The Usefulness of Automated Blood Culture Method to Detect Causative Organisms Causing Peritonitis in CAPD Patients: Lon-term Validity Assessment about Replacement of Conventional Culture Method

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INTRODUCTION

- Peritonitis is a common and serious complication of peritoneal dialysis (PD) and correct microbiological culturing of peritoneal effluent is utmost important to treat PD peritonitis.
- Although automated blood-culture techniques may not only increase isolation and identification rate but also could be save the time and labor, there have been a few studies with relatively small number of samples.
- The objective of this study is to investigate the usefulness of automated blood culture method to detect causative organisms causing peritonitis in large number of PD patients during long-term periods.

METHODS

- From January 2013 to July 2016, inoculation into automated blood culture bottles (blood culture method) were compared to direct inoculation of the centrifuged sediment (conventional method) in regard to agreement, sensitivity and the time required for reports.
- Among 1,635 CAPD fluids, requested for culture in patients with clinically suspicious PD peritonitis during study period, total 177, non-duplicated first encountered cases were evaluated.

- **Conventional method**

: 100 mL of fluid was aspirated from the injection port of the CAPD bag under all aseptic precautions. The fluid was distributed aseptically into sterile centrifuge tubes and centrifuged at 1700g for 20 minutes. The supernatant was discarded and the sediments were obtained. Loopfuls of the sediment were inoculated into 5% sheep blood agar and chocolate agar. Species identification was done with MicroScan Combo Panel (Siemens, Munchen, Germany).

- **Automated blood culture method**

: 20 mL fulid was aseptically collected from the injection port of the CAPD bag. This fluid was inoculated evenly 10 mL each to paired aerobic/ anaerobic blood bottles and cultured under BacT/Alert three-dimensional (bioMérieux, Marcy l'Étoile, France) system for 5 days. Culture positive bottle were sub-cultured in 5% sheep blood agar and chocolate agar. Species identification was done with MicroScan Combo Panel (Siemens, Germany).

RESULTS

Table.1 Detection of bacterial growth in PD effluents

	No. (%) of PD effluents showing bacterial growth (any cell count) (N=177)	No. (%) of PD effluents showing bacterial growth (WBC> 100/μL, with > 50% PMN) (N=103)
Total	93 (52.5)	87 (84.5)
Automated blood culture method	86 (48.6)	85 (82.5)
Conventional method	71 (40.1)	66 (64.1)

Table 2. Correlation of growth detected by each method

Total number of PD effleunts (N=177)	N	%
Concordance rate (N, %)	147	83.1
Discordance rate (N, %)	30	16.9
Automated blood culture methods only growth	21	11.9
Conventional methods only growth	6	3.4
Different organism growth	3	1.7

Table 3. Time to positive detection of bacterial growth in days

Methods	Mean (± 1SD)	Median	Range	
			Minimum	Maximum
Automated blood culture method	4.4 ± 1.3	4	2	8
Conventional method	4.2 ± 1.9	4	2	11

Table 4. Organisms detected by each method

Causative organisms	No. of organisms detected by each culture method		
	Total	Automated blood culture method	Conventional method
Coagulase-negative Staphylococcus	26	25	24
Streptococcus spp.	16	16	9
Staphylococcus aureus	9	9	8
Escherichia coli	8	7	4
Gram-positive bacilli	6	5	4
Neisseria spp.	3	3	3
Acinetobacter baumannii	3	1	3
Enterobacter spp.	2	2	2
Enterococcus faecalis	2	2	2
Klebsiella pneumoniae ss. pneumoniae	2	2	2
Micrococcus spp.	2	2	1
Serratia marcescens	2	2	1
Alcaligenes faecalis (odorans) (CDC VI)	1	0	1
Candida albicans	1	1	1
Corynebacterium spp.	1	1	0
Enterococcus faecium	1	0	1
Enterococcus gallinarum	1	1	1
Klebsiella oxytoca	1	1	1
Leuconostoc spp.	1	1	1
Oligella urethralis (CDC M-4)	1	1	1
Pseudomonas aeruginosa	1	1	1
Rothia spp.	1	1	0
Sphingomonas(Pseudo.)paucimobilis	1	1	0
Fusobacterium sp.	1	1	0
Total	93	86	71

CONCLUSION

- The automated blood culture method to detect organisms causing CAPD peritonitis showed better diagnostic performance. In considering of convenience and sensitivity, the automated blood culture method rather than the conventional method is advocated in the PD peritonitis.

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