ORIGINAL PAPER

URINARY TRACT INFECTIONS

A single 80 mg intravenous gentamicin dose prior to prostate needle biopsy does not reduce procedural infectious complications

Jay D. Raman, Chris Rjepaj, Christopher Otteni

Penn State Milton S. Hershey Medical Center, Department of Urology, Hershey, USA

Citation: Raman JD, Rjepaj C, Otteni C. A single 80 mg intravenous gentamicin dose prior to prostate needle biopsy does not reduce procedural infectious complications. Cent European J Urol. 2015; 68: 229-231.

Article history
Submitted: Dec. 27, 2014
Accepted: Jan. 18, 2015
Published on-line:
April 30, 2015

Corresponding author
Jay D. Raman
Penn State Milton
S. Hershey Medical Center
Division of Urology
500 University Drive
C4830B
17033 Hershey, PA, USA
phone: 717 531 6979
jraman@hmc.psu.edu

Introduction Rates of infectious complications continue to increase following transrectal ultrasound guided prostate needle biopsy (TRUS PNB). Administration of a parenteral antibiotic at time of procedure represents one potential prophylaxis strategy. The efficacy of this practice remains incompletely defined.
Material and methods Our institutional TRUS PNB database was reviewed to identify consecutive men undergoing a biopsy over a 48-month period. The peri-operative intravenous antibiotic regimen (when used) included gentamicin 80 mg administered intravenously (IV) 30 minutes prior to biopsy. The incidence of infections post-biopsy was compared between patients receiving oral alone versus IV plus oral antibiotic prophylaxis.
Results 182 of 522 men (34.9%) included in this study received peri-procedural IV gentamicin at time of TRUS PNB, with a significant increase in utilization during the study time period ($p < 0.001$). In total, 39 patients (7.5%) developed an infectious complication post-biopsy. No differences in infection rates were observed between patients receiving only oral prophylaxis (27 of 340, 7.9%) versus those receiving oral with IV gentamicin (12 of 182, 6.6%) ($p = 0.73$).
Conclusions In this 4-year cohort analysis, a single peri-procedural dose of 80 mg of intravenous gentamicin failed to confer a reduction in infectious complications following prostate needle biopsy. Such data underscore the need to better understand the dose, route, and type of antimicrobial therapy to limit procedural infections.

Key Words: prostate biopsy ‹› sepsis ‹› infection

INTRODUCTION

Transrectal ultrasound guided prostate needle biopsy (TRUS PNB) remains the gold standard for diagnosing prostate cancer. Contemporary studies implicate an increase in infectious complications following TRUS PNB [1]. Such infections contribute to patient morbidity, potential need for hospitalization, as well as incurring significant costs to the patient and society. The rise in these infections has been attributed to greater resistance of rectal flora to commonly employed quinolone-based antibiotics [2, 3]. One strategy to avert such infections involves administration of adjunctive broad spectrum intravenous (IV) or intramuscular (IM) antibiotics at the time of biopsy [4, 5]. Given the multidrug-resistant nature of *E.coli*, however, the efficacy of this practice remains incompletely defined [6]. Here, we review our experience utilizing a single intravenous dose of 80 mg of gentamicin at TRUS PNB and determine its impact on post-procedural infectious complications.

MATERIAL AND METHODS

Our institutional TRUS PNB database was reviewed to identify consecutive men undergoing a biopsy over

doi: 10.5173/ceju.2015.531

a 48-month period (March 2008 – March 2012). Patients were grouped chronologically into 12-month intervals to determine trends in utilization of peri-procedural IV antibiotics as well as infectious complications. All patients received a standard oral antibiotic regimen prior to biopsy, including three days of ciprofloxacin 500 mg (n = 485) or Bactrim DS 800 mg/160 mg (n = 37) twice daily. The use of Bactrim DS was reserved for patients with a documented prior adverse reaction to ciprofloxacin. The peri-operative intravenous antibiotic regimen (when used) included gentamicin 80 mg administered intravenously 30 minutes priorto biopsy. The use of intravenous gentamicin was at the discretion of the treating urologist and was performed in a non-randomized prospective manner. No patients in this series received a preoperative cleansing enema and urine cultures were only performed in men with lower urinary tract symptoms. The incidence of urinary tract infections and sepsis events post-biopsy (defined as fever >38.5°C with a positive blood and/or urine culture) was compared between patients receiving oral alone versus IV plus oral antibiotic prophylaxis. Univariate and multivariate analyses determined demographic or biopsy characteristics associated with infectious complications.

RESULTS

A total of 522 men with a mean age of 63.8 years and baseline prostate-specific antigen (PSA) PSA of 11.3 ng/mL were included. Of these, 62% were undergoing an initial biopsy, 18% had received antibiotic therapy within the previous 6 months, 8% had been hospitalized for at least 23 hours in this same time frame, and 2% were on chronic immunosuppressive therapy. The median number of biopsy cores obtained was 14.0 (range, 6–75) and 213 men (41%) had cancer on pathology. There were no differences observed between the two antibiotics cohorts with respect to baseline and biopsy characteristics.

Of 522 men in the cohort, 182 (34.9%) received peri-procedural IV 80 mg gentamicin at the time of TRUS PNB, including 26 of 142 (18%) in year 1, 36 of 132 (27%) in year 2, 50 of 121 (41%) in year 3, and 70 of 128 (55%) in year 4. Compared to the initial year of study, utilization of IV gentamicin rose significantly in year 3 and 4 ($p < 0.001$ for both) with a trend to significance at year 2 ($p = 0.08$) (Figure 1).

Overall, 39 patients (7.5%) developed an infectious complication post-biopsy, including 28 (5.4%) with a culture documented UTI and 11 (2.1%) with sepsis. The overall rates of UTI and sepsis increased successively each year during the study period (2.1% *vs.* 6.0% *vs.* 9.9% *vs.* 10.1%) (Figure 2). When specifically considering sepsis rates following TRUS PNB, we observed likewise a trend towards more complications (0.7% *vs.* 1.5% *vs.* 2.5% *vs.* 3.2%).

No differences in infection rates were observed between patients receiving only oral prophylaxis (27 of 340, 7.9%) versus those receiving oral with 80 mg of IV gentamicin (12 of 182, 6.6%) ($p = 0.73$). Additional subgroup analysis failed to demonstrate differences in infection rates when looking specifically at UTIs or sepsis rates. Culture data highlighted that 78% of infections were attributable to quinolone resistant *E.coli,* with 40% of these organisms being resistant to gentamicin.

A multivariate model was created to determine factors associated with post-biopsy infectious complica-

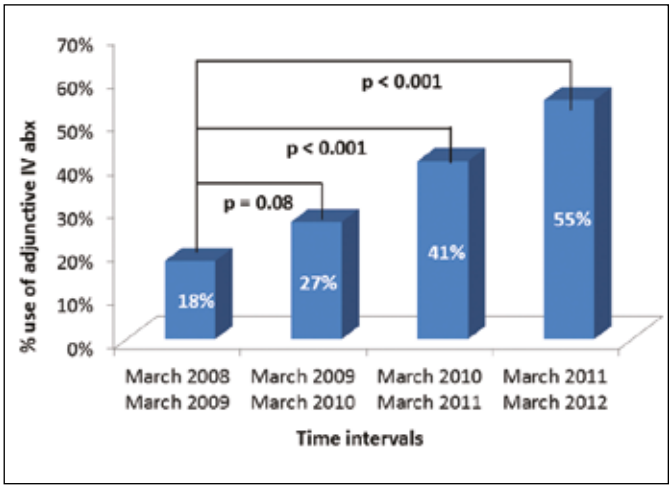

Figure 1. *Rates of utilization of intravenous gentamicin over a 4-year period at time of transrectal ultrasound guided prostate needle biopsy.*

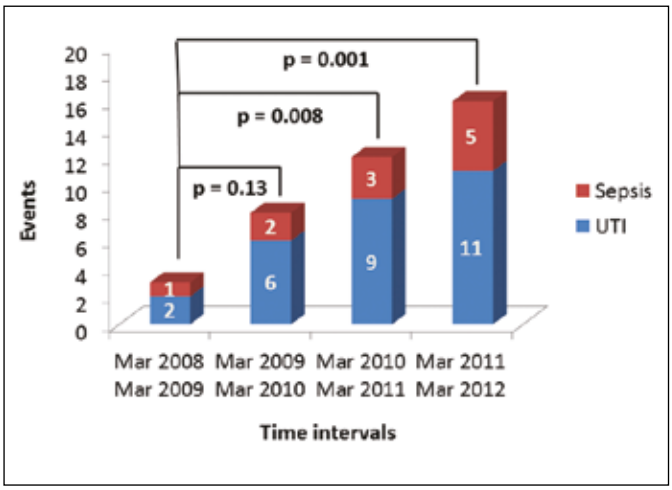

Figure 2. *Urinary tract infection and sepsis complication rates following transrectal ultrasound guided prostate needle biopsy.*

tions. In this model, whilst adjunctive IV gentamicin use (odds ratio [OR] 0.95, p = 0.87) was not associated with infections, any antibiotic use in the last 6 months (OR 3.65, 95% CI 1.8 – 5.1, p = 0.03) and a prior prostate biopsy (OR 1.4, 95% CI 1.0 – 2.1, p = 0.05) were associated with infectious complications.

DISCUSSION

In this 4-year cohort analysis, rates of administration of adjunctive 80 mg IV gentamicin rose substantially from 18% to 55%. Nonetheless, our experience suggests that a single dose of 80 mg IV gentamicin failed to significantly reduce the rates of infectious complications. Such observations may be attributable to the multidrug resistance of *E.coli*. In particular, 40% of isolated strains in our analysis were similarly resistant to aminoglycoside antibiotic therapy. We hypothesize that the rising infection rate may be attributable to an increased number of resistant organisms. Similar observations have been noted in larger scale studies [6].

Alternatively, the dosing regimen of 80 mg IV gentamicin may not be sufficient for adequate pre-biopsy prophylaxis. Indeed, a retrospective study by Lorber et al. suggested that doses of 80 mg and 160 mg of gentamicin were both insufficient to reduce sepsis complications, whilst 240 mg resulted in a clinically significant reduction in post-biopsy infections [7]. These authors postulated that a higher dose of 3–5 mg/kg may be necessary to achieve an appropriate antimicrobial effect in the setting of TRUS PNB. Nonetheless, more detailed antimicrobial work in an *in vitro* and *in vivo* setting are requisite to better address this issue.

CONCLUSIONS

Given the absence of clinical benefit in our study setting, our experience suggests that alternative antimicrobial agents, dosing, and strategies warrant investigation in the future.

CONFLICTS OF INTEREST

Authors declare no conflicts of interest.

References

1. Nam RK, Saskin R, Lee Y, et al. Increasing hospital admission rates for urological compli-cations after transrectal ultrasound guided prostate biopsy. J Urol. 2013; suppl 1: S17-18.
2. Taylor S, Margolick J, Abughosh Z, et al. Ciprofloxacin resistance in the faecal carriage of patients undergoing transrectal ultrasound guided prostate biopsy. BJU Int. 2013; 111: 946-953.
3. Losco G, Studd R, Blackmore T. Ertapenem prophylaxis reduces sepsis after transrectal biopsy of the prostate. BJU Int. 2014; suppl 2: 69-72.
4. Liss, MA, Chang A, Santos R, et al. Prevalence and significance of fluoroquinolone resistant Escherichia coli in patients undergoing transrectal ultrasound guided prostate needle biopsy. J Urol. 2011; 185: 1283-1288.
5. Kehinde EO, Al-Maghrebi M, Seikh M, Anim JT. Combined ciprofloxacin and amikacin prophylaxis in the prevention of septicemia after transrectal ultrasound guided biopsy of the prostate. J Urol. 2013; 189: 911-915.
6. Karlowsky JA, Hoban DJ, Decorby MR, Laing NM, Zhanel GG. Fluoroquinolone-resistant urinary isolates of Escherichia coli from outpatients are frequently multidrug resistant: results from the North American urinary tract infection collaborative alliance-quinolone resistance study. Antimicrobi Agents Chemother. 2006; 50: 2251-2254.
7. Lorber G, Benenson S, Rosenberg S, Gofrit ON, Pode D. A single dose of 240 mg Gentamicin during transrectal prostate biopsy significantly reduces septic complications. Urology 2013; 82: 998–1002.