Case Conference
2014-09-22

Reporter: R1 蔡宇承
Supervisor: F 徐英洲

Patient Information

- 23 歲　　男性
- 就診日期：DAY1 11:49
- 檢傷級數　2　　科別：外科
- 主訴：病人主訴從２米高摔下　頭部鈍傷
- 意識：E4 V5 M6　　血氧濃度：100%
- 體溫：36'C　脈搏：81次/min
  呼吸：18/min　血壓：126/75mmHg
- 過去病史：良好

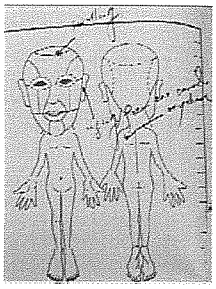
病史

- 自述爬約２M要拿東西　頭暈醒來人已在地上
- 無人目擊
- 左耳持續流血
- 頭暈
- 班長陪同前來

- 過去病史: Allergy: denied
  No Toxoid injected in 5 years

理學檢查

- Consciousness clear
- Head: Forehead swelling, oozing from left ear canal
- Neck: No midline tender
- Chest: No tender
- Abdomen: No tenderness.
- Four limbs: free



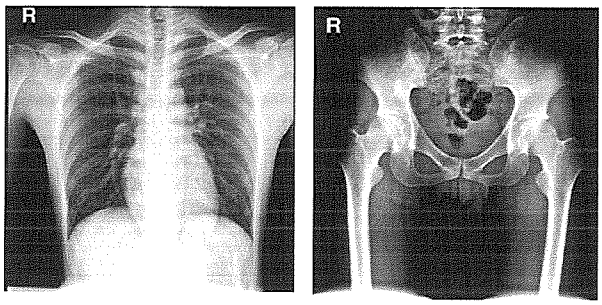
Initial Impression

- Head injury
  - R/o Skull bone fracture

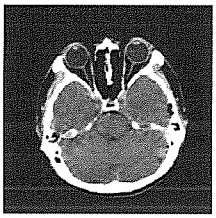
Course

- 12:00
- head & C-Spine CT w/o contrast
- Toxoid 0.5ml IM
- CXR & Pelvic

CXR & Pelvix X-ray



Head CT w/o Contrast



- 12:51
- L't skull linear fracture
- Pneumocranium
- SDH
- Suspect skull base fracture

Course

- 12:51
- On Monitor
- Consult NS

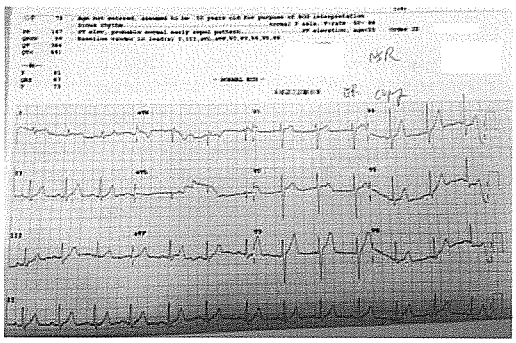
NS Consult reply @ 13:00

- E4V5M6
- CT: Left occipital SDH, linear fracture
- No open wound
- Left ear bleeding
- Suggestion
  - Close monitor GCS, pupil, MP
  - Admission
  - NPO & pre-OP
  - Mannitol 75ml q6h
  - Consult ENT for ear bleeding

Course

- 13:19
- Keto 1amp IV --- Headache, VAS: 7
- Mannitol 75ml IV q6h
- Hb, Plt, PT/aPTT
- ECG
- NPO
- Consult ENT (14:20 to 51 診)
- D5S run 60ml/hr

EKG

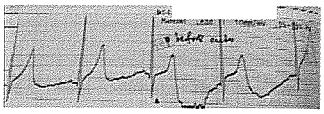


Lab

- Cr 0.74 mg/dl (GFR 131.07 ml/min)
- Hb 14.8 gm/dl
- Platelet 162,000 /uL
- PT 10.5
- INR 1.01
- PTT 37.1
- aPTT ratio 1.11

Course

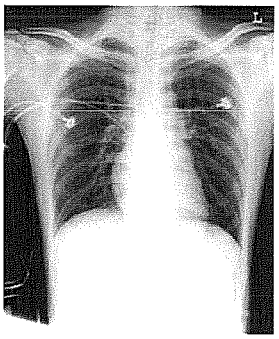
- 14:15 Codeine 30mg IV
- 14:25 (Dr.Note)止痛無效,病患哀叫頭痛 with cold sweating, 名字會回答、答不出如何在哪發生事, slow response, pupil 3+/3+
- E4V4-5M6 Vital sign: HR 43bpm RR 20cpm BP 112/79mmHg, SpO2 96%
  - Re-do head CT w/o contrast
  - Mannitol 100ml IV ST (suggested by NS 唐)
  - 改triage I 級
  - DC consult ENT
- 14:38 HR 41

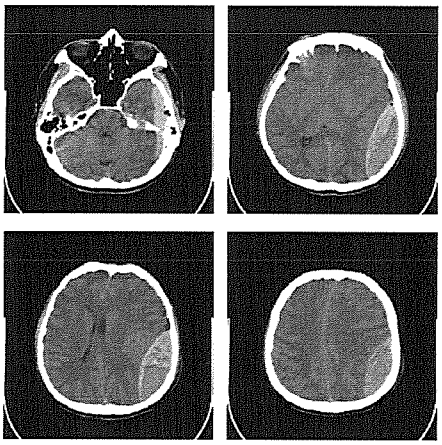


Course

- 14:45 Conscious 變差 E4V3M5, 反應遲鈍,口齒不清 無法配合作CT
- 電話通知姐姐告知病危
- On ETT with MV
- Lidocaine 100mg
- Dormicum 2.5mg IV
- Nimbex 10mg 1amp
- On NG decompression
- On Foley
- On critical
- CXR post ETT

After ETT @ 15:02





- 15:11
- Left temporal EDH
- Midline shift

Course

- 15:12 Vital sign: T 35'C R 15cpm HR 43 BP 119/72 SpO2:100%
  Conscious E1VtM1
- Mannitol 125ml IV ST
- Pre-OP
- Send P't to OR on call
- Admssion after OP
- 領pRBC 2U to OR

Emergent OP @ 15:50

- OP time duration: 2Hr 55min
- Removal of epidural hematoma
- ICP monitor
- Bloodloss: 1000ml

- OP finding:
  - EDH with mass effect
  - No SDH
  - head slack after EDH removal
  - Post OP side pupil 3mm

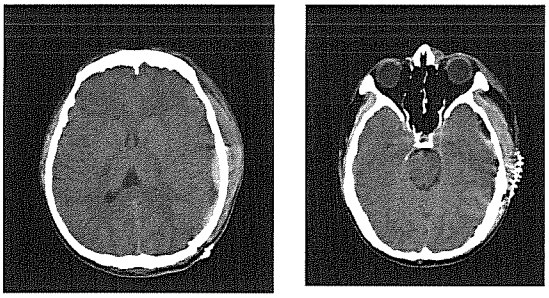
Hospital course

DAY1
- ER admission
- Emergent OP: Craniotomy + hematoma evaculation + ICP monitor
- Post-OP SICU admission

DAY3
- transfer to NS ordinary ward

DAY5
- Headache, left 3,4,5th finger numbness, Repeat Brain CT

Post-OP Head CT on DAY5



Hospital course

DAY1
- ER admission
- Emergent OP: Craniotomy + hematoma evaculation + ICP monitor
- Post-OP SICU admission

DAY3
- transfer to NS ordinary ward, E4V5M6

DAY5
- Headache, left 3,4,5th finger numbness, Repeat Brain CT

DAY 11
- Discharge

DAY37-DAY40 ENT Admission
- Left conductive hearing loss
- s/p OP ossiculoplasty, tympanoplasty, partial ossicular replaement prosthesis, left

Final Diagnosis

- Left Fronto-temporal-parietal epidural hemorrhage, traumatic, s/p left F-T-P craniotomy with evacuated EDH, ICP monitor

Discussion
Traumatic Brain Injury

Introduction

- Traumatic brain injury (TBI) – brain function impairment as a result mechanical force
- TBI is clinically classified
  - Mild – GCS 14-15
    - Majority 80% in US
  - Moderate – GCS 9 – 13
    - (Mortality <20%, long-term disability 50%)
  - Severe – GCS < 9
    - (Mortality ~ 40%, most death in 1st 48 hours)

台灣頭部外傷統計

- 自 1989 年 6 月至 1994 年 7 月五年間，共收集了 43901 例頭部外傷之病例。
- 男性有 29831例；女性有 13696 例。
- 最常發生之年齡層為 20-29 歲，其次為 70 歲以上。
- 發生頭部外傷之原因，全國皆以交通事故為主，佔 70%；
  - 其次是跌落（19%）
  - 遭外力攻擊（8%）。

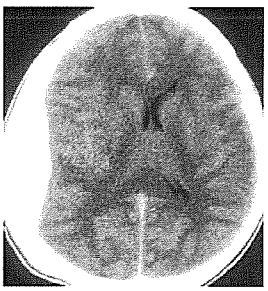
台灣地區頭部外傷描述流行病學
，臺北醫學院神經外科與中華民國神經學學會頭脊髓損傷研究小組對臺灣地區之頭部外傷進行了階段性的研究

台灣頭部外傷統計

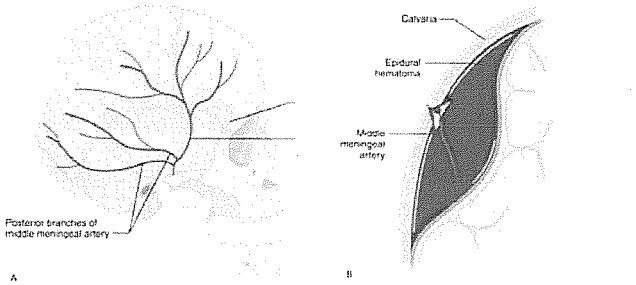
- 交通事故中以機車事故為首，佔 69%；其次是行人（11%）汽車（10%）腳踏車（4%）。
- 嚴重度以輕度最多，佔 80%；其次為重度 11%，中度佔 9%。預後方面，死亡佔 5%，植物人佔 1%，重度殘障佔 2%，輕度殘障佔 3%，良好佔 82%。共有 12024 例（28%）發生顱內血腫。
- 探討意識喪失，顱骨骨折與顱內血腫之間的相關性時發現是相當有意義的。顱骨骨折為硬腦膜上腔出血之相關性較其位置之出血是有意義的差別。
- 1994年 2 月至 5 月間，臺北市實施騎乘機車戴安全帽之宣導活動後，發現頭部外傷之住院率、死亡率及手術率均下降 30%。

Epidural Hemorrhage

- Blunt trauma with ILOC
  - Baseball, stick.. ect
- Skull fracture
- Only 20% with Lucid period
- Young adult
- Children < 2 y/o



Epidural Hemorrhage

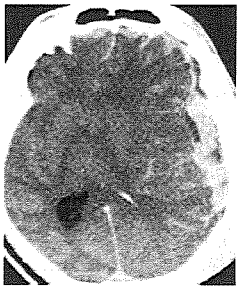


Lucid Period for EDH patient

- some patients with acute EDH develop "transient" loss of consciousness
- "lucid interval" - recovery of consciousness
- followed by deterioration over a period of hours due to continued arterial bleeding and hematoma expansion.
- This deterioration is typically associated with symptoms such as headache, vomiting, drowsiness, confusion, aphasia, seizures, and hemiparesis
- In a systematic review, a lucid interval followed by deterioration was observed in 456 of 963 patients (47 percent) who had surgery for EDH

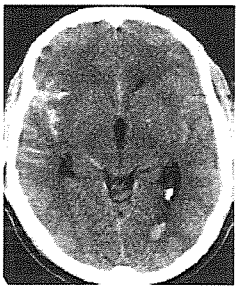
Subdural Hemorrhage

- Sudden acceleration-deceleration injury
- Elder, brain atrophy, alcholics
- Children < 2 y/o
- Venous origin – slow
  - Acute < 2 weeks
  - Chronic > 2 weeks



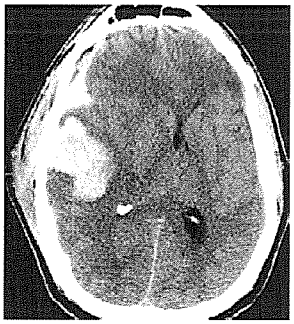
Subarachnoid Hemorrhage

- Acceleration-deceleration
- Blood in CSF
- Mortality ↑
- Most common in moderate/severe TBI
- Meningeal sign



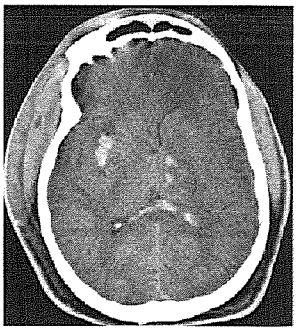
Cerebral Contusion

- Blunt trauma
- Countercoup (反彈) injury
- Days after trauma
- Coagulopathy patient



Diffuse Axonal Injury

- Shearing force → Axon fiber disruption
- Blunt trauma
- MVA
- Shaken baby syndrome
- Treatment limited



Pathyphysiology & Cushing Reflex

- Cerebral perfusion pressure (CPP)
- Mean arterial pressure (MAP)
- Intra-cranial pressure (ICP)

- CPP = MAP - ICP
  - Normal : > 60 mmHg

- Rapid rise of ICP → Cushing reflex (seen only in 1/3)
  - Hypertension
  - Bradycardia
  - Respiratory irregularity

Guidelines for severe TBI

- BTF - Brain Trauma Foundation
- Guidellines to improve patient outcome
  - Prehospital
  - pediatric
  - in-hospital adult
  - Surgical
  - battlefield management

http://www.braintrauma.org

Emergency Department Management

- History
  - Injury mechanism
    - Fall: height, impact surface, leading body part,
    - MVA: speed, vehicle type, airbag, seat-belt, windshield, helmet)
  - Type of injury (accelleration-deceleration, side impact, etc...)
  - Information before trauma event
    - Medical history
    - Medication (anti-coagulant use)
    - Drug intoxication (alcohol)
  - Symptoms
    - N/V, headache, memory loss, visual/auditory dysfunction

Emergency Department Management

- Resuscitation
  - Prevent secondary insult
  - Slow the expansion of underlying injury
- Airway & Breathing
  - Severe TBI (GCS < 9) → require airway control
  - RSI
    - Induction – Etomidate, Propofol
    - Paralysis – Succinylcholine, Rocuronium
- Circulation – Keep MAP > 80mmHg to maintain CPP
- Disability – GCS score

Head CT Decision Rules

- New Orleans Criteria
- Canadian CT Rules

- Applicable to patient
  - ILOC(+) or amnesia
- Not applicable to patient
  - Anti-coagulants usage
  - Children

Clinical Decision for Head CT

Table 254-3 New Orleans and Canadian CT Clinical Decision Rules	
New Orleans Criteria—GCS 15*	**Canadian CT Head Rule—GCS 13–15***
Headache	GCS <15 at 2 h
Vomiting	Suspected open or depressed skull fracture
Age >60 y	Any sign of basal skull fracture
Intoxication	More than one episode of vomiting
Persistent antegrade amnesia	Retrograde amnesia >30 min
Evidence of trauma above the clavicles	Dangerous mechanism (fall >3 ft or struck as pedestrian)
Seizure	Age ≥65 y
Identification of patients who have an intracranial lesion on CT	
100% sensitive, 5% specific	83% sensitive, 38% specific
Identification of patients who will need neurosurgical intervention	
100% sensitive, 5% specific	100% sensitive, 37% specific

Clinical Decision for Head CT

Table 254-5 Summary of Indications for CT Scanning for Adults with Mild Traumatic Brain Injury (TBI)
Mild TBI even if no loss of consciousness if one or more of the following is present:
Glasgow Coma Scale score <15
Focal neurologic findings
Vomiting more than two times
Moderate to severe headache
Age >65 y
Physical signs of basilar skull fracture
Coagulopathy
Dangerous mechanism of injury (e.g., fall >4 ft)
Mild TBI with loss of consciousness or amnesia if one or more of the following is present:
Drug or alcohol intoxication
Physical evidence above the clavicles
Persistent amnesia
Post-traumatic seizures

Increased Intra-cranial Pressure

- ICP Indicator
  - Cushing triad
  - Headache, nausea, vomiting, seizure
- IICP --> transtentorial herniation
  - Pupil dilation
  - Hemiparesis
  - Motor posturing
  - GCS ↓
- Repeat head CT

IICP management

- Keep PaCO2 35~40mmHg & SpO2 >95%
- Head Elevation at 30 degrees
- Keep MAP >80mmHg
- Mannitol - Cerebral flow ↑, free radical scavenger
  - Plasma expansion →Improve Oxygen carrying capacity, initially BP↑ , then BP↓ due to diuresis
  - Administered by repeat bolus (0.25 ~ 1 gm/kg)

Thank you for your attention

Comparsion of Intracranial Injury

Table 254-6 Comparison of Intracranial Injuries

	Type of Patient	Anatomic Location	CT Findings	Common Cause	Classic Symptoms
Epidural	Young, rare in the elderly and those aged <2 y	Potential space between skull and dura mater	Biconvex, footstool shaped hematoma	Skull fracture with tear of the middle meningeal artery	Immediate LOC with a "lucid" gaining prior to deterioration; rare; occurs in about 20%
Subdural	More common in the elderly and alcoholic patients	Space between dura mater and arachnoid	Crescent- or sickle-shaped hematoma	Acceleration-deceleration with the tearing of the bridging veins	Acute, rapid LOC; lucid period possible Chronic: altered mental state and headache with gradual decrease in consciousness
Subarachnoid	Any age group after blunt trauma	Subarachnoid	Blood in the cardiac cisterns and hemispheric sulci and fissures	Aneurysm rupture (more often with tearing of the subarachnoid vessels)	Mild, moderate, or severe thunderclap headache with meningeal signs and symptoms
Combination/intracerebral hematoma	Any age group after blunt trauma	Usually anterior temporal or posterior frontal lobe	May be maximal initially with stable enlargement	Severe or penetrating trauma; shaken baby syndrome	Symptoms range from normal to LOC