

Meningitis (pediatrics)

Meningitis is an inflammation of the leptomeninges (arachnoid and pia mater) caused mainly by bacteria, viruses, fungi, protozoa or parasites. About 60% of all meningitis occurs in childhood. The highest incidence is in the first 2 years of life.^[1]

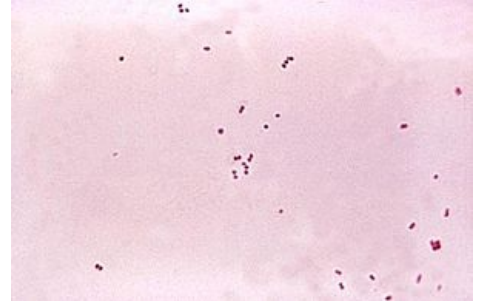
Bacterial meningitis

Etiology

- Up to 6 weeks of age: group B β -hemolytic streptococci (GBS) and *E. coli*, less commonly listeria, staphylococci and Klebsiella.
- From 7 weeks of age: *Haemophilus influenzae* type b, *Neisseria meningitidis* and *Streptococcus pneumoniae*.

Pathogenesis

- Newborns: sepsis, bacteremia.
- Young children: hematogenous spread of infection from the nasopharynx.
- Secondary meningitis - by transfer of infection from the paranasal sinuses, middle ear, mastoids; with open cranial injuries and transfer of pneumococci to the cerebrospinal fluid space.
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Neisseria meningitidis

Clinical picture

- Up to 6 weeks: non-specific symptoms, mostly **sudden breathing disorder**, light gray skin color, feeding difficulties, vomiting, piercing cry, tense fontanelle, opisthotonus, increased sensitivity to touch, hyperexcitability, disorders of consciousness, convulsions.
- From 6 weeks of age: mainly **fever and vomiting**, bulging of the fontanel, restlessness or lethargy, apathy, increased sensitivity to touch, convulsions.
- After 1 year of age: **fever and headache** predominate, neck stiffness, vomiting, impaired consciousness, convulsions.

Meningeal symptoms

- Brudzinski's sign: passive flexion of the neck leads to flexion of the hip and knee joints.
- Kernig's sign: passive tension of the knee joints when the hips are bent is painful and is accompanied by strong reflex resistance.
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Complications

- Acute hydrocephalus, subdural hygroma, inflammatory vascular occlusions, venous sinus thrombosis, cortical defects, SIADH, Waterhouse-Friderichsen syndrome.
- Late consequences: psychomotor retardation, hearing impairment, cerebral palsy, epilepsy, hydrocephalus.
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Diagnostics

- Lumbar puncture - cytological and biochemical examination of cerebrospinal fluid, culture, electrophoresis or latex agglutination examination for antigen detection, PCR.
 - The number of cells > 1000/ μ l, the proportion of granulocytes > 70%, protein > 1 g/l, glucose < 1.7 mmol/l, lactate > 4.5 mmol/l, the ratio of the concentration of glucose in the cerebrospinal fluid and in the blood: < 0, 4.
- Blood tests - leukocytosis with a shift to the left or leukopenia, increased CRP, sometimes thrombocytopenia; blood culture.
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Therapy

Early initiation of empiric antibiotic therapy

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- neonates and infants: cephalosporins, ampicillin and aminoglycoside iv (minimum 14 days);
 - older children: cefotaxime iv (minimum 7 days), dexamethasone (reduces the incidence of hearing defects).

Prognosis

- Pneumococcal meningitis has the worst prognosis (lethality 6–20%).^[1]

 For more information see *Purulent meningitis (pediatrics)*, *Purulent meningitis (infection)*, *Hemophilic meningitis*, *Tuberculous meningitis*.

Viral meningitis

Rarely in newborns and infants, more often in late childhood and young adulthood.

Etiology

- Echoviruses, coxsackieviruses (enteroviruses), mumps virus.
- Less often, adenoviruses, parainfluenzae, tick-borne meningoencephalitis virus, lymphocytic choriomeningitis virus.
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Clinical picture

- Sudden onset, fever, vomiting, headache, positive meningeal signs.
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Diagnostics


- Lumbar puncture:
 - cell count 11–500/μl, proportion of mononuclear cells > 70%, protein < 1 g/l, glucose normal.
- Serological tests for enteroviruses, mumps, KME and borreliosis.
- Isolation of the virus from cerebrospinal fluid, stool, pharyngeal lavage.

Therapy

- Symptomatic, fluids, bed rest.

Prognosis

- Very good.^[1]

 For more information see *Serous meningitis and meningoencephalitis* , *Viral meningitis*, *Herpetic meningoencephalitis* .

Links

Related Articles

- Meningitis • Meningeal syndrome
- Viral meningitis • Serous meningitis and meningoencephalitis • Herpetic meningoencephalitis
- Purulent meningitis (infection) • Purulent meningitis (pediatrics) • Hemophilic meningitis • Tuberculous meningitis
- Infectious diseases of the brain • Neuroinfections, CNS/PGS inflammations • Encephalitis

References

1. MUNTAU, Ania Carolina. *Pediatric*. 4. edition. Praha : Grada, 2009. pp. 155-157. ISBN 978-80-247-2525-3.