

CNS INFECTIONS

Revised and modified by the doctor, Insha'Allah it's more than enough, and what were highlighted in yellow are extremely important, ENJOY ☺

Encephalitis

Meningitis

Meningoencephalitis

Encephalitis

Causes:

- The most **SERIOUS** cause is **Herpes simplex 1:**
 - ✦ Associated with vesicles around the mouth[herpes labialis] | diagnosed by:PCR of CSF | **treated by: IV Acyclovir [first line]**
- The most common cause of meningoencephalitis is **Enterovirus**, but it causes benign not dangerous encephalitis .
- Arboviruses: e.g dengue
- Rare: Rabies,*Listeria*, amebic ,cat scratch disease(caused by *bartonella henselae*)

Meningitis

General Definition meningitis:

- Inflammation of the pia matter and the arachnoid mater, with suppuration تصدّي of the cerebrospinal fluid.

Causes:

- **Infectious:** Bacteria | Viral | Mycobacterial | Brucella | Fungal
- **Noninfectious:** Malignancy | Sarcoid | behcet disease | SLE

Aseptic meningitis:

Definition of Aseptic meningitis:

- inflammation of meninges with **sterile CSF**[u will find in the CSF : pleocytosis (leukocytosis) , Norm Glucose &Protein , Negative Culture]

Causes of Aseptic meningitis:

- Enteroviruses: most common cause 80% Viral meningitis is benign self-limited, Most people with viral meningitis usually get better on their own within 7 to 10 days. Initial symptoms of viral meningitis are similar to those for bacterial meningitis. However, bacterial meningitis is usually severe and can cause serious complications.
- HSV-2, and other viruses
- HIV
- Partially treated Bacteria
- Drugs: Metronidazole, TMP-SMX, NSAIDs, carbamazapine, IVIG
- Rare: leptospirosis

Bacterial meningitis:

Etiology:

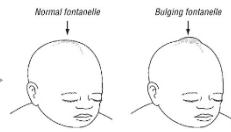
- **In Neonates**
 - **Group B Streptococci** 49%, E coli, enterococci, Klebsiella, Enterobacter, Samonella, Serratia, Listeria
- **In Older infants and children:**
 - Neisseria meningitidis, S. pneumoniae, M.tuberculosis, H. influenzae
- **In Adults:**
 - **Most common cause is Streptococcus pneumoniae**.....37%
 - **Neisseria meningitides**.....13%
 - **Listeria monocytogenes**.....10%
 - Other strept.species.....7%
 - Gram negative.....4%
 - Haemophillus influenza.....4%
 - **TB, Brucella**



KEEP IN MIND:

- ✦ Dramatic Reduction in invasive Hemophillus influenza disease secondary to use of conjugate Haemophillus Type B- vaccine.
- ✦ Group B – Streptococci: previously in neonate, now emerging as disease of elderly

Signs & symptoms of meningitis :

- High grade sudden fever
- Severe Headache
- irritability, photophobia
- Stiff neck
- Vomiting
- Bulging fontanel in infants →
- Petechiae, ecchymosis
- Signs suspect herniation: Papilledema, focal Neurological deficit, new onset Seizures, Altered level consciousness.
- Signs of meningeal irritation:

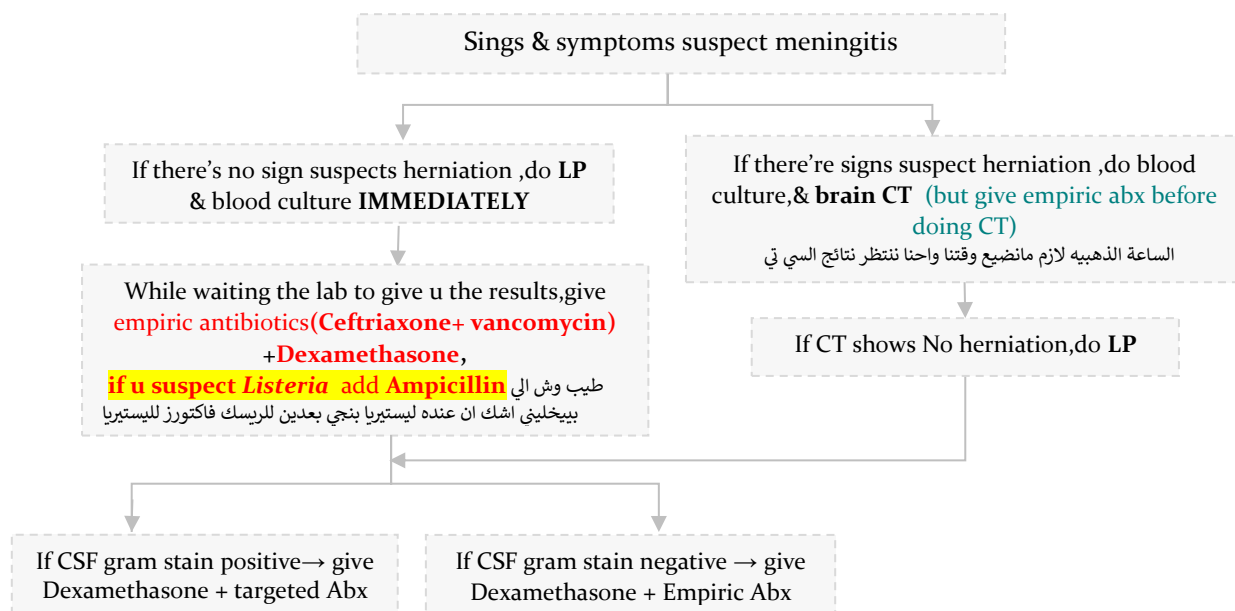


<p>Jolt accentuation maneuver: ask patient to rapidly rotate his or her head horizontally → Headache worsens MOST USEFUL SIGN (Sensitivity of 100%, specificity of 54%)</p>	<p>Kerning's sign: while patient is lying supine, with the hip and knee flexed to 90 degrees → then extend the knee → pain limits passive extension of the knee (have low sensitivity but high specificity, which means in most of cases doesn't present, but when it present it indicates meningitis)</p> 
<p>Nuchal rigidity: impaired neck flexion</p> 	<p>Brudzinski's sign: flexion of the neck causes involuntary flexion of the knee and hip (have low sensitivity but high specificity)</p> 

NOTES:

- Absence of ALL 3 signs of the classic triad of fever, neck stiffness, and an altered mental status virtually eliminates a diagnosis of meningitis
- Changes in mental status are more common in bacterial than viral meningitis

Investigation & Management: لازم نعالج بأسرع ما يمكن إلتهاب السحايا البكتيري خطير وكلما بكرنا بنقل المضاعفات



Cerebrospinal Fluid Evaluation			
	Bacterial meningitis	Tuberculosis	Viral
Cell count	1000s, neutrophils	10s–100s lymphocytes	10s–100s lymphocytes
Protein level	Elevated	Markedly elevated	Usually normal
Glucose level	Decreased	May be low	Usually normal
Stain and culture	Stain: 50–70%; culture: 90%	Negative	Negative

الدكتور عجبه الجدول، صورته وقال بحطه ((بسلايداتي للسنوات الجايه هه))

Complications:

- Hydrocephalus
- Seizures
- SIADH
- Subdural effusions & empyema
- Septic sinus or cortical vein thrombosis
- Arterial ischemia / infarction (inflammatory vasculitis)
- **Cranial Nerve Palsies (especially deafness)** أهم كومبليكشن لازم تعرفونها
- Septic shock / multi-organ failure from bacteremia (esp meningococcus & pneumococcus)
- Risk of adrenal hemorrhage with hypo-adrenalism (Waterhouse-Friderichsen syndrome)

Let's take some causes of meningitis and discuss them individually:

Streptococcus pneumonia

- Gram positive diplococci
- **The most common Cause of bacterial meningitis, Highest mortality 20–30%**
- **May be associated with other Focus:**
 - Pneumonia, Otitis Media, Sinusitis
 - Head Trauma (**basal skull fracture**) & CSF Leak

ذكر الدكتور قصه حلوه عشان تساعدكم بالربط فيه شاب بالعشرينات دايمًا يجيه مانتجائيس من فتره والنورولوجست عجزوا يعرفون السبب لها، آخر شي حولوه على الانتكشس د.مازن، سألته عن هوياته الى يمارسها وقاله بوكستق! قال طبيب لما تسجد تلاحظ فيه سائل زي المويه يقطر من الفتره! خشمك؟ قال ايبيه دائماً كلما أسجد خشني يقطر! آهاه عرفنا ليش
- splenectomy and Sickle cell disease.
- **Treatment:** ceftriaxone may consider adding vancomycin in cases suspected high penicillin G resistant

Neisseria meningitidis

- Gram negative diplococci
- Can cause:
 - Fulminate meningococemia with **purpura**: Overwhelming sepsis, DIC (**POOR PROGNOSTIC SIGN**)
 - Meningitis with **rash** (Petechiae)
 - Or meningitis without rash
- **Treatment:** Ceftriaxone or Pen G 7 days
- **Droplet Isolation** (the only bacterial need droplet isolation are N.meningitidis and Group A streptococcus)
- **Their close contacts need to take prophylaxis:** either Rifampin or Ciprofloxacin or Ceftriaxone, **BUT if pregnant the only prophylaxis is safer to her is Ceftriaxone.**

Listeria Monocytogenes

- Gram positive bacilli
- Predominant lymphocytes **unlike gram negative organisms where PMN are more dominant**
- **Risk groups :**
 - Age <1y or >50y
 - Alcoholics
 - **Pregnancy**, so if pregnant lady presents with s/s of meningitis u should give her **Ampicillin** along with Ceftriaxone & vancomycin.
 - Immunocompromised
- **Routes of transmission :**
 - Mainly food borne **most common cause of food poisoning worldwide**
 - Transplacental /vertical
 - cross contamination (nursery)
 - Inoculation (skin) farmers
 - Colo/sigmoidoscopy سناريو وحده سولها كولنسكوبي بعدها بأسبوع جاها صداع ونيك ستيفنس مع واتري دياريه هنا لازم تفكروا بليستيريا
- **Treatment:** **Ampicillin** +/- Gentamicin, Penicillin allergy patients: TMP-SMX or Meropenem

Neurobrucellosis

- **Risk with animal contact:** cattle & camel most often via unpasteurized milk
- **Diagnosis:**
 - PCR CSF detect Brucella
 - Brucella culture: may or may NOT grow
 - Can do serology for CSF
- **Treatment:**
 - Doxycycline+ Rifampin+Ceftriaxone
 - Duration ?Continue until CSF is normal

TB

- **Diagnosis:** AFB, culture (gold standard), PCR
- **Treatment:** isoniazid + rifampin + Pyrazinamide + ethambutol + Dexamethasone (necessary bc it associated with a reduced risk of Death) u should give all these 5!
 - NOTES:
 - Pyridoxine supplementation during isoniazid (INH) therapy is necessary in some patients to prevent the development of peripheral neuropathy

CNS Toxoplasmosis

CASE:32 HIV positive gentleman has disseminated Mycobacterium avium complex (MAC), 3 weeks later he e of forgetfulness change in personality, Presents with generalized seizure to ER, After ABC and stabilization CT done (shows multiple enhancing lesions), what is the most likely the organism?

- **TOXOPLASMA**, whenever u see HIV this means the cause of the neurological sx is Toxoplasma

Let's take two serious complications of meningitis and discuss them individually:

Brain abscess

- Organisms:
 - Streptococci (60-70%), Bacteroides (20-40%), Enterobacteriaceae (25-33%), S. Aureus (10-15%), S. Milleri. لما يجيكم سيناريو واحد يشتكي من صداع وونيك ستيفنس و مركب في قلبه صمام صناعي وبالإكو شافو فيجيتشن هنا فكروا ان المسبب ستاف اوريس
 - Rare: Nocardia, Listeria
- Who needs for abscess drainage:
 - CT brain: If abscess more than 2.5cm then surgical drainage.
 - if patient neurologically unstable or decrease LOC drain regardless of size
- Antimicrobials:
 - empirically Ceftriaxone with metronidazole (ANY ABSESS IN THE BODY U HAVE TO GIVE ANEORBITIC COVER (MOST IMP))
 - otherwise according to susceptibility
 - Duration until response by neuroimaging

Subdural Empyema

- **Most common causes:** In adults 60-90% are extension of: Sinusitis or Otitis media
- Surgical emergency: must drain
- Abx same as brain abscess

Done by Rawan Aldhuwayhi!

بالتوفيق! لا تنسوني من دعواتكم، أخلص جيل
الدروس الي متراكمه علي |