Sai Priya Marrapu et al. / International Journal of Pharmacy & Therapeutics, 5(4), 2014, 273-276.

e- ISSN 0976-0342
Print ISSN 2229-7456

International Journal of Pharmacy & Therapeutics

Journal homepage: www.ijptjournal.com

IJPT

ROLE OF CLINICAL PHARMACIST - A CASE OF PNEUMOCOCCAL MENINGITIS WITH INTERVENTIONS

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ABSTRACT

This is a case of Pneumococcal meningitis observed in a 36 year old male patient. His current prescription when reviewed by the clinical pharmacist was found to be irrational and on further follow up the disease was found to be progressing. Drugs irrationally used in this case are Dexamethasone and Mannitol, ADR (constipation) of ondansetron was ruled out using Naranjo causality assessment and WHO scales by which the ADR was categorized under probable. Interventions were made by providing suitable authenticated references to the physician and as a quote of acceptance physician changed the treatment regimen. This shows the importance of clinical pharmacist in promoting rational use of drugs .

Key Words:- Pneumococcal meningitis, Dexamethasone, Mannitol, Intervention.

INTRODUCTION

Bacterial meningitis is a medical, neurologic, and sometimes neurosurgical emergency that requires a multidisciplinary approach and it refers to inflammation of subarachnoid space or spinal fluid (Diederik van de B *et al.*, 2006). Approximately 1.2 million cases of acute bacterial meningitis, excluding epidemics, occur every year around the world, resulting in 135,000 deaths. CNS infections were primarily community acquired but few are nosocomial.Bacterial meningitis is may be due to Nisseria meningitides, Streptococcus pneumonia, Hemophilus influenzae, Listeria monocytogens and Mycobacterium tuberculosis (Joseph TD, 2011). The most common organisms that cause community-acquired bacterial meningitis are *Streptococcus pneumoniae* and *Neisseria meningitidis*. The incidence of Listeria infection increases in patients over age 50 and in those with compromised cell-mediated immunity (Adarsh B *et al.*, 2012) .Recommended antimicrobial therapy for treating pneumococcal meningitis is vancomycin plus a third generation cephalosporin (ceftriaxone/cefotaxime). Alternative therapy is with meropenem and fluoroquinolones. (Allan RT *et al.*, 2004)

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Case Report

A 36 yr old male patient was admitted in hospital with a past history of pneumococcal pneumonia with the chief complaints of Severe bilateral head ache since 1 month, Neck stiffness since 10days , Fever since 5 days which is associated with chills, Vomiting since 5 days – 5 episodes in a day , Altered mental status since 2 days . On examination patient shows positive signs for Nuchal rigidity test, kernig and brudzinski test. Lab investigation done with cerebro spinal fluid shows increased levels of protein (469mg/dl) and decreased levels of glucose (32mg/dl) and leukocytes (70%). Finally from the above information patient was diagnosed with meningitis caused by pneumococci (Etiology: Hematogeneous spread

from a primary infection site as the patient previously suffered from pneumonia).

DISCUSSION

Dexamethasone 0.6 mg/kg/day was given intravenously every 6 h. (Susan MK *et al*., 1994). Studies in animals have shown that bacterial lysis, induced by treatment with antibiotics, leads to inflammation in the subarachnoid space. Follow Up**:** On Day 11 poorly reactive pupils and on Day 12, diplopia is observed which is an indication of 6th nerve palsy due to raised ICP**.** CT brain was performed which revealed that the lateral ventricles were dilated which is an indication of developing hydrocephalus.

Role of Dexamethasone In Bacterial Meningitis

Corticosteroids are used as an adjunct to antibiotics in the treatment of bacterial meningitis in an attempt to attenuate the intrathecal inflammatory response and thereby reduce mortality and morbidity. Taken together, dexamethasone treatment may be associated with a lower mortality in adults and fewer neurological and auditory sequelae in adults and children from high-income countries, in particular in adults suffering from pneumococcal meningitis (Borchorst S *et al*., 2012), (Van de Beek D *et al*., 2007). On the basis of available evidence, adjunctive dexamethasone therapy should be initiated before or with the first dose of antibiotics and continued for four days in all adults with suspected or proven community bacterial meningitis in high-income countries, regardless of bacterial etiology (Van de Beek D *et al*., 2009). Dexamethasone is not currently recommended for the treatment of gram-negative bacillary meningitis and neonatal meningitis (Chaudhuri A *et al*., 2004). Dose is Dexamethasone oid space, which may contribute to an unfavorable outcome. These studies also show that adjuvant treatment with anti inflammatory agents, such as dexamethasone reduces both cerebrospinal fluid inflammation and neurologic sequalae (Jan De Gans *et al*., 2002). Dexamethasone has anti-inflammatory effects and decreases the release of various cytokines. They inhibit the transcriptions of mRNA for TNF-α and IL-1, and the production of prostaglandins and PAF, reduce vasogenic cerebral oedema, and reduce the production of inducible nitric oxide synthase. Inflammatory changes in meningitis may ultimately lead to nerve damage and deafness (H EI Bashir *et al*., 2003).

Treatment of Raised Intracranial Pressure with Mannitol

Raised intracranial pressure (ICP) is a well recognized complication of meningitis. Increased ICP in patients with bacterial meningitis seems to be multifactorial in origin. Cytotoxic and interstitial edema due to increased permeability of the blood-brain barrier is the main factor leading to increased ICP, although increased intracranial blood volume and disturbances in CSF flow may be important. Hydrocephalus is only rarely reported to be the cause of increased ICP at presentation. The aim of the ICP-reducing therapy was to keep ICP at <20 mm Hg. Mannitol, an osmotic agent, is a naturally occurring sugar alcohol that can be used intravenously to decrease the elevated intracranial pressure which is called as osmotherapy (Fatemeh T *et al*., 2011). Osmotherapy—mannitol 25–100 g q4h (0.25 -2g/kg) as needed (maintain serum osmolality <320 mosmol) or hypertonic saline (30 mL, 23.4% NaCl bolus) (Longo *et al*., 2011).

Table 1. Treatment Regimen

S.no	Drug	Roa	Frequency	Dose	Days
01.	Inj ceftriaxone	IV	1 - 0 – 1	2g	D1 – D12
02.	Inj.Ampicillin	IV	6th hrly	2g	D1– D12
03.	Inj.pantoprazole	IV	1-1-1	500mg	D1-D12
04.	Inj.ondansetron	IV	1-0-1	4mg	D1-D8
05.	Inj.Mannitol	IV	1-1-1	100g	D3-D12
06.	Inj.dexamethasone	IV	1-1-1	2CC	D3-D8
07.	Inj.Dexamethasone	IV	1-0-1	2CC	D9-D12

Table 2. Clinical Pharmacist Intervention

01.	Irrational drug use	Tab. Dexamethasone
02.	Drug interactions	Moderate drug interaction between Mannitol and dexamethasone.
03.	Frequency error	Mannitol
04.	ADR	Ondansetron induced constipation.

CONCLUSION

It was found that clinical pharmacist found useful because the irrational use of drugs were identified and reported to the physician.

- Dexamethasonae in meningitis is indicated only for 4 days from the first day of antibiotic initiation at a dose of 0.15mg/kg 1-1-1 or 0.4-0.6mg/day. It Should be administered 15-20 minutes prior to antibiotic administration so that it can Inhibits the synthesis of IL-1beta and TNF-alpha at the Level of mRNA from macrophages and microglia , only before these cells gets activated by bacterial endotoxins released from lysis of organisms after the antibiotic administration . But in this case it was started after 2 days from the initiation of antibiotic therapy and continued till 9 days which is considered to be irrational.
- A moderate drug interaction was identified between Dexamethasone and Mannitol (Anonymous 1)
- Frequency Error with Mannitol: Dose of mannitol - Raised intracranial or intraocular pressure, by intravenous infusion as a 20% solution infused over 30–60 minutes, Adult, 0.25–2 g/kg every 4hourly. (25-100g every 4 hourly) (Marc C. Stuart *et al*., 2008).
- ADR: In this case patient suffered from constipation from day 7 onwards. ondansetron has an ADR of constipation (6-11%) , and the causality assessment was made using Naranjo's causality assessment scale and the naranjo score was found to be 6 thus classifies as Probable ADR(score: 5-8)(Naranjo CA *et al*., 1981). According to WHO causality assessment the ADR comes under the Probable category.

After the interventions were made along with suitable authenticated references, physician has accepted and changed the treatment regimen as follows:

- Stopped using dexamethasone.
- Mannitol was given q4h at a dose of 100gm and other measures were taken to decrease intracranial pressure.
- Serum potassium levels were monitored. (No serious alterations found).
- Stopped ondansetron and Prescribed, Tablet Bisacodyl 5mg 2 tab at bed time from D7-D12 to treat ondansetron induced constipation.

This case report accentuates the importance of regular case follow up by the clinical pharmacist and also reflects the importance of Clinical pharmacist intervention when comes to the Pharmaceutical care. It is the duty of a pharmacist as health care professional to implement RUD (Rational use of drugs), which improves Patient's Quality Life (QOL).

ACKNOWLEDGEMENT

I would like to give thanks to my colleagues & my professors for guiding me in assessing the casual relationships of drugs and their effects. The authors are thankful to Dr.Ramarao. Nadendla (Principal, Chalapathi institute of Pharmaceutical sciences) and to doctors (department of General Medicine, Government general hospital, Guntur, Andhra Pradesh, India) for providing all the facilities and support to carry out this work.

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