



## **Vancomycin Induced Red Man Syndrome in Infant with Obstructive hydrocephalus 2<sup>o</sup> to Arnold Chain Malformation**

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### **ABSTRACT**

6 months old Indian Girl with underlying obstructive hydrocephalus secondary to Arnold-Chiari malformation and ruptured lumbosacral myelomeningocele, repaired on Day 2 of life (19/12/13) with problem of gross hydrocephalus block VP shunt associated with CONS, for removal of VP shunt and Omayra reservoir on Saturday with Day 26 post-revision of VP shunt. Child completed IV Cefazolin 280mg QID for 14days, CSF C&S x3 shows *Staphylococcus Aureus* coagulase negative, currently on IV Vancomycin 85mg 8hourly (15mg/kg/dose). Child developed facial puffiness and periorbital edema after last IV Vancomycin dose. No reaction after latest dose of IV Vancomycin.

**Keywords:** Red Man Syndrome, Obstructive Hydrocephalus, Arnold Chain Malformation, Paediatric

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## INTRODUCTION

Hydrocephalus is due to excessive cerebrospinal fluid (CSF) caused by a disturbance of absorption, flow or formation that accumulated within the head.<sup>1</sup> Pediatric hydrocephalus (HC) is a surgical disorder. Most conditions are lethal if did not treat it in time.<sup>2</sup> Hydrocephalus can be acquired or congenital. Acquired hydrocephalus occurs at the time of birth or after birth. Acquired hydrocephalus can develops at all ages by injury or illness. Congenital hydrocephalus is excessive CSF present at birth. This may be caused by influence on baby during fetal development such as bleeding in the fetus, infections, brain malformation or genetic defect. There are another two types of hydrocephalus, communicating and non-communicating. When obstruction of the flow of CSF occurs after it leaves the ventricles, it is known as communicating hydrocephalus. However, movement of CSF between the open ventricles may still occur. Non-communicating hydrocephalus develops during the obstruction of CSF along the narrow passages associating the ventricles.<sup>3</sup> When production of CSF exceeds absorption, intracranial pressure (ICP) also increases. At the time ICP increases to high levels, CSF production will start to drop and stabilization of hydrocephalus at a new steady state in order to compensate the abnormal ICP may take place by transventricular absorption of CSF.<sup>1</sup>

## RESULTS AND DISCUSSIONS

A 8 month old female, Indian in race, with a known surgical history of 3 months post ventriculoperitoneal (VP) shunt insertion for arnold chain malformation with obstructive hydrocephalus and repair of ruptured myelomeningocele. Patient was admitted in Hospital Sultanah Bahiyah. Patient's mother complaint of increasing in head size, having runny nose and cough for 4 days, chesty cough, noisy breathing and no rapid breathing. At the time of admission, patient was pink and alert. Based on computed tomography (CT) brain scan, shunt revision was carried out on 01/06/2014. Patient was given IV Cefazolin 50mg/kg stat after the surgical procedure, in order to prevent bacterial infection in shunt area.<sup>4</sup> Besides, Patient was given syrup Paracetamol 80mg QID to relieve pain. On the next day, IV Cefazolin 50mg/kg was stopped and replaced with IV Rocephine 275mg because *coagulase negative Staphylococcus* (CoNS) was presence in CSF. 3 days later, IV Rocephine 275mg was off and replaced by IV vancomycin 25mg/kg. At 1.30pm, mother complaint of rashes and swelling over face of patient. IV vancomycin was stop immediately. Doctor discussed with specialist regarding to start other antibiotic for patient as she was allergic to vancomycin. Patient was being monitored closely and to inform stat if baby develop tachpnic or bluish or worsening edema or redness. IV

hydrocortisone was served to treat allergy reaction. After discussion with pediatric team prior to initiation of new antibiotic and to enquire regarding efficacy of brain penetration and any cross reaction with Vancomycin, they decided to start IV Cefazolin again. After course of cefazolin (14 days) was completed, culture and sensitivity test shown that *negative coagulase staphylococcus* was still present in CSF. Since multi-resistant CoNS were difficult to kill or inhibit, vancomycin, which is the drug of choice for this isolates was preferred. So, paediatric team decided to start vancomycin again. Vancomycin dose was change to 10-15 mg/kg, it was infused over 2 hour ( $\leq 10$  mg/min) and concentrated vancomycin was diluted in 30cc H<sub>2</sub>O. Patient did not show any allergic symptom to vancomycin infusion. At 29 June 2014, patient was transferred from 5B ward to Paediatric intensive care unit (PICU). At 2 July 2014, patient was once again transferred from PICU to Paediatric high dependency ward (PHDW) due to lack of beds in PICU. Extubation is done before patient transfer from PICU to PHDW. So, prophylactic IV Dexamethasone 1.5mg TDS and IV Ranitidine 5.5mg TDS were given to patient.

**Table 1: Patient Medication Chart**

No.	Name and Dosage Form of Drugs	Strength	Frequency
1.	IV Cefazolin	50mg/kg	stat
2.	IV Cefazolin	50mg/kg	QID
3.	IV Rocephine	275mg	BD
4.	IV Vancomycin	25mg/kg	TDS
5.	IV Cefazolin	280mg	QID
6.	IV Vancomycin	85mg	TDS
7.	IV Vancomycin	85mg	QID
8.	Syrup Paracetamol	80mg	QID
9.	IV Hydrocortisone	10mg	stat
10.	IV Dexamethasone	1.5mg	TDS
11.	IV Ranitidine	5.5mg	TDS

The exact mechanism of action of cephalosporins show its bacterial activity by inactivate penicillin binding proteins and inhibit peptidoglycan structure cross-linking which then affecting the later phases of bacterial cell wall synthesis. Besides, cephalosporins also trigger bacterial cell autolysins which may be part of the cause for bacterial cell lysis. Cefazolin is 1<sup>st</sup> generation cephalosporin which is having improved spectrum of antibacterial activity, so it is given before the culture and sensitivity test result show out.<sup>5</sup> However, ceftriaxone was shown to be highly potent against a wide range of Gram-negative and Gram-positive clinical bacterial isolates. In the end, it was replaced by IV vancomycin because of widespread use of cephalosporin, many of the bacteria including *Staphylococcus Aureus* have become resistant to this  $\beta$ -lactam antibiotic.<sup>6</sup> CoNS infections had ability to show resistance to multiple antibiotics, so treatment of CoNS infections

always made difficulties. Resistance to methicillin is almost universal among isolates recovered from hospitalized individuals. For this reason, vancomycin is usually the antibiotic of choice in the treatment of CNS infections.<sup>7</sup> Vancomycin may cause red man syndrome (RMS) and anaphylaxis. Rapid infusion of the first dose of the drug and initially abstraction belonging to impurities found in vancomycin preparations may trigger RMS. Its symptoms include pruritus that appears in the face, neck, and upper torso, flushing, hypotension, muscle spasms, dyspnea, dehydration and angioedema. Commonly, patients may complaint about diffuse burning and itching sensation, paresthesia around the mouth, agitated, headache, fever and chills too. However, signs of RMS may appear in 4 to 10 minutes after rapid infusion of vancomycin (<1 hour), used of concentrated or high dose of vancomycin. This hypersensitivity reaction can be trigger by effect of vancomycin on mass cells where degranulation of mast cells and basophils take place, resulting in independent release of histamine regardless of preformed complement or IgE. The degree of histamine release is partially correlated with the rate of the infusion and the amount of vancomycin used on patient.<sup>8</sup> Hence, IV Hydrocortisone 10mg was given to treat vancomycin induced RMS. Hydrocortisone posses anti-inflammatory effect that suppress RMS.<sup>9</sup> Prior to extubation in patient due to transfer of ward, IV Dexamethasone 1.5mg TDS was given to patient. All invasive procedures having some hazards, thus airway mucosal ulceration, inflammation and airway edema can occur and may cause post extubation stridor (PS).<sup>10</sup> Corticosteroids because of their anti-inflammatory action are used to prevent PS. IV Ranitidine 5.5mg TDS was given along with dexamethasone because it is H2 antagonist. It inhibits the gastric acid secretion. Use of dexamethasone may have the risk of causing gastrointestinal ulceration. Concomitant use can reduce this risk.

## CONCLUSION

Present patient was successfully undergo VP shunt insertion but *coagulase negative staphylococcus* were found in CSF fluid of patient. Patient had taken various antibiotics in order to get rid of this bacterial infection. Current case was staying in PHDW to continue her vancomycin medication, where as special attention on dose, concentration and infusion rate on vancomycin were done to avoid vancomycin induced red man syndrome.

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