

COMPLICATIONS OF TETROLOGY OF FALLOT DURING CARDIAC CATHETERIZATION ANGIOGRAPHY: TWO YEAR STUDY AT AFIC & NIHD

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ABSTRACT

Objective: To determine the frequency of various complications encountered during cardiac catheterization angiography in patients with Tetralogy of Fallot (TOF).

Study Design: A descriptive cross-sectional study.

Place and Duration of Study: The study was conducted at Paediatric Cardiology Department and Cardiac Catheterization Lab at Armed Forced Institute of Cardiology & National Institute of Heart Diseases, Rawalpindi, from Jan 2017 to Dec 2018.

Material and Methods: All consecutive patients with Tetralogy of Fallot; undergoing cardiac catheterization angiography were included in the study. TOF diagnosis was made by 2D echocardiography (2D echo) done by paediatric cardiologist. Light sedation/ general anesthesia were given for the procedure after getting fitness for general anesthesia from cardiac anesthetist. Patients were admitted in the ward and any complications observed were documented. The complications were addressed and the patients were discharged once stable. All the data was entered and analyzed using SPSS-21.

Results: Total number of patients included in the study were 301, out of them male patients were 168 (55.8%) and 133 (44.1%) were female patients. Mean age of patients were 3.2 ± 1.8 (Mean \pm SD). The most common venous access was right femoral vein in 290 (96.3%). 208 (59.1%) procedures were done under general anesthesia while 93 (30.9%) were done under local anesthesia. The most common complications observed were transient lower limb pulse loss needed IV Heparin occurring in 13 (4.3%) of the patients, followed by cyanotic spell in 6 (2.0%) patients and transient pulse loss needed no heparin in 2 (0.7%) patients. All patients recovered without need of surgery. No complication of catheterization angiography was observed in 277 (92.0%) patients.

Conclusion: Though catheterization angiography for TOF patients is a safe procedure in the hand of an experienced cardiologist but some complications do occur. The most common complications observed in our patients were transient lower limb pulse loss and cyanotic spell.

Keywords: Tetralogy of fallot, Catheterization angiography, Pulse loss, Cyanotic spells.

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INTRODUCTION

Congenital cardiac defects can broadly be classified as cyanotic and acyanotic. The most common cyanotic cardiac lesions include Tetralogy of Fallot and transpositions of great arteries¹. TOF is a combination of 4 cardiac lesions including ventricular septic defects, overriding of aorta, right ventricular hypertrophy and right ventricular out flow tract obstruction. The severity and presentations of TOF depends on right ventricular outflow tract (RVOT)

obstruction². If the RVOT obstruction is severe then patients present early in life, with repeated Tet (hyper cyanotic) spells and may need early surgical intervention. If the right ventricular outflow tract obstruction is less severe there may be no or little cyanosis, sometimes called pink TOF³. TOF may have associated cardiac defects in the form of pulmonary atresia, with absent pulmonary valve and with multiple aortopulmonary collateral (MAPCAs). Overall prevalence of TOF in pediatric population is almost 8% of congenital cardiac lesion and 3 to 5/10,000 live births with no gender differences⁴. In a local study carried out at Military Hospital,

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Rawalpindi, Shahid *et al* documented that TOF was found to be 21% of the congenital cardiac defects. The etiology is multifactorial with infant of diabetic mother and of phenylketonuria are at increased risk. Neonates with chromosomal anomalies especially with trisomy's are also at increased risk^{5,6}.

Time of presentation of TOF depends on

emergency transcatheter or surgical intervention. Diagnosis of TOF is confirmed by transthoracic 2D echo⁸. To further define the anatomy cardiac computed (CT) tomography, cardiac magnetic resonance imaging (MRI) or cardiac catheterization may be required. Cardiac CT and cardiac MRI are noninvasive procedures whereas cardiac catheterization is an invasive procedure

Table: Showing demographic and clinical features of the patients.

Variables	N (%)
Age (mean \pm S.D)	3.2 \pm 9.8 years
Gender	
• Male	168
• Female	133
Disease of Patient	
• Tetralogy of Fallot	290
• TOF with absent Pulmonary Valve	04
• Double Outlet Right Ventricle (TOF type)	07
Associated lesions:	
• Dextrocardia	04
• Interrupted Inferior Venacava	05
• Absent Left Pulmonary Artery	03
• Patent DuctusArteriosis(PDA)	18
• Pulmonary Vein Stenosis	01
• Atrial Septal Defect(ASD)	15
• Partial Anamolous Pulmonary Venous Return	01
Venous Access	
• Right Femoral Vein	290
• Left Femoral Vein	04
• Right Jugular Vein	01
• Right Femoral Artery	76
Anesthesia	
• General Anesthesia	208 (59.0%)
• Local Anesthesia	93 (30.9%)

severity of disease and the most common presentation is central cyanosis. In severe cases the patient may present with tet spells. During tet spells the patients present with severe cyanosis, respiratory distress due metabolic acidosis and the severity of murmur is reduced⁷. Treatment of tet spell include making the child calm, placing the child in knee chest position, giving oxygen. Further treatment may include intra venous normal saline boluses, correcting acidosis, treating infection, use of propranolol and morphine. More severe cases may require

which is associated with some complications like bleeding, femoral artery thrombosis, cardiac arrhythmias and procedure failure due to difficult anatomy⁹.

Management of TOF is medical for stabilization of patients during emergency but the definitive treatment is total correction of cardiac lesions. The timing of TOF repair vary in different set up depending on the expertise and experience of cardiologist. The ideal age for repair is 1 year though some center carry out total correction earlier with some even in neonatal

periods. Palliative treatment with Blalock-Taussig shunt may be required if the surgery is to be delayed¹⁰.

Rationale of the study is to know about complications occurring during cardiac catheterization for TOF. Knowing complications would help in prevention of such complications in future or timely treatment of such adverse event which will help reduce mortality and morbidity from such unwanted events.

MATERIAL AND METHODS

This descriptive cross-sectional descriptive study was carried out in the Department of Paediatric Cardiology and Cardiac Catheterization Lab at Armed Forces Institute of Cardiology & National Institute of Heart Diseases from January 2017 till December 2018. The sampling technique used was consecutive non probability sampling. Patients of both gender with diagnosis of TOF having age from 2 years to 12 years, who were fit for anesthesia were included in the study. Diagnosis of TOF was made by 2D echo done by classified paediatric cardiologist. Patients who were not fit for anesthesia, who had some other anomalies with TOF were excluded from the study. Assessment for general anesthesia was done by a classified anesthetist. Cardiac catheterization was carried out by classified paediatric cardiologist in the presence of anesthetist. Femoral vein and or femoral artery were used for catheterization. The procedure was carried out under GA/LA depending on fitness and suitability. During and after the procedure any complication observed was documented and treated accordingly. After the procedure the patients were shifted to recovery room and when stable the patients were shifted to ward. The patients were discharged the next day if stable. This study was conducted after approval from hospital ethical committee. All the patients were subjected to detail history and clinical examination. Strict inclusion and exclusion criteria were used for the study. Written informed consent was taken from parents of all patients undergoing catheterization. All the

observed complications were documented in a preformed proforma. Data was entered and analyzed in SPSS Version 21.

RESULTS

Total number patients included in the study were 301, out of which male patients were 168 (55.8%) and 133 (44.1%) were female patients. Mean age of patients were 3.2 ± 9.8 (Mean \pm SD). The most common venous access was right femoral artery in 290 (96.3%) patients as shown in table. 208 (59.1%) procedures were done under general anesthesia while 93 (30.9%) were done under local anesthesia. The most common complications observed were transient pulse loss treated with IV Heparin occurring in 13 (4.3%) of

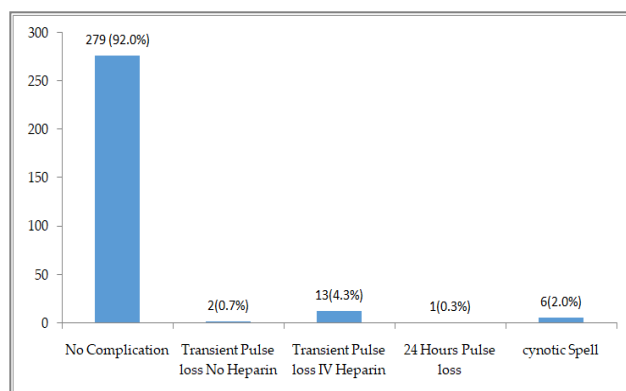


Figure: Showing complications of patients

the patients, followed by cyanotic spell in 6 (2.0%) patients and transient pulse loss required no heparin in 2 (0.7%) patients. No complication of catheterization angiography was observed in 277 (92.0%) patients as shown in fig-1. Meanduration of stay in hospital was 72.2 ± 8.3 hours in patients in which some complications occurred while in patients with no complications the duration of stay was only 24.5 ± 4.0 hours. The mortality rate was 1 (0.3%) as shown in fig-2.

DISCUSSION

Cardiac catheterization is done for two purposes; diagnostic and therapeutic. In TOF patients its used as both therapeutic and diagnostic¹¹. It is used to look for pulmonary arteries anatomy, coronary anatomy, additional VSDs, to find MAPCAS and to detect any

associated anomalies. The therapeutic use involve coiling of MAPCAS, RVOT stenting or pulmonary valve ballooning or in selected cases device closing VSDs. More complications of cardiac cath occur when it is done for therapeutic purposes than for diagnostic purposes¹². The timing of corrective surgery vary in different centers depending on the facilities and expertise available. In some centers it is carried out even in neonatal period with little complications. In our center TOF patients are managed medically initially, surgical treatment is done in the form of total correction or Blaloc-Taussing shunt depending upon clinical features, age, comorbidities. Corrective surgery in our center is done at about 1-2 years of age. Approach for cardiac cath is made from carotid artery in some centers and they claim it to be easy and with few adverse events. In our set up cardiac cath is done from preferably from femoral vein and if required than femoral artery is also accessed. In some selected cases the procedure may be carried out under LA whereas in other it is done under GA¹³⁻¹⁷.

In a study by Garg *et al*, which enrolled 40 patients, complications occurred in 9 (22%) patients. The procedure was inadequate in 02 patients. The most frequent complication noted in their study was difficulty in site access which was observed in 04 patients, temporary heart block in 02 patients, tet spells occurred in 02 patients and 01 patient suffered air embolism. Whereas in our study total no of patients were 301 and complications were observed in only 21 patients. The most common complications were transient pulse loss required IV Heparin occurring in 13 patients, followed by cyanotic spell in 6 patients and transient pulse loss but required no heparin in 2 patients.

CONCLUSION

Cardiac catheterization is a safe procedure in

patients with TOF with few minor complications.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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