

# A Case of Epstein-Barr Virus as rare suspected etiology of Rhombencephalitis

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## INTRODUCTION

Rhombencephalitis is an exceptionally rare inflammatory neurologic condition of the hindbrain that affects the brainstem and cerebellum (1). Symptoms associated with rhombencephalitis include cranial nerve involvement, ataxia, fever, altered consciousness and meningeal signs (2). One third of rhombencephalitis cases have no identifiable cause (2). When an etiology is known, it is often related to autoimmune diseases, paraneoplastic syndromes, lymphoma, prion diseases or infectious causes (2, 3). With increasing regularity, viral infections such as enteroviruses that classically remained in other parts of the body have started spreading to the central nervous systems (4). The most common infectious cause of rhombencephalitis is *Listeria monocytogenes* while rarer causes include tuberculosis, pneumococcal infection, *Brucella*, relapsing polychondritis, HHV6, HSV1 and 2 and Epstein-Barr Virus (EBV) (1, 2). EBV has been documented as a cause of rhombencephalitis in only a handful patients in the literature while well over 100 cases have been documented overall (2). When rhombencephalitis is caused by EBV however, it does not often present with meningeal signs commonly seen in other causes of rhombencephalitis (2). Few case reports are available which detail EBV rhombencephalitis and the treatment thereof. We present the case of a 78 year old gentleman who presented to the emergency department with bilateral lower extremity weakness, ataxia and dizziness for 3 days and was found to have rhombencephalitis suspected secondary to EBV infection to raise awareness of this rare condition.

## REFERENCES

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## HOSPITAL COURSE

78 year old right handed Caucasian male with past medical history significant for TIA, carotid stenosis s/p left CEA, paroxysmal atrial fibrillation, COPD, diabetes, HTN, HLD presented to the emergency department for lower extremity weakness, ataxia and dizziness for 3 days. Because of these symptoms he had sustained multiple ground level falls at home over the past 3 days. Initial head CT was obtained and showed nonspecific white matter changes and mild generalized proximal volume loss. Soon after admission he was found to have significant aspiration with solids and liquids. MRI brain without contrast was obtained which showed signal abnormality in the medulla consistent with rhombencephalitis (Image 1A and image 1B). There was no leukocytosis, or fever, but COVID-19 test was found to be positive. Repeat MRI brain with contrast was obtained which confirmed signal abnormality, but did not demonstrate mass-like enhancement. Lumbar puncture did not reveal active meningeal infection with negative cultures and negative viral testing. Further viral serologies were sent out and active EBV infection was confirmed. Viral, bacterial, and standard laboratory testing were within normal limits, while autoimmune and paraneoplastic laboratory results were still pending. The patient was treated symptomatically and with corticosteroids and while clinical status worsened due to COVID pneumonia, repeat MRIs showed reduction in signal intensity at the medulla significant for decreasing inflammation (Image 2 and Image 3). This patient was diagnosed with EBV rhombencephalitis, with suspicion of Covid possibly being cause of rhombencephalitis. The autoimmune and paraneoplastic panel returned positive for Voltage-Gated Calcium Channel Antibodies (VGCC Ab), a concern for Lambert-Eaton Myasthenic Syndrome (LEMS). A repeat VGCC Ab test was sent out, and the patient was briefly treated in the interim with IVIG, given his weakness. The patient did not show improvement with this therapy and the repeat VGCC was negative. The patient's overall mentation continued to decline with brief intermittent periods of improvement. He had been off of anticoagulation and antiplatelet medication due to anemia, due to a suspected GI bleeding, with positive fecal occult blood test. He was found to have a small acute pontine infarct on MRI. The patient went into acute respiratory failure days later, requiring rapid sequence intubation. He was optimized for placement of tracheostomy and percutaneous endoscopic gastrostomy tube placement. The next morning, the patient was found to have fixed pupils, and CT and CTA of head showed no acute changes. His left pupil remained fixed the next day; while the patient was being transported for MRI of head, he went into pulseless electrical activity cardiac arrest with ROSC achieved after receiving one round of CPR with epinephrine. The family agreed soon after to initiate comfort care only and the patient expired that night.



Image 1A: Sagittal MRI FLAIR image that demonstrates hyperintensity in the medulla consistent with rhombencephalitis.

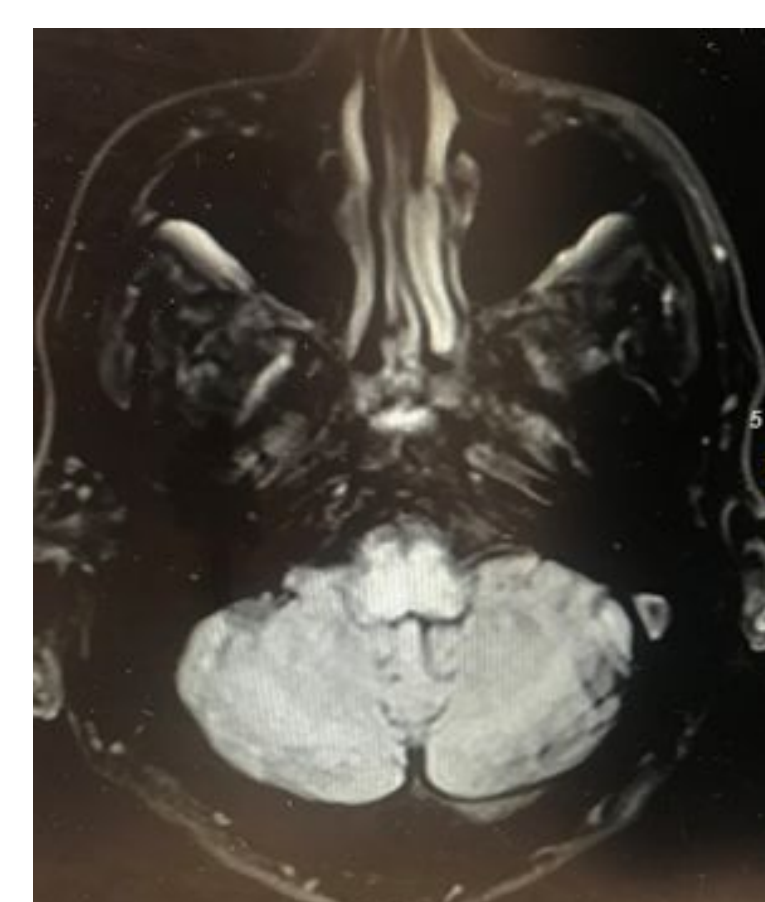


Image 1B: Axial MRI FLAIR image, redemonstrating the hyperintensity seen in Image 1A.

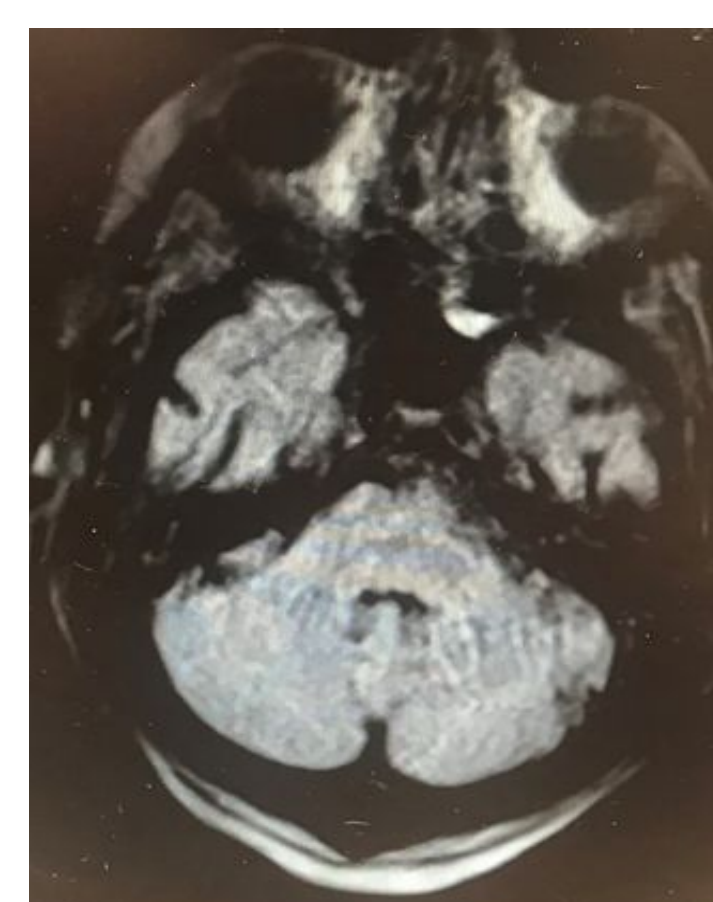


Image 2: Axial MRI FLAIR image showing improvement of the hyperintensity in the medulla.

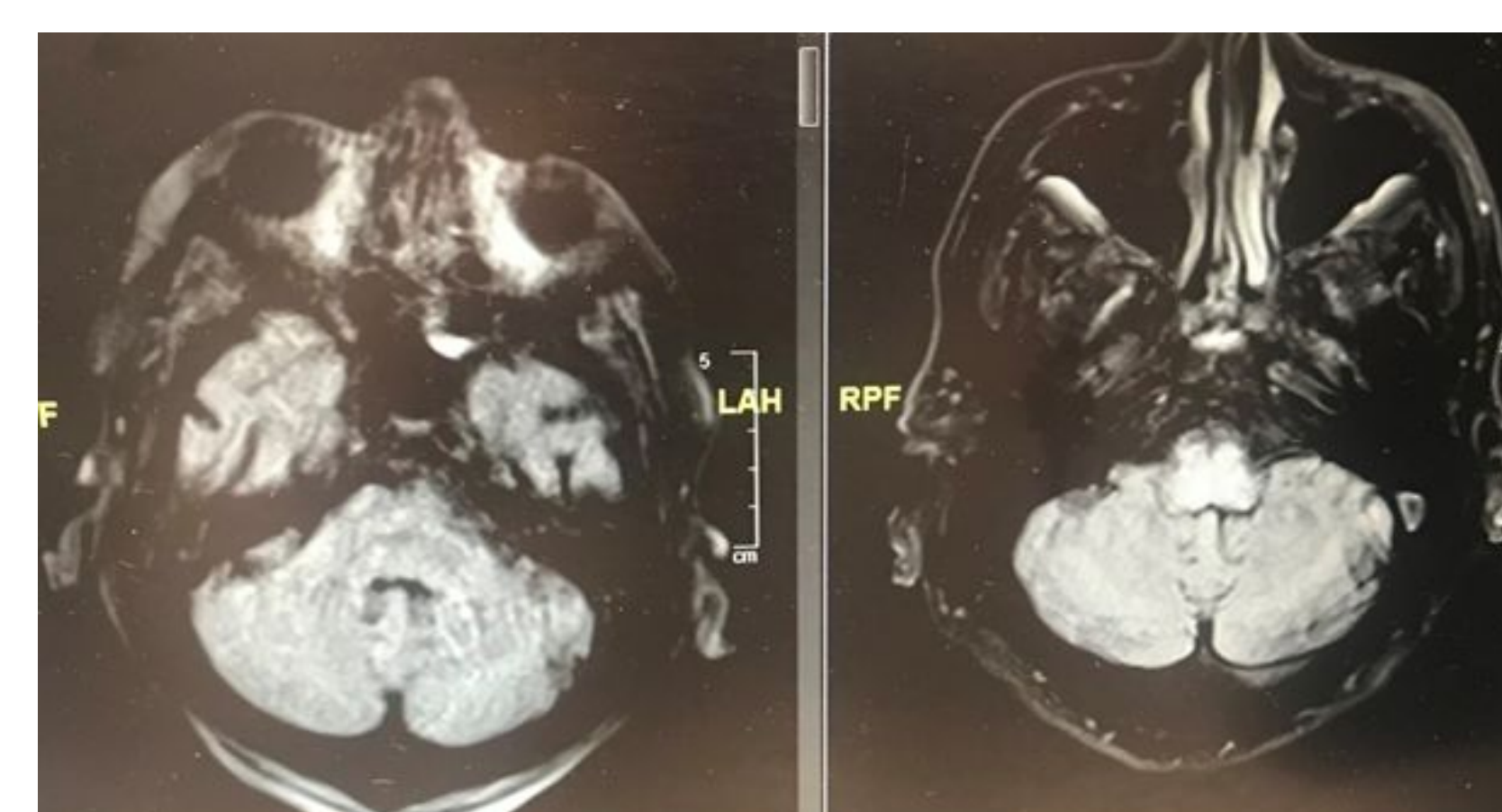


Image 3: This is a comparison with the axial MRI FLAIR images demonstrating the resolution of the hyperintensity seen in the medulla. Original MRI is seen on the right with later MRI showing improvement on the left.

## DISCUSSION

Documentation of cases of rhombencephalitis is low overall with a vast majority of the cases having either an unknown cause or being attributed to multiple sclerosis (MS). In patients with no history of autoimmune or neurologic diseases such as the patient presented here, with *Listeria monocytogenes* as the most common cause (2). Presenting symptoms vary widely based on the etiology of rhombencephalitis with fever and meningeal signs being most common in *Listeria* etiologies and ataxia and being the most common symptoms for EBV and paraneoplastic syndromes (2). This highlights the difficulty in diagnosing rhombencephalitis given the wide range of presentations as well as nonspecificity of presenting symptoms. As such, we believe rhombencephalitis may be underreported due to the variety and inconsistency of presenting symptoms. This highlights the need for a wide differential especially when considering nonspecific complaints from patients.

This patient's particular presentation included active, acute COVID 19 pneumonia which was also treated while the patient was at the hospital. COVID 19 has been known to have neurological effects with a variety of findings on MRI (4). These findings range from hemorrhagic strokes, to ischemia, to leptomeningeal enhancement. Diagnosis of COVID 19 related rhombencephalitis was considered, but was determined to be a less likely cause of this patient's rhombencephalitis given typical presentations and imaging appearance of COVID related neurologic complications. This when paired with positive EBV testing and symptoms consistent with those of other documented cases EBV rhombencephalitis indicate EBV as the most likely cause of this patient's symptoms and imaging findings. However, considering this patient's severe COVID 19 infection which required intubation, affected multiple systems and eventually resulted in his death it is reasonable to consider a role for COVID 19 in his neurologic symptoms in conjunction with EBV as his primary cause of rhombencephalitis.

## CONCLUSION

We believe this case to be a good example of a typical presentation of EBV rhombencephalitis which has poor representation in current literature due to a significantly less common association of EBV with rhombencephalitis. Furthermore it emphasizes the necessity of maintaining a wide differential to discover and treat less common causes of an already uncommon disease process.

## PROGNOSIS

Rhombencephalitis has an overall poor prognosis due to the relative difficulty in early diagnosis and treatment only been proven to be partially beneficial. However, with early diagnosis utilizing MRI imaging, CSF studies analysis and aggressive anti- microbial agents Rhombencephalitis could be actively treated in favor of a better prognosis than the patient discussed.