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CORRESPONDENCE

Tigecycline salvage therapy for ventriculoperitoneal shunt meningitis due to extensively drug-resistant *Acinetobacter baumannii*

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Abbreviations

CSF	Cerebrospinal fluid
EVD	External ventricular drainage
MIC	Minimum inhibitory concentration
XDR	Extensively drug-resistant
VPS	Ventriculoperitoneal shunt

To the Editor,

We read with great interest the article by Ye et al. [3] regarding tigecycline treatment for severe infection in children. In this cohort, only one patient with meningitis received tigecycline without clinical improvement. Management of extensively drug-resistant (XDR) *Acinetobacter baumannii* meningitis remains a therapeutic challenge in children due to the limited treatment options [1, 2]. Tigecycline, a glycylcycline with a broad spectrum of antibacterial activity, is not approved for children. But in the era of nosocomial infections due to multidrug-resistant bacteria, it can be a considerable option in life-threatening infections [1]. Here, we report two infants, who were diagnosed with ventriculoperitoneal shunt (VPS) meningitis due to XDR *A. baumannii* under colistin combination therapy. The addition of tigecycline to the treatment regimen of patients resulted in cure. Both *A. baumannii* isolates recovered from the cerebrospinal fluid (CSF) cultures of the patients showed susceptibility only to tigecycline (Table 1). Identification and antimicrobial susceptibility testing of *A. baumannii* were performed using the VITEK 2 automated system (bioMerieux, Marcy l'Etoile, France). Although tigecycline is not approved for central nervous system infections, it was the only available option for the treatment of our patients according to the antibiotic susceptibility results. CSF cultures became negative with normal clinical condition and laboratory values only after tigecycline was added to the treatment. Both of the patients had received antimicrobial treatment in different combinations before and during tigecycline treatment (Table 1). Additionally, the infected shunt was removed and an external ventricular drainage catheter was inserted in both patients. Clinical and laboratory features of the patients are summarized in Table 1.

In conclusion, tigecycline could be used as a salvage therapy, in combination with other antimicrobial agents, for children with VPS shunt meningitis caused by XDR *A. baumannii* when other therapies are not suitable.

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Table 1 Summary of patients treated for ventriculoperitoneal shunt meningitis with tigecycline

	Patient 1	Patient 2
Age, sex	4 months, male	2 months, female
Underlying disease(s)	Hydrocephalus	Myelomeningocele, hydrocephalus
Isolated microorganism (source)	XDR *Acinetobacter baumannii* (CSF)	XDR *Acinetobacter baumannii* (CSF, urine)
CSF leukocyte (mm^3)	1280	980
CSF protein (mg/dl)	220	184
CSF glucose (mg/dl)	20	38
The MIC results of the infecting *A. baumannii* strain (mg/L)*	Meropenem (16), colistin (4), tigecycline (0.5)	Meropenem (32), colistin (4), tigecycline (0.5)
Dose of tigecycline	1.2 mg/kg/dose IV every 12 h	1.2 mg/kg/dose IV every 12 h
Duration of tigecycline teatment (days)	14 days	12 days
Antimicrobial agents prior to tigecycline treatment (days)	Sulperazone (14), IV colistin (10)	Meropenem (16), IV colistin (11)
Concomitant antibiotics with tigecycline (days)	IV colistin (14), intrathecal colistin (10)	Meropenem (10), IV colistin (12)
Surgical intervention	VPS removal and EVD placement	VPS removal and EVD placement
Days to sterilize CSF (days)	6	7
Adverse events	None	None
Outcome	Cure	Cure

CSF cerebrospinal fluid, *EVD* external ventricular drainage, *IV* intravenous, *MIC* minimum inhibitory concentration, *XDR* extensively drug-resistant, *VPS* ventriculoperitoneal shunt

*Antimicrobial susceptibilities were determined according to the European Committee on Antimicrobial Susceptibility Testing guidelines, and the breakpoints for tigecycline were defined by the American Food and Drug Administration (susceptible defined as MIC ≤ 2 mg/L)

Authors' contributions MP: drafting of the manuscript and patient management; AOP: review of literature, critical revision, and approval of final draft of the manuscript

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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