

Meningitis aguda en adultos

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MENINGITIS AGUDA EN ADULTOS

RESUMEN

La meningitis es una emergencia medica

Paso: 1 Si existe el diagnostico debe hacerse

- a. RMI o TAC con contraste en tiempo de fase retardada
- b. Punción lumbar según el contexto clínico e imágenes
- c. Tratamiento empírico inmediato según los factores clínicos datos de riesgo

CASO 1

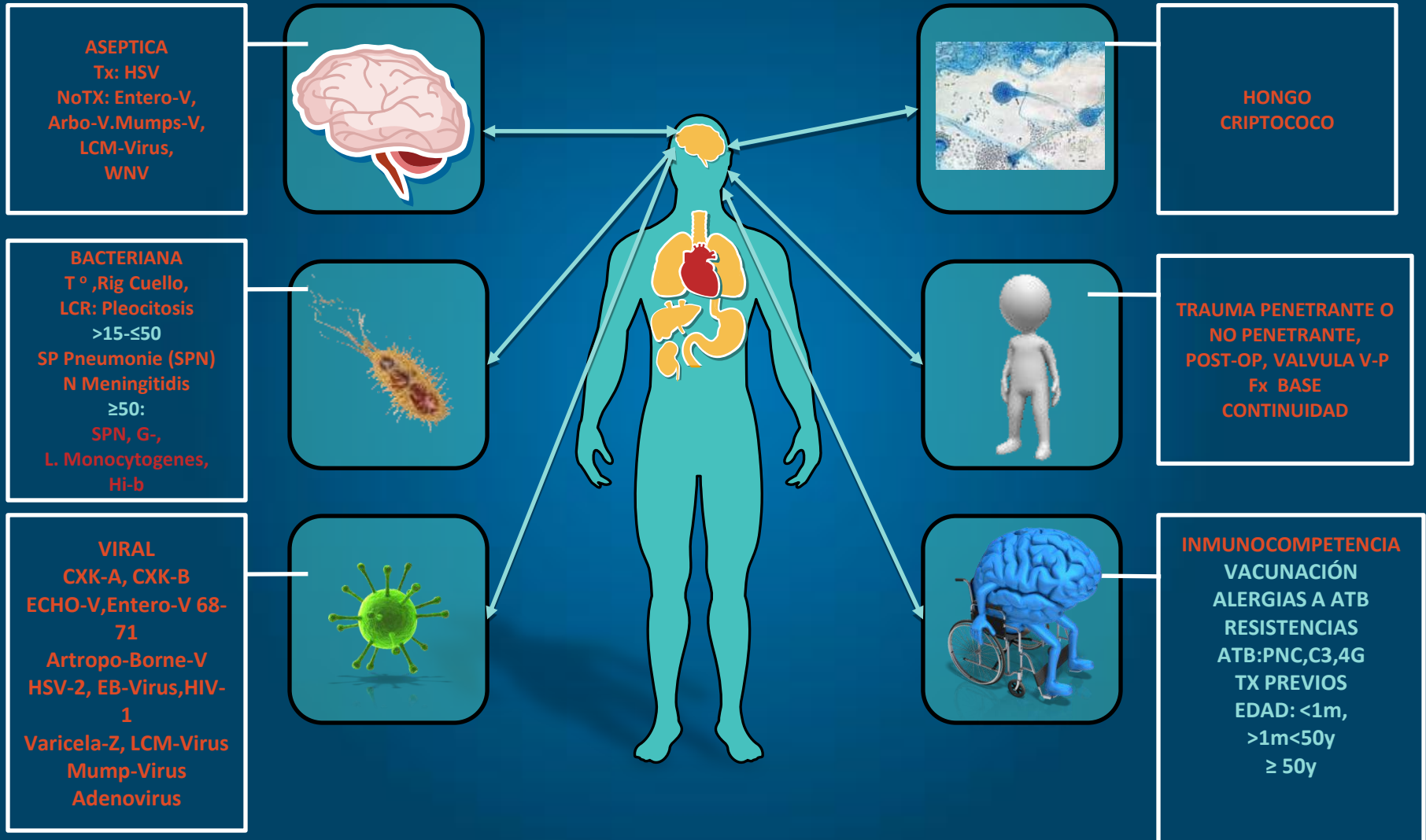
A 20-year-old man presents to the emergency department in early June complaining of 6 hours of fever, headache, and pain on flexion of his neck. He underwent renal transplantation 1 year ago. On examination he is febrile and has meningismus. There is a slight erythematous maculopapular rash on his chest. The neurological examination is normal with the exception of meningismus. Blood cultures are obtained. The patient is treated with dexamethasone 10 mg intravenously followed by cefepime 2 grams intravenously, vancomycin 1 gram intravenously, and ampicillin 3 grams intravenously. Over the course of an hour, he becomes increasingly lethargic and has a focal motor seizure with secondary generalization. Acyclovir 10 mg/kg and doxycycline 100 mg are added to the empiric regimen. Head computed tomographic (CT) scan is normal. Spinal fluid analysis demonstrates an opening pressure of 320 mm H₂O, 1000 white blood cells per mm³ with a predominance of polymorphonuclear leukocytes, a glucose concentration of 10 mg/dL, and a protein concentration of 100 mg/dL. Gram's stain of CSF demonstrates gram-positive lancet-shaped diplococci in pairs. Ampicillin, acyclovir, and doxycycline are discontinued.

CASO 1

Comment. Empiric therapy of bacterial meningitis is based on the possibility that a penicillin- and cephalosporin-resistant strain of *S. pneumoniae* is the causative organism of the meningitis and should include a combination of either a third- or fourth-generation cephalosporin plus vancomycin. The patient is an organ transplant recipient and thus is at risk for *L. monocytogenes* meningitis. Ampicillin is added to the empiric regimen until the results of the Gram's stain are known. When the patient has a focal seizure, empiric therapy for HSV encephalitis is added. As it is June, the possibility of a tick-borne bacterial infection, either Rocky Mountain spotted fever or an ehrlichia infection, should be considered in the differential diagnosis and empiric therapy with doxycycline initiated until another diagnosis is made. Once the antimicrobial sensitivities of the organism are available, the antibiotic regimen is modified.

Meningitis aguda en adultos, vista global

edad: >1m, Dur: <4 semanas



Fuentes de meningitis

LEPTOMENINGITIS



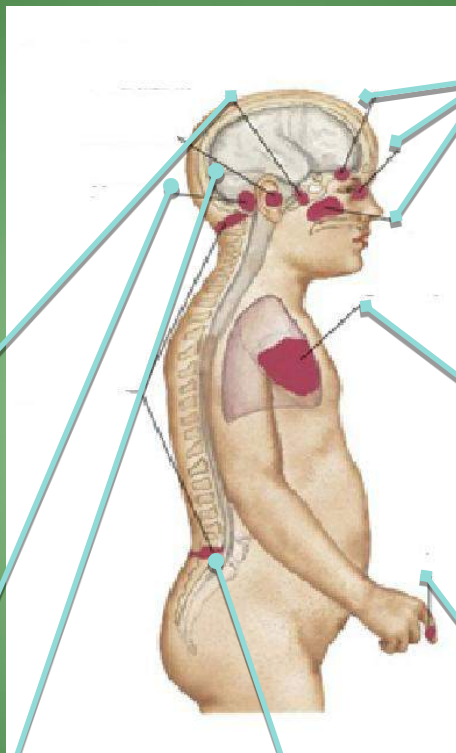
FRACTURA DE LA BASE DEL CRANEO



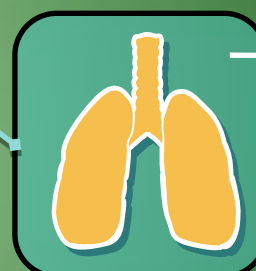
MASTOIDITIS



OTITIS MEDIA



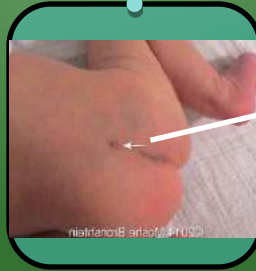
DEFECTO DE LA LAMINA CRIBOSA
ETMOIDITIS
NASOFARINGITIS



NEUMONIAS



FURUNCULOSIS
CELULITIS



SENO
DERMOIDE
CONGENITO

Fuentes de meningitis

S. Pneumonia y N. Meningitidis

LEPTOMENINGITIS



FRACTURA DE LA BASE DEL CRANEO
SP PNEUMONIA



MASTOIDITIS
N. MENINGITIS



OTITIS MEDIA
N. MENINGITIS



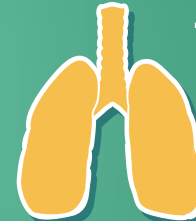
SENO DERMOIDE CONGENITO



DEFECTO DE LA LAMINA CRIBOSA
ETMOIDITIS
NASOFARINGITIS
N. MENINGITIS



NEUMONIAS



FURUNCULOSIS
CELULITIS



Otras fuentes de meningitis Pneumococcica

DEFICIENCIA DE COMPLEMENTO

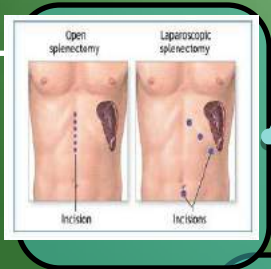


HIPOGAMMAGLOBULINEMIA
Enfermedad de Bruton
SP PNEUMONIA

X LINKED AGAMMAGLOBULINEMIA

- Bruton's disease
- Disease not apparent till 6 months of age
- Recurrent bacterial infections with Pneumococci, Staphylococci, Meningococci, Pneumoniae and H. influenzae
- Patient responds normally to viral infections
- All classes of immunoglobulins undetectable
- Thymus and Adrenals are enlarged
- Depletion of cells in bone marrow and areas of lymph nodes.

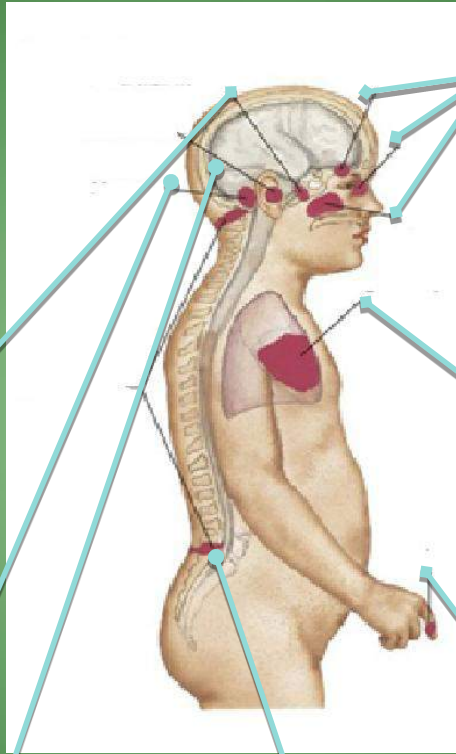
Esplenectomía
SP PNEUMONIA



TRAUMA CRANEANO
SP PNEUMONIA

tipos

- Trauma closed
- Trauma con afección
- Trauma con heridas abiertas
- Trauma hereditario



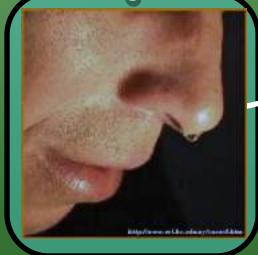
TALASEMIA MAYOR
ANEMIA CELULAS FALCIFORMES
MIELOMA
SP PNEUMONIA



DIABETES
SP PNEUMONIA

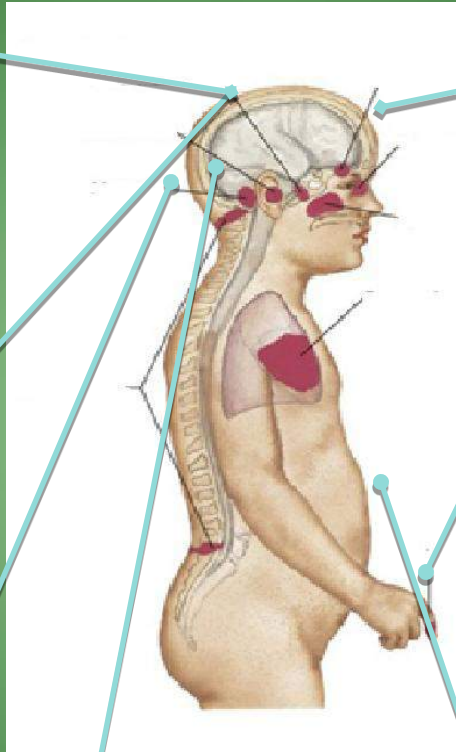


ALCOHOLISMO



RINORREA DE LCR

Meningitis infrecuentes



LISTERIA MONOCITÓGENES
COCO BACILO
GRAM +


Listeria monocytogenes

- Bacteria Listeria en humano
- Cocobacilo Gram positivo
- Aspecto: facultativo
- Catalasa positivo
- Presenta antígeno O y antígeno H (H6 antitermohábil)
- Es móvil (flagelos peritricos)
- Se comporta como los alimentos



CARACTERÍSTICAS GENERALES

- Cocobacilo Gram negativo.
- Son pleomórficos.
- Son inmóviles.
- Tamaño: 0,4 mm de ancho x 1 mm de largo.
- Se agrupan a menudo en cadenas cortas y bacilos aislados.
- No forman esporas.



HAEMOFILUS INFLUENZA
COCO-BACILO
GRAM -

ESTAFILOCOCOS
COCOS GRAM +

ESTAFILOCOCOS

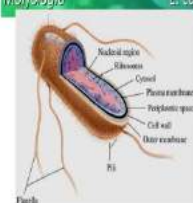
Los cocci grampositivos con un gran tamaño de hasta 10 micras. Los característicos tetradas se ven en forma de cubo, en racimo y en cadena de 2, 3 y 4 unidades de células. La presencia o ausencia de actividad catalasa es un primer método para su identificación en un primer paso. Los catalasa que reaccionan con hidrógeno peróxido de hidrógeno en agua y oxígeno peróxido. Cuando se pone en contacto con agua se liberan oxígeno peróxido de hidrógeno en un color rojo oscuro. Los catalasa que reaccionan con hidrógeno peróxido en un color rojo claro.




PSEUDOMONA AERUGINOSA
BACILO
GRAM -

E. COLI
BACILO
GRAM -

Morfología E. coli



ENTEROBACTER
COCO O BACILO
GRAM -



KLEBSIELLA
BACILO
GRAM -



FACTORES QUE PREDISPONEN A MENINGITIS y RECURRENCIAS

Table 2. Congenital immunodeficiencies that may predispose persons to acquire bacterial meningitis and other invasive bacterial infections.

Condition	Mode of inheritance
Antibody (B cell) immunodeficiency	X-linked; autosomal recessive and/or dominant
X-linked (Bruton) agammaglobulinemia	
Common variable immunodeficiency	
X-linked hypogammaglobulinemia with increased IgM level	
Combined antibody and cellular immunodeficiency	Variable
Severe combined immunodeficiency	Autosomal recessive or dominant
Immunodeficiency with adenosine deaminase or nucleoside phosphorylase deficiency	Autosomal recessive
Immunodeficiency with ataxia telangiectasia	Autosomal recessive
Wiskott-Aldrich syndrome	X-linked
Complement deficiencies	Variable
C1, C2, and C3 (early complement) deficiencies	Autosomal recessive or unknown
C4, C5, C6, C7, and C8 deficiencies	Autosomal recessive or unknown
Defects in alternate pathway, properdin	X-linked; sickle-cell disease
Splenic dysfunction	Variable
Sickle-cell disease	
Congenital acquired (elective or traumatic) dysfunction	
Splenuctomy	

Overturf GD.

Indications for the immunological evaluation of patients with meningitis.

Clin Infect Dis 2003;36:189–194.

Look for antibody and complement deficiencies in every patient with bacterial meningitis, even those who have no known predisposing immunodeficiency.



INVITED ARTICLE CLINICAL PRACTICE

Ellie J. C. Goldstein, Section Editor

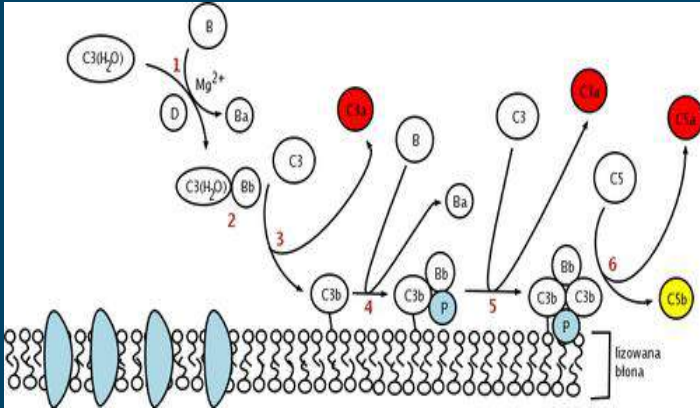
Indications for the Immunological Evaluation of Patients with Meningitis

Gary D. Overturf

Department of Pediatrics and Pathology, Division of Pediatric Infectious Diseases, University of New Mexico Health Sciences Center, Albuquerque



FACTORES QUE PREDISPONEN A MENINGITIS



Properdina o factor P

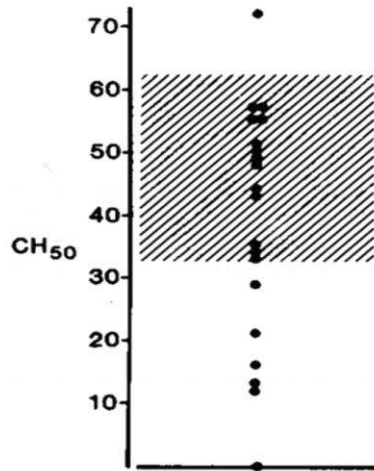


Figure 1. Concentrations of Complement in 20 Patients with Initial Meningococcal Disease, According to the CH₅₀ Assay. The crosshatching shows the normal range.

Table 2. Relation of Underlying Illness to Concentrations of Complement Proteins in 19 Patients with Initial Nonepidemic Meningococcal Disease.

UNDERLYING ILLNESS (NO. OF PATIENTS)	DECREASED COMPLEMENT PROTEINS *	MEASURED CONCENTRATION † (% OF NORMAL MEAN)
Patients with normal complement ‡		
None (7)	None	—
None (1)	Clq	43
None (1)	Clq, C4	45, 35
Hodgkin's disease (1)	None	—
Systemic lupus erythematosus (1)	None	—
Recent head trauma (1)	None	—
Remote varicella encephalitis (1)	None	—
Patients with low complement ‡		
None (2)	C6	0
None (1)	C8	8
Systemic lupus erythematosus (1)	Clq, C3, C4, C5	0, 39, 0, 38
Systemic lupus erythematosus (1)	C3, C4	38, 45
Multiple myeloma (1)	Clq, C4	0, 0

*All alternative-pathway and classical-pathway complement proteins not listed were present in normal concentrations.

†Measured by radial immunodiffusion assay for individual complement proteins.

‡Complement activity was measured by the CH₅₀ assay.

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Volume 308

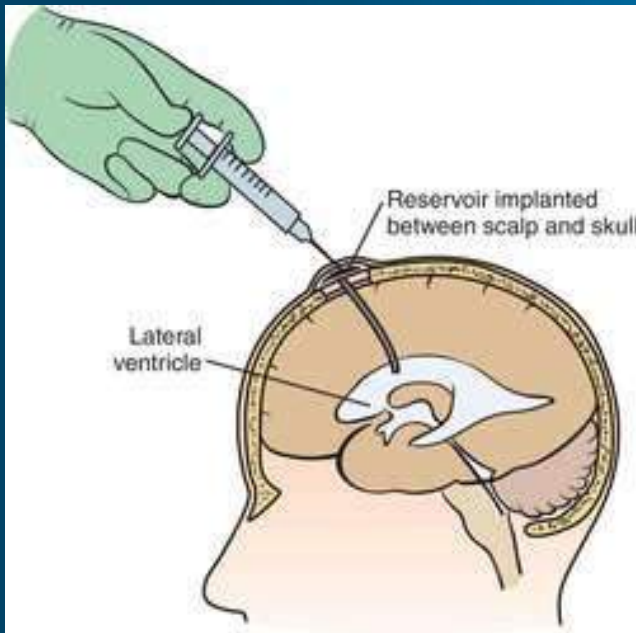
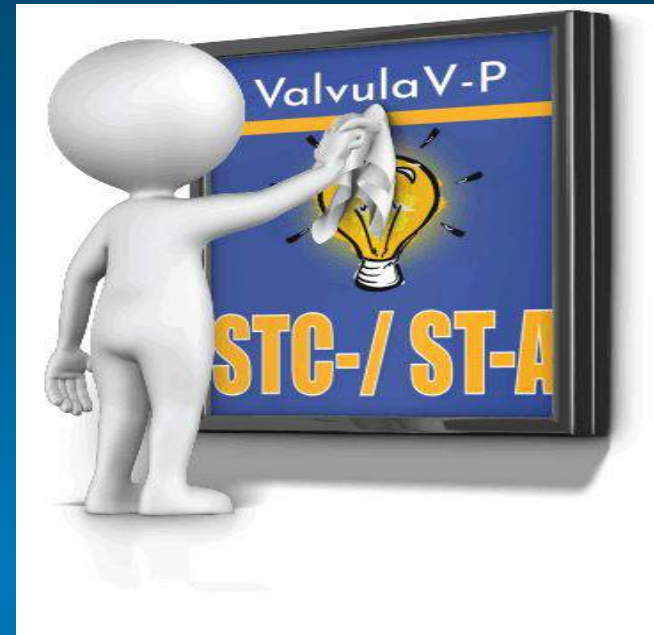
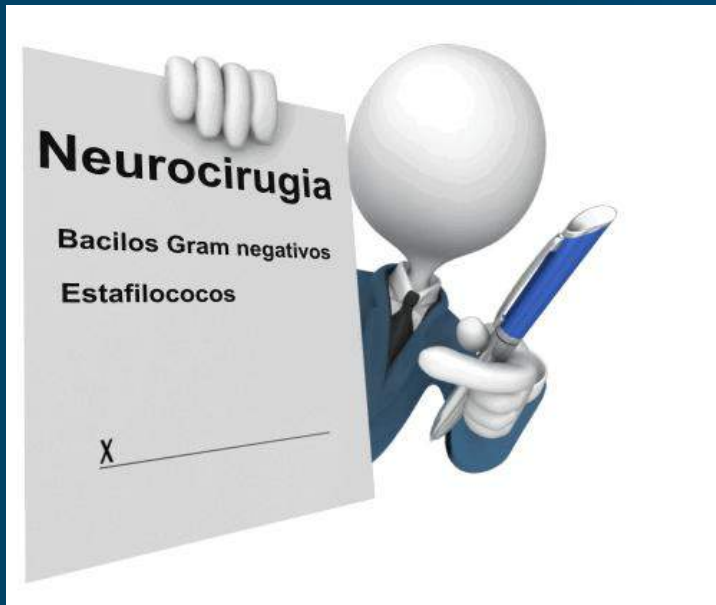
APRIL 21, 1983

Number 16

PREVALENCE OF CONGENITAL OR ACQUIRED COMPLEMENT DEFICIENCY IN PATIENTS WITH SPORADIC MENINGOCOCCAL DISEASE

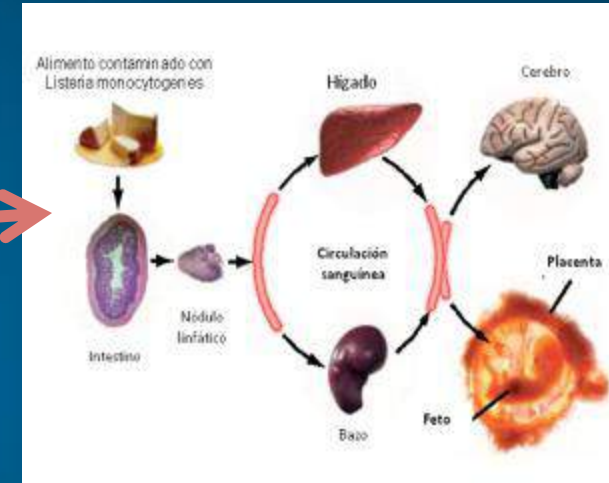
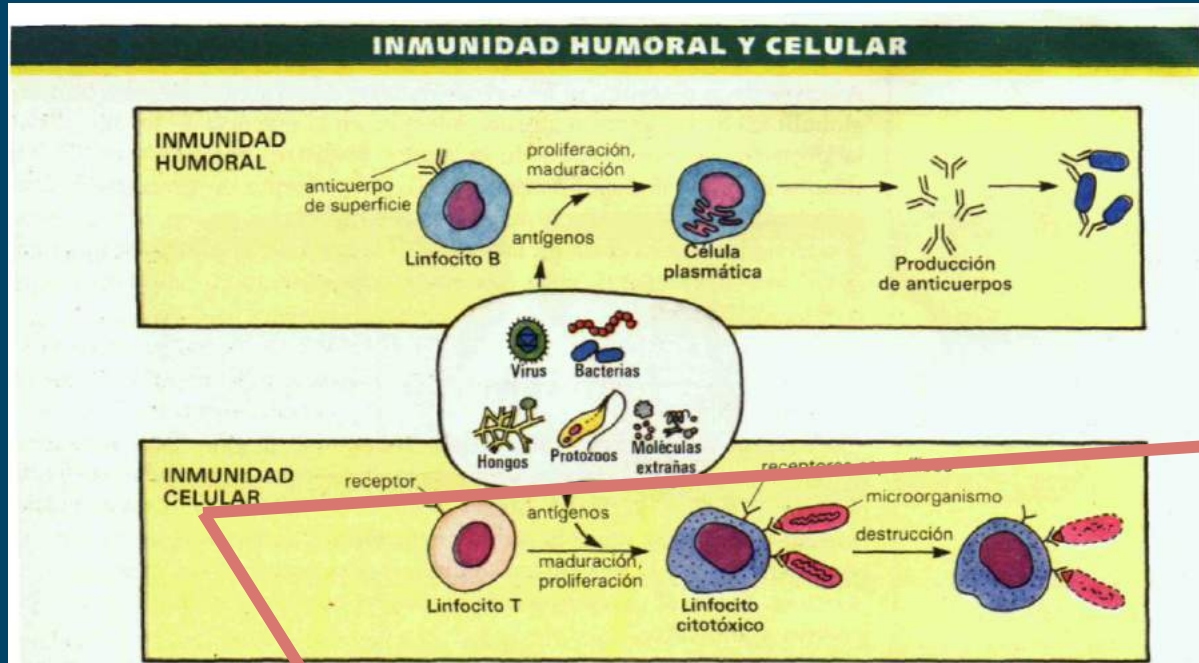
RICHARD T. ELLISON III, M.D., PETER F. KOHLER, M.D., JOHN G. CURD, M.D., FRANKLYN N. JUDSON, M.D., AND L. BARTH RELLER, M.D.

Huesped/Agente en meningitis



Valvula de Ommaya }
Riezgo de adquirir
Estafilococo Coagulasa neg
Estafilococo Aureus

Variedad de deficiencia inmune y duración



Parasitos Intracelulares

• Inmunidad celular



Macrófago



FAGOCITOSIS

(célula infectada + protozoo)

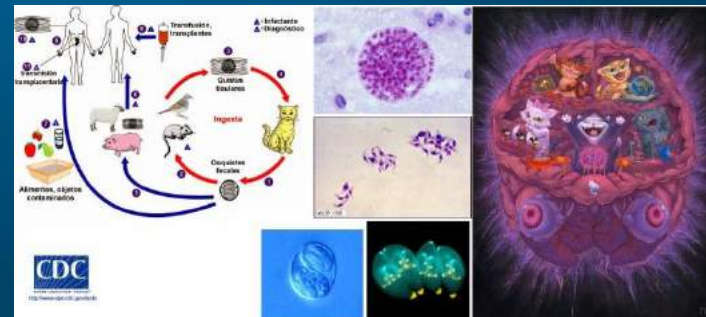


LTc

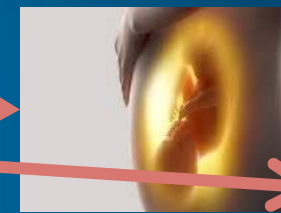
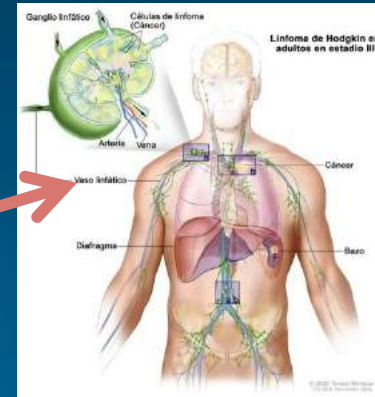
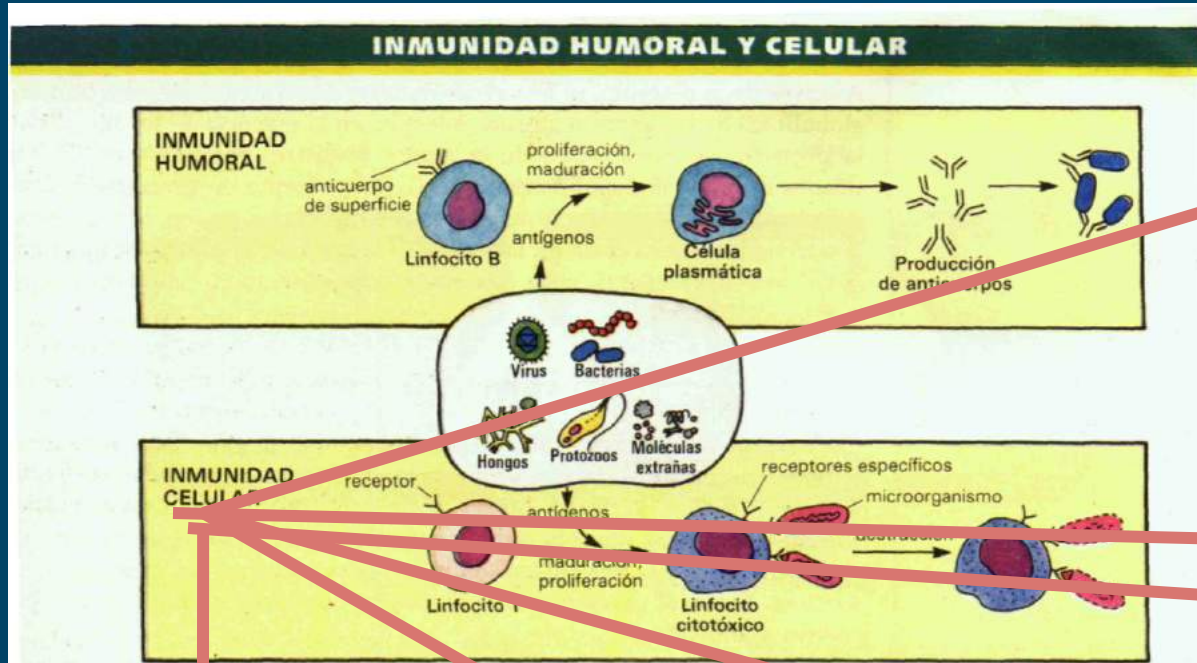


CITOTOXICIDAD

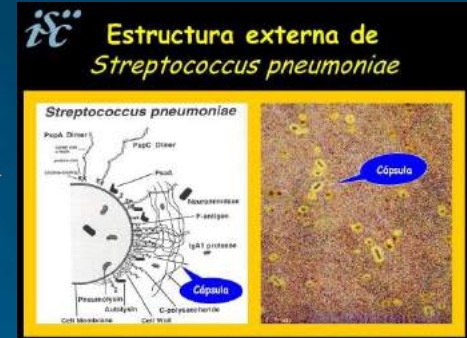
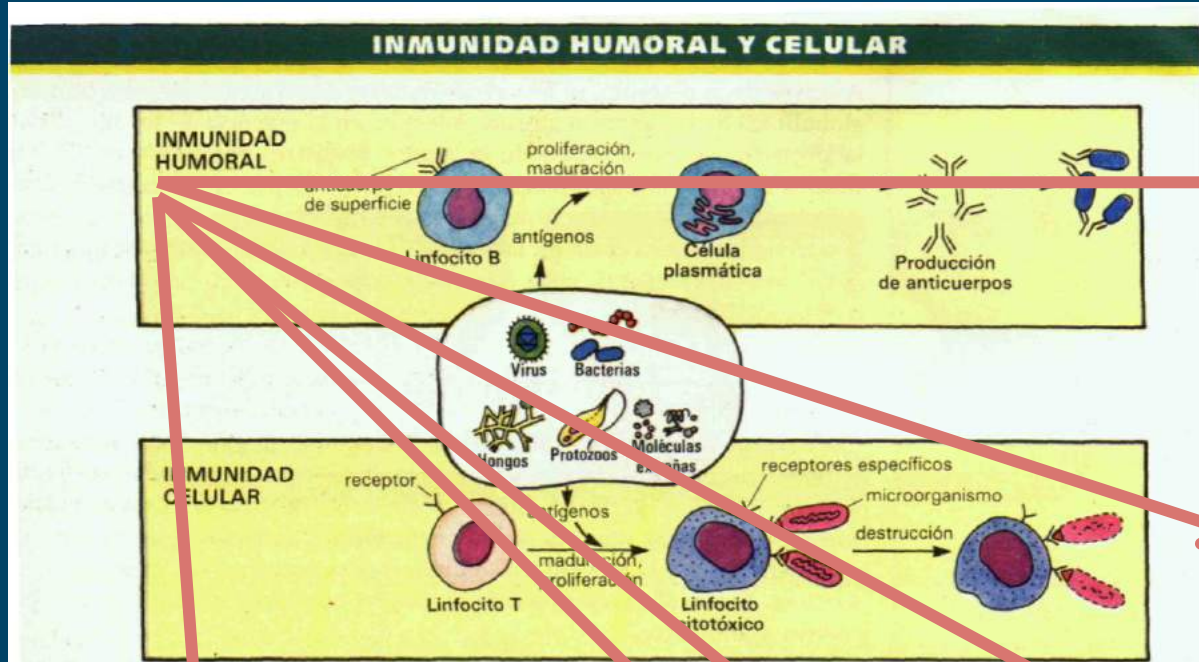
DIRECTA



Variedad de deficiencia inmune celular



Variedad de deficiencia inmune humoral



MAYORES DE 1 AÑO

- Fiebre que no cede con antipiréticos
- Cefalea
- Rigidez cervical
- Signos de irritación meníngea
 - Presentes en el 60-80% de niños con MBA al momento de la admisión
- Vómitos
- Convulsiones

Fernando Maquero, Rafael Vecino López, Fernando del Castillo Martín. Meningitis Bacteriana. AEPED 2009

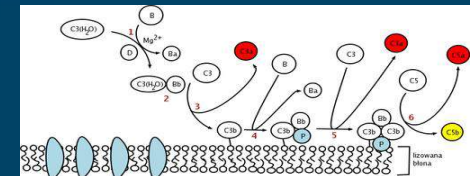
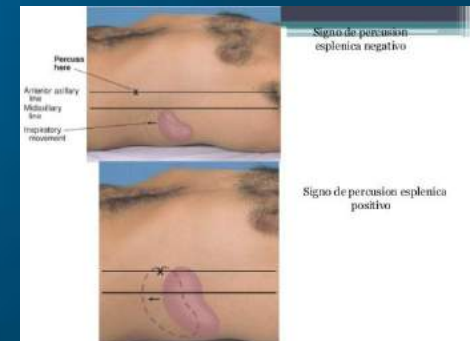
VIH y SIDA

Años sin medicamentos para tratar el VIH

VIH

SIDA

Para más información, visite: infoSIDA.gov



CASO 2

Case 1-2

A 46-year-old man presents for evaluation of recurrent bacterial meningitis. He is presently not symptomatic, but on three occasions Over the past year he has had fever, headache, stiff neck, and lethargy. He has no history of head trauma except for being hit in the head with a baseball during a Little League game as a child. He has no history of Surgery and no chronic medical conditions, nor is he an alcoholic. Spinal Fluid analysis each time has demonstrated an increased opening pressure, a polymorphonuclear pleocytosis, a decreased glucose concentration in the range of 0 mg/dL to 20 mg/dL, and an increased protein concentration. Prior to each episode of meningitis he has been treated with oral antibiotics for a sinusitis.

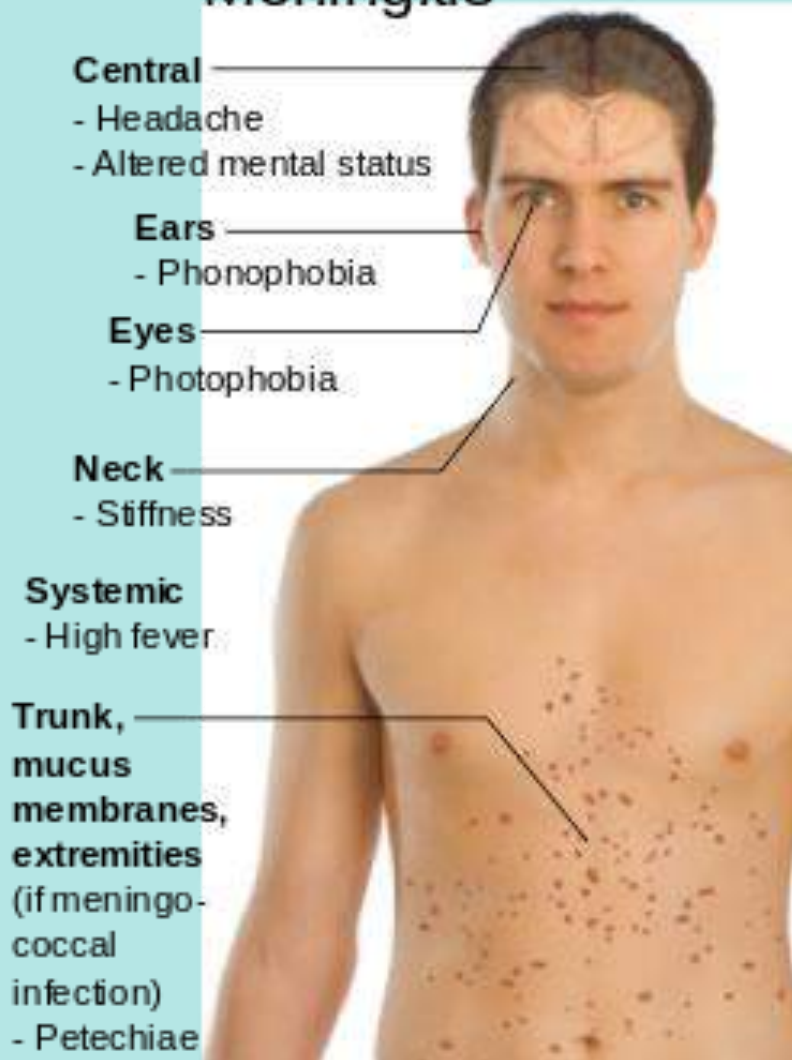
The CSF Gram's stain and bacterial culture have always been negative. A broad-range polymerase chain reaction (PCR) has not been available in the hospitals where he has been hospitalized. On examination, he is awake and alert. No evidence of rhinorrhea is present.

There is a mild left sixth nerve palsy, but findings from the neurological examination are otherwise normal. An isotope cisternogram, obtained to determine if there is a dural sinus fistula, is normal. Laboratory testing demonstrates a C2 deficiency and hypogammaglobulinemia.

Comment. Complement levels and immunoglobulin levels should be part of the evaluation of every patient with bacterial meningitis. These patients should also be vaccinated with both the pneumococcal and meningococcal vaccines, and their antibody levels should be monitored

CLINICA

Symptoms of Meningitis



Clínica: Síntomas/Signos clásicos (MBA)

- Meningismo: rigidez de nuca, fotofobia y cefalea. Signos: Kernig, Brudzinski.
- Fiebre y escalofríos.
- Vómitos.
- Síntomas neurológicos focales:
 - NC III, IV, VI, VII: 10-20%
- Convulsiones.
- Sensorio alterado.
- Signos de HEC:
 - Papiledema (1/3 de las meningitis con aumento PIC)
- Síntomas de infección respiratoria superior.



TRIADA:
FIEBRE
CEFALEA
RIGIDEZ DE CUELLO

Crterios dsm-5

DELIRIO

- **A) Disturbio en la atencion (por ejemplo reduccion de la habilidad para mantener, focalizar o enforzar la atencion o cambios patologicos de atencion) y del estado de alerta o del conocimiento**
- **B) El disturbio se desarrolla en periodos cortos de tiempo (horas o dias no semanas ni meses) , que representa la cambios de la atencion y del conocimiento y tienden a fluctuar en severidad durante el transcurso del dia**
- **C) Un trastorno de cognicion se agrega (Deficit de memoria, desorientacion, lenguaje, deficit de habilidad visuoespacial, o de percepcion)**
- **Los disturbios A y C no son explicados por otro trastorno preexistente, establecido, y desorden neurocognitivo involucrado y no ocurre en el contexto de una reduccion severa del despertar tal como el cuadro de coma.**

DELIRIO

- **El delirio sino se trata la cusa suele progresar desde la desorientación en tempo luego de lugar y finalmente en cuando a persona.**
- **Causas múltiples.**
 - Vasculitis
 - Encefalitis
 - Porfiria intermitente aguda, IRC, Hepática.
 - Infartos hemisféricos derechos
 - **Toxico-metabólicos: Abstinencia alcohólica, Atropínicos,**
 - **Medicaciones: BZP**

obnubilación

- **Del latín: "Golpear contra algo o embotar**
- **Significa: torpeza mental**
- **Menos interés por el medio que lo rodea, y responde lentamente a los estímulos externos pero correctamente**
- **Puede haber mayor somnolencia**

estupor

- **Del latín: aturdido:**
- **Es un estado de sueño profundo y persistente, el paciente no puede ser despertado, solo a estímulos enérgicos**
- **Diferencias:**
 - **Mutismo psiquiátrico catatonia**
 - **Trastorno somatoformo**

coma

- **Definición: Del griego: “trance”, o sueño profundo,**
- **Es un estado en la cual el paciente no puede ser despertado incluso con estímulos intensos o dolorosos, la respuesta puede ser de defensa pero no localiza el punto de estímulo.**
- **Es importante recordar que la respuesta motora es la conciencia y puede haber conciencia sin respuesta motora.**

Case 1-3

A 52-year-old woman 1 year after diagnosis with breast cancer complains of headache, fever, and stiff neck. She lives on a farm in the Midwest, and her husband complains there are far too many animals in the house. She has been taking nonsteroidal anti-inflammatory agents to treat her headaches and tamoxifen for breast cancer. Therapy is initiated with dexamethasone, cefepime, vancomycin, ampicillin, and acyclovir. Spinal fluid analysis demonstrates a normal opening pressure, a lymphocytic pleocytosis of 340 cells/mm^3 , a normal glucose concentration, and an increased protein concentration of 100 mg/dL . Gram's stain and bacterial culture are negative. Dexamethasone and the antibiotics are discontinued. Acyclovir is continued pending the results of CSF varicella-zoster virus IgM and PCR. India ink and fungal culture are negative. CSF smear for acid-fast bacilli is negative. *Mycobacterium tuberculosis* culture is pending. CSF broad-range PCR for bacterial nucleic acid is negative. CSF RT-PCR for enteroviruses is negative as is viral culture. No varicella-zoster virus antibodies are detected in CSF. PCR for varicella-zoster virus nucleic acid is negative. CSF cytology is negative. Serology for lymphocytic choriomeningitis virus is positive, and the patient admits to recently acquiring a hamster.

ACUTE MENINGITIS

Comment. The clinical presentation and the CSF formula suggest that this is a viral meningitis, although in a patient with a history of breast cancer, carcinomatous meningitis is also a possibility. In carcinomatous meningitis, the opening pressure is typically elevated, the protein concentration is moderately to markedly increased, and the glucose concentration is either normal or decreased. *L. monocytogenes* and varicella-zoster virus meningitis may have a CSF formula as above, and both may occur in a patient with defective cell-mediated immunity. T-cell subsets should be evaluated in all patients with a recent history of cancer for the possibility of a defect in T-cell mediated immunity. Nonsteroidal anti-inflammatory agents, intravenous immunoglobulin, trimethoprim, sulfonamides, and OKT3 monoclonal antibodies can all cause a drug-induced hypersensitivity meningitis. Spinal fluid analysis usually shows a pleocytosis of several hundred to several thousand cells/mm³, a normal glucose concentration, and an increased protein concentration. If there is no other explanation for the meningitis, the patient should discontinue the drug, and the symptoms should resolve. CSF white blood cell count may be abnormal for months in the patient with meningitis due to lymphocytic choriomeningitis virus.

CASO 4

Case 1-4

A 16-year-old girl presents with complaints of sore throat, painful nodes in her neck, headache, and fever. Therapy is initiated with dexamethasone, cefepime, vancomycin, and acyclovir. Examination of the CSF demonstrates a lymphocytic pleocytosis, a normal glucose concentration, and a normal protein concentration. Gram's stain is negative. Dexamethasone, cefepime and vancomycin are discontinued. CSF RT-PCR for enteroviruses is negative. CSF-PCR for HSV DNA is negative. HIV serology is negative. Antiviral capsid antigen (VCA) IgG titers are 1:320, and Epstein-Barr virus VCA IgM antibody is positive. Anti-Epstein-Barr (virus) nuclear antigen (EBNA) IgG is negative. EBV DNA is detected in CSF by PCR assay. The diagnosis is meningitis due to acute EBV infection.

Comment. Acute EBV infection is confirmed by the detection of VCA IgG titers of 1:320 or higher, positive IgM antibody titers to the VCA (EBV VCA IgM antibody), and the absence of antibodies to virus-associated nuclear antigen (anti-EBNA IgG). In subsequent serum specimens a fourfold decrease should occur in the IgG antibody titer to VCA and a 16-fold increase in anti-EBNA IgG (Connelly and DeWitt, 1994).

ESTUDIOS EN MENINGITIS

TABLE 1-1 Recommended Cerebrospinal Fluid Routine Studies for Acute Meningitis

- ▶ Opening pressure
- ▶ Cell count and chemistries
 - Cell count with differential
 - Glucose and protein concentration
- ▶ Stain and culture
 - Gram's stain and bacterial culture
 - India ink and fungal culture
 - Viral culture
 - Acid fast smear and *Mycobacterium tuberculosis* culture
- ▶ Antigens
 - Cryptococcal polysaccharide antigen
 - Histoplasma polysaccharide antigen
- ▶ Antibodies
 - Complement fixation antibody titers for *Coccidioides immitis*
 - Viral-specific IgM antibodies
- ▶ Polymerase chain reaction
 - Broad range PCR for bacterial nucleic acid
 - Bacterial-specific PCR
 - Reverse transcriptase PCR for enteroviruses
 - PCR for West Nile virus RNA
 - PCR for herpes simplex virus type 2 DNA
 - PCR for Epstein-Barr virus DNA
 - PCR for human immunodeficiency virus type 1 RNA

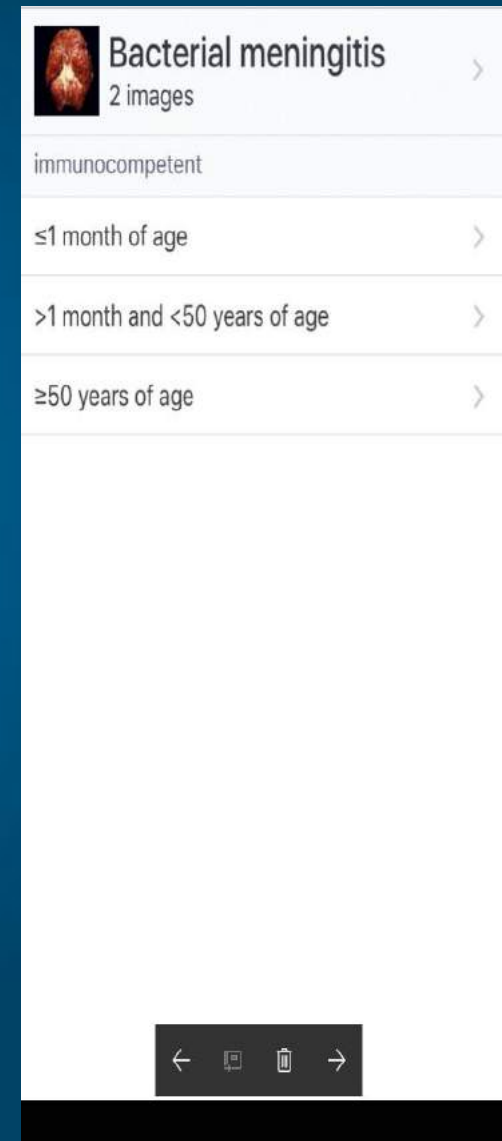
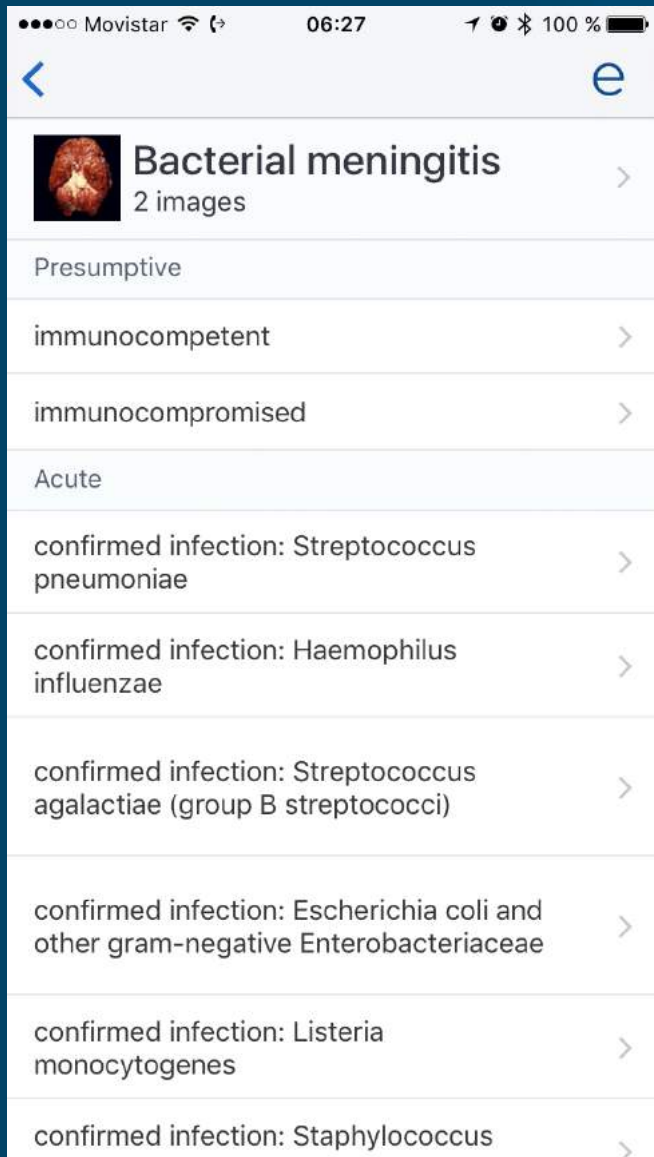
IgM = immunoglobulin M; PCR = polymerase chain reaction.

TABLE 1-2 Diagnostic Studies in Addition to Cerebrospinal Fluid for Acute Meningitis


- ▶ C-reactive protein
- ▶ Plasma procalcitonin
- ▶ Cultures
 - Blood cultures
 - Throat and stool cultures for enteroviruses
- ▶ Serology
 - Paired acute and convalescent sera for IgG antibodies
 - Enteroviruses
 - Arthropod-borne viruses
 - Virus-specific IgM antibodies
 - Human immunodeficiency virus serology
 - Antiviral capsid antigen (VCA) titer (Epstein-Barr virus acute infection)
 - Epstein-Barr virus VCA IgM antibodies
 - Anti-Epstein-Barr virus nuclear antigen IgG antibodies (past infection or latent infection)

IgG = immunoglobulin G; IgM = immunoglobulin M.

TRATAMIENTO EMPIRICO INMUNOCOMPETENTE MAYOR MENOR DE 1 MES



TRATAMIENTO EMPIRICO INMUNOCOMPETENTE MAYOR MENOR DE 1 MES



Bacterial meningitis

2 images

immunocompetent

≤1 month of age

>1 month and <50 years of age

≥50 years of age




Bacterial meningitis

2 images

≤1 month of age

1st empiric antibiotic therapy

plus supportive therapy



Bacterial meningitis

2 images

empiric antibiotic therapy

Primary Options


- **ampicillin**: consult specialist for guidance on dose **and** **cefotaxime**: consult specialist for guidance on dose

Secondary Options

- **ampicillin**: consult specialist for guidance on dose **and** **gentamicin**: consult specialist for guidance on dose

Comments

- Until the causative organism and its sensitivities have been identified, broad-spectrum antimicrobials should be given parenterally.[6] [23] [33]
- Choice of empiric antibiotic depends on patient's age and conditions that may have predisposed the patient to meningitis.[23]



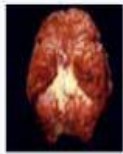
Bacterial meningitis

2 images

empiric antibiotic therapy

- Until the causative organism and its sensitivities have been identified, broad-spectrum antimicrobials should be given parenterally.[6] [23] [33]
- Choice of empiric antibiotic depends on patient's age and conditions that may have predisposed the patient to meningitis.[23]
- The regimen chosen must be broad enough to cover the potential organisms for the age group affected.
- For initial therapy, likely antimicrobial resistance should be assumed.[23]
- If a cephalosporin cannot be administered (e.g., with an allergy), an alternative antibiotic for neonates is an aminoglycoside (e.g., gentamicin).

TRATAMIENTO EMPIRICO INMUNOCOMPETENTE ≥ 1 mes y ≥ 50 años



Bacterial meningitis

2 images

>1 month and <50 years of age

1st

empiric antibiotic therapy

plus supportive therapy

adj. dexamethasone



Bacterial meningitis

2 images

empiric antibiotic therapy

Primary Options

- **vancomycin**: children: 60 mg/kg/day intravenously given in divided doses every 6 hours; adults: 500-750 mg intravenously every 6 hours
-- AND --
- **ceftriaxone**: children: 100 mg/kg/day intravenously given in divided doses every 12-24 hours; adults: 2 g intravenously every 12 hours **or**
- **cefotaxime**: children: 200 mg/kg/day intravenously given in divided doses every 6 hours; adults: 2 g intravenously every 4 hours

Secondary Options

- **vancomycin**: children: 60 mg/kg/day intravenously given in divided doses every 6 hours; adults: 500-750 mg intravenously every 6 hours
-- AND --
- **meropenem**: children: 120 mg/kg/day intravenously given in divided doses every 8 hours; adults: 1-2 g intravenously every 8 hours **or**
- **chloramphenicol**: children and adults: 50-100 mg/kg/day intravenously given in divided doses every 6 hours, maximum 4000 mg/day

Comments

- Until the causative organism and its sensitivities have been identified, broad-spectrum antimicrobials should be given parenterally.[6] [23] [33]
- The regimen chosen must be broad enough to cover the potential organisms for the age group affected.
- For initial therapy, likely antimicrobial resistance should be assumed.[23]

TRATAMIENTO EMPIRICO INMUNOCOMPETENTE ≥ 50 años



Bacterial meningitis

2 images

≥50 years of age

1st

empiric antibiotic therapy

plus

supportive therapy

adj.

dexamethasone

Primary Options

- **ampicillin**: 2 g intravenously every 4 hours **and**
vancomycin: 500-750 mg intravenously every 6 hours
-- **AND** --
ceftriaxone: 2 g intravenously every 12 hours **or**
cefotaxime: 2 g intravenously every 4 hours

Secondary Options

- trimethoprim/sulfamethoxazole : 8-10 mg/kg/day intravenously given in divided doses every 6-12 hours **and**
vancomycin: 500-750 mg intravenously every 6 hours
-- **AND** --

empiric antibiotic therapy

- meropenem**: 1-2 g intravenously every 8 hours **or**
chloramphenicol: 50-100 mg/kg/day intravenously given in divided doses every 6 hours, maximum 4000 mg/day

Comments

- Until the causative organism and antibiotic sensitivities have been identified, broad-spectrum antimicrobials should be given parenterally.[6] [23] [33]

TRATAMIENTO EMPIRICO INMUNOCOMPETENTE ≥ 50 años



Bacterial meningitis

2 images

≥50 years of age

1st

empiric antibiotic therapy

plus

supportive therapy

adj.

dexamethasone

Primary Options

- **ampicillin**: 2 g intravenously every 4 hours **and**
vancomycin: 500-750 mg intravenously every 6 hours
-- **AND** --
ceftriaxone: 2 g intravenously every 12 hours **or**
cefotaxime: 2 g intravenously every 4 hours

Secondary Options

- trimethoprim/sulfamethoxazole : 8-10 mg/kg/day intravenously given in divided doses every 6-12 hours **and**
vancomycin: 500-750 mg intravenously every 6 hours
-- **AND** --

empiric antibiotic therapy

meropenem: 1-2 g intravenously every 8 hours **or**

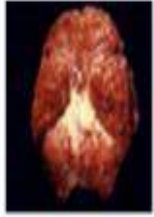
chloramphenicol: 50-100 mg/kg/day intravenously given in divided doses every 6 hours, maximum 4000 mg/day

Comments

- Until the causative organism and antibiotic sensitivities have been identified, broad-spectrum antimicrobials should be given parenterally.[6] [23] [33]

TRATAMIENTO EMPIRICO

DO CUALQUIER EDAD



Bacterial meningitis

2 images

immunocompromised

any age

empiric antibiotic therapy

mg/kg/day intravenously given in divided doses every 6 hours; adults: 2 g intravenously every 4 hours

Secondary Options

- trimethoprim/sulfamethoxazole : children >2 months of age: 15-20 mg/kg/day intravenously given in divided doses every 6-8 hours; adults: 8-10 mg/kg/day intravenously given in divided doses every 6-12 hours **and**

vancomycin: neonates: consult specialist for guidance on dose; children: 60 mg/kg/day intravenously given in divided doses every 6 hours; adults: 500-750 mg intravenously every 6 hours

-- **AND** --

meropenem: neonates: consult specialist for guidance on dose; children: 120 mg/kg/day intravenously given in divided doses every 8 hours; adults: 1-2 g intravenously every 8 hours **or**

empiric antibiotic therapy

Primary Options

- **ampicillin**: neonates: consult specialist for guidance on dose; children: 100-200 mg/kg/day intravenously given in divided doses every 6 hours; adults: 2 g intravenously every 4 hours **and**
- vancomycin**: neonates: consult specialist for guidance on dose; children: 60 mg/kg/day intravenously given in divided doses every 6 hours; adults: 500-750 mg intravenously every 6 hours

-- **AND** --

ceftriaxone: neonates: consult specialist for guidance on dose; children: 100 mg/kg/day intravenously given in divided doses every 12-24 hours; adults: 2 g intravenously every 12 hours **or**

cefotaxime: neonates: consult specialist for guidance on dose; children: 200 mg/kg/day intravenously given in divided

TRATAMIENTO MENINGITIS BACTERIANA AGUDA EN ADULTOS

TABLE 1-3 Recommendations for Specific Antibiotic Therapy in Bacterial Meningitis

Microorganism	Antibiotic
<i>Streptococcus pneumoniae</i>	
Penicillin susceptible	Penicillin G or ceftriaxone (or cefotaxime or cefepime)
Penicillin tolerant (MIC 0.1 $\mu\text{g/mL}$ to 1.0 $\mu\text{g/mL}$)	Ceftriaxone (or cefotaxime or cefepime) or meropenem
Penicillin resistant (MIC greater than 1 $\mu\text{g/mL}$)	Cefepime* (or ceftriaxone or cefotaxime) plus vancomycin
<i>Neisseria meningitidis</i>	Penicillin G* or ampicillin* Ceftriaxone or cefotaxime for penicillin-resistant strains
<i>Listeria monocytogenes</i>	Ampicillin* Ampicillin plus gentamicin for critically ill patient
<i>Streptococcus agalactiae</i> (group B streptococci)	Ampicillin* or penicillin G or cefotaxime
Gram-negative Enterobacteriaceae (ie, <i>Klebsiella</i> , <i>Escherichia coli</i> , <i>Proteus</i>)	Ceftriaxone* or cefotaxime* or cefepime*
<i>Pseudomonas aeruginosa</i>	Meropenem* or cefepime
<i>Staphylococcus aureus</i>	
Methicillin susceptible	Nafcillin* or oxacillin*
Methicillin resistant	Vancomycin*
<i>Staphylococcus epidermidis</i>	Vancomycin* or Linezolid
<i>Haemophilus influenzae</i>	Ceftriaxone* or cefotaxime* or cefepime*

*Recommended antibiotic.
MIC = minimum inhibitory concentration.

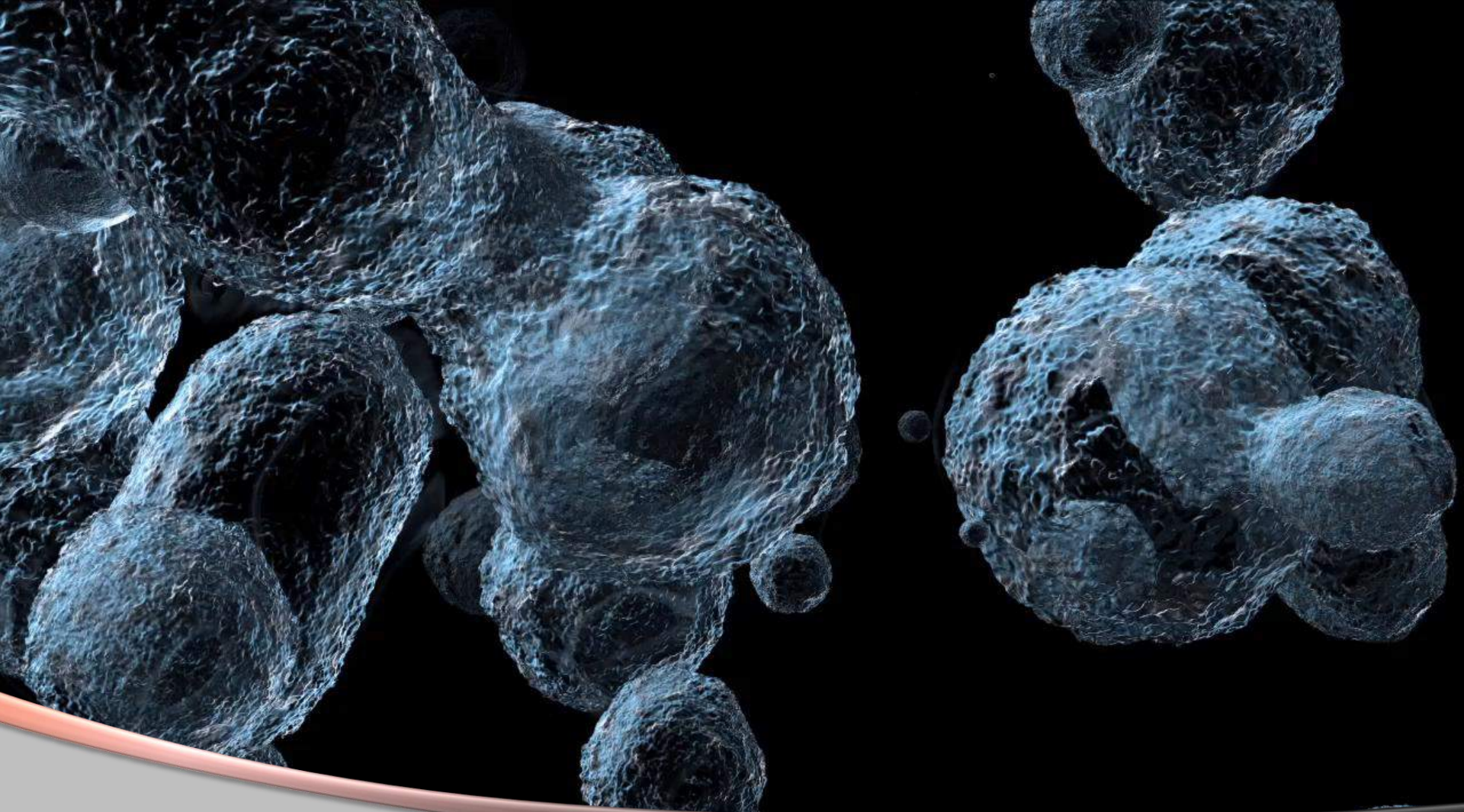
TRATAMIENTO EN MENINGITIS BACTERIANA AGUDA

TABLE 1-4 Recommended Doses for the Antibiotics Commonly Used in the Treatment of Bacterial Meningitis

Antibiotic Agent	Total Daily Dosage (Dosing Interval in Hours)
Ampicillin	Neonate: 150 mg/kg/d (every 8 hours) Infants and children: 300 mg/kg/d (every 6 hours) Adult: 12 g/d (every 4 to 6 hours)
Cefepime	Infants and children: 150 mg/kg/d (every 8 hours) Adult: 6 g/d (every 8 hours)
Cefotaxime	Neonate: 100 mg/kg/d to 150 mg/kg/d (every 8 to 12 hours) Infants and children: 225 mg/kg/d to 300 mg/kg/d (every 6 to 8 hours) Adult: 8 g/d to 12 g/d (every 4 to 6 hours)
Ceftriaxone	Infants and children: 80 mg/kg/d to 100 mg/kg/d (every 12 hours) Adult: 4 g/d (every 12 hours)
Gentamicin	Neonate: 5 mg/kg/d (every 12 hours) Infants and children: 7.5 mg/kg/d (every 8 hours) Adult: 5 mg/kg/d (every 8 hours)
Meropenem	Infants and children: 120 mg/kg/d (every 8 hours) Adult: 6 g/d (every 8 hours)
Nafcillin	Neonates: 75 mg/kg/d (every 8 to 12 hours) Infants and children: 200 mg/kg/d (every 6 hours) Adult: 9 g/d to 12 g/d (every 4 hours)
Penicillin G	Neonates: 0.15 mU/kg/d to 0.2 mU/kg/d (every 8 to 12 hours) Infants and children: 0.3 mU/kg/d (every 4 to 6 hours) Adult: 24 mU/d (every 4 to 6 hours)
Rifampin	Infants and children: 10 mg/kg/d to 20 mg/kg/d (every 12 to 24 hours) Adults: 600 mg/d to 1200 mg/d (every 12 hours)
Vancomycin* [†]	Neonates: 20 mg/kg/d to 30 mg/kg/d (every 8 to 12 hours) Infants and children: 60 mg/kg/d (every 6 hours) Adults: 2 g/d to 3 g/d (every 6 to 12 hours)

*For intravenous vancomycin therapy, maintain serum trough concentrations of 15 µg/mL to 20 µg/mL. Recommended peak levels 1 hour after intravenous administration, vancomycin 25 µg/mL.

[†]Intraventricular vancomycin administration: children 1 mg/d to 2 mg/d, adults 10 mg/d to 20 mg/d.



GRACIAS

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