RHINOGENIC AND OTOTIC INTRACRANIAL SUPPURATION

CASE PRESENTATION

PATIENT PROFILE

- Age: 8 yrs
- Sex: male
- Address: Vacoas
- Mother: self-employed
- Father: carpenter
- Sibling: 5yr a&w

HISTORY

- Referred from private clinic on 24/06/08
- Initially attended JH with:
  - Fever
  - Vomiting
  - Abdominal pain
  - No headache
  - No fits
  - No visual complaints
- Duration: 3 days

HISTORY (cont.)

- Admitted
- ? Early GE
- Mother signed DAMA
- Admitted in Clinic
- Persisting complaints
- Next day: neck stiffness
- Intravenous antibiotic therapy
- Investigation: ↑↑ WCC
- Special investigation: CT Brain ±Contrast

CT BRAIN

- Pansinusitis
- Right frontal brain abscess
- Right fronto temporo parietal subdural empyema

Referred urgently to neurosurgical unit, Victoria Hospital

PAST HISTORY

- h/o fall from stairs 3yrs back- had a lacerated wound on right forehead
- PMH
- PSH
- Drug history
- Allergic history
- Immunisation history
- Social history

On Examination

General physical examination

- Sick looking
- Extremely thin
- Unusually quiet
- Wt. 16kgs
- P: 92/min T/°C: 37.6 RR: 14/min
- No pallor, no jaundice
- No clubbing
- No lymphadenopathy
- ENT: nasal secretions ++ rt.>lt.

On Examination (cont)

Systemic examination

- CVS: Normal HS, no murmur
- RS: chest was clear, trachea centrally located, no adventitious sounds
- Abdomen: scaphoid, no organomegaly, mild RUQ tenderness
- Genitals: normal

On Examination (cont)

CNS examination

- GCS: $E_4M_5V_6$
- Higher mental functions
- Mild neck stiffness
- No cerebellar signs
- No photophobia
- Moving all limbs
- Fundoscopy: no papilledema
- Cranial nerve examination: normal

INVESTIGATION

- Hematological: ↑↑ WCC
- Biochemistry: normal
- LFT: normal
- Special investigation- CT BRAIN ±C

MANAGEMENT

- Admitted
- Continued i.v. antibiotic therapy
- i.v. fluid therapy
- Conditioned stabilised
- Urgent referral to E.N.T Hospital- admitted
- BAWO- Pus +++ right maxillary sinus
- Back to VH next day

MANAGEMENT (cont)

- 25/06/08: Cranial surgery

1. Right small frontal craniotomy for drainage of brain abscess
2. Wide temporoparietal craniotomy for evacuation of subdural empyema

- Nursed in ICU
- I.v antibiotics/ i.v phenytoin

POST-OP

- Marked improvement in clinical condition
- Uncomplicated recovery phase
- Lab culture report: sterile
- Drains removed after 48 hrs
- Referred to nutritionist- high protein diet
- Progress CT brain showed good evacuation of brain abscess & empyema, no features of infarct or ↑ ICP
- Continued on i.v antibiotics for two weeks

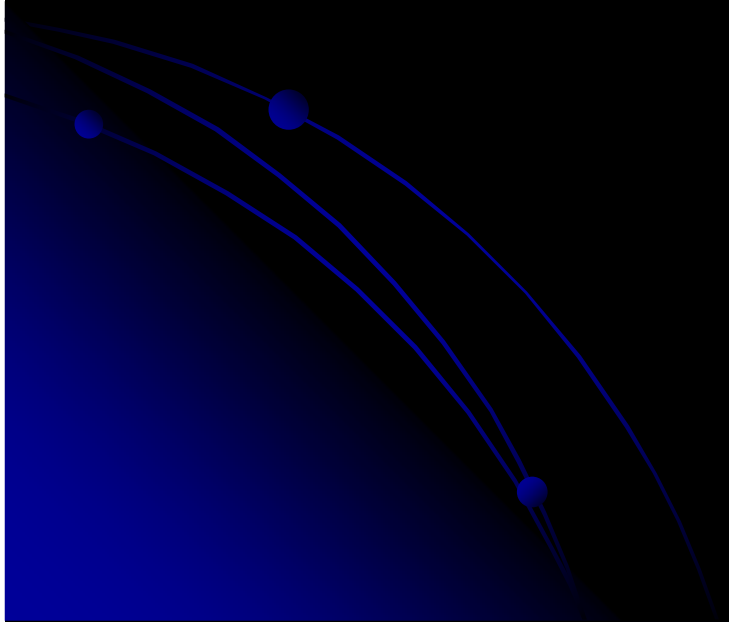
POST-OP

- Still having RUQ pain
- Ultrasound abdomen
  1. Gall bladder filled with calculi
  2. Small rt. Renal calculus
- Surgical opinion
- Pediatric opinion
- Still under investigation
- Review with surgeon

REVIEW

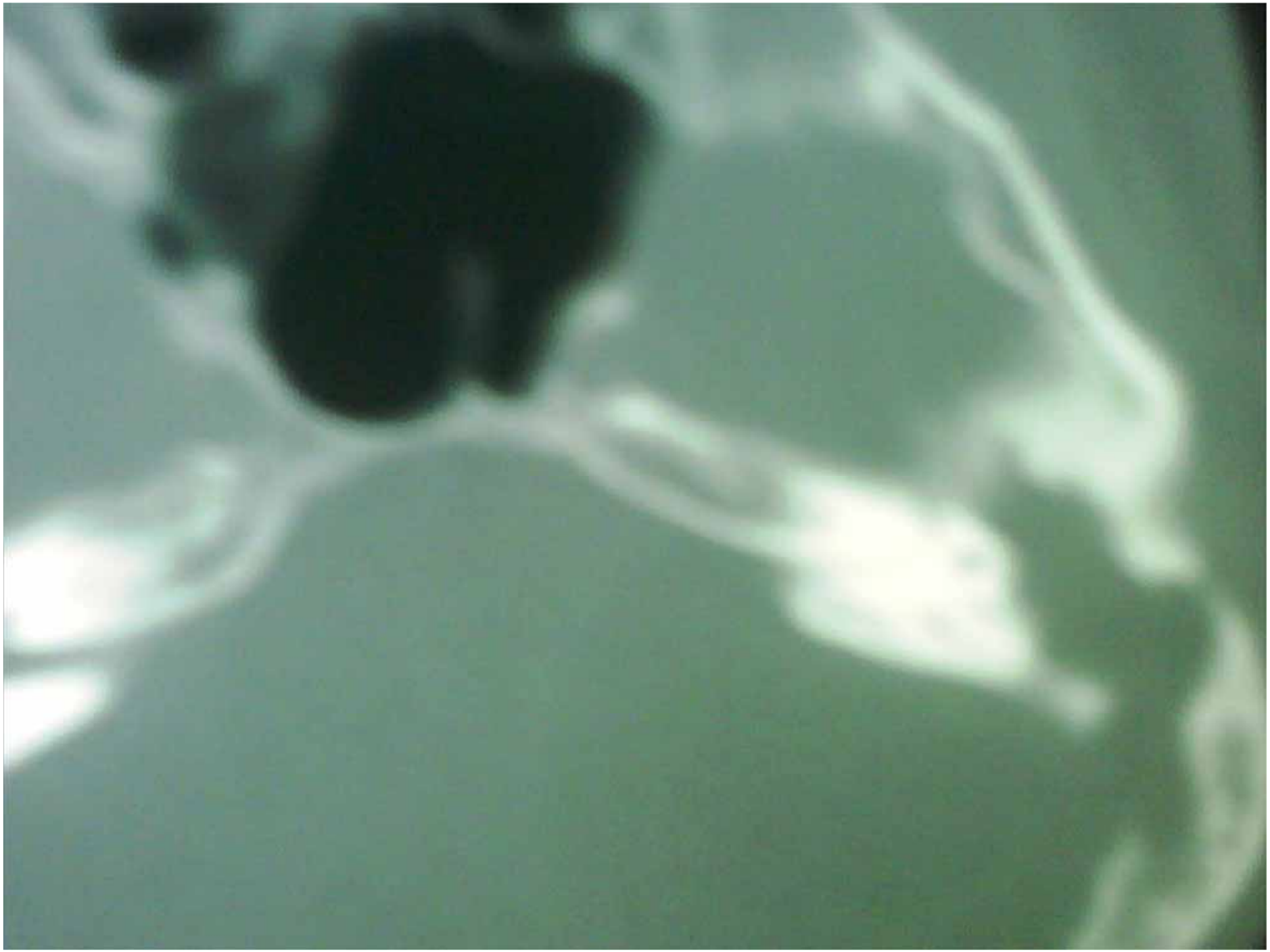
- With Neurosurgeon
- Oral antibiotics
- Oral AED
- Repeat CT of brain

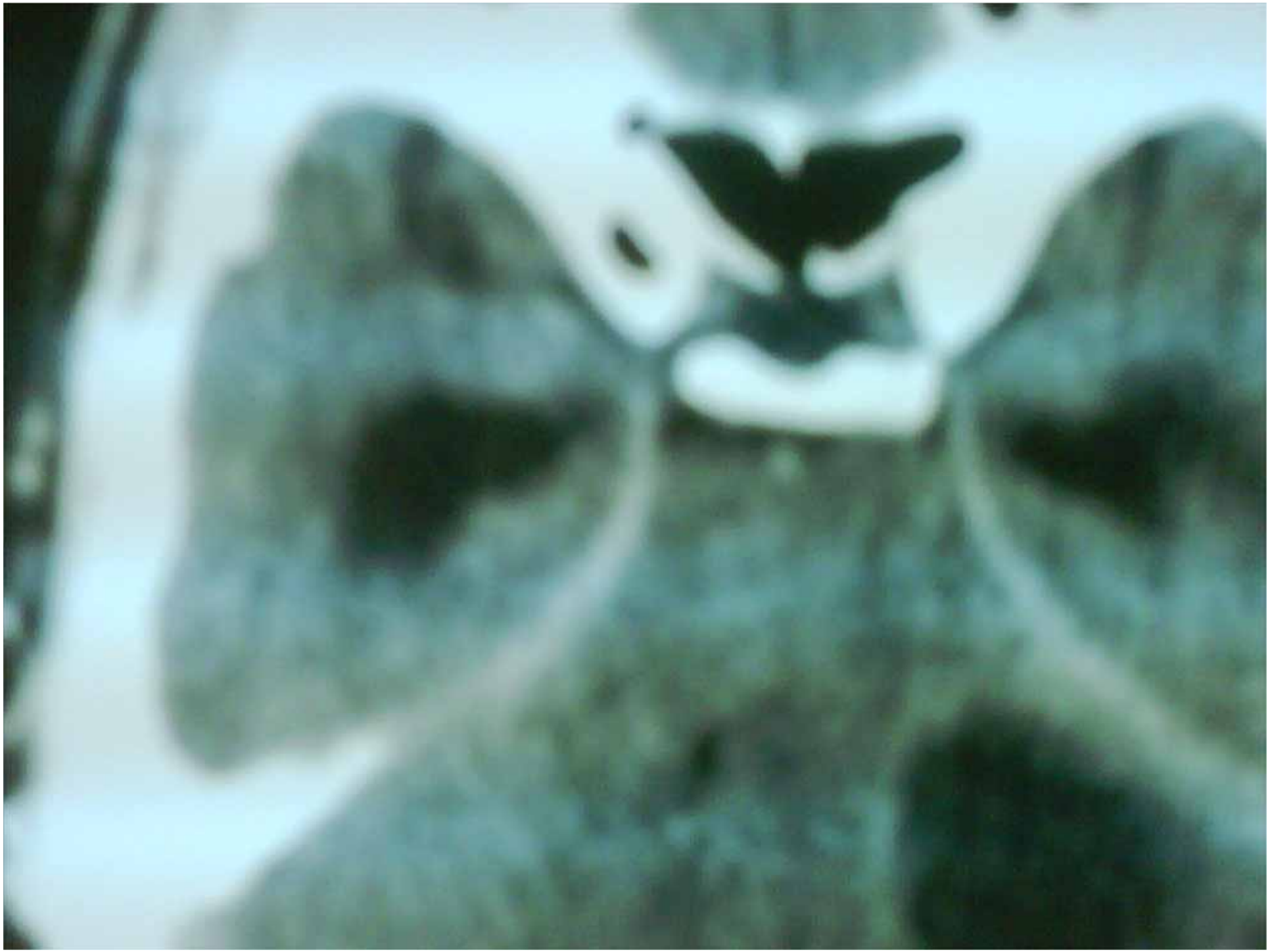
Thank you!!

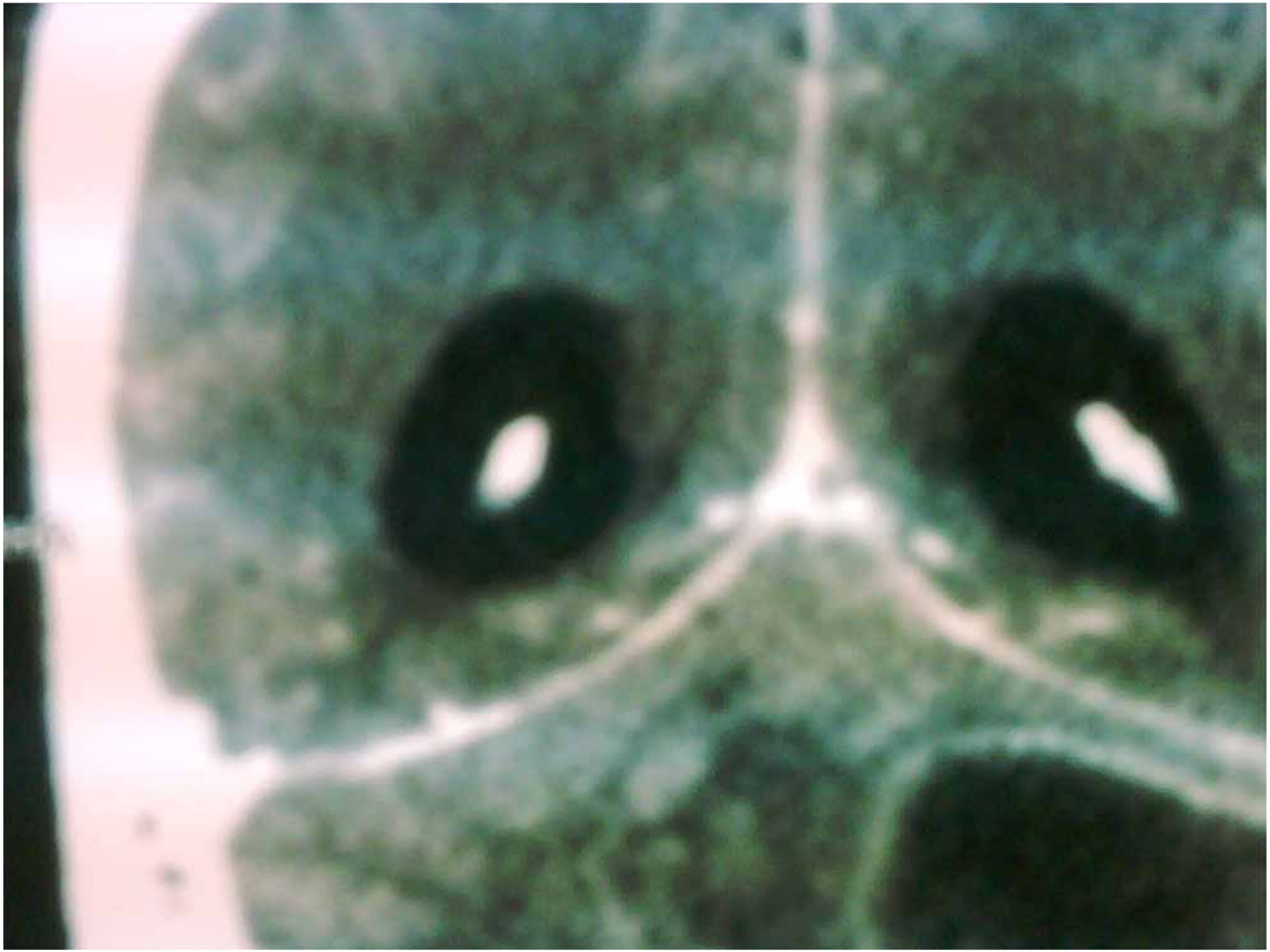


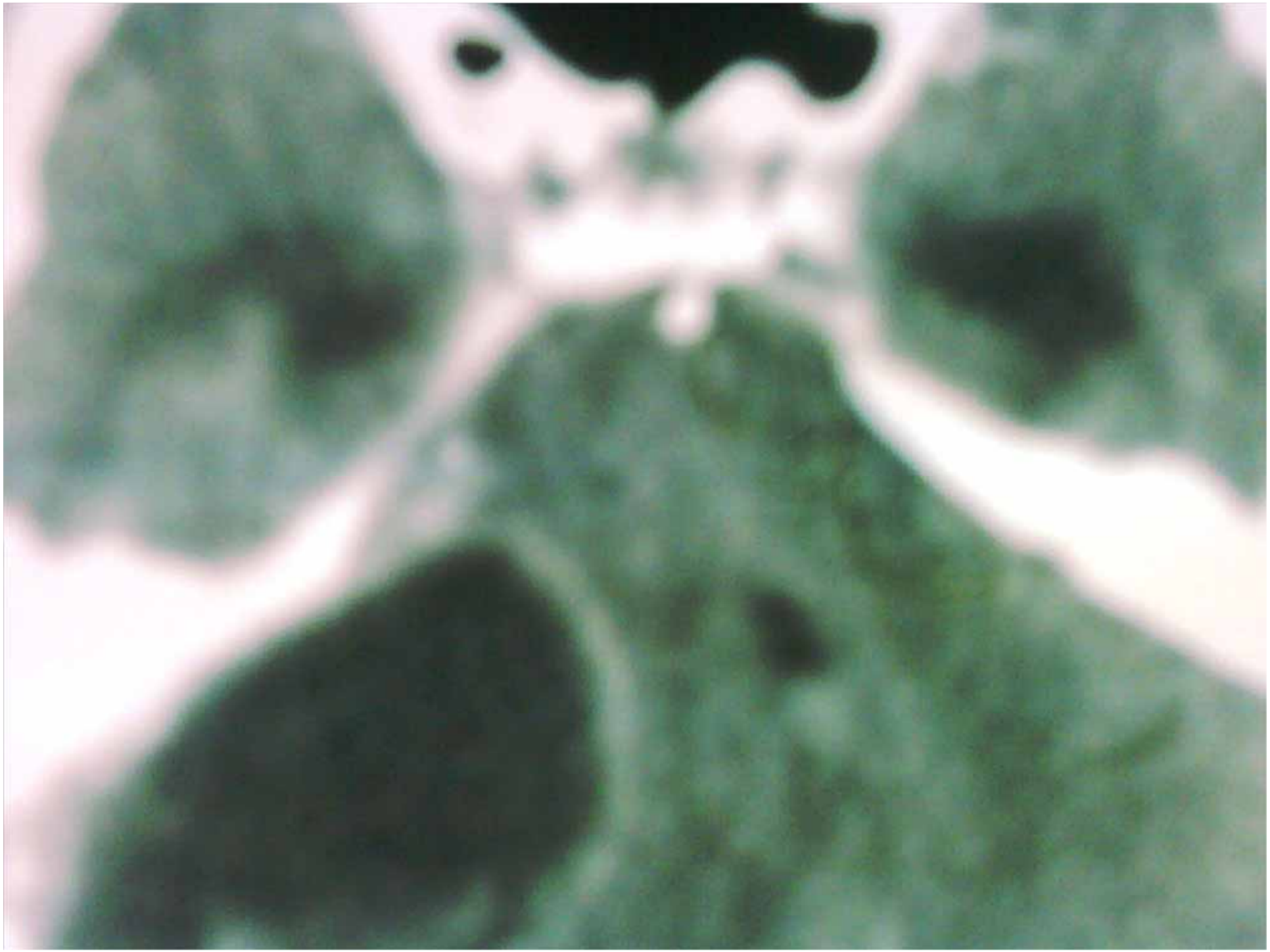
Patient Profile 2

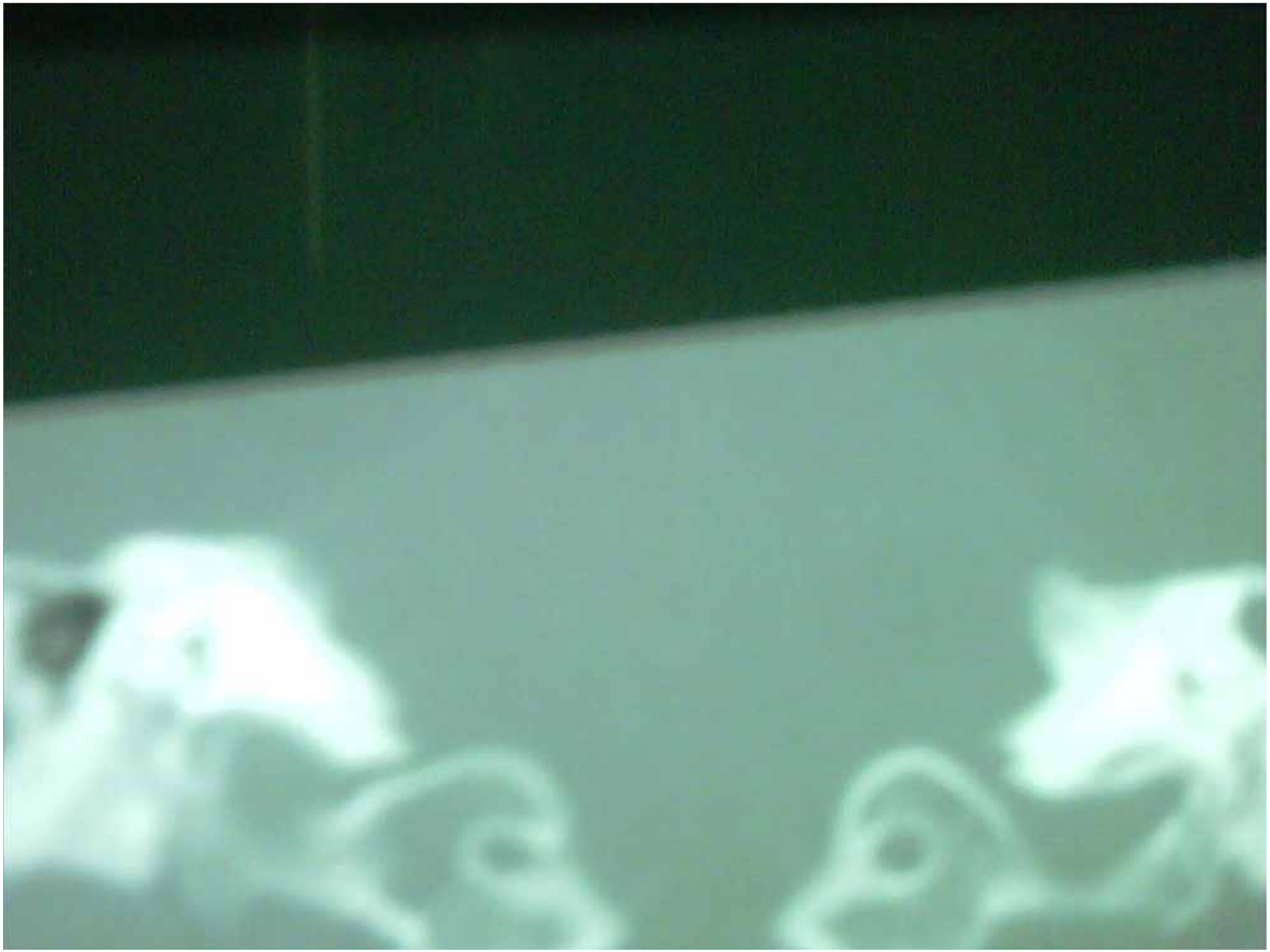
- 16 years Male
- Comores Island
- c/o Chronic discharge Left ear
- Headache, confusion, fever
- GCS10/15 (E3M5V2)
- Spastic, neck stiffness



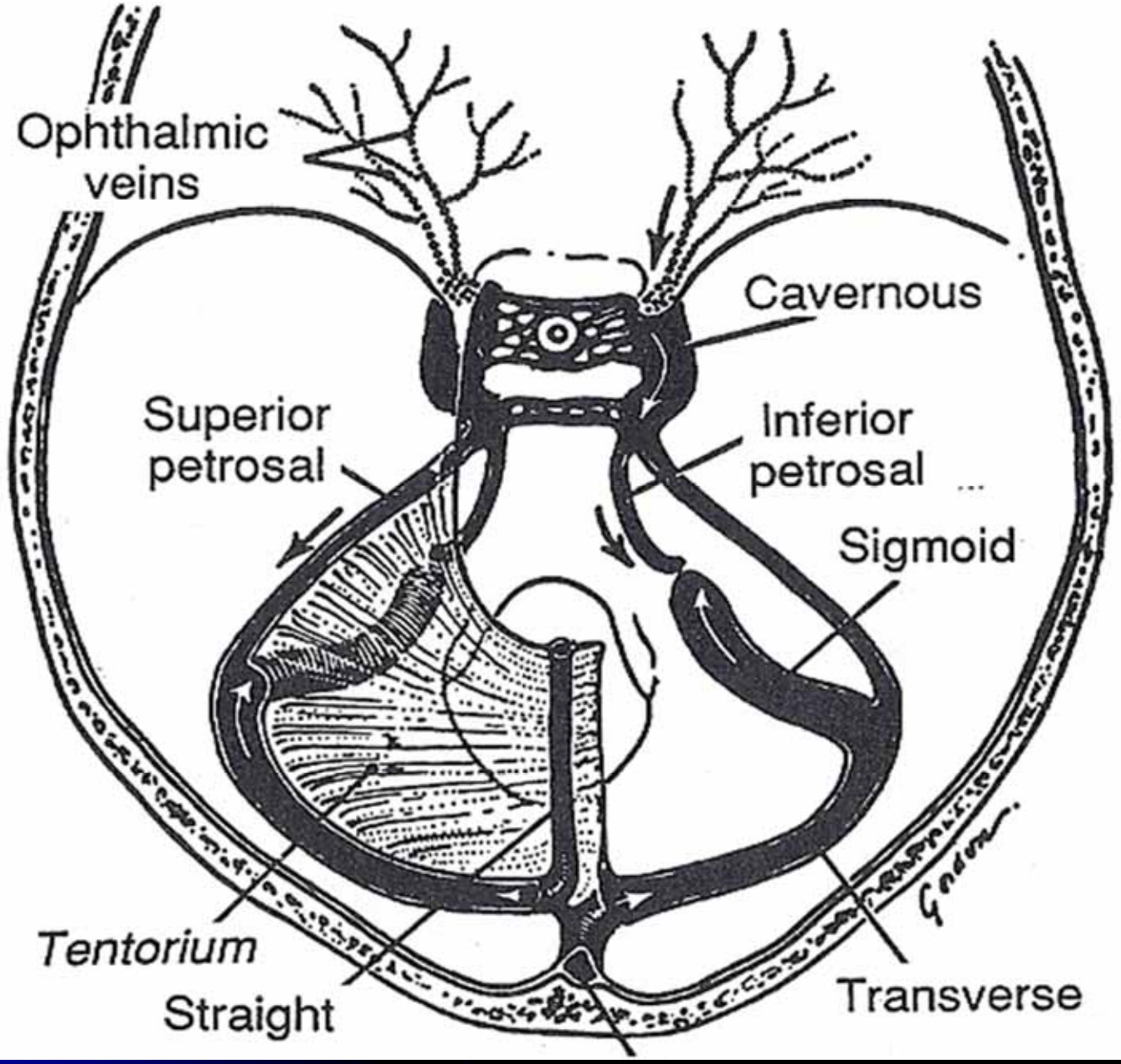


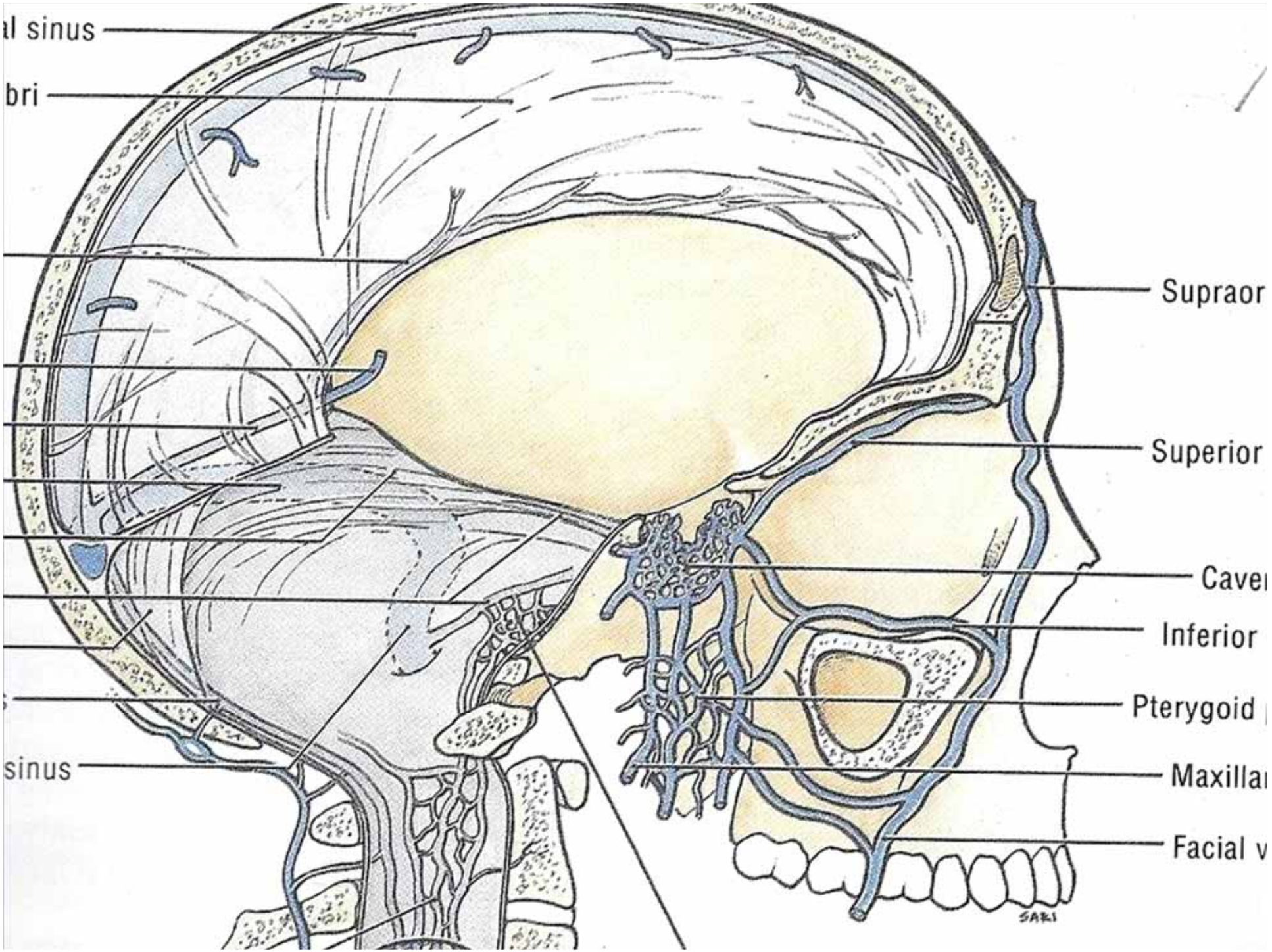






- Emergency combined surgical treatment
- Radical mastoidectomy and posterior fossa craniectomy


Ophthalmic veins
Cavernous
Superior petrosal
Inferior petrosal
Sigmoid
Tentorium
Straight
Transverse


l sinus
bri
Supraor
Superior
Caver
Inferior
Pterygoid
Maxillar
Facial v
sinus
SARI

CAVERNOUS SINUS

- 2 cm x 1 cm
- Located on each of sella turcica and body of sphenoid bone
- Superior orbital fissure to apex of petrous bone

ANATOMY

- Facial veins connect with the cavernous sinus via ophthalmic veins
- Thrombophlebitis of cavernous sinus can spread to superior and inferior petrosal sinuses

ANATOMY

- Posterior intercavernous sinus superior and inferior petrosal sinuses
- Receive blood from superior and inferior ophthalmic vein
- They drain posteriorly and inferiorly through the superior and inferior petrosal sinuses and pterygoid plexuses

SPREAD

- Infections of
  - Face, nose, orbit, tonsils, soft palate, pharynx, air sinuses, middle ear and mastoid can all spread to cavernous sinuses
- Sphenoid and posterior ethmoid sinuses
- Jaw –tooth extraction, maxillary surgery via (pterygoid plexuses)

SYMPTOMS & SIGNS

- Fever
- Ptosis/chemosis
- Oculomotor palsies (III, IV, VI)
- Contralateral hemiparesis (thrombosis ICA)

CT brain

- Irregular filling defect
- Convex bulging of the lateral wall
- Dilatation of superior opthalmic vein
- Thickening of extra ocular muscles and periorbital edema

TREATMENT

- **Antibiotics** (high doses)

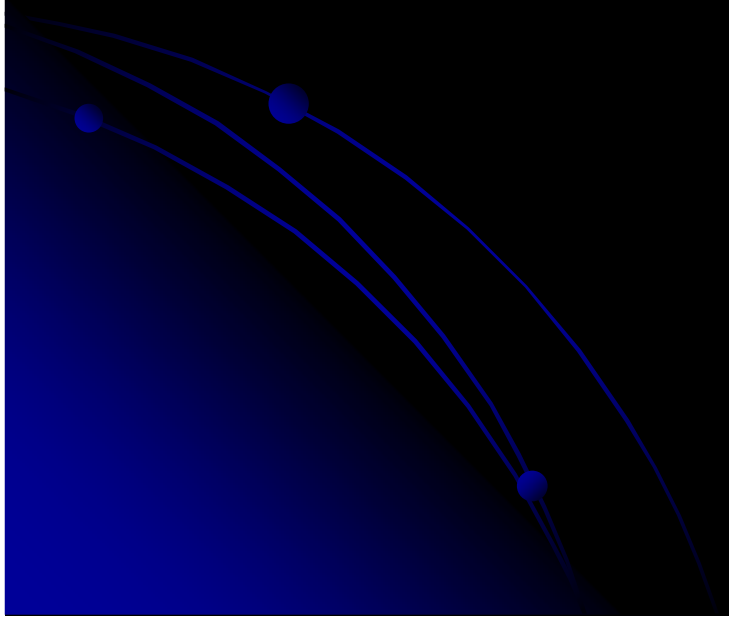
  (*Staph aureus*, *Strep pneumonia*, Haemophilus influenzae

- **Anticoagulant** (no evidence of cortical venous infarct)

- **Surgery-** sphenoid sinus sepsis

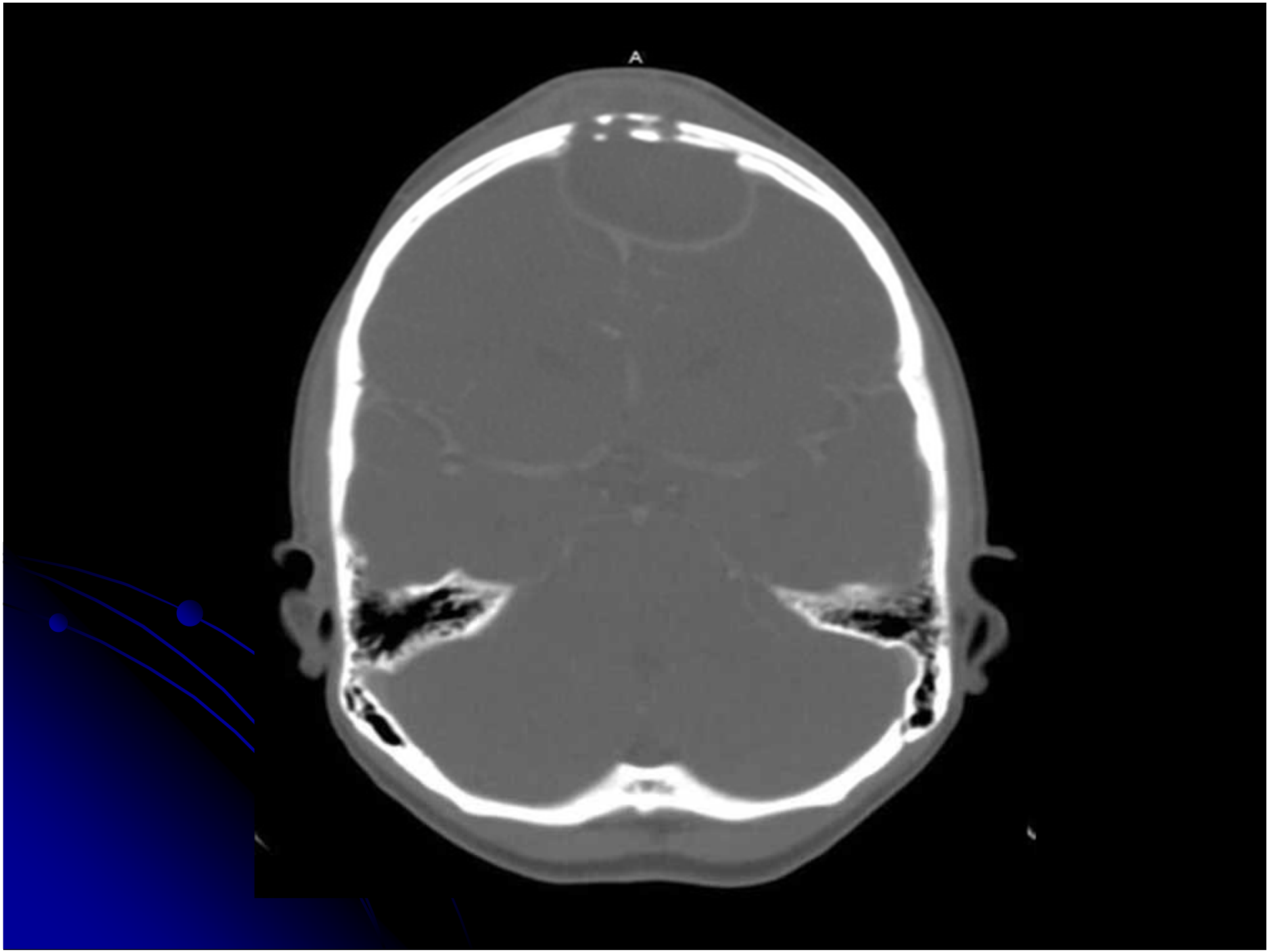
- 100 % mortality to 30 %

RHINOGENIC INTRACRANIAL SEPSIS



Leading neurological manifestation

- Fever 96%
- Seizures 70%
- Neurological signs 58%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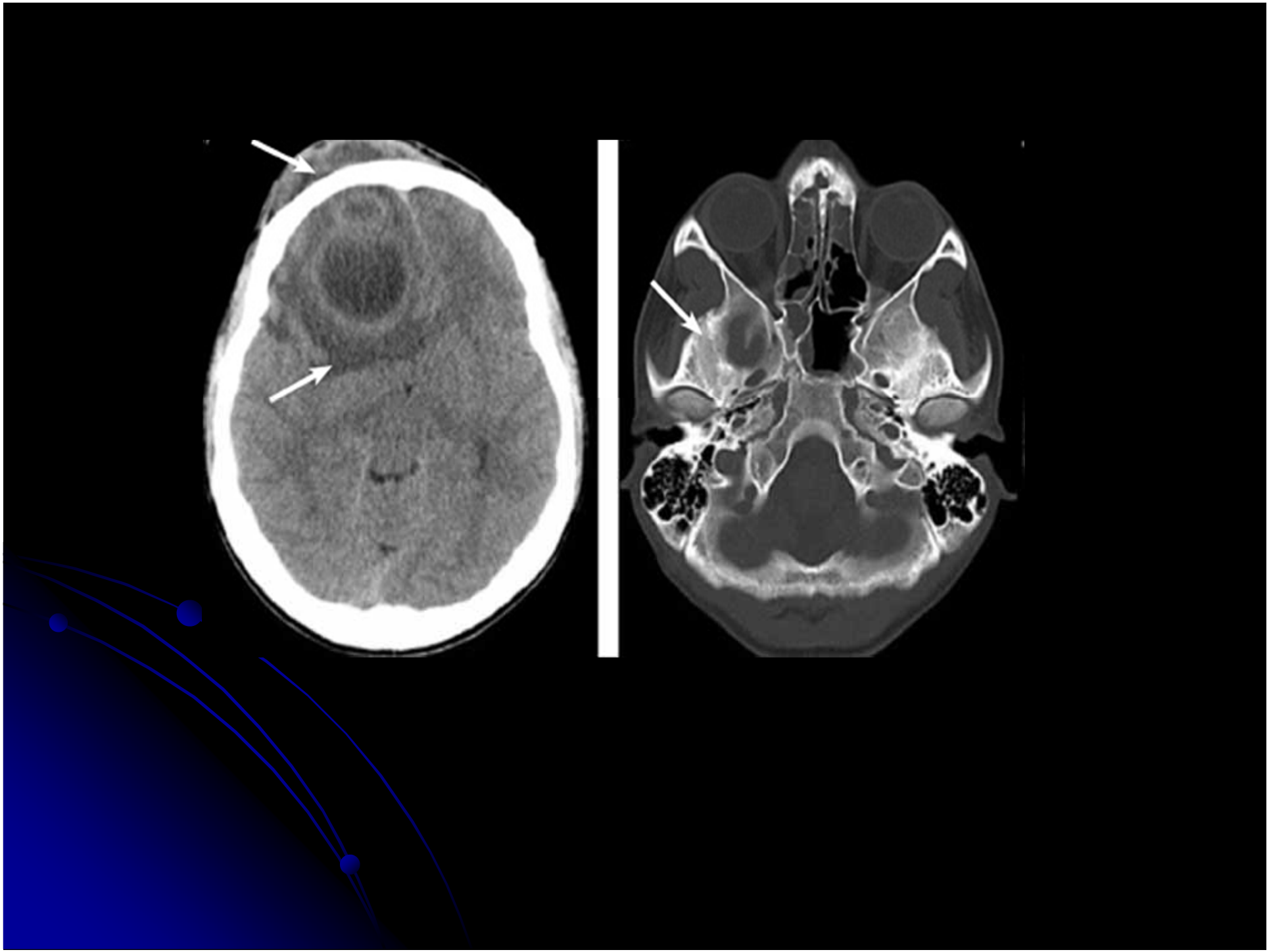

Epidemiology

- Most common in males
- Seasonal variation

Etiology

- Spread

Direct- Erosion of Tegmen tympani

Erosion of posterior wall of frontal sinus

Retrograde septic thrombophlebitis

Facial or scalp infection

Dental sepsis

Meningitis

Cranial surgery e.g. depressed fracture

- Infection at distant sites

Etiology

- Otorhinolaryngeal infection- 40-70 %
  - Paranasal sinusitis
  - Otitis media
  - Mastoiditis
- Cranial trauma- 6-30%

Predisposing factors

- Diabetes Mellitus
- Alcoholism
- Chest infection
- Sepsis
- HIV
- Immunodepression- steroids, cytotoxic drugs
- Poor nutrition, poor hygiene, delayed treatment

“Frequent use of broad spectrum antibiotics may contribute to subdural empyema”

Most common pathogens

- Strep pneumoniae- 16%
- Group B strep- 13%
- H. Influenzae- 13%
- Salmonella spp- 13%
- E. coli- 10%
- Pseudomonas aeruginosa- 10%

Pathogens

- **Pus**- sterile in 40%

  Use of broad spectrum antibiotics
- **NTSO**- non typhoidal salmonella organisms have been reported in the setting of advanced AIDS infection

Diagnosis

- Difficult to clinically differentiate between meningitis and SDE
- Diagnosis is based on strong clinical suspicion
- Triad of- fever
  sinusitis
  neurological deficit

Investigation

- Infants: brain sonography
- CT Bain with contrast, brain and paranasal sinuses, posterior fossa cuts

Investigation

- CT Brain (contrast)

  Thin rim of fluid, slightly hyperdense to CSF with surrounding enhancement, adjacent disproportionate cortical edema and effacement of cortical sulci
- Cranial ultrasound can substitute CT in infants
- LP must be avoided

Management

- Timing of surgery
  - Simultaneous neurosurgical and ENT intervention
- SDE requires surgical evacuation of infected material, irrespective of its volume

Management

- Craniotomy was determined to be the surgical procedure of choice in SDE
- Allows complete evacuation
- Decompression of cerebral hemisphere

TABLE 3. Clinical Features for 699 Patients with Subdural Empyemas

Clinical Features	No. of Patien
Symptoms	
Fever	536 (77%)
Seizures	273 (39%)
Focal	204 (29%)
Generalized	76 (4.2%)
Headaches	221 (32%)
Periorbital edema	
Unilateral	124 (31%)
Bilateral	83 (12%)
Vomiting	60 (8.6%)
Purulent nasal discharge	20 (2.9%)
Macrocephaly	19 (2.7%)
Signs	
Meningism	514 (74%)
Pott's puffy tumor	234 (33%)
Eyelid abscess	84 (12%)
Signs of tentorial herniation	40 (5.7%)
Hemiparesis and VIIth cranial nerve palsy	89 (13%)
Hemiparesis	178 (25.5%)
Monoparesis	28 (4%)
Gaze palsy	4 (0.6%)
Speech abnormalities	2 (0.3%)

TABLE 6. Bacteriological Spectrum for 699 Patients with Subdural Empyemas

Organism	No. of Patients
Sterile	123 (17.6%)
Streptococcus milleri	121 (17.3%)
Streptococcus B. haemolyticus	51
Anaerobic organisms	42
Staphylococcus aureus	33
Staphylococcus epidermidis	31
Haemophilus influenzae	25
Proteus mirabilus	23
Multiple organisms	
>2	65
>3	34
Escherichia coli	17
Pseudomonas aeuroginosa	12
Klebsiella pneumonia	12
Enterobacteriacae	5
Acinetobacter anitratis	4
Enterococcus faecalis	3
Mycobacterium tuberculosis	1
Salmonella typhi	1

TABLE 2. Clinical Features in 22 Patients with Infratentorial Empyema

Clinical Features	No. of Patients
Symptoms	
Depressed level of consciousness	16
Discharging ear	14
Fever	12
Headache	7
Seizure	2
Signs	
Signs of raised intracranial pressure	17
Meningism	15
Hemiparesis or cranial nerve palsy	7
Cerebellar signs	3

TABLE 1. Conditions Associated with Infratentorial Empyema

Condition	No. of Patients
Hydrocephalus	17
Cerebellar abscess	8
Supratentorial subdural empyema	2
Cerebral infarction	1
Osteitis	1
Active neurocysticercosis	1

TABLE 2. Source of Infection Related to Age (n = 699)

Cause	No. of Patients							
	0–5 yr	6–10 yr	11–20 yr[a]	21–30 yr	31–40 yr	41–50 yr	51–70 yr	Total
Paranasal sinusitis	12	103	328 (70%)	22	2	1	1	469 (67%)
Otogenic source	4	12	33	4	3	3	5	64
Trauma	6	3	11	16	9	8	4	57
Miscellaneous	7	4	3	3	3	3	8	31
Meningitis	72	1					73	
Dental caries	1		1	1	2			5
Total	102	123	376 (54%)	46	19	15	18	699

Prognosis

- Early diagnosis and treatment
- High degree of suspicion

“Prolonged fever, seizures, neurological signs”

Prognostic factors

- Age
- GCS
- Timing/ aggressiveness of treatment
- Progression of disease

Outcome

- Mortality- 100% before advent of antibiotics & CT
- Decreased to 40% after CT Scan
- 10-12% presently

- Intracranial subdural empyema is a neurosurgical emergency
- It is rapidly fatal if not recognised early and managed promptly

- **Early drainage, simultaneous eradication of the primary source of sepsis and intravenous administration of high doses of appropriate antibiotics agents represents the mainstay of treatment**

Spread

- **1. Direct spread**

  Erosion through the postwall of frontal

  sinus which has one-half the thickness of

  the anterior wall

- **2. Indirect mechanisms**

  Retrograde thrombophlebitis

Lumbar Puncture L.P

L.P performed in the presence of clinical features of raised ICP and focal neurological signs are extremely dangerous

- Disparity between CT imaging and clinical findings
- -integrity of arachnoid membrane- prevent spread
- -improve blood brain barrier
- -Wide cerebral decomposition via a wide craniotomy

DIAGNOSIS

- **Infective sinustis**
- **Periorbital swelling**
- **Purulent dural discharge**
- **Positive Neurosurgical signs**

MUST HAVE CT SCAN BRAIN & PNS

Role of Non Operative treatment

- Fully concious patient, with small EDE (no radiological mass effect) with no neurological deficit, signs of clinical improvement (temperature ↓; ESR ↓; WCC ↓)
- May be treated with intravenous antibiotics and prophylatic antiepileptic provided the primary source of sepsis has been surgically eradicated

Unlike SDE, EDE is a disease that should be managed without morbidity or death

INFRATENTORIAL EMPYEMA

- **Rare, highly lethal form of intracranial suppuration**
- **Lumbar puncture**
- **Cereballar abcess**
- **Hydrocephalus**
- **Extension of pus to cerebello pontine angle**

INFRATENTORIAL EMPYEMA

TREATMENT

- Early aggressive surgical drainage and decompression of the cerebellum by a wide posterior fossa craniectomy , eradication of the primary source of infection (usually mastoiditis) treatment of concomittant hydrocephalus high dose intravenous antibiotics

THANK YOU