Case Conference

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Brain Abscess- Pathogenesis

- Direct Spread- usually a single abscess
  - Subacute and chronic otitis media and mastoiditis
    → inferior temporal lobe and cerebellum
  - Frontal or ethmoid sinuses → frontal lobes
  - Dental infection → usually the frontal lobes

Brain Abscess- Pathogenesis

- Hematogenous Spread –
  usually multiple abscesses located in the distribution of MCA
  - Chronic pulmonary infections
  - Skin infections
  - Pelvic infections
  - Intraabdominal infections
  - Esophageal dilation and endoscopic sclerosis of esophageal varices
  - Bacterial endocarditis
  - Cyanotic congenital heart diseases (most common in children)
- No primary site or underlying condition can be identified in 20 to 40 percent of patients with brain abscess

Brain Abscess- Microbiology

Microbiologic pathogens in brain abscesses, according to major primary source of infection

Source of infection	Pathogens
Paranasal sinuses	Streptococcus (especially S. milleri), Haemophilus, Bacteroides, Fusobacterium
Odontogenic sources	Streptococcus, Bacteroides, Prevotella, Fusobacterium, Haemophilus
Otogenic sources	Enterobacteriaceae, Streptococcus, Pseudomonas, Bacteroides
Lungs	Streptococcus, Fusobacterium, Actinomyces
Urinary tract	Pseudomonas, Enterobacter
Penetrating head trauma	Staphylococcus aureus, Enterobacter, Clostridium
Neurosurgical procedure	Staphylococcus, Streptococcus, Pseudomonas, Enterobacter
Endocarditis	Viridans streptococcus, S. aureus
Congenital cardiac malformations (especially right-to-left shunts)	Streptococcus

Brain Abscess- Microbiology

- Anaerobic pathogens
  - anaerobic streptococci
  - Bacteroides spp. (including B. fragilis)
  - Prevotella melaninogenica
  - Propionibacterium
  - Fusobacterium
  - Eubacterium
  - Veillonella
  - Actinomyces
- → usually from normal mouth flora、intraabdominal or pelvic infections

Brain Abscess- Microbiology

- Aerobic pathogens
  - viridans streptococci
  - Streptococcus milleri
  - microaerophilic streptococci
  - Streptococcus pneumoniae
  - S. aureus → trauma or a neurosurgical procedure
  - Klebsiella pneumoniae → "*Metastatic Infection*"
  - Pseudomonas spp.
  - Escherichia coli
  - Proteus spp.

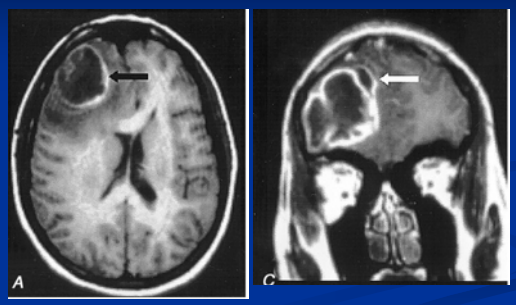
Brain Abscess – Clinical Manifestation

- Nonspecific ：
  - Headache -- localized to the side of the abscess
  - Neck stiffness -- 15 % of patients
  - Changes in mental status (lethargy progressing to coma)
  - Vomiting – IICP sign

Brain Abscess – Diagnosis

- Contrast brain CT-- a focal area of hypodensity surrounded by ring enhancement with surrounding edema .
- MRI T1WI -- capsule that enhances surrounding a hypodense center and surrounded by a hypodense area of edema
- MRI T2WI -- a hyperintense central area of pus surrounded by a well-defined hypointense capsule and a hyperintense surrounding area of edema

Brain Abscess – Image



Rapid empiric management of brain abscess

Empiric antibiotics

Immediately begin empiric antibiotics following sterotactic or open biopsy/aspiration to obtain a specimen for Gram stain, culture, and pathology.

The antibiotic regimen is dependent on Gram stain, if available, and the likely source of abscess.

Origin of abscess	Treatment regimen
Oral, otogenic, or sinus source	Metronidazole (15 mg/kg IV as a loading dose, followed by 7.5 mg/kg IV every eight hours) **PLUS either** penicillin G (20 to 24 million units per day IV in six equally divided doses) for a suspected oral focus, **or** ceftriaxone (2 g IV every 12 hours) **or** cefotaxime (2 g IV every four to six hours) for a suspected sinus or otogenic source
Hematogenous spread	Vancomycin* (30 mg/kg IV daily in two equally divided doses adjusted per renal function) for empiric coverage of methicillin-resistant Staphylococcus aureus Metronidazole may be added for anaerobic coverage
Postoperative neurosurgical patients	Vancomycin* (30 mg/kg IV daily in two equally divided doses adjusted per renal function) **PLUS either** ceftazidime (2 g IV every eight hours) **or** cefepime (2 g IV every eight hours)
Penetrating trauma	Vancomycin* (30 mg/kg IV daily in two equally divided doses adjusted per renal function) **PLUS either** ceftriaxone (2 g IV every 12 hours) **or** cefotaxime (2 g IV every four to six hours)

Glucocorticoids

Glucocorticoids should be used when substantial mass effect can be demonstrated on imaging and the mental status is significantly depressed.

Dexamethasone is administered at a loading dose of 10 mg IV followed by 4 mg every six hours.

* If susceptibility testing reveals methicillin-sensitive S. aureus, vancomycin should be replaced with nafcillin (2 g IV every four hou
or oxacillin (2 g IV every four hours).

Brain Abscess -- Treatment

- Duration of therapy -- usually 4 to 8 weeks
- The neurosurgeon needs to be contacted at the time of initial diagnosis of a brain abscess.

  Exception ： when a brain abscess occurs in the setting of bacteremia.

Brain Abscess -- Treatment

- Needle aspiration
  - preferable since reduced neurologic sequelae
- surgical excision
  - Traumatic brain abscesses
  - Encapsulated fungal brain abscesses
  - Multiloculated abscesses

Brain Abscess -- Prognosis

- Published mortality rates range from zero to 30%
- Poor prognostic factor：
  - Rapid progression of the infection before hospitalization
  - Severe mental status changes on admission
  - Stupor or coma (60 to 100 %mortality)
  - Rupture into the ventricle (80 to 100 % mortality)

Case report: brain and liver abscesses caused by oral infection with *Streptococcus intermedius*

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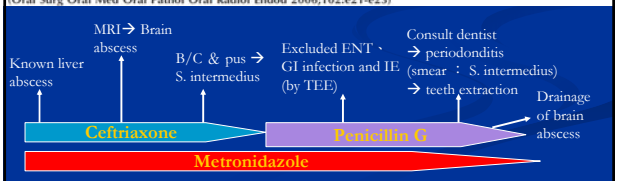
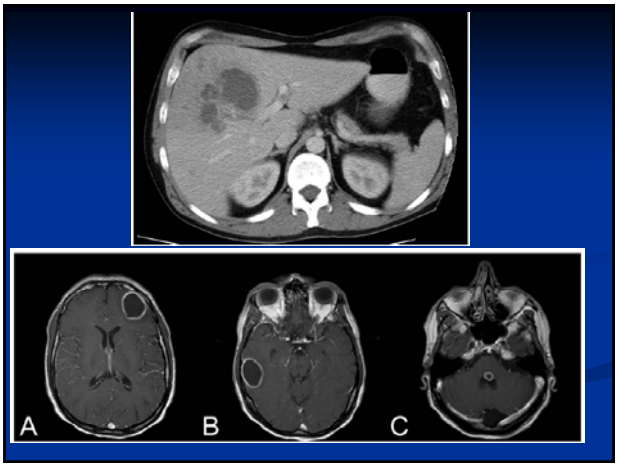
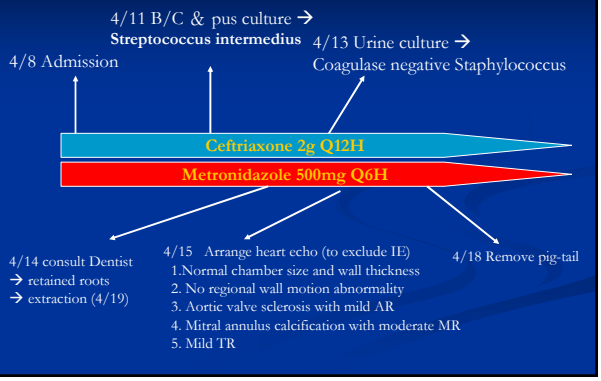
Organ abscesses are a rare and life-threatening complication mostly of hematogenously disseminated infections. We report a case of brain and liver abscesses. Identification of the lesions was made by contrast-enhanc computed tomography (CT) and magnetic resonance imaging (MRI), respectively. An oral examination comprised a oral focus of infection, *Streptococcus intermedius* was isolated from oral smear, liver and ventricular drainage, and blood sample. After the commencement of antibiotic therapy, drainage of abscesses and oral rehabilitation, comple recovery was noted.

(Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;102:e21-e23)





Back to our patient…



Brain Abscess – S.intermedius

- *viridans group streptococci*
- Etiology：oral infections, poor oral health, and dental interventions or oral prophylaxis.
- Bacterial invasion of the orofacial veins was then followed by pathogen distribution via the angular and ophthalmic vein to the cavernous sinus resulting in brain abscesses.

Thanks for your attention !