



## Case Report: Clinical Evaluation of Treatment for Congenital Heart Defects (ASD and VSD) with Bronchopneumonia

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### Abstract

Congenital heart defect is one of the common diseases in the HUSM pediatric ward. The defect of the heart exists at birth and there are a few common types of heart defects including atrial septal defect and ventricular septal defect. Bronchopneumonia is the acute or chronic inflammation of the lungs in which the alveoli and/or the interstitial are affected. Most commonly occurring in the elderly and children.

Case Presentation: MAI is a 1 year and 2 months old boy with a weight of 6.1 kg admitted to the ward for congenital heart defects and bronchopneumonia, believed to be community-acquired pneumonia. Patient was diagnosed with ASD and VSD.

Clinical Evaluation: Basically, there are 3 interventions that have been done during the clerking of this patient. One is regarding the toxicity of IV Cefotaxime, treatment wise for pediatric heart failure and the management of the side effects while using Cefotaxime.

The choices of antibiotics are very crucial especially when it comes to pediatrics as they are very sensitive towards the action of the drugs.

Key-Words: VSD: Ventricular septal defect, ASD: Atrial septal defect, Bronchopneumonia, HUSM: Hospital Universiti Sains Malaysia

### Introduction

Congenital heart defect is one of the common diseases that can be seen on a pediatrics ward here in HUSM. According to the American Heart Association (AHA), the term 'congenital' means existing at birth. Thus, it is basically an abnormality presents at birth in certain pediatrics. There are a few common types of heart defects including the ones that this patient is currently having which are atrial septal defect (ASD) and ventricular septal defect (VSD). ASD is where there is the presence of a hole in the wall which responsible for the separation of the top 2 chambers in the heart that is the atrial. Complication of this disease is that the oxygen-rich blood would leak into the oxygen-poor blood chambers in the heart. ASD is the defect in the septum between the heart's atria. VSD is the hole in the wall that separates the lower part of the heart (ventricular).

Blood would then travel from the left chamber into the hole and goes into the right ventricle and then out into the lung arteries. If the VSD becomes enlarged, the extra blood that is being pumped into the lung arteries would cause the heart and the lungs to work even harder causing the lungs to become congested.

Bronchopneumonia is the acute or chronic inflammation of the lungs where the alveoli and/ or the interstitial are affected. It occurs because of descends infection of the bronchi in an acute bronchitis. Normally, it would affects the children and the elderly because of the low body resistance and the impairment of the defense mechanism in the respiratory tract.

### Case Presentation

MAI is a 1 year and 2 months old boy, with a weight of 6.1kg who developed a disease known as congenital heart defects with the presence of atrial septal and ventricular septal defects. Currently admitted for the described disease and bronchopneumonia, believed to be community-acquired pneumonia. Patient was born

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through spontaneous vaginal delivery at HUSM with the weight of 2.8kg on 16<sup>th</sup> February 2012. Patient's mother had gestational diabetes mellitus (GDM) during antenatal and was on GDM diet control before giving birth to this patient. The patient's prenatal history was admitted to the NICU for 1 day for observation and had neonatal jaundice and was given phototreatment. Basically, patient's diet is breast feeding, a small amount of adult diet and porridge. Upon admission, patient was having a high grade fever for 4 days, noted fast breathing for 2 days, lethargic looking and chesty cough. Currently, patient can sit with support, turn and supine, not cruising, not crawling yet, transfer object hand by hand, palmar grasp, respond to sound, following object and babbling. It was noted that the patient's motor age is 4-5 months. There was no immunization taken by the patient till now and there were no known drug and food allergies as well as no family history of heart disease. Before admission, patient took syrup Captopril 3 ml TDS, syrup Lasix 2.5 ml TDS, and syrup Sildenafil Citrate 3 mg TDS. Generally, the blood test was done and it was found that the total white count is high that is  $15.16 \times 10^3$  u/L indicating of infection that is happening in the patient. Other than that is the platelet level which is low with the value of  $194 \times 100/L$ .

### Clinical Evaluation

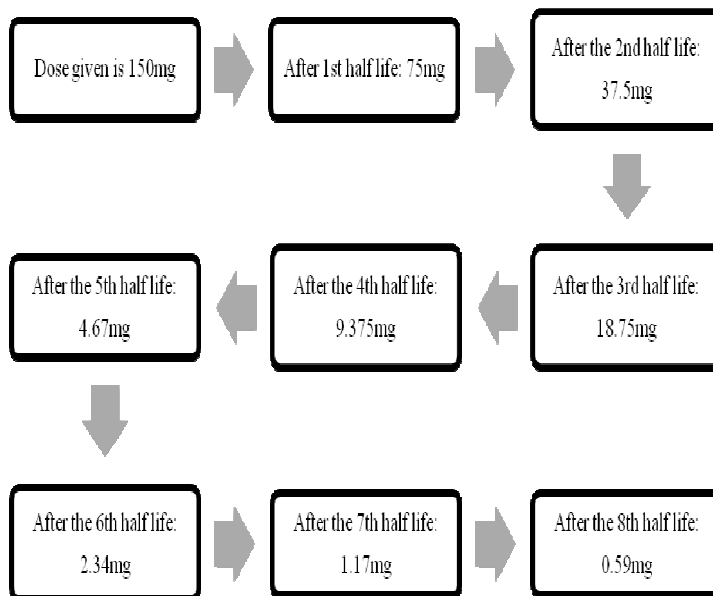
#### Drug Related Problem 1:

IV Cefotaxime 150mg TDS was given to the patient as the doctor diagnosed the patient with bronchopneumonia. There was no culture and sensitivity testing was done to the patient yet till now but they give the antibiotic as prophylactic treatment. Based on Frank-Shann Drug Doses, the dose of Cefotaxime is 25mg/kg every 12 hours or 8 hours therefore by multiplying the amount with the current weight of the patient, the dose is adequate. The drug of choice is also correct as it is suspected to be infection by *Stapylococcus aureus*. However, the concern thing is the toxicity wise of Cefotaxime in this patient. Based on drug monograph on Cefotaxime, about 60% of the administered dose was recovered from the urine during the first 6 hours after the start of infusion. The half-life of this drug is 1-1.5 hours but normally, the range would be 1 hour. Thus, after 6 half-lives, 60% would be excreted out from the urine therefore eliminating the toxic concentration from the blood. This is further supported by the calculated pharmacokinetic profile below:

8 half lives were calculated as the dose was given every 8 hourly. Basically after 8 hours or 8 half lives, the dose remaining in the patient's system is only

0.59mg equal to 586mcg. The MIC for Cefotaxime is 1-4mcg/mL thus even after 8 hours and before the next dose, the concentration of antibiotic in the body is still sufficient to work against the bacteria thus the body is still well protected.

Doctor's note: To continue the antibiotic regimen as stated.



#### Drug Problem 2:

From the Pediatrics Protocol in Hospital Malaysia settings, the pharmacological treatment wise for children with heart failure are diuretics, ACE-inhibitors, inotropes agent and beta-blockers. All have been given to the patient according to the protocol except for beta-blockers and potassium sparing diuretics. The patient only had been given Furosemide, a loop diuretic. Beta-blockers could not be given to the patient as it is only indicated for those who are having mild severity while this patient is not in this category thus explain the administration of Captopril in this patient. Basically, patient with heart failure must be restricted with the fluid intake as the heart could not pump efficiently in circulating the blood throughout the body. Thus, Furosemide is given to the patient to lower the fluid restriction and encourage the fluid elimination from the body. However, the mechanism of eliminating water is that Furosemide would eliminate the sodium as water comes out with it. The main concern is the potassium level as with the elimination of sodium, potassium level could also be dropping. However, in this patient, potassium-sparing was not indicated in

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this patient to preserve the amount the potassium in the body.

Doctor's note: Potassium-sparing (Spirinolactone) was not indicated in this patient as the level of potassium is within the normal range.

Pharmacist's Intervention: To advise the parents to give nutritious food to the patient especially those with high potassium content and to monitor the potassium level.

### Drug Related Problem 3:

Cefotaxime can cause thrombophlebitis in certain patient as the percentage of incidence is less than 1%. However, this patient has developed the described side effect. After 6 days of administration of IV Cefotaxime, patient developed thrombophlebitis thus the doctor needs to change the administration of the drug.

Doctor's note: Change to syrup Cefuroxime 150mg BD as it was difficult to find the IV line in the patient's arms as well as the documented thrombophlebitis.

Pharmacist Intervention: Watch out for any other hypersensitivity reactions that could occur in the patient.

### Conclusion

Upon discussion with the doctors regarding this patient, the choices of antibiotics given are based on their clinical intervention and experiences. Cefotaxime is a good choice of antibiotic for pediatrics with pneumonia but if possible, we need to choose the lowest effective dose to avoid any potential side effects especially in children as they are more sensitive to the drugs action. However, since the patient's IV line is

difficult to be found and it is also better to encourage oral feeding, syrup Cefuroxime is adequate for the patient. The needs to continue on antifailure drugs is important as to compensate the body requirements of blood supply with the current heart condition. Patient is currently has a low body weight thus difficult to do surgery for the patient. Nutritious food need to be given to patient and the intervention by the dietician is also important in helping the patient gaining weight according to the patient's current age which is about 10 kg for a 1 years old boy.

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