

# Pharmacology for Nurse Practitioners

GSN605

## Clinical Correlation for Acute Bacterial Prostatitis

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In this case a 63 year old man returns to his urologist three days after undergoing a TURP (transurethral resection of the prostate) for BPH (benign prostatic hypertrophy). He comes in with symptoms of fever and chills, irritative voiding symptoms, myalgia, and malaise, which started abruptly two days previously. This gentleman is also being treated for type 2 diabetes, hypertension and COPD. He reports an allergy to sulfa resulting in a rash. The patient's clinical course and initial laboratory results indicate a case of acute bacterial prostatitis. An empirical course of antibiotics is necessary with consideration of drug interactions and allergies. These antibiotics must be initiated, in order to avoid future serious problems (i.e. bacteremia, chronic bacterial prostatitis). Definitive therapy can be initiated once final laboratory reports are available. Patient education is especially important in this case due to the seriousness of possible future problems.

### Findings and Assessment

#### **Problem Identification**

1a. The following related to this case is consistent with Acute Bacterial Prostatitis:

<u>Signs:</u>	<u>Symptom</u>
Diaphoretic, Acutely ill appearance	Suprapubic pain
Mild lower abdominal tenderness	Fever and chills
Warm, tender, swollen prostate	Irritative voiding symptoms Myalgia Malaise

Laboratory values: Leukocytosis with shift to left

WBC: 16,700/mm<sup>3</sup>

Bands: 16%

Urine: Cloudy

Numerous bacteria

Blood: positive

WBC: 25-30/hpf

RBC: 4/hpf

Urine culture reported later grew *Pseudomonas aeruginosa*, a gram-negative opportunistic pathogen (most likely acquired at the time of urethral instrumentation during the TURP). This organism, which inhibits protein synthesis, is the cause of 10-20% of hospital-acquired infections. It is resistant to many drugs and sepsis by this organism has a mortality rate of 50%.

1b. Prostatic massage is contraindicated in the acute phase of acute bacterial prostatitis since bacteria may be disseminated into the bloodstream and induce bacteremia. The causative organism is usually associated with the same organism residing in the bladder urine. No massage should be performed until serum levels of the appropriate antibiotics are established.

1c. The most common organisms reported to cause acute bacterial prostatitis are:

Gram Negative Organisms: (*E. Coli*-75%, *Pseudomonas*, *Klebsiella*, *Proteus*, *Enterobacter* and *Serratia*).

Occasionally: Gram Positive Organism (*enterococcus*, *gonococcus*, and *staphylococcus*).

## **Desired Outcome**

2. The following are the primary goals of antibiotic therapy:
- A. Relieve or eliminate patient symptoms (fever, pain).
  - B. Remove offending bacteria from the system.
  - C. Avoid/minimize adverse effects of treatment.
  - D. Avoid aggravation of existing disease.

Resolution

## **Therapeutic alternatives**

- 3a. Non-antimicrobial therapies that may be beneficial to this patient:
- A.) Local heat to the perineum
    - 1.) Warm baths
    - 2.) Sitz baths.
  - B.) Bed rest in acute phase.
  - C.) Adequate hydration.
  - D.) Analgesics/Anti-inflammatories for pain control.
  - E.) Stool softeners.

3b. Antimicrobials do not penetrate into prostatic tissue in its usual state due to the 'honeycomb' architecture and alkaline environment of the gland. The prostate's lipid membrane is electronically charged, and the drug must be lipid soluble and minimally bound to plasma proteins to penetrate. When the prostate is acutely inflamed/infected, however, it allows adequate penetration and concentration of most antibacterial agents.

3c. The reasonable therapeutic alternatives for empiric intravenous antibacterial treatment of this patient are:

The literature lacks well-designed comparative studies of various antibiotic regimens in the treatment of acute bacterial prostatitis. There are few clinically appropriate control agents and most studies lack specific guidelines for the duration of treatment. Many studies have been conducted as uncontrolled trials so they lack statistical relevance. In younger ambulatory patients, the fluororoquinolone, ofloxacin 400 mg., p.o. bid is recommended.

Oral or parenteral therapy with trimethoprim-sulfamethoxazole (TMP-SMX) is a highly recommended treatment. Another therapeutic alternative is IV to oral sequential therapy with fluoroquinolones, since they have broad-spectrum activity against gram negative organisms including *P. aeruginosa*. Tobramycin is listed as having a greater effect on *psudomonas* than other aminoglycosides as well as the effectiveness of the extended spectrum penicillin, piperacillin. Empiric therapy is usually initiated with a combination of an aminoglycoside with a beta-lactam antibiotic (gentamicin plus ampicillin).

All treatment advocate that therapy needs to be extended in order to eradicate the offending pathogen.

## Optimal plan

3. A specific therapeutic regimen for this patient is:

Any sulfa-based drugs are not acceptable for use with this gentleman since the patient has an allergy to sulfa. The causative organism is resistant to many drugs but is empirically shown to respond to aminoglycosides and penicillins, both of which are free from serum protein binding. When an extended spectrum penicillin is utilized with an aminoglycoside a synergistic effect is the result. One specific therapeutic regimen would be comprised of the combination of Piperacillin with Tobramycin, IV until the patient's response indicates that he is having a positive outcome from this therapy (i.e. afebrile, reduction in symptoms). At least one hour should separate the administration of each of these IV drugs. Piperacillin should be administered 100-300mg./Kg q.4-6 hours, not to exceed 24g. daily., therefore, this patient should receive 6g. IV every 6 hours. Tobramycin dosing is recommended at 3mg.- 5mg./kg/day every eight hours. Since this patient is 63 years of age it would be best to start him on 3mg./kg./day and assess his renal function and therapeutic levels after the third dose before possibly increasing his dose. Therefore he should receive 100mg., IV q.8 hours.. On this pattern there will be at least one hour between each of these infusions. After the patient has been afebrile for 48 hours and symptoms have subsided or in 3-5 days, he should be switched to an oral antibiotic. A fluoroquinolone, ciprofloxacin, is the drug of choice since trimethoprim-sulfamethoxazole cannot be administered due to the sulfa allergy. Cipro, 500mg. p.o. every 12 hours should be taken for four weeks to eradicate the organism.

## Assessment parameters

5. The parameters that should be monitored to assure achievement of the desired therapeutic outcome while minimizing adverse effects are:

- A.) Monitor for effectiveness and toxicity.
  - a.) Peak and trough levels of tobramycin, starting after the third dose of the drug, with peak 4-8 mcg/ml and trough 1-2 mcg/ml. to be considered in the therapeutic range.
  - b.) BUN and s. creatinine .6-1.3.(Tobramycin and Cipro).
- B.) Monitor hearing for ototoxicity and monitor pt. symptoms, (i.e. ringing in ears, vertigo).Tobramycin.
- C.) CBC for thrombocytopenia.-Piperacillin and tobramycin side effects.
- D.) V.S. of patient (temperature and blood pressure).
- E.) Fluid intake (I&O) adequate fluids to prevent irritation of tubules and to assure that adequate output is maintained.
- F.) Patient symptoms that may indicate superinfection (i.e. sore throat, fatigue).
- G.) Monitor patient for vein irritation from IV therapy.
- H.) Electrolytes (Tobramycin contains 1.85 mEq of sodium per gram of drug).
- I.) Presence of diarrhea, nausea/vomiting (adverse reactions).
- J.) Theophylline levels since concomitant administration with Cipro can result in theophylline toxicity.

## **Patient counseling**

6. The following is the important information about treatment that should be provided to the patient upon discharge:
- A. Fluid intake should be 2000 to 4000 cc. Daily.
  - B. Voids should be done frequently.
  - C. Reassurance that there should be no effect on fertility or long-term sexual functioning.
  - D. Awareness of the need and importance of seeking care immediately with the reoccurrence of symptoms.
  - E. No use of over-the-counter drugs with anticholinergic properties (i.e. antihistamines/decongestants).
  - F. Importance of reporting promptly for follow-up visits and labs.
  - G. Measures to prevent reoccurrence.
  - H. The importance of adhering to the drug schedule (completing full course of the drugs on a regular basis as ordered).
  - I. Report any side effects that may develop, especially any indications which would indicate that there may be a theophylline toxicity (restlessness, insomnia etc.).
  - J. Avoid hazardous tasks that require alertness.
  - K. Oral ciprofloxacin should be taken 2 hours before or 2 hours after antacids, zinc, iron or calcium and that photosensitivity can occur with this drug.
  - L. Alcohol, hot spicy foods, and citrus juices may exacerbate symptoms.

## REFERENCES

- 1.) DiPiro, J., Talbert, R., Yee, G., Maltzke, G., Wells, B., & Posey, L. (1997). *Pharmacotherapy: A pathophysiologic approach* (3ed ed.). Stamford, CT: Appleton & Lange.
- 2.) Karlowicz, K. (Ed.). (1995). *Urologic nursing: Principles and practices*. Philadelphia, PA: W.B.Saunders Company.
- 3.) McCance, K. & Huether, S. (1998). *Pathophysiology: The biologic basis for disease in adults and children* (3ed ed.). St. Louis, MO: Mosby.
- 4.) Nickel, C. (1998, March). Prostatitis: Myths and realities. *Urology*, 51(3), 362-366.
- 5.) Prostate Health Council. *Prostatitis: Answers to your questions*. Baltimore, MD: American Foundation of Urologic Disease, Inc.
- 6.) Tierney, L., Jr., McPhee, S., & Papadakis, M. (2000). *CURRENT: Medical diagnosis and treatment 2000* (39<sup>th</sup> ed.). New York: NY: McGraw-Hill.
- 7.) Wells, B., DiPiro, J., Schwinghammer, T., & Hamilton, C. (2000). *Pharmacotherapy Handbook* (2ed ed.). Stamford, CT: Appleton & Lange.