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A Case Report on Cefotaxime-Induced Hypersensitivity Reaction

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Eldhose Elias George*[1], Anjali Shaju[1], Bony George [1*] -

[1] Doctor of pharmacy interns, Nirmala College of Pharmacy, Muvattupuzha, India.

[2] - Gastroenterologist and interventional endoscopist, Chazhikatt hospital, Thodupuzha, India.*

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ABSTRACT

Cefotaxime is an antibiotic that is used to treat bacterial infections in humans, animals, and plant tissue cultures. It's used to treat joint infections, pelvic inflammatory disease, meningitis, pneumonia, urinary tract infections, sepsis, gonorrhea, and cellulitis in humans. Cefotaxime injection belongs to a class of drugs known as cephalosporin antibiotics. It works by destroying bacteria. A case report of a 10-year-old male boy who received a Cefotaxime injection and developed a hypersensitive reaction characterized by coughing, shortness of breath, chest pain, throat discomfort, and decreased SPO2 values is presented here. Cefotaxime injection was stopped immediately once the hypersensitive reaction developed, and the condition was treated with hydrocortisone. After discontinuing cefotaxime, the patient's symptoms improved.

INTRODUCTION

Cefotaxime is a beta-lactam antibiotic classed as a third-generation cephalosporin that was originally manufactured in 1976 and is FDA authorized to treat gram-positive, gram-negative, and anaerobic bacteria. [1] Its broad-spectrum antibacterial activity can help treat bacteria that affect the lower respiratory tract, genito-urinary tract, central nervous system, intra-abdominal infections, bone and joint infections, skin infections, gynecologic infections, and septicemia. Cefotaxime can also be administered as a preventative measure before surgery to prevent surgical infections [2].

Cefotaxime works by binding penicillin-binding proteins (PBPs) via beta-lactam rings and reducing the definitive activity of transpeptidation in sensitive bacterial organisms' peptidoglycan cell wall production. Bacterial autolysis is exacerbated by the bacteria's failure to construct a bacterial cell wall. [3]Cefotaxime can be hydrolyzed by beta-lactamases, reducing its bactericidal activity even further. Despite its susceptibility, cefotaxime is relatively resistant to the activities of most -lactamases. Cefotaxime is metabolized in the liver and eliminated primarily through the kidneys after administration. Cefotaxime is metabolized in the liver to desacetylcefotaxime, which is next transformed to desacetylcefotaxime lactone and finally to M metabolites. More than 80% is recovered in the urine, with one-third of it as desacetylcefotaxime. Although desacetylcefotaxime is the most common metabolite of cefotaxime, its action is eight times lower than that of cefotaxime. [4]

The most common side effects of cefotaxime administration are local reactions such as discomfort, edema, and rash. Cefotaxime, like other cephalosporins, does not cause disulfiram-like effects. Cefotaxime should be used with caution when combined with nephrotoxic drugs since it may promote nephrotoxic effects on the kidney. Patients who are allergic to the cephalosporin or penicillin groups may experience anaphylactic reactions, which can be treated with adrenaline, antihistamines, vasopressors, or corticosteroids. Penicillins, for example, can cause non-allergic hypersensitivity as well as type I–IV reactions. These many types of reactions can also occur concurrently. Because of the substantial risk of contact allergy, topical penicillin formulations are no longer available on the market (10 percent). Variants in genes involved in the synthesis or breakdown of inflammatory mediators such as bradykinin, histamine, prostaglandins, or leukotrienes, or the activation of the relevant receptor, can cause hypersensitivity reactions. [5]

The most convincing proof of causality is a dechallenge-rechallenge test, which involves the regression of symptoms after discontinuation of the suspected offending drug and their re-emergence after it is reintroduced, either deliberately (provocative testing) or inadvertently (inadvertent reexposure). Adverse drug reactions (ADRs) are classified into two types: pharmacological ADRs (type A) and hypersensitivity reactions (type B) (type B). Type B reactions are further classified as immediate (within 1 hour, urticaria, anaphylaxis) and delayed (within >1 hour, varied manifestations such as exanthema, hepatitis, and cytopenias). Preventing hypersensitivity is frequently difficult.

CASE SUMMARY

A 10-year-old male child was admitted to the hospital with chief complaints of fever associated with abdominal pain and body pain, 3 episodes of vomiting and multiple episodes of loose stools. Upon admission, the height and weight of the child were 24.5 kg and 135 cm respectively. No history of cough or cold for the patient.Past history shows that there is a history of lower respiratory tract infections in the past. The patient has no significant family history and no drug allergies. The patient had a history of recent food intake from outside 4 days back. He was immunized for age and he was well nourished.

On vital sign evaluation, results were obtained as follows. Temperature - 37.4 degree Celsius, Pulse - 118 beats per minute, Respiratory rate - 28 beats per minute, Blood pressure - 108/70 mmHg, SpO2 - 98%.

The patient was diagnosed with acute diarrheal disease.

Treatment medications given to the patient include Inj. Taxim 840 mg IV TID, Syp. Nutrolin B 4ml BD, Inj. Pantop 20 mg IV OD, Inj. Emeset 4mg IV stat, Inj. Efcorlin 50mg OD.

During the first course of admission of cefotaxime injection, the patient developed a sudden onset of breathing difficulty and cough, chest pain, reduced SPO2 and throat discomfort. Immediately after the development of these symptoms, duty doctors were informed about this. The doctor immediately gave Inj. Efcorlin 50mg IV stat. After giving the injection, saturation starts to increase and breathing difficulty is reduced. On checking spo2, 96% was found.

DISCUSSION

The incidence of adverse reactions to cefotaxime ranges between 1% and 10%. Rashes, pruritus, diarrhoea, nausea, vomiting, and pain at the injection site are all common reactions. Life-threatening reactions, which include anaphylaxis, arrhythmia, and acute renal failure, are extremely rare, accounting for only 1% of all cases. [6] Anaphylaxis is a severe type I hypersensitivity reaction that develops over minutes to hours and involves multiple systems due to the systemic effects of histamine release. After initial exposure, the immune system becomes sensitized to an allergen. Following a subsequent exposure, massive mast cell degranulation and inflammatory mediator release occur, resulting in a severe anaphylactic reaction with circulatory collapse, laryngotracheal edoema, and spasm. [7]

The reaction developed was a new reaction to the patient. An Alert card was given to the patient by the standard by the clinical pharmacist. The doctor stopped the course of antibiotic cefotaxime and shifted to an amoxicillin-clavulanic acid combination. The reaction stopped after discontinuing Cefotaxime. Dechallenge was also performed and was found to be positive. The patients showed type B hypersensitivity reaction, which is immediate. When a hypersensitivity reaction arises, the immediate discontinuation of the triggering drug is the safest option. The reaction itself can only be managed with supportive care, as there is no causally directed treatment.

CONCLUSION

Careful, structured diagnostics in case of suspected hypersensitivity together with adequate documentation (allergy passport) is necessary to avoid incidents in patients receiving subsequent treatment. Consistent use of existing resources (diagnostics and documentation) can help to avoid hypersensitivity reactions or rapidly recognize and treat them, respectively.

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CONFLICT OF INTEREST

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