Neurosurgical History and Examination

Tutorial Session

Amro Al-Habib

- What do you want to know?

- Overview
- History
- Physical

Basic Idea

- Detective work!

Advice

- Summarize and memorize
- Develop a system that you follow:
  - What works for you may not work for others
  - Put it down in your own words
- Practice what you have (not easy)!

Case: History

- 54 y.o. right handed Saudi engineer. Works in ….. and a father of 3 kids.
- Medical history:
- Known to have Migraine, DM, HTN.
- Ref: Headache
- P/C: details

Hx. cont

- Systemic enquiry:
  - System by system
- Medication Hx:
- Past medical and surgical Hx.
- Social and Habits
  - Smoking, drinking
  - Marital status, travel abroad, occupation..
- Family Hx
  - Usually start by deaths and their ages..

- Headache, Vomiting, Papilloedema
- Headache that is the worst in the patient's life

Neuro exam

- First:
  - General exam
  - Vitals

Neuro exam cont.

- Mental status function
- Cranial Nerves
- Motor
- Sensory
- Cerebellar
- Reflexes and special tests (Gait, plantar, clonus, Romberg, Meningeal irritation, Hoffmann)

- Mental status:
  - Orientation
  - Memory
  - Speech
  - (Mini-mental test)
  - 4. Calculation

- 2. Cranial nerves:
- 1 to 12

- 3. Motor:
- Inspection for muscle atrophy
- Tone
- Power

MRC scale for muscle power

0	No muscle contraction visible
1	Muscle contraction visible, but no movement of joint
2	Joint movement when effect of gravity eliminated
3	Movement sufficient to overcome effect of gravity
4	Movement overcomes gravity plus added resistance
5	Normal Power

Macleod's Clinical Examination. Page 231

- 4. Sensory:
- Light touch, position sense and vibration
- Pain, touch, temperature

- 5. Cerebellar
- Nystagmus, dysarthria
- Rapid alternating movements
- Finger-nose, Heel-shin
- Heel-toe gait

Advice

- Be systematic:
  - Step by step
  - Start by upper limbs then lower
  - Or One side then the other

Unconscious patient / Emergency

- Head:
  - Trauma
    - ATLS guidelines
    - GCS

GCS

Glasgow Coma Score		
Eye Opening (E)	**Verbal Response (V)**	**Motor Response (M)**
4=Spontaneous 3=To voice 2=To pain 1=None	5=Normal conversation 4=Disoriented conversation 3=Words, but not coherent 2=No words.....only sounds 1=None	6=Normal 5=Localizes to pain 4=Withdraws to pain 3=Decorticate posture 2=Decerebrate 1=None
		Total = E+V+M

http://www.ssgfx.com/CP2020/medtech/glossary/glasgow.htm

- Spine:
  - ATLS guidelines
  - ASIA score

Patient Name _____

Examiner Name _____ Date/Time of Exam _____

STANDARD NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY

ASIA — American Spinal Injury Association

ISCOS

MOTOR

KEY MUSCLES (scoring on reverse side)

	R	L	
C5	☐	☐	Elbow flexors
C6	☐	☐	Wrist extensors
C7	☐	☐	Elbow extensors
C8	☐	☐	Finger flexors (distal phalanx of middle finger)
T1	☐	☐	Finger abductors (little finger)

UPPER LIMB TOTAL (MAXIMUM) ☐ + ☐ = ☐ (25) (25) (50)

Comments:

	R	L	
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) ☐ + ☐ = ☐ (25) (25) (50)

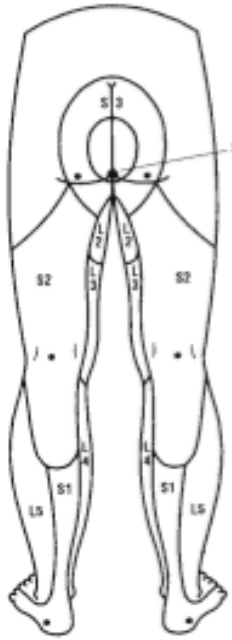
SENSORY

KEY SENSORY POINTS

	LIGHT TOUCH R	LIGHT TOUCH L	PIN PRICK R	PIN PRICK L
C2				
C3				
C4				
C5				
C6				
C7				
C8				
T1				
T2				
T3				
T4				
T5				
T6				
T7				
T8				
T9				
T10				
T11				
T12				
L1				
L2				
L3				
L4				
L5				
S1				
S2				
S3				
S4-5				

TOTALS (MAXIMUM) (56) (56) ☐ + ☐ = ☐ (56) (56) ☐ = ☐

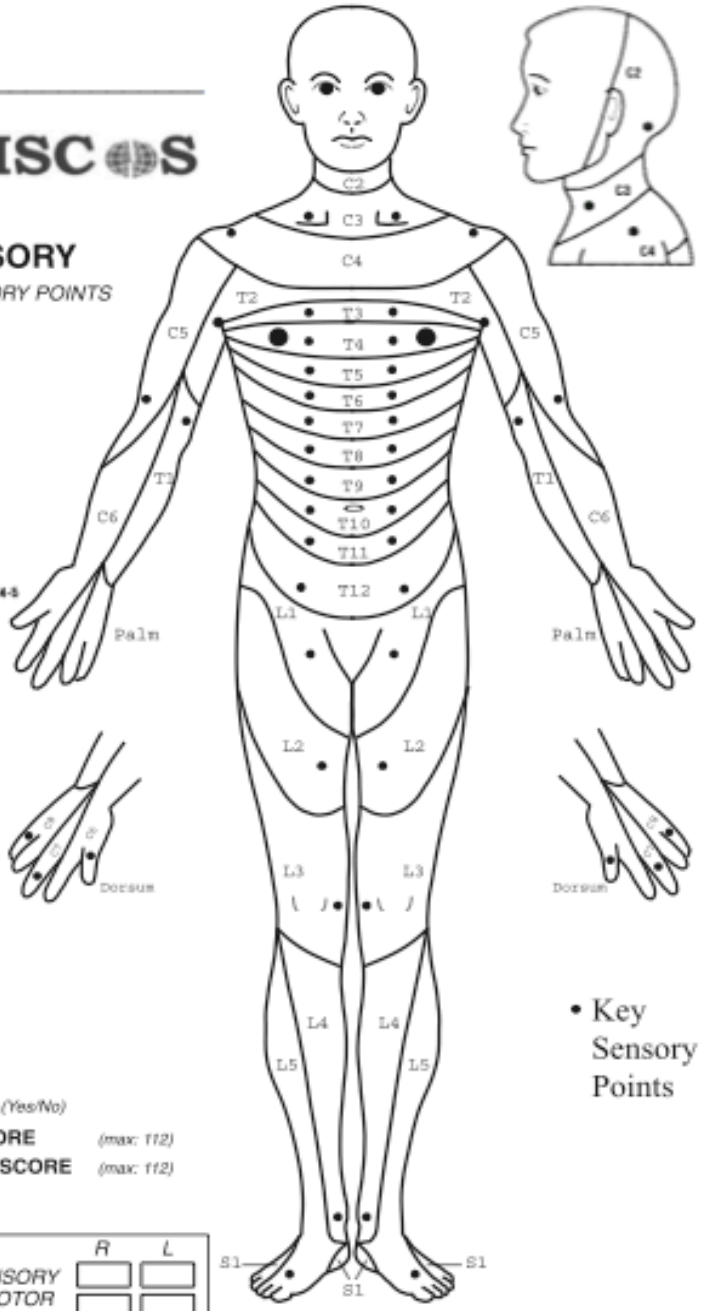
0 = absent
1 = impaired
2 = normal
NT = not testable



Any anal sensation (Yes/No) ☐

PIN PRICK SCORE (max: 112) ☐

LIGHT TOUCH SCORE (max: 112) ☐



• Key Sensory Points

NEUROLOGICAL LEVEL	SENSORY R ☐	SENSORY L ☐	COMPLETE OR INCOMPLETE? ☐	ZONE OF PARTIAL PRESERVATION	SENSORY R ☐	SENSORY L ☐
The most caudal segment with normal function	MOTOR ☐	MOTOR ☐	*Incomplete = Any sensory or motor function in S4-S5*	*Caudal extent of partially innervated segments*	MOTOR ☐	MOTOR ☐
			ASIA IMPAIRMENT SCALE ☐			

REV 03/06

MUSCLE GRADING

0 total paralysis

1 palpable or visible contraction

2 active movement, full range of motion, gravity eliminated

3 active movement, full range of motion, against gravity

4 active movement, full range of motion, against gravity and provides some resistance

5 active movement, full range of motion, against gravity and provides normal resistance

5* muscle able to exert, in examiner's judgement, sufficient resistance to be considered normal if identifiable inhibiting factors were not present

NT not testable. Patient unable to reliably exert effort or muscle unavailable for testing due to factors such as immobilization, pain on effort or contracture.

ASIA IMPAIRMENT SCALE

☐ **A = Complete**: No motor or sensory function is preserved in the sacral segments S4-S5.

☐ **B = Incomplete:** Sensory but not 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

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

1. Determine sensory levels for right and left sides.
2. Determine motor levels for right and left sides.
   Note: in regions where there is no myotome to test, the motor level is presumed to be the same as the sensory level.
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 ZPP
(For ZPP record lowest dermatome or myotome on each side with some (non-zero score) preservation)

NO ↓

Is injury motor incomplete? If **NO**, AIS=B
(Yes=voluntary anal contraction OR motor function more than three levels below the motor level on a given side.)

YES ↓

Are at least half of the key muscles below the (single) neurological level graded 3 or better?

NO ↓ AIS=C

YES ↓ AIS=D

If sensation and motor function is normal in all segments, AIS=E
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.

DDX

- The final goal is to reach a differential diagnosis (NOT only a diagnosis)
- Be broad in your thinking:
  - e.g. VITAMINE D

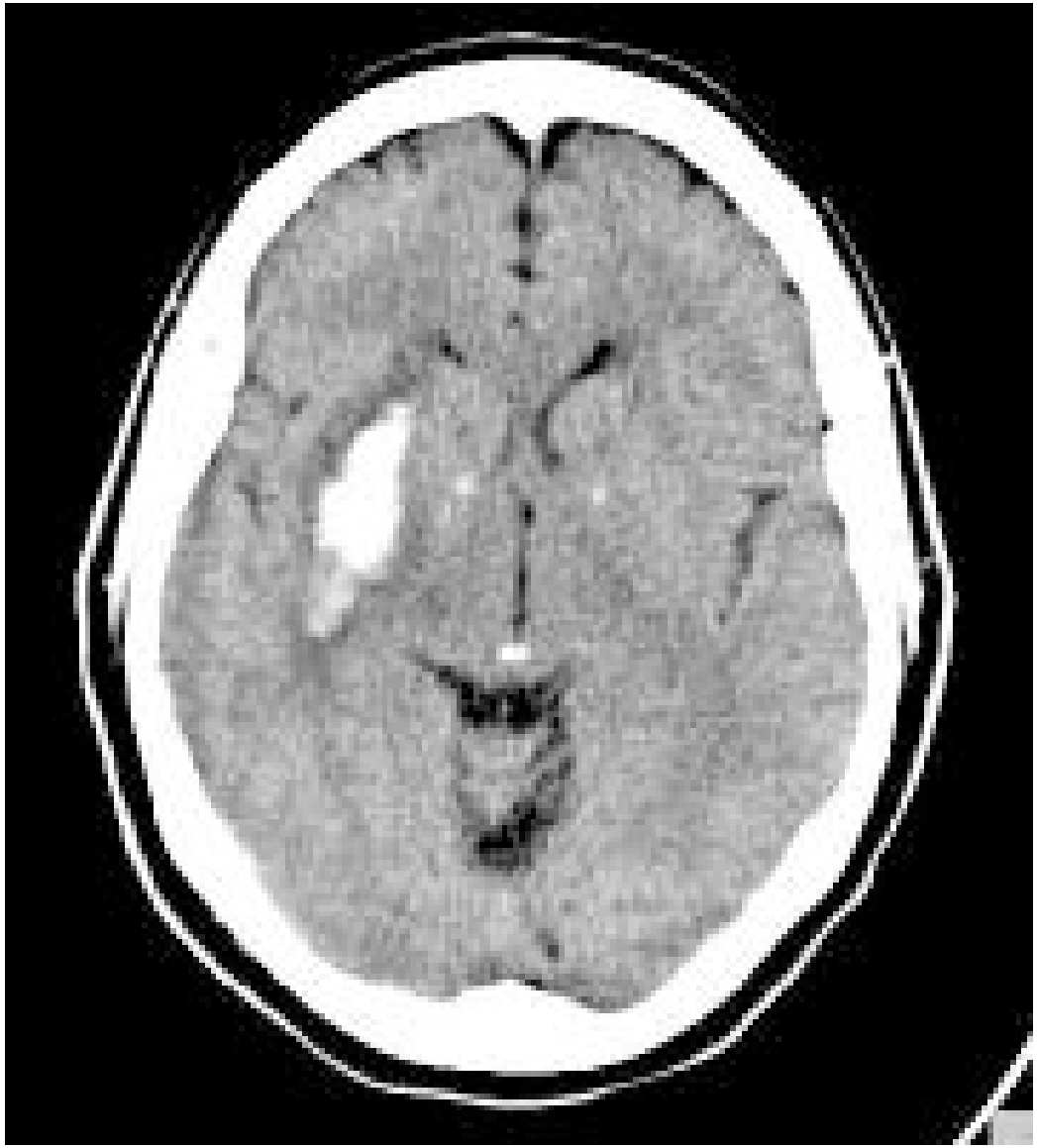
Case: 1

- 54 y.o. right handed Saudi engineer.

Works in ….. and a father of 3 kids.

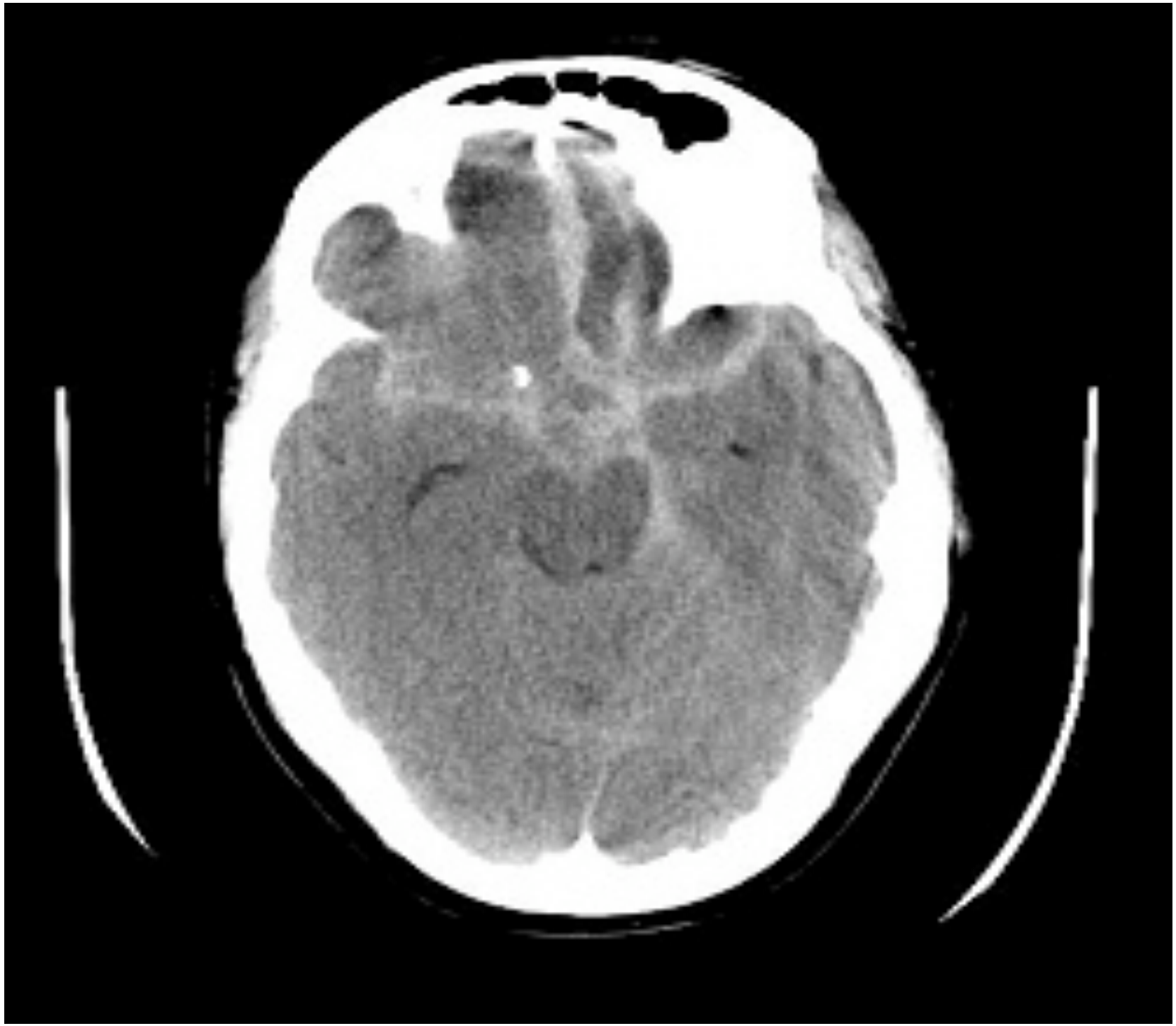
- Ref: Headache for 2 days
- P/C: details
- Medical history:

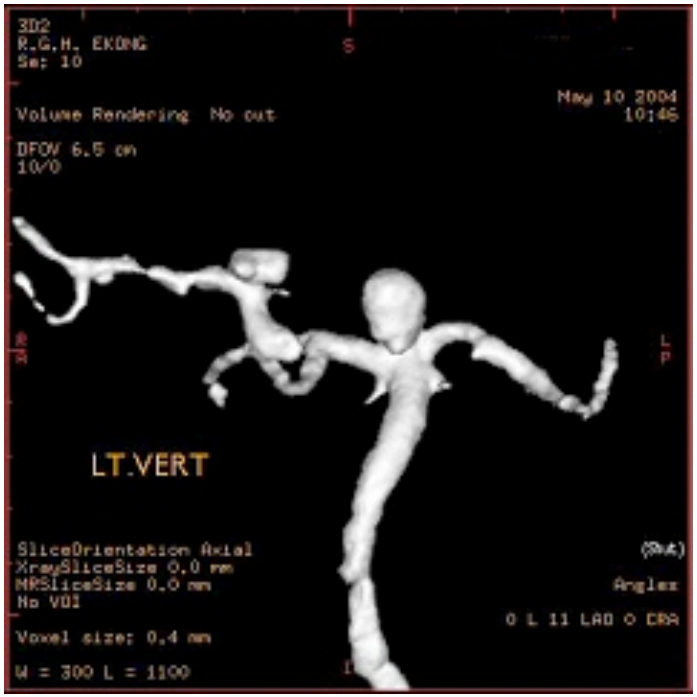
Migraine, DM, HTN.



Case 2

- 55 y.o. Rt handed lady. Teacher.
- P/C:
  - Headache that is the worse in her life.

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R.G.H. EKONG
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May 10 2004
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10/0
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W = 300 L = 1100
Angles
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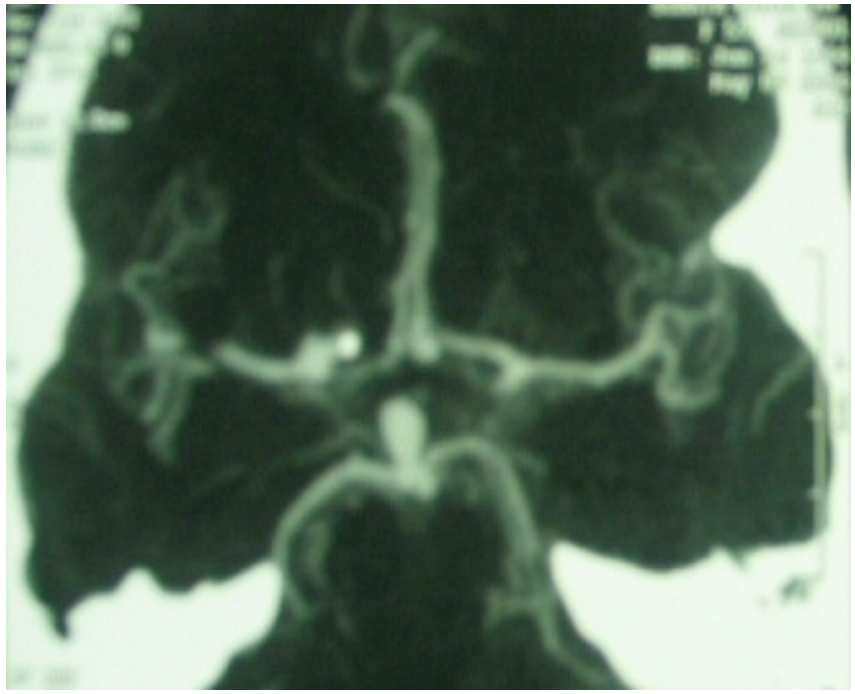
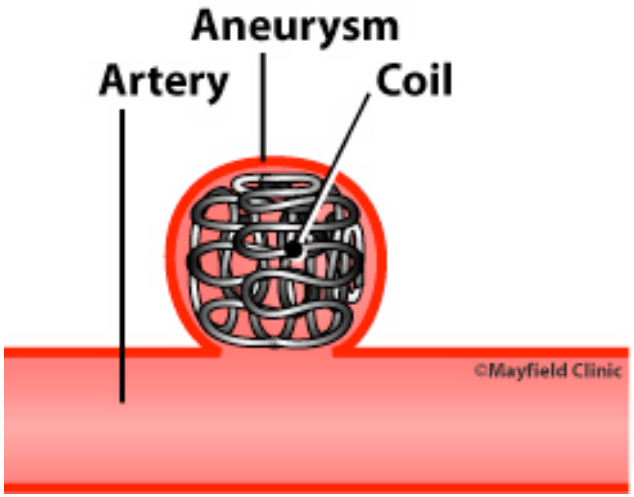
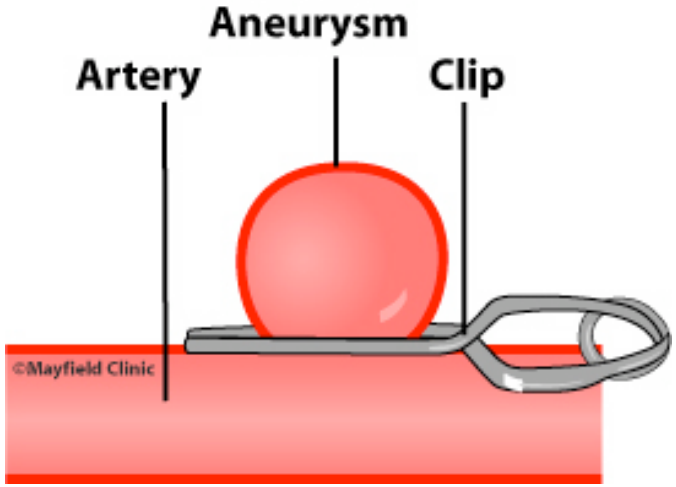



Aneurysm
Artery
Coil
©Mayfield Clinic

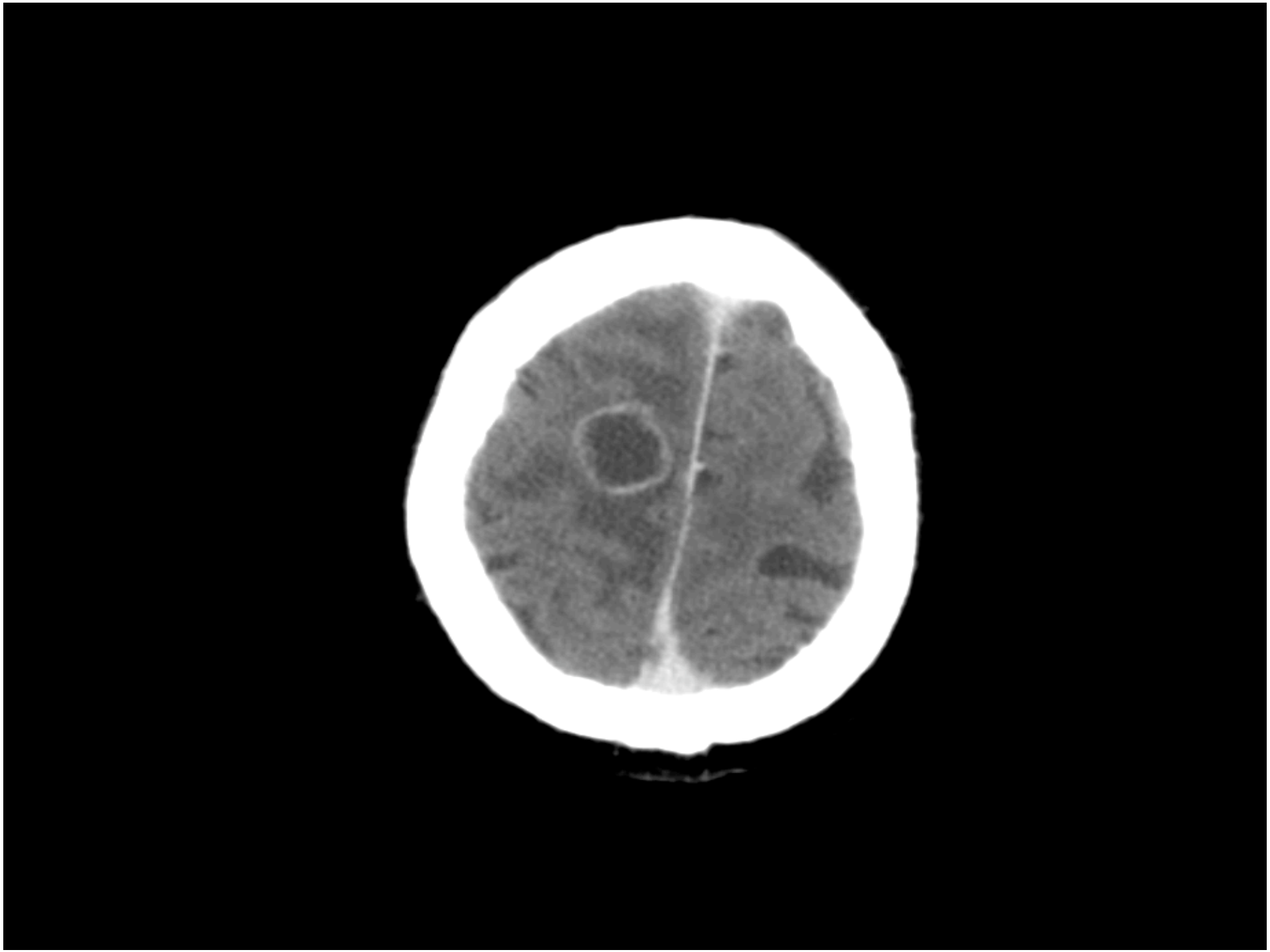

Aneurysm
Artery
Clip
©Mayfield Clinic

Case 3

- 25 y.o. Left handed construction worker.
- Ref: Left arm weakness.

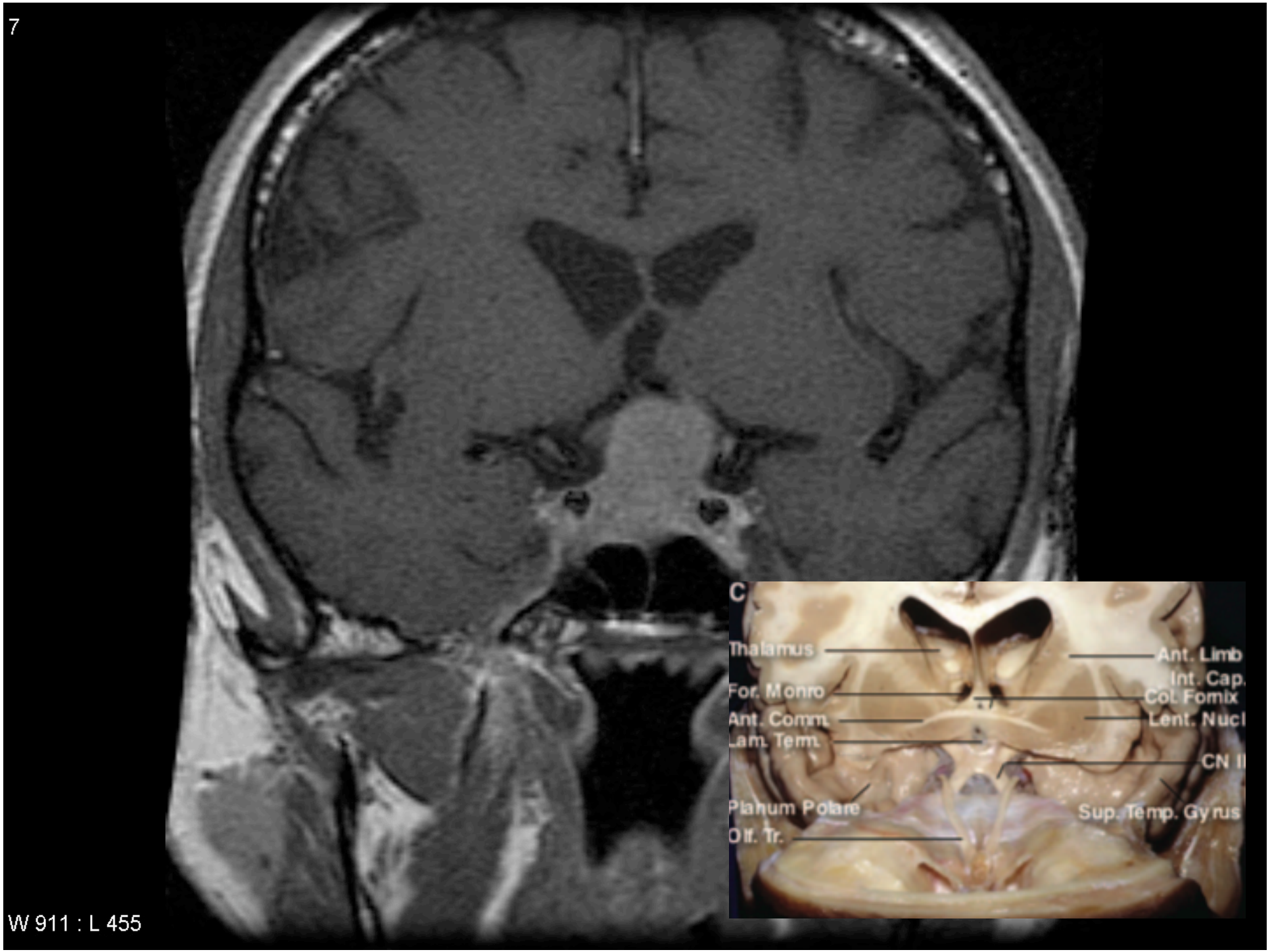
Case 3 cont.

- H/o frontal sinusitis for 1 month
- No fever
- Left arm 4/5 all muscle groups



Case 4

- 65 y.o.Rt handed male who works as a taxi driver.
- Not known to have medical problem
- P/C
  - Visual deterioration


7
C
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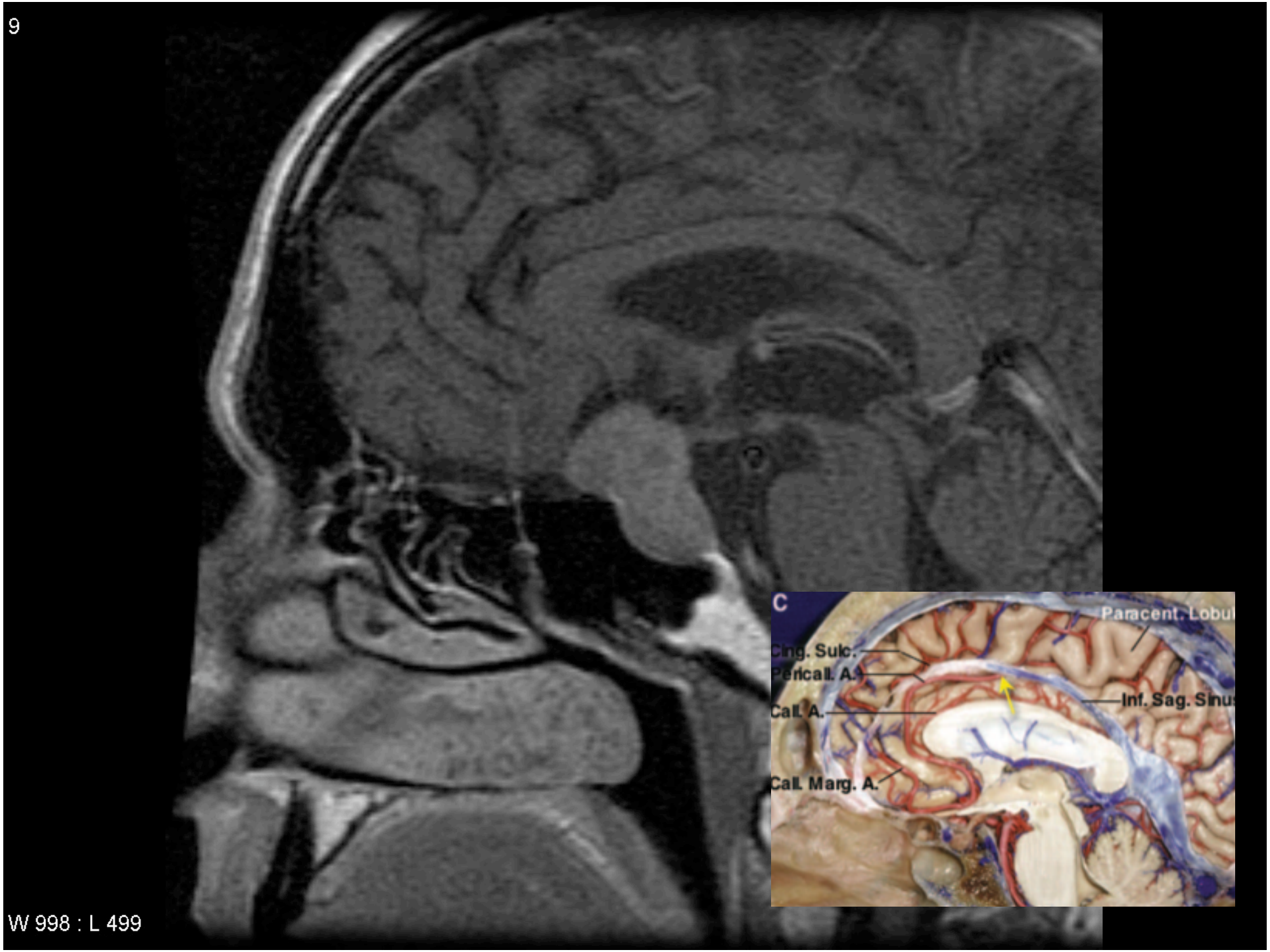
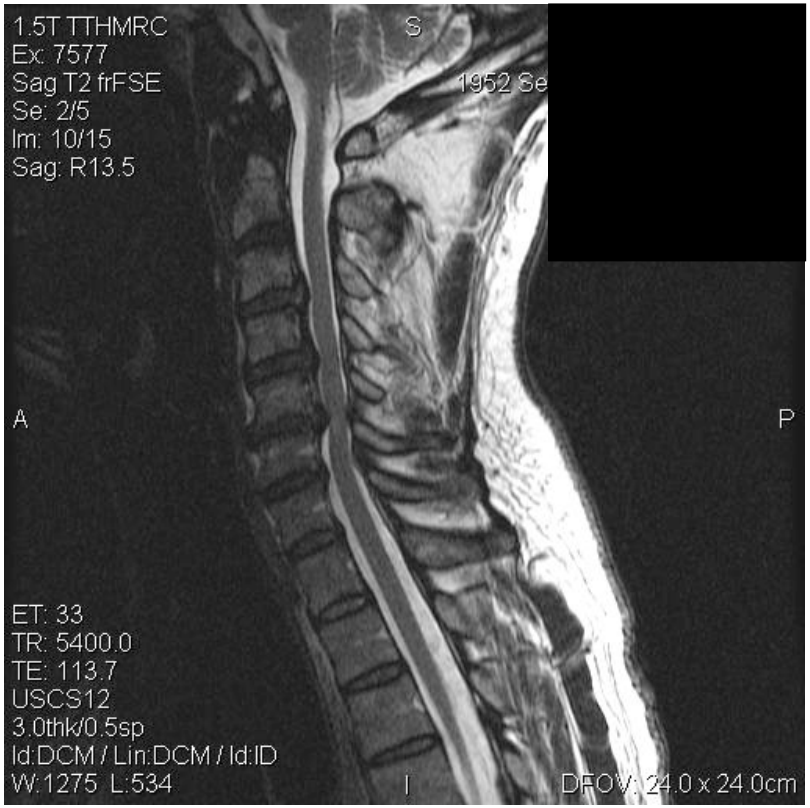
For. Monro
Ant. Comm.
Lam. Term.
Planum Polare
Olf. Tr.
Ant. Limb
Int. Cap.
Col. Fornix
Lent. Nucl
CN II
Sup. Temp. Gyrus
W 911 : L 455


9
C
Paracent. Lobul
Cing. Sulc.
Pericall. A.
Inf. Sag. Sinu
Call. A.
Call. Marg. A.
W 998 : L 499

Case 5

- 56 y.o. rt handed male. Accountant.
- P/C: bilateral hand numbness and weakness.

Case 5 cont.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Ex: 7577
Sag T2 frFSE
Se: 2/5
Im: 10/15
Sag: R13.5
S
A
P
ET: 33
TR: 5400.0
TE: 113.7
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3.0thk/0.5sp
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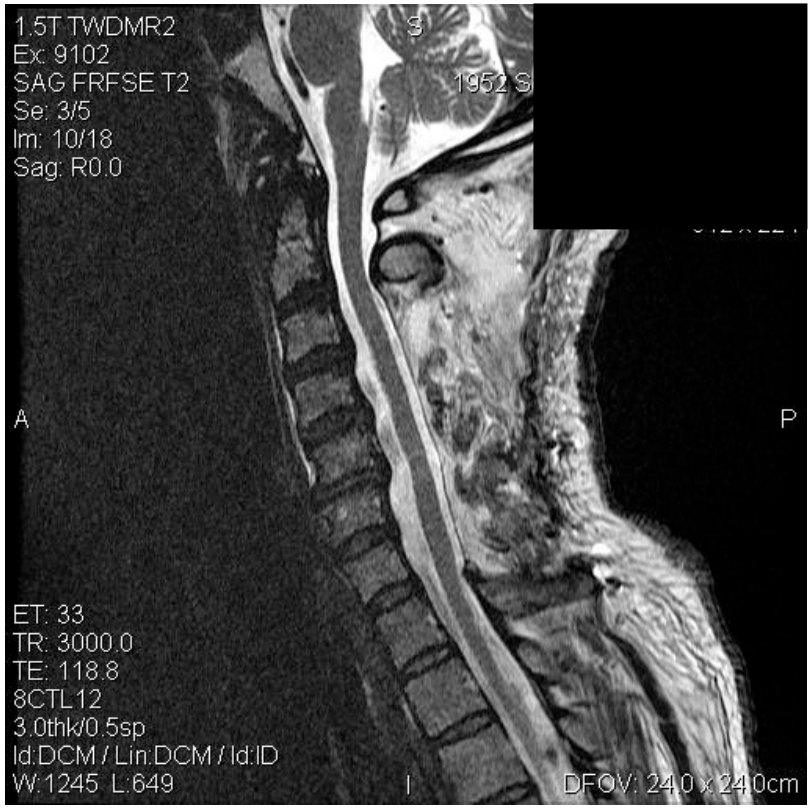
W:1275 L:534
DFOV: 24.0 x 24.0cm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Ex: 9102
SAG FRFSE T2
Se: 3/5
Im: 10/18
Sag: R0.0
S
A
P
ET: 33
TR: 3000.0
TE: 118.8
8CTL12
3.0thk/0.5sp
Id:DCM / Lin:DCM / Id:ID
W:1245 L:649
DFOV: 24.0 x 24.0cm

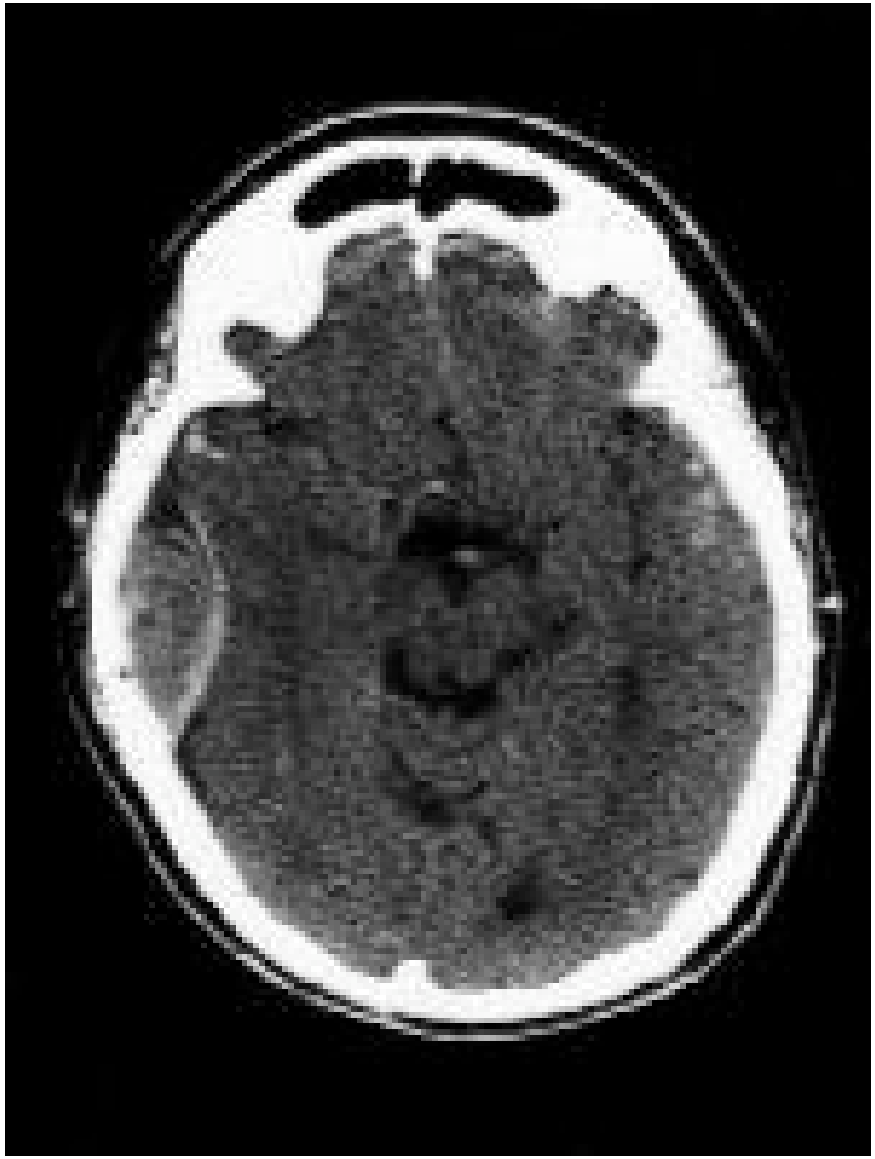
Case 6

- 25 y.o man, involved in a car accident.
- Brought by ambulance and was:
  - Opening eye to pain
  - Says few words but incoherent
  - Localizing to pain with the right side
- Tight pupil is larger than the left by 1 mm
- What to do?

GCS

Glasgow Coma Score		
Eye Opening (E)	**Verbal Response (V)**	**Motor Response (M)**
4=Spontaneous 3=To voice 2=To pain 1=None	5=Normal conversation 4=Disoriented conversation 3=Words, but not coherent 2=No words.....only sounds 1=None	6=Normal 5=Localizes to pain 4=Withdraws to pain 3=Decorticate posture 2=Decerebrate 1=None
		Total = E+V+M

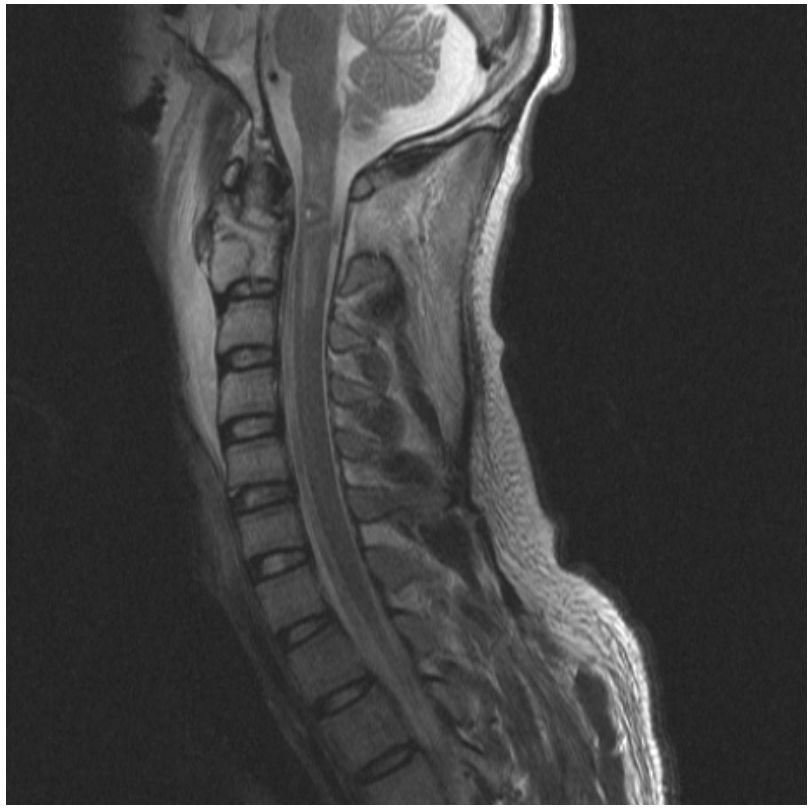
http://www.ssgfx.com/CP2020/medtech/glossary/glasgow.htm

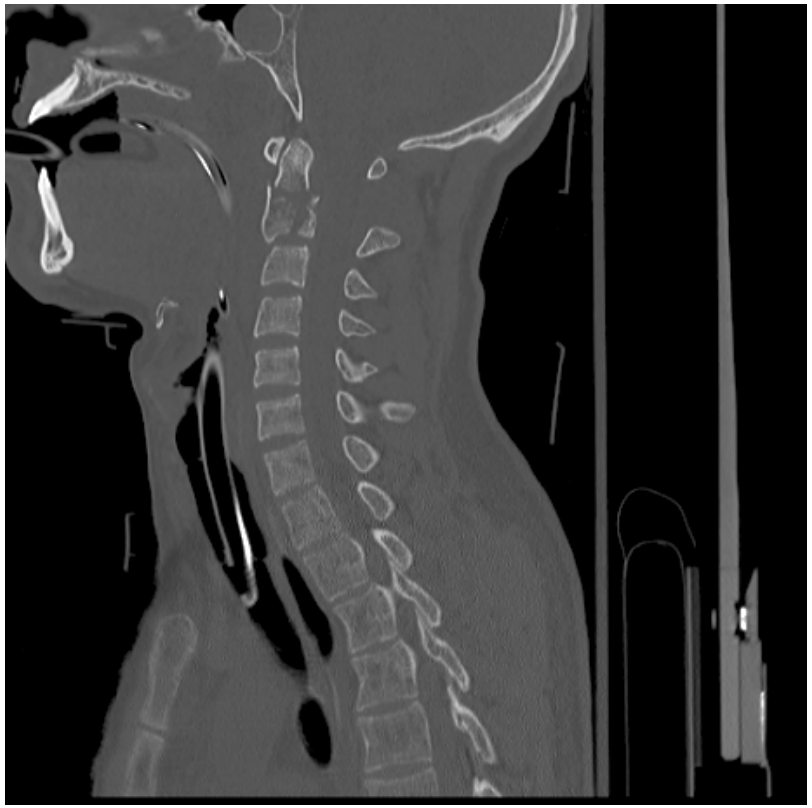


Case 7

- 17 y.o. rt handed student.
- Fell from a height while playing sports.
- Brought by ambulance:
  - Intubated.
  - Able to respond to command by facial movement
  - No arm or leg movement

Case 7 cont.





Case 8

- 60 y.o. rt handed woman.
- P/C: bilateral hand numbness for few months. Worse in the rt.

All the best and good luck …