VESICOURETERAL REFUX

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Figure 1 Diagram of the bladder submucosal tunnel

Reference: Cooper 2009

Figure 2 International Reflux Grading System

Reference: Cooper 2009
EVALUATION

- To diagnose VUR:
  - VCUG: urethral/bladder function assessed, requires catheter
  - Nuclear cystograph: to assess kidney function and structure
- Other assessments:
  - Kidney/bladder US: to see gross defects
  - IVP: visualizes entire urinary tract
  - DMSA scintigraphy: to assess renal scarring

MONITORING

- UTI incidence
- Blood pressure
- Urine creatinine
- Urine microalbumin
- Renal ultrasound (if no scarring and no UTI x 5 yr, stop monitoring)
ANTIBIOTIC PROPHYLAXIS?

- Increases resistance without decreasing UTI incidence in huge study, n = 74,974 (Conway 2007).
- That includes VUR kids (stage 4-5 most likely to get recurrent UTI)
- Trial showing no prevention of pyelonephritis or renal scarring in 100 Italian kids with VUR II-V vs. no tx, 4 yr follow-up (Pennesi 2008)

SURGERY?

- Indication for referral: VUR III+ with multiple recurrent UTIs, pyelonephritis, or signs of kidney damage
- Not superior to medical tx in randomized trial (Smellie 2001)
- “It is uncertain whether the treatment of children with VUR confers clinically important benefit. The additional benefit of surgery over antibiotics alone is small at best. Assuming a UTI rate of 20% for children with VUR on antibiotics for five years, nine re-implantations would be required to prevent one febrile UTI, with no reduction in the number of children developing any UTI or renal damage.” (Hodson 2007)

NATURAL TREATMENT PRINCIPLES

- Bacterial adhesion inhibitors; probiotics
- Immunostimulants, immunomodulators
- Urinary tract tonics
- Antifibrotics
- Treat acute UTIs; if not much better in 24-48 h resort to antibiotics
CLINICAL TRIAL 1

- Japanese children (n=7 boys, 5 girls) with VUR I-IV given 100 ml juice concentrate (“50%”) qd
- Controls: 11 boys, 8 girls given cefaclor 5–10 mg/kg
- 3–27 mon follow-up
- UTI (defined as fever, elev CRP, $10^6$ CFU/ml) occurred in 2 pt in each group (not significantly different)
- Reference: Nishizaki 2009

CLINICAL TRIAL 2

- Italian children n=186, double-blind trial, 1 yr follow-up
- Randomized to cranberry juice (“2.8% extract”) or trimethoprim syrup
- No difference in UTI rates between groups
- Subgroup with high ferulic acid levels in urine did have higher UTI rate. Difference in grain intake, or gut flora?
- Ref: Uberos 2012

ferulic acid
CRANBERRY INTERACTIONS

- No interaction with cefaclor or amoxicillin in humans (Li 2009)
- Sulfamethoxazole-trimethoprim: unknown, unlikely
- Nitrofurantoin: unknown, unlikely
- Confusing data on warfarin interactions
- Safe in pregnancy (Wing 2008)

MISC ADHESION INHIBITORS

- Vaccinium vitis-idaea (lingonberry)
- Equisetum arvense (horsetail)
- Betula pendula (birch)
- Galium odoratum (sweet woodruff)
- Urtica dioica (nettle) leaf
- Herniaria glabra (rupturewort)
- Zea mays (corn) stigmata
- Elymus repens (couch grass)

Reference: Rafsanjany 2013; Wojnicz 2012

Mahonia aquifolium

Berberine

5'-methoxyhydnoocarpin

Mahonia aquifolium. © 2013 Heron Botanicals, used with permission
BERBERINE

- In vitro, assembly of fibrimiae by uropathogenic *E. coli* inhibited by berberine (Sun 1988).
- In vitro, blocks biofilm formation by *Strep. epidermidis* (Wang 2009).
- In vitro, inhibits MRSA adhesion, also synergistic with ampicillin and oxacillin, even restoring their efficacy (Yu 2005).

*Equisetum arvense*

*Galium aparine*
Parietaria judaica

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Parietaria floridiana

P. floridiana © 2013 E. Yarnell

Echinacea angustifolia

E. pa © 2013 E. Yarnell
**Codonopsis pilosula**
(dǎng shēn)
党参

**Astragalus membranaceus**
(huáng qí)
黄芪

Anti-kidney scarring
(Lu 1997)

**Centella asiatica**
ACUTE UTI TREATMENT

- Definition: fever, pyuria, >10^6 CFU/ml bacteriuria
- Rest, no sweets, pungent foods, avoid sugar
- *Juniperus communis* aril tincture 3-10 gtt q2h
- *Echinacea angustifolia* fresh root tincture 2.5 ml (0.5 tsp) q2h
- *Urtica dioica* leaf tea, 0.5-1 cup 4-5 times a day
- Reminder: if not significantly better in 24-48 h, antibiotics

CASE STUDY

- 2-yo white girl, grade I (left), II (right) VUR, good diet/lifestyle, no other health issues
- Two confirmed UTIs to date, recovered quickly from both with antibx
- Parents prefer no antibx, ND rx cranberry powder and D-mannose
- One-year follow-up: one instance of culture-negative UTI-like sx (with pyuria), no need for antibx

REFERENCES


