

Rapid Communication

Infections Related to Post-Surgery Pediatric Patients of Congenital Cardiopathy in a High Specialty Medical Unit

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Introduction

Heart disease are the most frequent congenital malformations, its prevalence is estimated from 2 to 12.5 out of every 1000 live newborns [1]. Based on pediatric mortality rates, 83% belongs to children under one year old [1,2,5,6].

The incidence rate of infections associated with cardiac surgery first place reported includes a gap that ranges from 10 to 50% [8-10]. According to the National Center for Health Statistics and the Centers for Control and Prevention of Diseases, sepsis was the tenth cause of global death in 2007. This is expected to increase by 1.5% each year, resulting in one million additional cases [7].

The mortality rate related to surgical procedures is 3.1%, the infection rate is 15.1, and the number of hours of hospital stay in the Intensive Care Unit is 114 [8]. Developing countries face the problems of a huge burden of congenital heart diseases, limited infrastructure, lack of dedicated pediatric cardiac programs, a limited number of well-trained personnel, and suboptimal funding. Several preoperative and postoperative factors contribute to morbidity and mortality in children with congenital heart disease [8-9].

In the General Hospital – La Raza National Medical Center at Mexico City, an average of 160 of congenital cardiac heart disease surgeries are performed per year, of which the incidence of nosocomial infections is not known. Therefore, the present study aimed to record and report the incidence in this hospital and highlight which are the most frequently isolated microorganisms in these infections.

Abstract

Background: Congenital heart diseases are frequent malformations, in Mexico is second death cause among children under one year. The cardiac disease is the top cardiothoracic surgery, being the nosocomial infection important to consider.

Materials and Methods: Observational and descriptive study of patients who underwent cardiac surgery.

Results: The study included 165 patients; 12 developed nosocomial infection. Children under one year old has higher risk of infection (63.6%). The common microorganism isolated were *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*.

Conclusions: The development of nosocomial infections was minimal. Surgeries are more frequent in children under one year related to frequency of infectious complications.

Keywords: Infection; Congenital cardiopathy; Postoperative; Incidence; Infants; Children

Materials and Methods

From an observational, descriptive, prospective, cross-sectional study, data gathering from hospitalization logs and nosocomial infection reports of patients undergoing cardiac surgery from January 2021 to December 2021 period, were collected from patients entering to the Pediatric Intensive Care Unit (PICU) for close follow-up.

Results

In 2021, 554 patients were admitted into the PICU, 165 (29.78%) with a postoperative diagnosis of cardiac correction surgery. In 12 (7.27%) patients, bacterial development from different specimens was demonstrated by clinical laboratory studies, and confirmation based on the World Health Organization (WHO) criteria; a nosocomial infection diagnosis was documented. The cumulative incidence was 0.02%. The gender of patients with nosocomial infection corresponded to 6 girls (50%) and 6 boys (50%); seven (63.6%) were under one year old, one (9.1%) was in the 1-4 years age group, and four (36.3%) were older than five years.

The anatomical organs in which bacterial development was documented were: urinary tract 4 patients (36.36%), lower respiratory tract 3 patients (27.27%), circulatory system 2 patients (18.18%), gastrointestinal tract 1 patient (9.09%), and peritoneal cavity 1 patient (9.09%).

Table 1 shows below, in general, the microorganisms developed from the different studied specimens. *Pseudomonas aeruginosa* was the most reported microorganism, followed by *Klebsiella pneumoniae*;

Table 1: Isolated microorganisms and frequency.

Isolated Microorganisms		
Microorganism	Frequency	Percentage
<i>Pseudomonas aeruginosa</i>	5	45.45 %
<i>Klebsiella pneumoniae</i>	2	18.18 %
<i>Staphylococcus epidermidis</i>	1	0.09 %
<i>Enterococcus faecalis</i>	1	0.09 %
<i>Candida albicans</i>	1	0.09 %
<i>Burkholderia cepacia</i>	1	0.09 %
<i>Escherichia coli</i>	1	0.09 %
<i>Clostridium difficile</i>	1	0.09 %
<i>Corynebacterium sp</i>	1	0.09 %

Table 2: Microorganisms isolated by culture type.

Culture	Isolated microorganisms
Uroculture	<i>Enterococcus faecalis</i> , <i>Pseudomonas aeruginosa</i> , <i>Burkholderia cepacia</i> , <i>Escherichia coli</i> .
Bronchial Secretion	<i>Staphylococcus epidermidis</i> , <i>Klebsiella pneumoniae</i> , <i>Pseudomonas aeruginosa</i> .
Blood culture	<i>Candida albicans</i> , <i>Corynebacterium sp</i> .
Stool	<i>Clostridium difficile</i> .
Peritoneal fluid	<i>Klebsiella pneumoniae</i> .

the others are a homogeneous group of different infectious agents.

The microorganisms obtained from the affected anatomical organs are shown below in (Table 2).

Discussion

The incidence found in this study is low, a condition that should be taken in the context of the selected population; however, it is similar to that reported by Solano, who reported 628 patients in the period from 2006 to 2010 with an incidence of 0.3% per 1,000 live births [10]. Regarding prevalence studies, Alcántara found that the prevalence of congenital heart disease was 7.4 x 1,000 live births in a five-year period in two hospitals from Center of Mexico [11]. There was no disparity regarding the affection by sex, finding results equally distributed. In other series, males were slightly more affected compared to females. Solano found 337 male patients (53.6%) and 291 (46.4%) female patients affected by some cardiac malformation [10-11].

From a study of infections related to health care in a PICU, Abreu et al., found that the group that presented nosocomial infection with greater frequency was the children under one year old, a similar situation to the one in this unit [12].

About frequency order, the body organs from which infection was documented were urinary tract, lower respiratory tract, and circulatory system. Abreu found deep venous approaches as the main trigger [12]. Orozco [13] reported the same body sites as this study; however, the order corresponded to systemic infection associated with catheter, ventilator-associated pneumonia, and urinary tract infection associated with urinary catheter [13].

The isolations of microorganisms were diverse, finding mainly non-fermenters, as it happens in different centers and hospital care

units. In this study, *K pneumoniae* was the second most common microorganism found in the analyzed specimens; this differs from other studies. Finally, by anatomical site, the microorganisms were the same found in the nosocomial infection report at PICU by Zaragoza et al [14].

Conclusion

Patients considered as part of the surgical cardiology service who underwent surgery related to congenital heart disease represent a big quantity among the total admitted to the PICU.

Out of total patients belonging to this category, only a small amount maintains the diagnosis of nosocomial infection, and this percentage decreases drastically if we consider the total number of patients admitted to PICU in one year, which can show that the risk of developing a nosocomial infection is quite low.

Male patients are slightly more susceptible to nosocomial infection compared to female patients, statistically speaking.

The age group that shows a higher incidence of infection is that of less than one year old; it is congruent because they are the age group where it is preferred to perform different surgeries for correction or treatment of congenital anomalies, and, by other hand, because they represent a critical group within the pediatric population in general.

The human organs that show a higher incidence as infection key point are the respiratory tract, the urinary tract, and, in first place, the bloodstream, taking into account that it is the best place to carry out isolation.

Similar to different national and international reports, the microorganisms involved in nosocomial infections are the same with those found in this PICU over the course of a year, the most common were *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*.

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