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BC-6800 MINDRAY HEMATOLOGICAL ANALYSER: CYTOGRAPHIC THREE-DIMENSIONAL MODIFICATIONS IN CASE OF SEVERE SEPSIS BY CANDIDA PARAPSILOSIS

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INTRODUCTION

Candida Parapsilosis can cause bloodstream infections particularly after contamination of medical devices as central venous catheters. In case of Candidaemia, an etiological treatment must be started only after a positive blood culture. However, because the mortality rates can be increased by delay in diagnosis and in treatment, in some cases based on clinical and laboratory data, an empiric antifungal therapy can be started before blood culture. We describe two cases of bloodstream infections caused by Candida parapsilosis in which the instrumental information provided by BC-6800 hematological analyzer allowed us to suspect the diagnosis of sepsis by candida. before the availability of blood culture results. Based on these information, the clinicians could start an empiric antifungal therapy.

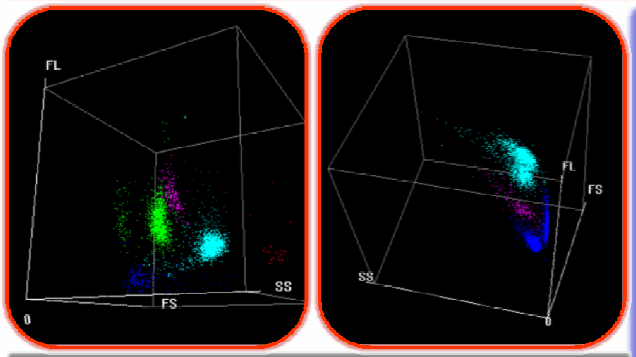


Figure 1. Mindray BC 6800 Analyzer. On the left DIFF cytogram: leukocytes are classified based on their internal complexity (SS), size (FS) and nucleic acid content (FL). On the right NRBC cytogram. When present, erythroblasts are classified as cells whit low complexity, low size and low nucleic acid content (fuchsia cluster). Such as in this case, each cytogram can be rotated in any direction to better evaluate the clusters morphology.

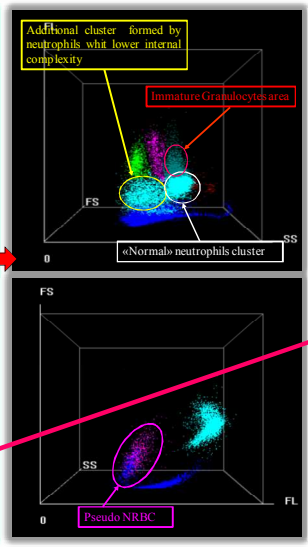
MATERIALS AND METHODS

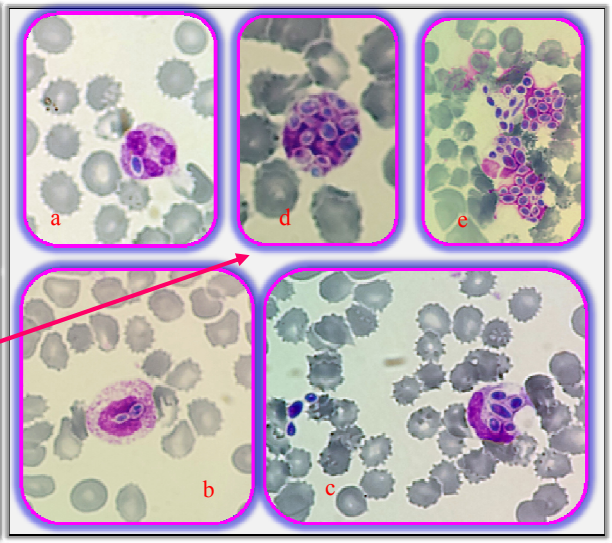
1. Analytical methods. Complete blood count and white blood cells differentials were performed on BC 6800 hematological analyzer (BC-6800, Mindray, China) (figure 1). Microscopic review of May Grünwald Giemsa stained peripheral blood smears was performed by experienced hematologists and microbiologist.
2. Patients. Both patients (P.C. a 74-years- old female and A.G. a 95-year-old female) were beavered of a central intravenous catheter and presented fever and precarious general condition. Middle anaemia (Hemoglobin 93,0 and respectively 85,5g/L) and moderate neutrophilia were also present. For each patient, blood samples from central catheter and from venipuncture were collected and cultures were performed whit Bactec 9240 system (Becton Dickinson, USA).The catheters tips were cultured on, chocolate, blood and MacConkey agar plates.

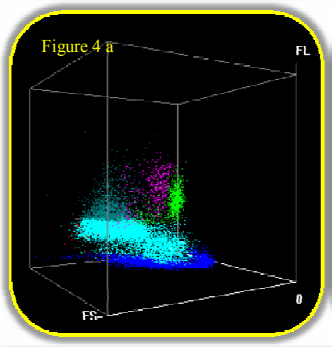
RESULTS

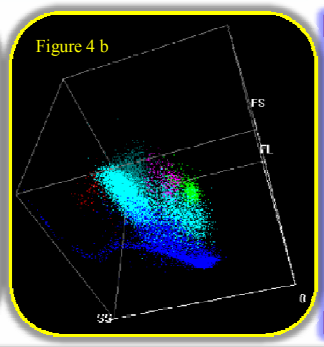
The BC-6800 cytogram for differential separation (DIFF) of leukocytes shows two neutrophils' cluster instead of one. An extension toward the area of the immature granulocytes (IG) is even present. In the NRBC channel, a cluster is present in the area usually occupied by erythroblasts but with modified shape and positioning respect to the normal (figure 2). Microscopic review shows numerous neutrophils that engulf one or more Candidas. Most of phagocytic cells are destroyed due to the large amount of ingested blastospores. Blastospores and pseudo-hyphae are also present outside of neuthrophils (figure 3 a,b,c,d,e).

IG as well as NRBC are not found. C. parapsilosis is later identified in catheters and blood samples cultures.









Morpho- cytographics correspondences

Neutrophils containing one ore more blastospores of Candida (figure 3 a,b) increase their size. For this reason, in DIFF cytogram, the corresponding light blue cluster extend along the FS axis just as we can see after rotation of the three-dimensional DIFF cytogram (figure 4a).

In some neutrophils, the presence of many intra-cellular Candidas (figure 3c) could increase the nucleic acid content thus simulating the presence of immature granulocytes.

Finally, the destroyed phagocytic cells (figure 3d) could have reduced their internal complexity and might form the second light blue neutrophilic cluster (figure 2 and 4a).

Extra-cellular blastospores and pseudo-hyphae (figure 3e) form a kind of blue carpet on the floor of the three dimensional DIFF Cube (figure 4b) as well as a "pseudo-erythroblastic" cluster on NRBC channel (figure 2).

Conclusions

The diagnosis of catheter-related candidemia require the yeasts isolation from both blood and catheter samples but for etiological diagnosis three or more days are needed. Therefore, considering that a sepsis by candida is related with high mortality rate, the lack of an early microbiological diagnosis can lead to begin an empiric antifungal therapy in cases of suggestive clinical and laboratory data. Detection of Candidas circulating in peripheral blood by automated hematology analyzers or by peripheral blood smear examination can be useful to suspect a sepsis. Unfortunately, this fact as been described as infrequent because they require yeast concentration ranged from 1-5x10^5 and 1-5x10^8 CFU/mL that are infrequent in clinical practice (1). Our observation suggest that in cases of bloodstream infections by Candida, the morphological changes of cytograms of Mindray BC-6800 analyzer can lead to an earlier diagnosis. These morphological changes could be related with pathophysiological events that involve the neutrophilic phagocytic activity. Further observations are needed to confirm this hypothesis.

1. Hirai Y ,Asahata S, Ainoda Y, Fujita T, Miura H, Hizuka N, Kikuchi K. Candidemia Diagnosed from Peripheral Blood Smear: Case Report and Review of Literature 1954–2013. Mycopathologia 2015 Aug;180(1):111-116