Der spinale neurologische Notfall

Spinal cord emergency

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Spinal cord emergencies

• traumatic

• non-traumatic
  – primary (myelitis, syringomyelia, intramedullary tumors..)
  – secondary (spinal metastases, intraspinal hemorrhage and abscess, spinal canal stenosis..)

• congenital
  – (meningo-myelocele, diastematomyelia, tethered cord..)
Spinal cord disorders: „the neurological examination is key!“
STANDARD NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY

MOTOR
KEY MUSCLES

C5: Elbow flexors
C6: Wrist extensors
C7: Elbow extensors
C8: Finger flexors (medial portion of middle finger)
T1: Finger adductors/handrow

UPPER LIMB TOTAL (MAXIMUM) (25) (25) (50)

L2: Hip flexors
L3: Knee extensors
L4: Ankle dorsiflexors
L5: Long toe extensors
S1: Ankle plantar flexors

Voluntary anal contraction (Yes/No)

LOWER LIMB TOTAL (MAXIMUM) (28) (28) (56)

Light Touch Score (MAXIMUM) (56) (56) (112)

Pin Prick Score (MAXIMUM) (56) (56) (112)

SENSORY
KEY SENSORY POINTS

This form may be copied freely but should not be altered without permission from the American Spinal Injury Association.
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Sport injuries
Traffic accidents
Emergency management
Diagnostische Abklärung einer akuten traumatischen Querschnittslähmung, Leitlinien DGN 2010
✓ Time is spine (early treatment)
✓ Decompression surgery
✓ Stabilization
✓ Cardiovascular management (ICU guidelines)
✓ Controlled mobilization

➤ Methylprednisolone
No evidence!
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Better a murder than a misdiagnosis.

House MD
Diagnostische Abklärung nicht-traumatischen Querschnittlähmung
DGN Guidelines 2010

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Red flags
Red flags

**First Red Flag: Pain**

- Usually first symptom
  - 80-90% of the time
- Usually precedes other neurologic symptoms by 7 weeks
  - Increases in intensity
- Severe local back pain
- Aggravated by lying down
  - Distension of venous plexus

Distribution of pain:
- bilateral pain
- clumsy hands/feet
- altered temp sen.
- girdle/belt like

Degenerative spinal canal stenosis

Spinal canal encroachments and instability
Segmental Sensory Assessment

Somato-sensory Evoked Potentials

SSEPS

Contact Heat Evoked Potentials

CHEPS

Large Diameter (tactile)

Small Diameter (temperature, pain)
Segmental Sensory Assessment

Somato-sensory Evoked Potentials
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Large Diameter (tactile)
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Segmental Sensory Assessment


Improved diagnosis of spinal cord disorders with contact heat evoked potentials. Ulrich A, Haefeli J, Blum J, Min K, Curt A. Neurology 2013
Snake – eye myelopathy

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Snake – eye myelopathy

police officer, 51 yrs
thermal hypaesthesia

Ulnar SSEP

Tibial SSEP

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Red flags

Second Red Flag: Motor

• Weakness: 60-85%
  – Tends to be symmetrical
  – Severity greatest with thoracic mets

• At or above conus medularis
  – Extensors of the upper extremities

• Above the thoracic spine
  – Weakness from corticospinal dysfunction
  – Affects flexors in the lower extremities

• Patients may be hyper reflexic below the lesion and have extensor plantars

Walking signs:
• unsteadiness
• fatigue
• weakness
  (limb or bilateral)

Calcified disc herniation T7/8
Lower back pain
Dysesthesia left leg
Lower limb reflexes increased
Female 36 years

Calcified disc herniation T10/11
Back pain, left leg pain
Bladder - bowel normal
Unlimited walking
Male 53 years
Patient with complete paralysis due to spinalis anterior syndrome with loss of thermal and pain sensation below T7 but preserved light touch where accordingly dSSEP remained normal but dCHEP were abolished below the level of lesion.
Intraspinal – epidural haemorrhage

**Acute, non traumatic epidural haemorrhage**

male, 31 years, physiotherapist, paraplegia T3 AIS B, became paralyzed within 60 min
Intraspinal – epidural haemorrhage

Although patient received decompression surgery within 6 hours after onset of symptoms he suffers from established (chronic) paraplegia (AIS-B)

Spinal cord damage as a sequel of spinal cord compression due to epidural haemorrhage
Intraspinal – epidural haemorrhage

Sub-acute onset
Male 63 yrs, marcumar therapy
AIS-C, able to stand and walk indoors

Pre OR

Post OR
Red flags

Types of Incontinence

Bladder signs:
- frequency
- voiding
- incontinence
Arterio-venous malformation of spinal cord

Lower limb fatigue and bladder urgency!
Meningeoma at thoracic cord level

Lower limb pain and bladder urgency!
Spinal metastases

What types of cancer cause it?

Most commonly seen in

- Breast
- Lung
- Prostate
- Lymphoma
- Myeloma

- 3-5% of patients with cancer overall

constant & increasing
Take home message: Red flags

Distribution of pain:
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  (limb or bilateral)

Bladder signs:
- frequency
- voiding
- incontinence

Lecture can be found on: www.balgrist/Zentrum für Paraplegie
…the spinal cord works not wireless yet, and we have ways to assess it....
Supplement
The examination of motor function is key!!
Schematic demarcation of dermatomes shown as distinct segments. There is actually considerable overlap between any two adjacent dermatomes.

Cervical segments
C5—Anterolateral shoulder
C6—Thumb
C7—Middle finger
C8—Little finger

Thoracic segments
T1—Medial arm
T3—3rd, 4th interspace
T4—Nipple line, 4th, 5th interspace
T6—Xiphoid process
T10—Navel
T12—Pubis

Lumbar segments
L2—Medial thigh
L3—Medial knee
L4—Medial ankle
Great toe
L5—Dorsum of foot

Sacral segments
S1—Lateral foot
S2—Posteromedial thigh
S3, 4, 5—Perianal area
**ASIA IMPAIRMENT SCALE**

The following order is recommended in determining the classification of individuals with SCI.

- **A** = Complete: No motor or sensory function is preserved in the sacral segments S4-S5.
- **B** = Incomplete: Sensory but no motor function is preserved below the neurological level and includes the sacral segments S4-S5.
- **C** = Incomplete: Motor function is preserved below the neurological level, and more than half of key muscles below the neurological level have a muscle grade less than 3.
- **D** = Incomplete: Motor function is preserved below the neurological level, and at least half of key muscles below the neurological level have a muscle grade of 3 or more.
- **E** = Normal: Motor and sensory function are normal.

**CLINICAL SYNDROMES (OPTIONAL)**

- Central Cord
- Brown-Sequard
- Anterior Cord
- Conus Medullaris
- Cauda Equina

**STEPS IN CLASSIFICATION**

1. **Determine sensory levels for right and left sides.**
2. **Determine motor levels for right and left sides.**
3. **Determine the single neurological level.**
   - This is the lowest segment where motor and sensory function is normal on both sides, and is the most cephalad of the sensory and motor levels determined in steps 1 and 2.
4. **Determine whether the injury is Complete or Incomplete (sacral sparing).**
   - If voluntary anal contraction = No AND all S4-5 sensory scores = 0 AND any anal sensation = No, then injury is COMPLETE.
   - Otherwise injury is incomplete.
5. **Determine ASIA Impairment Scale (AIS) Grade:**
   - **Is injury Complete?**
     - If YES, AIS = A (Record ZFP)
     - If NO, AIS = B
   - **Is injury motor Incomplete?**
     - If YES, AIS = B
     - If NO, AIS = C
   - **Are at least half of the key muscles below the (single) neurological level graded 3 or better?**
     - If YES, AIS = D
     - If NO, AIS = C

**Note:** AIS E is used in follow-up testing when an individual with a documented SCI has recovered normal function. If at initial testing no deficits are found, the individual is neurologically intact; the ASIA Impairment Scale does not apply.
Thank you for your attention!