin vs cefuroxime) vs topical antibiotics alone

FRENCH STUDY – CREUZOT-GARCHER, ET AL (2016)

- Looked at French national database from 2005-2014
- 6.3M eyes of 3.9M patients
- Mean incidence of endophthalmitis 0.105% declined during the 10 years of the study period from 0.145% to 0.053%
- Use of intracameral antibiotics increased from 0.60% to 80% over the same time period
- Antibiotic used was likely cefuroxime (Aprokam commercially available in Europe)
- Proved association between increasing use of intracameral cefuroxime and decreasing rate of endophthalmitis

INTRACAMERAL ANTIBIOTICS ARE RECOMMENDED TO HELP PREVENT ENDOPHTHALMITIS

CURRENT OPTIONS FOR INTRACAMERAL ANTIBIOTICS

- All options need to be compounded in the United States – Imprimis is the current market leader
- Dropless cataract surgery injections usually given transzonular into the vitreous with triamcinolone included (e.g. Imprimis' TRI-MOXI or TRI-MOXI-VANC)
- Cefuroxime preferred at Kaiser Permanente unless confirmed allergy – then moxifloxacin
- Some surgeons are using commercially available moxifloxacin straight from the dropper bottle into a syringe – not recommended
- Cost issue – currently no way to legally bill patient or insurer for cost of off-label intracameral drugs

HOW DO WE HELP PREVENT TASS?

TOXIC ANTERIOR SEGMENT SYNDROME (TASS)

- To be distinguished from endophthalmitis
- Presents with inflammation and little pain, possible late eye pressure elevation
- Resolves with topical/systemic steroids
- Usually occurs 12-24 hours after surgery and is culture and gram-stain negative
- Local outbreak of cases occurs
- Focus on prevention
- Caused by detergents, preservatives, bacterial endotoxin (ultrasound bath), talc, anesthetic and a variety of other contaminants on intraocular instruments

TASS PREVENTION

- Prevention involves quality control in sterile processing
- Instruments should be kept moist and fully cleaned prior to sterilization
- Viscoelastic material should not be allowed to dry on instruments
- Use sterile distilled or deionized water to clean instruments
- Take care to fully rinse all detergents and avoid glutaraldehyde
- Sterilize ophthalmic instruments separately from non-ophthalmic instruments
- Avoid flash sterilization if possible
- Single-use disposable cannulas and tubing should be used – avoid reusable tubular instrumentation

ENDOPHTHALMITIS CASE STUDY

NORTHWEST SURGICARE

- First ambulatory surgery center in Illinois – established in 1974
- Accredited by AAAHC
- SCA affiliate
- Primarily ophthalmology and orthopedics
- 2,500-3000 cataract procedures performed annually
- Alcon LenSx femtosecond laser online since Feb 2015

ENDOPHTHALMITIS OUTBREAK

- Noticed first few cases of endophthalmitis in Aug-Sept 2015
- Pointed out by our retina specialists who were handling the cases
- Brought up at our ophthalmology section meeting:
  - Could be due to incomplete betadine prep before surgery
  - We could be catching up on our statistics
  - Monitor for trend and get help from SCA specialist as needed

ENDOPHTHALMITIS OUTBREAK

- Seven cases of endophthalmitis between August 2015 and May 2016 at our surgery center
- One culture negative, two coagulase negative staph, one Staph lugdunensis/Staph epi, one Strep mutans (<24hrs after surgery), and two without culture results in chart
- Three standard phacos (two with iStent), two LenSx cases (one LRI and one toric), one phaco with intraoperative IOL exchange due to torn primary IOL, one planned IOL exchange PCIOL for ACIOL (worst outcome)
- Most cases did well with either vitrectomy or tap and inject

INVESTIGATION

CALLED IN SCA SPECIALIST TO INVESTIGATE THE OUTBREAK

- Recommended changing the ultrasonic cleaner water daily (rather then when visibly soiled) and using sterile distilled or deionized water to clean instruments and fill ultrasonic cleaner
- Obtain proper cleaning instructions for ultrasonic cleaner and test efficacy weekly with a foil test
- Use only sterile distilled or deionized water in the ultrasonic cleaner - no detergent
- Also recommended not using tap water rinse or a bowl to soak instruments - rather rinse without soaking in distilled water after ultrasonic cleaning

INVESTIGATION

- Purchase proper cleaning kit with aspiration brush for phaco handpieces and automated AOI QuickRinse system rather than manual flushing with syringe – make sure each lumen is flushed with water and air
- Peel pack additional key instruments in order to avoid flashing entire trays (we have 12 full cataract trays)
- Try to use disposable cannulas and phaco tips to prevent infection and TASS outbreaks
- Label syringes appropriately including initials of person who drew them up and time the medication is beyond use. Ensure that medication are disposed of if not used within a 1 hour window.

NEXT STEPS

- The endophthalmitis outbreak at our surgery center has subsided with no new cases this quarter
- We have purchased and implemented the new sterile processing equipment per the recommendations from the SCA investigator
- We are also working on our team to assure that sterile technique and betadine prep is uniform among staff
- We are going to implement an intracameral antibiotic prophylaxis program in the near future which is sensitive to cost and safety

THANKS FOR YOUR ATTENTION!