INTRACRANIAL SUPPURATION, ENT AND THE NEUROSURGEON

Dr H. BOODHOO
F.C.S
Consultant Neurosurgeon
PATIENT 1
PATIENT PROFILE

8 yrs old male
HISTORY

- Fever
- Headache
- Neck stiffness (day 3)
ON EXAMINATION

General physical examination

- Sick looking
- Extremely thin
- Unusually quiet
- Wt. 16kgs
- P: 92/min  T/°C: 37.6  RR: 14/min
- ENT: nasal secretions ++ rt.>lt.
On Examination (cont)
Systemic examination

- CVS
- Chest
- GIT

Normal
On Examination (cont)

CNS examination

- GCS: $E_4M_5V_6$
- Normal Higher mental function
- Mild neck stiffness
- No cerebellar signs
- Cranial nerve examination: normal
- Fundoscopy: no papilledema
CT BRAIN (contrast)

- Pansinusitis
- Right frontal brain abscess
- Right fronto temporo parietal subdural empyema
- Referred urgently to neurosurgical unit, Victoria Hospital
MANAGEMENT

- Admitted
- IV antibiotic therapy
- Urgent referral to E.N.T Hospital
- 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
- IV antibiotics/ antiepileptic
POST-OP

- Marked improvement in clinical condition
- Uncomplicated recovery phase
- Lab culture report: sterile
- Referred to nutritionist- high protein diet
- Progress CT brain showed good evacuation of brain abscess & empyema, no features of infarct or ↑ ICP
- Continued on IV antibiotics for two weeks
Patient 2

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

Radical mastoidectomy and posterior fossa craniectomy
PATIENT 3
Case 3

Patient profile

- NAME: A.K
- AGE/SEX: 20 years/male
- OCCUPATION: University student
- D.O.A: ENT- 20/05/10
  VH - 21/05/10
AT ENT hospital

- C/o swelling with boil over the nose
- Signed DAMA on antibiotics
Attended ENT Hospital with headache

Increased swelling and redness over nose

Patient admitted and put on I.V antibiotics- amoxyl, cloxacillin
URGENT TRANSFER TO VH

- Next morning, altered level of consciousness with severe head ache
- Urgent referral to VH the same day for CT scan brain
GENERAL PHYSICAL EXAMINATION

- GCS – E (closed) M5 V3
- Neck stiffness
- Proptosis right eye
- One furuncle over nasal tip with swelling
- Redness over nose with burst boil over tip of nose
- Bilateral periorbital edema
- Mild proptosis right eye
- Chemosis B/L eyes
Systemic Examination

- CVS
- R/S within normal limits
- GIT
CNS examination:

GCS - Es M5 V3
Asymmetry of face
Multiple cranial nerves palsy
(3\textsuperscript{rd}, 4\textsuperscript{th}, 6\textsuperscript{th} and lower cranial nerves)
INVESTIGATION

- URGENT CT SCAN REPORT OF BRAIN+PNS(CONTRAST)

- Evidence of left cavernous sinus thrombosis with generalised brain edema

- Mild proptosis left eye
MANAGEMENT

- ICU admission in VH
- Anticoagulants - HEPARIN
- IV antibiotics - AMIKACIN, VANCOMYCIN
- MANNITOL
- Ventilation
Deterioration of general condition

Drop in GCS

Urgent CT scan brain repeated
CT scan brain report

- Infarct both cerebellar lobes, brainstem, thalamus
- Cerebral edema
MANAGEMENT

- Maximum therapeutic treatment
- Medical therapy continued
- Coagulation profile monitored daily
COMPLICATIONS

- GIT bleeding
- Hypernatremia
- Polyuria

Diabetes insipidus
• Condition further deteriorated

• Both pupils dilated and unreactive

• Brainstem dysfunction – absent gag and corneal reflex

• Date of death: 26/05/10
Patient 4

- Male, 27 yrs
- Serious dental carries
- Headache
- Visual deterioration
- HIV negative
- Tooth extraction
- IV antibiotics
- Cardiac murmur (one week later)
- Cardiac echo-Severe vegetation on valve
- Blood culture- Strep melleri
- Long term stay in hospital
- Right sided Hemiparesis
- Seizures
- Follow up CT scan brain (resolution of CT scan brain - abscesses)
- Home based rehabilitation
Patient 5

- 13 yr old male patient from ENT treated for Pansinusitis
- Altered sensorium
- Persistent headache
- Urgent CT scan (Left frontal, extradural empyema)
Patient 6
Patient 6
UNCOMMON COMPLICATION OF A COMMON CONDITION
Otitic hydrocephalus

- Male: 40 yrs old
- Chronic purrulent discharge from right ear
- Altered sensorium
OTITIC HYDROCEPHALUS

- 1931 Symond’s
- Acute otitis media with hydrocephalus
- Thrombosis of transverse sinus, superior sagittal sinus
- Hypercoagulable states, cyanotic heart disease, oral contraceptives, polycytemia, haemoglobinopathy, leukemia, SLE
INVESTIGATIONS & TREATMENT

- MRI / MRV
- Steroids, Antibiotics, mannitol, acetazolamide, anticoagulants
- Lumbur puncture
- CSF shunting
- Optic nerve sheath fenestration
• OTITIC HYDROCEPHALUS can result in permanent vision loss and chronic headache

Although OTITIS MEDIA is a benign illness, clinicians must be alert to this complication
CAVERNOUS SINUS THROMBOSIS
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 ophthalmic vein
- Thickening of extra ocular muscles and periorbital edema
TREATMENT

- **Antibiotics** (high doses)
  
  \((\textit{Staph aureus, Strep pneumonia, Haemophilus influenzae})\)

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

- **Surgery**- sphenoid sinus sepsis

- 100 % mortality to 30 %
Otorhinogenic intracranial sepsis
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%
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>
<thead>
<tr>
<th>Subdural Empyemas</th>
<th>Clinical Features</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fever</td>
<td>536 (77%)</td>
</tr>
<tr>
<td></td>
<td>Scizures</td>
<td>273 (39%)</td>
</tr>
<tr>
<td></td>
<td>Focal</td>
<td>204 (29%)</td>
</tr>
<tr>
<td></td>
<td>Generalized</td>
<td>76 (4.2%)</td>
</tr>
<tr>
<td></td>
<td>Headaches</td>
<td>221 (32%)</td>
</tr>
<tr>
<td></td>
<td>Periorbital edema</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unilateral</td>
<td>124 (31%)</td>
</tr>
<tr>
<td></td>
<td>Bilateral</td>
<td>83 (12%)</td>
</tr>
<tr>
<td></td>
<td>Vomiting</td>
<td>60 (8.6%)</td>
</tr>
<tr>
<td></td>
<td>Purulent nasal discharge</td>
<td>20 (2.9%)</td>
</tr>
<tr>
<td></td>
<td>Macrocephaly</td>
<td>19 (2.7%)</td>
</tr>
<tr>
<td>Signs</td>
<td>Meningism</td>
<td>514 (74%)</td>
</tr>
<tr>
<td></td>
<td>Pott’s puffy tumor</td>
<td>234 (33%)</td>
</tr>
<tr>
<td></td>
<td>Eyelid abscess</td>
<td>84 (12%)</td>
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<tr>
<td></td>
<td>Signs of tentorial herniation</td>
<td>40 (5.7%)</td>
</tr>
<tr>
<td></td>
<td>Hemiparesis and VIIth cranial nerve palsy</td>
<td>178 (25.5%)</td>
</tr>
<tr>
<td></td>
<td>Hemiparesis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monoparesis</td>
<td>28 (4%)</td>
</tr>
<tr>
<td></td>
<td>Gaze palsy</td>
<td>4 (0.6%)</td>
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<tr>
<td></td>
<td>Speech abnormalities</td>
<td>2 (0.3%)</td>
</tr>
<tr>
<td></td>
<td>No focal signs</td>
<td>289 (41%)</td>
</tr>
<tr>
<td>Organism</td>
<td>No. of Patients</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>Sterile</td>
<td>123 (17.6%)</td>
<td></td>
</tr>
<tr>
<td><em>Streptococcus milleri</em></td>
<td>121 (17.3%)</td>
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<tr>
<td><em>Streptococcus B. haemolyticus</em></td>
<td>51</td>
<td></td>
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<tr>
<td>Anaerobic organisms</td>
<td>42</td>
<td></td>
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<tr>
<td><em>Staphylococcus aureus</em></td>
<td>33</td>
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</tr>
<tr>
<td><em>Staphylococcus epidermidis</em></td>
<td>31</td>
<td></td>
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<tr>
<td><em>Haemophilus influenzae</em></td>
<td>25</td>
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<tr>
<td><em>Proteus mirabilis</em></td>
<td>23</td>
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<tr>
<td>Multiple organisms</td>
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<td></td>
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<tr>
<td>&gt;2</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>&gt;3</td>
<td>34</td>
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<tr>
<td><em>Escherichia coli</em></td>
<td>17</td>
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<tr>
<td><em>Pseudomonas aeruginosa</em></td>
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<tr>
<td><em>Klebsiella pneumonia</em></td>
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<tr>
<td><em>Enterobacteriaceae</em></td>
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<tr>
<td><em>Acinetobacter anitratis</em></td>
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<tr>
<td><em>Enterococcus faecalis</em></td>
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</tr>
<tr>
<td><em>Mycobacterium tuberculosis</em></td>
<td>1</td>
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<tr>
<td><em>Salmonella typhi</em></td>
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### TABLE 2. Source of Infection Related to Age (n = 699)

<table>
<thead>
<tr>
<th>Cause</th>
<th>0-5 yr</th>
<th>6-10 yr</th>
<th>11-20 yr</th>
<th>21-30 yr</th>
<th>31-40 yr</th>
<th>41-50 yr</th>
<th>51-70 yr</th>
<th>Total</th>
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<tbody>
<tr>
<td>Paranasal sinusitis</td>
<td>12</td>
<td>103</td>
<td>328 (70%)</td>
<td>22</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>469 (67%)</td>
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<tr>
<td>Otogenic source</td>
<td>4</td>
<td>12</td>
<td>33</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>64</td>
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<tr>
<td>Trauma</td>
<td>6</td>
<td>3</td>
<td>11</td>
<td>16</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>57</td>
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<tr>
<td>Miscellaneous</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>31</td>
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<tr>
<td>Meningitis</td>
<td>72</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>73</td>
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<tr>
<td>Dental caries</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>123</td>
<td>376 (54%)</td>
<td>46</td>
<td>19</td>
<td>15</td>
<td>18</td>
<td>699</td>
</tr>
</tbody>
</table>

*P < 0.001.*
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
DIAGNOSIS

- Infective sinustis
- Periorbital swelling (Pott’s Puffy tumour)
- Purulent nasal discharge
- Positive Neurosurgical signs

MUST HAVE CT SCAN BRAIN & PNS
THANK YOU