

BALLOON ANGIOPLASTY OF NATIVE COARCTATION OF THE AORTA IN CAIRO UNIVERSITY, CHILDREN'S HOSPITAL: MIDTERM FOLLOW UP

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَلَقَدْ خَلَقْنَا الْإِنْسَانَ مِنْ سُلَالَةٍ مِّنْ طِينٍ
{١٢} ثُمَّ جَعَلْنَاهُ نُطْفَةً فِي قَرَارٍ مَّكِينٍ
{١٣} ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَقَةً فَخَلَقْنَا
الْعَلَقَةَ مُضْغَةً فَخَلَقْنَا الْمُضْغَةَ
عِظَامًا فَكَسَوْنَا الْعِظَامَ لَحْمًا ثُمَّ
أَنْشَأْنَاهُ خَلْقًا آخَرَ فَتَبَارَكَ اللَّهُ أَحْسَنُ
الْخَالِقِينَ {١٤}

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Dedication

*To my Father and my Mother whom taught me the principles
and patience*

*To my wife and my children Mohammed and Sheriff who
gave me the smile during hard time*

To all who sacrificed for me

Ahmed Fathi Ahmed El Said

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Abstract

Objectives: We evaluated mid-term results of balloon angioplasty performed in pediatric patients with aortic coarctation. **Study design:** this retrospective study included 13 children (11 boys, 2 girls; median age at BAP intervention was 16 months ranging from 4-96 months) who underwent balloon angioplasty for aortic coarctation. The patients were followed up by transthoracic echocardiography assessment for left ventricular functions, recoarctation, and other complications after a period of time ranging from 9 – 36 months with a mean of 24.38 ± 8.22 months after intervention. **Results:** The mean peak systolic gradients decreased to ≤ 20 in 84% of patient. The mean peak systolic gradients decreased from 61.15 ± 12.44 mmHg before angioplasty to 18.87 ± 13.72 mmHg and 15.38 ± 6.27 mmHg immediately after balloon and at follow up, respectively ($P=0.00$). The decrease in mean blood pressure gradients was not sufficient in two cases, where surgical resection were done, improved ventricular function in 100% of patients, mortality did not occur, restenosis were observed in one case whose age was four months at intervention, which was planned for redilatation. **Conclusion:** Considering its mid-term outcome, balloon angioplasty is a successful and reliable procedure in the treatment of aortic coarctation.

Key words: Angioplasty, balloon; aortic coarctation/midterm; child; heart defects, congenital; restenosis.

Contents

<u>Items</u>	<u>Page</u>
List of Tables.....	I
List of Figures	III
List of Abbreviations.....	V
Introduction	1
Aim of the Work.....	3
Review of Literature	4
<i>Chapter 1: Congenital Heart Diseases</i>	
I- Incidence	4
II- Etiology	5
III- Prevention	6
IV- Embryology.....	6
V- Normal Cardiac Anatomy	10
VI- Fetal and Transitional Circulations.....	12
VII- Pathologic Consequences of Congenital Cardiac Lesions.....	14
VIII- Evaluation of a Child with Congenital Heart Disease	17
<i>Chapter 2: Coarctation of the Aorta</i>	
I- Background	21
II- Prevalence and Etiology	22
III- Pathogenesis of Coarctation of the Aorta	22
IV- Histopathology	24
V- Hemodynamics.....	27
VI- Clinical Picture.....	29
VII- Differentials Diagnosis	32
VIII- Investigations	32

Chapter 3: Management Approach and Follow-Up

I-	Medical Management.....	40
II-	Surgical Management	41
III-	Percutaneous Balloon Angioplasty	44
	A) Introduction.....	44
	B) Technique.....	44
	C) Follow up results	47
	D) Surgery compared with balloon angioplasty therapy	49
	E) Recoarctation	50
IV-	Aortic Stents	51
	A) Introduction.....	51
	B) Follow up results	52
	C) Covered stents	54
V-	Follow-Up of Patients with Coarctation of Aorta.....	55
VI-	Residual Complications after Treatment	55
	Subjects and Methods	57
	Results.....	66
	Discussion	83
	Conclusions &Recommendations	93
	Summary	95
	References	97
	Appendix	120
I-	Master Sheet.....	120
II-	Master Table Key.....	122
III-	Master Table (Angioplasty Data).....	123
IV-	Master Table (Follow Up Data).....	128
	Arabic summary	

List of Tables

Table	Title	Page
(1)	Relative Frequency of Major Congenital Heart Lesions	5
(2)	Changes after Birth from Fetal to Adult Structures	14
(3)	Causes of Central Cyanosis	15
(4)	Lists Important Aspects of History Taking for Children with Potential Cardiac Problems	17
(5)	Prevalence of Associated Lesions with Coarctation of the Aorta	25
(6)	Clinical Presentation of Coarctation of the Aorta	30
(7)	Differential Diagnosis of Coarctation of the Aorta	32
(8)	Clinical and Hemodynamic Conditions that May Affect Long-Term Prognosis after Repair of Coarctation	49
(9)	Associated Cardiac Lesions	67
(10)	Clinical Features of the Studied Patients	68
(11)	Associated Cardiovascular Hemodynamic Changes with Coarctation on the Studied Patients	69
(12)	Clinical Features of the Studied Patients before Angioplasty and at Follow up	72
(13)	Femoral Pulses Improvement in Before Angioplasty and at the Follow-up	73
(14)	Systemic Blood Pressure before Angioplasty and at Follow-up	73
(15)	Comparison between the Mean Pressure Gradient and Mean Peak Instantaneous Gradient before and after Angioplasty, and at the Follow-up	74
(16)	Comparing the Mean Pressure Gradient and the Mean Peak Instantaneous Gradient after Angioplasty and at the Follow-up	75

Table	Title	Page
(17)	Hemodynamic and Angiographic Data before Angioplasty and at Follow-up	77
(18)	Echocardiographic Morphometric Measurements Data before Angioplasty and at the Follow-up	79
(19)	Left Ventricular Hypertrophy before Angioplasty & at Follow-up	80
(20)	Left Ventricular Dilatation before Angioplasty & at Follow-up	80

List of Figures

Figure	Title	Page
(1)	Looping of the single endocardial heart tube transforms it into a complex four chamber structure	7
(2)	Development of atrio-ventricular septation	8
(3)	Formation of the outflow tract and vascular septation	9
(4)	Changes that result during transformation of the truncus arteriosus, aortic sac, aortic arches, and dorsal aortae into the adult arterial pattern	9
(5)	The fetal circulation before birth. Red indicates more oxygenated blood and arrows indicate the direction of flow	13
(6)	Types of Coarctation of the aorta	21
(7)	Collateral circulation in coarctation of aorta	26
(8)	An electrocardiogram of a 10 day-old neonate with critical coarctation of the aorta, who presented in cardiogenic shock	33
(9)	Chest CT scan with three-dimensional reconstruction, demonstrating severe coarctation of the patient's aorta and the presence of large collateral vessels	34
(10)	Fetal echocardiogram showing hypoplastic transverse aortic arch , and coarctation of aorta	35
(11)	Transthoracic two-dimensional echocardiograms of aortic coarctation	35
(12)	Surgical techniques for repair of coarctation of the aorta	43
(13)	Anatomy of the groin, and obtaining femoral arterial and venous access	46
(14)	Balloon dilatation of coarctation	47
(15)	Types of aortic stents	52
(16)	Stenting of aortic coarctation	54

(17)	Sex distribution among the study group	66
(18)	The peak systolic pressure gradients at the site of coarctation of the patients before and after angioplasty	70
(19)	Systolic pressure gradient across the coarctation before and immediately after angioplasty	71
(20)	Diameter of the aorta at the coarctation before and immediately after angioplasty.	71
(21)	Systolic pressure gradient and peak instantaneous gradient before and after angioplasty, and at the follow-up	75
(22)	Systolic pressure gradient across the coarctation before and after angioplasty, and at the follow-up period	76
(23)	Diameter of the aorta at the coarctation before and after angioplasty, and at the follow-up period	78
(24)	Case number 8; Fourteen month old patient with severe coarctation (peak pressure gradient 80 mmHg and hypertension (135/90) treated with angioplasty	81
(25)	Case number 5; month old patient with severe coarctation (peak pressure gradient 50 mmHg and hypertension (165/110) treated with angioplasty	81
(26)	Case number 3; Eight year old patient with severe coarctation (peak pressure gradient 45 mm Hg and hypertension (130/100) treated with angioplasty	82

List of Abbreviations

AoV	Aortic valve
APTT	Activated partial thromboplastin time
AS	Aortic stenosis
ASD	Atrial septal defect
AV	Atrioventricular
BAP	Balloon angioplasty
BIB	Balloon in balloon
BP	Blood pressure
CHD	Congenital heart disease
CHF	Congestive heart failure
CoA	Coarctation of aorta
CUCH	Cairo University, Children's Hospital
DORV	Double-outlet right ventricle
d-TGA	d-Transposition of great arteries
ECG	Electrocardiography
EF	Ejection fraction
FS	Fractional shortening
Hb	Hemoglobin
HLHS	Hypoplastic left heart syndrome
I/D	Isthmus diameter/Descending aorta diameter
CoA/D	Coarctation diameter /Descending aorta diameter
IMA's	Internal mammary arteries
INR	International normalized ratio
IVS d	Inter-ventricular septum thickness during diastole

IVS s	Inter-ventricular septum thickness during systole
LA	Left atrium
LAO	Long-axial oblique
LHO	Left heart obstructive lesions
LL	Lower limbs
LSA	Left subclavian artery
LV	Left ventricle
LVH	left ventricular hypertrophy
LVID d	Left ventricular internal dimension during diastole
LVID s	Left ventricular internal dimension during systole
LVOT	Left ventricular outflow tract
LVPW d	Left ventricular posterior wall thickness during diastole
LVPW s	Left ventricular posterior wall thickness during systole
MDCT	Multidetector spiral computed tomography
MRI	Magnetic Resonance Imaging
PA	Pulmonary artery
PDA	Patent ductus arteriosus
PG	Pressure gradient
PIG	Pressure instantaneous gradient
PLT	Platelet count
PT	Prothrombin time
RA	Right atrium
RAO	Right anterior oblique
RSA	Right subclavian artery
RV	Right ventricle
RVH	Right ventricular hypertrophy

TAPVR	Total anomalous pulmonary venous return
TEE	Transesophageal Echocardiography
TGA	Transposition of the great arteries
TLC	Total leukocytic count
TOF	Tetralogy of Fallot
TTE	Transthoracic Echocardiography
UL	Upper limbs
VSD	Ventricular septal defect

Introduction

Coarctations are a challenging condition seen in pediatric cardiology patients with congenital heart defects. The prevalence of this pathology is about 6-8% in patients with congenital heart disease (CHD), which corresponds to 6 out of 10000 newborns (*Beekman, 2008*). Coarctation of aorta (CoA) is a constriction of the aorta distal to the left subclavian artery (LSA) typically near ductus arteriosus (*Moore and Persaud, 1998*).

Coarctation of aorta is a form of left ventricular outflow tract (LVOT) obstruction. A pressure gradient (PG) across the coarctation results in elevated blood pressure (BP) in the left ventricle (LV) and the arteries proximal to the obstruction. Conversely, pressure in the lower extremities is reduced, and perfusion may be diminished. When obstruction is severe extensive collateral vessels develop, usually involving the internal mammary, intercostals and axillary arteries (*Bickner et al., 2000*).

The clinical presentation of a hemodynamic significant CoA varies from asymptomatic high BP or a little murmur, to heart failure and shock. However there are variations in anatomy, physiology, treatment options and in outcomes (*Sadler and Peters, 2000*).

The prognosis is worse if CoA presents itself in combination with other intracardiac pathologies (*Beekman, 2008*). Coarctation, if left untreated, poses a significant health risk and up to 90% of the patients with isolated CoA may die before age fifty years of complications of coarctation including aortic rupture, intracranial hemorrhages, hypertension, endocarditis or heart failure (*Kirklin and Barrat-Boyes, 1993*).

Treatment of aortic coarctation comprises surgical intervention, BAP, or stenting (*Cowley et al., 2005 and Shah et al., 2005*). Percutaneous balloon angioplasty (BAP) is a less invasive alternative to surgery in