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

Thesis

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بِسْمِ اللهِ الرَّحْمنِ الرَّحِيمِ

وَلَقَدْ خَلَقْنَا الْإِنسَانَ مِن سُلَالَةٍ مِّن طِينٍ
{١٢} ثُمَّ جَعَلْنَاهُ نُطْفَةً فِي قَرَارٍ مَّكِينٍ
{١٣} ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَقَةً فَخَلَقْنَا
الْعَلَقَةَ مُضْغَةً فَخَلَقْنَا الْمُضْغَةَ
عِظَامًا فَكَسَوْنَا الْعِظَامَ لَحْمًا ثُمَّ
أَنشَأْنَاهُ خَلْقًا آخَرَ فَتَبَارَكَ اللَّهُ أَحْسَنُ
الْخَالِقِينَ {١٤}

سورة المؤمنون {١٢- ١٤}

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.*

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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