Drug Administration Tech.

DRUG Gati aqueous conc at surgery onset (µg/ml).
Moxi aqueous conc at surgery onset (µg/ml)

1 gtt QID x 2d
0.19 ± 0.23
0.38 ± 0.32

1 gtt QID x 2 d + Q15min x 3 pre-op (2h)
0.82 ± 0.31
2.16 ± 1.12

1 gtt QID x 4d + in wick
0.22 ± 0.07
0.88 ± 0.46

1 gtt QID x 4d + in wick + pre-op x 1
0.30 ± 0.21
0.97 ± 0.63

MIC (mg/L) Endophthalmitis
0.09 - 0.38
0.06 - 0.19

*Preop Topical G4 Fluoroquinolones achieve cidal aqueous levels at the beginning of surgery.

Intracameral antibiotic prophylaxis: Drugs that have been used & reported.

In every study, intracameral use significantly reduces the rate of post-operative endophthalmitis.

Recent Intracameral Cephalosporin & Moxifloxacin Data as Baseline References for Infection Rates

Are other intracameral antibiotics better than cefuroxime?

- ESCRs starting a European Endophthalmitis registry.
- ESCRs trying to enforce cefuroxime use across Europe
- The ESCR study did not compare efficacy of different IC antibiotics. It tested only IC cefuroxime.
- Recent ISBCS study (International Society of Bilateral Cataract Surgeons) compared different regimens.
- Huge numbers are needed to prove superiority of one antibiotic over another (because of the extremely low incidence of post-operative endophthalmitis in all groups).
- Both vancomycin and moxifloxacin tended to have lower infection rates than cefuroxime.
### Commercial Intracameral Cefuroxime

**Cefuroxime (Aprokam®):**
- Laboratories Thela 28/11/2012
- 50 mg anhydrous cefuroxime
- Reconstituted with 5 ml saline.

Contains 1mg. cefuroxime/0.1 ml.

### Issues with Different Antibiotics

1. **Vancomycin** - longest history, low resistance freq.
   - Does not cover gram negatives (5% infections).
   - Complex dilution.
   - Agent of last resort.

2. **Cefuroxime** - ESCRs study agent
   - MRSA & CNS, gm-ves, enterococci not covered
   - Complex dilution – errors ↠ TASS
   - Fusarium contamination – 8 cases in Turkey
   - Allergy, Anaphylaxis.

3. **Moxifloxacin** – broadest spectrum, easy to dilute, dose dep.
   - Increasing resistance
   - Not available as single dose commercial preparation.
   - Retinal detachment rate increased with ciprofloxacin?
   - Bilateral iritis & iris transillumination with systemic moxi.

### Does Moxifloxacin Have Advantages over Cefuroxime and Vancomycin?

1. Readily available - Vigamox, Alcon (non-preserved).
2. Uncomplicated to dilute.
   - Dose = 1250 μg/ml (0.1 cc x 12.5 cc = 0.1 cc/ml in AC)
   - Mix 3 ml Vigamox® + 7 ml BSS in 12 cc syringe.
   - Even if an infection occurs, it will likely be moxifloxacin resistant Staphylococcus, which is very sensitive to the usual endophthalmitis protocol of vancomycin & cefazolin, whereas infections that occur with IC cefuroxime are often with destructive resistant bacteria, such as enterobacter.
4. Drug allergy very rare with moxifloxacin.

*Personal communication: Per Morton MD*

### Injectable Moxifloxacin Now Available (2013 10)

- **4 Quin PFS** (prefilled syringe)
  - Manufacturer: Contacare Ophthalmics, Gujarat, India.
  - Marketer: Entod Pharmaceuticals Ltd., Mumbai, India.
  - 0.5% moxifloxacin (in H2O) prefilled syringe – 1 ml.

### Endophthalmitis in Bilateral Cataract Surgery

<table>
<thead>
<tr>
<th>IC Antibiotic</th>
<th>No. events</th>
<th>Endophthalmitis (PFS) cases</th>
<th>POE rate</th>
<th>PE rate</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediately Sequential Bilateral Cataract Surgeries only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No IC antibiotic</td>
<td>23,947</td>
<td>12</td>
<td>1:1,947</td>
<td>0.055</td>
<td>reference</td>
</tr>
<tr>
<td>Cefuroxime (cef)</td>
<td>45,873</td>
<td>5</td>
<td>1:9,175</td>
<td>0.05</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>15,240</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.01</td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>10,094</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Immediately &amp; Delayed Sequential Bilateral Cataract Surgeries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>19,722</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.17</td>
</tr>
<tr>
<td>Moxifloxacin &amp; Vancomycin</td>
<td>35,104</td>
<td>1</td>
<td>1:31,194</td>
<td>0.003</td>
<td>0.22</td>
</tr>
<tr>
<td>All IC antibiotics cases (vs. no IC)</td>
<td>100,245</td>
<td>0</td>
<td>1:14,900</td>
<td>0.004</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

*p = www.openepi.com 2 sided Mid-p exact

### Comparison of Rates of Endophthalmitis

**European Cephalosporin studies:**
- 1:311 > 80%: 1:1,977

**Swedish NCR 2006-10**
- 1:255: 1:3756

**Hatch (2015) unselected ON, Can.**
- 440K: 1:717

**American Topical Antibiotic Studies**
- Jensen (cns 2004) Moran Eye, Utah
- Arshinoff & B nastelli ISBCS 2011
- ISBCS Surgeon ISBCS + DSBCS cases

**Projected BSE Risk = risk x linkage (3) = ~ 10-100M**
Current anti-infective protocol – SAA

- Vigamox® gtt 1 gtt q 15 min x 4 preop
- Betadine gtt 5% solution 10 min preop.
- Betadine scrub 10% solution prep to paint eye preop.
- Moxifloxacin intracameral, intracapsular at end of case.
  - 300 µg in 0.2 cc BSS (⇒ 1 mg/ml in AC)
- Vigamox® gtt 1 gtt 6x/d x 3 days, then QID x 7 days.

ISBCS & IC Antibiotics: SAA Personal Experience to 12 2013
ISBCS performed routinely: 1996 01 - 2013 12 (17 yrs)

- All cataracts 1996 01 to 2013 12 31
  - ISBCS Eyes = 11,074
  - DSBCS or UCS = 8,558 (77.3%)
  - IC Vigamox Cataracts
    - Endophth. cases = 2
      - 1 resistant trauma 2 weeks post op
      - 1 unilateral most resistant S. ep 2011 01
        (1,000 at 300 µg/0.2 cc⇒ 9 µl)
  - IC Vancomycin cataracts
    - Endophth. Cases = 0
    - No IC antibiotics, all UCS = 6,797 (2004 12 - 2013 13)
  - Endophth. cases = 1

The 3½ big fears with ISBCS

1. Preferred practice patterns & collegial hostility.
2. Post operative retinal detachment (too late to matter)
3. *IOL power errors in 1st eye, correctable for 2nd?*
   (resolved by OUL & Lenstar, Heiga & Olson Eqns. & ASCRS post Refr. Surg. Calc.)
4. Bilateral post operative endophthalmitis (BSE) & TASS (Toxic Anterior Segment Syndrome).

Advantages of ISBCS

1. Overcomes fear for patient who had a problem with 1 eye.
2. More improvement after 2nd eye surgery than 1st.
3. Immediate rehabilitation of visual system
4. Better planning of refractive result
   - no period of anisometropia.
5. Fewer patient visits (traffic accident deaths).
6. Improved care by hospital staff.
7. Unusual patients (Christopher)

IC xylo-phe

1. Add minim (0.3 cc) 10% phenylephrine to 5 cc BSS in 6 cc syringe (⇒ 0.57%, diluted 17.7x).
2. Add 2-3 drops of above phenylephrine solution to xylocaine (Astra 1% non-preserved insotonic xylo polyamp) on scrub tray (⇒ 0.03%, diluted ≥300x).
3. Inject 0.1 cc IC xylo-phe thru side port. (1)
   - Almost all pupils dilate to 8-9 mm in 10 seconds.
4. Inject 0.1 cc IC xylo-phe under OVD. (2)
   - 1 more mm of pupil dilation.

IC xylo-phe: Why it works so well.

• Xylocaine completely paralyzes sphencter.
• Phenylephrine aggressively stimulates dilator.

Benefits:
- Maximally enhances iris tone.
- Great for all cataract cases.
- Adequate for 90+ % IFIS cases.
- Safe
The Tri-Soft Shell Technique (TSST) is a logical system of unification of all previous soft shell techniques to make them all easier to understand & perform.

**TRI-SOF SHELL TECHNIQUE (TSST):**
Enhanced by adding BSS below the cohesive OVD

Dispersive OVD
Cohesive or Viscoadaptive OVD
BSS
Capsulorhexis is easier when BSS is injected onto the capsule surface, beneath any viscous cohesive OVD.

The presence of an aqueous layer in TSST, along with the use of pulsed phaco, assures that phaco wound burns never happen.

**TSST**

The Tri-Soft Shell Technique (TSST) is a logical system of unification of all previous soft shell techniques to make them all easier to understand & perform.

**ULTIMATE SOFT SHELL TECHNIQUE (USST)**

Pre Capsulorhexis Step

Pre IOL Implantation Step

**Tri-Soft Shell Technique (TSST)**

Dispensive (viscoat) filled space (injected 1st)
Viscoadaptive (Healon5) filled space (injected 2nd)
BSS filled space (injected 3rd)
Incision

If you would like this xylo-phe formulation & use sheet, please email me at: ifix2is@sympatico.ca
Conclusions: IC Antibiotics, ISBCS, XYLO-PHE, TSST

1. All studies, irrespective of background infection rate, demonstrate 80+% reduction in endophthalmitis with IC antibiotics. Moxifloxacin appears to be best @ 300 µg/0.2 cc, (diluted 3:7 with bss).

2. XYLO-PHE makes surgery much easier.

3. TSST with variations, permits simpler surgery for the vast majority of cases.