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Encephalitis and myelitis in tropical countries: Report from the Task Force on Tropical Diseases by the World Federation of Societies of Intensive and Critical Care Medicine



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ABSTRACT

Tropical diseases are those that occur primarily or solely in the tropics, and as such include infectious diseases that are particularly prevalent in hot, humid conditions. The incidence of encephalitis in tropical countries is reported to be as high as 6.34/100,000/year. The term encephalitis implies inflammation of the brain and includes the presence of encephalopathy with two and more of the following features: fever, seizures and/or focal neurological findings; a cerebrospinal fluid pleocytosis; electroencephalographic findings or abnormal neuroimaging suggestive of encephalitis. Transverse myelitis (TM) is an inflammation of the spinal cord which has a wide variety of clinical presentations depending on the degree (severity of myelin and neuronal injury) and site of spinal cord involvement. In the present article we discuss the various forms of tropical, viral encephalitis and myelitis and the diagnosis and management.

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1. Introduction

Tropical diseases are disorders that occur primarily in the tropics leading to significant morbidity and mortality [1]. Overcrowding, malnutrition, poor hygiene and lack of basic sanitation predispose to these infections.

In 2015, encephalitis affected around 4.3 million people worldwide and resulted in 150,000 deaths. In tropical countries, the incidence is reported to be 6.34 per 100,000 per year [1–3].

The definition of encephalitis includes the presence of encephalopathy (altered consciousness, lethargy, irritability or a change in personality and behavior) with two or more of the following: fever, seizures and/or focal neurological findings; cerebrospinal fluid (CSF) pleocytosis or electroencephalographic (EEG) findings or abnormal neuroimaging (CT or MRI) suggestive of encephalitis [4,5].

Transverse myelitis (TM) is an inflammatory condition of the spinal cord which can have an unpredictable course and may present as a single event or as recurrent disease [6]. TM may be acute or subacute with signs and symptoms of motor, sensory, and/or autonomic dysfunction depending on the severity and site of the disease process [7]. Exclusion of compressive cord lesions, preferably by MRI is key to the diagnosis. TM can be caused by infections, immune system disorders, and any other condition that may damage or destroy myelin [7,8]. Identifying the etiology is very important as therapy can dramatically change outcomes. The reported incidence of TM is one to eight new cases per million people per year, but the actual incidence is probably much higher. Symptoms and signs that suggest an infectious etiology include the presence of fever, rash, adenopathy, concurrent systemic infections and symptoms of Zoster radiculopathy [8,9].

The current article, will focus on viral encephalitis and myelitis in tropical countries and the challenges faced with diagnosis and management.

2. Literature review and analysis

We reviewed the literature on the diagnosis and management of encephalitis and transverse myelitis via searches of the PubMed database up to September 2017. Searches included only review of articles published in the English language and were limited to human-only studies.

3. Clinical presentation and etiology

Neurological infections are not uncommon in the intensive care unit (ICU). They can primarily affect the meninges and spinal cord (epidural abscess) or the parenchyma (encephalitis, cerebral abscess, myelitis).

The meninges are frequently involved hence the term meningoencephalitis is frequently used. Meningeal involvement can present with either dural inflammation (pachymeningitis) or with inflammation of the pia and subarachnoid space (leptomeningitis) or with both.

Pachymeningitis is rare in the ICU, and may be seen in syphilis, tuberculosis, fungal and bacterial infections [10,11]. The clinical presentation is more insidious than that of leptomeningitis, with headache and cranial nerve palsies and sometimes even hydrocephalus. Viral causes of pachymeningitis are rare. Leptomeningitis is the most common form of meningitis and can be caused by viruses, bacteria, mycobacteria, fungi, protozoa, drugs, and autoimmune disorders. The most fulminant ones need intensive care admission, are usually bacterial and would warrant early empirical antibiotic therapy. The clinical presentation includes pyrexia, headache, vomiting, neck stiffness, seizures and coma.

The clinical presentation of encephalitis can vary widely. Patients might have a decreased level of consciousness, headache, nuchal rigidity and seizures. Seizures are common and focal neurological findings including cranial nerve palsies and hemiparesis may be present. Encephalitis can occur due to both infectious and non-infectious etiologies. Infectious causes include bacteria, fungi, protozoa, and viruses (Table 1).

Cerebral abscesses can form part of the differential diagnosis of encephalitis and these generally present with focal neurological deficits. The clinical presentation may be acute or sub-acute. The most common etiology of cerebral abscesses are gram positive and gram negative organisms arising from middle ear mastoiditis, sinusitis, or dental infection and occasionally from endocarditis [12].

The clinical presentation of TM is based on the portion of the spinal cord that is affected and on the severity of myelin and neuronal damage in the cord. Symptoms include: muscle weakness, paresthesias, neuropathic pain, spasticity, fatigue, depression and sexual, intestinal, and bladder dysfunction. Spinal Cord epidural infections are usually bacterial [13]. Myelitis may be infectious or non-infectious in nature. Non-infectious myelitis is generally immune-mediated, whereas infectious myelitis may be viral, bacterial, fungal and helminthic [14–17].

4. Viral encephalitis in the tropics: specific etiologies

Encephalitis occurs in epidemic outbreaks and may be restricted to certain geographical areas based on the host, vector and invading microorganisms. Non-availability of adequate laboratory techniques due to economic constraints may hamper diagnosis [2,18].

5. Arboviruses encephalitis

Arboviruses infections are transmitted to humans by hematophagous arthropods. The arboviruses important to public health belong to three genera: Flavivirus (Zika virus, Saint Louis encephalitis virus, West Nile Virus, yellow fever virus, Japanese encephalitis virus and Rocio virus); Alphavirus (Venezuelan equine encephalitis and Chikungunya); and Bunyavirus (Oropouche) [19–22].

Increased urbanization leads to a conducive environment for vector-host interactions in tropical and subtropical countries. Eliminating mosquito breeding areas can be an extremely effective and permanent way

Table 1
Etiology of Tropical Encephalitis.

Viral encephalitis	Non-viral etiology of infectious encephalitis			
	Bacterial	Rickettsial	Fungal	Parasitic
HSV-1, HSV-2	<i>Borrelia</i>	Ehrlichiosis	Cryptococcosis	Cerebral malaria
VZV, EBV	<i>Brucellosis</i>	Q fever	Sporotrichosis	Toxoplasmosis
Adenoviruses	<i>Listeria</i>	Endemic & epidemic typhus	Blastomycosis	Trypanosomiasis
Enteroviruses, Poliovirus	<i>Legionella</i>		Coccidioidomycosis	Schistosomiasis
Measles/Mumps/Rubella	<i>Mycoplasma</i>	Rocky Mountain spotted fever	Mucormycosis	
Rabies	<i>Nocardia</i>		Histoplasmosis	
Arbovirus JE/WNE/TE	<i>Salmonella typhi</i>		Paracoccidioidomycosis	
Bunyaviruses	<i>Treponema</i>			
Reoviruses	Tuberculosis			

Herpes simplex virus (HSV-1, HSV-2); Varicella-Zoster virus (VZV), Epstein-Barr virus (EBV), Japanese B Encephalitis (JE), West Nile encephalitis virus (WNE), tick-borne encephalitis viruses (TE).

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