

## Altered Mental Status (AMS) - Coma, Delirium -

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### Case: 14-year-old male

- SOB and semiconscious
  - Apparently ill at school
  - Vomited 2-3 times, then collapsed
  - SBP 60 mm Hg; PR 100, RR 22 (deep and sighing); 37.2 °C
  - Skin dry and dehydrated

請問 mental alertness 是由腦部哪  
兩個部位所決定的呢？

### Mental alertness

- Cerebral hemispheres
- RAS ( reticular activating system )

請問要如何定義 coma ？

### Coma

- A depressed mental state in which verbal and physical stimuli cannot elicit useful responses
- GCS < 9

## Case: 23-year-old female

- SOB and confusion
  - Sitting naked outside the bathroom
  - Frightened, tachypneic, unable to talk
  - Recalled seeing a ghost while taking bath
  - Denied taking illicit drugs or alcohol
  - BP 105/70 mm Hg; PR 126, RR 36; 36.3 °C

請問要如何定義 delirium ?

## Delirium

- **Acute** mental confusion that usually **fluctuates** in intensity
- S/S: abnormal attention, hallucinations, dream-like state, **hyperactivity**, disorientation to time/place/ person, memory impairment

請問 coma 的可能原因？  
【 TIPS AEIOU 】

## Causes of coma (1)

- **TIPS**
  - T: Trauma, temperature
  - I: Infection (CNS and systemic)
  - P: Psychiatric
  - S: Space-occupying lesions, shock, stroke, SAH

## Causes of coma (2)

- **AEIOU**
  - A: Alcohol and other drugs
  - E: Endocrine, exocrine, electrolytes
  - I: Insulin
  - O: O<sub>2</sub>, opiates
  - U: Uremia

## Causes of delirium

- **D**: Drugs  
anticholinergics, ETOH
- **E**: Endocrine  
BS, Na, Ca, Mg, cortisol, etc.
- **M**: Metabolic  
organ failure, hypoxia, etc.
- **E**: Epilepsy  
postictal status
- **N**: Neoplasm  
especially SIADH, CNS
- **T**: Trauma  
concussion, surgery
- **I**: Infection  
any
- **A**: Apoplexy  
any vascular event MI, PE, CVA

## Toxic Encephalopathy

- Solvents, such as gasoline, kerosene, turpentine, benzene, and alcohols
- Carbon monoxide
- Refrigerants (Freon, aka chlorofluorocarbons, CFC)
- Heavy metals, such as lead, mercury, and arsenic
- Insecticides, such as Parathion and Sevin
- Mushrooms, such as Amanita species
- Plants such as jimsonweed (*Datura stramonium*) and morning glory (*Ipomoea* spp.)
- Animal venoms

## Coma: 簡易記法

- **M I D S O**
  - M : Metabolic (DM, cirrhosis, uremia, electrolytes)
  - I : Infection / inflammation
  - D : Drugs / alcohol
  - S : Structural (stroke, HI)
  - O : Others (seizure, psychogenic)

疑似 seizure 病人的病史詢問要特別注意哪些重點？

## "ICTUS"

- Incontinence
- Cyanosis
- Tongue-biting
- Upward-gaze
- Shaking

請問 GCS 評估比較不適用於何種病患？

1. ICH ?
2. Drug overdose ?

## GCS

- GCS is inappropriate in assessing conscious level of a p't in metabolic confusion
- GCS is useful especially in cases of HI and structural brain lesions

## 何謂 Cushing's reflex?

## Cushing's reflex

- BP↑
- HR ↓
- Irregular respirations

## Lesion 在哪裡？

- Abnormal respiratory patterns :
  - Cheyne-Stokes
  - Hyperventilation
  - Ataxic
  - Apneustic

## Abnormal respiratory patterns

- Cheyne-Stokes : Compromised diencephalon
  - Also: hepatic coma, hypoxia
- Hyperventilation : Compromised upper brainstem
  - Also: metabolic acidosis, hypoxia
- Ataxic : Compromised medulla
- Apneustic : Compromised pons
  - Also: hypoglycemia, anoxia, meningitis

## 什麼狀況會出現 pinpoint pupils ?

## Pinpoint Pupils

- Pinpoint → 2P2O:
  - Pontine hemorrhage
  - Pilocarpine
  - Organophosphate
  - Opiates

請問哪些 coma 病患會出現 dilated pupils ?

## Dilated Pupils

- Bilateral dilatation
- Brain death
  - Anticholinergic (e.g. TCA, antihistamine)
  - Cocaine / amphetamine intoxication

Q: Pupillary reactivity is relatively resistant to...?

- 1. Metabolic brain insult ?
- 2. Structural brain insult ?

## Pupillary Reactivity

- Pupillary reactivity is relatively resistant to metabolic insult and is usually preserved in metabolic coma

何謂 Marcus Gunn pupil ?

## Marcus Gunn pupil

- Defect in optic nerve / retina
- Paradoxical ipsilateral pupilodilatation to light



請問 bilateral eye roving movements that cross the midline 在 coma 病患有何意義？

## Eye position

- Bilateral roving movements that cross the midline → brainstem is intact

眼睛歪 (conjugate/dysconjugate deviation) 有何意義？

## Conjugate Deviation



- Stroke:
  - Deviate to the side of the lesion
- Seizure:
  - Deviate away from the side of the focus
- Dysconjugate gaze:
  - Brainstem or peripheral nerve insult

何謂 doll's eye test？

## Oculocephalic (doll's eye) Test

- Method: Rapid twisting of the neck
- Intact brainstem with cortical dysfunction: Eyeballs turn in the opposite direction
- Awake and aware or compromised brainstem: Eyeballs turn in the same direction
- A bad idea in the unconscious p't because occult **cervical trauma** may be present

何謂 cold caloric test positive ?

## Oculovestibular (cold caloric) Test

- Irrigate the ear canal with 50 cc of ice water
- Advantages: Without manipulating the neck
- Nystagmus both eyes (slow toward cold, fast to midline)
  - Not comatose or psychogenic coma
- Both eyes tonically deviate toward cold water
  - Coma with intact brainstem
- No eye movement
  - Brainstem injury
- Movement only of eye on side of stimulus
  - Internuclear ophthalmoplegia / brainstem lesion

## Smell

- Coma + fruity smell → DKA
- Coma + urine smell → Uremia
- Coma + alcohol smell → ?

## Smell

- Coma + fruity smell → DKA
- Coma + urine smell → Uremia
- Coma + alcohol smell → R/O ICH / SAH
  - Vodka has no odor; brandy has strong odor
  - P't who "smells drunk" may actually have had sudden SAH and spilled brandy on his shirt

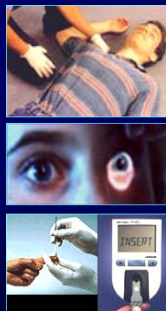
AMS 病人的第一個檢查是？

AMS 病人的第二個檢查是？

AMS 病人的第三個檢查是？

優先檢查...

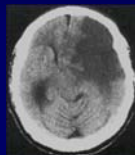
- 1. Pupils
- 2. F/S (OneTouch)
- 3. ABGs



Pupils、F/S、ABGs...  
再來呢？

驗血、驗尿、切 CT

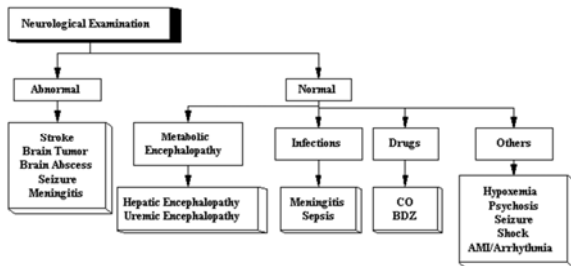
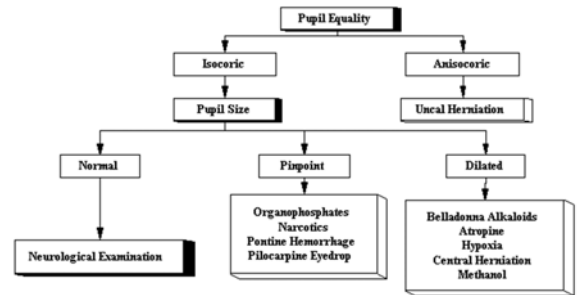
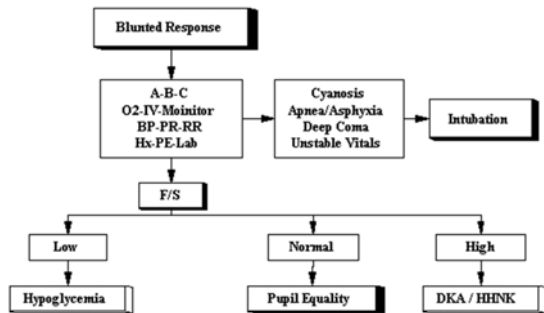
- Blood tests:
  - CBC + DC, glu, BUN, Cr, Na, K, Cl, Ca, iCa, GOT, NH3, PT, PTT
- Head CT
- Toxic screen
- Breathalyzer or blood alcohol (> 300mg/dl)
- Thyroid function test



其他：Neuro 三寶

- Lumbar puncture
- EEG
- MRI





有哪些情況病人會被誤診為 coma  
缺非真正 coma ?

## Comalike states

- **Locked-in syndrome**
  - Lesion at ventral pons; completely awake and alert; can blink, do vertical eye movements, and breathe
- **Akinetic mutism**
  - Diffuse frontal lobe disease; awake but not aware; visual tracking
- **Psychogenic coma**
  - Conversion disorder: Hysteria
  - Catatonia: Withdrawal, mutism, rigidity, grimacing, bizarre posturing
  - Malingering

## Psychogenic Coma



- Open the eyelids
  - Eyes flutter upward, exposing only the sclera (Bell's phenomenon)
- Leg-crossing; arm-crossing
- Lift the arm and drop it toward the face
  - The face is avoided
- Talk to the p't in a calm, caring tone
  - Often reassurance will awaken the p't
- Cold caloric testing if all else fails
- Repeated painful stimulation should be avoided !!

## Management of Coma / Delirium

無法檢查時，coma 的病人可先給予的經驗療法包括哪些？  
【 DON'T 】

### Coma Cocktail: DON'T 亂槍打鳥

- Dextrose
  - 50 ml of 50 % GW IV
- O2
- Narcan (Naloxone)
  - 0.4-2.0 mg IV or IM q3'; may repeat 3 h later
- Thiamine ( Vit. B1 )
  - 100 mg IV stat and 50-100 mg/d

### Flumazenil

- Anexate (Flumazenil 0.5mg/amp)
  - 0.2 mg IV q30"-60" up to 1.0 mg
  - Avoided in seizure p't or TCA ingestion

### Delirium: Nonpharmacological Management

- Provide general supportive measures:
  - Avoid restraints
  - Encourage familiar faces for reassurance
  - Fluids, nutrition
  - Low stimulation
  - Provide orientation
  - Correct sensory impairment

### Delirium: Pharmacological Management (Haldol)

- High potency, only use for SEVERE agitation
- Lowest anticholinergic activity of all major neuroleptics
- Start with 0.5 - 1 mg, titrating to a max of 4 mg/day IM/IV
- Repeat dose q 2-4 h, taper as soon as possible
- Avoid in individuals with Parkinson's Disease

## Delirium: Pharmacological Management (Benzodiazepines)

- May cause increased agitation
- Best reserved for delirium secondary to
  - Alcohol withdraw
  - Benzodiazepine withdrawal
- Relatively contraindicated in delirium from hepatic encephalopathy

## Atypical Antipsychotics

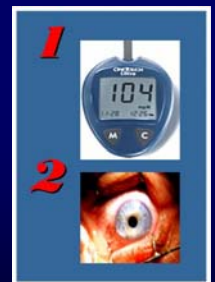
Risperidone, olanzapine, quetiapine (Seroquel)

- Risperidone - starting at 0.25 mg BID
- Olanzapine - starting at 2.5 mg/d
- Quetiapine - starting at 12.5 mg/d



## Conclusion

- ABC
- O<sub>2</sub> – IV - Monitor
- DON'T / Haldol / BZD
- CT
- TIPS-AEIOU
- Consultation



**Thank You**