Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v2024i1.1338
*Biol. Clin. Sci. Res. J., Volume, **2024**: 1338*
Original research article

FREQUENCY OF CARDIAC ANOMALIES IN PATIENTS WITH CLEFT LIP AND PALATE PRESENTED AT HAYATABAD MEDICAL COMPLEX

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(Received, 27th August 2024, Revised 20th November 2024, Published 11 December 2024)

Abstract: *Cleft lip and/or palate are among the most common congenital craniofacial anomalies and are often associated with other systemic anomalies, including congenital cardiac anomalies (CCAs). The identification of CCAs in these patients is crucial for optimizing surgical outcomes and long-term health.* ***Objective:*** *To determine the frequency and types of congenital cardiac anomalies (CCAs) in patients with cleft lip and/or palate.* ***Methods:*** *This cross-sectional study was conducted at the burns and plastic surgery unit, Hayatabad Medical Complex, Peshawar. Children aged 3 to 10 years with cleft lip, cleft palate, or both were included. All patients underwent a detailed echocardiographic evaluation to identify CCAs, which were categorized as Atrial septal defect (ASD), Ventricular septal defect (VSD) and Mitral regurgitation.* ***Results:*** *Out of 73 patients included, 13.7% were found to have CCAs. The most common anomalies were atrial septal defect (6.8%), ventricular septal defect (4.1%), and mitral regurgitation (2.7%). ASD was observed exclusively in males, while VSD was more common in females. The younger age group (3–6 years) showed a higher prevalence of ASD. No significant associations were observed between CCAs and socioeconomic status or cleft type.* ***Conclusion:*** *Congenital cardiac anomalies are prevalent in patients with cleft lip and palate, with atrial septal defect and ventricular septal defect being the most common.*

Keywords: Cleft lip, Cleft palate, Congenital cardiac anomalies, Atrial septal defect, Ventricular septal defect, Echocardiography.

Introduction

Cleft lip and palate are among the most common congenital craniofacial abnormalities. The condition is defined by the failure of the palate and lip to properly fuse at the midline during developmental stages, resulting in a noticeable malformation in the newborn. Inadequate treatment of cleft lip and palate in newborns can lead to significant functional complications. (1) The ability of a newborn to feed can be influenced by cleft lip and palate through various factors, such as increased nasal reflux, difficulty achieving a proper latch, and the additional effort needed for feeding, which can lead to fatigue. Although isolated instances of cleft lip and palate occur, these conditions often manifest as components of congenital syndromes that require identification and can gain from prompt diagnosis and treatment. Consequently, cleft lip and palate and cleft palate only exemplify the engagement of diverse social and health care providers. (2)

Approximately 50% of cleft palate occurrences are associated with additional congenital defects, compared to 15% of cases involving both cleft lip and palate. The research indicates that the likelihood of being affected is nearly double for Asians compared to Whites, with incidence rates ranging from one in 1,000 to one in 650 live births. Males exhibit a higher susceptibility compared to females. (3)

Cardiac malformations are among the most significant congenital conditions associated with patients who have cleft lip and palate. This encompasses both cyanotic as well as cyanotic cardiac abnormalities, including truncus arteriosus, transposition of the great vessels, tricuspid atresia, and total anomalous pulmonary venous return (TAPVR). (4, 5) Congenital cardiac conditions refer to structural defects of the heart that increase the risk of complications for patients. (6, 7) A study indicated that cardiac anomalies associated with bilateral cleft lip and palate include atrial septal defect at 7.6%, ventricular septal defect at 2.7%, and mitral regurgitation at 1.7% of patients. The total incidence of cardiac anomalies observed in patients with cleft lip and palate is 12%. (8)

Cleft lip and palate are congenital conditions frequently associated with various other abnormalities, such as cardiovascular malformations. The traditional emphasis in cleft lip and palate management has been on surgical repair and speech therapy. However, there is an increasing acknowledgement of the significance of early detection and management of related cardiac anomalies, which can complicate overall prognosis and treatment outcomes. The rationale for studying cardiac anomalies in patients with cleft lip and palate presented at Hayatabad Medical Complex stems from the need better to understand the associated comorbidities in this patient population. By identifying the cardiovascular challenges that may accompany Cleft lip and palate, this study will contribute valuable insights into the need for comprehensive screening and targeted interventions, ensuring that these patients receive timely and appropriate care for both their craniofacial and cardiac health.

Methodology

This cross-sectional study involved the evaluation of patients with cleft lip and/or palate (CLP) to determine the frequency of congenital cardiac anomalies (CCAs) in the burns and plastic surgery unit at Hayatabad Medical Complex, Peshawar conducted from January 2024 to July

[Citation: Khan, I., Ubaid., Junaid., Shahid., Ijaz., Rohail., (2024). Frequency of cardiac anomalies in patients with cleft lip and palate presented at hayatabad medical complex. *Biol. Clin. Sci. Res. J.*, **2024***: 1338*. doi: https://doi.org/10.54112/bcsrj.v2024i1.1338]

2024, with ethical approval obtained from the hospital. The study population included children aged from 3 to 10 years who were diagnosed with cleft lip, cleft palate, or both. These patients were recruited consecutively from the outpatient department. Inclusion criteria were a confirmed diagnosis of cleft lip and/or palate based on clinical evaluation and imaging, as well as the availability of complete medical records. Patients with syndromic clefts, incomplete records, or those unable to undergo echocardiography were excluded. Data were collected using a structured proforma designed to capture demographic details such as age, gender, socioeconomic status, and cardiac anomalies. Cardiac anomalies were evaluated through echocardiography performed by a certified pediatric cardiologist. Anomalies were classified as Atrial septal defect (ASD), Ventricular septal defect (VSD) and Mitral regurgitation.

Statistical analyses were performed using SPSS software to determine the frequency of CCAs and their association with variables such as gender, age groups, and cleft type. Continuous variables such as age were expressed as means and standard deviations, while categorical variables were reported as frequencies and percentages. Chi-square tests were used to assess associations between categorical variables, with a p-value of <0.05 considered statistically significant.

Results

Our results show that the study included 73 patients with a mean age of 6.67 ± 2.24 years, ranging from 3 to 10 years. Among the participants, 38 (52.1%) were male and 35 (47.9%) were female. The socioeconomic status of the cohort revealed that 17 patients (23.3%) were classified as poor, 45 (61.6%) as middle class, and 11 (15.1%) as rich. Age distribution was evenly split between two groups: 34 patients (46.6%) were aged 3 to 6 years, and 39 patients (53.4%) were aged 7 to 10 years. Cardiac anomalies were identified as follows: atrial septal defect (ASD) was present in 5 patients (6.8%), ventricular septal defect (VSD) in 3 patients (4.1%), and mitral regurgitation in 2 patients (2.7%). The remaining 68 patients (93.2%) did not have ASD, 70 patients (95.9%) were free of VSD, and 71 patients (97.3%) did not have mitral regurgitation. The total number of patients with at least one cardiac anomaly was 10 out of 73 participants, yielding an overall frequency of 13.7% in this cohort. This indicates that about one in seven patients with cleft lip and palate also had a cardiac anomaly.

An analysis of the association between gender and cardiac anomalies revealed that all cases of ASD (5 patients, 100%) occurred in males, while no female patients were affected ($p = 0.02$). VSD was observed only in females (3 patients, 100%) and not in males ($p = 0.06$). Mitral regurgitation was found exclusively in males (2 patients, 100%), with no cases in females ($p = 0.16$). Age distribution and cardiac anomalies were also examined. ASD was more common in younger children aged 3 to 6 years, with 4 cases (80.0%) in this group compared to 1 case (20.0%) in the 7 to 10 years group ($p = 0.12$). VSD followed a similar trend, with 2 cases (66.7%) in the younger group and 1 case (33.3%) in the older group ($p = 0.47$). Mitral regurgitation was evenly distributed between the two age groups, with 1 case (50.0%) in each ($p = 0.92$).

These findings highlight the frequency and distribution of cardiac anomalies in patients with cleft lip and palate, with significant variations observed by gender for certain anomalies, such as ASD and VSD. Age-related trends were noted, though statistical significance was not consistently demonstrated.

Table 1: Demographics

Demographics		Frequency	Percentage
Gender	Male	38	52.1%
	Female	35	47.9%
Socioeconomic	Poor	17	23.3%
	Middle class	45	61.6%
	Rich	11	15.1%
Age distribution	3 to 6 years	34	46.6%
	7 to 10 years	39	53.4%

Table 2: Cardiac anomalies

Cardiac anomalies		Frequency	Percentage
Atrial septal defect (ASD)	Yes	5	6.8%
	No	68	93.2%
Ventricular septal defect (VSD)	Yes	3	4.1%
	No	70	95.9%
Mitral regurgitation	Yes	2	2.7%
	No	71	97.3%

Table 3: Association of cardiac anomalies with gender

Cardiac anomalies		Gender				P value
		Male		Female		
		Frequency	Percentage	Frequency	Percentage	
Atrial septal defect (ASD)	Yes	5	100.0%	0	0.0%	0.02
	No	33	48.5%	35	51.5%	

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Atrial septal defect (ASD)	Yes	0	0.0%	3	100.0%	0.06
	No	38	54.3%	32	45.7%	
Mitral regurgitation	Yes	2	100.0%	0	0.0%	0.16
	No	36	50.7%	35	49.3%	

Table 4: Association of cardiac anomalies with age

Cardiac anomalies		**Age distribution**				**P value**
		3 to 6 years		**7 to 10 years**		
		Frequency	**Percentage**	**Frequency**	**Percentage**	
Atrial septal defect (ASD)	Yes	4	80.0%	1	20.0%	0.12
	No	30	44.1%	38	55.9%	
Atrial septal defect (ASD)	Yes	2	66.7%	1	33.3%	0.47
	No	32	45.7%	38	54.3%	
Mitral regurgitation	Yes	1	50.0%	1	50.0%	0.92
	No	33	46.5%	38	53.5%	

Discussion

Our study demonstrated that congenital cardiac anomalies (CCAs) are significantly associated with patients with cleft lip and palate (CLP), with an overall frequency of 13.7%. This aligns with findings from similar studies, though variations in prevalence and types of anomalies are evident across different populations and settings. The most frequently identified anomalies in our study were atrial septal defect (ASD) at 6.8%, ventricular septal defect (VSD) at 4.1%, and mitral regurgitation at 2.7%.

The frequency of CCAs observed in our study is consistent with the findings of Arshad et al., who reported a prevalence of 13.0% among children with non-cardiac congenital anomalies, including CLP. In their study, ASD and VSD were the most common anomalies, highlighting similar trends in anomaly types. (9) Likewise, Karkar et al. identified a prevalence of 12.37% for CCAs in a rural Indian population of CLP patients, with ASD and VSD accounting for the majority of anomalies. (10) These comparable prevalence rates underscore the importance of routine cardiac screening in patients with CLP, particularly given the potential for unrecognized cardiac defects to increase perioperative risk.

Our study found that the prevalence of CCAs differed by gender. ASD was exclusively observed in males, while VSD occurred only in females. This contrasts with the findings of Akhiwu et al., where the prevalence of CCAs, including ASD and VSD, was distributed across both genders without significant gender-specific patterns. (11) However, Kasatwar et al. reported an equal distribution of CCAs between males and females, suggesting that the gender-based differences observed in our study may reflect sample-specific characteristics. (4)

Age distribution also played a role in the frequency of cardiac anomalies in our study. ASD was more prevalent in the younger age group (3–6 years), while VSD and mitral regurgitation were evenly distributed between age groups. This pattern aligns with the findings of Shafi et al., who reported a higher prevalence of cardiac anomalies in younger children with CLP, likely due to earlier detection during routine evaluations. (12) The importance of early screening for CCAs is further emphasized by Kasatwar et al., who found that younger patients with unilateral cleft palate had the highest prevalence of anomalies. (4)

The types of CCAs observed in our study also align with the global literature on CLP-associated anomalies. ASD and VSD consistently rank among the most common anomalies across studies. For instance, Kasatwar et al. identified VSD as the most frequent anomaly (36.6%), followed by patent ductus arteriosus (PDA) and ASD. (4) Similarly, Karkar et al. noted a high prevalence of ASD and VSD, emphasizing the embryological link between cardiac and craniofacial development during early gestation. (10)

Our findings underscore the need for routine cardiac screening in patients with CLP. Early detection of CCAs can mitigate the risks associated with surgical interventions, especially in resource-limited settings where access to advanced diagnostics may be constrained. Routine echocardiography should be considered a standard component of the preoperative evaluation for CLP patients, as highlighted in multiple studies including Akhiwu et al. and Shafi et al. (11, 12)

Conclusion

Congenital cardiac anomalies are prevalent in patients with cleft lip and palate, with atrial septal defect and ventricular septal defect being the most common. The observed prevalence of 13.7% cardiac anomalies highlights the critical need for multidisciplinary management and the integration of routine cardiac evaluations into standard care protocols for CLP patients. Future studies should explore the genetic and environmental factors contributing to these associations to better understand the pathophysiology and guide preventive measures.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.
Approved by the department Concerned. (IRBEC-TCV-02/23)

Consent for publication
Approved

Funding
Not applicable

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Conflict of interest

The authors declared an absence of conflict of interest.

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Concept & Design of Study

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