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Isolation of a Multi-Drug Resistant and Kpc Positive Salmonella Group E from a Patient with Severe Combined Immunodeficiency

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Abstract

History: A 5-year old male was admitted last February 2013 for multiple infections secondary to Severe Combined Immunodeficiency. He was treated with different antibiotics for Mycobacterial, Fungal and Multiple opportunistic Bacterial Infections. Patient complained of gastrointestinal pain and mild diarrhea. The first request for stool culture was made on May 6, 2013 and the Microbiology Laboratory identified the organism by VITEK 2 compact (Biomeriux) as Salmonella Group. Polyvalent slide latex agglutination (Sifin Germany) was used and typed it as Group E Salmonella. Sensitivity results were resistant to all Cephalosporins, Fluoroquinolones, and Aminopenicillins and Penicillins with beta lactamase inhibitor. Carbapenems were all sensitive and attending physician started Imipenem. After 15 days, the second culture was repeated. Salmonella group E was isolated with the same sensitivity pattern but this time gave an intermediate result on Ertapenem. The third stool culture was done after five days. Salmonella group E was isolated with same sensitivity pattern but carbapenems were all reported resistant. Manual ESBL and Modified Hodge tests were performed according to the CLSI and ESCMID guidelines. Both yielded negative. Sample was sent to Milan, Italy for Molecular Typing. Results showed that the organism was positive for the Carbapenemase class KpC. Patient was treated successfully with Colistin.

Conclusion: The investigators were able to isolate the first Salmonella non-typhi (Group E) that is highly resistant to Carbepenems, Cephalosporins & other anti-Salmonella drugs. Salmonella spp. is generally sensitive to a wide variety of antibiotics. ESCMID and CLSI recommend only a few antibiotics to be tested against Salmonella typhi and Salmonella non-typhi. Ampicillin, Co-trimoxazole, a flouroquinolone and a 3rd generation Cephalosporin antibiotics in cases of extra intestinal Salmonellosis must be reported in the sensitivity panel. This case reports the 1st strain of Salmonella non-typhi that is highly resistant to these anti-microbials and responded only to Colistin.

Keywords: Carbapenemase; ESBL; Modified Hodge Test

Introduction

Salmonella infection particularly typhoid fever is common among developing countries; it causes a wide variety of infection like intestinal and extra intestinal Salmonellosis. *Salmonella typhi* is the most common infectious agent associated with this disease. Some strains of *S. typhi* were reported to be ESBL positive and countries around the world were able to document Carbapenemase production among Salmonella spp [1]. The investigators isolated the first Salmonella non-typhi (Group E) from a 5 year old male with Severe Combined Immuno Deficiency (SCID) that responded only to Colistin and positive for the Carbapenemase KpC enzyme.

Procedure

Stool sample from the patient was isolated using the *Salmonella Shigella* Agar (liofilchem Italia) and was subsequently tested for Identification and Sensitivity using the VITEK system (biomeriux). After the Identification was made, the colonies were typed using the polyvalent slide latex agglutination (Sifin Germany) and it was grouped as Salmonella group E. the VITEK system reported that the organism was resistant to Cephalosporins and other anti-Salmonella drugs with exception to Carbapenems [2]. Manual ESBL and MHT (Modified Hodge test) was performed in Mueller Hinton Agar (liofilchem, Italia) and with aide of the 2013 EUCAST and CLSI guidelines.

Results

VITEK system reported resistance to Cephalosporins, Flouroquinolones and other antibiotics with anti-Salmonella activity (Table 1). Manual ESBL and MHT testings were done and turned out negative (Figures 1 and 2). Isolates were eventually sent to Milan, Italy (Centro Diagnostico Italiano) for Molecular Biology testing (Carbapenemase) and result was positive for the KpC enzyme [3,4].

Conclusion

The investigators were able to isolate the first *Salmonella non-typhi* (Group E) that is highly resistant to Carbepenms, Cephalosporins & other anti-Salmonella drugs. Salmonella spp. are generally sensitive to a wide variety of antibiotics, EUCAST and CLSI recommend only few antibiotics to be tested for *Salmonella typhi* and *Salmonella non-typhi*. Ampicillin, Co-trimoxazole, a Flouroquinolone and a 3rd generation Cephalosporin antbiotic in cases of extra intestinal Salmonellosis must be reported in the sensitivity panel.

This case reports the 1st strain of Salmonella Group E that is highly resistant to these Anti-microbials including Carbapenems and responded only to Colistin. The authors would like to point also the low accuracy of the MHT (Modified Hodge Test) as a primary screening test in detecting Carbapenemase, though CLSI gave a low sensitivity and specificity for low level producers. ESCMID (ECCMID 2013 Berlin, Germany) even

	Ampicillin	Co-amoxiclav	Pip-Tazo	Cefuroxime	Ceftriaxone	ceftazidime	ertapenam	Imipenam	Meropenem	Ciprofloxacin	Co-trimoxazole	Colistin
1st result	R	R	R	R	R	R	S	S	S	R	R	S
	MIC>32	MIC>32	MIC>128	MIC>64	MIC>64	MIC>64	MIC 1	MIC 0.25	MIC 0.25	MIC>4	MIC>320	MIC<0.5
2nd result	R	R	R	R	R	R	I	S	S	R	R	S
	MIC>32	MIC>32	MIC>128	MIC>64	MIC>64	MIC>64	MIC 4	MIC 0.25	MIC 0.25	MIC>4	MIC 320	MIC<0.5
3rd result	R	R	R	R	R	R	R	R	R	R	R	S
	MIC>32	MIC>32	MIC>128	MIC>64	MIC>64	MIC>64	MIC>8	MIC 4	MIC 4	MIC>4	MIC>320	MIC<0.5

Table 1: Sensitivity result of patient with Salmonella non-typhi (Group E) isolate
R – resistant; I – intermediate; S - susceptible

Figure 1: Manual ESBL Test showing negative result showing negative result

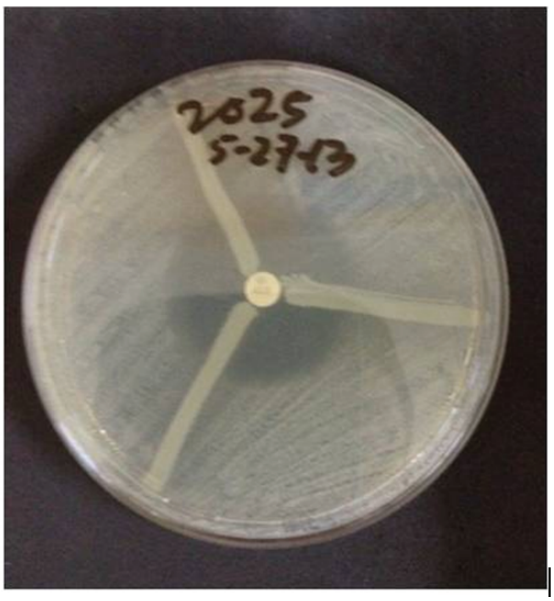

Figure 2: Manual Modified Hodge Test (MHT)

discourages the use of the MHT in detecting Carbapenamase. Both EUCAST and CLSI recommended Molecular Biology in detecting Carbapenemase and their respective class.

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