False-Negative Culture Results with Fungal Isolates from Peritoneal Dialysis Fluid

Recently, newly reported causes of fungal peritonitis associated with continuous ambulatory peritoneal dialysis were described both in this journal and in another (6, 7). These episodes threatened to go undetected due to false-negative culture results in the initial investigations.

Each of these cases involved inoculation of peritoneal dialysis (PD) fluid into BACTEC (Becton Dickinson) blood culture bottles with incubation in a BACTEC 9240 (Becton Dickinson) system. This approach for culturing PD fluid is not novel. It has been previously established that the sensitivity of detecting organisms in a sterile fluid can be greatly increased by using a large volume of inoculum and a large volume of media (10). In the clinical microbiology laboratory, this is conveniently achieved with blood culture bottles. Superior performance using blood culture bottles compared to conventional culturing has been noted for the recovery of organisms from synovial (10), ascitic (1), and peritoneal dialysis fluid (8). Specifically, inoculation of BACTEC blood culture bottles with sterile fluids has proven effective for the recovery of a variety of microorganisms (4, 5), including fungi (9).

In both of the reported cases, PD fluid submitted for culture signaled positive by the BACTEC 9240 system within several days, though microscopy with Gram’s stain was negative. Subsequently, in both cases visual inspection was needed to identify the growth of filamentous fungi within the blood culture bottles.

The two reports indicate that fluid was initially recovered from positive blood culture bottles via needle extraction. The current BACTEC blood culture bottle is approximately 14 mm in diameter at the top and 17 mm at the base of the neck. The length of the neck is approximately 50 mm, which exceeds the length of many standard needles. These dimensions are designed to accommodate the plastic safety sheath that is used with the Vacutainer (Becton Dickinson) needle system. The aim of this system is to reduce the risk of needlestick injuries.

It is likely that due to the filamentous nature of these fungi (Curvularia inaequalis [6] and Cunninghamella bertholletiae [7]), the clumps of mycelium did not rapidly travel down into the neck of the bottle when inverted. As such, it is also likely that the reach of the needle was exceeded and no hyphae were drawn out, yielding negative microscopy results. It has been previously demonstrated experimentally that filamentous fungi that form visible mycelial masses in blood culture bottles may still fail to release spores or hyphae into the broth (2). In cases such as these, uncapping the bottle and manually extracting pieces of the fungal mass may be necessary.

The visual inspection of blood culture bottles in order to avoid false-negative results is not a recent concept (3). Moreover, the importance of this practice should not be overlooked, for a delay in identification of fungal isolates may result in the delay of appropriate antifungal treatment. So, it bears repeating that, as a rule, when a blood culture bottle with a positive signal is found to have a negative microscopic examination, a visual inspection must be performed, or a vital piece of information may be missed or even discarded.

REFERENCES


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