

Congenital heart disease in the resolving polyclinic of children's cardiology at the Hospital del Niño "Dr. Ovidio Aliaga Uría" at 3.650 masl

Abstract

Introduction: Congenital malformations are the leading cause of early neonatal mortality and the second leading cause of infant mortality. Among them, congenital heart diseases are the main cause of mortality in the early neonatal period.

Material and methods: A prospective cross-sectional study was conducted at the "Dr. Ovidio Aliaga Uría" Children's Hospital in La Paz, Bolivia, at an altitude of 3,650 masl. A pediatric cardiology outpatient clinic was set up to examine 42 children, recording clinical data, physical examination, and color Doppler echocardiography. **Results:** The most frequent reason for referral was a heart murmur. In 52.38% (n=22) of the evaluated patients, congenital heart disease was present, with ventricular septal defects being the most common at 40.91% (n=9), followed by atrial septal defects at 18.18% (n=4), persistent foramen ovale at 13.64% (n=3), and patent ductus arteriosus at 9.09% (n=2) of patients.

Discussion: There are very few studies in populations living at altitudes above 3,000 masl. Our study shows a high percentage of children with cardiac defects, which may be attributed to accurate diagnosis at referral or possibly a higher incidence of cardiac malformations in the studied population.

Conclusion: the most common cardiac defect was ventricular septal defect, as described in populations living at sea level.

Keywords: congenital heart diseases, children's, echocardiography, 3000 masl

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Introduction

Congenital malformations are the leading cause of early neonatal mortality and the second leading cause of infant mortality. Among them, congenital heart defects are the main cause of mortality in the early neonatal period. The incidence of congenital heart defects is 8 per 1000 live births, consistent worldwide, and independent of factors such as race, socioeconomic status, or geographical location, with equal proportion for major and minor congenital heart defects.¹⁻³ Congenital heart diseases are the most common congenital disorders in the world population, they generally manifest after birth. Altitudes between 2,500-3,500 meters above sea level have been linked to the high incidence of congenital heart diseases such as patent ductus arteriosus, atrial septum defects, and ventricular septum defects.⁴ There are few studies on congenital heart defects in populations living at altitudes above 3,000 masl. A prospective cross-sectional study was conducted. During four days, a pediatric cardiology outpatient clinic was held with a resolution-oriented approach, aiming to assess the presence of cardiac defects and the types of heart conditions found in children referred to the cardiologist. All patients belonged to the department of La Paz, Bolivia.

Methods and material

A prospective cross-sectional study was conducted in January 2016 at "Dr. Ovidio Aliaga Uría" Children's Hospital, a 160-bed public pediatric hospital located in La Paz, Bolivia. A pediatric cardiology outpatient clinic was held, with a resolution-oriented approach, for 42 children who were referred to the cardiologist for the first time due to various reasons. All of them lived in different areas of the La Paz department at an average altitude of 3,650 masl.

A medical consultation was performed, and a clinical history was recorded, including clinical, physical, and demographic data, following a previously established protocol. The investigated variables included age, sex, gestational age, clinical manifestations, physical examination findings, and echocardiographic diagnosis, aimed at determining and confirming the clinical impression and identifying which children had congenital heart disease and which were the most frequent congenital heart conditions within the studied group. The B-mode color doppler echocardiogram was performed by the same operator using a MyLab60 echocardiograph with a pediatric probe 5-7.5Hz. The results are presented in absolute numbers, percentages, mean, median, tables, and images.

Results

In relation to sex there was no significant difference, with 52,38% being male (n=22). The mean age was 2 years and 3 months. The mean gestational age at birth was 38 weeks. The mothers had an average of three children. The birth weight of the studied group ranged from 1,300 grams to 4,700 grams, with an average of 3,050 grams at birth. The most frequent reason for referral was cardiac murmur, present in 69,05% (n=29) of the 42 patients referred to the pediatric cardiology outpatient clinic Table 1.

Congenital heart disease was present in 22 (52%) of the evaluated patients, with the most common defect being ventricular septal defect found in 9 (40.91%) cases Figure 1, followed by atrial septal defect in 4 (18,18%), patent foramen ovale in 3 (13.64%), and patent ductus arteriosus in 2 (9.09%) Table 2.

The associated pathologies were Trisomy 21 in six children (14,29%), and of those, four had minor cardiac defects: three had

perimembranous ventricular septal defects, one had an atrial septal defect, and two did not present congenital heart disease. One child was a carrier of Seckel Syndrome, and another had an ano-rectal malformation. In three of the studied children, we found a false tendon or fibromuscular accessory in the left ventricle. They presented a systolic murmur of grade 2/6 in the mesocardium and were referred for further evaluation Figure 2.

Table 1 Shows all the reasons for referral

Reason for medical visit	N°	%
Cardiac murmur	29	69.05%
Trisomy 21	6	14.29%
Dyspnea	1	2.38%
Pectus carinatum	1	2.38%
Edematous syndrome	1	2.38%
Aneurysm of the Vein of Galen	1	2.38%
Achondroplasia	1	2.38%
Others (pre-surgical evaluation, anorexia)	2	4.76%
Total	42	100%

Table 2 Displays all the cardiac defects found

Congenital heart disease table	N°	%
Ventricular septal defect	9	40.91%
Atrial septal defect	4	18.18%
Patent foramen oval	3	13.64%
Patent ductus arteriosus	2	9.09%
Ebstein's Anomaly	1	4.55%
Severe pulmonary valve stenosis	1	4.55%
Bicuspid Aortic Valve	1	4.55%
PDA, VSD, ASD	1	4.55%
Total	22	100%

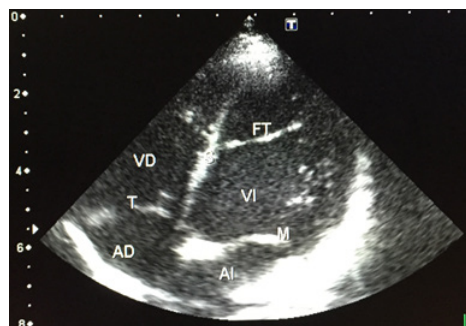


Figure 1 FT: False fibromuscular tendon in the left ventricle.

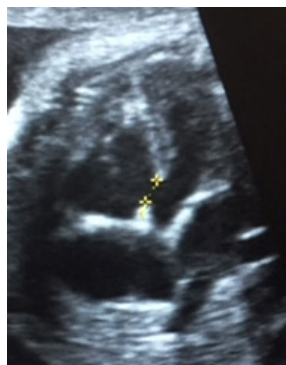


Figure 2 Perimembranous interventricular septal defect. (+ +).

According to the type of ventricular septal defect, the most frequent was the perimembranous type, with 7 cases, followed by the muscular type, with 2 cases. Regarding atrial septal defects, there were two ostium secundum, one ostium primum, and one sinus venosus type.

One of the patients presented a bicuspid aortic valve, while another had a persistent ductus arteriosus associated with both ventricular and atrial septal defects.

Three patients had cardiac defects requiring surgical or percutaneous closure due to their hemodynamic repercussions. They were referred to the cardiothoracic center for treatment. The defects included ventricular septal defect, severe pulmonary valve stenosis, and atrial septal defect.

Discussion

It is important to mention that there are very few studies in populations living at altitudes above 3,000 masl. Our study shows a high percentage of children with heart defects; this could be due to accurate diagnosis in the referral or perhaps a higher incidence of cardiac malformations in the studied population. Some studies mention an incidence twice as high as that described at sea level⁵. However, other studies are inconclusive due to multiple distracting factors related to the causes of congenital heart diseases.⁶ The most frequently found cardiac defect was ventricular septal defect, followed by atrial septal defect, as described in national and foreign literature.⁷⁻⁹ In three cases, a patent foramen ovale was found, and all affected children were under 6 months of age. The vast majority of the studied children had heart murmurs, and we detected an accessory fibromuscular band in the left ventricle known as a variant of normality.^{10,11} According to different studies, this fibromuscular band in the left ventricle could explain or be the cause of some innocent childhood murmurs that do not disappear, as its origin is structural rather than due to hemodynamic phenomena, flows, or physiological changes that occur in childhood.^{11,12} We also noticed the high presence of trisomy 21, but the children did not have major cardiac defects. The most frequently found defects do not differ from other publications.

Conclusion

Congenital heart diseases are the most common birth defects in the world population, with a high rate of morbidity and mortality in the pediatric age, especially in the newborn period without diagnosis. This increases in patients who have not been diagnosed early and even more so in patients diagnosed late beyond the first year of life. Among the patients in our study there were minors who had a late diagnosis, but this did not have an impact on their treatment since they did not have a severe defect, referring to the cardio-surgical center to treat their pathology and thus obtain the best results both in terms of survival and quality of life during its development. In our study, the most common cardiac defect was ventricular septal defect, as described in populations living at sea level.

Acknowledgments

None.

Conflicts of interest

The author declares there is no conflict of interest.

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