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Original Article

Establishing Pediatric Cardiac Surgery Unit in Underprivileged Area. An Audit of First 100 Cases & Challenges Faced

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ABSTRACT

There is significant global improvement has been observed in declining of under 5-year mortality from 93 deaths per 1,000 births in 1990 to 39 in 2017 (58%). Nevertheless, congenital anomalies predominantly cardiac are still leading cause of under five-year-old mortality**. Objective:** The aim of this audit was to present our experiences of first hundred cases of congenital heart defects surgeries along with the challenges faced during the establishment of new pediatric cardiac surgery center in underprivileged area. **Methods:** This was an audit of the first 100 cardiac surgeries performed for congenital heart defects at Gambat Institute of Medical Science from 15- 3- 2021 to1-10-2022. During the period challenges other then related with surgical interventions; more than an investment of money but political, cultural, and social faced. **Results:** The mean age was 9+/-6.5 years, with female predominance of 57. Sever pulmonary hypertension was present in 6 patients. The majority of our patients were from RACHS1 score category 1. Out of 100 patient open heart surgeries were 89(89%) and close heart were 11(11%). We have single mortality of patient underwent Tetralogy of Fallot correction developed massive stroke and expired at 5th postoperative day. Three patients were re explored for bleeding while one required emergency reopening in PICU for cardiac arrest. Post clamp removal arrhythmias were observed in 7(7%) patients. We received three patients in emergency from Pediatric cardiology post intervention including device embolization, device malposition and acute Mitral regurgitation post intervention. **Conclusions:** Providing Pediatric cardiac surgery services to the children of remote and socioeconomically deprived area is a greatly rewarding. It has many challenges other than providing direct patient care.

INTRODUCTION

There is significant global improvement has been observed in declining of under 5-year mortality from 93 deaths per 1,000 births in 1990 to 39 in 2017 (58%) [1,2]. This was the result of significant improvement in control and prevention of communicable diseases and over all maternal and child care. Nevertheless, after infection third most common reason of the less than five years' age mortality is congenital anomalies with predominant congenital cardiac defects with significant socioeconomic impact on the community [3]. It is estimated the prevalence of congenital heart defects are 8 to 12 children per thousand live birth [4].

There is extreme unequal access for definite health care for children with congenital heart defects with less than 100000 compare to over 1.3 million born every year with congenital heart defects [5]. Resulting improve survival in high income countries with already low birth rate leaving low income countries where burden is heaviest and disabilities continue to raise [6,7]. Regrettably this desired care is mostly provided to a small fortunate number of children residing in North America, Western Europe. There are sporadic centers with excellent care are also available in major metropolitan areas of many other countries

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throughout world thanks to the individuals with commitment. There are multi factorial reasons for such unequal distribution of care. Required allotment of resources, clinical care, and development of cost-effective treatment strategies requires assessment of the burden of congenital heart diseases problem in community, that is often lacking in underdeveloped countries due to prevalence of home deliveries and non-availability of experienced pediatricians in primary and secondary care maternity setups for early detection. In Pakistan 60000 children born with congenital heart defects every year with 11% mortality during first month of life [8,9]. In the state of Sind second largest populated state of Pakistan with estimated population of more 48 million, there is only one government supported institute NICVD providing all type of cardiovascular management. The PAQSJ institute of medical sciences a multidisciplinary institute located in tinny city of Gambat in the state of Sind planned to start the setup for pediatric cardiac services. Our team was approached for this challenging position. In spite of all challenges, our commitment and promised economic potential enable us to anticipate positive developments, including rapid growth of pediatric cardiac services. To overcome these challenges a "Pediatric Cardiac Team" was then established including pediatric cardiac surgeon, pediatric cardiologist, cardiac anesthetic and pediatric ICU manager and a part time pediatric cardiac perfusionist. Further recruitment of staff was carried out from local population including three staffs and two technicians for PICU. While rest of staff was involved from preexisting adult cardiac surgery team as per requirements.

METHODS

The first Open heart surgery was done at 20-03-2021 that was a7 year old child with Atrial Septal Defect LI. Clinical assessment and appropriate investigations were done as per standard including PCR for COVID 19 at the time of admission (no more perquisite until suspicious) and before surgery if time period between admission and surgery was more than five days. Transthoracic echocardiography was repeated in the presence of surgeon in all cases for diagnosis after admission in surgical ward. All open heart surgeries were done under tepid(30 to 32c)to moderate(28 c) cardiopulmonary bypass with aortic and bicaval cannulation. Myocardial protection was with cold blood Delnido(self constituted by percussionist in Ringer Lactate solution)cardioplegia in all cases transfused via Aortic root at pressure of 100mmgh and visual assessment of aortic distension and topical cooling with frequent cold saline irrigation. Patients were weaned off from bypass with selected ionotropic support with adenaline add-on milrinon add on noradrenaline in order of our preference. we use Wernovsky IS for calculation of ionotropic score of patients [10]. Following surgery, the patients were transferred to the Intensive Care unit with Propofol infusion and planned for fast tract exultation. Nevertheless, if patient planned for prolong intubation then our choice was intermittent or infusion of Attracurium with Nalbuphine. Patients remained in PICU till discharge. The patients were usually seen 2 weeks afterwards in the cardiothoracic department. Demographic and clinical data were collected from medical notes and mobile software of surgilog(mobile application)from surgeon's personal data base. These data included patient age, diagnosis, surgical procedure, preoperative use of inotropic and vasoactive medications, and duration of CPB and aortic cross clamp and outcome on excel sheet. In addition, patients were categorized by the Risk adjusted congenital heart surgery (RACHS-1) method as described by Jenkins [11]. Data were recorded on excel sheet. All continuous variables were expressed as Mean with standard deviation, and qualitative variables were expressed as numbers with percentages.

RESULTS

A total of 100 surgeries involving congenital heart defects were carried out from 20/03/2021 to 1/10/2022. The demographic characters of patients are shown in table 1. consisting of 89(89%) open heart surgeries and 11 close heart surgeries. The patients had a mean age of 9.1=/-6.5 years with the youngest of 2years. With female 57 and male 43. The patients in all had a mean weight of 23 +/- 13.5 kg with minimum weight of 10 kg and maximum of 61 kg.

Female : Male	57:43
Age	9.1 +/- 6.542016 (years)
Weight	23.09 +/- 13.606 kg
On pump :off pump	89:11
Pump time	112.7586 +/- 58.5 minutes
Cross clamp time	54.67816 +/- 38.6 minutes

Table 1: Demographic and Operative variables of patients

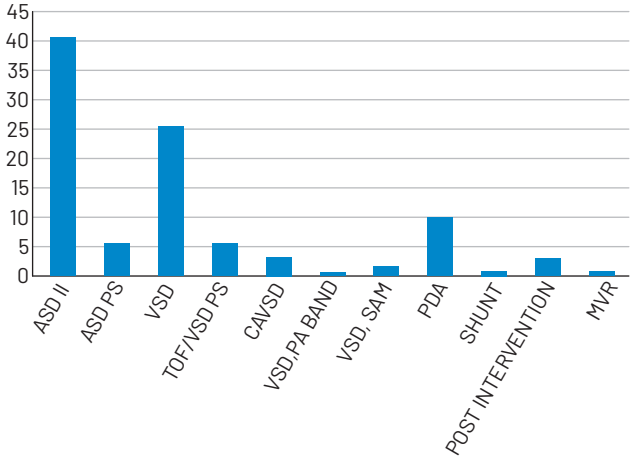

Figure 1: Anatomical Diagnosis of patient population

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The diagnosis of patients is shown in chart 1 with the Risk Adjusted classification for Congenital Heart Surgery (RACHS-1) was used to classify the patient's population for surgical risks shown in table 2.

RACHS1 Category	Patients
1	51
2	42
3	4

Table 2: RACHS 1 risk category of patient population

Group	Ionotrope score
1	<10
2	10 to 14
3	15 to 19
4	20 to 24
5	>25

Table 3: Groups with ionotrope score10

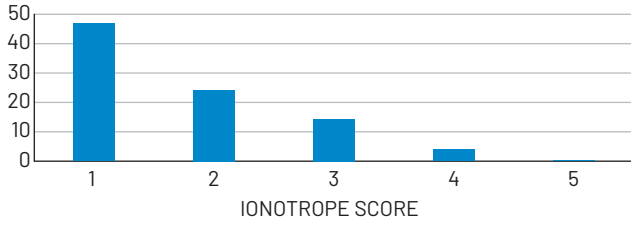

Figure 2: Ionotropic Score of patients at the PICU receiving

DISCUSSION

Pediatric cardiology department established in NICVD, Karachi in 1984 [13]. It is the first government supported institute looking after the children with congenital or acquired heart defects; children are brought from all over the Sind, southern Punjab and Baluchistan travel to Karachi for their treatment till our team accepted the challenge to establish second government supported unit of pediatric cardiac services in Sind. Importance of new unit can be well understandable from the observation of Kowalsky and others [14]. for each 100 km of distance traveled by patient to reach health care facility he or she will be delayed for 1.4 times of median age ideally desired for their respective intervention for cardiac problem this difference was even becomes twice if family belongs to rural locations. There were echoes of concerns from inside and outside about all obstacles when planning for establishing a new set up. Most of the colleagues have opposite of opinion of leaving a well established institute considering it a downhill course. Rao and others elaborate the challenges to establish cardiovascular care like limited financial support, deficient health care infrastructure, competing priorities, and unavailability of well trained pediatric cardiac care specialists [15]. Working in under privilege area is rewarding if we look at statics with 85 to 90% of the world's children are born in regions where cardiac surgery is not available [16,17]. That suggest about millions of Children as 28% children born with congenital defects have cardiac involvement who remain alive worldwide with heart problems, waiting for surgery, and new babies are born every day with congenital heart defects [18]. It is always should be taken in consideration prior to intervene and help to develop any type of project, its problems and resistances. Out, together with the local staff, exactly what is needed and how it can be addressed. Though financial resources are a major concern, supposition that it is the only or even the predominant problem is a common misconception instead always be ready for some difference of opinions are the real concerns for establishing a new project. The commonly faced resistances are to accept a new program or team includes: political obstacles problems, mostly local (institutional) and national levels, cultural differences such as skills (acceptance of others abilities and qualities), individual priorities, lifestyles and the "brain drain (unavailability of local expertise) [19]. Many of the time political will is very encouraging and enthusiastic for establishing the new unit till ribbon cut and few photographs. Furthermore, a more drastic effect is change of political will is diversion of assigned logistic and equipment to other new priority. Similarly, local politics may be the result of significant competition between individual providers for the scare of their existing position or sharing of the financial or logistics. There may be certain attitudes or acts from local staff considered unprofessional or against work ethics for a new appointee needed to be tactfully address to avoid any unwanted confrontation. Establishing a successful and sustainable program require a team of highly committed trained members who work in coordinate fashion with tolerance and commitment. The unavailability of local train staff is a major reason of failure. Locally trained staffs working in big cities most of the time not willing to back to native places. Adequate salary offer is crucial for reverse brain drain of experienced staff. Even the hiring a highly trained person has its own limitations and concerns due to non availability of advance instruments and professional support. Another major reason preventing reverse brain drain is desire of achieving higher position considering more growth potential compare to under developed regions. Furthermore, social life style, opportunities and concern for education of children are other major concerns. Nevertheless, despite of all challenges and resistances we have to understand the problems and then look forward for solution. Especially when we look at the statics about 15 million children are died or crippled from cardiac conditions waiting or searching for treatment almost all belong to underprivileged areas [20]. Most of the time planning is made sitting remotely or by quick visit well impressed from the enthusiasm from local bosses and

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colleagues and subordinates with warm welcoming gesture. Therefore, there shall be few visits and predefined strategy to determine the rules of proceeding. Furthermore, to proceed ahead needs frequent involvements of administration to maintain their attention towards us rather than after ribbon cut all interests diverted to other desires. This needs frequent communication. Our target shall be to achieve the aim rather indulging and arguing with how it will be achieved. There shall be willingness to accept their thought. It is imperative to identify, "fertile land", where people are doing good work, and sorting out their help through the concept of a twinning program. Our struggle is still in infancy where more problems listed still awaiting the solution. Many of the times we have to accept palliations despite of having definitive cure of our problems.

CONCLUSIONS

Providing pediatric cardiac surgery services to the children of remote and socioeconomically deprived area is a greatly rewarding. It has many challenges other than providing direct patient care. To achieve a sustainable program tolerance, commitment and adaption with the system is prerequisite.

Conflicts of Interest

The authors declare no conflict of interest

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