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Original Article

Diagnostic pediatric cardiac catheterization: Experience of a tertiary care pediatric cardiac centre

Col Prabhat Kumar^{a,*}, Col Vidya Sagar Joshi^b, Lt Col P.V. Madhu^c^a Senior Advisor (Pediatrics & Pediatric Cardiology), Military Hospital (CTC) Pune 40, India^b Senior Advisor (Cardiothoracic Anaesthesiology), Military Hospital (CTC), Pune 40, India^c Classified Specialist (Cardiothoracic Anaesthesiology), Command Hospital Air Force, Bengaluru, India

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ABSTRACT

Background: Cardiac catheterization was considered gold standard for confirmation of diagnosis and analyzing various management issues in congenital heart diseases. In spite of development of various non invasive tools for investigation of cardiac disorders diagnostic catheterization still holds an important place in pediatric patients.

Methods: 300 consecutive diagnostic cardiac catheterization performed since April 2007 were included in this study. The study was undertaken to evaluate the profile of patients undergoing diagnostic cardiac catheterization, its results, assess its safety and its contribution toward solving various management issues.

Result & Conclusion: Children who underwent cardiac catheterization ranged in weight from 1.6 kg to 35 kg, with their age range 0 day–12 years. The information obtained was of great importance for further management in over 90% cases. The procedure of cardiac cath is invasive, still it was proved to be quite safe even in smallest baby.

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Introduction

Congenital heart diseases (CHD) occur in almost 8–10 per 1000 babies. Diagnosis of CHD is done by clinical examination, chest radiograph and electrocardiogram. Echocardiography helps in confirmation of diagnosis and in solving most of the management issues. In earlier years of pediatric cardiology, cardiac catheterization was the major diagnostic tool but in recent years, the use of catheterization for the diagnosis of congenital heart diseases has limited applications. Angiographic cardiac imaging is required for those areas inaccessible to echocardiography, such as the distal great arteries, abnormal venous connections, complex congenital heart diseases and patients with poor echo window such as in post

operative conditions. Trans-esophageal echo, MRI, Radio-nuclide angiography and spiral CT have been employed in defining the structural heart lesions. Of these modalities MRI appears to be most promising. The increased imaging versatility offered by these new modalities has important financial consequences and requires a responsible economic approach.¹ Cardiac centers where MRI facilities are not available in house the cardiac catheterization is still the investigation of choice. MRI centers who are not performing cardiac MRI for congenital heart diseases on a regular basis can not provide all relevant information in detail as it is possible with cardiac catheterization.

Cardiac catheterization (cath) in children is now more applicable for therapeutic reasons; still role of diagnostic

* Corresponding author. Tel.: +91 9922923383, +91 (0) 20 24263082.

E-mail address: drprabhat_cardio@yahoo.co.in (P. Kumar).

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Table 1 – Profile of acyanotic patients.

Diagnosis (n = 94) M 55, F 39	<6 Months	>6 Months–1 year	>1 Year–5 years	>5 Years
VSD (n = 30)		3	12	15
AP window (n = 10)	6	2		2
ASD (n = 15)		3	6	6
Truncus (n = 2)	2			
AVSD (n = 1)			1	
PDA (n = 11)		1	6	4
Coarctation (n = 10)	2	1	1	6
AS (n = 1)				1
PAH (n = 1)			1	
DCRV (n = 11)			7	4
RSOV (n = 1)			1	
Renal angio (n = 1)				1

VSD – Ventricular septal defect, AP – Aortic pulmonary, ASD – Atrial septal defect, AVSD – Atrio ventricular septal defect, PDA – Patent ductus arteriosus, AS – Aortic stenosis, PAH – Pulmonary arterial hypertension, DCRV – Double chambered right ventricle, RSOV – Ruptured sinus of valsalva.

cardiac catheterization can not be undermined in difficult cases where it is still the gold standard. Meaningful and accurate data must be acquired for the pre surgical evaluation of patients with CHD to better guide clinical decisions.² This study was undertaken to evaluate various issues related to diagnostic cardiac catheterization in children.

Material and methods

A prospective study was conducted to examine the profile of patients, indications of catheterization, analyze the available information, contribution of the available information in further management of the patient and safety issues related to diagnostic cardiac catheterization procedure.

Consecutive diagnostic cardiac catheterization performed in 300 children since April 2007 were included in this study. Patient where catheter based cardiac intervention was done, were not included in this study. All these children were referred from various hospitals with a provisional diagnosis of congenital heart disease. Detailed clinical examination was

done at our center. Echocardiography was performed in all patients by iE 33 Philips machine, and majority of patients were assigned either medical or surgical management based on their diagnosis and clinical condition. In patients where for various reasons clear decision was not possible cardiac catheterization was performed.

Patients were hospitalized a day prior to cardiac catheterization. They were kept fasting for 3–4 h prior to procedure. Procedure was done under deep sedation with Midazolam (0.1 mg/kg) and Ketamine (1–2 mg/kg). Groin was cleaned and local anesthesia was given. Smaller children were also restrained by tying them over the board so as to avoid unnecessary movements. Arterial and venous access was obtained after puncturing right or left femoral artery and vein by Seldinger’s technique. Heparin was given 100 units/kg at the beginning of the procedure. Angiographic pictures were recorded on Siemen’s machine. Total contrast used for angiography was non ionic (Omnipaque) with total dose limited to 3–4 ml/kg.

Indications for cardiac catheterization in acyanotic heart diseases

Table 2 – Profile of cyanotic patients.

Diagnosis (n = 206) M134,F72	<6 Months	1 Year–3 years	3 Years–5 years	5 Years–10 years	>10 Years
TOF (n = 101)	12	47	18	18	6
TOF, pulm atresi (n = 26)	8	8	2	3	5
TOF absent pulm valve (n = 5)	3		2		
DORV, VSD, PS (n = 8)	2	3	1	2	
TA/VSD (n = 13)		6	2	4	1
Post PA band (n = 7)	2	2		3	
TGA (n = 4)		3			1
Post Glenn (n = 14)		2	6	1	5
Single ventricle, PS (n = 4)		1	1	2	
TAPVC (n = 5)	2	1		2	
Complex (n = 9)	5	2		1	1
Dextrocardia with CCHD (n = 8)		1	3	2	2
CTGA, VSD, PS (n = 2)			1	1	

TOF – Tetralogy of Fallot, DORV – Double outlet right ventricle, TGA – Transposition of great arteries, PS – Pulmonary stenosis, TAPVC – Total anomalous pulmonary venous connection, CCHD – Congenital cyanotic heart disease, CTGA – Corrected transposition of great arteries.

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