ISNCSCI / ASIA Examination & Cases

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Objectives

- Be familiar with how the ISNCSCI/ASIA exam is performed
  - International Standards for the Neurologic Classification of Spinal Cord Injury
  - American Spinal Injury Association
- Be able to define/determine the following:
  - Sensory level
  - Motor level
  - Neurological level of injury
  - Completeness of injury
  - AIS Classification
- Be able to determine ASIA classification using practice cases

ASIA Standards

- Frankel Classification—1969
  - Frankel A, B, C, D, E
- ASIA Standards—1982
  - Modified from the Frankel Scale, further defined subgroups
- ASIA Revision—1989
  - Standardization of sensory anatomical landmarks; sacral sparing incorporated
- ASIA Impairment Scale—1992
  - FIM incorporated, PP/LT tested separately, motor level defined as 3/5 with 5/5 above.
- Revisions—1996
  - ASIA C vs. D clarified; motor level determined by sensory level in areas unable to be tested (C2-4, T2-L1)
- Revisions—2000
  - ASIA C/D required to have either voluntary anal contraction OR sensory sacral sparing w/ sparing of motor function *more than three levels* below motor level; FIM eliminated.

More revisions!!!—2011

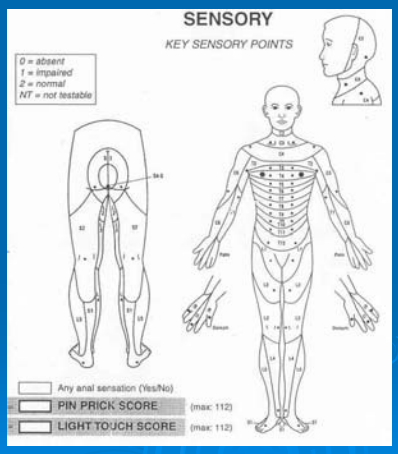
- Deep anal “sensation” replaced with “pressure”
- Classification as C1 AIS X for patient with impaired/absent sensation at C2
- If LT/PP sensation present at S4/5 don’t have to test deep anal sensation (but your finger is there anyway, so you might as well)
- ZPP defined as the “dermatomes and myotomes caudal to the **sensory and motor levels** (rather than NLI) on each side of the body that remain partially innervated” in complete SCI
- Emphasis on calling it the ISNCSCI exam (International Standards for Neurological Classification of SCI)

ASIA Examination

- Sensory level
- Motor level
- Neurological level of injury (NLI)
- Complete vs. Incomplete injury
- Sacral sparing
- Zone of Partial Preservation (complete injuries)

Sensory Level

- ***28*** key dermatomes
- Test light touch and pinprick
- Face is used as control.
- Three point scale:
  - 0 = ***absent***
  - 1 = ***impaired***
  - 2 = ***normal***
  - NT = ***not tested***



Light Touch Sensory Scoring

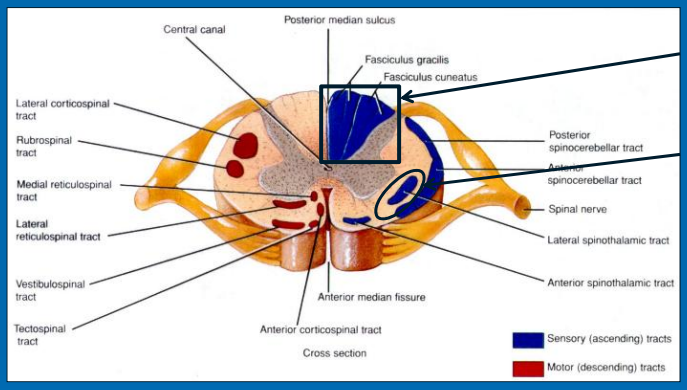
- Use cotton tip applicator
- Stroke across skin moving over a distance that does not exceed 1 cm
- For C6-C8 use dorsal surface of proximal phalanx
- Chest and abdomen points should be tested in the midclavicular line.

Pinprick Sensory Scoring

- Clean safety pin
- Use consistent pressure in each dermatome
- Poke one time only, not repeated

Pop quiz! You test the C6 dermatome and patient says “It feels sharp, but not as sharp as my face”. What score do you assign that dermatome?

Sensory Tracts



LT = Dorsal columns

PP = Spinothalamic tracts

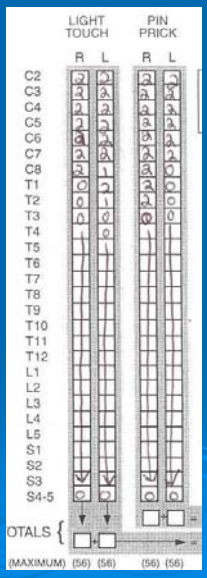
Patient "feeling" PP but unable to differentiate sharp and dull is simply sensing pressure—PP sensation is *ABSENT*.

Sensory Testing—perianal area

- S4/5 dermatome represents the most caudal aspect of the spinal cord
- S4/5 is tested for both PP and LT
- Deep anal pressure: on digital rectal exam patient is asked to report sensory awareness. Recorded as "present" or "absent".

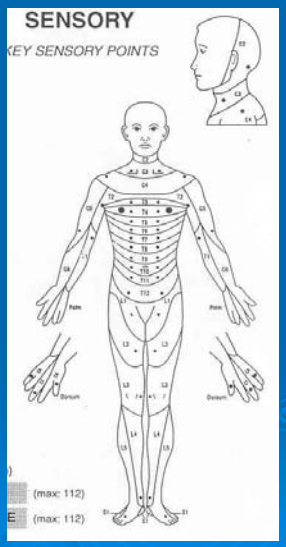
Determining sensory level…

- Determined for right side and left side
- Defined as ***the level where sensory function is normal on both sides of the body***
  - Lowest level where you have "2's" with all above levels being "2's"



Sensory Testing Pitfalls

- Inappropriately scoring PP as "impaired" when it should be "absent"
  - Unable to differentiate between sharp and dull edges = ABSENT!!
- **Something about C4 Bib???**



Motor Examination

- ***10*** key muscle groups
- Other muscles may be clinically important but do not contribute to motor scores
- Examine in rostral to caudal sequence (Don't Skip Around!)
- Tested in ***supine*** position
  - Necessary during acute period, allows for comparison later on.
- 6 point scale (0-5)
  - Only whole numbers, no plus/minus (for research purposes)

Motor Exam

- **1:** Muscle twitch
- **2:** Full active ROM with gravity eliminated
- **3:** Full active ROM against gravity
- **4:** Able to generate some resistance
- **5:** Normal strength

Motor Examination

Upper Extremities:

- C5 = *Elbow Flexors*
- C6 = *Wrist Extensors*
- C7 = *Elbow Extensors*
- C8 = *Finger Flexors*
- T1 = *Finger Abductors*

Lower Extremities:

- L2 = *Hip Flexors*
- L3 = *Knee Extensors*
- L4 = *Ankle Dorsiflexors*
- L5 = *Long Toe Extensors*
- S1 = *Ankle Plantarflexors*

Motor Testing

- Test each of the ten key muscles
- Record numeric values only (for research and test-taking purposes).
- **Voluntary anal contraction**: contraction of EAS around examiners finger; graded as “present” or “absent”

Motor Testing—Fine points

- If only minimal movement in muscle group palpate over muscle
- Pain and deconditioning may cause patient to grade 4/5; *can grade this as 5**
- Score “NT” if patient not fully testable due to pain, spasticity, uncontrolled clonus, fracture

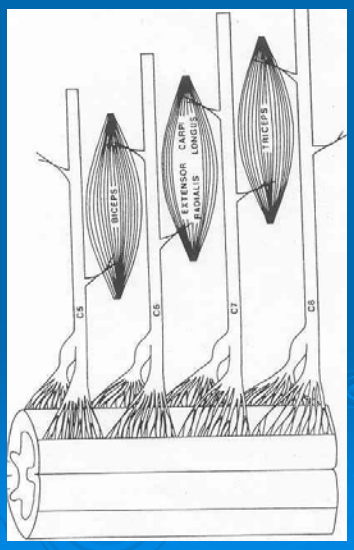
Motor Testing—Fine points

- Contractures:
  - ***What do we do???***

NT if contracture limits > 50% ROM

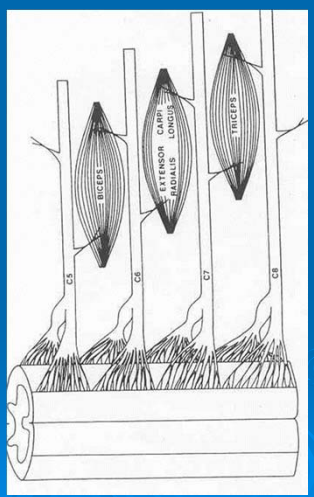
Motor Examination

- Key muscles are given a single level on ASIA (elbow flexors = C5) for simplification.
- Muscles generally innervated by at least two roots (biceps = C5,6).



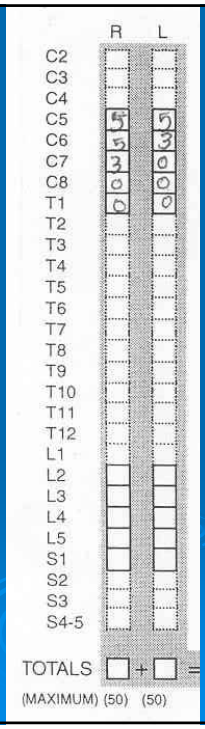
Motor Examination

- If muscle has <u>only</u> rostral root intact (C5 for elbow flexors) will likely have 3/5 strength. If both C5,6 intact will have 5/5 strength.
  - ***This is important for determining motor level!!!***

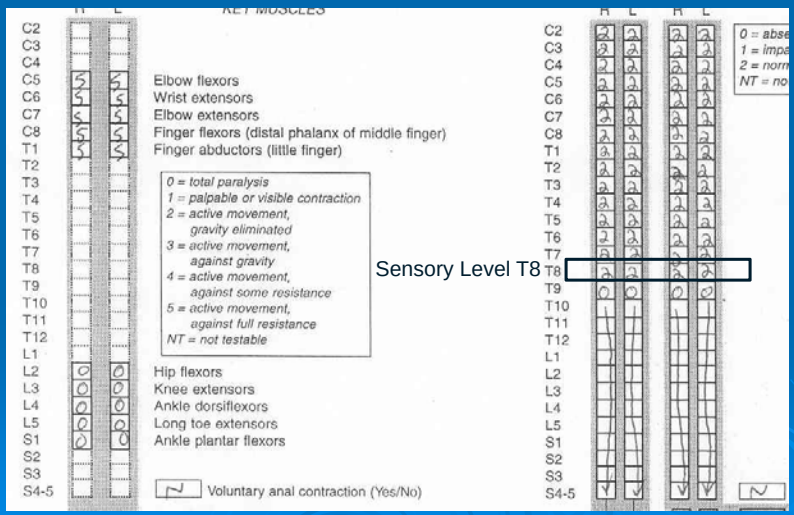


Motor Score

- Level at which strength is ***at least 3/5 with all levels above being 5/5***
- Scored for each side, overall score is last normal for both.
- Left = C6
- Right = C7
- Overall motor score = C6



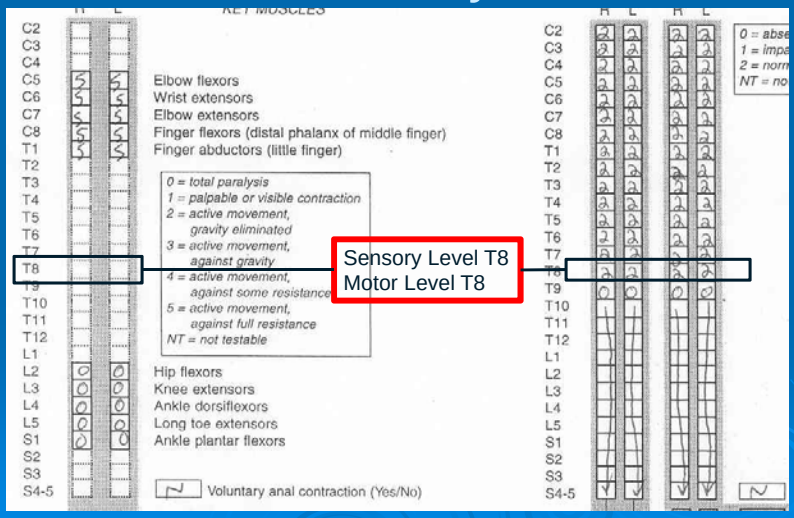
What if you can't test the motor level?



Motor Level

- 1996 revision:
  - **Sensory level** is in a region that cannot be tested (**C2-4, T2-L1, S3-5**) → **Motor level is designated as being <u>the same as the sensory level</u>.**

If can't test motor, then motor level is same as sensory level….



Neurological Level of Injury

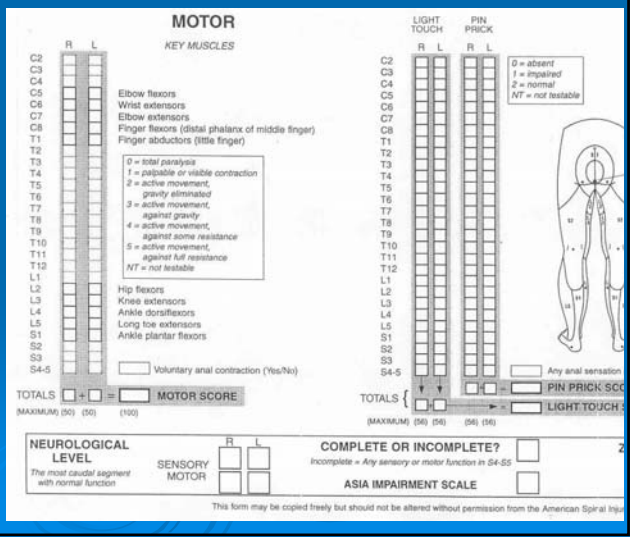
- The ***most caudal*** (lowest) level at which both motor and sensory modalities are intact on both sides of the body.
  - Motor ≥3/5 w/ levels above being 5/5
  - Sensory intact bilaterally for LT and PP with all sensation above intact
- If there is no key muscle for a segment that has sensory intact (C2-4, T2-L1, S3-5), the sensory level defines the motor level and the NLI

Complete vs. Incomplete

- Complete = ***NO sacral sparing***
  - ***"NOON sign"***
- Incomplete = ***ANY sacral sparing***

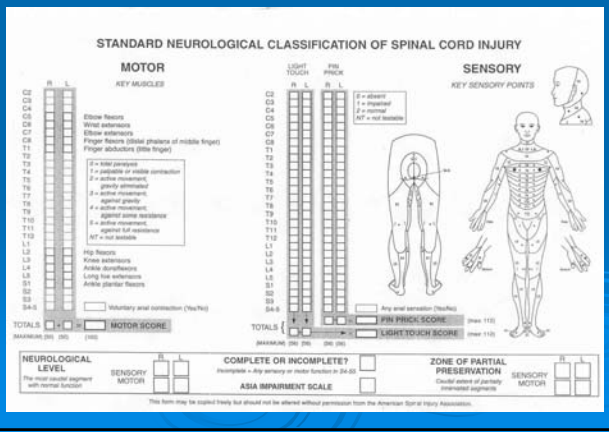
Sacral Sparing

1. Light touch sensation at S4/5
2. Pinprick at S4/5
3. Deep anal pressure
4. Voluntary anal contraction



Zone of Partial Preservation

- All segments below NLI with presevation of sensory or motor findings in **complete SCI.**



ASIA Impairment Scale Classification

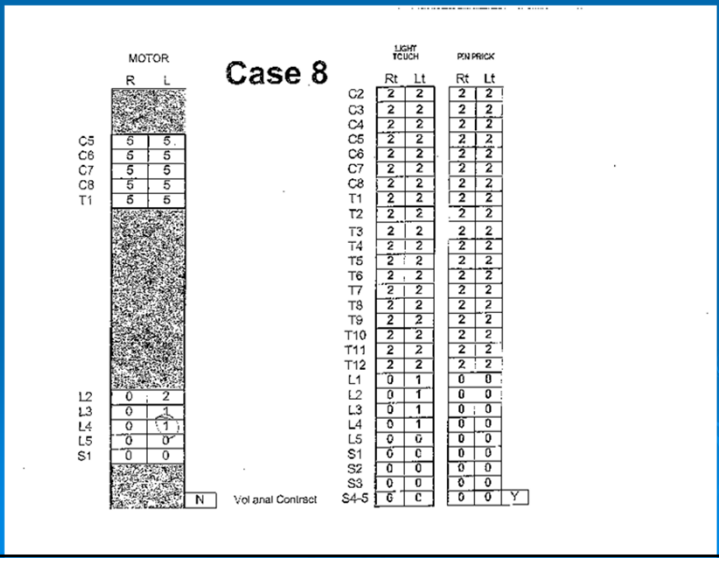
- **AIS A** = Motor and Sensory **Complete**
  - No motor or sensory function preserved in sacral segments (S4/5)
- **AIS B** = Sensory Incomplete
  - Sensory but no motor below the NLI, and includes sacral segments S4/5
- **AIS C** = Motor Incomplete
  - Motor function preserved below **NLI**, and ***more than half*** of the muscles have grade **<3/5**
- **AIS D** = Motor Incomplete
  - Motor function preserved below **NLI**, and ***at least half*** of the muscles have grade **>3/5**
- **AIS E** = Normal; motor and sensory function are normal.

Motor Incomplete Rules

- In order to classify as AIS C or D must have either:
  - Voluntary anal sphincter contraction

    OR
  - Sensory sacral sparing with sparing of motor function **more than 3 levels** below the **motor level**

Example of motor incomplete in absence of voluntary anal contraction



AIS C vs AIS D

- When determining if patient is AIS C or an AIS D look at all motor scores ***below the ??? Level***
  - ***NEURO LEVEL***
- (Remember B vs C you use the ***??? level*** to determine—see previous slide)
  - ***MOTOR LEVEL***

What if I want to double check myself???

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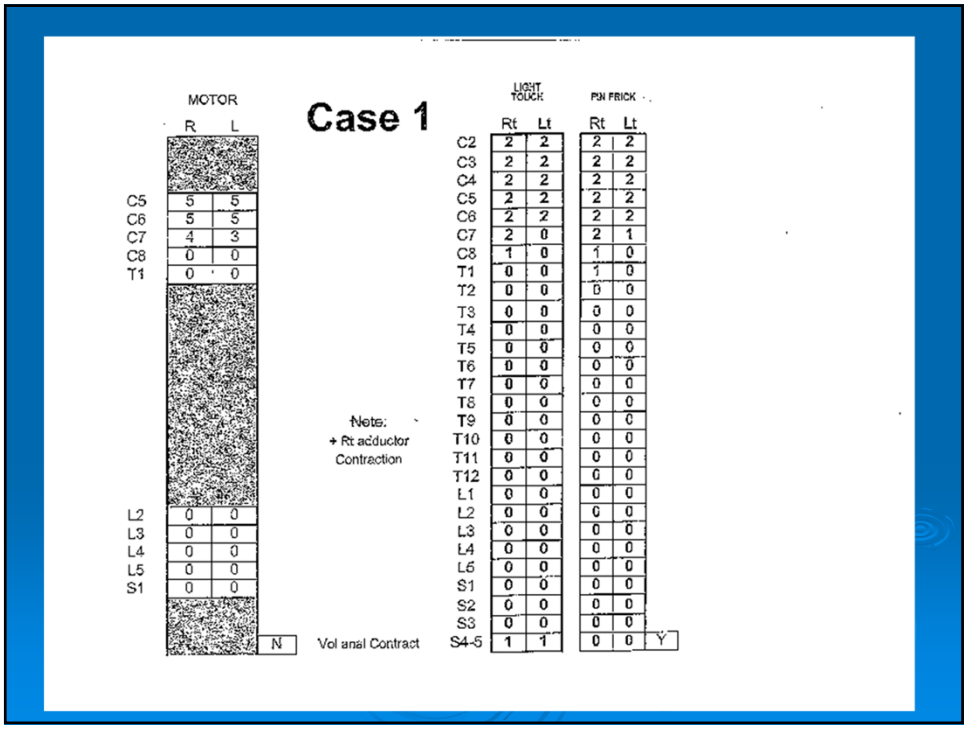
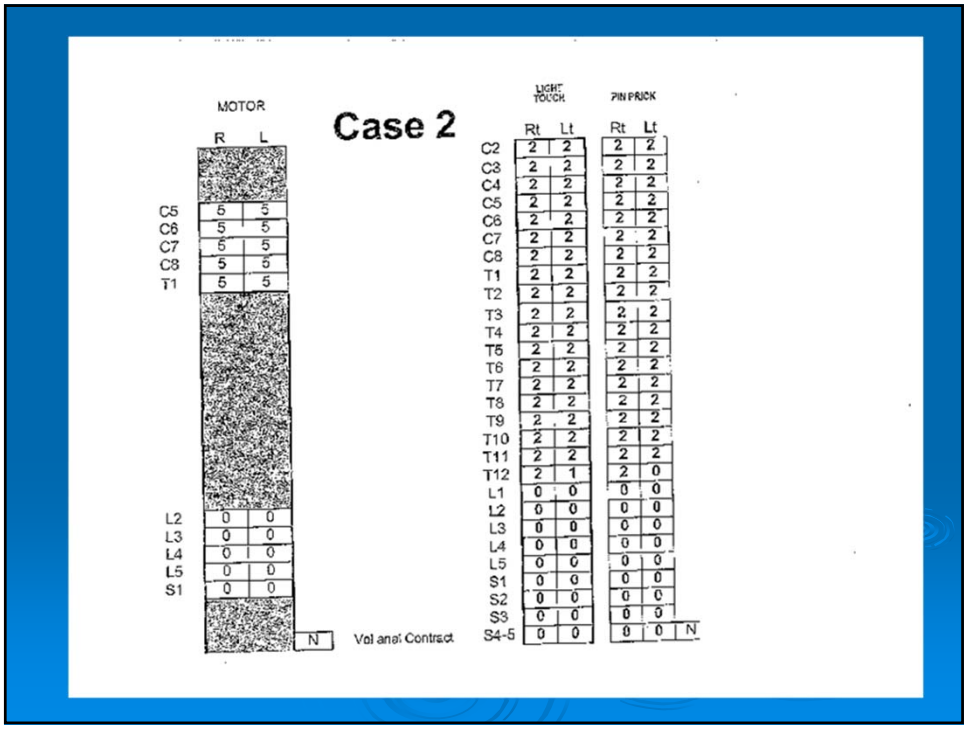
FUN CASES!



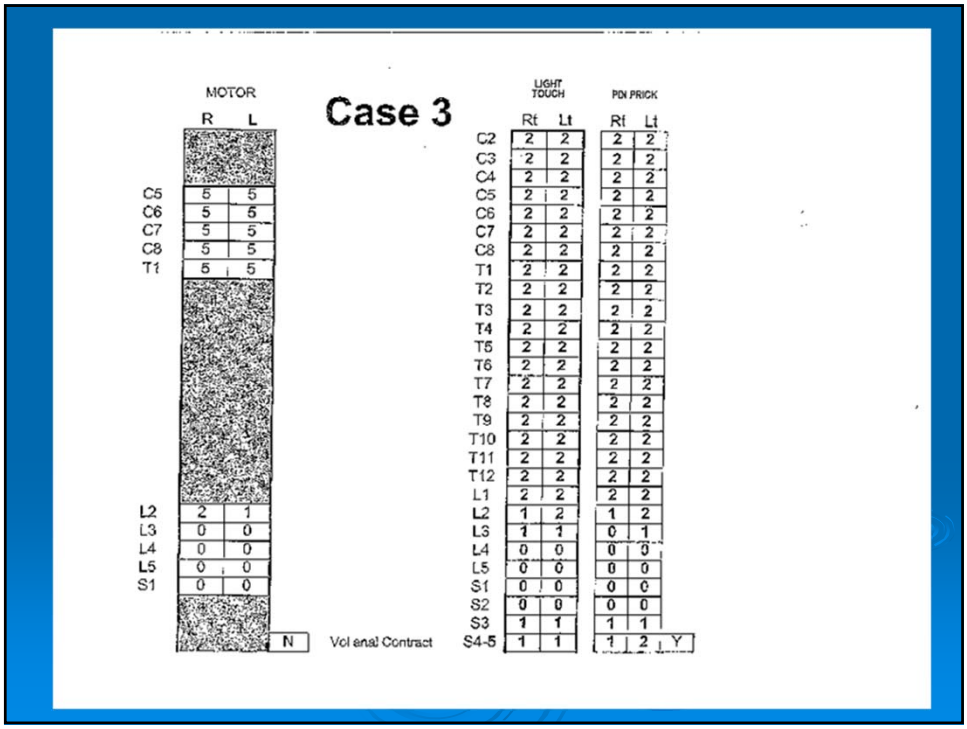
Case 1

- Sensory Level: R C7, L C6
- Motor Level: R C7, L C7
- Neuro Level: C6
- Incomplete
- C6 ASIA C



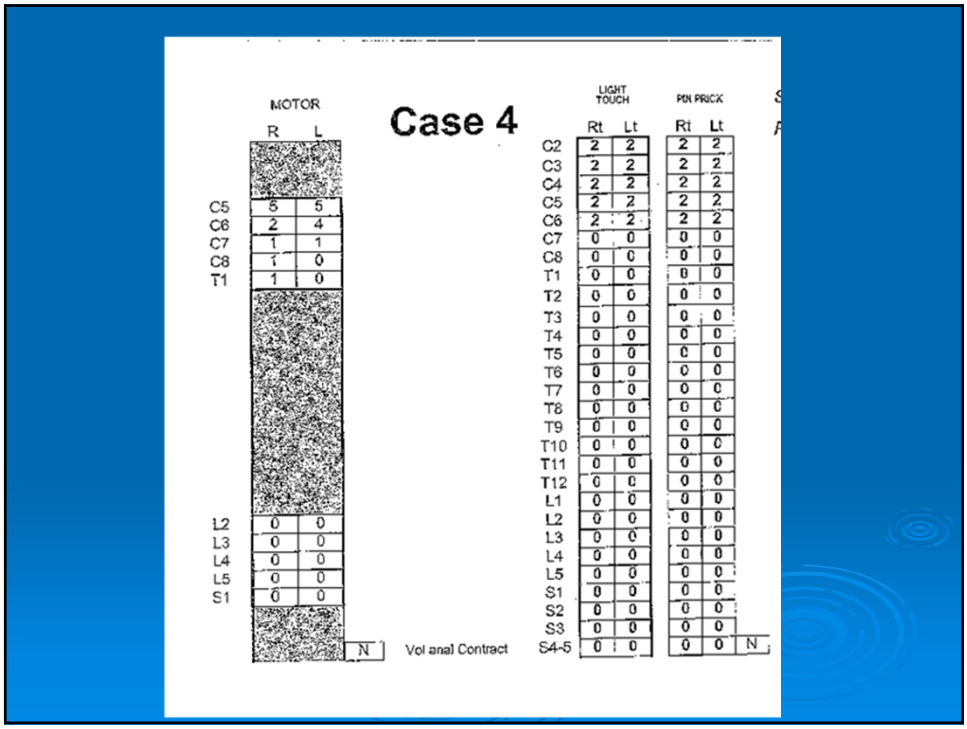
Case 2

- Sensory: R T12, L T11
- Motor: R T12, L T11
- Neuro: T11
- Complete
- T 11 ASIA A



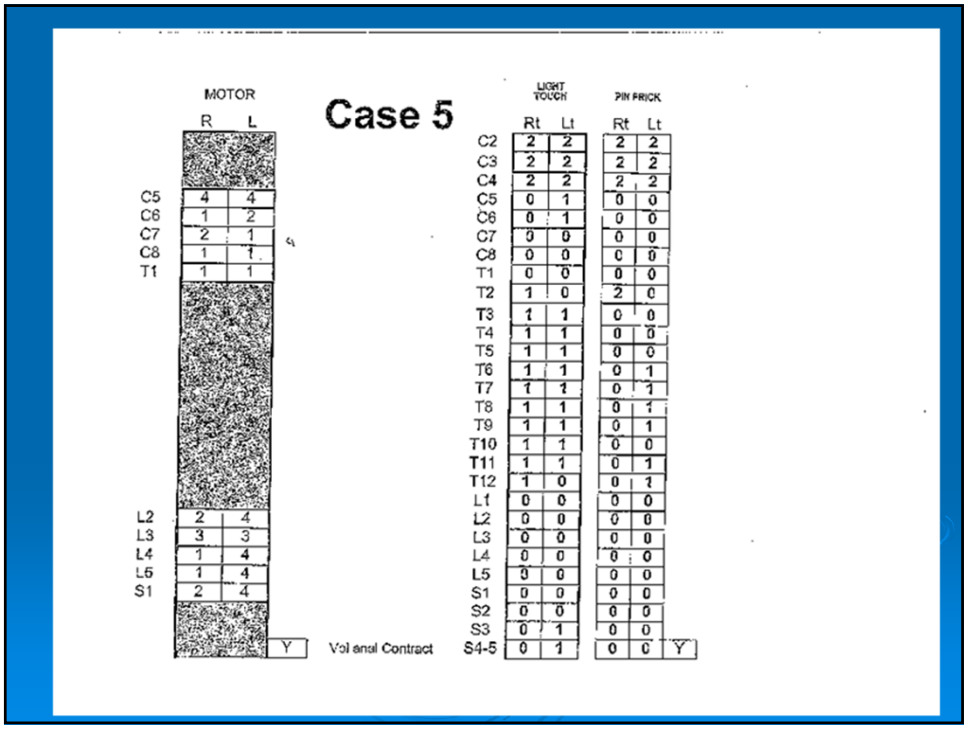
Case 3

- Sensory: R L1, L L2
- Motor: R L1, L L1
- Neuro: L1
- Incomplete
- L1 ASIA B



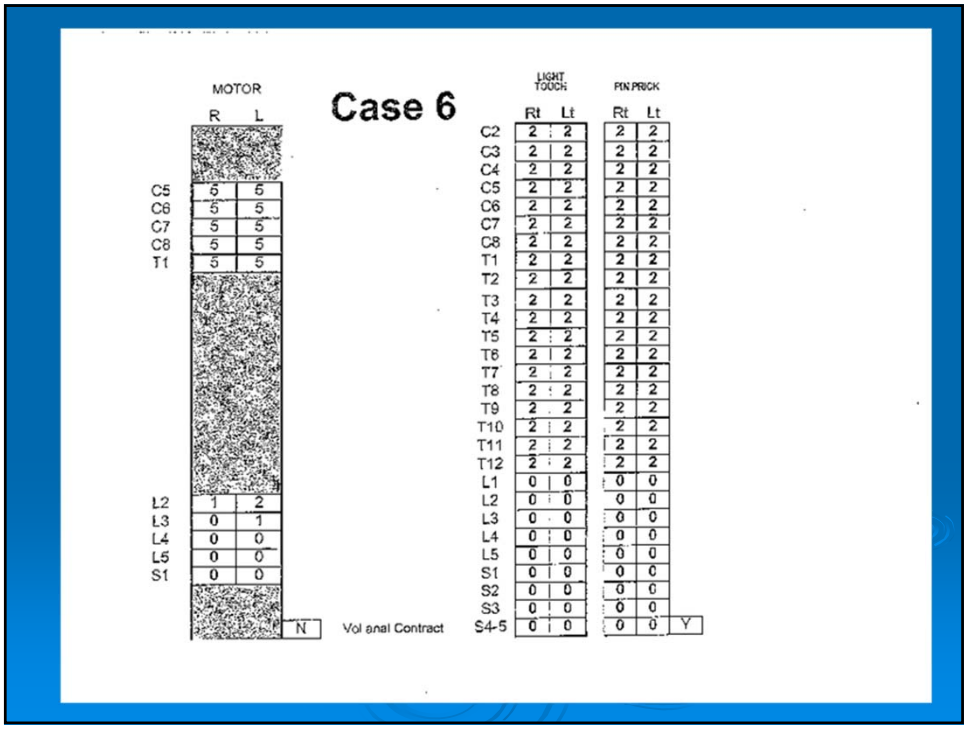
Case 4

- Sensory: R C6, L C6
- Motor: R C5, L C6
- Neuro: C5
- Complete
- C5 ASIA A



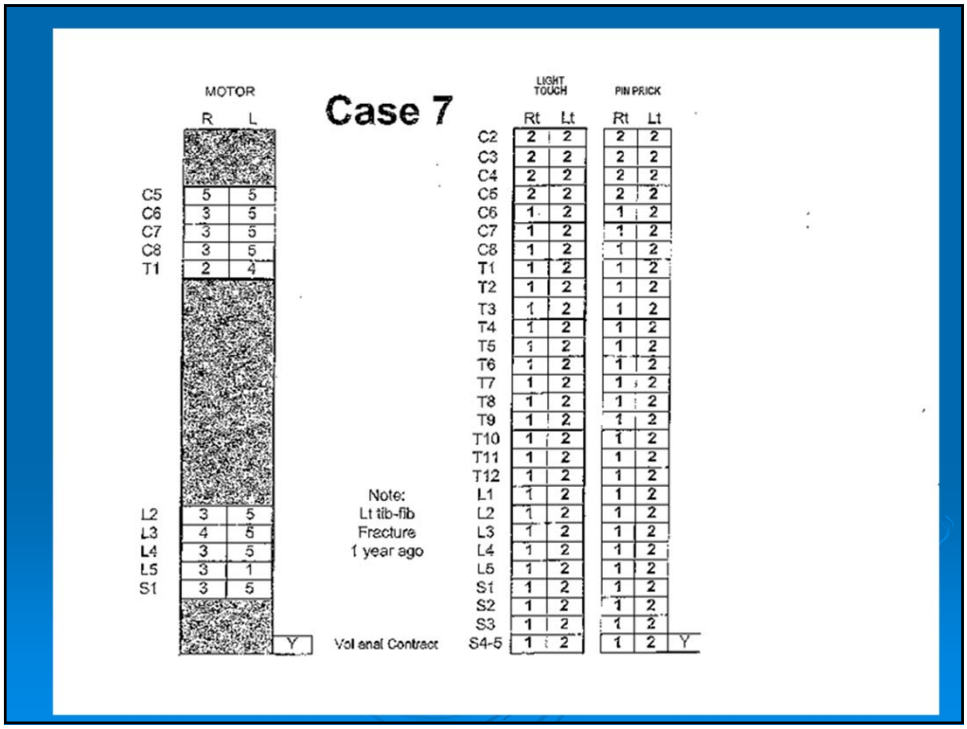
Case 5

- Sensory: R C4, L C4
- Motor: R C5, L C5
- Neuro: C4
- Incomplete
- C4 ASIA C



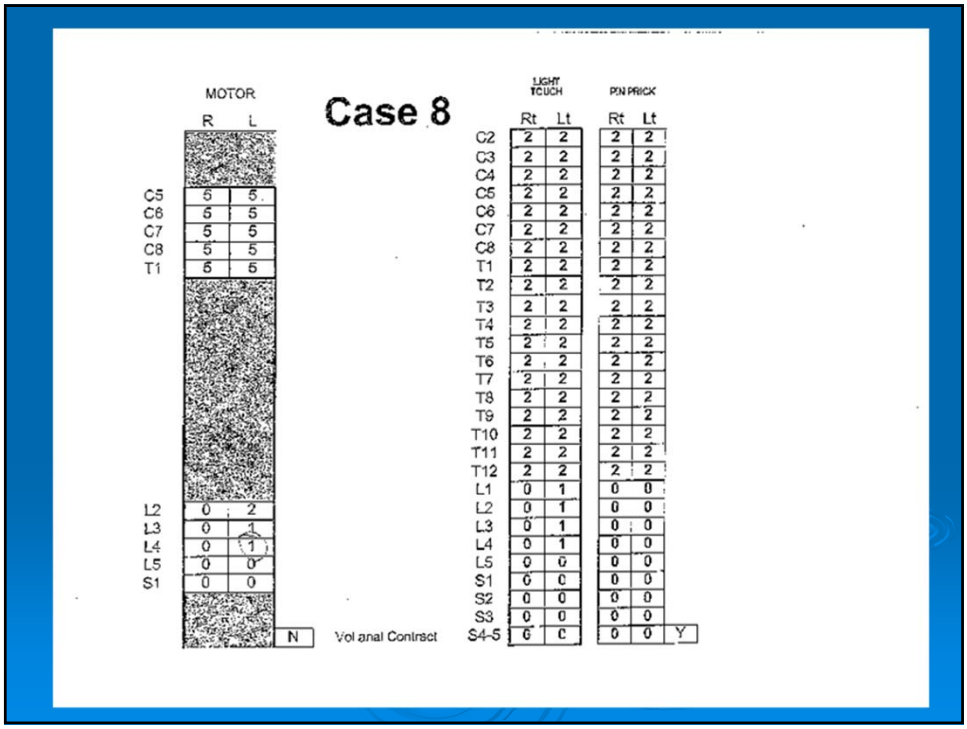
Case 6

- Sensory: R T12, L T12
- Motor: R T12, L T12
- Neuro: T12
- Incomplete
- T12 ASIA B



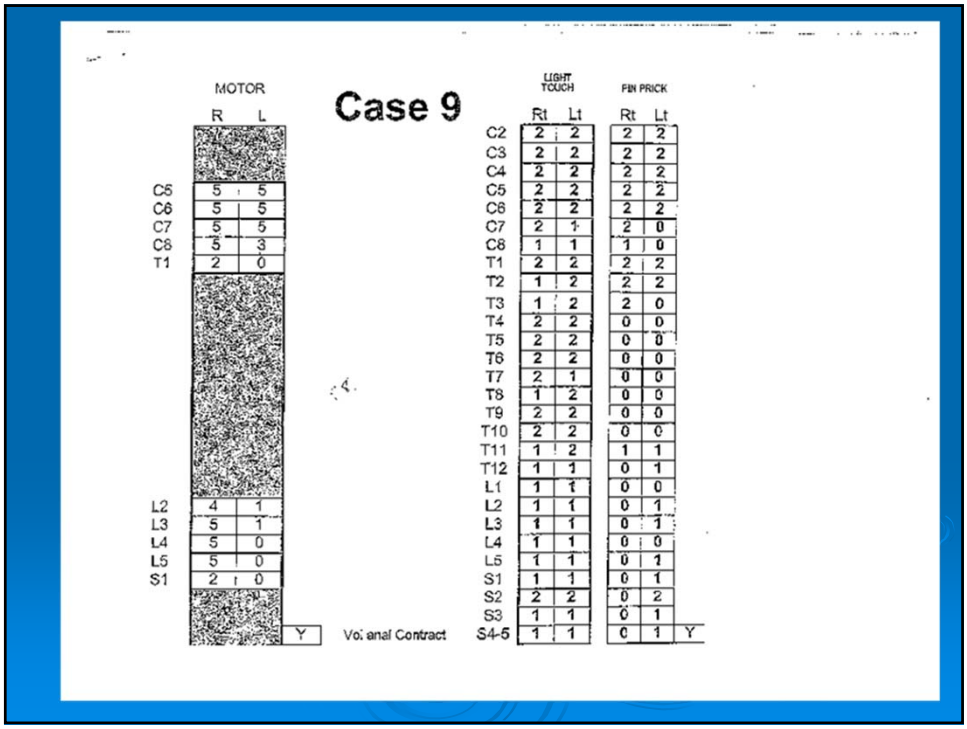
Case 7

- Sensory: R C5, L S5
- Motor: R C6, L T1
- Neuro: C5
- Incomplete
- C5 ASIA D



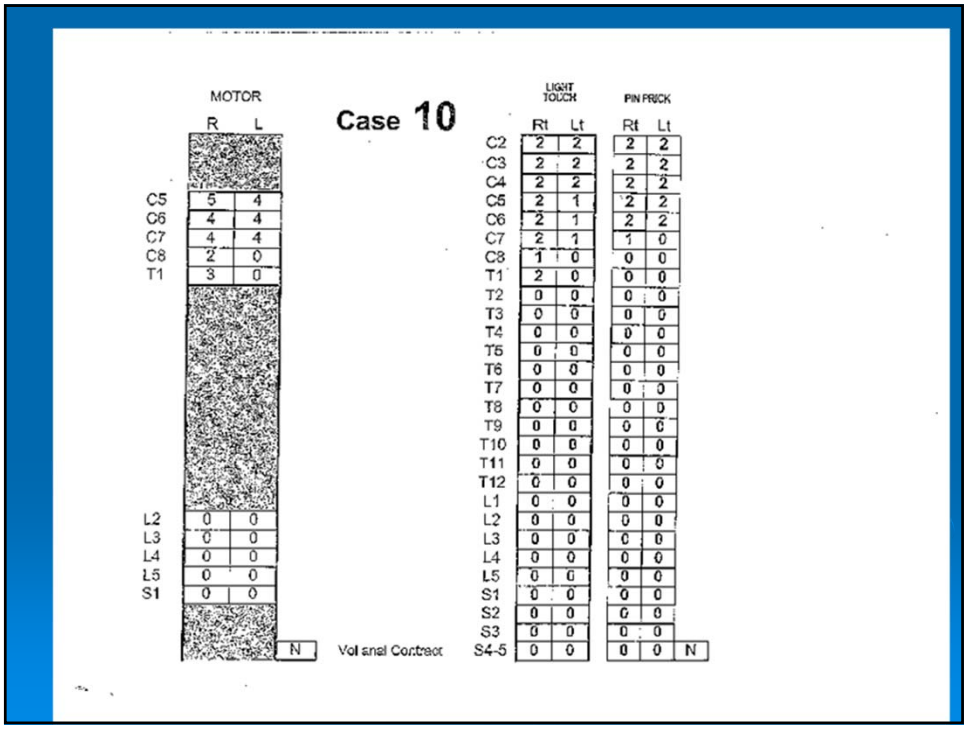
Case 8

- Sensory: R T12, L T12
- Motor: R T12, L T12
- Neuro: T12
- Incomplete
- T12 ASIA C



Case 9

- Sensory: R C7, L C6
- Motor: R C8, L C8
- Neuro: C6
- Incomplete
- C6 ASIA D



Case 10

- Sensory: R C6, L C4
- Motor: R C6, L C5
- Neuro: C4
- Complete
- C4 ASIA A