Cytomegalovirus Infection

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Risk

- Seroprevalence increases with age and low socioeconomic status in USA: From 58.9% in those aged ≥6 y to 90.8% in those ≥80 y. Also higher in non-Hispanic blacks, Mexican Americans, and women.
- Severe disease from CMV is rare in immunocompetent individuals.
- Risk for CMV disease in transplant recipients: 10–40% with preventive measures.
- Risk for CMV disease in HIV-positive pts: 20–30% (increased risk with low CD4 count).
- Approximately 1:150 children is born with congenital CMV.

Perioperative Risks

- CMV transmission from tissue or blood products from a CMV-seropositive donor to a seronegative recipient
- Related to severity of CMV-induced organ dysfunction (if present): Pulmonary, CNS, hepatic, GI, cardiac, bone marrow, adrenal

Worry About

- Giving CMV-seropositive blood products to a CMV-seronegative immunocompromised host; filters that remove leukocytes from the blood can be used to prevent transmission of CMV if CMV-seropositive blood donors are used.
- Abnormal hepatic metabolism if CMV hepatitis is present may alter drug clearance.
- Elevated ICP if CMV encephalitis/meningitis.
- Abnormal oxygenation if CMV pneumonitis.
- Myocardial dysfunction or arrhythmias if CMV myocarditis.
- Perforated viscus secondary to colonic/gastric CMV.
- Bone marrow suppression resulting in abnormal bleeding from thrombocytopenia, anemia, and neutropenia.
- Adrenal insufficiency due to CMV adrenalitis.

Overview

- Double-stranded DNA betaherpesvirus; member of the *Herpesviridae* family—largest virus to infect humans.
- Vast majority of North American adults have had prior exposures and are CMV seropositive.
- Establishes latency after primary infection. Secondary infection occurs after reactivation of a latent virus in an immunocompromised host.
- Transmission through close contact, blood and blood products, organ transplantation, and sexually and perinatally.

Manifestations

- Immunocompetent host: Asymptomatic, heterophile antibody–negative mononucleosis-like syndrome
- Immunocompromised host: Symptomatic or asymptomatic viremia with or without organ involvement—retinitis, encephalitis, meningitis, myelitis, polyneuropathy, pneumonitis, esophagitis, gastritis, colitis, hepatitis, cholangitis, myocarditis, adrenalitis, vasculitis, and bone marrow suppression
- Neonates: Petechial rash, jaundice with hepatosplenomegaly; neurologic abnormalities, such as microcephaly and lethargy, eye involvement with chorioretinitis and optic nerve atrophy, prematurity and low birth weight, and sensorineural hearing loss

Diagnosis

- Serology: IgM has high rates of false positivity. Positive IgG indicates prior infection, which is useful for risk stratification in transplant recipients
- NAAT (in immunocompromised hosts)
- Viral cultures
- pp65 antigenemia (in immunocompromised hosts)

Usual Treatment

- Immunocompetent host: Supportive symptomatic management, antivirals not indicated
- Immunocompromised host: IV ganciclovir in moderate-to-severe infection; oral valganciclovir in mild infection. IV foscarnet or cidofovir for resistant virus. IV immunoglobulins as adjunctive therapy in refractory cases; other experimental drugs (brincidofovir, maribavir, letermovir)
- Surgical: For complications of end-organ damage, such as repair of GI perforation.

Prevention

- Oral valganciclovir in high-risk solid organ transplant recipients
- Preemptive monitoring with NAAT in stem cell, bone marrow, and umbilical cord transplant recipients

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Destruction of retina	Decreased visual acuity, blind spots	Funduscopy; white and red lesions	Ophthalmology evaluation
CV	Myocarditis; LV dysfunction	CHF symptoms, palpitations	Irregular rhythm, displaced PMI, S_3	ECG, ECHO, heart biopsy
RESP	Pneumonitis; impaired gas exchange	Dyspnea, nonproductive cough	Wheezes, crackles, hypoxemia	CXR, ABG, bronchoscopy + biopsy
GI	Viral infection of organ	Hepatitis/cholangitis: • Right upper quadrant pain • Jaundice, itching, acholic stools Esophagitis: Dysphagia, odynophagia Colitis: Diarrhea, abdominal pain Gastritis: Pyrosis, anorexia, epigastric pain	Signs of hepatic failure, fetor hepaticus, asterixis, jaundice, bruising, painful liver, nonspecific abdominal pain	Liver function tests, ERCP, EGD, US, NAAT, ± biopsy
HEME	Bone marrow suppression	Fever, fatigue	Petechiae, pallor, tachycardia	CBC with differential
CNS	Encephalitis	Motor or sensory abnormalities, altered mental status	Motor weakness, sensory abnormality, cerebellar ataxia, abnormal tests of cortical function	CT, MRI, lumbar puncture

Key References: Rafailidis PI, Mourtzoukou EG, Varbobitis IC, et al: Severe cytomegalovirus infection in apparently immunocompetent patients: a systematic review, *Virol J* 5:47, 2008; Crumpacker C: Cytomegalovirus. In Bennett J, editor: *Mandell, Douglas, and Bennett's principles and practice of infectious diseases*, ed 8, Philadelphia, PA, 2015, Elsevier, pp 1738–1753.

Perioperative Implications

Perioperative Preparation

- Evaluate for signs of pulmonary, cardiac, hepatic, CNS, bone marrow, and/or adrenal dysfunction.

Monitoring

- Routine
- May need drug dose adjustment if hepatic/renal dysfunction present

Airway

- May require high FIO_2 and PEEP if pneumonitis present

Preinduction/Induction

- Avoid tachycardia/hypotension.

Maintenance

- Follow CO, PCWP, SaO_2, and BP.

Extubation

- No special concerns

Postoperative Period

- Monitor for clinical signs of disease progression.

Adjuvants

- No special concerns

Dandy-Walker Syndrome

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Risk

- Multiple genetic factors; mostly sporadic with limited familial inheritance
- Range: 1:10,000-30,000 newborns

Perioperative Risks

- Variable phenotypic expression and organ involvement
- Increased incidence of additional developmental abnormalities
- Depend upon severity of disease and comorbidities, which may include elevated ICP; craniofacial, cardiac, and renal malformation; seizure disorder; respiratory depression; nausea; and vomiting