

Role of intraoperative transesophageal echocardiography in pediatric cardiac surgery



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Background: Intraoperative transesophageal echocardiography (TEE) has a major role in detecting residual lesions during and/or after pediatric cardiac surgery.

Methods: All pediatric patients who underwent cardiac surgery between July 2001 and December 2008 were reviewed. The records of surgical procedure, intraoperative TEE, and pre-discharge transthoracic echocardiograms were reviewed to determine minor and major residual cardiac lesions after surgical repair.

Results: During the study period, a total of 2268 pediatric cardiac patients were operated in our center. Mean age was 21 months (from 1 day to 14 years). Of these patients, 1016 (48%) had preoperative TEE and 1036 (46%) were evaluated by intraoperative echocardiography (TEE or epicardial study). We identified variations between TEE and preoperative transthoracic echocardiography in 14 patients (1.3%). Only one surgical procedure was cancelled after atrial septal defect exclusion. The other 13 patients had minor variation from their surgical plan. Major residual lesions requiring surgical revision were detected in 41 patients (3.9%), with the following primary diagnoses: tetralogy of Fallot in 12 patients (29%), atrioventricular septal defect in seven patients (17%), ventricular septal defect in seven patients (17%), double outlet right ventricle in two patients (5%), Shone complex in two patients (5%), subaortic stenosis in two patients (5%), mitral regurgitation in two patients (5%), pulmonary atresia in two patients (5%), and five patients (12%) with other diagnoses.

Conclusion: Intraoperative TEE has a major impact in pediatric cardiac surgery to detect significant residual lesions. Preoperative TEE has a limited role in case of a high quality preoperative transthoracic echocardiography. We recommend routine use of intraoperative TEE during and/or after intracardiac repair in children.

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Introduction

Transesophageal echocardiography (TEE) has been used intraoperatively since the 1980s [1,2]. In congenital heart surgery intraoperative TEE was useful in confirming the preoperative diagnosis [3,4], evaluation of surgical results as well as in monitoring the cardiac function [5]. The aim of this study is to describe our experience in intraoperative TEE during and/or after repair of congenital heart disease.

Materials and methods

All consecutive pediatric patients (age < 14 years) patients who underwent intraoperative TEE from July 2001 to December 2008 were assessed. A biplane probe was used in the first 166 patients and, later, when it became available, a mini-multiplane probe was used in the rest of the patients. The TEE probe was inserted preoperatively by the anesthetist and was kept in position during the surgery for postoperative study.

TEE was performed by a pediatric cardiologist. Standard views were obtained according to the American Society of Echocardiography Guidelines [2].

Echocardiography reports from patients in the designated study period were reviewed retrospectively on a digital archiving system (Xcelera, Version 2.2; Philips, Eindhoven, The Netherlands). The reviewed reports were classified and characterized as follows. (1) Preoperative transthoracic echocardiography (TTE): defined as the last echocardiography study performed before surgery. (2) Preoperative TEE: consisting of the echocardiography study carried out in operating

Abbreviations

ALCAPA	Abnormal left coronary artery from pulmonary artery
ASD	Atrial septal defect
AVSD	Atrioventricular septal defect
DILV	Double inlet left ventricle
DORV	Double outlet right ventricle
HLHS	Hypoplastic left heart syndrome
LPA	Left pulmonary artery
LV	Left ventricle
LVOT	Left ventricular outflow tract
MR	Mitral regurgitation
MS	Mitral stenosis
MV	Mitral valve
PA	Pulmonary artery
PAPVD	Partial anomalous pulmonary venous drainage
RPA	Right pulmonary artery
RUPV	Right upper pulmonary vein
RVOT	Right ventricular outflow tract
SVC	Superior vena cava
TAPVD	Total anomalous pulmonary venous drainage
TEE	Transesophageal echocardiography
TGA	Transposition of great arteries
TOF	Tetralogy of Fallot
TR	Tricuspid valve regurgitation
VSD	Ventricular septal defect

theater before surgery. This was compared with preoperative TTE to determine variations in diagnosis. If the surgical procedure totally changed or was canceled, this was labeled as major variation in diagnosis. Otherwise the variation was considered minor. (3) Intraoperative echocardiography: consisting of TEE or epicardial study conducted after surgery in the operating theater before revising heparin. Reports were reviewed for residual lesions. A major residual lesion was defined as a lesion which required return on pump for surgical correction. Other abnormal findings which did not require surgical revision were defined as minor

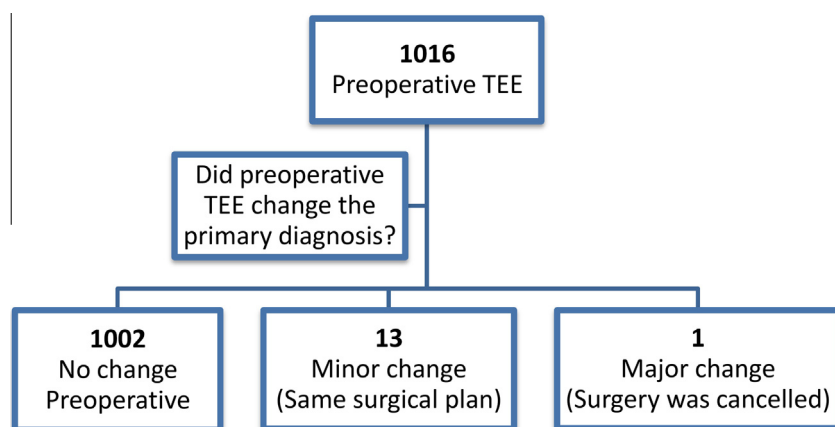


Figure 1. Changes from primary diagnosis in preoperative TEE.

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