

Review Report on Viral Meningitis

Manisha Kacharu Parande

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ABSTRACT: Viruses are likely to be responsible for the majority of episodes of acute meningitis, and viral meningitis is frequently considered to be caused by the commonest pathogens that cause meningitis. This is normally true with enteroviruses, but for many other pathogens that cause viral meningitis, including common pathogens in immunocompromised or infants, viral meningitis is frequently associated with major neurological sequelae and mortality. In recent years, diagnostic tools for rapid and reliable pathogen identification have developed, allowing for more precise and early diagnosis. There has been a modest development in viral meningitis medicines, and most infections still have no viable therapies, emphasising the need for prevention and early diagnosis. This study focuses on viral meningitis management as well as meningitis prevention for infections for which effective vaccinations are available.

Keywords:- Diagnostics, Meningitis, Virus, Therapeutics, Sequelae, Aseptic, Meningitis.

I. INTRODUCTION :

Infection of the central nervous system (CNS) by bacteria, fungi, protozoa, or viruses is a neurological emergency that requires immediate medical attention. Depending on the existence of meningeal symptoms focal signs and impaired brain function, CNS infections are classified as meningitis encephalitis or meningoencephalitis.

The presence of acute onset of meningeal symptoms and cerebrospinal fluid (CSF) Pleocytosis (>5 with negative bacterial and fungal cultures) confirms aseptic meningitis, which is the most frequent kind of meningitis. Importantly, the majority of instances of aseptic meningitis have no recognised viral cause. Meningitis is difficult to diagnose clinically, but polymerase chain reaction (PCR) testing can assist distinguish between viral, bacterial, and fungal meningitis. Several international investigations that used PCR found that viral meningitis was more common than bacterial or fungal meningitis.

Since the introduction of vaccines, the rate of bacterial meningitis has decreased dramatically,

with several types of viral and bacterial meningitis nearly eradicated. Before the measles, the most common cause of viral meningitis was mump-related meningitis. Although viral meningitis is commonly reported in children, enteroviruses are responsible for a large number of cases in both children and adults.

Only 240 of the 1,607 patient files analysed matched the inclusion criteria; their demographic and clinical features are shown in the table below. The rate of positive viral meningitis was 40.4 per cent among these 240 patients (54.6 per cent male), and the rate of aseptic meningitis of unknown aetiology was 59.6 per cent. The majority of individuals with viral meningitis were under the age of four (66%) and 18.6% were between the ages of five and seventeen. Fever was the most common symptom of viral meningitis (72.2%), followed by headache (25.7%) and vomiting (20.6%); few patients (5.2%) had neck pain/ stiffness, and Kernig's and Brudzinski's symptoms were rarely described (2.1 and 2.1 per cent, respectively). 14 (14.4%) of the 97 patients were admitted to the critical care unit (ICU), with 9 (9.2%) of them being paediatric cases. Encephalitis was not found in any of the ICU patients. Two cases of viral meningitis resulted in death, both of whom were immunocompromised.[1] [3][4][7].

Table : Viral Meningitis Patients With Positive Viral Etiology. [1]

Variable	N (%)
Gender	
Male	52(53.6%)
Female	45(46.4%)
Age groups	
0-4 years	64(66%)
5-17 years	18(18.6%)
18-34 years	6(6.2%)
35-64 years	5(5.2%)
>65 years	4(4.1%)
Symptoms	
Fever	70(72.2%)
Headache	22(25.8%)
Vomiting	20(20.6%)
Photophobia	10(10.3%)
Hypoactivity	13(13.4%)
Decreased oral intake	10(10.3%)
Seizure	8(8.2%)
Altered mental status	6(6.2%)
Signs	
Neck pain/ stiffness	5(5.2%)
Kernig's sign	2(2.1%)
Brudzinski's sign	2(2.1%)
Temperature (°C) (mean +SD)	37.7+0.8
Median Length of stay (IQR)	2(2-4)
Sepsis	3(3.1%)
Intensive care unit (ICU) admission	14 (14.4%)
Death	3(3%)
CSF characteristics	
Median WBC (cell/mm) (IQR)	15(1-84.5)
Median protein (g/L) (IQR)	0.5(0.32-0.81)
Median glucose (mmol/L) (IQR)	3(2.7-3.4)

Table 2: Etiology of viral identified viral meningitis by general and age groups.[1].

Virus	No. of detected		% of positive sample		General No. of positive detection by age				
			Male-	female	0-4	5-17	18-34	35-64	>65
CMV	3	1.3%	2	1	2	0	1	0	0
Enterovirus	60	25%	32	28	41	15	4	0	0
HSV2	2	0.8%	0	2	0	0	0	2	0
HHV-6	19	7.9%	8	11	16	2	0	1	0
HPeV	4	1.7%	3	1	4	0	0	0	0
VZV	9	3.8%	7	2	1	1	2	2	4
Unknown*	0	0%	79	64	101	15	15	10	2

II. OBJECTIVE :

1. Determine the most prevalent cause of viral meningitis.
2. Review the usual symptoms of viral meningitis patients.
3. Explain the various great sustain released ment and care options for viralmeningitis.
4. Describe interprofessional team techniques for advancing viral meningitis management and increasing outcomes by improving care coordination and communication.[2][3][7].

III. PATHOPHYSIOLOGY :

Viruses enter the CNS through a variety of routes. Many viruses, such as enteroviruses, reproduce outside the CNS and subsequently move through the bloodstream. Viruses infectvascular endothelial cells after passing through the blood-brain barrier or being carried across by infected leukocytes (e.g., measles, or herpesviruses). Other viruses, such as polio and HIV, infect the peripheral and cranial nerves, respectively. Viruses may move across the CSF's subarachnoid space once within the CNS, triggering inflammatory reactions that lead to meningitis. Viruses can also move via brain tissue to neurones and glial cells directly or via inflammatory leukocytes.

Inflammatory cells, including lymphocytes that particularly target the infecting virus, concentrate in the CNS once the infection has taken hold. This is accompanied by the creation of local immunoglobulin by plasma cells and the release of inflammatory cytokines such as interleukin (IL)-1, IL-6, and tumour necrosis factor (TNF). Increased permeability of the blood-brain barrier as a result of an inflammatory reaction allows circulating immunoglobulins to enter. Viruses can circumvent an effective immune response by inducing

immunological tolerance or evading immune monitoring. Lymphocytic responses are an important aspect of the immune response to some viruses, as seen in patients with compromised cell-mediated immunity who develop persistent cytomegalovirus (CMV) or varicella-zoster virus (VZV) meningitis. Viruses like VZV can cause disease by inducing cerebral vasculitis, with immunocompetent individuals experiencing large-vessel vasculitis and immunocompromised patients experiencing small-vessel, diffuse vasculitis.[2]

IV. SOURCE OF DATA:

History :

The clinical findings of viral meningitis vary depending on age and immune status, with acute onset typically presenting with fever, headache, photophobia, neck stiffness, nausea, and vomiting. In young children, fever and irritability may present without evidence of meningeal irritation. There is no clear clinical signal to distinguish viral from bacterial meningitis at first presentation. Enteroviral meningitis can mimic bacterial sepsis in newborns, and it can also cause systemic complications such as hepatic necrosis myocarditis, necrotizing enterocolitis, convulsions, or localised neurological abnormalities.

Biphasic fever can occur in older infants and children, with the first phase culminating with systemic constitutional symptoms and the second phase beginning with neurological indications. Adults with viral meningitis are more likely to have meningeal symptoms and a higher CSF protein level. WNV meningitis in adults presenting with CSF is more likely to have a fever, respiratory symptoms, and leukocytosis than in children

with viral meningitis.

WNV is more prevalent in adults than in children, with pleocytosis and lesser motor neuron involvement.

Because many viruses have distinct geographical distributions, it's critical to get a travel history from patients with suspected viral meningitis.

Etiology:

- Enteroviruses
- Herpesviruses
- Flaviviruses
- Mumps
- HIV
- Human parechoviruses
- Herpes simplex virus
- Varicella-zoster virus
- Arboviruses
- Other viruses[3][7][9][10]

Symptoms :

Early meningitis symptoms may resemble those of the flu (influenza), which can develop over several hours or days.

Anyone above the age of two may experience the following signs and symptoms. The majority of persons with mild viral meningitis recover on their own within 7-10 days.

Although the symptoms of viral meningitis are similar to those of bacterial meningitis, bacterial meningitis is usually more severe and can result in serious problems such as brain damage, hearing loss, or learning impairments. Pathogens (germs) that cause disease. Bacterial meningitis can also be linked to sepsis, a potentially fatal condition. The body's severe response to infection is sepsis. Sepsis can quickly progress to tissue damage, organ failure, and death if not treated promptly. If you think you or your kid may have meningitis, see a doctor very once. A doctor can tell you if you have the disease, what's causing it, and how to treat it the best way possible.

- High fever that appears out of nowhere.
- Stiff neck.
- A severe headache that does not appear to be normal.
- Headache accompanied by nausea.
- Vomiting.
- Confusion or inability to concentrate.
- Seizures.
- Sleepiness or a hard time waking up.
- Light sensitivity.
- There is no desire to eat or drink.
- A rash on the skin. (Meningococcal

meningitis, for example).

- Fever
- Photophobia. (Due to the increased sensitivity of the eyes to light).
- Lethargy. (a lack of vitality).

Treatment :

Other than supportive care, most viruses that cause meningitis have no specific therapy. The mainstays of viral meningitis management are fluid and electrolyte management and pain control. Patients should be monitored for neurological and neuroendocrine complications, such as seizures, cerebral oedema, and SIADH.

Because it might be difficult to tell the difference between viral and bacterial meningitis at first, empiric medicines are usually prescribed until bacterial meningitis is ruled out. While culture results are pending, empiric therapy for bacterial meningitis can be given to patients aged one month and older with vancomycin in combination with either ceftriaxone or cefotaxime. If encephalitis is suspected, empiric antiviral treatment with intravenous can be given. For suspected or confirmed HSV or VZV infections, acyclovir should be used. Although it has been demonstrated to help with HSV encephalitis, it has not been proved to help with meningitis.

There is no specific treatment for viral meningitis in the majority of instances; nonetheless, most persons with mild viral meningitis recover entirely in 7-8 days without treatment. Antiviral drugs may benefit persons who have meningitis caused by viruses such as the herpes virus or influenza.

Antibiotics are ineffective in the treatment of viral meningitis because they do not improve viral infections. Antibiotics, on the other hand, kill germs and are crucial in the treatment of bacterial meningitis.

People who develop a severe illness or are at risk of getting one may require hospitalisation[4]

Case Studies -:

Patients No. 1

Headache, neck stiffness, photophobia, and vomiting were reported by a 37-year-old lady. She had been feeling increasingly ill over the previous ten days and had sought medical advice on several occasions for acute dysuria; she was being treated for a suspected urinary tract infection. She was febrile and showed symptoms of meningitis during the examination. Vesicles were not found on vulval examination. White cells

(99% lymphocytes), protein 1.6g/l, and glucose 2.8mmol/l were found in the cerebrospinal fluid; no accompanying serum sample was provided. HSV-2 DNA was identified in the cerebral fluid by polymerase chain reaction, confirming the diagnosis of herpes simplex virus meningitis. She was given intravenous acyclovir 10 mg/ kg eight times a day for six days, then oral valaciclovir 1 g eight times a day for two weeks. Her symptoms faded with time, and she was released after six days.

Acute and convalescent type-specific serology revealed a recent primary HSV-2 (HSV-2IgG) infection at the genitourinary clinic two months later. HSV-2IgG infection in conjunction with meningitis and suspected urethritis (HSV-2IgG positive; HSV-1IgG negative; anti-HSV IgM positive). Her husband was also there; while

being asymptomatic, he had significant serological evidence of past HSV-2 infection. She developed recurrent genital herpes a year later, but not meningitis.

Patient No. 2

A 32-year-old woman had been suffering from headaches, fever, and photophobia for three days. Her boyfriend had detected a rash and realised she had perianal pain. Unilateral herpetic lesions were discovered throughout the investigation. Varicella-zoster virus DNA was found in the cerebrospinal fluid, which revealed mononuclear pleocytosis and a protein concentration of 1.2g/l. She was given valaciclovir 1g orally eight hours a day for seven days, as well as opiates for a severe headache. Over three weeks, her symptoms subsided.

Fig.1. Zoster associated with varicella-zoster virus meningitis



Prevention :

Mumps and measles have active immunisation to prevent viral meningitis (MMR) Inactivated polio vaccines are currently available in the UK for Japanese B encephalitis, tick- borne encephalitis, rabies, influenza, varicella, and polio. Given the rate of severe adverse reaction to Japanese B. encephalitis vaccine, polio vaccine with diphtheria and tetanus vaccine 4-8 per 100.000 people have a severe allergic reaction, and 2.5 million people get encephalitis.

Long-term residents in endemic areas and travellers at high risk of infection are frequently

the only ones who get vaccinated. Travelling to places of the world where flaviviral illnesses are common should be avoided to avoid mosquito and tick bites. Using insect repellents impregnated bed nets in particular.

Immunoglobulin therapy, on the other hand, protects patients with primary

immunodeficiency from enteroviral meningitis. In terms of infection prevention, intramuscular administration is not as successful as intravenous therapy. Human immunoglobulin preparations are also available for rabies and tick-borne encephalitis post-exposure prophylaxis. Pregnant women should minimise interaction with rats to avoid congenital LCMV infections.[9]

4.6 Cause :

In the United States, non-polio enteroviruses are the most common cause of viral meningitis. Meningitis affects a small percentage of patients infected with enteroviruses.

Enteroviruses have superseded mumps as the most prevalent cause of viral meningitis in children as a result of mumps, measles, and rubella immunisation. Although enteroviruses are thought to be responsible for 80% of cases in adults, a wider spectrum of causes is increasingly being implicated, and in many cases, no cause is discovered. Only 72 of the 144 adults who developed aseptic meningitis had a verified diagnosis. Herpes simplex virus types 2 (31%), Varicella zoster virus (11%), and herpes simplex virus type 1 were the most frequent, according to 46 % (4 %).[10]

V. CONCLUSION :

The MEPCR panel was utilised to identify viruses that caused 40.4 per cent of the viral meningitis cases in this study. The majority of these instances were males in the paediatric age categories, with enterovirus as the cause. This study found a low mortality rate of 1.1 per cent, with all of the deaths occurring in immunocompromised individuals.

Despite advancements in the detection of viruses by molecular testing, viral meningitis etiologies remain underdiagnosed. This suggests that existing ME multiplex PCR panels should be expanded, or that forthcoming sophisticated technologies like NGS should be used more frequently. Overall, better clinical care for viral meningitis is necessary for the absence of complete and readily available molecular testing, and more research into neuroinvasive viruses is highly suggested.

Viral meningitis is one of the most frequent clinical disorders that affect people of all ages. In adults, it frequently goes unnoticed or results in a self-limited sickness. In infants and toddlers, however, serious consequences might arise, including high fever, mental impairment, and, in extreme cases, death. Many viral causal

agents, such as enterovirus, parechovirus, and herpesviruses, have been linked to viral meningitis. Knowing the most prevalent causal agents for aseptic meningitis can thus aid in a better understanding of the condition and, as a result, offer the foundation for the establishment of prevention and control measures. Many nations, notably those in the Middle East and North Africa (MENA), lack molecular epidemiological research of viral meningitis.

More research is needed to better understand the aetiology and pathophysiology of this illness so that new therapeutic strategies can be developed to assist improve outcomes.[3][12]

VI. QUESTION :

5. What are the signs and symptoms of viral meningitis?

Ans. The earliest indicators of viral meningitis are fever, vomiting, headache, limb pain, and cold hands and feet.

6. Is it possible to recover from meningitis?

Ans - Meningitis can be fatal if left untreated, but prompt medical care and intervention can help the patient survive.

7. What is the sensation of a meningitis headache?

Ans - Unlike a typical headache, a meningitis headache affects the entire head and is not limited to a single area.

8. What are the factors that increase the risk of meningitis?

Ans - Young, Age, Pregnancy, Young, Age, Pregnancy, Young, Age, Pregnancy, Young, Age, Pregnancy A person with a weakened or compromised immune system who lives in a community and refuses to be vaccinated.

9. What is the treatment for meningitis?

Ans - Medical treatment for meningitis varies depending on the type of infection.

Bacterial meningitis necessitates the use of intravenous antibiotics and corticosteroids right away.

Bed rest, fluid drinking, and over-the-counter pain medication are used to treat viral meningitis; antifungal medicine is used to treat fungal meningitis.

In some cases of meningitis, treatment is not required because the condition improves on its own. Doctors prescribe antiviral and antibiotic treatment for non-infection meningitis.

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