Multi-Drug Resistance and the Utility of Rectal Swab prior to Prostate Biopsy

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Multi-drug resistance and sepsis

• First report of multi-drug resistance related sepsis following TRUS guided prostate biopsy (Davidson 2006)
  – E. Coli

• Levofloxacin resistant E.coli related sepsis following TRUS biopsy (Miura 2008)
    • 4 cases (0.6%)
      – Levofloxacin prophylaxis
        » ¾ had previous quinolone exposure and ¾ had sepsis
      – Intravenous carbapenem
Prevalence of antimicrobial resistance in rectal flora

• Rectal swab prior to TRUS guided biopsy in 445/529 patients (75.1%) (Batura 2010)
  – Resistance to coliforms in the bowel flora
    • 0.2% resistance amikacin
    • 10.6% resistance to cipro
    • 13.3% resistance to coamoxiclav
  – 7/8 patients with UTI or sepsis had resistant coliform bacteria
    • In patients with infection related complication drug resistance high in blood and urine to quinolones
  – Strong correlation between antimicrobial sensitivity of swab to cultures from blood and urine
Prevalence of antimicrobial resistance in rectal flora

- E. Coli resistance in men undergoing repeat TRUS guided biopsy (Liss et al 2011)
  - Multi-institutional study (three centers)
    - Rectal swabs from 136 men over 14 month period
      - 33 men with no previous biopsy served as controls
    - Selective media used to isolate resistant E. coli
      - Questionnaires prior to and 7 days following biopsy
  - Total of 30 (22%) patients had quinolone resistant E.Coli
    - Controls 5/33 (15%) and ≥ 1 biopsy 25/103 (24%) (p=.27)
      - Asian ethnicity and diabetes were trending risk factors
    - Wide resistance pattern
      - Five patients (3.6%) with post biopsy fever (only 1 with positive swab)
Prevalence of antimicrobial resistance in rectal flora

• Prospective study of men undergoing TRUS guided prostate biopsy (Steensels et al 2012)
  – All had rectal swabs and peri-procedural questionnaires for identification of risk factors for resistance
  – 236/335 were included in the study
    • 52/236 (22%) had cipro resistant E.Coli
      – Others were pseudomonas, proteus, candida
        » Risk factors for carriage were quinolones < 6 months prior
  – Infectious complications occurred in 7/236 (3%)
    • All cases were cipro resistant E. Coli (6/7 sepsis)
      – Risk factors were fecal carriage, quinolone use < 6 months prior
      – Repeat biopsy alone not a risk factor
Antibiotic resistance in *Escherichia coli* from urine cultures of all men ≥45 years old in the period 2003–2009.
Prevalence of antimicrobial resistance in rectal flora

• Prospective study of 849 men over two years (Taylor et al 2012)
  – Pre-biopsy rectal swab, urine culture and sensitivities obtained
    • Cipro prophylaxis and fleets enema
• Cipro resistant gram-negative coliforms detected in 161/849 (19%) of patients
  – 90.6% of cipro resistance involved E. coli
    • High risk to harbor quinolone resistance included a history of heart valve, and cipro use in last 6 months
• Infectious complications in 31 (3.6%)
  – 15/31 (48%) grew cipro resistant bacteria on pre-biopsy swab
Antimicrobial resistance of Gram-negative coliforms (n = 493).

- Imipenem: 0.02%
- Piperacillin/Tazobactam: 0.10%
- Tobramycin: 9.10%
- Gentamicin: 11.90%
- Co-trimoxazole: 23.70%
- Ceftazidime: 1.40%
- Ceftriaxone: 8.10%
- Cefazolin: 14.2%
- Cephalothin/Cephalexin: 18.80%
- Augmentin: 14%
- Ampicillin: 32.60%
- Ciprofloxacin: 49.40%
Effect of Rectal Cleansing Prior to Biopsy

• Randomized prospective study
  – Povidone-iodine cleansing prior to TRUS guided prostate biopsy (Abughosh et al 2013)
  – 865 men randomized to rectal cleansing (421) and no cleansing (444)
    • Cipro prophylaxis and rectal swab
      – Telephone interview – fever, UTI, and sepsis ≤ 7 days
    • 31 patients (3.5%) with infectious complication overall
      – Sepsis in 4 (1%) treated and 7 (1.6%) control patients
  – Risk factors for infectious complications
    • Multivariate analysis
      – Resistance to cipro in rectal swab (p=.002)
      – Cipro three months prior to biopsy (p=.009)
Targeted anti-microbial prophylaxis

• 457 men in one practice over a 9 month period were studied prior to prostate biopsy (Taylor et al 2012)
  – 112 (24.5%) had pre biopsy rectal swab
  – 345 (75.5%) none

• No infectious complications in those who were given targeted prophylaxis
  – 22/112 (19.6%) had quinolone resistant organisms
  – 9 infectious complications in empirical group (p=.12)

• Costs analysis per 100 men showed targeted prophylaxis group was less expensive ($1346) than empirical group ($5598)
  – Limitations were various empirical regimens used
Disinfection of Biopsy Needles

• Formalin disinfection of biopsy needles reduces the risk of sepsis following biopsy (Issa et al 2013)
  – 1642 consecutive prostate biopsies at one institution over 4 year period (2008 – 2012)
    • Enema use, three days of fluoroquinolone
  – Compared to historical controls (n=990 procedures)
    – Formalin 10% solution was used to disinfect biopsy needle after each core
      • 2 with sepsis and 3 with UTI (0.3% versus 0.8% control) (p=0.13)
    – Ex vivo experiments showed a lack of growth of quinolone resistant E. Coli after formalin exposure
      • Formalin exposure well under EPA standards for tissue toxicity
Summary Statements

• The risk of infection related complications following TRUS guided prostate biopsy has increased

• The prevalence of gram negative coliforms in the rectal vault with quinolone resistance is approximately 20% in men prior to biopsy
  – Rectal cleansing prior to biopsy is safe yet does not appear to reduce rates of infectious complications
  – Disinfection of biopsy needles after each biopsy core with formalin is safe

• Role of targeted antimicrobial prophylaxis utilizing pre-biopsy rectal swab culture remains uncertain