Spinal Cord Injury & Spina Bifida

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Astellas - Speaker

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Facts & Figures

• Around 1,000 people sustain a spinal cord injury each year in the UK and Ireland
• 50,000 people living with SCI in UK & Ireland
• Cost per annum £ 1 billion
Classifications of SCI

- Mechanism of Injury
- Skeletal and Neurologic Level
- Completeness (degree) of Injury

Mechanism of Injury
- Flexion
- Hyperextension
- Compression
- Flexion /Rotation
Pathophysiology of SCI

Flexion injury
Displacement of vertebrae with fracture of 2 vertebral bodies and 1 disk

Extension injury
Disruption of intervertebral disk

Flexion-rotation injury

Compression injury
Burst vertebral body with cord compression

Figure 87-5  Mechanisms of spinal injury.
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Spinal and Neurogenic Shock

- Spinal Shock
  - Decreased reflexes and loss of sensation below the level of injury
  - Motor loss - flaccid paralysis below level injury
  - Sensory loss - light touch, pressure, temperature pain and proprioception below injury
  - Lasts days to months
How do you know spinal shock is over?

- Clonus is one of the first signs
- Hyperreflexia of foot
- Test by flexing leg at knee & quickly dorsiflex the foot
- Rhythmic oscillations of foot against hand
- clonus
Neurogenic bladder types

- Cerebral (CVA)
  - Detrusor instability due to loss of volitional inhibition
- Suprasacral spinal (MS)
  - Detrusor sphincter dyssynergia
- Sacral & peripheral (Cauda Equina)
  - Detrusor areflexia
SCI- Urological Strategy

- Preservation of renal function
- Avoidance of infection
- Provision of a stable compliant bladder

- Avoidance of indwelling catheters wherever possible
- Restoration of “continence”
- Facilitation of ISC (esp females)
- Consideration of bowel & sexual dysfunction
- Management of urological complications
Complications of Neurogenic Bladder

- Morbidity
  - UTI, Pyelonephritis, Stones, Renal dz.
  - Spasticity, Aut. Dys., Pressure Ulcers
- Mortality
  - Sepsis, Renal dz
- Social
  - Incontinence
  - Sexuality
Mortality Associated with Renal Dysfunction Following SCI

- World War I - 80%
- World War II - 40%
- Korean War - 25%
- Vietnam War - Minimal
- Today - Negligible
Renal Failure is No Longer the #1 Cause of Death (Reasons):

• Antibiotics
• Catheterisation (Guttman)
• Understanding complications of the “high pressure bladder”
• Education to patient/family
• Follow-up Testing
Patient Education

• Early education on bladder mx essential
• < 50% of SCI patients have good knowledge about bladder management and pressure ulcers after discharge.
• Significant decrease in knowledge after discharge
• Tetraplegics seemed to retain information > paraplegics

Conservative Management

- Catheters
  - Indwelling
  - CISC

- Crede manoeuvres / reflex voiding
  - Only safe if storage pressure low and sphincter is normo / aflexic
Crede & Valsalva Maneuvers

- Potential complications of the Credé and Valsalva manoeuvres include:
  - high bladder pressure
  - abdominal bruising with the Credé method
  - hernia
  - haemorrhoids
- Cross-sectional study of SCI pts with flaccid bladders 20 yrs after an earthquake China.
- Most had residuals >100 mL, and 50% had >300 mL of residual urine after Credé manoeuvre.
- Urologic complications included
  - pyuria (82%)
  - urinary lithiasis (31%)
  - ureteral dilatation (60%)
  - hydronephrosis (35%)
  - renal damage (16%)
- Upper tract deterioration was more common in men.
- Women who perform the Credé manoeuvre may develop POP.

Annual Review

- U & E, eGFR
- Cr-EDTA GFR
- Annual ultrasound
  - Upper tracts and PVR
  - Bladder stones
- Urine dip (MSU/CSU)
  - UTI’s
  - Catheter management & facilitation of SIC
  - Dysfunctional sexual problems (mainly ED)


Table 2. Recommendations for follow-up, according to the EAU guidelines on Neuro-Urology [4]

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>LE</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>In high-risk patients, the UUT should be assessed at least every six months</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>In high-risk patients, physical examination, and urine laboratory should take place every year</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Any significant clinical changes should instigate further, specialized, investigation</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Urodynamic investigation is a mandatory baseline diagnostic and in high-risk patients, should be done at regular intervals</td>
<td>3</td>
<td>A</td>
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</tbody>
</table>

LE, level of evidence according to the Oxford Centre for Evidence-Based Medicine (2011).

Figure 1.

Guideline for the urological management of the patient with SCI. ATLS, advanced trauma life support; UDS, urodynamic studies.
Treatment Options

• Bespoke

• Dependent upon all sorts of other aspects
  o Pt needs
  o Disability
  o Level of care available
  o Co-morbidities
Spina Bifida
Prevalence of all neural tube defects (NTDs), spina bifida, anencephaly and encephalocele diagnoses (live births, late fetal losses after 20 weeks’ gestation and terminations) per 1000 live births; eight regional congenital anomaly registers in the UK: 1991–2012.
Prevention of neural tube defects in the UK: a missed opportunity

Table 2
Estimation of the number of pregnancies with a neural tube defect (NTD) that would have been prevented if folic acid fortification of flour had been implemented in 1998 in the UK

<table>
<thead>
<tr>
<th>Year of notification</th>
<th>Number of pregnancies with an NTD(^*)</th>
<th>Proportion of women taking folic acid before pregnancy (%)</th>
<th>Estimated additional percentage reduction in women if folic acid fortification implemented from 1998 (%)</th>
<th>Number of pregnancies with an NTD that would have been prevented by folic acid fortification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C=(1−B/100)×23</td>
<td>A×C</td>
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<td>1998</td>
<td>936</td>
<td>39.6</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2000</td>
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<td>125</td>
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<td>2012</td>
<td>1012</td>
<td>27.0</td>
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<td>169</td>
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\(^*\)From online supplementary appendix table 1.

\(^\dagger\)From ref. 19.

\(^\ddagger\)Conservative assumption of no reduction in the first year of fortification.
Types of Spina Bifida

1. Spina Bifida Occulta – abnormality confined to vertebrae due to an unclosed posterior vertebral arch.

2. Spina Bifida Cystica – A more severe type of spina bifida that has two classifications.
   - Meningocele – Where the meninges protrude through the defect. (4%)
   - Myelomeningocele – Elements of the cord also protrude through the defect, resulting in severe neural deficits. (96%)
## Classification

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<th>Urodynamic features</th>
<th>Conus reflexes</th>
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<td><strong>Contractile</strong></td>
<td>Detrusor Overactivity +/- DSD</td>
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<td>(25%)</td>
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<td></td>
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<tr>
<td><strong>Acontractile</strong></td>
<td>Absent detrusor activity SUI</td>
<td>-</td>
</tr>
<tr>
<td>(10%)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Intermediate</strong></td>
<td>Detrusor Over activity Incomplete Emptying Non relaxing Sphincter Low compliance SUI</td>
<td>+/-</td>
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<tr>
<td>(65%)</td>
<td></td>
<td></td>
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<td>Low compliance</td>
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<td></td>
<td>SUI</td>
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<td>Nb High Risk To Kidneys</td>
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Problems Associated with Spina Bifida
Spina Bifida - management

- Modifiable by Paed RX
  - ISC
  - Anti Chol / BoTox
- Timing of reconstruction
- Who will do ISC
  - Who will remind Jonny to do ISC?
  - Who will do this after parents die
- Bowels
- Sex

- Holistic approach
  - All the problems
  - All the family
  - Lifelong
  - ? Spinal injuries unit ?
- Upper tracts at risk in all
  - Boys > girls
  - Higher > lower
- Continence
  - At risk in all
  - Girls > boys
Ongoing issues

- Patients aging
- Conduits aging
- Cystoplasties and AUS’s aging
- Carers aging and dying
- Fragmented care
- Paed / adult divide
- GP ignorance
- No special status
  - Unlike SCI
Ms GB 50 yr old urology secretary  
Had Ileal conduit > 30 years ago  
Presents with urosepsis  
Needs ITU admission  
Multiple previous revisions and mesh hernia
RESULTS:

• 123 pts. FU a median of 48 months
• 586 individual clinic visits.
• Urological issues seen in 109 patients (88.5%)
  • 21% were asymptomatic.
• Symptomatic patients, the median time to present with a urological issue was 12 months.
• 81% of the urological issues required some form of treatment or intervention.
• The treatment or intervention in 56% of asymptomatic urological issues was surgery.

CONCLUSION:

• Most adult SB patients with urological issues are symptomatic by 2 years of follow-up; Asymptomatic patients with urological issues 34% at 3 years.
• Closer follow-up seems warranted.
Conclusions

- Bladder function changes throughout life of patients
- Goals and priorities ever changing
- Risk of interventions also changes