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DAPSONE INDUCED METHAEMOGLOBINEMIA IN A PEDIATRIC PATIENT

Paediatrics

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ABSTRACT

Dapsone is a well-known potent cause of methemoglobinemia and hemolytic anemia. We discuss a case of 9yr old female who developed severe methemoglobinemia after being treated with Dapsone for clinically diagnosed leprosy.

KEYWORDS

Dapsone, Methemoglobinemia, Cyanosis, Methylene blue

INTRODUCTION

Dapsone is an anti-microbial agent well known for treating leprosy along with other drugs. Dapsone is often reported as a cause of acquired methemoglobinemia. Dapsone is a synthetic sulphonamide that is used as an antimicrobial to prevent and treat diseases including leprosy, tuberculosis, malaria, pneumocystis carini, Toxoplasma gondii encephalitis as well as anti -inflammatory condition such as dermatitis herpetiformis. However, the drug is also associated with severe adverse effect using dose related hemolysis, methemoglobinemia, psychosis, peripheral neuropathy, agranulocytosis, hypersensitivity syndrome. Of these effects methemoglobinemia is the most common side effect of dapsone. We describe a case of severe methemoglobinemia in a 9yr old female treated with dapsone.

Case Report

A 9 year old female weighed 30 kg with no significant past medical history and no family history of G6PD deficiency or hemoglobinopathy. She arrived at the emergency of pediatric department with her parents .She presented with irritability, nausea and bluish discolouration of nails and lips for past 10 days .She was being treated for leprosy from past 3 months and was on the drugs for the same including Dapsone, clofazimine, and rifampicin.

Upon arrival she had central and peripheral cyanosis. Her oxygen saturation was 75 % on room air. Heart rate -124 / min, RR (respiratory rate) - 40 / min, BP (blood pressure) - 110/70 mmHG, RBS (random blood sugar)-112 mg /dL .The chest was with bilaterally equal air entry, no adventitious sounds heard. Other system examinations were also normal. Methemoglobinemia secondary to dapsone ingestion was suspected .She was started on 10L of oxygen via NRM (non-rebreather mask) which improved oxygen saturation to 86% .Sample was taken for ABG which showed high MetHb level 31.2 %, pH 7.406, pco2 35-40; mmHG, HCO3 21.9mm/L .Her liver and renal function test were within reference ranges and the finding from the chest x ray was unremarkable.

Dapsone was discontinued and she was put on maintenance fluid with the 1st dose of methylene blue (1mg/kg over 5 minutes) was given as soon as it became available (about 8hr after her presentation).The patient's peripheral cyanosis immediately improved after the first dose of methylene blue and her irritability resolved. One hour after first dose of methylene blue the patient's MetHb level decreased to 5.6%.She received two more boluses of methylene blue and was shifted to paediatric intensive care unit .After 3rd dose MetHb level came to 4.3 % and oxygen saturation improved to 94 % at room air and symptomatic relief was present .Two days later she was clinically well with oxygen saturation of 97% at room air as measured by pulse oximeter and MetHb level 1.8 % and cyanosis resolved .she was discharged on the next day with advice of follow up.

DISCUSSION

Methemoglobinemia is a potentially fatal condition that arises from the oxidisation of ferrous iron (Fe2+) of heme to ferric iron (Fe3+). This results in inability of oxygen to bind to Hb dose reducing oxygen carrying capacity of RBC, producing cyanosis and characteristic chocolate brown colour venous blood which occur at MetHb level of 10 to 15%. Further progress cyanosis and the development of other symptoms such as tachycardia, headache, irritability, fatigue and weakness occur with MetHb level 25-50 %. MetHb level of higher than 70 % are considered fatal. Dapsone is known cause for methemoglobinemia and hemolytic anemia. Management of methemoglobinemia can vary depending on the severity of the patient condition. Asymptomatic patient may require only stopping the causative agent. However, for symptomatic patient or patient with level exceeding more than 20% antidote treatment with methylene blue is indicated which acts as a cofactor in the NADPH system and acts by reacting within RBC to form leukomethylene blue, which is a reducing agent of oxidised haemoglobin converting the ferric ion (Fe3+) back to its oxygen carrying ferrous state (Fe2+). In turn, this will increase the oxygen - binding capacity of hemoglobin and thus increase oxygen delivery to tissues.

CONCLUSION

Dapsone toxicity is a very serious condition that require prompt and effective management. Because of long half-life of dapsone and its active metabolite, dapsone induced methemoglobinemia can be severe and prolonged. Methylene blue is preferable treatment in patient with dapsone induced methemoglobinemia.

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