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Mini Review

Meningitis-Ventriculitis by *Stenotrophomonas maltophilia* Multidrug Resistance in an Infant with Giant Myelomeningocele. A Case Report and Literature Review

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Abstract

Stenotrophomonas maltophilia is an opportunistic pathogen of nosocomial origin most of the time of growing concern in infants with critical pathology, due to its multidrug resistance and pathogenic potential. The current work describes a case of an infant with giant myelomeningocele who presented meningitis and ventriculitis due to this bacterium. Multi-resistance was successfully treated early with triple antibiotic therapy with colistin, cotrimoxazole and levofloxacin. Rapid suppression of colistin after clinical improvement decreases adverse events.

Keywords: *Stenotrophomonas maltophilia; Meningitis; Ventriculitis; Colistin; Multidrug Resistance*

Abbreviations

EVD: External Ventricular Drainage; CSF: Cerebrospinal Fluid; IV: Intravenous; CNS: Central Nervous System

Introduction

Stenotrophomonas maltophilia is a gram-negative, ubiquitous, aerobic and non-fermentative bacillus, which causes bacteremia, respiratory and urinary tract infections, as well as osteo-articular, skin and soft tissue infections, endocarditis and meningitis [1-5]. Main risk factors are prolonged hospitalization, invasive procedures, especially neurosurgical procedures, immunosuppression, therapy with broad-spectrum antibiotics, mechanical ventilation and severe mucositis [4].

Meningitis is a frequent complication in paediatric patients after microsurgical interventions, especially in patients with ventricular shunt systems [6]. The most prevalent early infections are those in which microorganisms of the cutaneous flora are frequently implicated. These infections are mainly produced by gram-positive germs [7,8]. Gram-negative germs usually appear later, due to contamination of the distal end of the catheter, or in ventricle-peritoneal drainages, causing approximately 10 - 15% of infections. The most frequent germ is *Acinetobacter baumannii* [9,10]. Infection with *Stenotrophomonas maltophilia* is a rare cause of meningitis [1,3]. However, it is currently a focus of interest, due to its increasing involvement in nosocomial infections, its high pathogenic potential, and its marked antibiotic resistance [11].

We report the case of a 5 month-old infant with a history of giant myelomeningocele and progressive obstructive hydrocephalus (Figure 1 and 2). The defect was closed and a ventriculoperitoneal shunt was inserted. One month after the intervention, the patient presented associated meningitis-ventriculitis by Enterobacter cloacae as a complication, thus an external ventricular drainage system (EVD) was placed. The infant received broad-spectrum antibiotics for three weeks. During her evolution, clinical deterioration was observed with haemodynamic instability, apnea, irritability and seizures. In the cerebrospinal fluid (CSF) sample for cytochemical study and culture, ventriculitis was confirmed, isolating *Stenotrophomonas maltophilia*. Therefore, given the severity of the condition, it was decided to triple the therapy with cotrimoxazole, levofloxacin and colistin, and the EVD system was changed. Because of the persistent isolation of *Stenotrophomonas maltophilia* in CSF, it was considered to associate intraventricular treatment with colistin, which was ruled out by the clinical improvement of the patient. Consequently, colistin IV was suppressed. In subsequent controls, CSF cultures were negativised, although treatment with cotrimoxazole and levofloxacin was maintained for 21 days. After the suspension of the antibiotic therapy, the ventricle-atrial shunt was inserted, and the infant evolved without any complications.

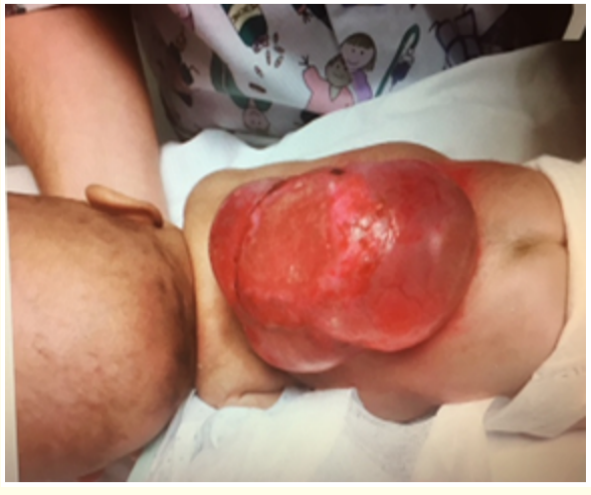

Figure 1: *Giant myelomeningocele.*

Figure 1: *Obstructive hydrocephalus.*

There are few reported cases of meningitis-ventriculitis due to *Stenotrophomonas maltophilia* in the paediatric population [1,3,4,12] and this, along with the high intrinsic resistance to antimicrobials, makes it difficult to know and manage it. Cotrimoxazole would be, in principle, the treatment of choice, according to in-vitro and in-vivo susceptibility data [6,8]. However, monotherapy should be avoided. Some quinolones, such as ciprofloxacin, levofloxacin, and ticarcillin/clavulanate, in combination with other antibiotics, could be considered as therapeutic options. Treatment with intravenous and/or intrathecal colistin has been little studied in the paediatric age [12,13], but it could be an alternative in neurocritical situations, as described by Ziaka M., *et al.* [14] and Gilbert B., *et al.* [15] as in the case we have presented. Bargiacchi O., *et al.* [7] and Karaiskos., *et al.* [9] also have supported the use of colistin in CNS infections due to multiresistant germs, but the experience comes from cases in adult patients. It has been described that the use of colistin IV reaches very low concentrations in CNS, due to its poor diffusion to the CSF [1,7], which is why combined IV and intrathecal treatment has been recommended as it achieves higher concentrations in CSF [7,8,13]. However, treatment with intrathecal colistin is not free of risks. Convulsive seizures, chemical meningitis and cauda equina syndrome, among others, have been described as adverse events [7,12,15]. In the present reported case, considering the improvement of the clinical evolution and the most marked risks in the infant, we have not indicated intrathecal treatment with colistin. The dose indicated in childhood has not been well defined yet, although most authors consider safe doses of 2000 IU/kg/day IV in one or two daily doses [10,16].

Regarding our patient, we have considered that the giant myelomeningocele, as well as the neurosurgical procedures and use of broad-spectrum antibiotic drugs for a prolonged period (3 weeks) seemed to trigger infections. *Stenotrophomonas maltophilia* may cause meningitis-ventriculitis in clinically severe infants with risk factors. For this reason, early administration of intravenous of broad-spectrum antibiotics combined with colistin and guided by antibiogram should be recommended. Rapid suppression of colistin after clinical improvement decreases the likelihood of adverse events.

Conclusion

Meningitis due to *Stenotrophomonas maltophilia* multidrug resistance is an entity of growing concern in patients with prolonged hospitalization, invasive procedures, immunosuppression, therapy with broad-spectrum antibiotics, mechanical ventilation and severe mucositis. Its management is often difficult due to its marked antibiotic resistance.

Cotrimoxazole would be, in principle, the treatment of choice, according to *in-vitro* and *in-vivo* susceptibility data. However, monotherapy should be avoided. Some quinolones, such as ciprofloxacin, levofloxacin, and ticarcillin/clavulanate, in combination with other antibiotics, could be considered as therapeutic options. Treatment with intravenous and/or intrathecal colistin has been little studied in the paediatric age, but could be an alternative.

We proposed as seen in our patient the use of iv antibiotics but never in monotherapy, guided by antibiogram and used for prolonged time in order to sterilize the CSF. The iv colistin, although it reaches poorly to the CNS, should be considered a coadyuvant option. The use of both iv and intrathecal colistin should be considered in refractory cases.

More studies about the use of colistin in the pediatric population are demanded.

Bibliography

1. Rojas P., *et al*. "Successful treatment of Stenotrophomonas maltophilia meningitis in a preterm baby boy: a case report". *Journal of Medical Case Reports* 3 (2009): 7389.

2. Lo WT., *et al*. "Successful treatment of multi-resistant Stenotrophomonas maltophilia meningitis with ciprofloxacin in a pre-term infant". *European Journal of Pediatrics* 161.12 (2002): 680-682.

3. Yemisen M., *et al*. "A meningitis case due to Stenotrophomonas maltophilia and review of the literature". *International Journal of Infectious Diseases* 12.6 (2008): e125-e127.

4. Gulcan H., *et al*. "Nosocomial Stenotrophomonas maltophilia cross-infection: three cases in newborns". *American Journal of Infection Control* 32.6 (2004): 365-368.

5. Adegoke AA., *et al*. "Stenotrophomonas maltophilia as an Emerging Ubiquitous Pathogen: Looking Beyond Contemporary Antibiotic Therapy". *Frontiers in Microbiology* 8 (2017): 2276.

6. Sood S., *et al*. "Meningitis due to Stenotrophomonas maltophilia after a Neurosurgical Procedure". *Journal of Clinical and Diagnostic Research* 7.8 (2013): 1696-1697.

7. Bargiacchi O and Giussepe de la Rosa F. "Intrathecal o intraventricular colistin: A review". *Le Infezioni in Medicina* 24.1 (2016): 3-11.

8. Tunkel AR., *et al*. "Practice guidelines for the management of bacterial meningitis". *Clinical Infectious Diseases* 39.9 (2004): 1267-1284.

9. Karaiskos I., *et al*. "Intraventricular and intrathecal colistin as the last therapeutic resort for the treatment of multidrug-resistant and extensively drug resistant Acinetobacter Baumannii ventriculitis and meningitis literature review". *International Journal of Antimicrobial Agents* 41.6 (2013): 499-508.

10. Saleem AF., *et al*. "Acinetobacter species meningitis in children: a case series from Karachi Pakistan". *Journal of Infection in Developing Countries* 5.11 (2011): 809-814.

11. Correia CR., *et al*. "Stenotrophomonas maltophilia: a rare cause of meningitis". *Pediatrics International* 56.4 (2014): e21-e22.

12. Al Yazidi., *et al*. "Persistent Gram-negative Neurosurgical Meningitis in a Neonate, Successfully Treated With Intraventricular Colistin: Case Report and Review of the Literature". *Pediatric Infectious Disease Journal* 37.3 (2018): e79-e81.

13. Cascio A., *et al*. "Extended-spectrum beta-lactamase-producing and carbapenemase-producing Enterobacter cloacae ventriculitis successfully treated with intraventricular colistin". *International Journal of Infectious Diseases* 20 (2014): 66-67.

14. Gilbert B and Morrison C. "Evaluation of intraventricular colistin utilization: A case series". *Journal of Critical Care* 40 (2017): 161-163.

15. Ziaka M., *et al*. "Combined intravenous end Intraventricular Administration of Colistin Methanesulfonate in critically ill patients with central nervous system infection". *Antimicrobial Agents and Chemotherapy* 57.4 (2013): 1938-1940.

16. Sahbudak Bal Z., *et al*. "The evaluation of safety and efficacy of colistin use in pediatric intensive care unit: Results from two reference hospitals and review of literature". *Journal of Infection and Chemotherapy* 24.5 (2018): 370-375.

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