Acute Encephalitis Syndrome - A Complex Zoonotic Disease

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Abstract

Acute Encephalitis Syndrome (AES) is a group of Clinical neurologic manifestation caused by wide range of viruses and bacteria. Japanese encephalitis (JE) is considered as a main viral aetiology of patients with AES. Leptospirosis as a new aetiology of the patients presenting AES. There is seasonal and geographical variation in the causative organism. The outbreak of diseases usually coincides with the onset of climate change where the density of vectors fluctuates for transmission of the infectious organism either biologically or mechanically, while encephalitis due to other viruses specially enteroviruses occurs throughout the year as it is a water borne disease. The newly introduced West Nile Encephalitis (WNE) virus also causes acute encephalitis syndrome. The case fatality and morbidity is very high.

Key Words: Acute Encephalitis Syndrome, Japanese encephalitis, Leptospirosis, Diagnosis, Treatment.

Introduction

Acute encephalitis syndrome (AES) is a group of clinically similar neurologic manifestation caused by a wide range of viruses and bacteria. AES is reported mainly from Assam, Bihar, Karnataka, Tamil Nadu and Uttar Pradesh which contributes approximately 80% of cases (Borah et al., 2011). The case fatality and morbidity is very high. Japanese encephalitis (JE) is considered as a main viral aetiology of patients with AES (Khinchi et al., 2010). Other causes are West Nile encephalitis, Dengue, Chikungunya, Fungal infections, Parasites, Spirochetes, chemical/toxins etc. Leptospirosis is a zoonotic disease and its severe form causes AES (Khan et al., 2012). Specific anti-viral drug for AES including Japanese Encephalitis is not available till date and cases are managed symptomatically. The causative agent of the AES varies with season and geographical location. The outbreak of AES and JE usually coincides with the monsoon and post monsoon period when the density of mosquitoes increases. Encephalitis due to entero-viruses occurs throughout the year as it is a water borne disease.

CLASSIFICATION OF AES:

Suspected case of AES should be classified in one of the following four ways.

i. Laboratory-confirmed JE:
A suspected case that has been laboratory-confirmed as JE.

ii. Probable JE:
A suspected case that occurs in close geographic and temporal relationship to laboratory-confirmed case of JE, in the context of an outbreak.

iii. **Acute encephalitis syndrome (due to agent other than JE):**
A suspected case in which diagnostic testing is performed and an etiological agent other than JE virus is identified.

iv. **Acute encephalitis syndrome (due to unknown agent):**
A suspected case in which no diagnostic testing is performed or in which testing was performed but no etiological agent was identified or in which the test results were indeterminate.

**Symptoms of Acute Encephalitis Syndrome (AES)**
Clinical case of AES affects a person of any age, at any time of year specifically monsoon and post monsoon period. Clinical manifestations includes Acute onset of fever and a change in mental status such as confusion, disorientation, inability to talk and onset of seizures. Other early clinical findings may include an increase in irritability, somnolence or abnormal behaviour greater than that seen with usual febrile illness (Khinchi et al., 2010).

**Japanese Encephalitis (JE)**
Japanese encephalitis (JE) is considered as a main viral aetiology of patients with AES. JE is a mosquito–borne zoonotic viral disease that affects mainly horses, donkeys, pigs and humans. The virus causes reproductive losses in swine and encephalitis in horses. In Birds, which are infected asymptomatically, serve as important reservoir hosts. In humans, Japanese encephalitis can be a very serious disease, although most infections are asymptomatic, clinical cases tend to manifest as severe, often fatal encephalitis (Dutta et al., 2011).

**Etiology**
Japanese encephalitis virus is an arbovirus (arthropod-transmitted virus) in the genus *Flavivirus* and family *Flaviridae*.

**Transmission**
Japanese encephalitis virus is usually transmitted by mosquitoes in the genus *Culex*. The specific mosquito vectors vary with the region, mainly *Culex vishnui* group (*Culex tritaeniorhynchus, Culex vishnui* and *Culex pseudovishnui*) are the chief vectors of JE in different parts of India. Man to man transmission has not been recorded so far. Pigs and birds belonging to Family Ardeidae (e.g. cattle egrets, pond herons, etc.) are reservoir of infection and are often called as “amplifier hosts”, in the transmission cycle, while man and horse are “dead end” hosts. Humans are usually infected when they are bitten by a mosquito (Dutta et al., 2011).

**Incubation Period**
In horses, the incubation period is usually 8 to 10 days. In man the initial signs, begin after an incubation period of 6 to 14 days.

**Clinical Signs**

In horses, most infections are subclinical. Clinical signs include transient fever, anorexia, lethargy, congested or jaundiced mucous membranes and neurological signs that commonly include difficulty swallowing, in coordination, transient neck rigidity, radial paralysis or impaired vision. This syndrome usually lasts for 2 to 3 days, and the horse recovers without complications.

In pigs, Japanese encephalitis is usually characterized by reproductive disease. The most common symptom is the birth of stillborn or mummified fetuses, usually at term. Piglets born alive often have tremors and convulsions, and die soon after birth. Pregnant sows may also abort. Non pregnant animals are usually asymptomatic. Other domesticated animals can be infected but typically remain asymptomatic (Borah et al., 2011).

**Diagnosis of Japanese Encephalitis**

**Clinical Manifestations in Man**

In man clinical manifestations includes Prodromal fever, headache, nausea, diarrhoea, vomiting, and myalgia which last for few days (1-5 days) followed by irritability, altered behaviour, convulsions and coma. The progression of disease is rapid. Signs of raised intra cranial tension are commonly present in acute stage of illness. The patient may develop difficulty of speech and other neurological deficits like ocular palsies, hemiplegia, quadriplegia and extrapyramidal signs in the form of dystonia, choreoathetosis and coarse tremors.

**Laboratory Tests**

A definitive diagnosis can be made by virus isolation. Japanese encephalitis virus can be isolated in chicken embryo, porcine or hamster kidney cells, African green monkey kidney (Vero) cells, the MDBK cell line or mosquito cell lines (e.g. C3/36). The isolated virus can be recognized as a flavivirus by hemagglutination inhibition or enzyme-linked immunosorbent assays (ELISAs). It can be confirmed as Japanese encephalitis virus by virus neutralization, reverse transcription polymerase chain reaction (RT-PCR) assays. Immunohistochemistry has been used to identify viral antigens in the central nervous system (CNS).

**Management of Cases Of Acute Encephalitis Syndrome (AES)**

Management of Acute Encephalitis Syndrome including Japanese Encephalitis is symptomatic. The treatment of the patients may require, as follow:-

1. **Management of Airways and Breathing.**  
   Give Oxygen if needed

2. **Management of Circulation.**
Give intravenous fluid to correct dehydration and to prevent shock.

3. **Control of Convulsion and Intracranial pressure**

Give anticonvulsant drugs if there was a history of convulsions such as Phenobarbitone (Gardinal/Luminal), Phenytoin (Eptoin/Dilantin) and Sod. Valporate etc.

4. **General management**

Frequent suction either by mucous sucker, or suction machine to be done on an unconscious patient, so secretion may not collect in mouth to avoid aspiration and maintenance the patency of airways. Catheterize the patient to avoid soiling of beds. Place a Nasogastric tube into stomach and do a frequent suction to avoid any vomiting and aspiration. It will also help in decompensation of stomach and decrease intra abdominal pressure. It will help in respiration.

**Control**

1. Strengthening early diagnosis and prompt case management at PHCs, CHCs and hospitals through training of medical and nursing staff.

2. Vector control measures mainly fogging during outbreaks, space spraying in animal dwellings, and antilarval operation where feasible.


4. Pigs should be raised away from horses. Japanese encephalitis vaccines can prevent disease in horses and pigs.

5. The virus can be killed by disinfecting the area with 70% ethanol, 2% glutaraldehyde, 3–8% formaldehyde, 1% sodium hypochlorite, iodine, phenol and iodophors. The virus is also sensitive to heat, ultraviolet light and gamma irradiation (Dutta et al., 2011).

**References**


