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Case Report Open Access

Neonatal Ventriculitis with Multi Drug Resistant *Acinetobactor baumanii*: A Case Report and Review of Literature

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Abstract

Meningitis due to Multi Drug Resistant *Acinetobacter baumannii* (MRAB) is a serious emerging problem in pediatric intensive care. Treatment of these patients is challenging and polypeptide antibiotic is an important option but have poor cerebrospinal fluid (CSF) penetration. We describe our experience of a successfully treated neonatal ventriculitis and meningitis due to MRAB with intraventricular polymyxin B.

Keywords: Neonatal ventriculitis; *Acinetobacter baumannii*; Polymyxin B

Introduction

Neonatal meningitis and ventriculitis due to multi drug resistant *Acinetobacter baumannii* (MRAB) is an emerging trend in the intensive care units across the world [1,2]. These patients are difficult to treat and remain a challenge. Polypeptides are one of the main stay of the treatment [3,4]. But it has poor CSF penetration and hence intraventricular injection therapy is required. We report a case of neonatal septicaemia with meningitis and ventriculitis caused by multi resistant *Acinetobacter baumannii* in a preterm male baby. He required intraventricular polymyxin B and intravenous netilmycin and polymyxin B for the treatment of meningitis.

Case Detail

Eighteen day old born male child was admitted for the management of neonatal sepsis and meningitis. Baby was delivered vaginally in a local hospital with 34 weeks gestation weighing 1.5 kg. The antenatal history was uneventful. There was no history of leaking, prolonged rupture of membranes and administration of intrapartum steroids or antibiotics.

Initially baby was admitted in some other neonatal care unit where on fourteenth day of life he became irritable, hypothermic and there was refusal to feed which rapidly progressed to respiratory failure needing mechanical ventilation. In view of strong suspicion of sepsis and meningitis, blood culture was done. It showed growth of *Acinetobacter baumannii* with sensitivity pattern as shown in the table (Table1).

The lumbar cerebrospinal fluid (CSF) examination revealed cell count of 200 cells /hpf with more than 90% neutrophils, CSF sugar was 30 mg/dl, protein levels were 150 mg/dl and no RBCs. CSF culture was not done there at that time. Patient was referred after 4 days of intravenous ceftazidime and amikacin in the appropriate doses as per the blood culture report.

Baby became stable and was extubated after two days of admission. On 22nd day of life, patient developed bulging anterior fontanel, refusal to feed and became dull. Head circumference was 38 cm. Cranial ultrasound was suggestive of hydrocephalus and ventriculitis. Ventricular CSF examination was suggestive of high pressure system with no RBCs, cell count of 600/hpf with neutrophils sugar level 23 mg/dl, proteins were 240 mg/dl. CSF culture was suggestive of multi resistant *Acinetobacter baumannii* (MRAB) with sensitivity to polymyxin B and netilmycin.

Intravenous antibiotics were started on day 26 of life as per the culture report. Intraventricular polymyxin B 40000 units alternate day for 7 doses was given by alternate day ventricular puncture as the family did not give consent to the insertion of a ventricular reservoir.

After 3 weeks of intravenous antibiotics therapy, CSF examination was normal and sterile. Patient was on full breast feeds and had satisfactory weight gain. Repeat cranial ultrasound was suggestive of persistent hydrocephalus. Computerized tomography (CT) scan was done which revealed increasing hydrocephalus with periventricular oozing of the CSF without ventriculitis. Ventriculoperitoneal (VP) shunt was in pediatric surgery for this and patient had a good post operative recovery and is under regular follow up. He has normal mental and motor mile stones and is in regular follow up since last 1 year.

Discussion

Acinetobacter baumannii is saprophytic and ubiquitous in both the natural and hospital environment [1,2]. *A. baumannii* forms part of

Antibiotic	Sensitive	Resistant
Trimithoprim	+	
Ceftazidime	+	
Gatifloxacin	+	
Polymyxin B	+	
Amikacin	+	
Colistin	+	
Ceftriaxone		+
Cefuroxime		+
Ampicillin		+
Piparacillin+ tazobactum		+
Cefepime		+
Ticarcillin+clavulanic acid		+
Gentamycin		+
Tobramycin		+
Imipenem		+

Table 1: Antibiotic sensitivity pattern of blood culture report at the time of referral.

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the normal skin flora in about 25% of the population [3]. *Acinetobacter* have several virulence factors which enhance their pathogenicity in the debilitated individuals as the cell wall, outer membrane protein, fimbriae, polysacchride capsule, protein S layer and slime [4-6]. *Acinetobacter* infections are uncommon and usually involve organ system with high fluid content eg. Respiratory tract, CSF, peritoneal cavity, urinary tract [6].

Resistance to common antibiotics is a major problem in treating *Acinetobacter* infections [7,8]. Clinical isolates are predictably resistant to penicillin, ampicillin, first generation cephalosporins and chloramphenicol. Activity of carbenicillin, tetracyclines, aminoglycides, second and third generation cephalosporins, quinolones, trimethoprim- sulfamethoxazole and carbapenems [9] have been documented in recent articles about the successful use of intravenous colistin as a safe alternative to the carbapenems. A potential role has also been demonstrated for sulbactum in patient management. Due to unpredictable multi resistant patterns of nosocomial strains, consideration must be given to the prevalent susceptibility profiles within the institution.

Polymyxin B is a polypeptide antibiotic used in the treatment of urinary tract, blood stream, and meningeal infections caused by gram negative organisms. Because of the potential life threatening side effects as neuro and nephro toxicity, it is a reserved drug for the resistant infections. It penetrates poorly into the CSF and the presence of meningeal inflammation does not enhance absorption.

Cure rate with polymyxin B in adult meningitis is reported to be better for a combination of systemic (intravenous/intramuscular) and local therapy (intraventricular/ intrathecal) as compared to the therapy given alone by any one route.

Management of neonatal MRAB sepsis, meningitis and ventriculitis was difficult in our case due to:

1. Rarity of neonatal MRAB infections and hence the lack of literature
2. Poor CSF penetration of the relevent antibiotics
3. Refusal by the family for the insertion of a ventricular reservoir for administration of intraventricular antibiotics
4. Evidence in literature that intraventricular treatment of neonatal ventriculitis is associated with increased mortality.

Intraventricular therapy for neonatal ventriculitis remains controversial. In theory, intraventricular administration of antibiotics would produce higher drug levels in CSF and better elimination of bacteria. However, ventricular taps/ reservoirs are potentially dangerous with risk of trauma to the brain and secondary infection. There are reported cases of successful treatment of MRAB neonatal ventriculitis with intravenous and intraventricular colistin [10-12]. A recent cochrane review shows that intraventricular treatment of neonatal ventriculitis is associated with three folds increase in the mortality as compared to receiving intravenous antibiotics alone thus advocating the avoidance of this modality [13].

Unfortunately, the therapeutic options available in our patient were limited due to multi drug resistant nature of the pathogen. Both, intravenous polymyxin B and netilmycin have poor CSF penetrability, hence intraventricular administration was done. Another interesting thing in this case was initial presence of sensitive strain of *Acinetobacter baumannii* in the blood culture and only in a week's period the CSF growth was of MRAB. Such rapid mutation of strains would be unexpected. Presence of two different strains in blood and CSF could be a possibility. The fact that at the referring hospital, the CSF culture was not done in spite suspecting meningitis suggests a poor decision making there.

Intraventricular therapy is generally administered through a ventricular reservoir and multiple ventricular punctures are not recommended due to its potential complications. In our patient also we had planned for ventricular reservoir. But the parents refused for the reservoir and we were left with no other options.

However, the patient responded well to the treatment which was evident by CSF studies and subsequent good response to the surgical procedure.

After the emergence of the above strain, the hospital infection control committee was informed about this. The baby was kept in isolation away from other patients till discharge. The whole NICU was sterilized once this patient was discharged. During its hospital stay, all the health care workers were instructed about the strict hand washing instructions. Luckily, we have not detected any MRAB in our neonatal care unit after this case in last more than a year or so.

Conclusion

This report states the success of intraventricular polymyxin B administration as a desperate measure and a potential life saving therapy for MRAB. It is safe and should be combined with systemic therapy for improving the efficacy of the treatment. The fact that there was rapid emergence of a MRAB in the case also emphasizes the need for simple but proper sterilization technique before handling the neonates or else we will be facing a dangerous pattern of MRAB.

Reference

1. Getchell-White SI, Donowitz LG, Groschel DH (1989) The inanimate environment of an intensive care unit as a potential source of nosocomial bacteria: evidence for long survival of acinetobacter calcoaceticus. Infect Control Hosp Epidemiol 10: 402-407.
2. Aygun G, Demirkian O, Utku T, Mete B, Urkmez S, et al. (2002) Environmental contamination during a carbapenem resistant acinetobacter baumannii outbreak in an intensive care unit. J Hosp Infect 52: 259-262.
3. Towner KJ, Bergogne Berezin E, Fewson CA (1991) The outer membrane of acinetobacter: structure function relationship (eds), The biology of acinetobacter: taxonomy, clinical importance, molecular biology, physiology, industrial relevance, New York.
4. Anstey NM, Currie BJ, Hassell M, Palmer D, Dwyer B, et al. (2002) Community-acquired bacteremic Acinetobacter pneumonia in tropical Australia is caused by diverse strains of Acinetobacter baumannii, with carriage in the throat in at-high risk groups. J Clin Microbiol 40: 685-686.
5. Obana Y, Nishino T, Tanino T (1985) In-vitro and in-vivo activities of antimicrobial agents against Acinetobacter calcoceticus. J Antimicrob Chemother 15: 441-448.
6. Jain R, Danziger LH (2004) Multidrug resistant acinetobacter infections: an emerging challenge to clinicians. Ann Pharmacother 38: 1449-1459.
7. Lee CM, Lim HK, Liu CP, Tseng HK (2005) Treatment of pan-drug resistant Acinetobacter baumannii. Scand J Infect Dis 37: 195-199.
8. Garnacho-Montero J, Ortiz Lebya C, Jimenez Jimenez FJ, Barrero-Almodóvar AE, García-Garmendia JL, et al. (2003) Treatment of multidrug-resistant Acinetobacter baumannii ventilator-associated pneumonia(VAP) with intravenous colistin: A comparison with imipenem-susceptible VAP. Clin Infect Dis 36: 1111-1118.
9. Levin AS (2002) Multiresistant Acinetobacter infections. A role for sulbactam combinations in overcoming an emerging worldwide problem. Clin Microbiol Infect 8: 144-153.
10. Everett ED, Strausbaugh LJ (1980) Antimicrobial agents and the central nervous system. Neurosurgery 6: 691-714.

11. Biehl JP, Hamburger M (1954) Polymyxin B therapy of meningitis following procedures on central nervous system; beneficial therapeutic effect of polymyxin B in meningitis due to organisms of the colon group. AMA Arch Intern Med 93: 367-378.

12. Quintiliani R, Lentnek A (1971) Polymyxin B in the treatment of Klebsiella pneumonia meningo- ventriculitis. Intraventricular and intrathecal administration. Am J Dis Child 121: 239-242.

13. Shah S, Ohlsson A, Shah V (2004) Intraventricular antibiotics for bacterial memningitis in neonates. Cochrane Database Syst Rev 4.