KP Best Practice: Antibiotic Prophylaxis for Prostate Biopsy

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Antibiotic Prophylaxis

• Transrectal Ultrasound Guided Prostate Biopsy (TRUSPB)
  - Procedure associated with variable rates of infectious complications (<1%-20%) with prophylaxis
    • Would expect infections to include GNR, Enterococci, viridans strep, anaerobes and occasionally yeast
    • All infections in prospective and case review studies reveal coliform GNR, the overwhelming majority being E coli (~90% or more)
  - Abx prophylaxis regimens vary but all tend to include FQ, some institutions use cephalosporins
    • Bactrim resistance is too high
  - Procedure associated frequently with non-infectious complications
    • Hematuria, rectal bleeding, perineal pain or dysuria
  - As population ages, will become more common procedure
  - Number of core biopsies over last few decades has increased from six to twelve and even more in some instances
    • May carry an increased risk of complications, infectious and otherwise

Antibiotic Prophylaxis

• Should we use antibiotics?
• How long should we use them for?
• What should be used?
• What if resistance develops?
• What do we expect in the future?
Antibiotic Prophylaxis

• Should we use antibiotics?
• How long should we use them for?
• What should be used?

Antibiotic prophylaxis for transrectal needle biopsy of the prostate: a randomized controlled study
M. ARON, T.P. RAJEEV and N.P. GUPTA
Department of Urology, All India Institute of Medical Sciences, New Delhi, India

• 231 pts
  – Group 1 (75) placebo – 19 infections (25.3%)
  – Group 2 (79) single dose Cipro/Tinidazole – 6 inf (7.6%) \( p<0.01 \)
  – Group 3 (77) Cipro/Tinidazole for 3 days – 8 inf (10.3%) \( p<0.01 \)
• Of the 27 pos cx (24 urine, 3 blood)
  – 21 E coli
  – 4 Enterobacter spp
  – 2 Klebsiella spp
• Single dose vs 3 days not significant difference
• Pre-procedural enema had no effect on infection rate
• 537 pts randomized to Cipro or placebo (double blinded, prospective)
• 8% bacteruria and 2% hospitalized in placebo group
• 3% bacteruria and none hospitalized in Cipro group

Antimicrobial prophylaxis for transrectal prostatic biopsy: a prospective study of ciprofloxacin vs piperacillin/tazobactam

L. CORMIO, B. BERARDI, A. CALLEA, N. FIORENTINO, D. SIBLENDORIO, V. ZIZZI and A. TRAFICANTE
Department of Urology, Bari, Italy

• Pip/Tazo IM BID x 2 days vs Cipro PO BID x 7 days (72 vs 66 pts)
• 2.8% bacteruria in Pip/Tazo vs 4.2% in Cipro group [NS]
• none hospitalized in Pip/Tazo, one in Cipro group
• IM abx no better than oral abx

Original Article: Clinical Investigation

Prospective assessment of the efficacy of single dose versus traditional 3-day antimicrobial prophylaxis in 12-core transrectal prostate biopsy

Kamil Can, Ali Kayikci, Yavuz Akman and Ali Erol
Department of Urology, Duzce University School of Medicine, Duzce, Turkey

• 400 pts – randomized not blinded
  – 1st group (139) IM Ceftriaxone x 1 – 3 inf (2%)
  – 2nd group (131) 3 days Cipro – 2 inf (1.5%)
  – 3rd group (130) single dose Cipro – 2 inf (1.5%)
• E. coli (5), Klebsiella (1), Pseudomonas (1)
• Single dose vs 3 days no difference
• Comparing prior studies of 6 core vs present study 12 core biopsy w/o increased rate of infections
Antibiotic Prophylaxis

- Based on these studies the American Urological Association recommended a FQ antibiotic to be used for ≤ 24 hrs. (J Urology 179:1379-1390)
- If FQ could not be used, Gent and Flagyl was an alternative
- In the randomized controlled trials, 3 days was no better than 1 day of prophylaxis however, some authors feel that in certain situations such as long term immunosuppression or in pts with frequent or chronic urinary infections, that the longer course may be appropriate
- Because TRUSPB is a largely outpatient procedure, the oral, more bioavailable, less expensive FQ class of abx were preferred over all parenteral antibiotics
- Not part of the AUA guidelines, it is still not clear if pre-procedure enemas help prevent infectious complications in TRUSPB. If used, most authors recommended phosphate enemas over povidine/iodine.
Antibiotic Prophylaxis

• What if resistance develops?

Sepsis Due to Fluoroquinolone-resistant *Escherichia coli* After Transrectal Ultrasound-guided Prostate Needle Biopsy

Jennifer L. Young, Michael A. Liss, and Richard J. Szabo

- Description of 5 cases of FQ resistant E coli after TRUSPB from 2006 to 2008 (3 of 5 cultures due to ESBL producers)
- All with bacteremia, all received IM Gentamicin one hour before biopsy
- All had antibiotic use within 21 months of biopsy
- All blood isolates were Cipro resistant but Gentamicin sensitive, suggesting suboptimal dosing of Gentamicin (1.5 to 2 mg/kg recommended)
- Tailor prophylaxis to individual patient particularly if recent exposure to FQ class or history of infection due to ESBL organism
Multi-drug resistant E. coli urosepsis in physicians following transrectal ultrasound guided prostate biopsies—three cases including one death.

Carlson WH, Bell DG, Lawen JG, Rendon RA.
Department of Urology, Dalhousie University, Halifax, Nova Scotia, Canada.

Multi-drug-resistant bacteremia after transrectal ultrasound guided prostate biopsies in hospital employees and their relatives.

Kamdar C, Mooppan UM, Gulmi FA, Kim H.
Department of Urology, Brookdale University Hospital and Medical Center, Brooklyn, New York 11212, USA. kamdarciamack@yahoo.com

• 3 physicians and 3 hospital employees or their relatives reported with Cipro resistant E. coli bacteremia after TRUSPB
• Points to using broad spectrum abx if pts working in these environments present with infection post-biopsy
• Likely asymptomatic colonization by way of environment

One year of TRUSPB cases reviewed = 256.
Patients received Cipro 500mg BID and Flagyl 400mg TID for 3 days, both beginning 24 hrs prior to biopsy
• 7 of 256 with infection (2.7%), all due to Cipro resistant coliforms [5 E. coli, 1 Citrobacter, 1 Proteus], only 2 isolates were Gentamicin resistant.
• Infections felt to be due to asymptomatic carriage of ESBL producing organisms in the gut
• Selection for these organisms may be occurring with “early” prophylaxis as compared to “pre-op” prophylaxis
• Authors have switched to prophylaxis beginning 2 to 3 hrs prior to biopsy and for 48 hrs after biopsy, future results will be reported.
Antibiotic Prophylaxis

- Is timing important?

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THE TIMING OF PROPHYLACTIC ADMINISTRATION OF ANTIBIOTICS AND THE RISK OF SURGICAL-WOUND INFECTION

DAVID C. CLAUSEN, M.D., R. SCOTT EVANS, PH.D., STANLEY L. PEARSON, R.PH., SUSAN D. HORN, PH.D., RONALD L. MEDENOV, P.H.D., AND JERRY P. BURKE, M.D.

• “Early” denotes 2 to 24 hrs before incision
• “Preoperative” 0 to 2 hrs before incision
• “Perioperative” within 3 hrs after incision
• “Postoperative” more than 3 hrs after incision

- All pts received prophylaxis for minimum of 24 hrs after surgery and more than 80% received it for at least 48 hours. No difference in the duration of antibiotic prophylaxis detected among various timing groups.

Table 1. Temporal Relation between the Administration of Prophylactic Antibiotics and Rates of Surgical-Wound Infection

<table>
<thead>
<tr>
<th>Time of Administration</th>
<th>No. of Patients</th>
<th>No. (%) of Infections</th>
<th>Relative Risk (95% CI)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>369</td>
<td>14 (3.8%)</td>
<td>6.7 (2.9-14.7)</td>
<td>4.38 (1.8-10.4)</td>
</tr>
<tr>
<td>Preoperative</td>
<td>1708</td>
<td>10 (0.59)</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Perioperative</td>
<td>282</td>
<td>4 (1.4%)</td>
<td>2.4 (0.9-7.9)</td>
<td>2.1 (0.6-7.4)</td>
</tr>
<tr>
<td>Postoperative</td>
<td>488</td>
<td>16 (3.3%)</td>
<td>5.8* (2.6-12.3)</td>
<td>5.8** (2.4-13.8)</td>
</tr>
<tr>
<td>All</td>
<td>2847</td>
<td>44 (1.5)</td>
<td>—</td>
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</tr>
</tbody>
</table>
Antibiotic Prophylaxis

- Is Cipro still the optimal antibiotic?

- Study performed to see if oral Augmentin suitable for prophylaxis vs standard Cipro regimen
- Underlying urinary coliform Cipro resistance ~12% vs ~3% for Amox/Clav
- In Cipro group, 2 of 119 returned with sepsis (1.68%) vs 8 of 110 in Augmentin group (7.27%) [P=0.036]
- In Cipro group with infection 1 of 2 with bacteremia, E coli resistant to Cipro but sensitive to Amox/Clav
- In Augmentin group with infection 4 of 8 with E coli isolated, all sensitive to Augmentin, 3 of 4 isolates also sensitive to Cipro
- Suggests poor absorption, too low of a dose, poor tissue penetration or too short of a course of prophylaxis
- Authors feel it is poor GI absorption and poor tissue penetration
Vancouver Gen Hosp, 4749 TRUSPB between 2001 and 2006
- 24 (0.5%) returned with “urosepsis”
  - 22 had Cipro prophylaxis, 2 with Bactrim prophylaxis
  - 22 pts with 8 cores, 1 each with 10 and 12 cores
  - 16 with bld cx - all E coli, one with E coli and viridans strep
  - 12 with Ucx – all E coli except one Enterobacter
- All E coli Cipro resistant, most retained Gent sensitivity (81%), TMP-SMX sens (50%), Cefazolin sens (81%)
- Points to knowing local and regional resistance patterns
- Rate of infections low, Cipro still very useful in prophylaxis
- In the two pts who did not get Cipro prophylaxis, their isolates were cipro sens suggesting they were missed opportunities

### LAMC OUTPT

|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| ORGANISM SOURCE | ORGANISM SOURCE | ORGANISM SOUR
Antibiotic Prophylaxis

- Almost exclusively in urology, Fluoroquinolones (FQ) and Aminoglycosides (AG) are used for abx prophylaxis which leads to different resistance and side effect issues
  - Oral FQs are highly bioavailable and concentrate in prostatic tissues when taken orally, optimal timing of prophylaxis is 2 hours prior to procedure
  - Costs are less versus using IV abx
  - Increasing resistance being seen in community and in hospital to FQs, need to follow local antibiograms
  - ESBL producing gram negative rods on the rise in community and in hospitals, again follow antibiograms
    - Although ESBL producers typically cause resistance to beta-lactams, there is cross resistance to other classes of abx specifically FQ and less so AG
  - KPC-Klebsiella (Carbapenemase producing strains) also on the rise

New Delhi metallo-β-lactamase (NDM-1)
- resistance to carbapenems, AGs, FQs as well as all beta-lactam abxs
- new resistance gene among coliforms transmitted by plasmids
- found in pts returning from India and Pakistan after having medical procedures (“medical tourism”)
- only sensitive to Colistin and Tigecycline
Where to from here?

- Some suggestions in urology literature to look at TRUS-guided or template guided transperineal biopsy
- Historically less infectious complications
- Flora involved in infections typically skin related Gram positives and not GI related coliforms
- Technically more difficult and also very painful
- Requires special equipment