Risk Factors and Characteristics of Candidemia after Cardiac Surgery in Pediatric Patients in Israel

Yaara Kahan[1, 3*], Samantha G Tope[3*], Adi Ovadia[2, 3], Adi Shpring[2, 3], Rachel Shatzman-Steuerman[3, 4], Gilad Sherman[3, 4], Galia Barkai[3, 4], Avigdor Mandelberg[2, 3] and Diana Tasher[1, 3]

*YK and SGT contributed equally to the study [1]Pediatric Infectious Diseases Unit, Edith Wolfson Medical Center, Holon, [2]Department of Pediatrics, Edith Wolfson Medical Center, Holon
[3]Sackler School of Medicine, Tel-Aviv University, Tel-Aviv, [4]Pediatric Infectious Diseases Unit, Sheba Medical Center, Ramat-Gan

Introduction

Candidemia is a serious complication in pediatric patients with congenital heart defects (CHD) after cardiac surgery. Data on the epidemiology, clinical characteristics and risk factors for postoperative candidemia in this vulnerable population remains limited.

Methods

This retrospective case-control study was conducted at two pediatric intensive care units between 2004-2019. All patients <18 years old who developed candidemia following cardiac surgery were included as cases. Cases were matched with 2 control patients without candidemia. Multivariable logistic regression analysis was conducted to identify risk factors for postoperative candidemia.

Results

Thirty-five candidemia cases were identified and matched to 70 control cases. The incidence of candidemia was 6.3 episodes per 1000 admissions. The median age of candidemia cases was 4 months (16 days-9.7 years). The attributable mortality was 28.5%. Risk factors independently associated with candidemia included cumulative antibiotic exposure ≥ 4 days, the need for total parenteral nutrition (TPN) or peritoneal dialysis and delayed sternal closure ≥ 2 days (Table 1, Figure 1) .Non-*albicans Candida* species were the predominant (54%) pathogens isolated (Figure 2). *C.parapsilosis* isolates demonstrated high resistance to fluconazole (70%).

Table 1: Multivariable Regression Analysis of Factors Associated with Development of Candidemia in the Cardiac PICU

Risk Factors	OR	95% CI	P-value
Cumulative antibiotic exposure ≥ 4 days	4.3	1.3-14.6	0.02
Receipt of TPN or peritoneal dialysis	6.1	2-18.8	0.001
Delayed sternal closure ≥ 2 days	3.2	1-11.2	0.05
Male gender	6.2	1.9-20.3	0.002

Figure 1: Receiver Operating Characteristic Curve of Factors Associated with Development of Candidemia

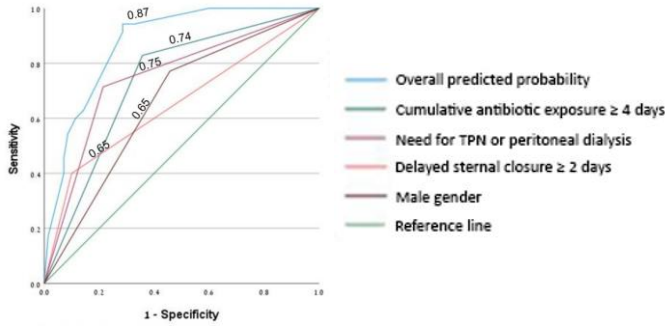
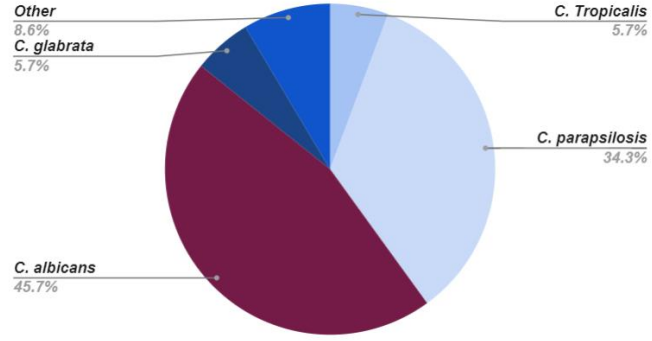


Figure 2: Distribution of Candida Species Causing Candidemia



Conclusions

Postoperative candidemia in patients with CHD is an uncommon complication, occurring mostly in young infants. We observed an increasing proportion of fluconazole resistant *C. parapsilosis* as the main cause of non-albicans candidemia. Furthermore, previously recognized risk factors for candidemia have been confirmed and some new possible risk factors such as delayed sternal closure and male gender have been uncovered.