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Case Report

Malassezia pachydermatis Identified from the Blood Culture of an Immunosuppressed Infant in a Tertiary Care Hospital of Maharashtra: A Case Report

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Abstract

Malassezia pachydermatis, a rarely reported zoonotic pathogen that can potently cause life-threatening septicemia, was reported from the blood culture of a low birth-weight male infant with renal complications and congenital heart disease. Blood-sample screening through routine culture revealed fungal growth on Sabouraud Dextrose Agar (without lipid supplementation). Creamy, dull, smooth, pasty colonies upon staining and visualization revealed short hyphae and infrequent branching, characteristic to *M. pachydermatis.* The patient responded to antifungal fluconazole post intravenous cefotaxime, amikacin, and meropenem, hence suggesting an effective empirical treatment and cure to the infection despite physiological complications.

Keywords: *Blood Culture; Malassezia pachydermatis; Paediatrics*

Introduction

Malassezia yeasts are members of the Malasseziaceae family, the Malasseziales order, and the Malasseziomycetes class. They belong to the morphologically varied subdivision Ustilaginomycotina, and Basidiomycota because of the filament (hyphae) and reproduction properties of their cells. They are thick-walled commensal yeasts that are ovoid, ellipsoid, or cylindrical in shape having a genome of 10 Mb [1-3].

Malassezia pachydermatis is a non-lipid dependent zoo-pathogen forming normal microbiota of the skin and ear canal of dogs, cats, and other canines where it causes dermatitis and otitis externa [4]. Rarely, it is also isolated from healthy and diseased human skin. In infants, it is often associated with septicemia. The risk factors for invasive *Malassezia* infections in infants include prematurity, the presence of a central venous catheter, use of broad-spectrum antibacterial treatment, multiple underlying complications and prolonged total parenteral nutrition with administration of parenteral lipids [5,6].

There are also evidences of contamination during insertion of catheter and by local replication or shedding of the organism in blood owing to its ability to form biofilm and adherence to catheter surfaces [7,8]. Infants become colonized by skin contact with parents or healthcare workers, which may further transit the organism from an infected or colonized infant to others *via* their hands. The organism can be introduced into nursery on health care workers' hands after being colonized from pet dogs at home. *Malassezia* can also persist for prolonged time on incubator surfaces [8-10].

We report here a case of septicemia in an immunosuppressed infant from which *Malassezia pachydermatis* was isolated.

Case Report

A one and half month-old Intra Uterine Growth Retarded (IUGR), Small for Gestational Age (SGA), Very Low Birth Weight (1.4 kg) male child was admitted to Neonatal Intensive Care Unit (NICU) of GMCH Nagpur with complaints of not passing urine and stool for the last 4 days. There was no maternal history complicating pregnancy and the mother took regular antenatal check-up. On Abdomino-pelvic USG he was diagnosed to have renal cystitis with hydronephrosis and probable sepsis. 2D Echocardiography revealed Congenital Heart Defect (CHD). Routine blood examinations and CSF study were within normal parameters. Urine was sent for routine microscopy/culture sensitivity. Blood was sent for bacterial and fungal culture.

Due to the lack of the fatty-acid synthetase gene and the resulting inability to manufacture long-chain fatty acids, all *Malassezia* depend on lipids for growth. However, *M. pachydermatis*, can uniquely grow on Sabouraud dextrose agar (SDA), a medium without lipid supplementation, owing to the usage of lipid fractions within the peptone, a component of SDA [11].

Hence, subculture from Blood Culture Bottle was performed on Blood Agar and SDA (with and without lipid supplementation) to strengthen the identification criteria. Blood agar plate showed no growth. On SDA without lipids, at 35 °C, colonies were convex, cream coloured, 2 - 3 mm in diameter with intact margins, with a waxy, pasty texture. Gram staining revealed Gram positive elongated cells. Microscopically, saline wet mount preparation showed yeast cells which were ovoid to ellipsoid, with monopolar budding measuring 4 - 6 µm x 2.8 - 4 µm in size. No hyphal forms were observed. Lactophenol Cotton Blue (LPCB) Preparation, Modified ZN Stain showed bottle shaped cells and cells with collarette. Safranin staining revealed cells with characteristic collarette (not shown). The colonies were positive to Urease Hydrolysis Test. Figure 1 represents the standard culture and microscopic observations. Based on the observations, the isolate was identified as *Malassezia pachydermatis*. The baby was being treated with intravenous antibiotics Cefixime, Amikacin and Meropenem to which intravenous antifungal Fluconazole was added post diagnosis was made.

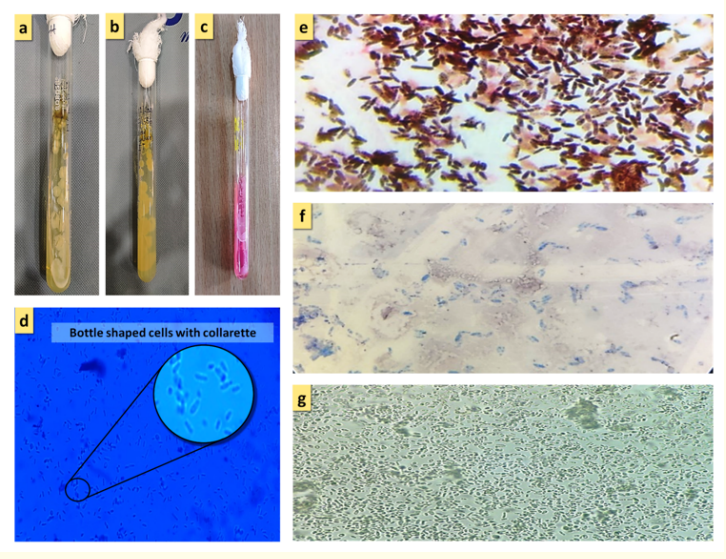

Figure 1: *(a) SDA with creamy pasty colonies - Obverse, (b) SDA with creamy pasty colonies - Reverse, (c) Positive urease test, (d) LPCB preparation showing bottle shaped cells and cells with collarette, (e) Gram positive elongated cells, (f) ZN Staining showing bottle shaped cells and cells with collarette, (g) Wet mount preparation showing bottle shaped cells and cells with collarette.*

The patient responded to treatment and was discharged. No sign of residual fungal growth was observed from the blood culture of the patient post recovery.

Discussion and Conclusion

Zoopathogens have threatened the healthcare scenario worldwide and *Malassezia pachydermatis* is one such kind that continues to invade immunosuppressed infants with the potential to cause septicaemia [7]. In 1987, Mickelsen., *et al.* reported details of *M. pachydermatis* sepsis in three infants in their NICU. All infants had birth weights of < 1000g and had numerous complications of prematurity [10]. Larocco., *et al.* retrospectively reviewed their clinical microbiology laboratory records of cultures obtained from 507 infants hospitalized in their NICU from October 1985 to January 1987. They identified eight infants (1.6%) from whom *M. pachydermatis* had been recovered [12]. In a study in 2014, Noura., *et al.* reported a case of *M. pachydermatis* fungemia in a preterm neonate [6].

The present study represents one of the classical evidences of *M. pachydermatis* infection in an IUGR, very low birth weight baby (1.4 kg) with CHD, admitted in NICU who subsequently got cured with intravenous combined antibiotic and antifungal therapy.

The case report suggests that *M. pachydermatis* infection can be accompanied with non-specific symptoms hence, educated clinical intervention is necessary for immunosuppressed infants.

The routine medical assistance profile and sound health of the mother suggests that the disease has not been transmitted vertically.

Previous clinical evidences suggest that the fungal colonization in neonates is mostly reported in NICU, however, the probability of transmission from an environmental source (through a carrier-human contact) cannot be overruled [11].

There is no well-devised standardization to test antibiotic susceptibility of the organism. Antifungal susceptibility in *M. pachydermatis* can differ according on the type of infection, site of infection, duration of infection, co-morbid conditions present, and whether or not an infected individual is immunosuppressed [11].

Drug-resistance in microbial pathogens is the major clinical concern at present [13-15]. Biofilm development, mutations or overexpression of ERG11, overexpression of efflux pumps, and chromosome 4 gene rearrangements or overexpression are examples of antifungal resistance mechanisms in the organism [11,16]. However, in the present study, the organism succumbed to available antimicrobials. This shows that the organism (from the concerned geographical area) has not developed resistance to available diagnostics and therapies.

The study portrays classical clinical evidence of *Malassezia pachydermatis* infection and also shows that immunosuppressed infants are still susceptible to the infection.

Ethics Statement

The study has been approved by Institutional Ethical Committee (File no: EC/Pharmac/GMC/NGP/3844) with proper patient's family consent.

Conflict of Interest

None.

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