

CONGENITAL, PYOGENIC AND VIRAL INFECTIONS OF CNS

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CONGENITAL INFECTIONS

- ▶ Parenchymal calcifications are the hallmark of most congenital infections.
- ▶ The pathology and insult to the CNS due to infection depends on timing of infection than the infectious agent
- ▶ **During 1st trimester :**
 - Miscarraige
 - Brain destruction
 - Malformations like anencephaly , agyria, lissencephaly

CONGENITAL INFECTIONS

- ▶ Late in pregnancy:

Myelination disturbances like demyelination, dysmyelination, hypomyelination

Microcephaly with encephalomalacia are common

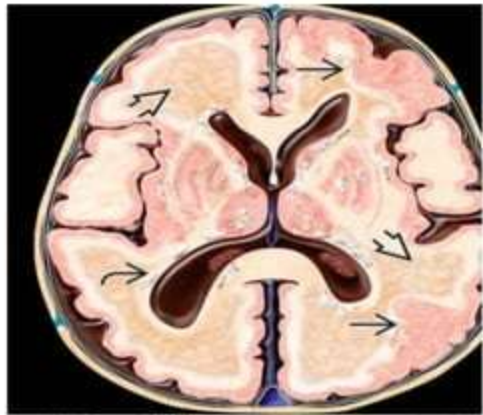
- ▶ Most of congenital infections are secondary to transplacental passage
- ▶ Zika is transmitted by mosquitoes
- ▶ Herpes virus family- HSV1, HSV2, VZV, EBV, CMV, HHV6

TORCH INFECTIONS

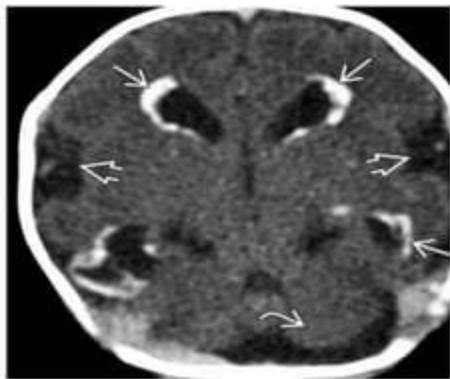
- ▶ TORCH-
- ▶ Toxoplasmosis
- ▶ Rubella
- ▶ CMV
- ▶ Herpes
- ▶ If syphilis is included TORCH(S)
- ▶ In addition to TORCH-zika, LCMV, HPV19 ,Hep B, VZV, HIV ,Parasitic toxocariasis


IMAGING

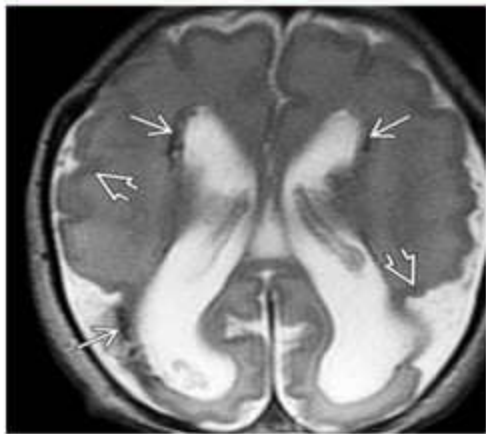
- ▶ Toxoplasmosis , Rubella, CMV , Herpes, VZV, HIV—parenchymal calcifications



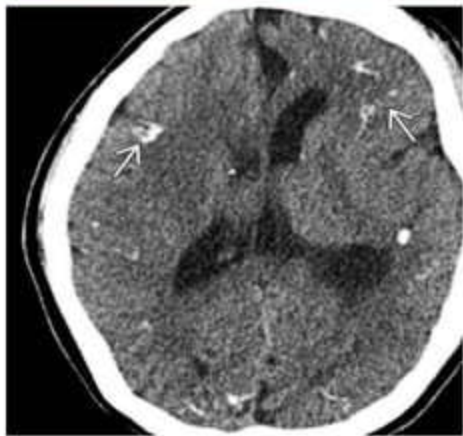
- ▶ CMV- periventricular calcification




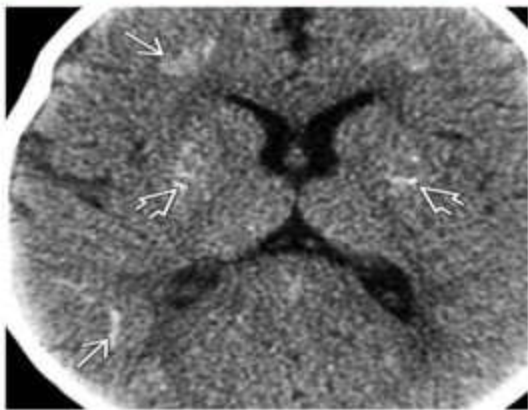
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- ▶ Cysts, cortical clefts
 - ▶ Polymicrogyria



- ▶ Early CNS infection with zika leads to microcephaly ,calcification, gray white tumors
- ▶ Rubella &HSV Infection leads to lobar destruction, cystic encephalomalacia
- ▶ Congenital syphilis Infection leads to basilar meningitis
- ▶ Congenital HIV Infection leads to basal ganglia calcifications & atrophy, aneurysmal atrophy
- ▶ TORCH, zika, LCMV Infection leads to microcephaly, parenchymal calcifications, chorioretinitis, IUGR.



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- ▶ CMV early infection causes Germinal zone necrosis with sub ependymal cysts , dystrophic calcifications



HERPES SIMPLEX VIRUS

- ▶ **HERPES SIMPLEX VIRUS:** Congenital and neonatal infections
- ▶ CNS involvement in HSV primarily effects neonates
- ▶ **ETIOLOGY:**
- ▶ DUE TO HSV 1 & HSV 2
- ▶ 85% are acquired while delivery
- ▶ 10% are acquired postnatal contamination
- ▶ 5% are acquired through in utero transmission

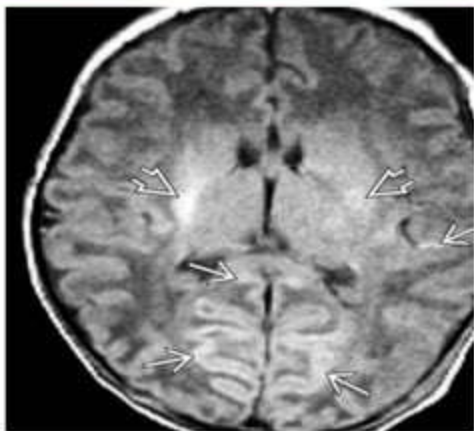


▶ **PATHOLOGY:**

- ▶ Meningoencephalitis with necrosis & hemorrhage
- ▶ Late stages- atrophy , calcification, cystic encephalomalacia
- ▶ Severe cases- near total loss of brain stem substance with hydrocephaly

▶ **IMAGING**

- ▶ Grey & white matter are depleted
- ▶ At 2-3 weeks of neonatal life lead to diffuse cerebral edema & leptomeningeal enhancement



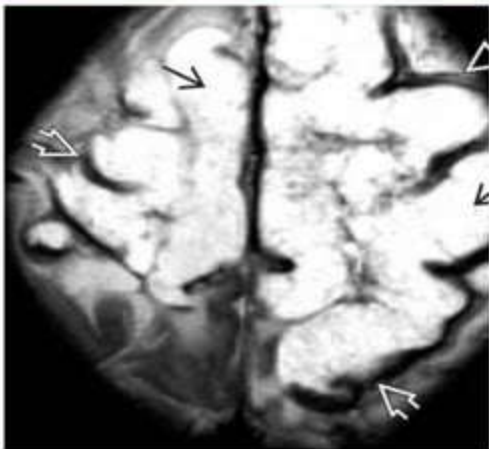


- ▶ CT

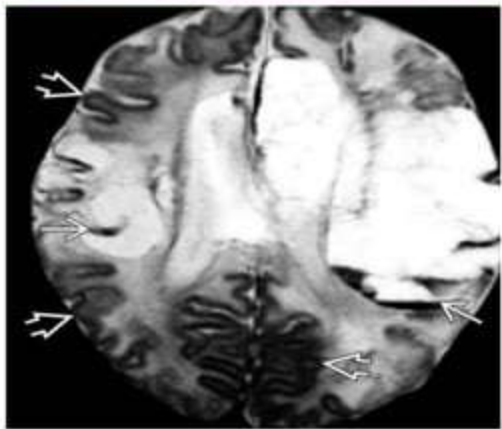
- ▶ Diffuse hypoattenuation—cortex , subcortical white matter ,cerebral edema, hemorrhages which are multifocal punctate and patchy

- ▶ MRI

- ▶ T1W-normal / hypointensities



- ▶ T2W—Hyperintensities in cortex, white matter, cortex
- ▶ T2—Hemorrhagic foci
- ▶ Late stages
- ▶ TIC—meningeal pattern of enhancement
- ▶ T2—Blooming due to hemorrhages



CONGENITAL(PERINATAL) HIV

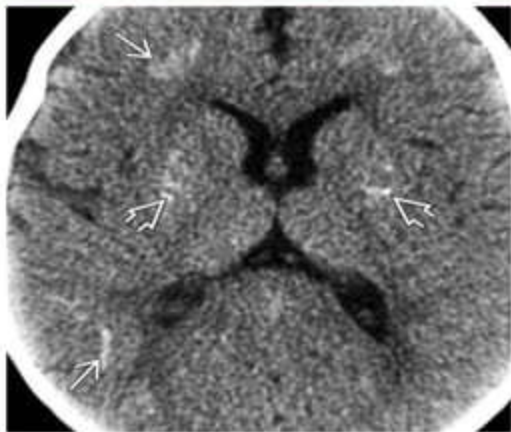
- ▶ The striking finding—atrophy of frontal lobes
Bilateral symmetric basal ganglion calcifications



- ▶ Ectasia at fusiform enlarges intracranial artery are focal-3 to 5%
- ▶ **DIFFERENTIAL DIAGNOSIS:**
- ▶ TORCH
- ▶ MCV-periventricular calcification
- ▶ microcephaly
- ▶ cortical dysplasia
- ▶ TOXOPLASMOSIS-scattered parenchymal calcifications

OTHER CONGENITAL INFECTIONS

- ▶ Rubella-German measles
- ▶ Timing of infection magnitude of diseases microcephaly, parenchymal calcifications
- ▶ Delayed myelination
- ▶ Peri ventricular & basal ganglion cysts
- ▶ LATE STAGES- Brain volume loss



CONGENITAL VARICELLA ZOSTER

- ▶ Microcephaly
- ▶ Parenchymal calcifications
- ▶ Ventriculomegaly
- ▶ Polymicrogyria
- ▶ Necrosis of white matter in cortical & Sub cortical tissues

SELECTED CONGENITAL AND PERINATAL INFECTIONS: NEUROIMAGING FINDINGS AND COMMON CAUSES

Cytomegalovirus

- Microcephaly, Ca⁺⁺ at caudostriatal groove, polymicrogyria (PMG), cysts, WM abnormalities, cerebellar hypoplasia, vertical hippocampi

Toxoplasmosis

- Macrocephaly, hydrocephalus, scattered Ca⁺⁺, lack of cortical malformations

Herpes Simplex Virus

- Early-diffuse cerebral edema, multifocal lesions, DWI abnormalities, hemorrhage, watershed infarctions, leptomeningeal enhancement, late cystic encephalomalacia

Lymphocytic Choriomeningitis Virus

- May precisely mimic features of CMV, negative routine TORCH testing

Zika Virus

- Microcephaly, ventriculomegaly, Ca⁺⁺ at GM-WM junctions, cortical malformations

Rubella Virus

- Microcephaly, Ca⁺⁺ (basal ganglia, periventricular, and cortex) may cause lobar destruction

Varicella-Zoster Virus

- Necrosis of WM, deep GM nuclei, cerebellum ventriculomegaly, cerebellar aplasia, PMG

Syphilis

- Basilar meningitis, stroke, scattered Ca⁺⁺

HIV

- Atrophy, basal ganglia Ca⁺⁺, fusiform arteriopathy

Human Parechovirus

- Confluent periventricular WM abnormality mimic of perinatal periventricular leukomalacia

Human Parvovirus B19

- WM, cortical, and basal ganglia injury in setting of severe fetal anemia



THANK YOU