Neurogenic Bladders

Mark W. Christopherson, M.D.

Neurogenic Bladder

- Who cares about the bladder?
- Medical School
  - Bladder is ignored
  - Last in anatomy, physiology, and pathology

Bladder Functions

Storing urine
Emptying urine
Socially Acceptable

“Oh that life could be so simple”

Bladder Function ‘a priori’

- Protect the KIDNEYS
- Preserve RENAL FUNCTION

Why is this important for MD’s to know?

- Lessons learned in neurogenic bladders can save patients morbidity and mortality!
- NOT JUST SCI
  - Most of your pts will have bladders

History of the World (In Brief And Sharp Focus)

- SCI cause of DEATH
  - Early DRG’S work
  - Papyrus of E. Smith
  - Civil War
  - Dances with Wolves
  - WWI
  - PCN
  - Aminoglycosides
  - WWII
  - Patients died of chronic renal failure

MD’s Life Before Dialysis
History of the World
(Brief And Focused)

• 1960-1970's
  • Maguire
  • University of Michigan
  • Morbidity ~ bladder storage pressure
  • Neurogenic bladders with > 36 cm H2O "storage pressures"
  • Upper track failure
  • SCI death predialysis days

What Does This Mean?

• Another 'stinkin' bladder question!
  • "What is your bladder pressure?"
• Does it really Matter?
  • Life expectancy days/weeks: pre-civil war - pulmonary
  • months - PCN
  • < year(s) - Aminoglycoside
  • NOW?

‘YES’
Life Expectancy SCI With Neurogenic Bladders

• Normal 20-year-old
  • +55 years
• Paraplegic 20-year-old
  • +45 years
• Tetraplegic 20-year-old
  • +35 years
• *Days>>>>>Decades
  • managed pressures

So What? Who Cares?

• You do or should

  Life off Dialysis is even better
  • Life is good

ZING!!!

• SCI life is worth living?
• Pre SCI >80% NO
• Post SCI ~40% NO
• 2yrs s/p SCI < 5% NO
• SCI life is “GOOD”
• How can this be?

Neurogenic Bladder
‘A Little Physiology Please’

• All diagnosis groups can benefit from physiology-based bladder management
Neurological Regulation of Normal Micturition

• Specifics are not universally agreed upon
• Will present a clinically useful, somewhat simplified neurourological architecture

Central Regulation of Normal Micturition “Neurologic Control”

• 3 functional micturition centers within central nervous system
• We will look from “bottom up”

Sacral Micturition Center

REFLEX CENTER

• Local reflex Arc’s
  • stretch the detrusor
    • it contracts
  • stretch the sphincter
    • it contracts
• How do you stretch the sphincter?
  • Fluid is non-compressible +/-

Pontine Micturition Center

• Coordinate Sphincter & Detrusor
• Dyssynergia
  • Dys = ‘BAD’
  • Synergia = ‘working together’
• Gumby Story

Cortical Micturition Center

• Knowledge Center
  • need to void
  • voiding
  • inhibit voiding
• Note Bilateral Cortical representation

How Do We Study Bladder Function?

• Diaries ?
• Urodynamic Study
• Real time neuromuscular physiology
• Are we having fun yet?
  • UDS Study
**Vesicular PRESSURE**

- Renal function & parenchyma loss
- Exceed glomerular filtration capillary pressures
- Ischemia...Cell death
- Infection
- WBC migration into bladder

**Bladder Storage Pressure**

- < Capillary Pressure

**Does it Matter?**

- Yes, pressure leads to loss of renal function!

**Neurogenic Bladder Rx Options**

- UCI/Suprapubic Tube
- I/O Catheterization
- Sphincterotomy
  - Condom catheter
  - Continent Catheterizable Stoma
- Ileal Conduit
  - Ostomies
- Catheter-Free Void
  - Alpha block / rectal stretch

**Urinary Catheter In UCI /SPT**

- Fluids
  - >2.5 liters/d
  - Change q 2-4 wks
- Evaluate Q year
  - Renal US/KUB/VCG
  - Renal parenchyma, stones / hydro / reflux
  - Cysto
  - Squamous metaplasia
    - 10% in 10 yrs
- UDS
- No prophylactic ABX

*Anticholinergics
Vesicular compliance protection
Mucosal <->Connective tissue
**Intermittent Catheterization**

- **Fluids**
  - 1800 ml/day
  - 400 meals
  - 200 10am, 2, & 4pm
  - Non evening...Legs
- **Q I D Cathing**
  - goal < 500 cc / cath
- **Anticholinergics**
  - ?ALL versus storage @ >36 cm/H2O
- **ABX Prophylaxis**
  - 'Maybe'
- **Evaluation**
  - Q year
    - Cysto
    - r/o stones
    - UDS - ? high pressure storage
    - VCUG
    - r/o reflux
    - KUB / Renal US
    - Cr, Cystatin C, UA/UC
    - *periodic ~ risk

**Anticholinergics**
- ?ALL versus storage @ >36 cm/H2O
- **ABX Prophylaxis**
- 'Maybe'

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**Sphincterotomy & Condom Catheterization**

- **Fluids**
  - minimum 1800 ml
  - prefer >2.5 L
  - training schedule
- **Post Void Residual ‘PVR’**
  - <100cc (150)
  - supine or seated
- **Evaluation**
  - 1-3 years if low-pressure storage
  - PVR, VCUG, Renal US, KUB, Cr, UA/UC

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** Continent Catheterizable Stoma**

- **Females**
  - CIC is difficult
  - transfer
  - undress / dress
  - clean perineum
  - urethral location
  - Continuous drainage
  - undesirable
  - "PEE HOLE BELLY BUTTON"

**Neurogenic Bladder Evaluation**

- **Upper Tract (kidney / renal pelvis / ureter)**
  - define anatomy
  - define function
- **Lower Tract (bladder / urethra)**
  - define anatomy
  - define function

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**Upper Tract (kidney / renal pelvis / ureter)**

- **Anatomy**
  - KUB / EXU
  - Renal US
  - CT
- **Function**
  - Cr ( reduced muscle)
  - Cystatin C
  - CrCl
  - Iothalamate or 24hr

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**Lower Tract**

- **Anatomy**
  - Cystogram
  - Cystoscope
- **Function**
  - UDS
  - Voiding Diary or HX
Common Bladder Medications What Do They Really Do?

- Anticholinergic
  - decrease detrusor activity
  - mucosal/adventitia interface
  - Dec fibrosis
- Alpha blockers
  - decrease internal sphincter tone

Bladder Neurologic Receptors

Who Do I See Who May Have A Neurogenic Bladder?

- Multiple sclerosis
- Strokes
- NPH
- SCI

Neurogenic Disorders of the Urinary Bladder

Mayo Clinic Locations

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Questions & Discussion