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CASE REPORT

Linezolid for treatment of ventriculoperitoneal shunt meningitis caused by Methicillin resistant Staphylococcus aureus not responding to Vancomycin.

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ABSTRACT

Methicillin resistant Staphylococcus aureus is a common cause of ventriculoperitoneal shunt meningitis. It carries high morbidity and mortality. We present a case of 8-year male who presented with extradural hematoma secondary to trauma. The patient underwent craniotomy and evacuation of hematoma. Ventriculoperitoneal shunt was placed for hydrocephalus and was discharged home. After one month, he developed fever, abdominal pain and altered sensorium and was diagnosed as pyogenic meningitis secondary to Methicillin resistant Staphylococcus aureus. Patient was treated with Vancomycin and Meropenem and the shunt was exteriorized, but there was no clinical improvement over next three days. Linezolid was initiated. After two days, there was improvement in fever and headache. The distal end of shunt was removed. After 21 days of medical and surgical management of meningitis and hydrocephalus, patient was discharged home. Linezolid may be helpful as a second line treatment of Methicillin resistant Staphylococcus aureus associated ventriculoperitoneal shunt meningitis in patients who fail to respond to Vancomycin.

Keywords: *Linezolid, Vancomycin, ventriculoperitoneal shunt meningitis.*

INTRODUCTION

Ventriculoperitoneal shunt (VPS) is used for treatment of hydrocephalus. Complications like blockage, infection and migration are more common in children than in adults.[1] VPS shunt infection ranges from 5.6% to 12.9%.[2] Staphylococcus aureus is most common pathogen causing meningitis in VPS but Methicillin resistant staphylococcus aureus (MRSA) accounts for 40-60%. Treatment for MRSA meningitis include Vancomycin, Linezolid, Daptomycin and Trimethoprim-Sulfamethoxazole.

CASE REPORT

An 8 years old male presented to the emergency department with history of trauma associated with loss of consciousness, headache and vomiting. At presentation, his Glasgow Coma Scale (GCS) was 7/15 and right sided pupil was 2 mm reactive and left pupil was 5mm and not reactive to light. His pulse rate was 54 beats per min, blood pressure 130/80 mm Hg, respiratory rate 20 breaths/min, oxygen saturation 95% at room air. Respiratory, cardiovascular and abdominal examinations were normal.

His investigation profiles were total leucocyte count of 13,000/mm^3, platelets of 140,000/mm^3 and hemoglobin of 9 gm/dL. Liver function test, renal function test, sodium and potassium was normal. Chest X-ray was normal. Computed tomography (CT) head showed left sided extradural hematoma, (Figure 1) which was surgically evacuated immediately.

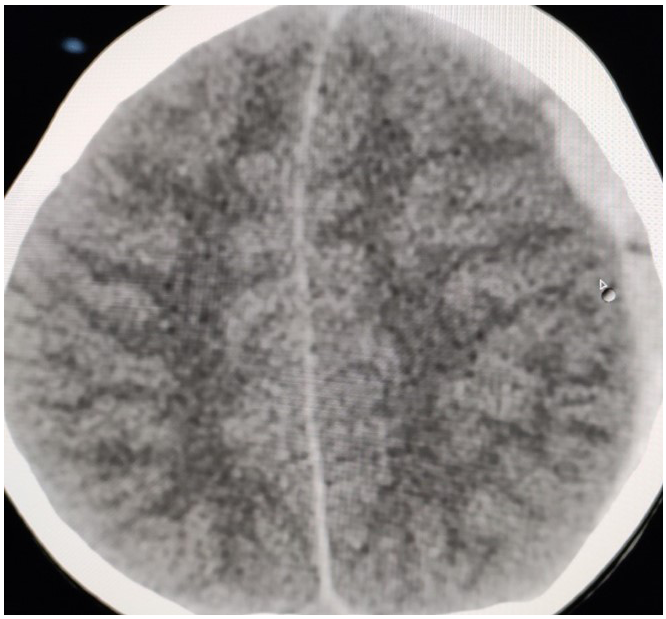

Figure 1. *Computed Tomography of brain showing left sided extradural hemorrhage.*

After 7 days of surgical evacuation, he developed decreased level of consciousness and vomiting. CT head showed hydrocephalus (Figure 2). Ventriculoperitoneal shunt was placed and was discharged after 14 days. He developed fever, headache, vomiting, and abdominal pain after 1 month of discharge. Abdominal examination revealed features suggestive of peritonitis. Cerebrospinal fluid (CSF) analysis showed cells of 400/µL with neutrophil 90%, lymphocyte 10%, protein 115mg/dL, sugar 64 mg/dL and lactate of 5 mmol/L, which was consistent with pyogenic meningitis. CSF culture showed MRSA sensitive to Vancomycin, Linezolid, Doxycycline and Amikacin.

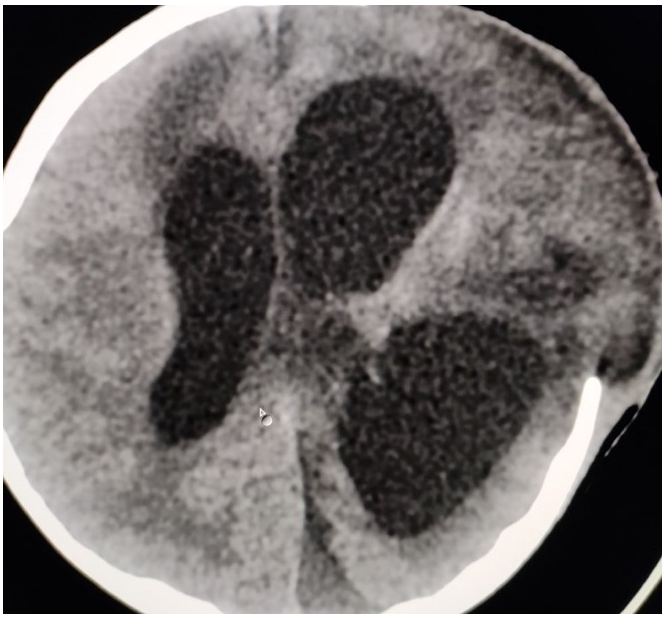

Figure 2*. Computed Tomography of brain showing hydrocephalus.*

Vancomycin at 60 mg/kg/day in 4 divided doses and Meropenem at 120 mg/kg/day in three divided doses was initiated and exteriorization of shunt was done but there was no clinical improvement for 3 days. Vancomycin level was not measured due to unavailability of the test. Intravenous Linezolid was started at 30mg/kg/day in three divided doses. Three days after initiation of Linezolid, patient had improvement in fever, headache and there was decrease in total leukocyte count. Surveillance culture of CSF was performed every alternate day until it was negative. Patient was discharged after 21 days. He was followed every 14 days for 2 month and every 1 month for next 6 month and did not develop any new complications.

DISCUSSION

VPS placement is a common procedure performed in patient with underlying neurological condition like intracerebral hemorrhage, hydrocephalus, post meningitis and arteriovenous malformation. VPS can be complicated with meningitis. MRSA is one of the common offenders. Vancomycin is most commonly used for MRSA VPS meningitis.[3] Like in our case, some patients fail to respond to Vancomycin. This may be due to variable penetration (0 to 18%) of Vancomycin through meninges.[3,4] Drug penetration is unpredictable in the absence of severe meningeal inflammation and when there is concomitant use of anti-inflammatory medications like steroids that hinder drug penetration. Studies have shown that when minimum inhibitory concentration (MIC) for Vancomycin is more than 1µg/ml, alternative therapy needs

to be considered. The reason for failure of Vancomycin in our patient may be due to high MIC.

Linezolid is an oxazolidinone used as alternative to Vancomycin.[4] It has penetration of 70% in meningitis which is greater than that of Vancomycin. Studies have shown that Linezolid is equally effective as Vancomycin in treatment of meningitis.[5] It has same bioavailability in oral and intravenous form, does not require renal adjustment and is cheap. So, it was used in our patient. Myelosupression is a possible complication, which was not observed in our patient. Linezolid has been used for treatment of Vancomycin resistant enterococcus meningitis.[5,6] Guidelines support the use of Linezolid as a second line agent for MRSA meningitis in patients not responding to Vancomycin.[6,7]

To conclude, Linezolid can be a reasonable second line agent for treatment of MRSA VPS shunt meningitis in patients not responding to Vancomycin.

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