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Experience with cardiac catheterization of congenital heart disease in Cairo University Children Hospital

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ACC/ AHA/HRS	American College of Cardiology/American Heart Association/Heart Rhythm Society
ADO	Amplatzer Duct Occlude
AP	Aorto Pulmonary
AS	Aortic stenosis
ASD	Atrial septal defect
ASO	Amplatzer Septal Occlude
AV	Atrio Ventrivular
AVC	Atrio Ventricular Canal
AVF	Arterio Venous Fistula
AVNRT	Atrio Ventricular Reenterant Technology
CAVC	Common Atrio Ventricular Canal
CAVF	Coronary Arterio Venous Fistula
CHD	Congenital Heart Disease
COA	Coarcotation Of Aorta
CT	Computed Tomography
DDIR	Dual Paced ,Dual Sensed, Inhibited, Rate Responsive
DILV	Double inlet right ventricle

DORV	Double outlet right ventricle
DPT	Demerol، Phenergan, and Thorazine
D-TGA	Dextro-Transposition Of Great Arteries
EPS	Electro Physiological Studies
FDA	Food and Drug Administration
GA	General Anaesthesia
HLHS	Hypoplastic Left Heart Syndrome
HLHS	Hypoplastic left heart syndrome
HTN	Hypertension
IART	Intra-atrial Reentry Tachycardia
ICD	Internal Cardiovertor Defibriliator
IVC	Inferior vena cava
LPA	Left pulmonary artery
L-TGA	Levo- Transposition Of Great Arteries
LVAD	Left Ventricle Assisted Device
MAPCAs	Major Aorto- Pulmonary Collateral Arteries
MBT	Modified Blalock Taussing
MRA	Magnetic Resonance Angiography

MRI	Magnetic Resonance Imaging
MS	Mitral stenosis
MVSD	Muscular Ventricular Septal Defect
PA	Pulmonary atresia
PAB	Pulmonary artery bandage
PAPVR	Partial Anomalies Pulmonary Venous Return
PDA	Patent Ductus Arteriosus
PH	Pulmonary Hyper Tension
PM	Pace Maker
PMVSD	Peri Memberanous Ventricular Septal Defect
PMVSD	Perimemberanous Ventricular Septal Defect
PS	Pulmonary Stenosis
RF	Radio Frequency
RPA	Right Pulmonary Artery
RV	Right Ventricle
RVOT	Right Ventricular Outflow Tract
S/P	Status/Post
SVC	Superior Vena Cava
SVR	Systemic Venous Return

TAPVR	Total Anomalies Pulmonary Venous Return
TEE	Trans Esophageal Echocardiography
TOF	Tetralogy Of Fallot
TPV	Transcatheter Pulmonary Valve
TVR	Transcatheter Valve Replacement
VSD	Ventricular Septal Defect
VT	Ventricular Tachycardia
VVIR	Ventr Paced, Ventricular Sensed ,Initiated, Rate Responsive

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Introduction, aim of the work.

Cardiac catheterization in pediatrics and for congenital heart disease encompasses a wide range of both diagnostic and therapeutic procedure types***.(Bergersen et al, 2011)*** In recent years, catheterization has shifted from a diagnostic tool to an interventional one still; non interventional pediatric cardiac catheterization continues to have an important role in the assessment and treatment of patients with congenital heart diseases. ***(Joshua et al, 2005)***Despite the considerable improvement in catheterization techniques, equipment and skills of the interventionist, the risks of catheterization continue to complicate these procedures.(***Mehta et al, 2008)***

The aim of this work is to analyse our results in the cardiac catheterization laboratory and analysis of the types, numbers and oucome of the performed cardiac catheter procedures.

Introduction and historical review of cardiac catheterization.

Pediatric cardiac catheterization is a unique specialty encompassing a wide range of diagnostic and therapeutic techniques applied to a diverse group of congenital and acquired cardiovascular disorders. ***(Robert 2005)***

Cardiac catheterizations usually include right (and left) heart catheterization, quantification of cardiac index, multichamber oximetry assessments, calculations of left-to-right and right-to-left shunts, and pulmonary and systemic vascular resistance. Cardiac index may be measured by thermodilution, but because of the presence of shunts, the Fick principle is more commonly employed, and oxygen consumption is usually assumed. Because of dramatic growth-related changes in pediatric body surface area and the need for comparative hemodynamic data, flow and resistance values are usually indexed for body surface area. (***hijazi 2008)***

The incidence of congenital heart disease(CHD) is less than 1%.Overall, three out of 1000 live births will have congenital heart disease that will require an immediate intervention، including cardiac catheterization and surgery. Cardiac catheterization should be used in any circumstance in which the anatomy of the heart of a child with congenital heart disease is inadequately defined by non-invasive means. On some occasions، particularly in very complex lesions, more specific details about the anatomy or hemodynamic features are necessary. Pediatric cardiac catheterization is a safe and effective procedure used to obtain detailed information about heart anatomy as well as to repair the heart without surgery. Advances in non-invasive imaging have allowed cardiac catheterization to become increasingly a catheter based therapeutic option rather than a diagnostic tool. ***(Bonnet and Greffier, 2013)***

Interventional cardiac catheterization describes procedures where cardiac catheters are used to modify, palliate, or treat congenital or acquired cardiac disease ***(Robert et al, 2010)***Interventional pediatric cardiac catheterization has evolved to include a variety of procedures, including the closure of atrial septal defect, the closure of ventricular septal defect (VSD), the closure of patent ductus arteriosus, the creation of holes such as septostomy, angioplasty, valvuloplasty, the placement of stents to open up narrowed vessels, the embolization of vessels such as collateral vessels or more recently, the replacement of heart valves. ***(Legendre and Boudjemline 2011)***

Pediatric cardiac catheterization is not without risk to the patient. In the last decade, there have been significant improvements in technology and equipment. Nonetheless, the risk of complications remains and these risks adversely affect outcomes ***(Ovaert et al, 2011)***

History of cardiac catheterization

Cardiology as a medical speciality was limited, mainly, to internists. When Robert Gross ligated a patent ductus in 1938, pediatric cardiology, as a discipline, was born. Physiologic studies, angiography, and the development of extracorporeal circulation allowed congenital cardiac lesions previously considered a curiosity to be diagnosed and treated successfully. By 1961, pediatric cardiology became the first subspecialty board in pediatrics. ***(Ovaert et al, 2011)***

Forssman in 1929 passed a catheter into his own heart, but it was not until 1932 that Richardson and Cournand began performing cardiac catheterizations in humans. With the advent of surgery for cardiac defects, it became essential that correct diagnoses be made preoperatively. In 1949, Cournand and his associates in New York, working with Janet Baldwin, a pediatric cardiologist, reported on cardiac