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Colisitn & Multidrug resistant Acinetobacter sepsis in a neonate

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Abstract

Acinetobacter infections are uncommon but, when they occur, usually involve organ systems that have a high fluid content. A. baumannii is intrinsically multidrug resistant. Relatively few antibiotics are active against this organism. We present here a case of multi drug resistant acinetobacter sepsis successfully treated with colistin, a previously abandoned polymyxin antibiotic.

Key words Acinetobacter baumanii, Colistin, Neonate

INTRODUCTION

Acinetobacter baumanii infections are an emerging source of morbidity and mortality in neonatal intensive care units. Relatively few antibiotics are effective against this organism. The use of colistin, a previously abandoned polymyxin antibiotic has emerged successful in the treatment of multidrug resistant acinetobacter sepsis.

CASE PRESENTATION

Index case was a 1.215 kg, male baby, born by normal vaginal delivery at 29 weeks of gestation, to a 32 year old multi gravida mother with history of foul smelling discharge per vaginum from 28 weeks of gestation. At birth, baby had tachypnea and cyanosis with intercostal recessions and expiratory grunt. A diagnosis of preterm, very low birth weight with hyaline membrane disease was made and baby was intubated, given surfactant and ventilated with empirical antibiotics. Baby was initially treated with ampicillin and gentamicin empirically in view of maternal sepsis. Maternal high vaginal & cervical swab cultures did not grow group B streptococcus.

Chest x ray was consistent with the diagnosis of Hyaline Membrane disease and arterial blood gas showed respiratory acidosis. By postnatal hour 13, baby developed signs of poor perfusion and was started on dopamine infusion and given packed red cell infusion. Baby improved within 24 hours, was extubated and onto CPAP (continuous positive airway pressure). On post natal day 7, baby developed tachycardia, mottling, pallor and prolonged capillary refill time suggestive of late onset sepsis. When baby worsened the antibiotic was upgraded to Meropenem. But, the blood culture yielded A. baumanii sensitive only to Colistin. Baby was then started on IV colistin which was continued for 10 days. Baby improved over next few days and oral feeds were stepped up and discharged home. At follow-up now at 6 months of age, baby is doing well and gaining weight with normal milestones of development.

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DISCUSSION

The genus Acinetobacter consists of strictly aerobic, gram-negative coco-bacillary rods that grow at 200 to 300 C on usual laboratory media. Its clinical significance, especially over the last 15 years, has been propelled by its remarkable ability to upregulate or to acquire resistance determinants, making it one of the organisms threatening the current antibiotic era. Acting in synergy with this emerging resistance profile is the uncanny ability of A. baumannii to survive for prolonged periods throughout a hospital environment, thus potentiating its ability for nosocomial spread. The organism commonly targets the most vulnerable hospitalized patients, those who are critically ill with breaches in skin integrity and airway protection. Most infections involve organ systems with high ? uid content, such as respiratory tract, peritoneal ? uid, and the urinary tract, and are associated with indwelling devices.[1]

A. baumannii is intrinsically multidrug resistant. Relatively few antibiotics are active against this organism. Multi-drug resistance (MDR) is defined as acquired non-susceptibility to at least one agent in three or more antimicrobial categories, Extensively drug resistance (XDR) is defined as non-susceptibility to at least one agent in all but two or fewer antimicrobial categories (i.e. bacterial isolates remain susceptible to only one or two categories) and Pan drug resistance (PDR) is defined as non-susceptibility to all agents in all antimicrobial categories.[2] Medications to which Acinetobacter is usually sensitive are Meropenem, Colistin, PolymyxinB, Amikacin, Rifampin, Minocycline and Tigecycline. In general, first-, second-, and third-generation cephalosporins, macrolides, and penicillins have little or no anti-Acinetobacter activity, and their use may predispose to Acinetobacter colonization.

Patients with Acinetobacter colonization often have a history of prolonged hospitalization or antimicrobial therapy (with antibiotics that have little or no activity against Acinetobacter). Culture of the appropriate body fluid that is properly transported, plated, and incubated grows A. baumannii. Recovery of the organism from non-sterile body site (e.g. endotracheal secretions, urine in patients with foley's catheter) does not indicate or imply an infectious pathogenic role. In outbreaks, Acinetobacter is easily cultured from monitoring devices or biological fluids from multiple patients as part of an epidemiological investigation. While colonization should not be treated, infection should be treated. Proper hand washing before and after touching patients aids greatly in containing the spread of infection. Proper sterilisation of all equipments after use on a patient with

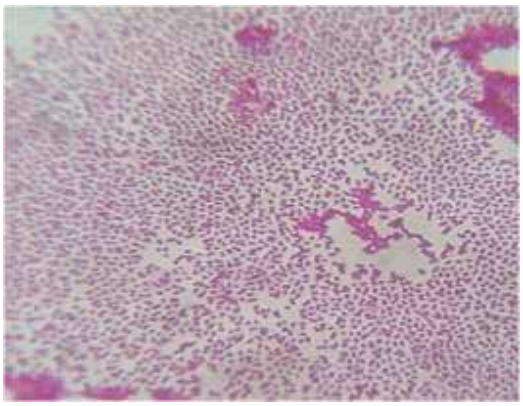

Figure 1 - Fusiform cocco-bacillary forms of Acinetobacter baumannii in Hematoxylin-eosin stain.

colonisation or infection is mandatory.[3]

Colistin was discovered in 1949 and was non-ribosomally synthesized by Bacillus polymyxa subspecies colistinus Koyama.[4,5] Two forms of colistin are commercially available, colistin sulfate and colistimethate sodium (also called colistin methanesulfate, pentasodium colistimethanesulfate, and colistin sulfonyl methate). Colistimethate sodium is less potent and less toxic than colistin sulphate.[6,7] The target of antimicrobial activity of colistin is the bacterial cell membrane. The initial association of colistin with the bacterial membrane occurs through electrostatic interactions between cationic polypeptide (colistin) and anionic lipopolysaccharide (LPS) molecules in the outer membrane of gram-negative bacteria, leading to derangement of cell membrane. Colistin displaces magnesium (Mg+2) and calcium (Ca+2), which normally stabilize the LPS molecules, from negatively charged LPS, leading to local disturbance of outer membrane. The result of this process causes increase in permeability of cell envelope, leakage of cell contents, and subsequently, cell death.[8,9] In addition to the direct antibacterial activity, colistin also has potent anti-endotoxin activity. The endotoxin of gram-negative bacteria is the lipid A portion of LPS molecules, and colistin binds and neutralizes LPS.[10]

In a recently published case of meningitis due to MDR A. baumannii, intravenous administration of 1 million IU of colistin every 6 h resulted in sufficient CSF penetration to cure the infection (concentration of colistin in CSF was 25% of the serum concentration).[11] Colistin has excellent bactericidal activity against most gram-negative aerobic bacilli, including Acinetobacter species, Pseudomonas aeruginosa, Klebsiella species, Enterobacter species, Yersinia pseudotuberculosis, Shigella species, Escherichia coli, Salmonella species, Citrobacter species, Haemophilus influenzae and Morganella morganii. Colistin has also been shown to possess considerable in vitro activity against Stenotrophomonas maltophilia strains (83%–88% of the tested isolates were susceptible to colistin in 2 recent studies).[12-14] The dosage of intravenous colistin recommended by manufacturers in United States is 2.5–5 mg/kg (31,250–62,500 IU/kg) per day, divided into 2–4 equal doses (1 mg of colistin equals 12,500 IU).

In our case, the baby was treated with Colistin for a period of 10 days without any adverse effects. The mother's high vaginal and cervical swabs and blood culture did not grow any organisms, probably because she was on antibiotics. Hence, infection in the baby could have been maternal or probably acquired nosocomially due to ventilation and use of antibiotics insensitive to acinetobacter.

The most common adverse effects of colistin therapy are nephrotoxicity and neurotoxicity. Renal toxicity mainly includes acute tubular necrosis manifested as decreased creatinine clearance and increased serum urea and creatinine levels.[16] Both renal and neurological toxicity are considered to be dose-dependent and is usually reversible after early discontinuation of therapy.[17]

CONCLUSION

Multidrug resistant acinetobacter sepsis is an increasing problem in intensive care settings especially, in patients with multiple intravenous lines, catheters and on multiple antibiotics and colistin can be life- saving in such situations, as in this case.

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