WEST NILE VIRUS: AN OLD TALE, NEW MYSTERY

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CASE

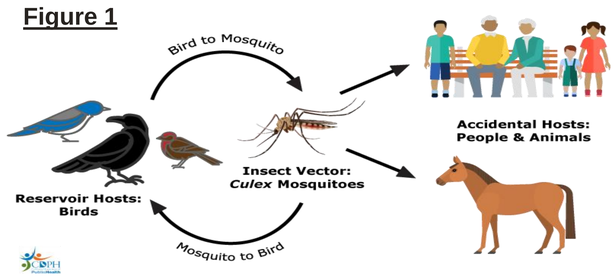
- Elderly male with a past medical history of prostate cancer status-post radiation, myocardial infarction with stents and hypertension presented with a one week history of generalized weakness, decreased appetite and non-productive cough. Vitals signs were: Temp 102.5 F, pulse 77, RR 19, BP 125/65, O2 saturation 96% room air.
- Patient was alert and oriented x3, diminished airflow bi-basilar in nature and diminished lower extremity reflexes. Labs were significant only for serum sodium of 130.
- Over 24 hours, patient had worsening weakness, prominent in the lower extremities with persistent diminished reflexes and non-sustained ventricular tachycardia.
- Progressively unstable vital signs and encephalopathy led to the patient being transferred to ICU and subsequently intubated.
- CT head/chest and thoracic/lumbar MRI were unrevealing for overt pathology. Urinalysis, blood and stool cultures were negative.
- Lumbar puncture (LP) was contraindicated at time of ICU admission secondary to Plavix use. Patient was empirically treated with cefepime and doxycycline for recent travel to Lyme disease endemic area of North Carolina/Tennessee and with IVIG for questionable Acute Inflammatory Demyelinating Polyneuropathy (AIDP).
- Eventual LP analysis was positive for CSF pleocytosis and West Nile anti-bodies (IgM/IgG). Patient was unable to be weaned off ventilator and underwent tracheostomy/gastrostomy tube placement and transferred to long-term acute care facility for further management.

BACKGROUND

- West Nile Virus (WNV), belongs to the Flavivirus family, is considered an endemic disease in many states including Florida.
- In the last decade, the virus has been prominently reported in the Southern and Midwest States.
- The disease is most prevalent during the summer to fall month periods due to elevated temperatures leading to enhanced vector transmission.
- WNV is acquired via the bite of an infected mosquito particularly the Culex species, and is considered as the vector for the disease.
- Equines and humans are incidental hosts of WNV and disease transmission from these sources are rare. There are various human risk factors that are associated with WNV.
- Disease prevalence is reported to be equal among the sexes but peak incidence and mortality rates are seen among those who are 50 years of age and older, with a reported increase of encephalitis or meningitis variants of the disease.
- Comorbidities such as diabetes, hypertension and other chronic illnesses have not been linked to WNV prevalence and disease outcomes.

West Nile Virus Transmission Cycle

Figure 1



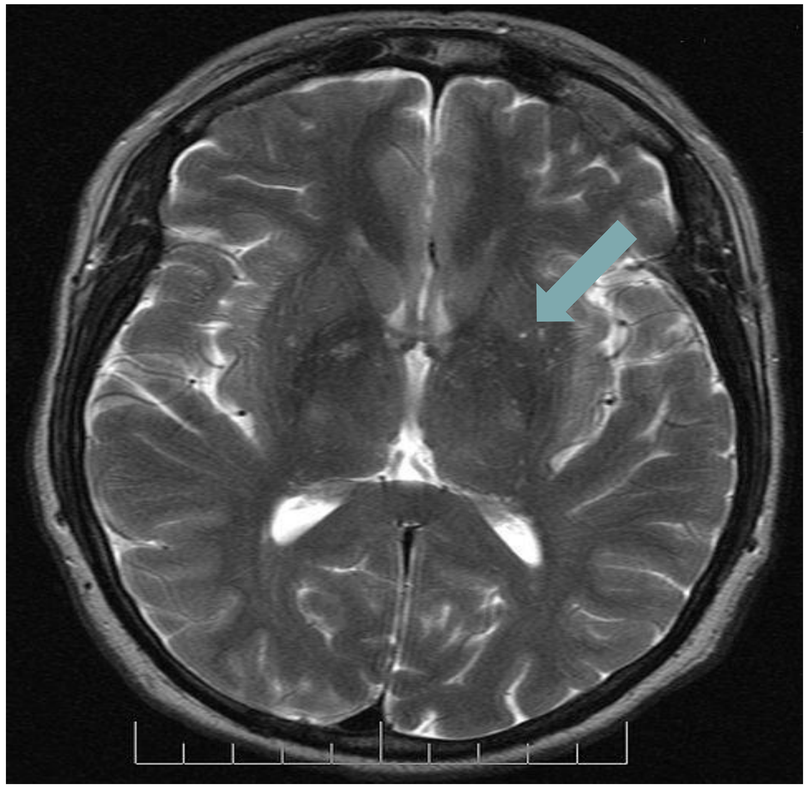


Figure 2: T2 weighted MRI image will indicate High Signal Intensity and Swelling in the Thalamus in patients with West Nile Virus Encephalitis. Hemorrhage may also be noted in this area on occasion.

Classic MRI findings include:

1. **Hyperintensity in the Basal Ganglia and Thalamus.**
2. **Restricted diffusion in the Basal Ganglia and Thalamus**

DISCUSSION

- The case is unique in the rarity of disease presentation, as literature review indicates that <1% of patients develop West Nile neuro-invasive disease (WNND), which includes (encephalitis and/or myelitis), resulting in long-term neurological deficits.
- WNND can present with normal imaging studies, CSF pleocytosis, persistent weakness and cognitive deficits that require long-term management.
- The most validated test for diagnosing WNV is IgM Antibody detection by ELISA of serum of CSF within a time period of eight to twenty one days after symptom onset with a reported sensitivity of 95%.
- There are no current treatment regimens that offer complete disease eradication but there are vaccines in development.
- One such is HydroVax-001 WNV which has been shown promising outcomes with in vitro/in vivo studies to produce significant neutralizing antibody response against WNV.
- WNV is an important cause of viral encephalitis epidemic in the country and has been well recognized as an established seasonal epidemic.
- It is critical for Family Physicians across the nation, especially for those practicing in endemic areas, to include WNV in the differential disease panel for patients in the primary care setting, presenting with vague symptoms and undifferentiated/unexplained weakness and symptoms.

FUTURE DIRECTION / CONCLUSION

- Strategies can be adopted by family practice focused on improving patient learning on prevention techniques such as using DEET containing repellents and outdoor protection with appropriate attire.
- Education on symptom recognition is crucial with severe manifestations including convulsions, weakness and paralysis or mild effects of nausea, vomiting and myalgia.
- It is also important to note that a vast majority of patients may be asymptomatic in the initial stages of infection, with no discernible diagnostic test to determine if a person may develop disease manifestation.

REFERENCES

1. Davis LE, DeBiasi R, Goade DE et al. West Nile virus neuroinvasive disease. *Annals of Neurology.* 2006;60(3):286-300.
2. Hart J, Tillman G, Kraut MA, et al. West Nile virus neuroinvasive disease: neurological manifestations and prospective longitudinal outcomes. *BMC Infectious Diseases.* 2014;14(248).
3. Huhn GD, Sejvar JJ, Montgomery SP & Dworkin MS. West Nile Virus in the United States: An Update on an Emerging Infectious Disease. *Am Fam Physician.* 2003;68(4):653-660.
4. Poore EA, Slifka DA, Raue HP, et al. Pre-clinical development of a hydrogen peroxide-inactivated West Nile Virus vaccine. *Vaccine*. 2017;35(2):283-292.
5. Solomon T., Flavivirus Encephalitis. *N Engl J.* 2004; 351(4):370-378.
6. West Nile Virus (WNV) Fact Sheet. CDC, National Center for Emerging and Zoonotic Infectious Diseases. www.cdc.gov/westnile
7. http://www.westnile.ca.gov/wnv_faqs_basics.php - Figure 1
8. https://commons.wikimedia.org/wiki/File:MRI_T2_Brain_axial_image.jpg – Figure 2

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