

INVASIVE CANDIDIASIS IN PRETERM NEWBORN: A CASE REPORT

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Candida is the main etiologic factor in the development of invasive fungal infections in children in the hospital environment. We reported our autopsy findings from clinically undiagnosed neonatal invasive candidiasis. Male preterm newborn 27 gestational weeks old died after 24 days after delivery with clinical diagnosis of intracranial and intrapulmonary hemorrhage, threatened with surfactant, antibiotics and invasive mechanical ventilation. Histologically, multiple colonies of fungi were found in lung blood vessels, kidney, suprarenal gland, brain, endocardial and myocardial tissue. In the liver, centrilobular necrosis was found.

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Key words: *Candidiasis, invasive, preterm newborn*

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Introduction

The majority of candidemia cases are noted among one year olds (particularly in the neonatal period) (1). Invasive candidiasis ended in mortality in 14-40% of the cases and with significant neurological and developmental abnormalities in 30-70% of surviving children (2).

We reported our autopsy findings from clinically undiagnosed neonatal invasive candidiasis in a preterm newborn.

Case report

Male preterm newborn 27 gestational weeks old (body weight 1040 g, crown-heel length 34 cm,

head circumference 25 cm) was treated with surfactant, antibiotics (ampicillin, gentamicin, meropenem and piperacillin/tazobactam) and invasive mechanical ventilation in the Intensive Care Unit, at the Pediatric Clinic, Clinical Center Niš Serbia. In the culture of aspirated fluid, *Pseudomonas aeruginosa*, *Klebsiella* spp. (at the second postnatal week), and *Stenotrophomonas maltophilia* (at the third postnatal week) were found.

A newborn died 24 days after the delivery with clinical diagnosis of intracranial and intrapulmonary hemorrhage.

At autopsy, diffuse petechial skin hemorrhages were found on male preterm newborn (body weight 1460 g, body length 40 cm, toe-heel length 52 mm, biparietal diameter 7 cm, crown-rump length 21 cm). In the left cerebral ventricle hemorrhage was found. Lung and liver parenchyma were heavily congested.

Histologically, using alcian blue-periodic acid-Schiff (AB-PAS) stain at pH 2.5, multiple colonies of fungi were found in lung blood vessels (Figure 1), composed of spherical or ovoid blastospores or yeast cells, about 5 µm in diameter, elongated pseudo-hyphae with constriction at septations (Figure 2), and true hyphae. Similar colonies of fungi were found in the kidney, suprarenal gland, brain (Figure 3), and endocardial and myocardial tissue (Figure 4). In the liver, centrilobular necrosis was found. Involution was found in the thymus. Fungi were not found in the gut lumen.

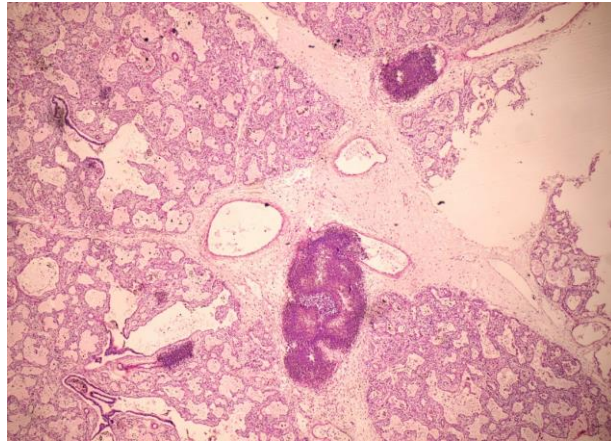


Figure 1. Colonies of fungi in lung blood vessels. AB-PAS, x40

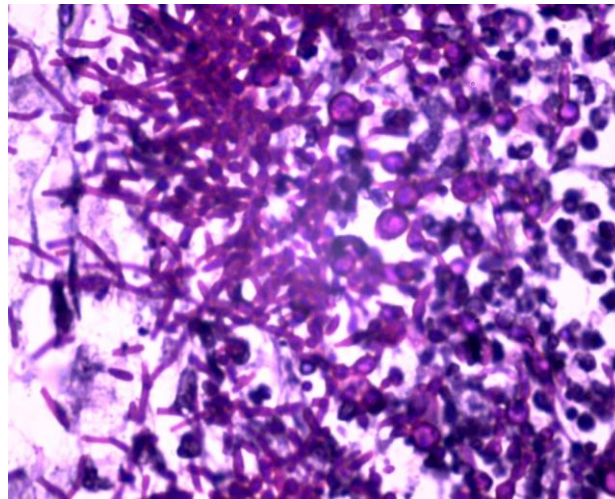


Figure 2. Spherical blastospores, about 5 μm in diameter, elongated pseudohyphae with constriction at septations, and true hyphae. AB-PAS, x600

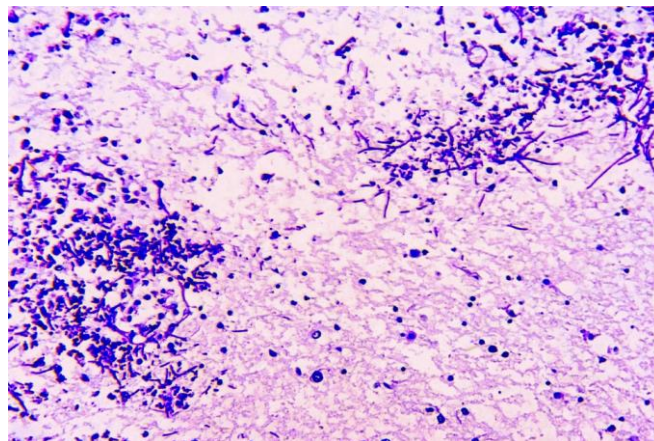


Figure 3. Colonies of fungi in brain tissue. AB-PAS. x100

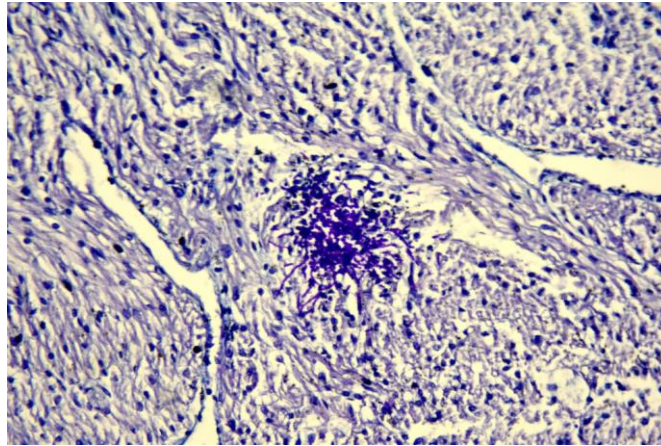


Figure 4. Fungi in myocardial tissue. AB-PAS, x200

Discussion

Candida species are present in humans as commensal organisms, and candidiasis in intrahospital conditions is usually endogenous and caused by those very types. Invasion and spreading occurs through the damaged mucosae and has also been linked with the overuse of antibiotics. Exogenous origin of invasive candidiasis has also been found (caused by types acquired from other patients, medical staff and apparatus, as well as local hospital environment (3).

Invasive candidiasis encompasses candidemia (presence of fungal elements in the blood) with/or without the infection of deep tissues and internal organs (4). This fungal species is the most common and frequent cause of invasive fungal disease in preterm children (5). Studies identified risk factors that could be linked with candidiasis such as: intubation, insertion of venous catheter, and administration of parenteral therapy in the form of intravenous lipid emulsion (6). Our patient was intubated for two weeks.

Although *C. albicans* is the most common type (45-55% of *Candida* species) responsible for invasive candidiasis among infants, recent studies have shown an increased incidence of non-*albicans Candida* (NAC) species, which led to higher mortality and poorer antifungal therapy response. *Candida*

parapsilosis, *Candida glabrata*, *Candida tropicalis*, and *Candida krusei* together make up about half of all *Candida* types found in blood specimen cultures. Causes of this change in incidence could be explained by an increased usage of caspofungin and azoles as a part of antifungal treatment protocol (2, 5, 7, 8). In our case, in aspirate culture Gram-negative bacteria were found. Culture of fungi was not done and diagnosis was made after autopsy.

C. albicans and non-*albicans Candida* species vary in micromorphology and severity of harmfulness towards the organism they infect. *Candida* species can be found in form of spherical or oval shaped blastospores or yeast cells that can produce chains of elongated blastospores or pseudohyphae. *C. albicans* can also be found in the form of elongated filamentous cells (true hyphae) (9). In our case true hyphae were found. *C. Albicans* infection is often accompanied by severe inflammatory response while non-*albicans Candida* organisms are far more indolent and less noticeable pathohistologically (5).

Conclusion

Our findings show the association of prolonged mechanical ventilation and antibiotic therapy in preterm newborn with invasive candididasis.

References

1. Walsh TJ, Katragkou A, Chen T, Salvatore CM, Roilides E. Invasive candidiasis in infants and children: recent advances in epidemiology, diagnosis, and treatment. *J Fungi (Basel)* 2019;5(1):11. [[CrossRef](#)] [[PubMed](#)]
2. Autmizguine J, Tan S, Cohen-Wolkowicz M, Cotten CM, Wiederhold N, Goldberg RN, Adams-Chapman I, Stoll BJ, Smith PB, Benjamin DK Jr; NICHD Neonatal Research Network. Antifungal susceptibility and clinical outcome in neonatal candidiasis. *Pediatr Infect Dis J* 2018;37(9):923-9. [[CrossRef](#)] [[PubMed](#)]
3. Ben Abdeljelil J, Saghrouni F, Emira N, Valentin-Gomez E, Chatti N, Boukadida J, Ben Said M, Del Castillo Agudo L. Molecular typing of *Candida albicans* isolates from patients and health care workers in a neonatal intensive care unit. *J Appl Microbiol* 2011;111(5):1235-49. [[CrossRef](#)] [[PubMed](#)]
4. Pappas PG. Invasive candidiasis. *Infect Dis Clin North Am* 2006;20:485-506. [[CrossRef](#)] [[PubMed](#)]
5. Hemedez C, Trail-Burns E, Mao Q, Chu S, Shaw SK, Bliss JM, De Paepe ME. Pathology of Neonatal Non-*albicans Candidiasis*: Autopsy Study and Literature Review. *Pediatr Dev Pathol* 2019;22(2):98-105. [[CrossRef](#)] [[PubMed](#)]
6. Benjamin DK Jr, Stoll BJ, Gantz MG, Walsh MC, Sánchez PJ, Das A, Shankaran S, Higgins RD, Auten KJ, Miller NA, et al. Neonatal candidiasis: epidemiology, risk factors, and clinical judgment. *Pediatrics* 2010;126:e865-e873. [[CrossRef](#)] [[PubMed](#)]
7. Basu S, Kumar R, Tilak R, Kumar A. *Candida* blood stream infection in neonates: experience from a tertiary care teaching hospital of Central India. *Indian Pediatr* 2017;54(7):556-9. [[CrossRef](#)] [[PubMed](#)]
8. Forrest GN, Weekes E, Johnson JK. Increasing incidence of *Candida parapsilosis* candidemia with caspofungin usage. *J Infect* 2008;56:126-9. [[CrossRef](#)] [[PubMed](#)]
9. Thompson DS, Carlisle PL, Kadosh D. Coevolution of morphology and virulence in *Candida* species. *Eukaryot Cell* 2011;10:1173-82. [[CrossRef](#)] [[PubMed](#)]

Prikaz bolesnika

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INVAZIVNA KANDIDIJAZA KOD PRETERMINSKOG NOVOROĐENČETA: PRIKAZ SLUČAJA

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Kandida je vodeći uzrok invazivnih gljivičnih infekcija kod hospitalizovane dece. Prikazujemo autopsijski slučaj klinički neotkrivene neonatalne invazivne kandidijaze. Muško pretermensko novorođenče gestacione starosti 27 nedelja umrlo je 24 dana nakon porođaja sa kliničkom dijagnozom intrakranijalne i plućne hemoragije, lečeno surfaktantom, antibioticima i invazivnom mehaničkom ventilacijom. Histološki, mnogobrojne kolonije gljivica otkrivene su u krvnim sudovima, bubrezima, nadbubrežnim žlezdama, mozgu, tkivu endokarda i miokarda. U jetri je uočena centrolobularna nekroza.

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Ključne reči: kandidijaza, invazivnost, pretermensko novorođenče

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