Case Report

Correlation between TORCH infection and congenital hydrocephalusin pediatric age groups: Case report.

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Abstract:

TORCH infection is associated with Toxoplasmosis, Treponema pallidum, Rubella, Cytomegalovirus (CMV), Herpes simplex virus (HSV), Hepatitis viruses, Human immunodeficiency virus (HIV), and other infections such as varicella andparvovirus B19.Paediatric age group with congenital hydrocephalus present with different presentation and has different etiology associated too. TORCH infection is associated with increase morbidity and mortality in pediatricsmainly in prenatal and infant age groups. Clinical presentation varies with type of infection involved and clinical outcome varies too. We report our experience with the management of 4 patients with hydrocephalus associated with TORCH infection, its presentation, its sequelae and management.

Key words: *TORCH infection, clinical presentation, multiloculated hydrocephalus, sequelae, management.*

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Abbreviation:
Ab.: Antibody
CSF: Cerebrospinal fluid
CT: Computed tomography
HCP: Hydrocephalus
ICU: Intensive care unit
Ig: Immunoglobulin
IVH: Intraventricular haemorrhage
NICU:Neonatal intensive care unit
OFC: Occipito-frontal circumference
Pt.:Patient
TORCH: Toxoplasmosis, Treponema pallidum, Rubella, Cytomegalovirus (CMV), Herpes simplex virus (HSV), Hepatitis viruses, Human immunodeficiency virus (HIV), and other infections
VP shunt: Ventriculoperitoneal shunt

Introduction:

TORCH is an acronym which stands for Toxoplasmosis, Other (Parvovirus B19, Varicella-Zoster virus infection, Syphilis, Hepatitis B), Rubella virus, Cytomegalovirus infection and Herpes Simplex virus infection. These groups of infections are the main threats of serious congenital infection during pregnancy, which may ultimately cause fetal damage or other anomalies[1].The epidemiology of these infections varies, and in low-income and middle-

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income countries, where the burden of disease is greatest, TORCH infectionsare major contributors to prenatal and infant morbidity and mortality[2].

Infection is a well-documented complication of cerebrospinal fluid (CSF) shunts which occurs in 5-10% of cases[3]. Multiloculated hydrocephalus, which is occasionally labelled as compartmentalized hydrocephalus, ventricular compartmentalization, ventricular septations and polycystic brain disease[4,5], is a challenging neurosurgical problem, still associated with an unfavourable outcome. Early reports stated that neonatal meningitis was the commonest cause of multiloculated hydrocephalus accounting for up to75% of cases[4,5,6]. In recent years, however, multiloculatedhydrocephalus has been attributed to intraventricular haemorrhage (IVH) more frequently[5,7]. It is logical to assume that the ventriculitis associated with the shunt infection may result in ventricular septations and closure of the foramen of Monro, aqueduct and the outlets of the fourth ventricle. Fortunately, however, the development of this complication following a shunt infection is rare[3].

Case Report:

Case-1:A 9 months old baby of non-consanguineous parents admitted with enlargement of head since birth, multiple episodes of seizure and vomiting since birth. The baby had history of right sided VP shunt at the age of 2 months. The baby was well for 5 months following VP-shunt.Then the mother noticed that the lower end of shunt tube was coming out through the umbilicus. The baby also developed fever, convulsion.After consulting with the pediatrician,the baby was diagnosed as a case of Meningitis with non-functioning VP-Shunt.CT scan of head was done and shunt removed for non-functioning. The baby was managed in ICU for 15 days for meningitis. The baby was reasonably well but there was again increase in head size.

On admission to our department, the baby was playful but occasional drowsy with history of occasional vomiting.

On examination: - OFC was 48cm, there was craniofacial asymmetry with dilated scalp veins and setting sun sign.Anterior and posterior fontanelles were open and tensed.

CT-scan of head was done and revealed multi-septate hydrocephalus (Fig:-1: a, b).

TORCH screening test reveal-Anti-CMV IgG positive.

Pt. underwent right VP-shunt following admission. Following shunt, pt. improved clinically.Fontanelles were laxed, setting sun sign improved.

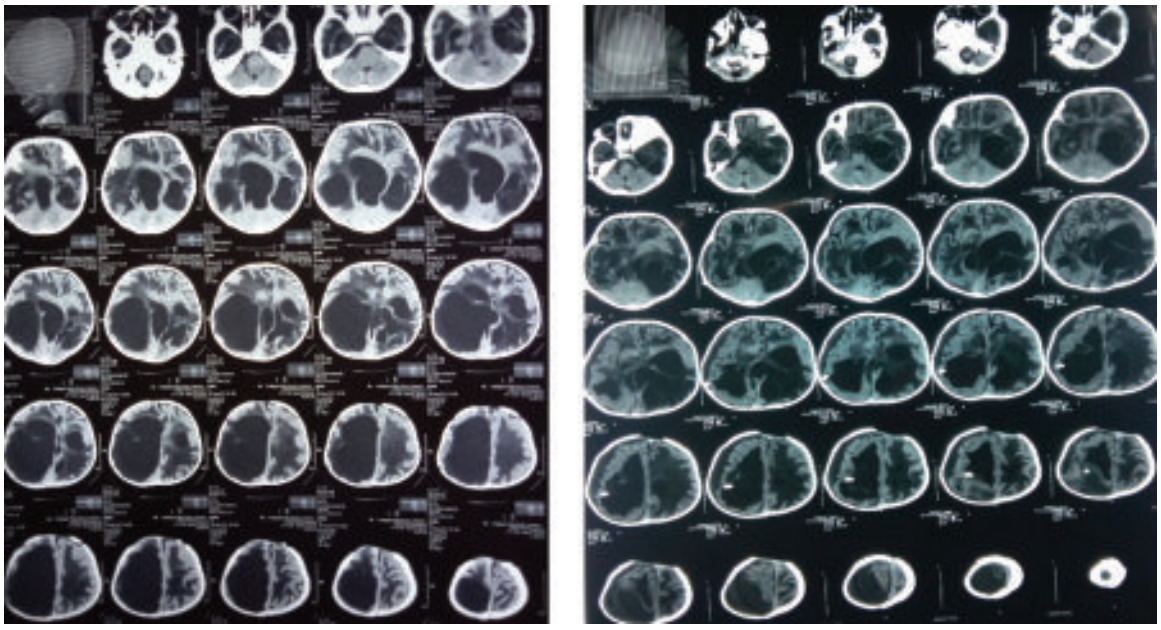

Fig.-1: *(a) CT scan of head before shunt showing both lateral ventricles and 3rd ventricle are dilated. There are multiple septations present within the lateral ventricles. (b) CT scan of head after right sided VP shunt showing lateral ventricles and 3rd ventricular size has decreased than previous and there is also right sided subdural hygroma.*

Case-2: A 3 months old baby of non-consanguineous parents admitted with enlargement of head since birth. The baby was delivered by lower uterine caesarian section due to HCP and there was history of birth asphyxia. The baby's mother was on regular antenatal checkup. The baby had no history of fever, vomiting and convulsion.

On examination (on admission):-OFC was 39 cm, anterior and posterior fontanelles were open, sutural diastasis -present, baby was playful, moves all 4 limbs, follow objects, all reflexes were intact.

CT scan of head showed tri-ventriculomegaly (Fig: - 2).

TORCH screening test reveals: - Rubella IgG and CMV IgG: positive. During her hospital course, she was stable and was managed conservatively and discharged with intact neurological function as on admission.

Case-3: A 4 months old baby of non-consanguineous parents admitted with enlargement of head since birth, clear fluid discharge from head for 3 months, wound in the head for 3 months. The baby was delivered by lower uterine caesarian section due to HCP and there was no history of birth asphyxia. The baby's mother was on regular antenatal checkup. The baby had no history of fever, vomiting but there was history of convulsion.

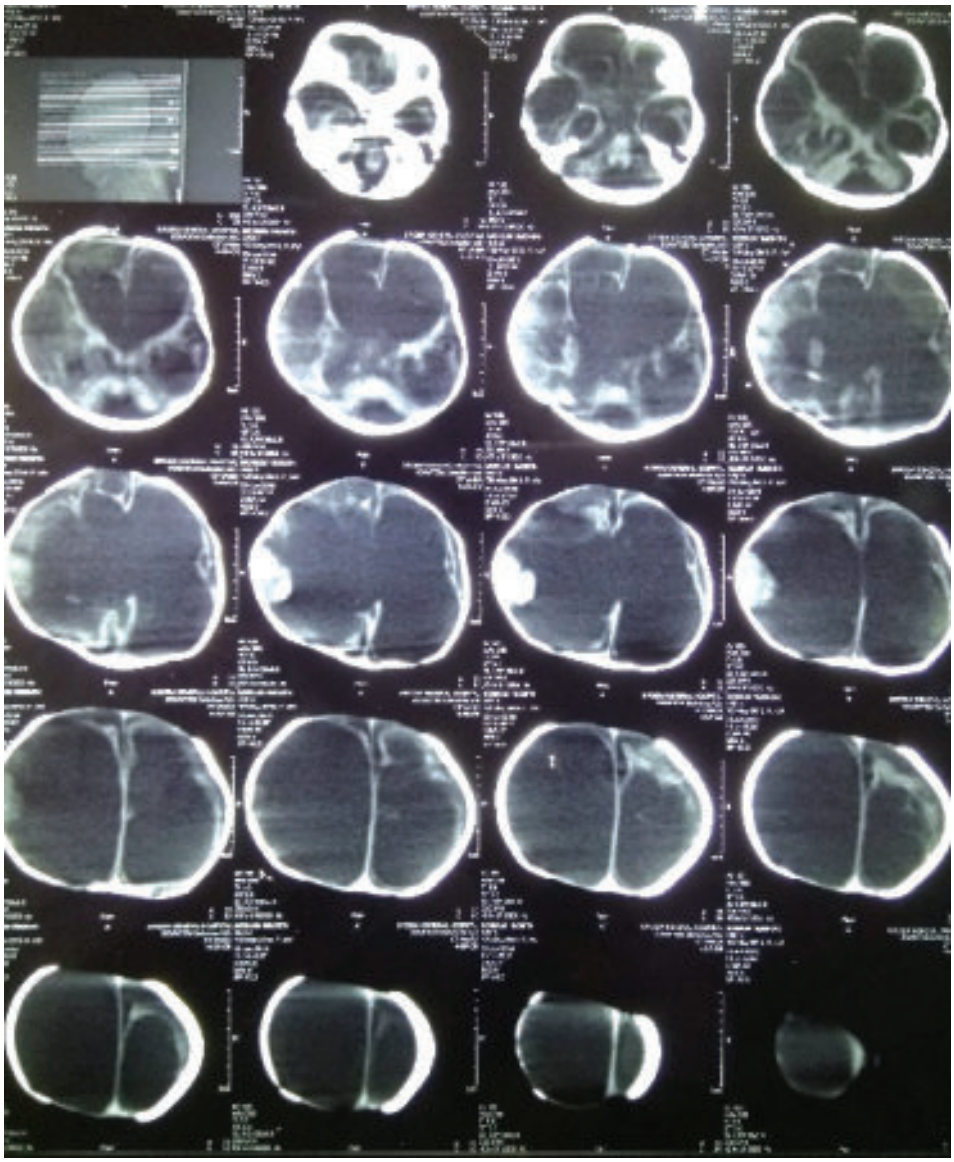

Fig.-2: *CT scan of head showing dilatation of all ventricles.*

On examination during admission- baby had craniofacial asymmetry, setting sun sign, sutural diastasis, depressed fontanelles, dilated scalp veins, pressure sore (Grade II) on both parietal eminences, no discharge of CSF.

CT scan of head showedat 12 days of age: markedly dilated ventricles and thinning of cortical mantle and at 4 months of age: decrease of ventricular size after CSF leakage with subdural hygroma.(Fig:-3: a, b).

Torch panel screening test:Anti-Herpes Simplex virus 1 Ab-IgG positive, Rubella virus Ab-IgG- positive.

This patient was managed conservatively. After healing of pressure sore, there was refilling of fontanelle, clinically improved but no surgical intervention was done. Pt. was discharged with advice of close monitoring and regular follow-up.

Case 4:A 3 year old baby of non-consanguineous parents admitted with enlargement of head since birth, multiple episodes of seizure and vomiting since birth.History of convulsion at the age of 4 months and was admitted in NICU. History of VP shunt at 8 months of age and there was also delayed milestone of developments (sitting 1.5 year, standing with support 2.5 year, tremor while standing and cannot walk yet, speech was normal). The baby was reasonably well but there was again increase in head size.

On admission to our department, the baby was playful but occasional drowsy with history of occasional vomiting.

On examination: - OFC was 52 cm,setting sun sign absent. Anterior and posterior fontanelles were closed.

Ct-scan of head was done and revealed multi-septate hydrocephalus (Fig:-4: a, b).

TORCH screening test reveal-Anti-CMV IgG positive, Anti-Herpes Simplex virus 1 Ab –IgG positive, Rubella virus Ab-IgG- positive.

This patient was managed conservatively and pt. was improved clinically.

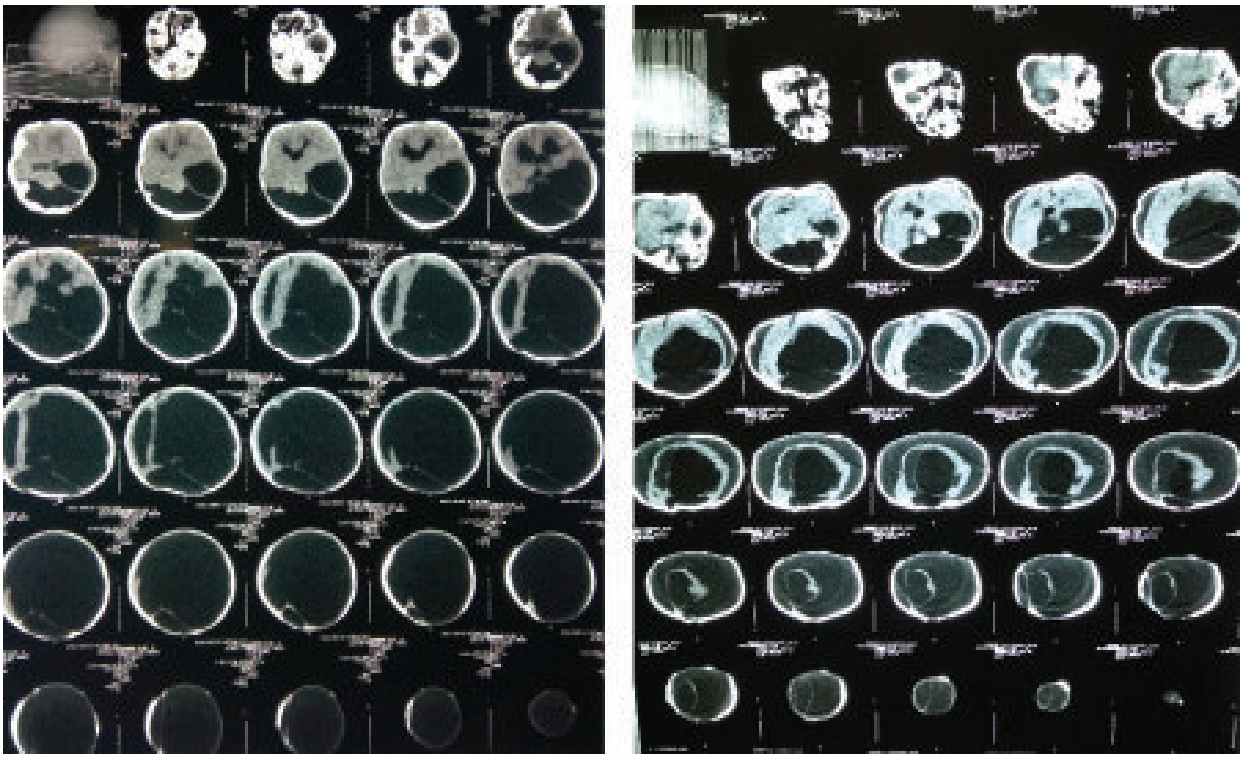

Fig.-3: *(a) CT scan of head at 12 days of age showing markedly dilated ventricles and thinning of cortical mantle. (b) CT scan of head at 4 months of age showing decrease of ventricular size after CSF leakage with subdural hygroma.*

Discussion:

Multiloculated hydrocephalus is most commonly attributed to insults incurred during the neonatal period, such as intraventricular hemorrhage or intracranial infection. The role that neonatal meningitis plays as an etiological factor in the development of multiloculated hydrocephalus has been well described[4,5,6]. Hydrocephalus is common in infants who survive neonatal meningitis, developing with an estimated incidence of greater than 30%[9]. The first case of multiloculated hydrocephalus following neonatal meningitis that we can identify was reported by Salmon in 1970[10].

It is thought that the septations giving rise to multiple loculations probably represent the organization of intraventricular exudate and debris produced by ventriculitis, regardless of whether it is of chemical or infectious nature[11]. An inflammatory response at the ependymal surface could encourage proliferation of subependymal glial tissue, upon which exudate and debris organize to form fibroglial webs. With disruption of the overlying ependymal lining, glial tufts emerge and serve as a nidus for the formation of septations that span the ventricles. The septations not only alter the ventricular anatomy, but disrupt the normal flow of cerebrospinal fluid (CSF). In the end, production and accumulation of CSF within a loculated cavity can lead to progressive dilatation and mass effect [5].

Pathological Correlates

Schultz and Leeds have provided the most detailed description of gross and microscopic findings associated with multiloculated hydrocephalus. Grossly, the usual findings are ventricular dilatation and compartmentalization by membranes. The membranes appear filmy and translucent, and may vary in thickness. Microscopically, the septationsare composed of fibroglial elements, with some round and polymorphonuclear cells. The characteristic findings of chronic ventriculitis are frequently present, with subependymal gliosis, small areas of denuded ependyma, and glial tufts extending through the denuded ependyma into the ventricular lumen[11].

Diagnosis

When hydrocephalus is suspected, CT or MR imaging is usually performed. These studies may suggest the presence of ventricular septations and irregular or disproportionate dilatation of various parts of the ventricular system. Often, CT shows transversely oriented septations of varying thickness and non-uniform distribution, dividing the ventricular system into one of irregular contour. Although the septations may not be visible in the early disease process, retrospective temporal review often delineates a pattern of progressive compartmentalization and asymmetrical hydrocephalus. The initially documented ventricular pattern gradually becomes unrecognizable, so that ultimately the cerebral mantle encloses a large single multiloculated cavity. In advanced stages, it can be difficult to recognize the ventricles and other anatomical structures of the brain. Computerized tomography cannot accurately identify communication between cavities. The more recently introduced MR imaging offers the added advantage of multiplanar viewing; although it may be more sensitive in revealing septations, the ability of MR imaging to document the communication of the cysts with the rest of the ventricular system is unproven. Absolute confirmation of non-communicating loculations still requires ventriculography. This technique allows the direct visualization of sequestered ventricular compartments; however, it requires multiple punctures to document the cavities and determine the presence or absence of communication among them. Simultaneous sampling of CSF for analysis of protein content may also indirectly support the presence of noncommunicating cysts. A preferred technique is to inject small volumes of low concentration contrast material into cavities and obtain serial CT scans[5].

Conclusion:

Paediatric age group often present with neurological abnormalities including enlarged head since birth, poor developmental milestone etc..Pt. of such group with enlarged head are often diagnosed with congenital hydrocephalus.Such pt. may have different etiology and often missed with multiseptate hydrocephalus. TORCH infection attributes to formation in multiseptate hydrocephalus.TORCH disease is an intrauterine infection that can cause congenital malformations in central nervous system, resulting in neurological abnormalities. Due to infection with many organisms, diagnosis and treatment is very difficult. Though treatment includes either with medical or surgical, the outcome of such pt. remains same as observed in our cases. Chance of failure with either medical or surgical still remains

high in multiseptate hydrocephalus associated with TORCH infection. Such pt. needs to have close monitoring and follow-up.

In the future there will be many more vaccines, treatment options and sophisticated diagnostic tools for TORCH disease. During the pregnancy all the drugs are not safe so in the time of treatment specific precaution should be taken. Avoid the drugs which have teratogenic activity. Generally vaccines are safe during pregnancy. Public awareness on proper maintaining of hygienic conditions is very important for the prevention of this infection. Women, who are planning to become pregnant, must be tested routinely.

Declarations:

Authors' contributions:

Conception, diagnosis and design, Radiological diagnosis and Final approval of manuscript:

Dr. Mohammad Hossain, Dr. Nur Muhammad, Dr. Satish Kumar Shah.

Manuscript preparation, Technical revision, Manuscript editing and revision:

Dr. Satish Kumar Shah, Dr. Nur Muhammad.

Literature review: Dr. Satish Kumar Shah, Dr. Nur Muhammad, Dr. Pulak Kumar Biswas.

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Ethics Approval: There is no ethical issue in this paper.

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