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Clinical Characterization of Patients Under 5 Years of Age Operated on For Aortic Coarctation in A Tertiary Clinic in Neiva-Huila During the Period 2018 – 2023

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ABSTRACT

Within the framework of the development of the project for the degree option of the Medicine program, of the Faculty of Health Sciences of the Navarra University Foundation – UNINAVARRA, the development of a research process was planned that would be oriented to carry out a process of clinical characterization of patients under 5 years of age operated on for aortic coarctation in a third level clinic in the city of Neiva located in the Department of Huila during the period 2018 – 2023, resulting in important findings and analyses that allow better information to be obtained for the identification of entry patterns that could significantly affect the patient's evolution during the surgical procedure and, therefore, offer statistical information that could anticipate the possible postoperative complications of patients operated on for coarctation of the aorta (CoA) and hypoplasia of the aortic arch.

This information could be used to strengthen early diagnoses of the disease, provide inputs to reinforce good practices at the time of surgical intervention, and create early warnings of possible immediate and immediate postoperative complications in these patients.

Keywords: *aortic coarctation, anastomosis, clinical characterization, pre-surgical, post-surgical, prevalent diseases, hypoplasia, cardiovascular diseases, chylothorax, arterial hypertension, intestinal ischemia.*

1. INTRODUCTION

The Research Results Report "Clinical characterization of patients under 5 years of age operated on for aortic coarctation in a third level clinic in Neiva-Huila during the period 2018 – 2023" carried out during the month of May in 2024 at the Medilaser Clinic in the city of Neiva-Huila, for the knowledge and consultation of health professionals in the Department of Huila, is officially presented.

This research study is carried out within the framework of the Degree Project of the Medicine program of the Faculty of Health Sciences of the University Foundation of Navarra – UNIVARRA, made up of the researchers Jackeline Ayala Buendía, Nathalia Andrea Casallas Loaiza, Ana María Hernández Gómez and Alex Mauricio Trujillo Manzo where the hypothesis of *"The clinical characteristics, demographics, and associated factors in patients under 5 years of age undergoing interventions for aortic coarctation in the tertiary care clinic of Neiva-Huila during the period 2018 – 2023, will significantly influence postoperative outcomes, including morbidity and mortality, duration of hospitalization, and the need for additional interventions."*

The research study was carried out over a period of 3 years, with a sample of 19 patients whose medical records were characterized, tabulated and analyzed in order to obtain the required variables, access to the respective medical records counted on the due process of reservation of the processing of personal data and the consent of patients and their families, The sampling technique used was "non-probabilistic" of type

"intentional" and the sample were patients under 5 years of age with a diagnosis of coarctation and aortic hypoplasia undergoing extended end-to-end anastomosis in a third-level complex clinic in the city of Neiva-Huila between January 2018 and June 2023.

2. OBJECTIVES

The research project had the following objectives, developed within the framework of the process within the Medilaser clinic over a period of 3 years

- **General Objective:**

To identify the clinical characteristics of patients operated on for coarctation of the aorta (CoA) during the period 2018 – 2023 in a clinic in the city of Neiva.

- **Specific Objectives:**

- To determine the characterization of patients operated on for coarctation of the aorta (CoA) during the period 2018 – 2023 in a tertiary level of complexity institution
- Describe the main surgical findings and complications presented by patients
- To assess the prevalence of different risk factors for the occurrence of complications

3. RESULTS

The following are the most relevant results and data obtained from the research process, in which 19 medical records of patients under 5 years of age with a diagnosis of coarctation and aortic hypoplasia undergoing extended end-to-end anastomosis in a third-level complex clinic in the city of Neiva-Huila between January 2018 and June 2023 were presented.

Initially, there was a volume of 28 medical records, however 9 of the records are in custody, which is why they were not part of the investigation.

Methodology used:

Selection criteria:

Inclusion.

- Patients between 0 and 5 years old.
- Patients with intra-institutional pre- and post-operative echocardiographic study
- Patients with CUPS: 358702 - Coarctation Aortic Repair with Resection and Subclavian Flap - 358703 - Coarctation Aortic Repair with Graft Interposition.
- Patients treated at a tertiary health center in the city of Neiva-Huila.
- Authorisation of the interinstitutional committee for data processing

Exclusion:

- Absence of more than 50% of clinical information to be collected that leads to biases in the characterization

of the patient.

- Patient with non-cardiac congenital malformations that do not allow population characterization

Table of Variables and Indicators:

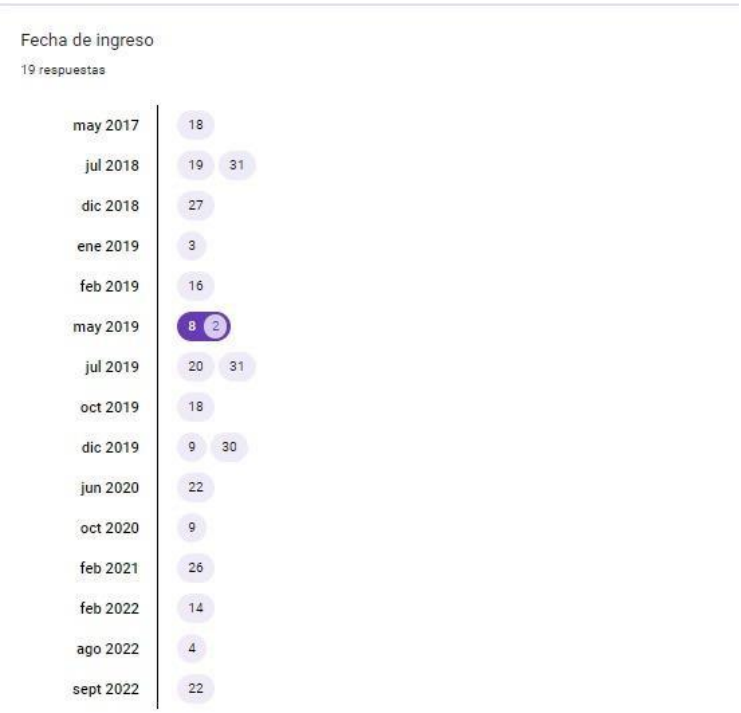
Research objective	Variable label	Defining the Variable	Variable Type	Indicator
Characterize the population under study.	Gender	Group of people with common characteristics	Qualitative dichotomous	Male Female
	Weight	Unit of measurement that can be in grams	Continuous quantitative	Weight in grams
	Age group	Set of people of a certain age	Qualitative	Neonatate: ≤1 month Infant: > 1 month to 12 months. Older infant: 12 months until 24 months. Preschool: 2 years to 5 years
	Origin	It is said of the origin of a person	Nominal qualitative	Municipality and department.
	Diagnosis of bronchopulmon dysplasia	Lung disorder in neonates	Qualitative	Otherwise
	<Time to Intervention	Understood how the time between the diagnosis of pathology and The realization surgical procedure. Measured in days	Quantitative	Number of days
	Guy of intervention	Extended end-to-end anastomosis for correction of stenosis with hypoplasia of the aortic arch	qualitative	-Sternotomy -Thoracotomy

	Re-coarctation	Understood as obstruction which has a gradient greater than 20 mmHg at the site of repair.	qualitative	OTHERWISE
	Recoarctation Time	Time from end-to-end anastomosis to coarctation	quantitative	Time in months
Main pre-echocardiographic findings and post-operative procedures carried out in the intra-institutional setting.	Ventricular dilation	Enlarged ventricles	Quantitative	Size in millimeters
	Stenosis of aortic valves and mitral	Valve that does not open on your totality in turn decreasing blood flow	Qualitative	OTHERWISE
	Size of the Arytic Isthmus	Segment of the aortic arch between the emergence of the subclavian artery to the ductus arteriosus	Quantitative	Z Score -2 0.41 cm
	Size of the aortic arch	That portion of the aorta between the ascending and descending arteries	Quantitative	Z Score ≤ 3mm
	Size To the descendant	Understanding as the largest segment of the aorta	Quantitative	Z Score 0.82 cm
	Size To the ascendant	Segment between the aortic valve and the aortic arch	Quantitative	Z score <-2
	Gradient of the zone Repaired	Herself esteem the diagnosis of recoarctation with one	Quantitative	>20 mmHg
		Increased post-coarctation repair gradient value		

	Left ventricular diastolic dysfunction	Inability of the left ventricle to produce strength during diastole	quantitative	Z score
	Diastolic ramp	Continuous high-velocity anterograde flow in diastole	qualitative	OTHERWISE
Postoperative pleuropulmonary complications .	Pleural	Condition that alters the tunica that covers the lungs and inner wall of the chest cavity	nominal qualitative	Quilotórax Neumotoórax Hemotórax Paralysis of the phrenic nerve
	Pulmonary	A condition that develops in the organ after Surgery	nominal qualitative	Pulmonary laceration Hematoma parenchymatous Fistula bronchopulmonary

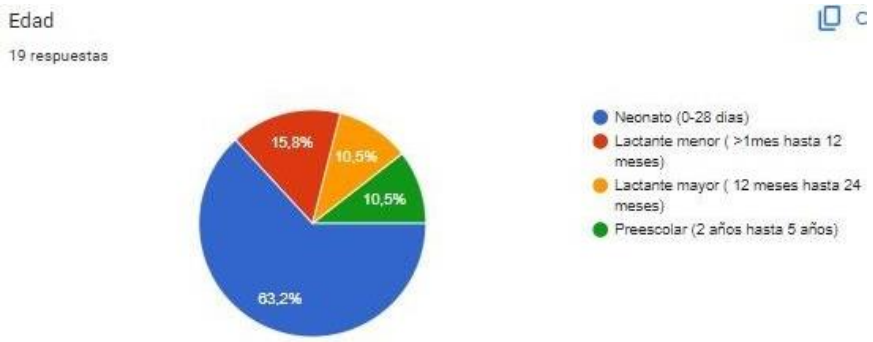
General characterization:

For the development of this research process, a sample of 19 patients with the aforementioned characteristics (under 5 years of age with a diagnosis of coarctation and aortic hypoplasia undergoing extended end-to-end anastomosis) whose hospital stay periods were between May 2017 and September 2022 as detailed in the following graph.



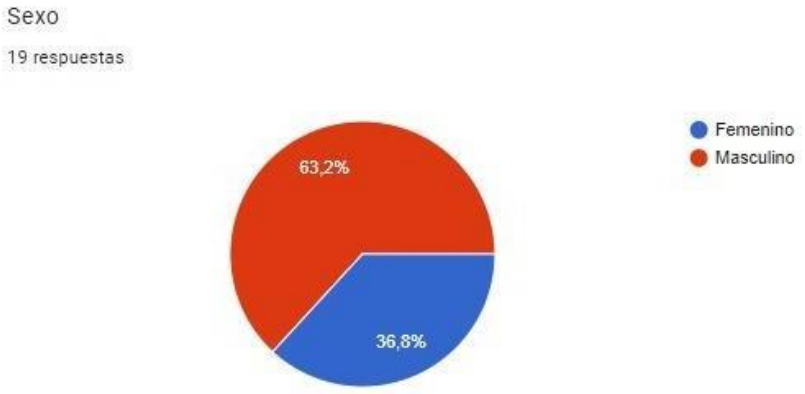
Graph 1: Dates of hospital admission of patients. In original Spanish language

63.2% of the patients who participated in this research study were in a neonatal age range (between 0 and 28 days of age), which considered an additional risk since in neonates the symptoms are more severe, unlike adults who can be asymptomatic. therefore, the identification of This pathology has a lower level of complexity, thus having an early diagnosis, as evidenced in the following graph.



Graph 2: Age of hospital admission of patients. In original Spanish language

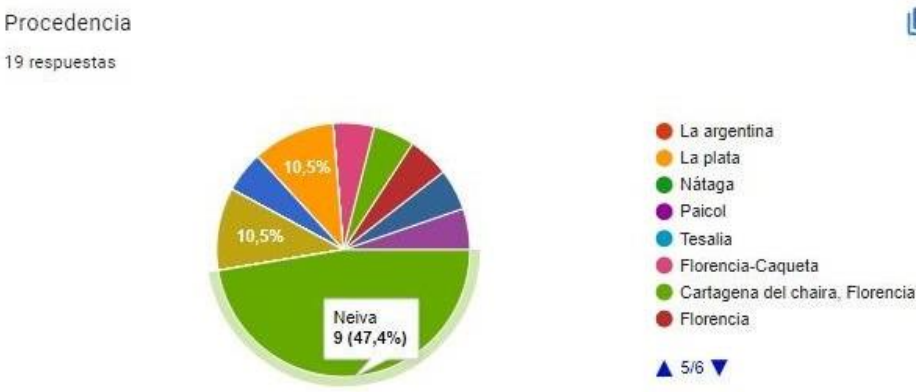
63.2% of the patients admitted were male at birth and the remaining 36.8% were female at birth, identifying a higher proportion of admission due to complications for the present case study of male patients at birth, as shown in the following graph.



Graph 3: Sex at birth of hospitalized patients. In original Spanish language

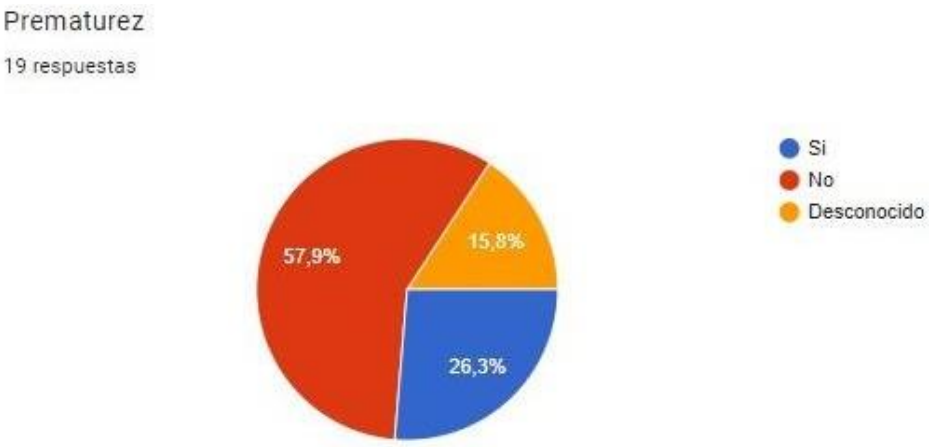
Regarding issues of origin or geographical location of origin of patients admitted for complications, according to the analysis of the variables identified in this research study, 47.4% identified the origin from the city of Neiva (urban sector) and in second and third place respectively Pitalito (10.5%)

and La Plata (10.5%), this may have a coincidence relationship of the majority of cases that come from population centers or urban sectors, and to a lesser extent from rural sectors or municipalities with dispersed population. This raises a concern, are there greater complications for urban or populated sectors?, or, on the contrary, is there a lack of information or access to hospital service in rural sectors that prevent or hinder access to the emergency service for these patients and therefore they do not identify themselves?, this as can be seen in the following graph:



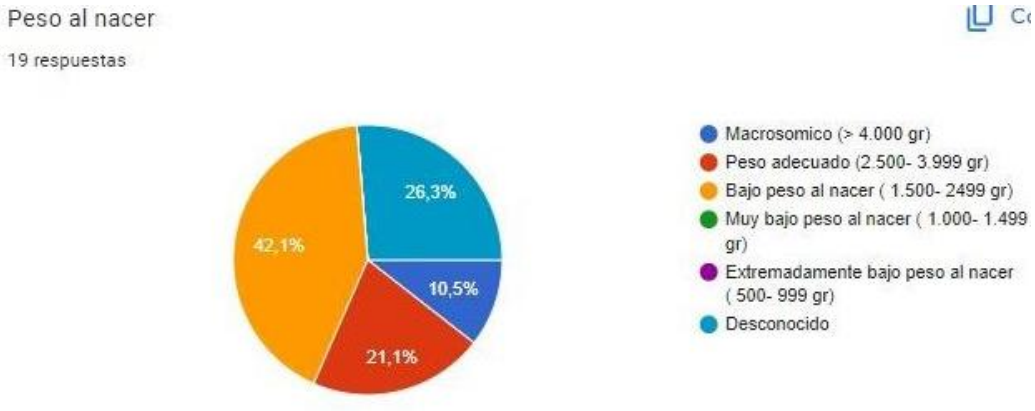
Graph 4: Geographical origin of the patients admitted. In original Spanish language

Another important factor identified in the realization of this study is the identification of a high degree of "prematurity" at the time of admission of patients to the emergency health service, and this being a percentage of 26.3%, although the percentage of patients who were born at term is even higher (47.4%), the possibility of asking ourselves the question of whether, Does the condition of prematurity influence the development of postoperative complications?, likewise, perhaps due to failures in the preparation of medical records, it was not possible to evidence in 15.8% of the binding or non-binding condition of prematurity in the patients admitted.



Graph 5: "Premature" condition of the patients admitted. In original Spanish language

Regarding the relationship of birth weight, the study also identifies an important finding that could be related to the post-surgical complications of the patients, and that is, that 42.1% of them were born with low birth weight (1,500 – 2,499 g), and there may be a possible relationship between weight deficiencies and the appearance of complications after the aortic coarctation intervention. As can be seen in the following graph:



Graph 6: Birth weight condition of hospitalized patients. In original Spanish language

Extended end-to-end anastomosis is considered a procedure with a high level of difficulty, complications in the process can be identified in some cases surgical nerve such as chylothorax, which can lead to pleural effusion in neonates in 6% and paralysis of the recurrent laryngeal nerve. (Induni et al., 2000)

Corrections of coarctation of the aortic are performed at an early age, since a patient without medical treatment may present a critical condition, for this purpose two surgical procedures have been described in order to correct the obstruction that occurs in the artery by means of a resection and extended end-to-end anastomosis.

That is why the present research study emphasized the cardiac variables which are related below:

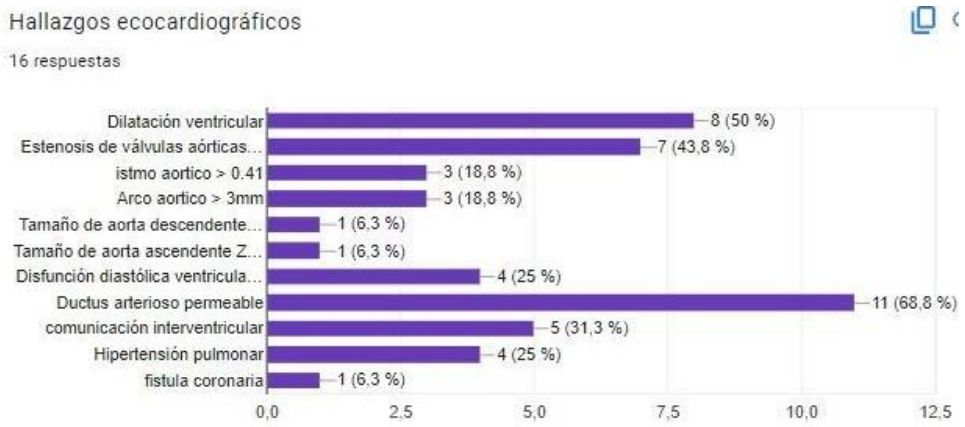


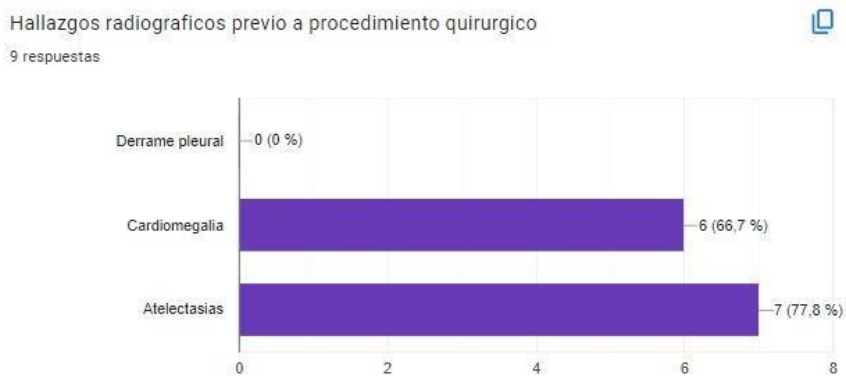
Figure 7: Echocardiographic findings of hospitalized patients. In original Spanish language

In a higher proportion is the complication due to *"patent ductus arteriosus"* which has 68.8%, followed by ventricular dilation with 50%, and aortic valve stenosis with 43.8%.

Other findings found by echocardiogram:

- ***Hypoplasium of the aortic arch.***
- ***Septal hypertrophy.***
- ***Descending aortic hypoplasia.***
- ***Closed ductus.***
- ***Very short aortic arch with a segment cut out at the level of the arch between the left carotid and left subclavian.***
- ***Severe aortic arch hypoplasia.***
- ***Underdeveloped left ventricle.***
- ***Juxtaductal aortic coarctation with collaterals***
- ***Small aortic arch.***

Likewise, and continuing with the respective findings, 9 patients with complications were identified by radiographic examination, with atelectasis presenting the highest proportion with 77.8% of the identified patients, followed by cardiomegaly with 66.7%.



Graph 8: Radiographic findings of hospitalized patients. In original Spanish language

Regarding the surgical procedures found in ICD 10 performed, it was found that "repair of coarctation of the aorta" occurred in 12 cases (75%), followed by ductus closure with 7 cases in 43.8%.

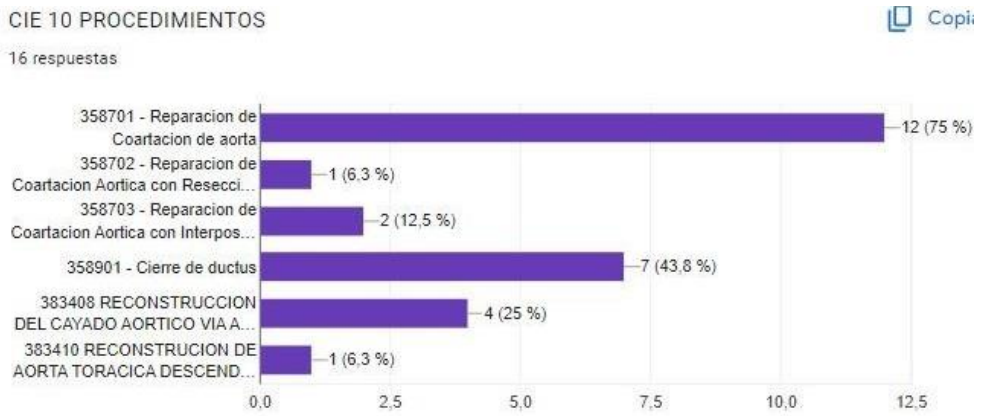


Figure 9: Surgical procedures of admitted patients. In original Spanish language

At the international level, there is official information regarding research, case studies and medical responses to these pathologies, as we can detail in a study carried out at the Hospital Universitario La Paz, (Madrid, Spain), in which both immediate and mediate postoperative complications of a significant number of patients are listed. resulting as one of the main complications in the mediate postoperative period, arterial hypertension, which is usually transient, as well as bleeding, especially in older patients or those who underwent new re-interventions, postoperative intestinal ischemia (post-coarticotomy syndrome) is infrequently presented, which is caused by an increase in blood flow and pressure in the post-repair mesenteric arteries resulting in abdominal distension. pain, vomiting and decreased bowel sounds, delaying the introduction of feeding for up to three days. (Spanish Association of Pediatrics, Spain, 2010).

That is why, by performing the official characterization of the patients subject to this research study, important findings were obtained regarding presurgical complications (for which they were admitted to the emergency room), as shown in the graph following:

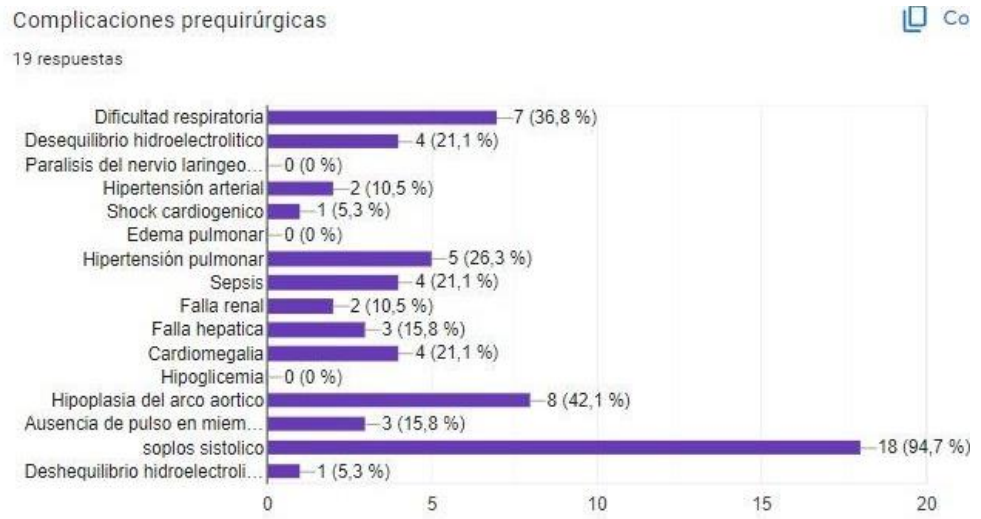


Figure 10: Presurgical complications of hospitalized patients. In original Spanish language

Identifying that 18 of the patients admitted (94.7%) suffered "systolic murmurs", which led to their emergency admission to the hospital system, in the second proportion 8 of the patients in 42.1% of the cases "hypoplasia of the aortic arch" was identified, followed by "respiratory distress" present in 7 of the cases (36.8%).

Other pre-surgical findings found:

- ***Hypotension.***
- ***Hypoperfusion.***
- ***Decompensated respiratory acidosis.***

- ***Tachycardia.***
- ***Transfusion requirement.***
- ***Poor prenatal check-ups.***
- ***Síndrome anémico.***
- ***Twin pregnancy.***

Similarly, at the time of the consultation on the findings found at the time of the operative process (during), the following were found:

Ramas pulmonares pequeñas izquierda de la mitad del calibre de la derecha de 3.5 mm a izquierda y 5 mm la derecha, tronco pulmonar dilatado, ductus grande
Coartacion de aorta severa con hipoplasia de arco aortico y ductus arterioso permeable casi del doble del arco aortico
Coartacion de aorta laga de aproximadamente 2 CM con dilatación precoartacion, arco aortico de tamaño normal, ductus arterioso permeable
Coartacion de aorta yuxtaductal, ductus arterioso pequeño de aproximadamente 4mm, múltiples colaterales de la aorta descendente
UCTUS ARTERIOSO PERSISTENTE MAS GRANDE QUE LA AORTA DISTAL, DOS VECES EL TAMAÑO DEL ARCO AORTICO ARTERIA SUBCLAVIA IZQUIERDA EMERGIENDO AL LADO CONTRARIO DEL DUCTUS. ARCO AORTICO MUY CORTO CON SEGMENTO COARTADO A NIVEL DE ARCO ENTRE CAROTIDA IZQUIERDA Y SUBCLAVIA IZQUIERDA

Figure 11: Findings found in the operative process (during). In original Spanish language

Post-surgical complications:

By internalizing the information obtained from the research study, the trends and statistics at the international level are reaffirmed at the level of the 19 patients characterized, which indicates that among the most relevant or common postoperative complications are arterial hypertension with 60% of cases, ARDS(acute respiratory distress syndrome with the need for supplemental oxygen also with 60%, followed in third place by sepsis at 50%

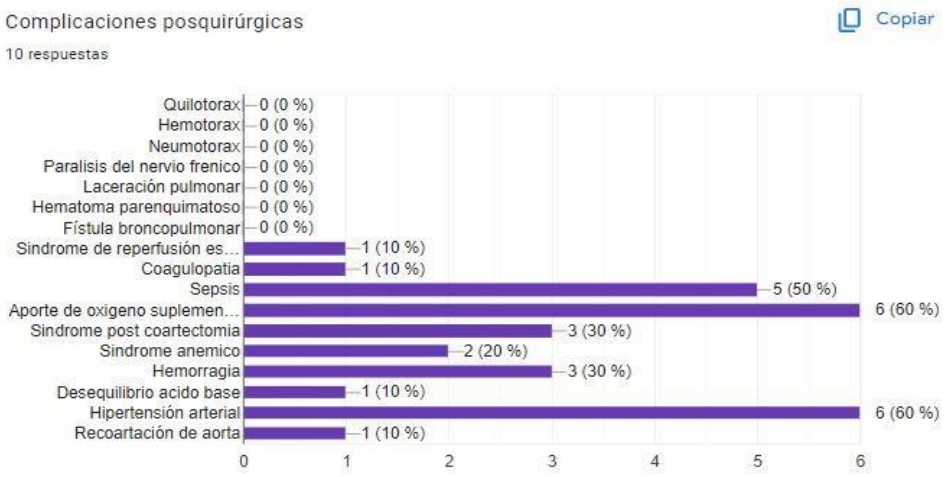


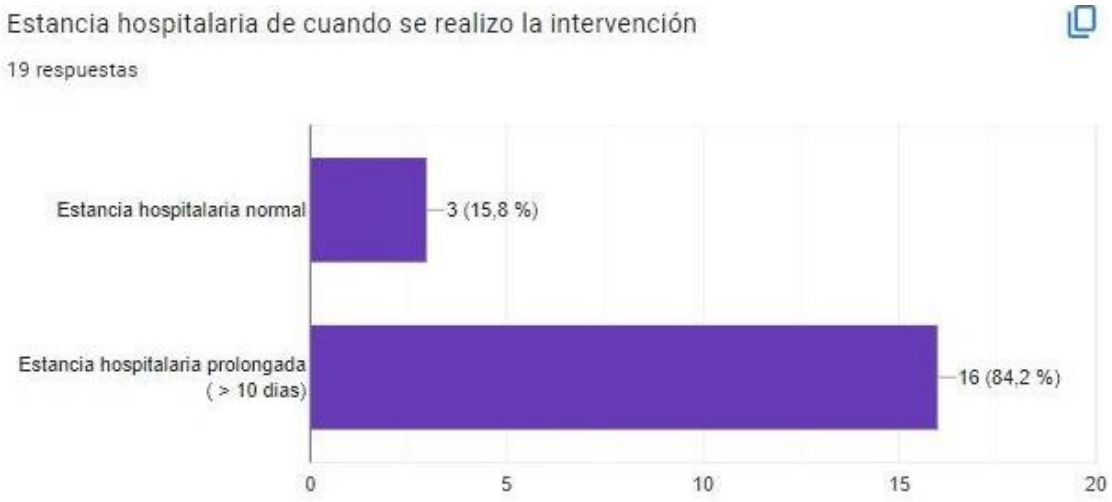
Figure 12: Postoperative complications. In original Spanish language

Other post-surgical findings found:

- ***Kidney failure.***
- ***Tachycardia.***
- ***Hepatomegalia.***

- ***Hypotension.***
- ***Transfusion requirement.***
- ***Cardiogenic pulmonary edema.***
- ***Left carotid tear.***
- ***Pulmonary hypertension.***
- ***Myocardial ischemia.***
- ***Heart failure.***
- ***Cardiogenic shock.***
- ***Liver failure.***
- ***Severe acute bronchiolitis.***
- ***Hypoperfusion.***
- ***Liver failure.***
- ***He dies during the procedure.***

Regarding the length of post-surgical hospital stay, it was found that in 84.2% more than 10 days of prolonged hospitalization were required for review, follow-up and medical surveillance processes.



Graph 13: Hospital stay. In original Spanish language

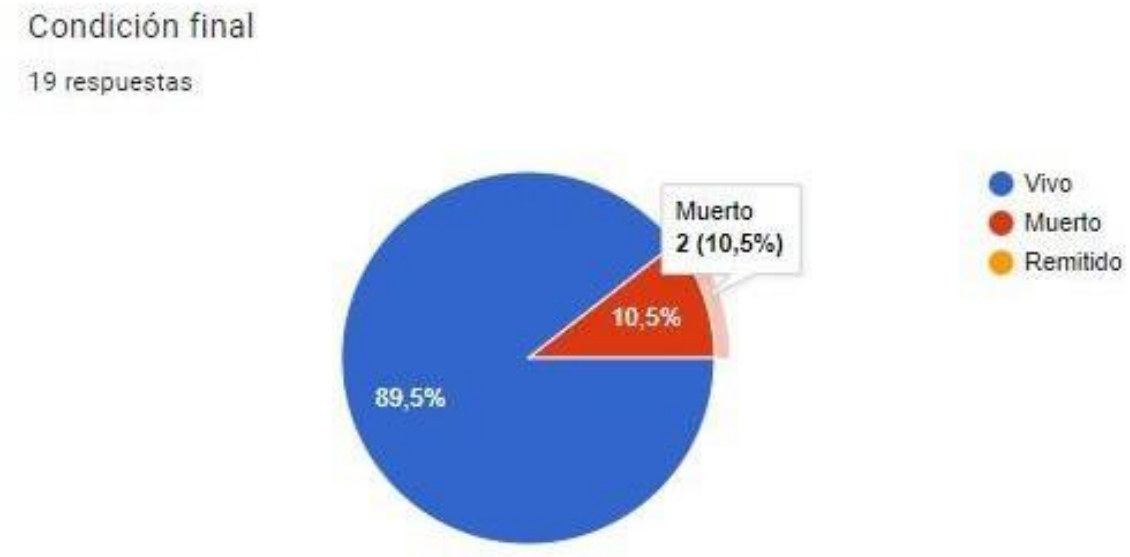
In relation to whether complications or readmissions due to pre- or post-surgical complications of the patients subject to this research study were related to chromosomal disease, it is found that in only 3 cases (15.8%) such as Down syndrome, trisomy 18 and Turner syndrome.

This as can be seen in the following graph.

Figure 14: Chromosomal diseases.

In original Spanish language

Finally, 2 of the cases analyzed in this research study culminate in the death of the patient, with 89.5% of cases of success at the time of the performance and draw of recovery in pre- and post-surgical processes.



Graph 15: Final condition of the patient. In original Spanish language

4. CONCLUSIONS AND RECOMMENDATIONS

The present study with respect to extended terminal anastomosis becomes the first of its kind to be carried out in the city of Neiva, and therefore of the Medicine program of the Faculty of Health of the Navarra University Foundation, contributing directly to the congenital heart disease unit of the Medilaser Clinic located in the same city.

The present study, therefore, through its findings, conclusions and recommendations, allows us to open a window to identify

the recurrence or relationship of postoperative complications with the prevalent characteristics before the surgical intervention, that is, input information, thus allowing not only to identify the most common complications in patients operated on for coarctation of the aorta, but also to identify the most common complications in patients operated on for coarctation, if not, provide a relationship between their

initial state before the surgical procedure and the complications generated in the postoperative period.

In this sense, we present a list of conclusions and recommendations that could be inputs that allow health professionals in the City of Neiva to anticipate possible postoperative complications of patients with aortic coarctation.

5. CONCLUSIONS

The research carried out described the clinical characterization of patients under 5 years of age operated on for aortic coarctation in a tertiary clinic in the city of Neiva located in the Department of Huila during the period 2018 – 2023, where it was possible to determine that the age at which aortic coarctation occurred most frequently is in neonatal age. who were patients from urban areas

In relation to the characteristics and/or clinical and imaging findings presented prior to the surgical procedure in symptomatic children under 5 years of age, systolic murmur in greater proportion, hypoplasia of the aortic arch and respiratory distress as the third instance. Likewise, the findings after the surgical procedure are arterial hypertension, respiratory distress that requires oxygen supplementation, and sepsis, which was mostly of pulmonary origin.

Among the risk factors related to complications is prematurity since it is related to the degree of severity in terms of alterations at the level of multiorgan failure. In addition, variables that contribute to surgical risk were presented, such as low birth weight, male sex, and being from urban areas.

6. RECOMMENDATIONS

As can be evidenced within the research, prematurity was found as a risk of complications during the surgical procedure, which is why carrying out the preconceptional consultation and complete assistance of all prenatal controls can help us to identify early the conditions in which the fetus is developing in order to attend a hospital or clinic of high complexity. in which they have all the required instrumentation and trained professionals, thus providing a better outcome of said pathology.

It is recommended to expand this study by including variables or prenatal tests that indicate the presence of coarctation of the aorta at an early stage.

It is recommended that the Medilaser clinic improve the registration and correct preparation of medical records, so that it is a totally reliable resource for data collection for further research

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