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Case Report on Therapeutic Duplication of Antibiotics



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ABSTRACT

Therapeutic duplication is the practice of prescribing multiple medications for the same indication without a clear distinction of when one agent should be administered over another. Antibiotics, also known as antibacterials, are medications that destroy or slow down the growth of bacteria. They include a range of powerful drugs and are used to treat diseases caused by bacteria. This is a case report of a male child of age 3 months old was admitted in Paediatric ward in King George Hospital, Visakhapatnam with a chief complaint of fever, cough, cold, shortness of breath since 1 week. The initial treatment includes 265mg IV TID, Inj. Artesunate 2.4cc IV BID. Inj. Clindamycin 80mg IV BID, Inj. Cefoperazone + sulbactam 250mg IV BID, Inj. Amikacin 60mg IV BID, Inj. Ampicillin + Cloxacillin 200mg IV TID, Syp. Paracetamol 5ml TID and later the treatment was done based on symptoms which includes Inj. Cefoperazone + sulbactam 250mg IV BID, Inj. Ampicillin + Cloxacillin 200mg IV TID, Syp. Paracetamol 5ml TID. This may lead to resistance and cautious evaluation must be necessary to monitor such condition.

INTRODUCTION

Antibiotics, also known as antibacterials, are medications that destroy or slow down the growth of bacteria. They include a range of powerful drugs and are used to treat diseases caused by bacteria. Antibiotics cannot treat viral infections, such as cold, flu and most coughs. Several types of modern antibiotics are available, and they are usually only available with a prescription in most countries. Topical antibiotics are available in over-the-counter (OTC) creams and ointments.¹The terms *antimicrobial*, *antibiotic*, and *anti-infective* encompass a wide variety of pharmaceutical agents that include antibacterial, antifungal, antiviral, and antiparasitic drugs.

Obtaining an Accurate Infectious Disease Diagnosis

An infectious disease diagnosis is reached by determining the site of infection, defining the host (eg, immunocompromised, diabetic, of advanced age), and establishing, when possible, a microbiological diagnosis. It is critical to isolate the specific pathogen in many serious, life-threatening infections, especially for situations that are likely to require prolonged therapy (eg, endocarditis, septic arthritis, disk space infection, and meningitis). Similarly, when a patient does not benefit from antimicrobial therapy chosen on the basis of clinical presentation, additional investigations are needed to determine the etiologic agent or exclude non-infectious diagnoses.²The discovery, commercialization and routine administration of antimicrobial compounds to treat infections revolutionized modern medicine and changed the therapeutic paradigm. Unfortunately, the marked increase in antimicrobial resistance among common bacterial pathogens is now threatening this therapeutic accomplishment, jeopardizing the successful outcomes of critically ill patients. In fact, the World Health Organization has named antibiotic resistance as one of the three most important public health threats of the 21st century.³Unfortunately, greater use of antibiotics during the past 50 years has exerted selective pressure on susceptible bacteria and may have favoured the survival of resistant strains, some of which are resistant to more than one antibiotic. If excessive antibiotic use can be reduced, the expectation is that resistant bacteria may be replaced by susceptible bacteria because resistant bacteria may be less “fit” than susceptible bacteria.⁴Multidrug resistant patterns in Gram-positive and -negative bacteria have resulted in difficult-to-treat or even untreatable infections with conventional antimicrobials. Because the early identification of causative microorganisms and their antimicrobial susceptibility patterns in patients with bacteraemia and other serious infections is lacking in

many healthcare settings, broad spectrum antibiotics are liberally and mostly unnecessarily used.⁵The indications for using the beta lactam antibiotics vary from small boils, carbuncles, respiratory and urinary tract infections, ear or eye infections and gonorrhoea to life threatening conditions like ventilator associated pneumonia, meningitis, septicaemia and gangrene to a prophylactic use in bacterial endocarditis, agranulocytosis or in other immunocompromised situations and the prophylaxis of surgical site infections which are secondary to proper aseptic and antiseptic measures. There are certain prevailing notions among the prescribers with respect to the effectiveness of the beta lactam antibiotics that need our attention:

1. The beta lactam antibiotics are effective against most of the bacteria which we encounter in any kind of infection.
2. The combination of the beta lactams with beta lactamase inhibitors is effective against the more resistant kind of organisms.
3. The higher the version, the greater is the sensitivity of the antibiotic against organisms, e.g., among the cephalosporins, the 3rd generation > the 2nd generation > the 1st generation.⁶

The drugs include ceftriaxone, cefoperazone + sulbactam (cephalosporins), ampicillin+ cloxacillin, amoxicillin/clavulanate (penicillins) which come under the class beta-lactam antibiotics.

Mechanism of action:

These drugs interfere with the last step of bacterial cell wall synthesis (transpeptidation or cross-linkage), resulting in exposure of the osmotically less stable membrane. Cell lysis can then occur, either through osmotic pressure or through the activation of autolysins.⁷

CASE REPORT

A male child of age 3 months old was admitted in Paediatric ward in King George Hospital, Visakhapatnam with a chief complaint of fever, cough, cold, shortness of breath since 1 week. High grade fever which was relieved with medications. Patient also had history of haematuria since 1 week and cola coloured urine. He also suffered with pneumonia for which he was treated with ceftriaxone, ampicillin, artesunate and clindamycin before admitting in the hospital as inpatient. The impression in Ultrasonography was found to be: Moderate

amount of fluid in right pleural cavity. The patient was diagnosed as **right side emphysema with R/O pneumonia with R/O malaria with R/O haemoglobinopathies**, for which the initial 15 day treatment includes IVF-800ml, Inj.Ceftriaxone 200mg IV BID, Inj. Amoxicillin+ clavulanate 265mg IV TID, Inj. Artesunate 2.4cc IV BID, Inj. Clindamycin 80mg IV BID, Inj. Cefoperazone + sulbactam 250mg IV BID, Inj. Amikacin 60mg IV BID, Inj. Ampicillin + Cloxacillin 200mg IV TID, Syp. Paracetamol 5ml TID and later the treatment was done based on symptoms which includes Inj. Cefoperazone + sulbactam 250mg IV BID, Inj. Ampicillin + Cloxacillin 200mg IV TID, Syp. Paracetamol 5ml TID.

DRUG	DOSE	FREQUENCY	ROUTE OF ADMINISTRATION	DAYS 1-10	DAYS 11-15
IVF	800ml	-	IV	*	-
Ceftriaxone	200mg	BD	IV	*	-
Amoxicillin+ clavulanate	265mg	TID	IV	*	-
Artesunate	2.4cc	BD	IV	*	-
Clindamycin	80mg	BD	IV	*	-
Cefoperazone + sulbactam	250mg	BD	IV	*	*
Amikacin	60mg	BD	IV	*	-
Ampicillin + Cloxacillin	200mg	TID	IV	*	*
Syp. Paracetamol	5ml	TID	PO	*	*

Laboratory data include haemoglobin:5g/dl, PCV:17%, neutrophils:75%, lymphocytes:13%, eosinophils:9%, Basophils:5%, total leucocyte count: 25,600. While coming to general examination Pulse rate: 130 beats/min, spo₂:98%, tachypnea, CVS: S₁, S₂+, CNS: B/L pupil, Normal in size and reactive to light, Respiratory system: normal vascular breath sounds.

CLINICAL PHARMACIST INTERVENTION

There are no serious drug interactions in the case as per the data available from ‘Medscape’, but prescribing more number of antibiotics from the same class is unnecessary and this may lead to development of resistance especially in the case of antibiotics. As these antibiotics belong to same class i.e, beta lactam antibiotic and which have broad spectrum activity hence it is necessary to avoid prescribing combination of antibiotics concomitantly and these can be

prescribed on rotation basis to avoid development of resistance. Therefore evaluation of clinical pharmacist is important to identify and rectify such problems.

DISCUSSION

Antibiotic therapy should be always definitive or empirical but not blind or prophylactic. In this case report, we observed duplication of same class antibiotics i.e, beta lactam antibiotics which indicates that these drugs are prescribed blindly. This duplication should be avoided as it may lead to development of resistance in patient to that particular class of antibiotics and it may also increase the cost of treatment. Due to the resistance, these antibiotics may not show their activity in future which may complicate the patient treatment. While comparing our work with Economic Impact of Redundant Antimicrobial Therapy in US Hospitals⁸, they concluded that there might be pervasive use of redundant antimicrobial therapy within US hospitals and their appropriate use of antimicrobials may reduce the risk of harm to patients and lower healthcare costs.

CONCLUSION

As the patient is paediatric, therapy should be done carefully. This kind of duplication of drugs should be avoided as they cannot express any adverse effects related to drugs. Duplication therapy of antibiotics will lead to development of more number of adverse drug reactions, antibiotic resistance and also increases the economical burden to the patient. Hence it is necessary to avoid prescribing combination of antibiotics concomitantly and these can be prescribed on rotation basis to avoid development of resistance. Therefore evaluation of clinical pharmacist is important to identify and rectify such problems. The patient should be monitored regularly and checked for any development of any resistance.

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