Clinical Case Studies and Reports

Case Report

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A case of recurrent ventriculitis associated with Colistin-Resistant Klebsiella pneumoniae in patient with ventriculoperitoneal shunt treated with intrathecal amikacin

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Abstract

Carbapenem-resistant Klebsiella pneumoniae (CR-KP) strains have been increasingly seen as agents in the nosocomial infections in recent years. Many drugs, especially colistin have been mostly used in the treatment of these pathogens. With the increasing use of colistin, we have been encountered colistin-resistant strains in the hospital outbreak and infections. The treatment of carbapenemase-producing organisms is unclear and has not been reached a consensus yet. Two or more antibiotics have been administered due to high mortality rate and a major concern in emergence of new resistance. Herein, we presented a patient who was administered intravenous (IV) + intrathecal colistin therapy due to recurrent ventriculitis associated with ventriculoperitoneal (VP) shunt. But the condition of the patient worsened under this treatment and then colistin-resistant *Klebsiella pneumoniae* (CoR-KP) was isolated from cerebrospinal fluid (CSF) culture. Finally, she could be successfully treated with intravenous and intrathecal amikacin use. Resistant bacteria seem to increase and pose a threat to our life in the future. Thus, infection control measures should be taken immediately. In these infections, along with the use of systemic antibiotics, intrathecal use should be administered for meningitidis.

Introduction

Carbapenem-resistant *Klebsiella pneumoniae* (CR-KP) strains have been increasingly seen as agents in the nosocomial infections in recent years. Many drugs, especially colistin are mostly used in the treatment of these pathogens [1]. As a natural result, we encountered colistin-resistant strains in the hospital outbreak and infections. This challenge provide very limited treatment options for us and it shows that not only carbapenem but also colistin need to be used appropriately because of possibility of resistance [2]. Antibiotic resistance is seen due to unnecessarily and inappropriately using and not implementing hospital infection control procedures. Herein, we presented a patient who was administered intravenous (IV) + intrathecal colistin therapy due to recurrent ventriculitis associated with ventriculoperitoneal (VP) shunt. But the condition of the patient worsened under this treatment and then colistin-resistant *Klebsiella pneumoniae* (CoR-KP) was isolated from cerebrospinal fluid (CSF) culture. Finally, she could be successfully treated with intravenous and intrathecal amikacin use.

Case

37-year-old female patient that was placed VP shunt due to congenital hydrocephalus 35 days ago; this patient admitted to our emergency with three days of headache, nausea, vomiting, blurred vision and fever. On physical examination, the patient was conscious, cooperative and her fever was 39.1^{0}C and initially she did not have stiff neck. The CSF culture was obtained and meropenem 3x2 g and vancomycin 2x1 gr IV were initiated, the signs of shunt associated ventriculitis were seen in cranial computer tomography (CT). Extra-ventricular drainage (EVD) was removed and shunt catheter was inserted. In the CSF samples, *Pseudomonas spp, Enterobacter cloaca IBL (+), Acinetobacter baumannii and ESBL (+) Klebsiella pneumoniae* were isolated respectively and many different anti-microbial agents such as meropenem, amikacin, colistin, cefoperazone/ sulbactam, piperacillin tazobactam were given at different duration (course). EVD was replaced a total of 10 times during six months, due to carbapenem resistant *Acinetobacter baumannii* and CR-KP [ertapenem MIC>16 Colistin MIC=0.75 mcg/mL] agents which isolated from CSF culture and even with intravenous and intrathecal colistin therapy which were combined with other antibiotics, we could not achieve clinical improvement in the patient during 75 days of treatment. On the 80th days of the admission, CoR-KP (Colistin MIC=64 mcg/mL) were isolated from CSF cultures (Figure 1), and on the same day, IV therapy (1 g/day) and intrathecal (1x30 mg) amikacin was added to the therapy, stopping colistin. On follow up; the patient was extubated from the ventilator on the 3th days of the amikacin, CSF culture was become negative on the 7th days of the

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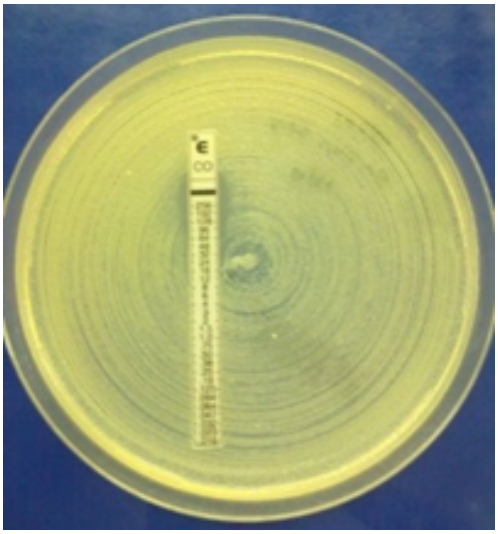

Figure 1. CoR-KP strains isolated from CSF culture on the 75th day of the treatment (MIC=64 mcg/mL)

therapy and consciousness of the patient was opened on the 15th days of the amikacin and Glasgow coma score (GCS) was increased (improved) from 9/15 to 14/15 and subsequently the patient was discharged from intensive care unit for regular physiotherapy and supportive treatment on the 25th days of the cure , ultimately she returned to normal life with the recent therapies.

Discussion

Antibiotics use, especially both in medicine and in agriculture have been increasing and improperly and unnecessarily using them has deeply threatened to our life due to the emergence of resistance and this resistance makes therapy difficult to cure diseases. Because resistant bacteria are not susceptible to many potent agents and available used agents for resistant bacteria are more toxic and less potent. Recently, there has been a paucity in novel antimicrobial to treat the resistant pathogens [3]. Therefore, we will face with the worst clinical issues in the future and we should immediately take measures for this issue. These are antibiotic stewardship, control and prevention measure, hand hygiene, surveillance, cohorting of infected/colonized patients, implementation of contact precautions [4]. Particularly in nosocomial infections, these resistant microorganisms can spread from person to person, can colonize and later cause infections and outbreak [5,6].

There are few options in the treatment of carbapenemase-producing organisms that is unclear and has not been reached a consensus yet [4] but if the patient has severe infection such as bacteremia and meningitidis, as in this patient. We can use two or more antibiotics due to high mortality rate and a major concern in emergence of new resistance [4] Therefore, we used combination therapy in the index case and the challenge of our case was meningitidis. Because antibiotics cannot penetrate well into the meninges, and thus the treatment become difficult to achieve improvement. Consequently, we used combination therapy with intrathecal use that is formed local antimicrobial effects. The concentration rate of the antibiotic at the inflamed site increases and this local effect, thereby facilitating the healing of the disease

It is not known how the mechanism(s) of colistin resistance is in carbapenem-resistant *Enterobacteriaceae* [7] and the criteria of resistance has not been well defined by the formal establishment While the preferred test for detecting colistin resistance is the broth microdilution method, E-testing also ensure us results that are compatible with the broth test [8]. Hence, we utilized the methods to determine colistin susceptibility testing and the MIC of colistin resistance was detected as 64 mcg/mL.

In Around 2000 years, colistin resistance was fairly rare but along with administering in other resistant bacteria including *Acinetobacter baumannii and Pseudomonas spp*, resistance in colistin has begun to appear much more. while some investigator are thought that previously colistin use, and the duration of the colistin are important factors for the emergence of resistance [9-11] a report could not find any association because they found infections caused by CoR-KP but without prior colistin use [12]. In our case, the patient previously took colistin therapy for infections, we thought the bacteria might become resistant because of this use. Also, we did not have any other patient that colonized/infected with CoR-KP in this unit.

Conclusion

As a conclusion, resistant bacteria seem to increase and pose a threat to our life in the future. Thus, infection control measures should be taken immediately. In these infections, along with the use of systemic antibiotics, intrathecal use should be administered for meningitidis.

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