



## Presentation and Echocardiographic Findings In Patients With Coarctation Of Aorta

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### Abstract

**Background:** Coarctation of the aorta (CoA) is a partial- or long-segment narrowing of the aorta, usually at the aortic isthmus, between the ductus arteriosus and the left subclavian artery.

**Patients and methods:** This was an observational cohort prospective study conducted at the Pediatric Department at Sohag University Hospital between July 2016 to July 2017. Full history, full clinical examination, Echocardiography were done for all included patients.

**Results:** The age range of presentation of CoA, was found to be 30 cases (60%) presented during infancy, followed by 14 cases (28%) at the age from 1-5 years, then 6 cases (12%) after 5 years.

The clinical presentation of the studied cases were (54%) of the patients presented with heart failure, 28 (56%) cases presented with dyspnea, 32 (64%) cases presented with loss of femoral pulse, all patients had a femoral radial delay and 21 (42%) cases presented with hypertension.

Echocardiographic findings show that 58% of patients had left ventricular hypertrophy, 12% had hypoplasia of aortic arch, 22% had the bicuspid aortic valve, 18% had aortic stenosis. The associated cardiac congenital anomalies were 58% and 42% had no associated cardiac congenital anomalies.

**Conclusion:** Most cases of Coarctation of the aorta (CoA) presented during infancy, the most frequent symptoms were dyspnea and the most common sign is a femoral radial delay. Echocardiography is a noninvasive method and the one of choice in the diagnosis of Coarctation of the aorta.

**Keywords:** Coarctation of the aorta, early and late presentation, Echocardiographic findings.

### Introduction:

Coarctation of the aorta (CoA) is estimated by the Centers for Disease Control and Prevention to account for 4%–6% of all CHD in the United States, with a reported prevalence of ~4 per 10 000 live births. (1).

The presentation of coarctation can be in isolation or in association with

other congenital heart anomalies. In some cases of long-standing coarctation, a compensatory collateral circulation develops from the internal thoracic and intercostal arteries, bypassing the coarctation to provide circulation to the lower extremities. (2)

Treatment and prognosis depend on the clinical state of disease: age, a

clinical feature of the disease, associated anomalies, “simple CoA” or “mixed CoA”, concomitant arch hypoplasia, hypertension, cerebral vascular involvement, etc (3).

We aimed to study the clinical profile of the Coarctation of the aorta (incidence, presentation, complications, echocardiographic findings) at the Pediatric Department at Sohag University Hospital (outpatient, inpatient, emergency department and neonatal intensive care unit).

### Patients and method:

The present study had been performed at the pediatric department, outpatient clinic, intermediate care unit, and neonatal intensive care unit (NICU) of Sohag university hospital, Upper Egypt through the period from July 2016 to July 2017. It included 50 patients in the age category from birth to 15 years.

**Inclusion criteria of patients:** Any patient with a diagnosis of coarctation of aorta presented to our pediatric department during the period of study including both sexes. The age varies from birth to 15 years old.

**Methods:** All patients were subjected to:

- Complete medical history.
- Complete medical examination focusing on general and local cardiac examination.
- Echocardiography.

**Statistical analysis:**

Data were analyzed using IBM SPSS Statistics for Windows version 22.

Quantitative data were expressed as means  $\pm$  standard deviation, median, and range. Qualitative data were expressed as number and percentage. The data were tested for normality using the Kolmogorov–Smirnov test and the Shapiro-Wilk test. The nonparametric Kruskal–Wallis test was

used for data that wasn't normally distributed. A Chi-Square test was used for comparison between qualitative variables. A 5% level was chosen as a level of significance in all statistical tests used in the study.

**Ethical Consideration:**

Consent was proved informally by a parent of patients in the Sohag Faculty of Medicine by the ethical Committee.

### Results

The study included 50 patients diagnosed by trans-thoracic two dimensional 2D, Doppler and color Doppler echocardiography as coarctation of the aorta (COA). Records of these patients were analyzed for details of history, physical examination, and detailed echocardiography. Their ages ranged from 0 days to 15 years, as for gender distribution of the studied cases (50) 34 cases were males while 16 were female with male predominance 68% of them. Table (1)

In our study we found that 30 cases (60%) presented during infancy, followed by 14 cases (28%) at the age from 1-5 years, then 6 cases (12%) after 5 years. Table (1)

As regard to clinical presentation of the studied cases we found that (54%) of the patients presented with heart failure, 28 (56%) cases presented with dyspnea, 32 (64%) cases presented with loss of femoral pulse, all patients had femoral radial delay and 21 (42%) cases presented with hypertension. **Table (2)** According to echocardiographic findings our present study shows that 58% of patients had left ventricular hypertrophy, 12% had hypoplasia of aortic arch, 22% had a bicuspid aortic valve, 18% had aortic stenosis and the mean of doppler gradient at coarctation ( $48.5 \pm 9.7$ ). **Table (3)**

It was found that 42% had no associated cardiac congenital anomalies and 58% of patients had associated cardiac congenital anomalies in the form of ASD, VSD in 14% each of them followed by PDA in 12% and others anomalies PFO, TGA, TR, MS, Complete A-V canal defect, PDA&ASD, PDA&VSD, Shone complex (AS, MS) and PDA, VSD& DORV in 2% for each Table (4).

**Table (1): Socio-demographic characteristics and weight of the studied cases (No. =50).**

Parameter	Mean± S.D or Number (Frequency)
Age	(Mean± S.D = 24.8 ± 37.4 months)
< 1 month	5 (10%)
1 month - < 1 year	25 (50%)
1 -5 years	14 (28%)
> 5 years	6 (12%)
Gender	
Males	34 (68%)
Females	16 (32%)

**Table (2): Clinical presentation of the studied cases (No.=50)**

Parameter	Number and Frequency
Heart failure	
No	23 (46)
Yes	27 (54)
Dyspnea	
No	22 (44)
Yes	28 (56)
Loss of femoral pulse	
No	18 (36)
Yes	32 (64)
Femoral radial delay	
No	0 (0.0)
Yes	50 (100)
Hypertension	
No	29 (58)
Yes	21 (42)

**Table (3): Echocardiographic findings of the studied cases. (No.=50).**

Parameter	Summary statistics
Left ventricular hypertrophy	
No	21 (42%)
Yes	29 (58%)
Hypoplasia of aortic arch	
No	44 (88%)
Yes	6 (12%)
Bicuspid aortic valve	
No	39 (78%)
Yes	11 (22%)
Aortic Stenosis	
No	41 (82%)
Yes	9 (18%)
Doppler gradient at the coarctation	
Mean± S.D.	48.5 ± 9.7
Median (Range)	45.5 (35– 70)

**Table (4): Distribution of the studied cases according to associated cardiac congenital anomalies (No. =50).**

Parameter	Number and Frequency
ASD	7 (14)
VSD	7 (14)
PDA	6 (12)
PFO	1 (2)
TGA	1 (2)
TR	1 (2)
MS	1 (2)
Complete A-V canal defect	1 (2)
PDA, ASD	1 (2)
PDA, VSD	1 (2)
Shone complex	1 (2)
PDA, VSD, DORV	1 (2)

(ASD: Atrial septal defect, VSD: Ventricular septal defect, PDA: Patent ductus arteriosus, PFO: Patent

*foramen ovale, TGA: Transposition of the great arteries, TR: Tricuspid regurgite, MS: Mitral stenosis, A-V: Atrio-ventricular, DORV: double outlet right ventricle)*

### Discussion:

The present study had been performed at the pediatric department, outpatient clinic, intermediate care unit, and neonatal intensive care unit (NICU) of Sohag university hospital, Upper Egypt through the period from July 2016 to July 2017. It included 50 patients in the age category from birth to 15 years.

In this study, there was male predominance among total cases of CoA(50) males were 34 cases while 16 were females with male predominance 68% of them. This finding was in agreement with another study by Pedersen TAL et al they involved 246 patients underwent surgical repair of CoA with male predominance 63% .(3)

In our study we found that most of the cases 30 (60%) presented during infancy, followed by 14 (28%) at the age from 1-5 years, then 6 (12%) after 5 years. These findings were highly in concordance with a study of Laohaprasitiporn, et al that found that the majority of the patients (78.8%) were presented early within the first year of life. (4)

As regard to the clinical presentation of the studied cases, we found that 27 (54%) of the patients presented with heart failure, 28 (56%) had dyspnea, 32 (64%) had loss of femoral pulse, all patients had femoral radial delay and 21(42%) had hypertension.

When comparing these findings with other results, our results are highly in concordance with **Laohaprasitiporn et al. (4)** that show the predominant clinical manifestations were congestive heart failure (69.6%),

systemic hypertension of the upper extremities (36.3%) and decreased femoral pulses.

As regard presence of associated cardiac congenital anomalies the present study it was found that 58% of the patients had associated cardiac congenital anomalies (in the form of ASD, VSD 14% each of them followed by PDA in 12% and other anomalies PFO, TGA, TR, MS, Complete A-V canal defect, PDA and ASD, PDA and VSD, Shone complex (AR and MS) and PDA, VSD and DORV in 2% for each) and 42% had no associated cardiac congenital anomalies. These results correlate with Sun, et al series who stated that, there were 6 patients of CoA of solitary type and 47 patients with other intracardiac malformations, including, in descending order of frequency, PDA (54.7%), VSD (43.4%), ASD (35.8%) and TAPVD (1.9%). (5)

In the current study, we found that 6% of patients had noncardiac congenital anomalies in the form of Down syndrome, Turner syndrome and hypertelorism, cleft palate, small mandible, protruded mandible for 2% of patients each. This is consistent with a study done by **Malic et al. (6)** who stated that 20 (9.95%) patients, coarctation were found within the known syndromes (Turner, Noonan, Williams Beuren, Ellis van Creveld, Down, partial trisomy 18, fetal valproate syndrome).

### Conclusion:

Most cases of Coarctation of the aorta 30 (60%) presented during infancy, the most frequent symptom was dyspnea, the most common sign is a femoral radial delay and the less common sign was hypertension.

Echocardiography is a noninvasive method and the one of choice in the

diagnosis of Coarctation of the aorta and presence of other associated cardiac congenital anomalies.

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**Author's contributions:**

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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