UTI In Neurogenic Bladder & The Elderly Patient

Ahmad Nazran
Advanced Urology Course 2014
Neurogenic Lower Urinary Tract Dysfunction (NLUTD)

- Lower urinary tract dysfunction secondary to confirmed pathology of the nervous supply
- Wide range of causes
  - Intracranial neoplasms
  - Dementia
  - Cerebral palsy
  - Basal ganglia disorders
  - Cerebrovascular Accidents
  - Spinal Stenosis
  - Diabetes Mellitus
  - Etc

Sauerwein D, Int J Antimicro Agents 2002
Urinary Tract Infection (UTI) in NLUTD

- Important cause of hospitalization and mortality
- Can contribute to renal failure
- Classical symptoms of UTI cannot be used due to underlying pathology. Possible clues:
  - Sweating
  - Fatigue
  - Restlessness
  - Increased spasticity
  - Bradycardia
  - Hypertension

Sauerwein D, Int J Antimicro Agents 2002
Pathophysiology

- Altered commensal flora
  - Usually lactobacillus, CNS, cornybacteria, streptococci
  - Replaced with enterobacterioceae, Pseudomonas, Acinetobacter and Enterococci
  - May be due to
    - changes in skin moisture, temperature and pH
    - urine leakage
    - Faecal soiling
    - Personal hygiene

- Deficient secretory IgA and glycosaminoglycan layer
  - May be due to bladder overdistension or urothelial disruption

Madersbacher H, Curr Bladder Dysfunction Reports 2013
Pathophysiology (cont’d)

- Bladder ischaemia secondary to overdistension / high pressure system
  - Reduced capillary blood flow and hence entry of defence mechanisms

- Impaired washout
  - High post-void residual (> 80 – 150mL)
  - Vesico-ureteric reflux
  - Altered anatomy and hydrokinetics

Madersbacher H, Curr Bladder Dysfunction Reports 2013
Pathophysiology (cont’d)

- Catheterization
  - Indwelling catheter
    - Negates protection afforded by urethral length
    - Damage to GAG layer
    - Mechanical cleansing of urethra does not occur
  - Biofilms
  - Intermittent self catheterisation
    - May be due to poor technique

- Bladder Stone

Madersbacher H, Curr Bladder Dysfunction Reports 2013
Diagnosis of UTI in NLUTD

- Bladder puncture urine or urine collected by catheterization
- Culture indicated in WCC > $10^5$/mL
- Diagnosis of UTI if CFU > $10^5$/mL even if asymptomatic
- If symptomatic may treat even if no bacteriuria isolated

Sauerwein D, Int J Antimicro Agents 2002
Common bacteriuria in NLUTD

Distribution of uropathogens from patients with NLUTD 1988 - 1997

Sauerwein D, Int J Antimicro Agents 2002
Management

- Resuscitation

- History
  - Symptoms
  - Previous history of UTI
  - Any prophylactic antibiotics
  - Form of catheterization used and frequency
  - Underlying neurological problem

- Examination
  - Bladder distension
  - SPC site
  - Other sources of infection
Investigations

- UFEME and Urine C&S
- Blood C&S, FBC, Renal Profile
- X-ray KUB and USS KUB
- (Urodynamics Study)
Treatment

抗生素 ideally based on culture and not empirical. Treatment duration 7 – 10 days.

? Replenishment of GAG layer

Intravesical instillation of hyaluronic acid or chondroitin sulphate has been used in recurrent UTI not due to NLUTD
# Antibiotics for Empirical Rx

<table>
<thead>
<tr>
<th>Antibiotics recommended for initial empirical treatment</th>
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<tbody>
<tr>
<td>Fluoroquinolones</td>
</tr>
<tr>
<td>Aminopenicillin plus a BLI</td>
</tr>
<tr>
<td>Cephalosporin (Groups 2 or 3a)</td>
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<td>Aminoglycoside</td>
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<th>Antibiotics recommended for empirical treatment in case of initial failure, or for severe cases</th>
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<tr>
<td>Fluoroquinolone (if not used for initial therapy)</td>
</tr>
<tr>
<td>Ureidopenicillin (piperacillin) plus BLI</td>
</tr>
<tr>
<td>Cephalosporin (Group 3b)</td>
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<tr>
<td>Carbapenem</td>
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<tr>
<td>Combination therapy:</td>
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<td>- Aminoglycoside + BLI</td>
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<th>Antibiotics not recommended for empirical treatment</th>
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<tr>
<td>Aminopenicillins, e.g. amoxicillin, ampicillin</td>
</tr>
<tr>
<td>Trimethoprim-sulphamethoxazole (only if susceptibility of pathogen is known)</td>
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<td>Fosfomycin trometamol</td>
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*BLI = β-lactam inhibitor*
Prevention

- Low pressure storage and prevention of overdistension
  - Increase frequency of ISC
  - Fluid schedules
  - Valsalva
  - Convert to indwelling catheter
  - Botulinum toxin injection
  - Surgery e.g. bladder augmentation

- Good hygiene
  - No evidence for regular cleaning with antiseptics

- Active bacterial interference
  - Deliberate inoculation of non-pathogenic bacteria
  - An RCT inoculating E Coli into the bladder showed significantly reduced incidence of UTI (Darouiche et al, Urology 2011)

Madersbacher H, Curr Bladder Dysfunction Reports 2013
Prevention (cont’d)

- Cranberry juice
  - Anti-adherence agent
  - Cochrane review – did not significantly reduce UTI

- Vaccination
  - Hachen et al showed a significant reduction in UTI with oral administration of E. Coli vaccine (J Urol 1990)

- Regular and aseptic change of indwelling catheter

- No touch technique ISC, ideally sterile. Adequate frequency and lubrication

Madersbacher H, Curr Bladder Dysfunction Reports 2013
Antimicrobial Prophylaxis

- Not advised by EAU due to risk of developing resistance

- WOCA (Salomon et al, J Antimicro Chemo 2006)
  - Weekly Oral Cyclic Antibiotic Programme
  - 2 antibiotics were given alternately in a heavy dose once weekly
    - e.g. co-trimoxazole, cefixime, fosfomycin, nitrofurantoin, amoxicillin
  - Significant decrease in antimicrobial consumption
  - But has not been replicated elsewhere
Summary

- UTI an important complication of NLUTD
- Avoid unnecessary treatment of leucocytosis
- Aim for low pressure system with low residual urine
- Use ISC if possible with good aseptic technique
- Consider WOCA
UTI in the Elderly

- Prevalence of UTI increases with age
- In young population F:M = 50:1, but in those > 70 only 2:1
- Incidence 10%, increasing to 30% in those institutionalized
- Mortality can be as high as 33%

Pathogenesis

- Increased colonization of skin with Gram negative bacteria
- In postmenopausal women intravaginal pH high – increased bacterial adherence
- Increased post void residual
  - BPH
  - Weakened pelvic musculature
  - Underlying neurologic disorders or medications
- Overall reduced immunity
- Catheterization
- Constipation

Pathogens

- E. coli most common in uncatheterized patients (70%)
- In catheterized / institutionalised patients – Klebsiella, Proteus and Pseudomonas spp more important.
- May be polymicrobial
- Increased incidence of funguria

Management

- Resuscitation
- History
  - Still present with classical UTI symptoms
  - May present in other ways
    - Altered mental state
    - New-onset incontinence
    - Nausea and vomiting
    - Urinary retention
    - Decreased mobility
- Examination – routine

Investigations

- UFEME and Urine C&S
- Blood C&S, FBC, Renal Profile, Glucose
- X-ray KUB
- USS KUB
- Flexible cystoscopy
Treatment

- **Antibiotics**
  - **Problems**
    - Large range of pathogens with likely resistance
    - Co-morbidity including renal impairment
    - Risk of Clostridium difficile diarrhoea
  - In mild cases best to wait for culture
  - In more ill patients look at previous sensitivities and local resistance patterns
  - For uncomplicated lower UTI – trimethoprim 3 – 7 days
  - Acute pyelonephritis – 14 days
    - Ciprofloxacin
    - 2nd / 3rd generation cephalosporins
    - Aminoglycosides
  - Prostatitis – 4 weeks of ciprofloxacin or co-trimoxazole

Treatment (cont’d)

- If possible remove indwelling catheter. If not change it during antibiotic course
- Consider underlying BPH
- Optimization of underlying medical conditions e.g. diabetes mellitus

Asymptomatic bacteriuria

- 10% of men and 20% of women > 80 years
- 15 – 50 % of those institutionalised
- No evidence for screening or treatment

Prevention

- **Indwelling catheters**
  - Minimize use
  - Early removal
  - Closed system
  - Consider ISC or surgery

- **Topical oestrogen therapy**
  - RCT by Raz et al (NEJM 1993) showed statistically significant (p<0.001)
  - Reappearance of lactobacilli in 61% vs 0%
  - Reduction of UTI 0.5 vs 5.9 episodes per patient year

- **Cranberry juice** – equivocal evidence

- **Treat constipation**

Summary

- UTI is a common and important cause of morbidity and mortality in the elderly.
- Need to always consider UTI as a differential despite sometimes atypical presentations.
- Avoid indwelling catheters if possible.