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International Journal of Pharmaceutical Research & Allied Sciences, 2017, 6(1):213-216

Research Article

ISSN : 2277-3657
CODEN(USA) : IJPRPM

Immune hemolytic anemia induced by ceftriaxone in SCD children

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ABSTRACT

Ceftriaxone is the drug of choice for infection in pediatric population. The ceftriaxone induced hemolytic anemia (CIHA) is a rare condition but fatal and could be associated with multi-organ failure and death in pediatrics especially those with SCD due to their abnormal structure of RBCs. This case report study objected to review the incidence of CIHA in two cases of children with SCDadmitted to Al-Ahmdy Hospital, Almadina Almunawara concluding that despite the rare incidence of ceftriaxone induced hemolytic anemia in pediatric patients with sickle cell disease but still it occurs in two patients admitted to our hospital in 1-year period. Thus, other alternatives for ceftriaxone should be considered in this population to avoid fatal outcomes.

Keywords: *Ceftriaxone, Drug Induced, Hemolytic Anemia, Sickle cell disease (SCD)*

INTRODUCTION

Drug-induced immune hemolytic anemia is a fatal and rare condition that associated with major adverse effect as in case of ceftriaxone, and cefotetan[1].

Ceftriaxone is the antibiotic of choice in pediatric patients specially which sickle cell disease (SCD) in case of sepsis and infection[2].Immune hemolytic anemia that induced by ceftriaxone is a fatal complication despite its rare presentation.It includes formation of antibodies against ceftriaxone that induces intravascular hemolysis through the immune antigen-antibody complex mechanism[3].

SCD is a predisposing factor for ceftriaxone immune hemolytic anemia and this could be attributed to the repeated used of ceftriaxone and/or the abnormal shape of RBCs in SCD patients [3-5]. This type of anemia is characterized by decrease in the survival rate of erythrocyte and the hemolysis could be diagnosed byreduction of the haptoglobin level and increase in the levels of lactate dehydrogenaseand indirect bilirubin[6].This study reviewed ceftriaxone induced hemolytic anemia in two cases of sickle cell anemia admitted to our hospital during a year of studying SCD patients.

Case 1:

A 5-year old Saudi female was admitted to the hospital with signs of common cold including mild fever, mucopurulent nasal discharge, throat irritation, myalgia and anorexia. The child was subjected to history taking and clinical diagnosis. The case history of the child was sickle cell disease, blood transfusion for 3 times, and

hydroxyurea treatment. The diagnosis of the case was upper respiratory tract infection. On admission, the hemoglobin level was 11 gm/dL, the platelets count was 190×10^3µL and white blood cells count was 5.8×10^3µL. The treatment was initiated and the patient received daily intra-venous ceftriaxone (75mg/kg/day)but twenty minutes after the third infusion of ceftriaxone, the patient experienced severe pain, tachycardia, seizures and loss of consciousness.

The history indicated that the patient had received ceftriaxone seven timed prior this occasion. The infusion was discontinued and the patient received intravenous immunoglobulin and corticosteroid. The laboratory investigations at the time of episodes were repeatedthat revealed severe anemia, thrombocytopenia. Then the patient received packed RBCs and erythropoietin and the lab. Investigations were repeated which indicated an improvement of hemoglobin and platelets levels in the after discontinuation of ceftriaxone (Table. 1).

Table. 2. Laboratory results of case 1:

Investigation	On admission	Post reaction	At discharge
Hb (gm/dL)	**11**	**7.5**	**10.2**
WBCs (µL)	**5.8×103**	**4.5×10^3**	**5×10^3**
Platelets (µL)	**190×103**	**130×10^3**	**176×10^3**

Case 2:

A nine year old Indian boy with sickle cell anemia was presented to our hospital with productive cough, and fever for 4 continuous days. With clinical diagnosis, the child had high fever and auscultation revealed tachypnea with crackles was diagnosed as pneumonia and was confirmed with X-ray (Figure. 1). On admission laboratory investigations were done and the history confirmed that there was no past history of drug allergies, and patient was started on intravenous ceftriaxone once per day. At the second day, the child had signs of icterus and after the third infusion the patient had severe back pain and experienced a shock. The patient's laboratory tests revealed a severe drop on hemoglobin to 7 g/dL without any signs of hemorrhage and the serum bilirubin was 2 mg/dL. The diagnosis of this condition was ceftriaxone induced hemolysis and the drug was stopped immediately. The hemoglobin was increased to 9.7 g/dL after two days with the transfusion of two units of packed RBCs and 4 days after the bilirubin returned to normal value (Table. 2).

Table. 2. Laboratory results of case 2:

Investigation	On admission	Post reaction	At discharge
Hb (gm/dL)	**10.2**	**7**	**9.7**
WBCs (µL)	**7.5×10^3**	**5×10^3**	**8×10^3**
Platelets (µL)	**240×10^3**	**178×10^3**	**212×10^3**
Bilirubin (mg/dL)	**0.5**	**2**	**0.7**

Discussion:

Drug induced hemolytic anemia is a rare condition but could induce fatal complications especially in pediatrics.For febrile children and those having SCD, the most preferred broad spectrum antibiotic is ceftriaxone that can be used in adults as well[7.8].

Ceftriaxone induced immune hemolysis anemia (CIIHA) could lead to sudden drop in HCT value through intravascular hemolysis[3,9,19]. Many studies have confirmed many adverse effects of hemolysis or the profound anemia including renal failure, convulsions, brain lesions, chronic hepatopathy, loss of consciousness and shock[9-13].

The pathway of CIIHA is the anti-ceftrixone antibodies that bind to RBCs surface but not to its membrane proteins and induce immunecomplex reaction, also the SCD patients have abnormal structure of erythrocytes that could contribute to hemolysis[14]. Also, Quillen et al., suggested that the repeated use of ceftriaxone in SCD patients could develop anti-ceftriaxone antibodies[15].

Conclusion

Despite the rare incidence of ceftriaxone induced hemolyticanemia in pediatric patients with sickle cell disease, still it occurs in two patients admitted to our hospital in 1 year period. Thus other alternatives for ceftriaxone should be considered in this population to avoid fatal outcomes.

ETHICS:This study was approved from the Ethical Committee of Ohud Hospital, Almadina Almunawara, Saudi Arabia and a written informed consent was obtained from the parents of included children.

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