CRANIO-CEREBRAL INJURIES

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- *Head injuries are a major cause of morbidity and mortality in the community*

- *Trauma is the 3rd most common cause of death in the Jordan, preceded only by cardiovascular diseases and cancer*

- *Head injuries contribute to over half of trauma related death.*

EPIDIMIIOLOGY

- *DEATHS: 9:100.000 in UK. 25:100.000 in*
- *USA. And Jordan 12:100.000*
- *OF ALL DEATHS = 1%*
- *OF TRAUMA DEATHS = 25%*
- *MEN > WOMEN*
- *YOUNG > OLD*

EPIDIMIIOLOGY

- *CAUSES IN CIVIL LIFE*
  - *ROAD TRAFFIC 60%*
  - *DOMESTIC 30%*
  - *INDUSTRIAL*
  - *ASSSAULTS*
  - *SPORTS*

PATHOLOGY

- *CLOSED, PENETRATING OR MISSILE*
  - *SCALP*
  - *SKULL*
  - *BRAIN*
- *PRIMARY*
- *SECONDARY*
- *COMPLICATIONS*
  - *EARLY*
  - *LATE*

PATHOLOGY (cont.)

- ***SCALP INJURIES***

1. *CLEAN CUT WOUNDS*
2. *LACERATIONS*
3. *AVULSIONS*
4. *CONTUSIONS*
5. *HEMATOMAS*

   a- SUB-GALEAL

   b- SUB-PERICRANIAL

PATHOLOGY (cont.)

- ***SKULL INJURIES (FRACTURES)***

  SIMPLE OR COMPOUND

  TYPES:

  - *LINEAR*
  - *DEPRESSED*
  - *POND*
  - *BASAL*

PATHOLOGY (cont.)

- ***BRAIN INJURIES***
  - *PRIMARY*
    - *CONCUSSION*
    - *CONTUSION*
    - *LACERATION*
  - *SECONDARY*
  - *LOCALIZED*
  - *DIFFUSE*

CLINICAL PICTURE

- *HISTORY*
  - *TIME OF TRAUMA*
  - *TYPE OF TRAUMA*
  - *HISTORY OF CONVULSIONS*
  - *HISTORY OF L.O.C. (LUCID INTERVAL)*
  - *POST TRAUMATIC AMNESIA (PTA)*
  - *RETROGRADE AMNESIA*

CLINICAL PICTURE (cont.)

- ***EXAMINATION***
  - *PATENCY OF AIRWAYS*
  - *LEVEL OF CONSCIOUSNESS*
    - *GLASGOW COMA SCALE (GCS)*
    - *TRAUMA SCALE (SCORE)*
  - *PUPILLARY SIZE*
  - *BLOOD PRESSURE AND RESPIRATION*

  SHOCK IS RARE EXCEPT IN ENFANTS OR SEVERE SCALP INJURIES

ASSESSMENT OF THE SEVERITY IN HEAD INJURIES

(Glasgow Coma Scale: GCS)

Points	Eye Opening	Best Verbal	Best Motor
6	…	…	Follows commands
5	…	Appropriate	Localizes pain
4	Spontaneous	Inappropriate	Withdraws to pain
3	In response to voice	Moaning	Flexion (decorticate)
2	In response to pain	Incomprehensible	Extension (decerebrate)
1	None	None	None

CLINICAL PICTURE (cont.)

- *SCALP EXAMINATION*
  - *SCALP WOUNDS*
  - *SCALP HEMATOMAS*
  - *BATTLE'S SIGN*
  - *RACOON EYE*
- *NEUROLOGICAL EXAMINATION*
- *EXAMINATION OF OTHER SYSTEMS*

MANAGEMENT

- *EXAMINATION*
- *MAKE SURE AIRWAY IS PATENT*
- *PUT I.V. LINE*
- *SKULL X-RAYS: 3 VIEWS*
- *CERVICAL SPINE X-RAYS: 16% ASSOCIATED*
- *CT AS INDICATED*
  - *FRACTURES*
  - *DISTURBED LEVEL OF CONSCIOUSNESS*
  - *NEUROLOGICAL DEFICITS*

MANAGEMENT (cont.)

- ***INDICATIONS OF ADMISSIONS***
  - *PTA (POST TRAUMATIC AMNESIA) LONGER THAN 5 MINUTES OR GCS LESS THAN 14*
  - *SKULL FRACTURES*
  - *POSITIVE CT SCAN*
  - *NEUROLOGICAL DEFICITS*
  - *CHILDREN*
  - *DRUNKEN*
  - *IF IN DOUBT*
  - *ASSOCITAED SYSTEM INJURIES*

SCALP INJURIES

- *TYPES*
  - *CONTUSIONS*
  - *HEMATOMAS*
  - *CLEAN CUT WOUNDS*
  - *LACERATED WOUNDS*
  - *AVULSED SCALP*
  - *SUB-GALEAL HEMATOMA*
  - *SUB-PERIOSTEAL HEMATOMA*
- *MANAGEMENT*
  - *FIRST AID BY COMPRESSION BANDAGE*
  - *SHAVE HAIR*
  - *CLEAN WOUND WITH ANTISEPTIC*
  - *INSPECT WOUND AND REMOVE FB*
  - *CLOSE IN LAYERS*
  - *DRESSING*
  - *ANTIBIOTICS*

LINEAR SKULL FRACTURES

- *IS INTERRUPTION TO THE CONTUINUITY OF THE SKULL BONES.*
- *THE TRAUMA IS SIGNIFICANT AND MAY PROVIDE AN INDICATION TO THE PRESENCE OF AN EXTRADURAL HEMATOMA*
- *THE PATIENT SHOULD BE ADMITTED FOR OBSERVATION AND CT SCAN SHOULD BE PERFORMED.*

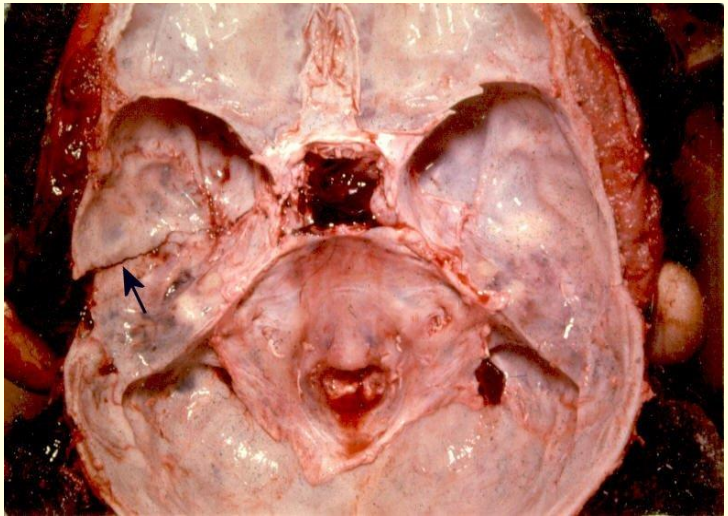
LINEAR SKULL FRACTURES

IF THEY EXTEND TO INVOLVE THE BASE OF THE SKULL THEN THEY ARE CALLED

<u>BASAL SKULL FRACTURES</u>

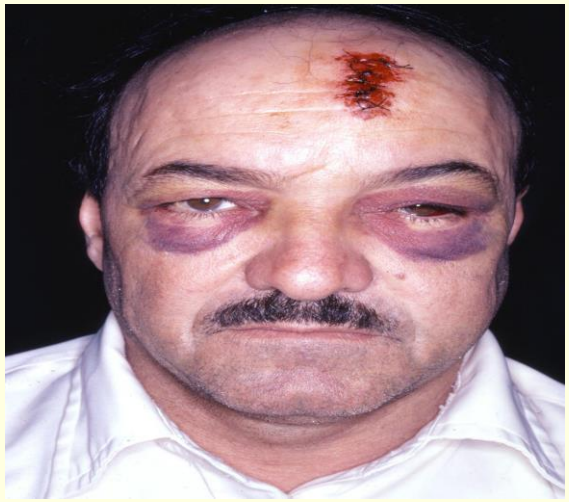
THEY TEND TO RUN ALONG THE FORAMINA OF CRANIAL NERVES, MAINLY IN THE ANTERIOR AND MIDDLE CRANIAL FOSSAE IN CLOSE

PROXIMITY TO PARANASAL AIR SINUSES.



BASAL SKULL FRACTURES

- *PRESENTATION IN ANTERIOR CRANIAL FOSSA FRACTURES IS WITH:*
  - *BRUISING AROUND THE EYE "RACOON EYE"*
  - *OR SUBCONJUNCTIVAL HEMORRHAGE*
  - *OR CSF LEAK " RHINORRHEA"*
  - *OR CRANIAL NERVE DEFICIT*
- *PRESENTATION IN MIDDLE CRANIAL FOSSA FRACTURES IS WITH:*
  - *BRUISING BEHIND THE EAR "BATTLE SIGN"*
  - *OR HEMOTYMPANUM*
  - *OR CSF LEAK "OTORRHEA"*



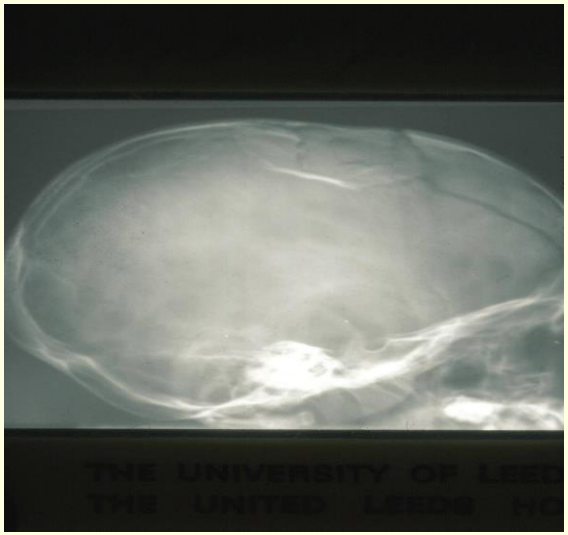
MANAGEMENT OF LINEAR & BASAL SKULL FRACTURES

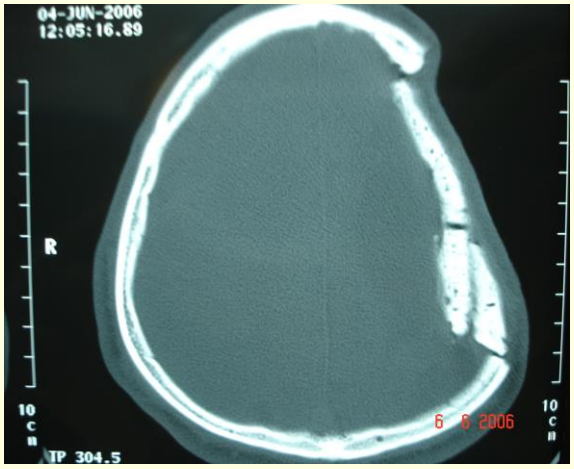
- ✓ *There is no specific management for linear skull fractures. Just admit for observation and do CT scan to rule out hematomas.*

- ✓ *Basal skull fractures should be covered with antibiotics and the nose and ear should be observed for CSF leak*

DEPRESSED SKULL FRACTURES

- ARE DEPRESSIONS OF THE BONE OF THE SKULL.
- THEY COULD BE:
  - SIMPLE WITH SKIN INTACT
  - COMPOUND WITH CUT SKIN
- EITHER COULD BE:
  - ONE DEPRESSED SEGMENT
  - COMMINUTED





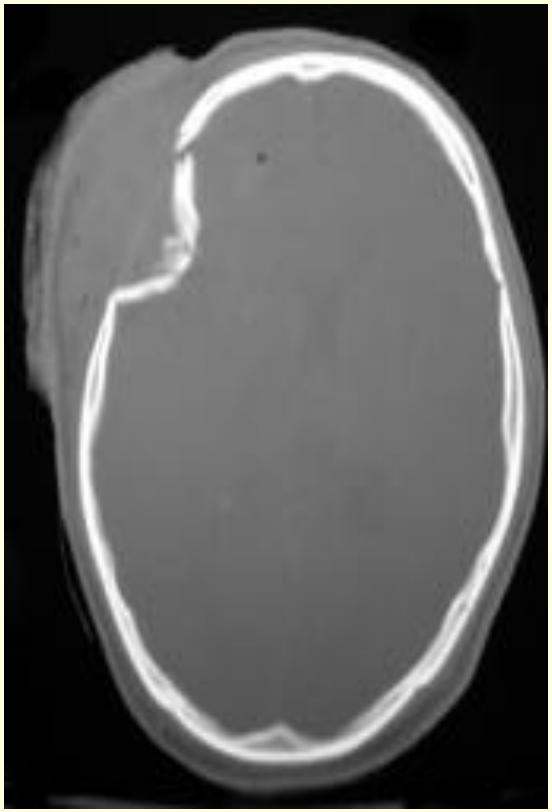
MANAGEMENT OF DEPRESSED SKULL FRACTURES

- ***THEY NEED TO BE OPERATED UPON***

  IF:

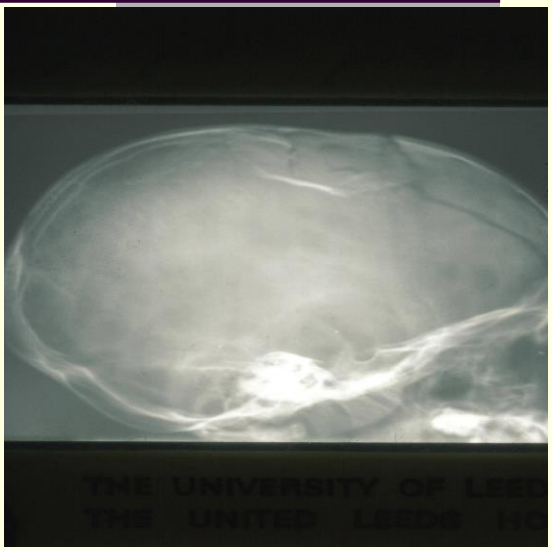
  - *THE DEPRESSION IS MORE THAN THE*

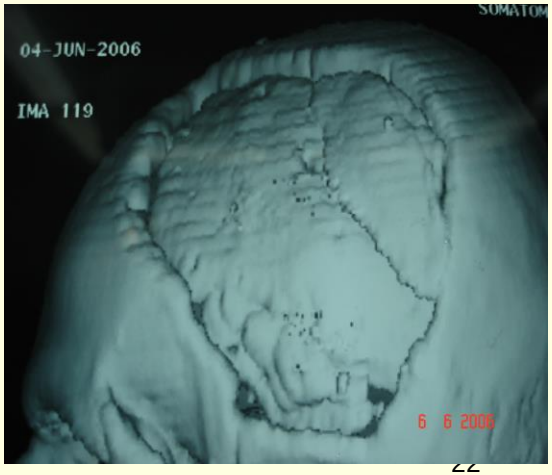
    THICKNESS OF THE SKULL
  - *THERE IS CSF LEAK*
  - *THERE WERE SEIZURES*
  - *THEY OVERLIE AN IMPORTANT AREA*
  - *THEY WERE COMPOUND*



MANAGEMENT OF DEPRESSED SKULL FRACTURES

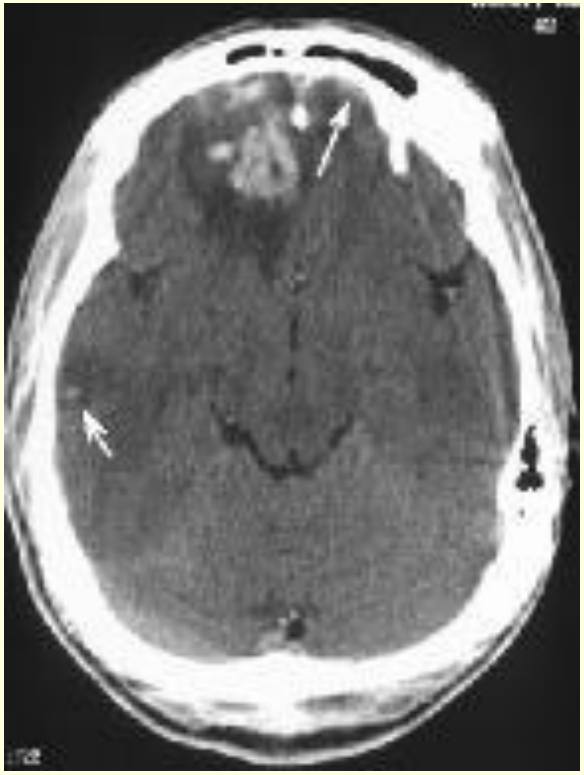
- ***THEY NEED TO BE OPERATED UPON .***
- ***THE OPERATION COULD BE:***
  - *Simple elevation*
  - *Craniectomy, this will need to be repaired later by an operation called Cranioplasty*





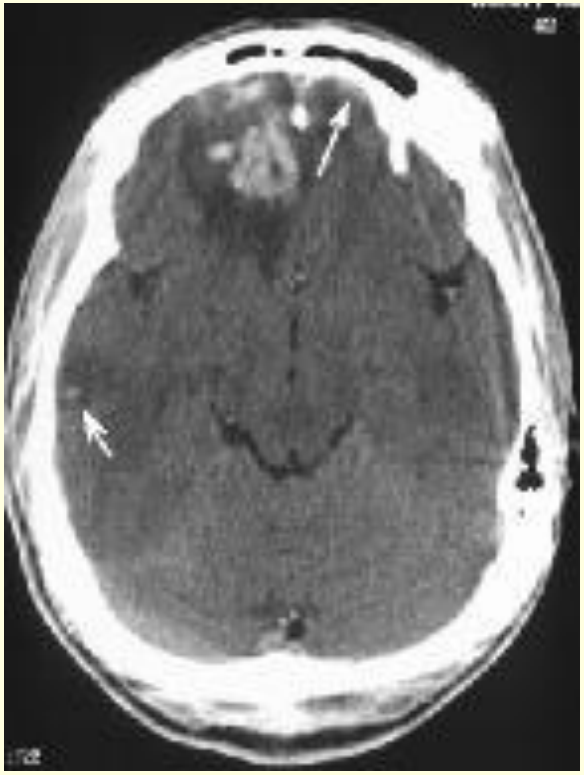
BRAIN INJURIES

- ***BRAIN INJURIES***
  - ***PRIMARY INJURIES***
    - *CONCUSSION*
    - *CONTUSION*
    - *LACERATION*
    - *DIFFUSE AXONAL INJURY*
  - ***SECONDARY EVENTS***
    - *BRAIN OEDEMA*



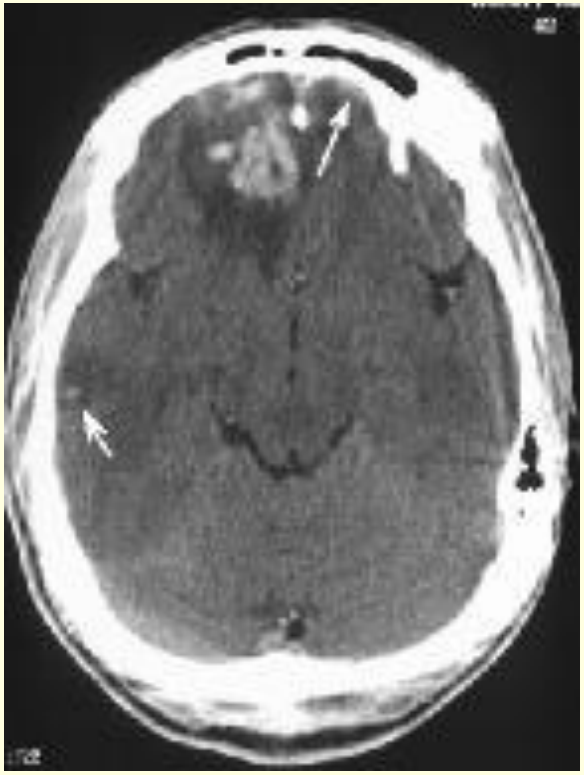
MANAGEMENT OF BRAIN INJURIES

- BRAIN INJURIES
  - SEVERE
    - GCS 8 OR BELOW
  - MODERATE
    - GCS BETWEEN 9 AND 13
  - MILD
    - GCS 14



MANAGEMENT OF BRAIN INJURIES

- ***BRAIN INJURIES***
  - ***PRIMARY INJURIES***
    - ***CONCUSSION:***
      - *OBSERVE FOR 24 HOURS*
    - ***CONTUSION & LACERATION:***
      - *?STERIODS, DIURETICS,*
      - *ANTICONVULSANTS, MAY NEED ICP MONITOR OR EXCISION*
    - ***DIFFUSE AXONAL INJURY:***
      - *AS ABOVE, BUT REQUIRES ALSO ICP MONITORING AND VENTILLATION*



MANAGEMENT (cont.)

- *SECONDARY EVENTS*
  - *HYPOVOLAEMIA*
  - *HYPOXIA*
  - *BRAIN OEDEMA*
    - *? STEROIDS*
    - *OSMOTIC DIURETICS (MANNITOL)*
    - *HYPERVENTILLATION*
    - *ICP MONITORING*
    - *ANTICONVULANTS*

COMPLICATIONS & THEIR MANAGEMENT

COMPLICATIONS OF HEAD INJURIES

- *EARLY*
  - *HYPONATRAEMIA*
  - *EPILEPSY*
  - *HEMATOMA*
  - *CSF LEAKS*
- *LATE*
  - *EPILEPSY*
  - *INFECTION*
  - *HYDROCEPHALUS*
  - *POST TRAUMATIC SYNDROMES*

EPILEPSY

- *DEPENDS ON LOCATION OF INJURY, EXTENT OF INJURY AND AGE*
- *MAY LEAD TO HYPOXIA AND ↑ ICP*
- *COULD BE PREDICTED AND SCORED*
- *TREATED BY*
  - *CARBAMAZEPINE (TEGRETOL)*
  - *PHENYTOIN (EPANUTIN)*
  - *PHENOBARBITONE*

- ***EPILEPSY:***

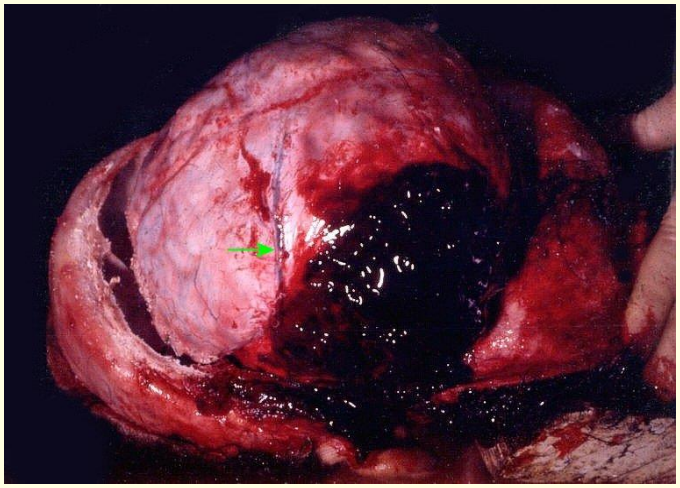
  TWO CATEGORIES

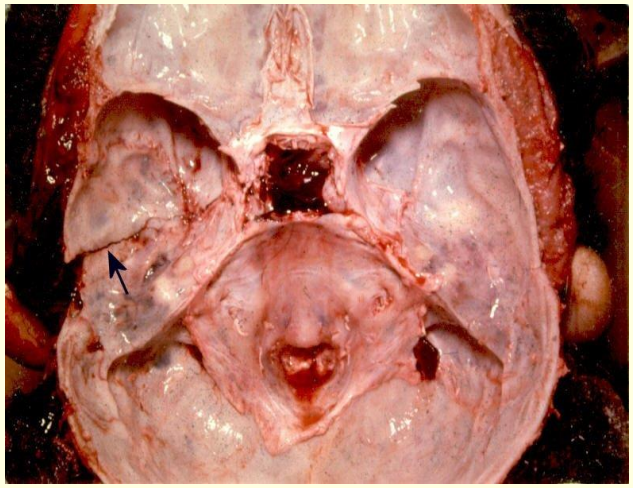
  - ***EARLY***
    - *WITHIN FIRST WEEK OF INJURY*
    - *5% OF CASES*
    - *10% IN CHILDREN BELOW 5 YEARS*

  - ***LATE***
    - *AFTER FIRST WEEK OF INJURY*
    - *5% OF CASES*
    - *50% DEVELOP DURING FIRST YEAR*

INTRACRANIAL HEMATOMAS

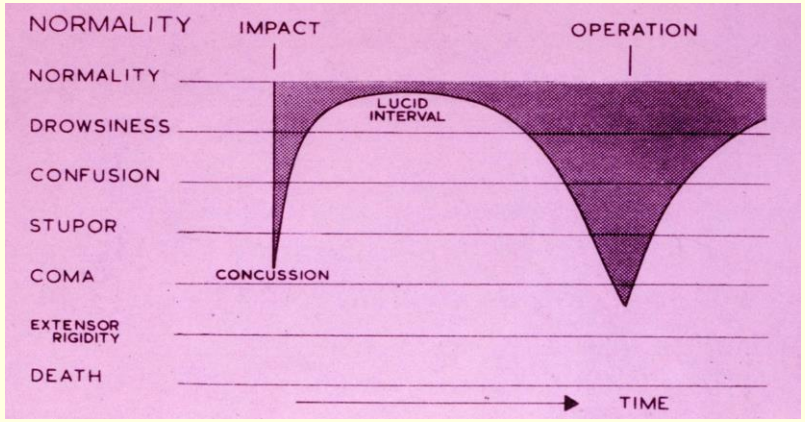
- *EXTRADURAL (EPIDURAL) HEMATOMA*
  - *BETWEEN DURA AND BONE*
  - *ARTERIAL OR VENOUS MAINLY MMA*
  - *ADULTS 90% ASSOCIATED WITH FRACURE*
  - *25% OF CHILDREN HAVE FRACTURES*
  - *MOSTLY WITHEN 8 HOURS OF INJURY, (STEM OF MMA)*
  - *8-24 HOURS (FROM ANTERIOR BRANCH)*
  - *24-36 HOURS (FROM POSTERIOR BRANCH)*



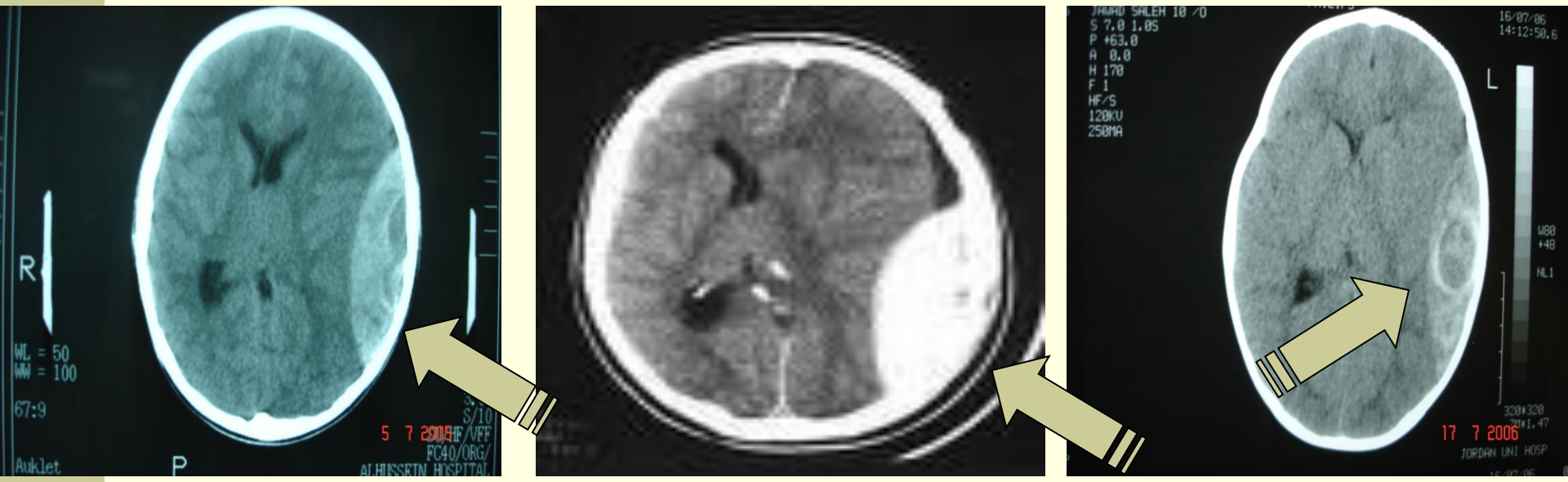


EXTRADURAL(EPIDURAL) HEMATOMA

- *TRAUMA ⟶ LOC (CONCUSSION) ⟶ WAKE UP (LUCID INTERVAL) ⟶ LOC (HEMATOMA)*
- *LEADS TO ↑ ICP AND NEUROLOGICAL DAMAGE*
- *INVESTIGATIONS*
  - *IF THERE IS TIME DO CT*
  - *IF NO TIME DO SURGERY*
- *TREATMENT*
  - *BURR-HOLES*
  - *CRANIOTOMY OR*
  - *CRANIECTOMY*



EXTRADURAL HEMATOMAS



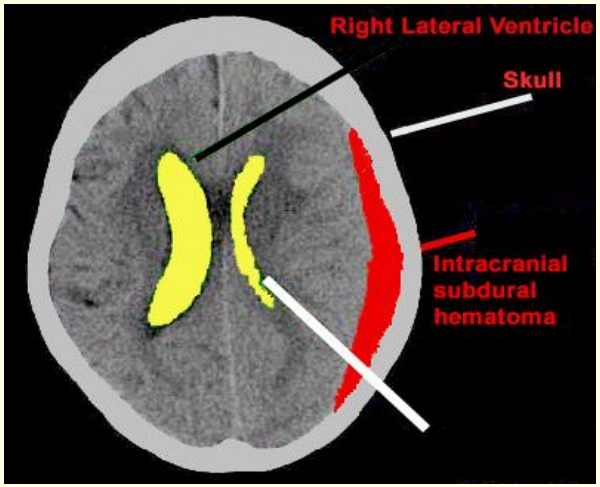
ACUTE EXTRADURAL HEMATOMA

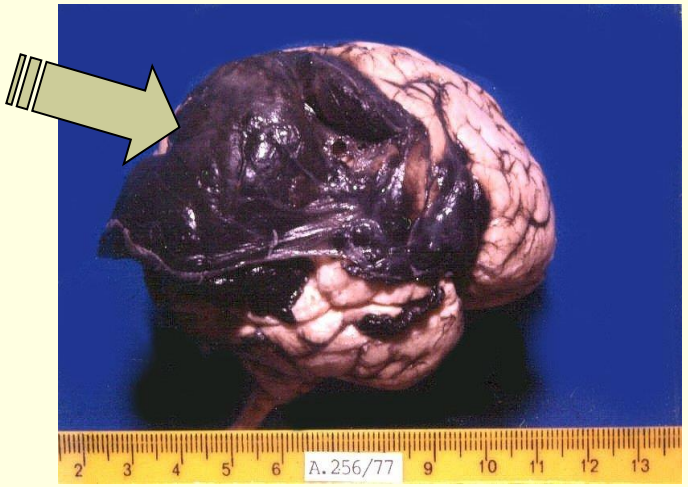
ACUTE SUBDURAL HEMATOMA

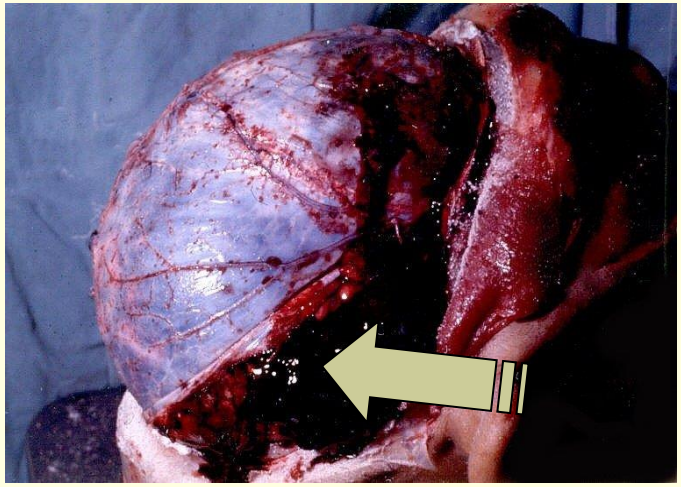
- *BETWEEN BRAIN AND DURA*
- *FROM BRAIN VESSELS*
- *PART OF SEVERE INJURY AND*
- *LACERATION*
- *PRESENT AS EDH BUT CLINICAL PICTURE IS OVELAPPED BY THE*

  SEVERE HEAD INJURY
- *INVESTIGATIONS AS EDH*
- *TREATMENT*
  - *THAT OF HEAD INJURY*
  - *EVACUATE HEMATOMA*
- *MAY BECOME CHRONIC*

ACUTE SUBDURAL HEMATOMA



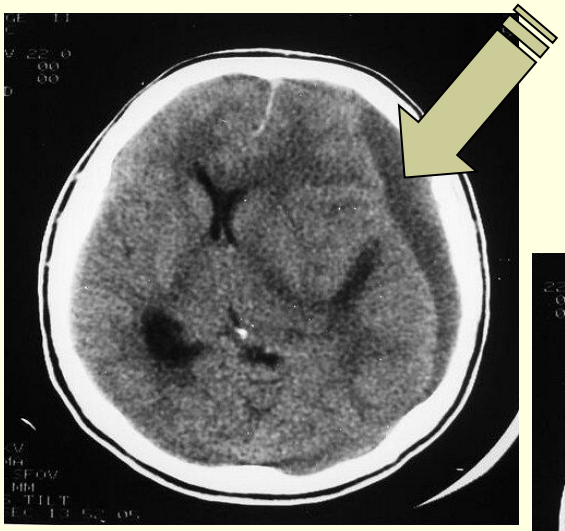


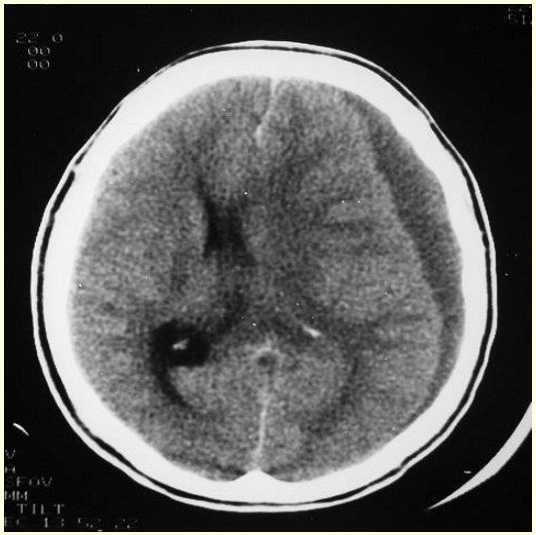


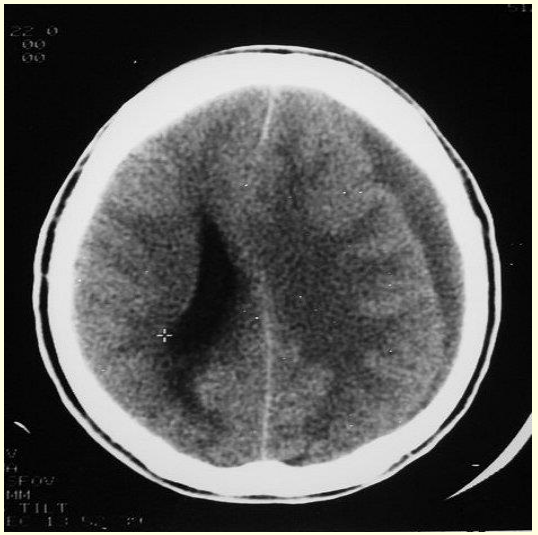
CHRONIC SUBDURAL HEMATOMA

- *IN ELDERLY*
- *RISK FACTORS: ALCOHOLISM, SEISURES, CAOGULOPATHY*
- *BILATERAL IN 30%*
- *APPEARS HYPODENSE ON CT*
- *STARTS AS ACUTE AND TURNS TO CHRONIC IN 3 WEEKS.*
- *SYMPTOMS HEADACHE, CONVULSIONS,SEIZURES, DEFICITS, COMA*
- *TREATMENT IS SURGERY IF SYMPTOMATIC OR MORE THAN 1 CM THICK*

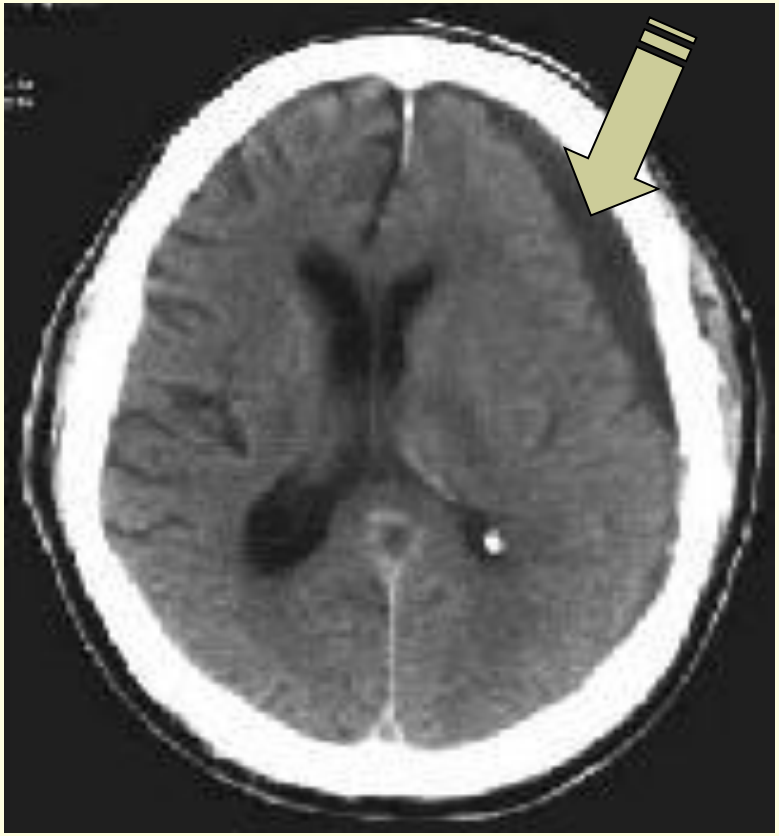
CHRONIC SUBDURAL HEMATOMA



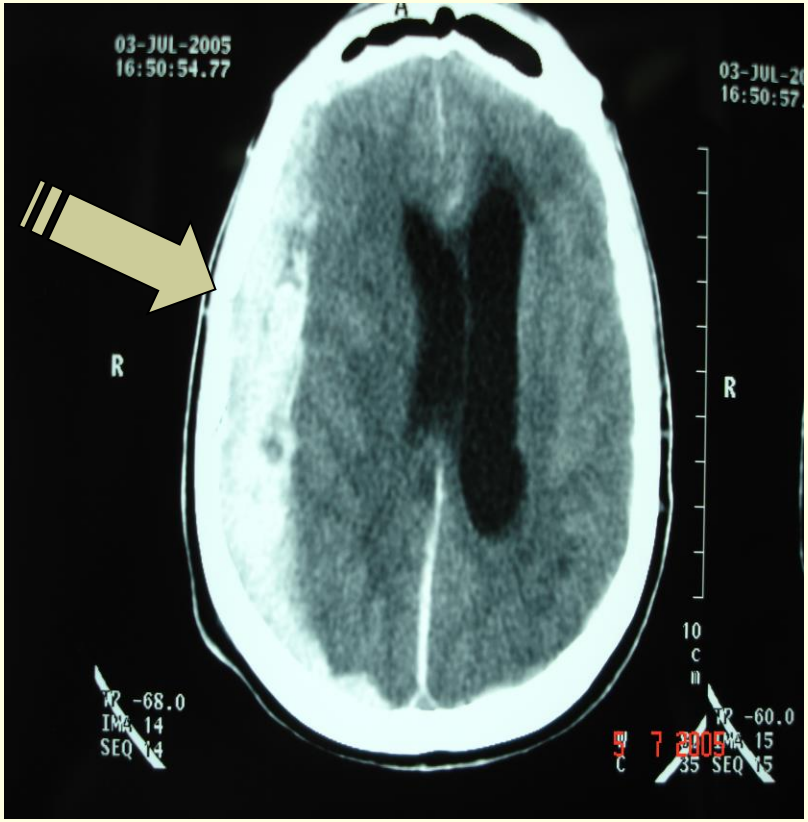




ACUTE AND CHRONIC SUBDURAL HEMATOMA



CHRONIC SUBDURAL HEMATOMA

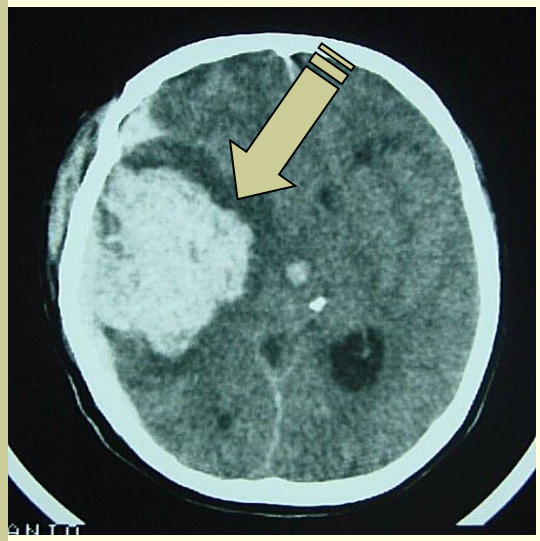


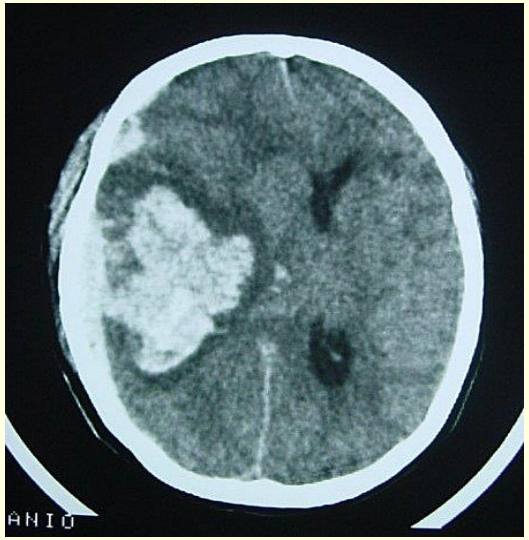
ACUTE SUB DURAL HEMATOMA

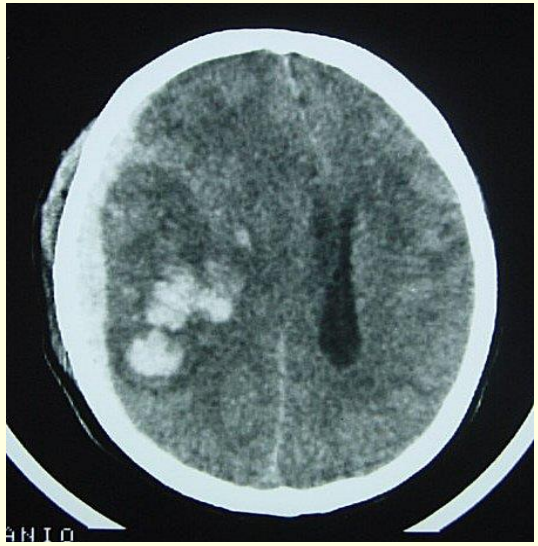
INTRACEREBRAL HEMATOMA

- ***DUE TO BRAIN MOVEMENT OR DIRECT TRAUMA***
- ***MAINLY AT POLES OF CEREBRUM***
- ***MAY BE AT SITE OF TRAUMA OR FAR AWAY***
- ***USUALLY A PART OF SEVERE HEAD INJURY***
- ***DIAGNOSED BY CT. MAY LOOKS LIKE CONTUSION***
- ***TREATMENT***
  - ***THAT OF HEAD INJURY***
  - ***EVACUATE HEMATOMA IF IT IS RESPOSIBLE FOR CONTINUED DETERIORATION***

INTRACEREBRAL HEMATOMA



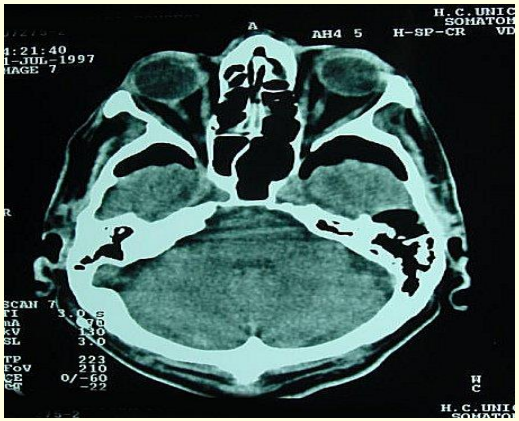


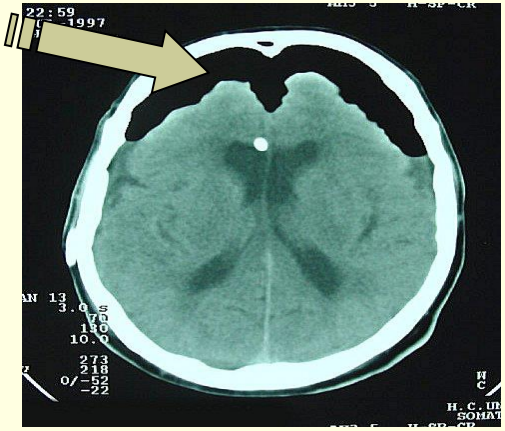


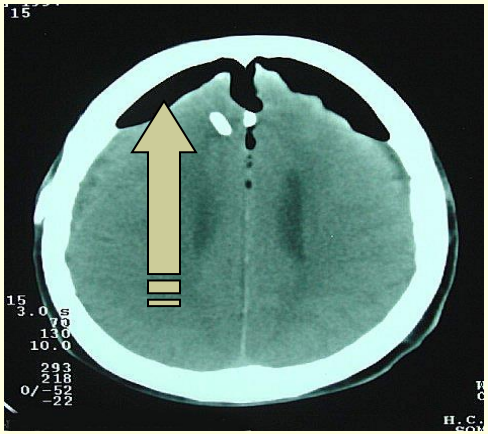
CEREBRO-SPINAL FLUID LEAKS

- ***REQUIRES FRACTURES AND DURAL TEARS***
- ***TYPES***
  - *CSF RHINORRHEA IF FROM NOSE*
  - *CSF OTORRHEA IF FROM EAR*
- ***DIAGNOSED BY***
  - *CSF LEAK*
  - *PRESENCE OF AEROCELE*
  - *DEVELOPMENT OF MENINGITIS*
  - *APPROPRIATELY PLACED FRACTURE*

CEREBRO-SPINAL FLUID LEAKS







CEREBRO-SPINAL FLUID LEAKS

- *CSF RHINORRHEA*
  - *IN 25% OF CASES WITH ANTERIOR BASAL SKULL FRACTURE*
  - *IN FIRST WEEK IN 60% OF CASES*
  - *MAY BE MISSED DUE TO SWALLOWING*
  - *FLUID COULD BE ANALYESD FOR SUGAR*
  - *50%STOP SPONTANEOUSLY*
  - *TREATMENT: ANTIBIOTICS FOR 2 WKS OR SUERGERY FI IT DOES NOT STOP*

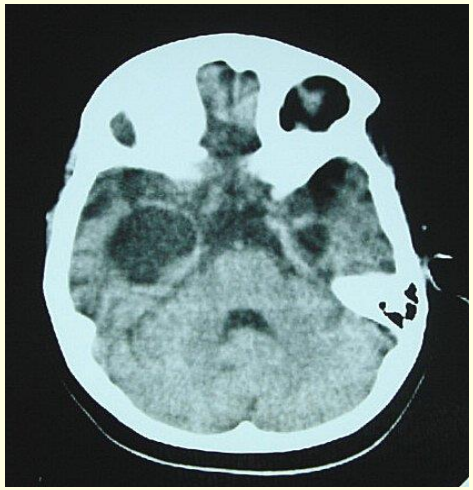
CEREBRO-SPINAL FLUID LEAKS

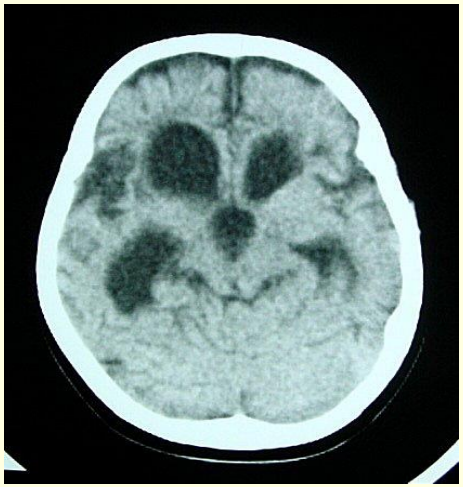
- ***CSF OTORRHEA***
  - *IN 2% OF CASES WITH BASAL SKULL FRACTURE*
  - *MAY BE VERY PROFUSE*
  - *95% DRY UP IN 10 DAYS*
  - *EXAMINATION OF THE EAR MUST BE AVOIDED*
  - *REQUIRES ANTIBIOTIC COVER*
  - *EXTERNAL EAR DRESSING*
  - *FEW NEED SURGICAL REPAIR*

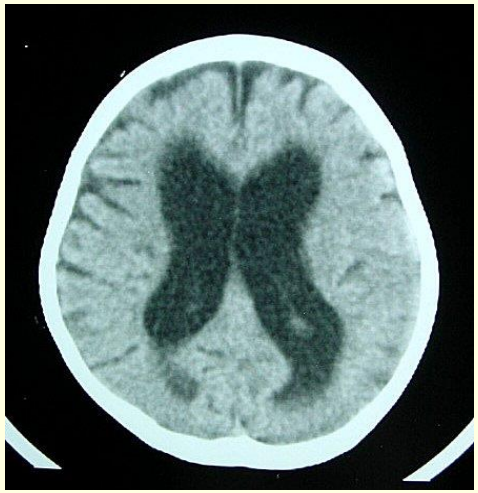
HYDROCEPHALUS

- ***DUE TO BLOOD IN CSF***
- ***USUALLY OF COMMUNICATING TYPE***
- ***SHOULD BE SUSPECTED IN DELAYED RECOVERY***
- ***MAY LEAD TO:***
  - ***HEADACHE***
  - ***DETERIORATION IN MENTAL FUNCTION***
  - ***ATAXIA***
  - ***INCONTINENCE***
- ***MAY REQUIRE SHUNTING***

HYDROCEPHALUS







POST CONCUSSION SYNDROME

- *COLLECTION OF SYMPTOMS DUE TO MINOR HEAD TRAUMA*
- *CONTROVERSIAL WHETHER ORGANIC OR PSYCHOLOGICAL*
- *SYMPTOMS:*
  - *SOMATIC:*
    - *HEADACHE*
    - *DIZINESS*
    - *VISUAL DISTURBANCES*
    - *HEARING PROBLEMS*
    - *BALANCE DIFFICULTIES*
  - *COGNITIVE:*
    - *CONCENTRATION DIFFICULTY*
    - *DEMENTIA*

POST CONCUSSION SYNDROME

- *PSYCHOLOGICAL:*
  - *EASY FATIGABILITY*
  - *LOSS OF LIBIDO*
  - *EMOTIONAL DISTURBANCES*
  - *PERSONALITY CHANGES*
  - *INSOMINIA*
  - *PHOTOPHOBIA*

- *TREATMENT*
  - *REASSURANCE*
  - *SUPPORT*

MISSILE INJURIES

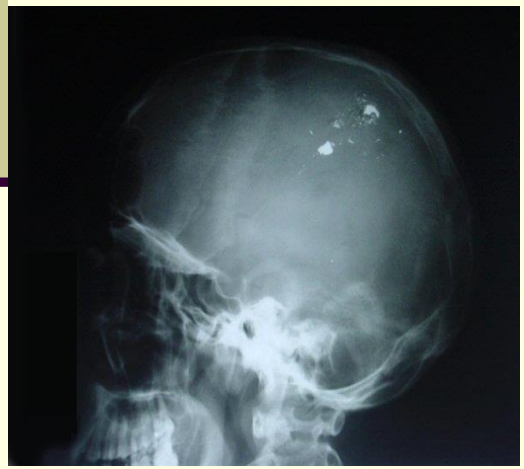
- *THE LINES OF MANAGEMENT ARE SIMILAR TO THOSE OF CIVILIAN LIFE HEAD INJURIES, BUT HAVE CERTAIN SPECIFIC POINTS WHICH REQUIRE SPECIAL ATTENTION.*

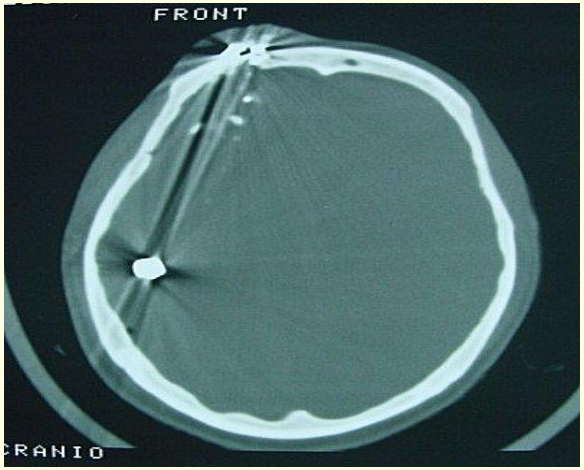
MISSILE INJURIES

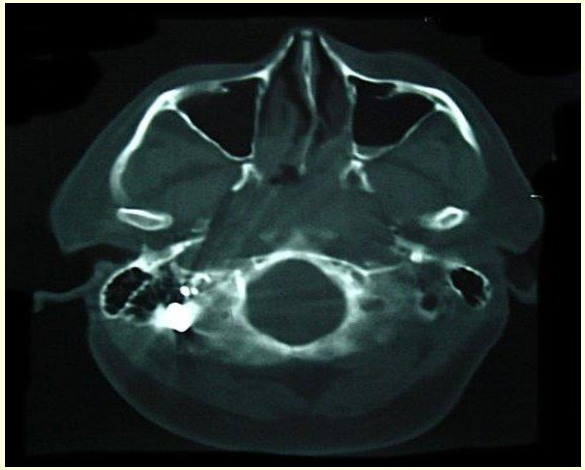
- *THERE ARE USUALLY OTHER ASSOCIATED INJURIES.*
- *THERE IS INCREASED RISK OF INFECTION*
- *THEY MAY ARRIVE IN BIG NUMBERS WHO NEED ATTENTION*

MANAGEMENT OF HEAD INJURIES DUE TO BULLETS

- *STANDARD EXAMINATION AND EVALUATION*
- *ATTEND TO AIRWAYS*
- *SECURE PROPER I.V. LINES*
- *SKULL X-RAYS AND CT SCANS*
- *MANAGEMENT WILL DEPEND ON THE NEUROLOGICAL STATUS OF THE PATIENT*

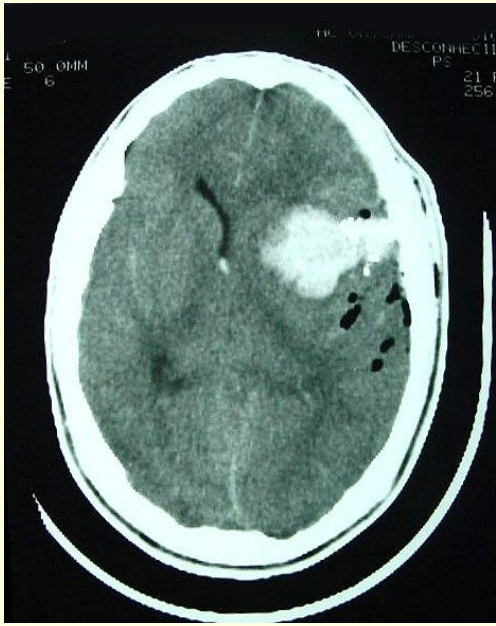






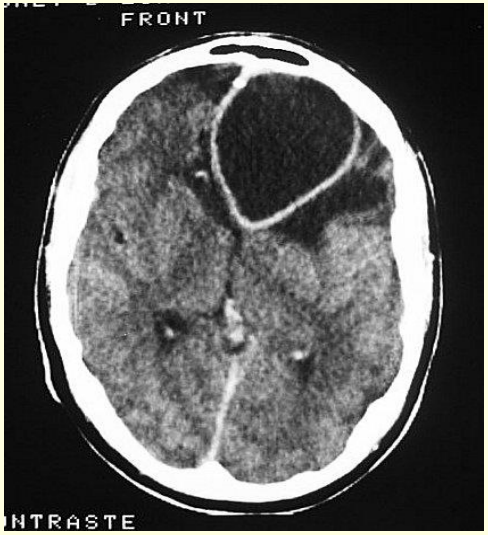
MANAGEMENT OF HEAD INJURIES DUE TO BULLETS

- *DEBRIDEMENT AND CLOSURE OF SCALP WOUNDS*
- *CRANIECTOMY FOR COMMINUTED SKULL FRACTURES*
- *CRANIOTOMY AND EXCISION OF CONTUSED SWOLLEN SUPERFIACIAL BRAIN AREA*
- *REMOVAL OF ACCESSABLE FRAGMENTS*
- *EVACUATION OF LIFE THREATENING HEMATOMAS*
- *BURR HOLE FOR INSERTION OF ICP MONITOR*



MANAGEMENT OF HEAD INJURIES DUE TO BULLETS

- *MANNITOL FOR BRAIN OEDEMA*
- *HYPERVENTILLATION*
- *BROAD SPECTRUM ANTIBIOTICS*
- *ATTENTION TO COMPLICATIONS LIKE:*
  - *EPILEPSY*
  - *INFECTION SPECIALLY BRAIN ABCESSES.*



MANAGEMENT OF HEAD INJURIES DUE TO BULLETS

- *THE FOLLOWING HAVE HIGH MORTALITY RATE:*
  - *GCS OF 4 OR LESS ON ARRIVAL*
  - *HIGH VELOCITY WOUNDS*
  - *TRANSLOBAR PATH OF PROJECTILE*
  - *TRANSVENTRICULAR COURSE*
  - *IF ASSOCIATED WITH SHOCK*

MANAGEMENT OF HEAD INJURIES DUE TO BULLETS

- *REMOVAL OF DEEPLY SITUATED BULLETS OR FRAGMENTS IS NOT REQUIRED.*
- *REMOVAL AT A LATER STAGE, IF THE PATIENT SURVIVES IS ONLY REQUIRED IF COMPLICATIONS ARISE.*