

# C O N G E N I T A L C A R D I O L O G Y T O D A Y

Timely News and Information for BC/BE Congenital/Structural Cardiologists and Surgeons

Volume 7 / Issue 3  
March 2009  
North American Edition

## IN THIS ISSUE

### Early Post-Operative Risk Factors After Fontan: Experience from The Rajaie Heart Center, Iran

by Mohammad Youseff Arabbi Moghaddam, MD; Mohsen Shahidi, MD; Nader Givtaj, MD; Hooman Bakhshandeh, MD  
~Page 1

### Welcome to Holland

by Emily Perl Kingsley  
~Page 13

## DEPARTMENTS

### Medical News, Products & Information

~Page 15

## CONGENITAL CARDIOLOGY TODAY

Editorial and Subscription Offices  
16 Cove Rd, Ste. 200  
Westerly, RI 02891 USA  
[www.CongenitalCardiologyToday.com](http://www.CongenitalCardiologyToday.com)

© 2009 by Congenital Cardiology Today ISSN: 1544-7787 (print); 1544-0499 (online). Published monthly. All rights reserved.

Statements or opinions expressed in Congenital Cardiology Today reflect the views of the authors and sponsors, and are not necessarily the views of Congenital Cardiology Today.

### Workshop IPC & ISHAC

March 22-25, 2009  
Milano Convention Center  
Milan, Italy  
[www.WorkshopIPC.com](http://www.WorkshopIPC.com)

Recruitment Ads:  
Pages - 3, 4, 5, 8, 9, 10, 13

## Early Post-Operative Risk Factors After Fontan: Experience from The Rajaie Heart Center, Iran

By Mohammad Youseff Arabbi Moghaddam, MD; Mohsen Shahidi, MD; Nader Givtaj, MD; Hooman Bakhshandeh, MD

### Abstract Objectives

The post-operative morbidity and mortality of the Fontan operation are still a matter of concern. The purpose of this report is to assess suspected predictors of unstable hemodynamics and death after the Fontan procedure. **Methods and Materials:** From 1994 to 2007, we performed a case series study on 80 patients with mean age of  $8.5 \pm 4$  years who had undergone total cavopulmonary connection. Association between the clinical outcomes and suspected risk factors were investigated by student's test (for interval data) and chi square or Fisher's exact test and also poisson regression models. P value  $< 0.05$  considered statistically significant. **Results:** Unstable hemodynamics and death were evaluated for their association with suspected predisposing variables including; age, weight, sex, pump time, associated heart anomalies with single ventricle, pulmonary artery pressure, previous palliation and different types of Fontan surgery. Statistical analysis showed significant association of death with pump time ( $P=0.002$ ), pulmonary artery pressure ( $P<0.001$ ), ventricular morphology ( $P=0.049$ ) and types of Fontan operation ( $P=0.035$ ).

**Conclusion:** Decreasing the pump time through using trouble-free kinds of Fontan procedure such as extra-cardiac conduit might decrease postoperative morbidity and mortality. Likewise, considering ventricular morphology beside other prominent risk factors such as mean pulmonary artery pressure and pulmonary arterial size might diminish the undesirable outcomes early after operation.

### Introduction

The Fontan operation was reported for the palliation of single ventricle anatomy in 1971.<sup>1,2</sup> Although Fontan's procedure has improved considerably with time, perioperative mortality still occurs, attributed to low pulmonary vascular bed compliance, ventricular dysfunction, stroke, arrhythmia, thromboembolism, and multi-organ dysfunction. Selection of appropriate patients with lower risk factors for operation was performed according to parameters such as pulmonary pressure, size of pulmonary artery branches, atrioventricular valve function and ejection fraction. Some investigators have reported long duration of cardiopulmonary bypass or aortic cross-clamping as the risk factors.<sup>2-4</sup>

Although previous postoperative mortality of 25%-30% has been improved with time, however, most large centers still report mortality rates of 2-7%.<sup>2-4</sup>

The American College of Cardiology Presents

**CCS.09**

March -31, 2009  
Orlando, FL

**[acc09.acc.org](http://acc09.acc.org)**

click on *Education and Congenital Cardiology Solutions* for more information

# INVOS

## REVEALING BRIGHTER FUTURES

# SYSTEM



Someday I want to be a doctor, not a patient.

### His heart surgery seemed to go smoothly. But will kindergarten?

Brain dysoxygenation. Shock. Renal failure. Congenital heart patients face numerous ischemic threats, but the INVOS® System can help keep them safe. Oxygenation data from up to four specific sites helps you assess perfusion distribution and oxygen saturation in real time, allowing for early detection and rapid response. It also shows immediate patient responses to interventions so you can better judge their impact and efficacy. So let the INVOS System help these kids navigate through the OR and PICU... and perhaps even kindergarten too<sup>1-3</sup>.



GENERAL/SOMATIC  
**INVOS OXIMETER**  
REFLECTING THE COLOR OF LIFE®

1. Hoffman et al, Anesthesiology 2008; 109 A7 2. Dent et al, J Thorac Cardiovasc Surg. 2006 Jan; 131(1):190-7  
3. Andropoulos et al, Anesthesiology 2007; 107: A209

We attempted to evaluate the association of presumed risk factors with hemodynamic instability and mortality.

#### Materials and Methods

In this study, we evaluated patients with single ventricle between 2 and 24 years old who had undergone Fontan operations during the period 1994 - 2007 in The Rajaie Heart Center in Tehran, the main referral center for pediatric heart disease in Iran. This study was approved by Rajaie Heart Center research committee which is licensed via Iranian health minister. No informed consent was included due to the retrospective structure of our study.

Post-operative death and hemodynamic status were considered outcomes which would be compared statistically with suspected preoperative or perioperative risk factors.

The early post-operative period was defined as the period after termination of Fontan operation until the discharge from ICU.

Anatomically, patients included those with different types of single ventricle anatomy with double, single or common inlet ventricle. However, no patient with Hypoplastic Left Heart Syndrome was treated with the Fontan operation.

Catheterization was performed for all patients at least one time before Fontan operation and in 88%, it was also performed before the primary palliation.

Pulmonary artery pressure measurement was measured by passing catheters through systemic to pulmonary shunts, patent arterial duct, collaterals (75%) or by passing via pulmonary valve (12%). In the few remaining cases it was evaluated by means of pulmonary venous wedge pressure. Increased mean pulmonary artery pressure was considered to be as a crucial risk factor for Fontan operation. Mean pulmonary artery pressures equal to or lower than 15 mm Hg was considered optimal; pressures between 15 and 19 mm Hg were considered high-risk; and pressures higher than 20 mm Hg excluded patients from Fontan surgery. Pulmonary artery branch diameter Z values within 2 Standard Deviations (SD), smaller than between 2 and greater than 3 SD, and smaller than 3 SD were considered respectively to be acceptable, relatively small, or severely hypoplastic.

Echocardiographic evaluation was performed before the operation at least three times under the supervision of a senior pediatric cardiologist. Likewise, echocardiography and contrast echo were carried out after Fontan procedure for anatomic and hemodynamic measurements.

Four types of cavopulmonary connection were classified including; atriopulmonary connection(16.3%), intracardiac lateral tunnel(46.3%), extra-cardiac conduit(26.3%) and bilateral Glenn(11.3%).

**PEDIATRIX**  
MEDICAL GROUP

## PEDIATRIC CARDIOLOGIST

### Fairfax, Virginia

Exciting opportunity available for a BC/BE Pediatric Cardiologist to join a team dedicated to providing quality pediatric cardiology care in the Northern Virginia, Maryland, and Washington, D.C. areas. At Child Cardiology Associates, we specialize in the care of the fetus, infant, child and adolescent with congenital and acquired heart disease. Many adult patients with congenital heart disease choose to continue under our care, where we combine the roles of diagnostician, teacher, counselor, and consultant. We maintain admitting privileges in pediatric cardiology at Inova Fairfax Hospital for Children, and we are available for consultation at all area hospitals, as well as in more than 15 satellite locations. Fairfax is located in Northern Virginia on the outskirts of Washington, D.C. – only a short drive from the Nation's Capital with its monuments, museums, The John F. Kennedy Center for Performing Arts, plus a wide variety of cultural, professional sports and entertainment opportunities.

Child Cardiology Associates is an affiliate of Pediatrix Medical Group, Inc. Pediatrix offers competitive salaries and an excellent benefits package including health, disability, and liability insurances; employee stock purchase program; 401(k); and CME.

**For additional information, please contact**  
Ron Grattan, Physician Relations Specialist  
[ron\\_grattan@pediatrix.com](mailto:ron_grattan@pediatrix.com)  
Pediatrix Medical Group  
1301 Concord Terrace, Sunrise, FL 33323  
800.243.3839, ext. 5635

**Child Cardiology Associates**  
8318 Arlington Boulevard, Suite 250, Fairfax, VA 22031  
[www.childcardiology.com](http://www.childcardiology.com) [www.pediatrix.com](http://www.pediatrix.com)

**B | BRAUN**

For information, please call 1-800-BRAUN2 (227-2862)

[www.bbraunusa.com](http://www.bbraunusa.com)



Working Together to Develop a Better Tomorrow



## CHICAGO

### Rush University Medical Center Pediatric Cardiologist

The Department of Pediatrics in conjunction with the Center for Congenital and Structural Heart Disease at Rush University Medical Center, is seeking to recruit junior to mid level candidates for Pediatric Cardiology.

Board eligible/certified in pediatric cardiology, board Certified in Pediatrics with interest in Fetal Echocardiography, Intracardiac Echocardiography and interventional cardiology. It is essential that candidate is an expert in TEE in the OR and in the interventional cath lab setting including hybrid procedures. Strong clinical research background and experience in teaching residents and medical students are required. Candidates will be expected to drive to attend satellite clinics in the Chicago metro area and its suburbs.

This recruitment is part of a key strategic growth initiative in a multidisciplinary advanced congenital/structural cardiology program with state of the art mechanical support and clinical trials. Experience in clinical research is desirable. Rush is home to one of the first medical colleges in the Midwest and one of the nation's top-ranked nursing colleges, as well as graduate programs in allied health, health systems management and biomedical research.

*Rush is an Equal Opportunity Employer.*

#### **Please contact:**

Courtney Kammer  
Director, Faculty Recruitment  
Rush University Medical Center  
312-942-7376  
[Courtney\\_Kammer@rush.edu](mailto:Courtney_Kammer@rush.edu)

Before 1993 atriopulmonary connection was the dominant type of Fontan operation. Thereafter, it declined remarkably as it was no longer performed after 1999, and other types of Fontan procedure including lateral tunnel and extra-cardiac conduit were the main types of operation.

No patients had anomalous pulmonary venous connections.

All types of Fontan operation were started with median sternotomy. Cardiopulmonary bypass was performed by using bicaval cannulation through the superior and inferior caval veins. Cold crystalloid solution used as cardioplegia intermittently. Aortic cross clamp was performed for different types of Fontan procedure with mean time of 50 minutes. Circulatory arrest was not used in our series. Systemic hypothermia was controlled at about 25° C.

In lateral tunnel procedure after anastomosis of incised distal superior caval vein to superior portion of right pulmonary artery a tunnel baffle made of a tube of polytetrafluoroethylene provided a pathway from inferior caval vein toward pulmonary artery leaving a small aperture.

Extra-cardiac conduit was started by anastomosis of the superior caval vein to right pulmonary artery and opening of the inferior surface of right pulmonary artery in order to make the anastomosis to an appropriate polytetrafluoroethylene tube graft connected to the inferior vena cava.

Bilateral cavopulmonary connection was performed in those patients with suitable size right and left superior caval vein, and with azygos continuity and interrupted inferior caval vein.

Atriopulmonary connection was performed by direct anastomosis of main pulmonary artery or right pulmonary artery to the right atrium usually through its appendage.

Early after Fontan procedure all patients were hemodynamically monitored through central venous access and arterial line in the pediatric intensive care unit. Likewise, patients were controlled for cardiac rhythm and oxygen saturation. In addition to pulse oxymetry, arterial blood gas was measured every two hours for the first 24 hours followed by wider intervals during the next days. Hemodynamic instability was determined by means of all clinical and paraclinical measurements.

Continuous intravenous heparin was started as soon as possible depending on the patient's blood coagulation status and quality of chest tube drainage followed by warfarin administration with gradual discontinuation of heparin. Fontan pathway and fenestration flow were assessed at patient's admission to the ICU, and, thereafter serially by means of echocardiography and contrast echocardiography. We intended to keep the mean pulmonary pressure below 16 mm Hg as evaluated by pulmonary catheter. Milrinone was administered for those patients with

Heart Valves • Cannulae • Oxygenators & Filters • RVOT Conduits • Ablation Technologies • Pacemakers • ICDs



*Committed to providing more options  
for the lifetime care of patients  
with congenital heart disease.*



***“The post-operative morbidity and mortality of the Fontan operation are still a matter of concern. The purpose of this report is to assess suspected predictors of unstable hemodynamics and death after the Fontan procedure.”***

borderline or increased pulmonary artery pressure. Fontan takedown was considered when patients were not responsive to medical therapy.

**Statistical Analysis**

Data were presented as mean ± standard deviation for interval and count (percent) for categorical variables. Association between the study outcomes (death and hemodynamic status) and other factors were investigated by student's t test (for interval data) and chi square or Fisher's exact test (for nominal data). P value < 0.05 considered statistically significant. Multivariate analysis was performed using poisson regression models to determine the adjusted associations between favorite outcomes and related factors. We used STATA 8 for Windows (STATA Corporation, Texas, USA) for statistical analysis.

**Results**

Patients' ages at the time of operation were between 2 and 24 years (mean=8.5±4) with mean weight of 23.5±12 kilograms.

The frequency of female and male sex was 45% and 55% respectively.

Patients consisted of 39 (48.8%) with tricuspid atresia and 41 (51.3%) with

single ventricular heart anomaly including those with double inlet, single inlet and common inlet ventricle. No patients with Hypoplastic Left Heart Syndrome were included in our study.

Left ventricular morphology was present in 74 cases (92.5%) with the remainder including those with right ventricular, mixed and undetermined types (7.5%).

Pulmonary stenosis or atresia was present in 74 cases (92.5%).

Patients with severe pulmonary artery branch stenosis did not undergo Fontan operations. Therefore, pulmonary artery branch diameter was acceptable in 60 patients (75%), and relatively small size in the remainder (25%). Nevertheless, all the selected patients had pulmonary artery branch continuity.

Pulmonary artery pressure was less than 15 mm Hg in 72 patients (90%), and in the remainder 10% between 15 and 20 mm Hg.

Mild to moderate atrioventricular valve regurgitation was present in 33 patients (41%), but in the remaining 59%, there was no remarkable regurgitation. Atrioventricular valve repair was performed for 17% of all patients, but no patient with severe atrioventricular valve regurgitation had a Fontan operation.

The position of the great arteries was normal in 44 cases (55%), and transposed to the right or left in the remaining 36 cases (45%). Dextrocardia was present in 7 cases (8.8%).

In 57.5% of all patients, a fenestration was left during the operation. Therefore, it was performed in 61% of atriopulmonary connection, 70% of lateral tunnel and 43% of extra-cardiac conduit.

Previous surgical palliations were performed for 72.5% of all patients, including systemic to pulmonary artery shunt (60%), Glenn shunt (5%) and pulmonary artery banding (7.5%).



**PEDIATRIC  
CARDIOLOGIST**

Northwest Permanente, P.C., a physician-managed multi-specialty group of over 900 physicians serving the members of Kaiser Permanente in Oregon and Washington, has an excellent opportunity for a Pediatric Cardiologist to join our collaborative practice. Our service is located at Doernbecher Children's Hospital, involving care of both Kaiser and community patients.

The ideal candidate should be BE/BC in pediatric cardiology with expertise in general Echocardiography, Fetal Echo, TEE etc. as well as other non-invasive procedures. Candidates should have excellent judgment, good work ethic, and interact well with peers, other medical and support personnel, and community physicians. This position will also have an important role with pediatric students, residents and fellow educators with the opportunity to conduct clinical research.

In addition to a lifestyle inherent to the beautiful Pacific Northwest, we offer a competitive salary and benefits package which includes a generous retirement program, professional liability coverage, sabbatical leave and more.

To submit your CV and learn more about this opportunity, please visit our website: <http://physiciancareers.kp.org/nw/> and click on Career Opportunities. For more information please call: 1-800-813-3763

We are an equal opportunity employer and value diversity within our organization



case reviews in **pda**

*free on-demand webcast*  
specifically designed for clinicians treating patients with patent ductus arteriosus

[www.5StarMedEd.org/pda-cases](http://www.5StarMedEd.org/pda-cases)

The mean preoperative arterial PO<sup>2</sup> and O<sup>2</sup> saturation were 48 and 77 mm Hg respectively, which increased to 59 and 86 mm Hg after Fontan surgery. The mean PO<sup>2</sup> and O<sup>2</sup> saturation were statistically higher in patients who were provided a lateral tunnel or extra-cardiac conduit (60% and 88 mm Hg respectively) in comparison with atriopulmonary connection (55% and 80 mm Hg) (P=0.03).

Early after Fontan operation 16 patients (20%) needed inotropic agents. Ten patients (12.5%) had unstable hemodynamic in spite of using inotropic agents, but in the remaining 6 cases systemic blood pressure was relatively stable. Eighty percent of those patients with unstable hemodynamic (8 cases) died during the first few hours or days after operation. In comparison, of the 8 patients (33%) who were stable with inotropic agents, 2 cases expired early after surgery.

Mean pump time of patients with unstable hemodynamics (172.2 minutes) was remarkably higher than of the hemodynamically stable cases (122 min). Indicating that hemodynamic instability is statistically related to increased pump time ((P=0.009) Table 1). Likewise, mean pump time of 16 patients who needed inotropic agents (157 min) was statistically higher than of those patients who did not require these drugs (121 min)(P= 0.024).

Other quantitative predictors including age, weight, PO<sup>2</sup> and SaO<sup>2</sup> were assessed for their likelihood association with hemodynamic status, but no statistical relationship was found (Table 1).

Univariate analysis of post-operative hemodynamic status and ventricular morphology showed that non-left ventricular morphology may be a positive predictor for unstable hemodynamics (P=0.018) (Table 2). Likewise, this relationship

**Table 1. Relationship of quantitative variables with death and hemodynamic**

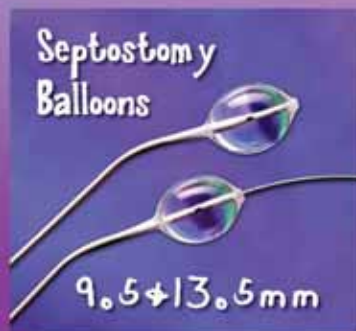
Variables	Mean	Hemodynamic		P value	Death		P value
		Stable	Unstable		No	Yes	
Age	8.5±4 y	8.6±3.6	7.7±6	0.5	8.5±3.5	8.5±6	0.9
Wt	23±12 Kg	24±12	20±12	0.3	24±12	23±14	0.8
PO <sub>2</sub>	48±9 mm Hg	48±9	48±14	0.9	48±8	50±15	0.3
SaO <sub>2</sub>	76±9%	77±9	76±9	0.7	76±8	78±10	0.6
P-time	128±57 min	122±54	172±54	0.009	120±54	173±54	0.002

**Table 2. Relationship of cardiac anomaly and outcomes**

Predictors		P value	Outcome		P value	Hemodynamic	
			Died	Alive		Unstable	Stable
Yes	TA	0.594	5	34	0.933	5	34
No			7	34		5	36
LV	Vent Morph	0.002	8	66	0.018	7	67
Other			4	2		3	3
Two	AV valve	0.196	7	26	0.551	5	28
One			5	42		5	42
Yes	NRGA	0.122	9	35	0.33	7	37
No			3	33		3	33
Yes	Dex	0.956	1	6	0.883	1	6
No			11	62		9	64
Normal	PA branch	0.041	6	54	0.051	5	55
Small			6	14		5	15
No	Regurg	0.719	11	60	0.892	9	62
Yes			1	8		1	8
Yes	PS	0.033	9	65	0.163	8	66
No			3	3		2	4
Normal	M_PAP	0.001	7	65	0.001	5	67
Increased			5	3		5	3

TA=tricuspid atresia, Vent morph=ventricular morphology, AV valve=atrioventricular valve, NRGA=normal related great artery, Dex=dexterocardia, PA branch=pulmonary artery branch, Regurg=atrioventricular regurgitation, PS=pulmonary stenosis, M\_PAP=mean pulmonary artery pressure

# BECAUSE TOMORROW IS JUST A HEARTBEAT AWAY



B. Braun Interventional Systems Inc.  
824 Twelfth Avenue  
Bethlehem, PA 18018  
Tel: 1-877-VENA CAV (836-2228)  
Fax: 610-266-3982  
[www.bbrousa.com](http://www.bbrousa.com)



**Pediatric Cardiology  
Kansas City, Mo**

The Section of Cardiology at Children's Mercy Hospitals and Clinics-Kansas City is seeking a full-time board-eligible/certified cardiologist with training and experience in non-invasive diagnostic imaging, including transthoracic, transesophageal, and 3-D echocardiography. This physician will join a team of 12 boarded pediatric cardiologists, 10 skilled pediatric nurses, and 2 exercise physiologists, all professionals, all committed to excellence in patient care in a supportive environment. Our section, with support from nursing, social work, nutrition and exercise physiology, offers the region's most comprehensive care for newborns to young adults with congenital or acquired heart disease. Treatments emphasize preventive care. In addition, through our Ward Family Center for Congenital Heart Disease, we collaborate with cardiac surgeons and other specialists to offer enhanced treatment and research opportunities for children and adults with congenital heart disease.

As the training site for University of Missouri-Kansas City pediatric residents and numerous fellowships, Children's Mercy affords its physicians ample academic opportunity.

Children's Mercy Hospitals and Clinics, a 314-bed system, is the pediatric specialty provider of choice for families throughout eastern Kansas and western Missouri. It has the only free-standing level I pediatric trauma center between Saint Louis and Denver. A medical staff of nearly 600 pediatric specialists, representing more than 40 pediatric specialties, offers a comprehensive range of programs and services. EOE/AAP.

**Contact: Mary Ann Brennan**  
**Toll free: 866.264.4652**  
**Email: [physicianjobs@cmh.edu](mailto:physicianjobs@cmh.edu)**

**Table 3. Relationship of previous operation and Fontan with outcomes**

Predictors		Hemodynamic		P value	Output		P value
		Stable	Unstable		Alive	Dead	
Palliation	yes	48	10	0.088	46	12	0.021
	no	22	0		22	0	
Type of Pre op	shunt	41	7	0.082	40	8	0.04
	Pa band	4	2		3	3	
	Glen	3	1		3	1	
	non	22	0		22	0	
Types of Fontan	AV connection	10	3	0.037	9	4	0.145
	Extra conduit	20	1		20	1	
	Intra cardiac	31	6		30	7	
	Bilateral tunnel	9	0		9	0	

**Table 4. Relationship of predictors with outcomes by using multivariate analysis**

Variables	Death		Unstable Hemodynamic	
	P value	Coef	P value	Coef
Age	0.55	0.04	0.58	-0.5
PS	0.13	1.2	0.66	0.6
Vent morph	0.049	0.67	0.86	0.1
m-PAP	0.005	2.6	0.001	4.6
Regurgitation	0.5	-0.73	0.16	-2.5
HO palliation	0.99	-17	0.59	-3
Fontan OP	0.035	-1.2	0.006	-1.4
_cons	0.99	13	0.532	2

*PS=pulmonary stenosis, OP=operation, HO=history of operation, Coef=coefficient*

was present for increased pulmonary artery pressure ( $P<0.001$ ); whereas, it was borderline for small size pulmonary artery branches ( $P=0.051$ ) (Table 2).

However, there was no statistical relationship between hemodynamic status and other aspects of cardiac anatomy including: position of great arteries, pulmonary stenosis, cardiac situs and atrioventricular anatomy or regurgitation (Table 2).

Comparing the type of operation with unstable hemodynamics displayed significantly higher occurrence among patients with atriopulmonary connection ( $P=0.037$ ) (Table 3).

Twenty percent of all patients (16 cases) died after Fontan operation. A review of the time of death statistics revealed that 75% (12 cases) of all mortalities emerged during the first month after operation, whereas just 2 cases (12.5%) died during the following two years after surgery



***“In conclusion, shorter pump time and aortic cross-clamp time diminish early post-operative complications and mortality.”***

indicating that the main cause of death was due to early postoperative complications.

Our review indicated relatively more occurrence of mortality among patients who had undergone atriopulmonary connection (31%) (Table 3). Likewise, of 37 patients with lateral tunnel procedure 7 cases died (19%). In comparison, there was only one death after extra-cardiac conduit operation (4%).

Univariate analysis did not show a relationship between previous history of palliation and unstable hemodynamics (P=0.088), however, previous palliation and death were associated (P=0.04) (Table 3), which could be attributed to pulmonary artery banding.

Pump time had a significant relationship to post-surgical death (P=0.002) (Table 1). Likewise, mean pulmonary artery pressure was statistically related to postoperative death (P<0.001) (Table 2). Other quantitative variables including age, weight, height and preoperative blood O2 content were not associated with increasing mortality (Table 1).

Considering the kind of heart anatomy indicated that there is no significant statistical relationship between death and tricuspid atresia with transposition of the great arteries, dextrocardia, and atrioventricular anatomy or valve regurgitation. However, this relationship was present between death and ventricular morphology through univariate analysis (P=0.002) (Table 2).

Likewise, the absence of main pulmonary artery stenosis or atresia, was statistically associated with increased mortality (P=0.033) which might be due to increased mean pulmonary artery pressure (Table 2). In comparison, small pulmonary artery branch size was statistically associated with increased mortality (P=0.041) (Table 2).

Poisson regression models were used to determine adjusted association between study outcomes and the predictors which are indicated in Table 4.

Multivariate analysis indicated that increased pulmonary artery pressure had significant association with mortality (P<0.001 with coefficient of 2.6) and hemodynamic instability (P<0.001 with coefficient of 4.6).

According to the adjusted analysis, there was no association between unstable hemodynamics and ventricular morphology



## PEDIATRIC CARDIOLOGISTS

*PHOENIX: the Perfect Blend of Lifestyle and Work*

Known as “the Valley of the Sun,” Phoenix offers numerous cultural, recreational and sporting events along with a strong, vibrant economy. Live in a family-oriented community with excellent school districts and unlimited activities for children. Hike in nearby mountains or play in the surf along the California coast. Advance your career as part of our 17-member group, providing the full spectrum of congenital cardiac services in one of the fastest growing metropolitan cities in the nation.

Arizona Pediatric Cardiology Consultants is seeking three BE/BC Pediatric Cardiologists to join our rapidly expanding practice in Phoenix:

- Generalist: Provide outpatient services in one of our community-based offices; strong interpersonal and clinical skills required.
- Director of Echocardiography: Experience required in all aspects of echocardiography; must have leadership and research capabilities.
- Transplant/Heart Failure Specialist: Pilot a program with the transplant surgeons at Phoenix Children’s Hospital and the Mayo Clinic.

Our practice is recognized as the primary pediatric cardiology group at Phoenix Children’s Hospital. We provide all inpatient cardiology care, including transthoracic and transesophageal echocardiography, catheter interventions, electrophysiology/RFA and MRI procedures. Our group is truly unique, providing our practitioners with cutting-edge technology and academic affiliation in a private practice setting.

As one of our clinicians you will also enjoy:

- 401(k)
- Professional liability insurance
- Comprehensive health/life benefits
- Clinical research opportunities
- CME allowance
- Competitive salaries
- Relocation assistance
- Stock purchase plan

**For more information regarding this opportunity, please contact:**

Lori Abolafia  
800.243.3839, extension 5209  
Email: [lori\\_abolafia@pediatrix.com](mailto:lori_abolafia@pediatrix.com)  
Fax: 800.765.9859 [www.azkidsheart.com](http://www.azkidsheart.com)

Arizona Pediatric Cardiology Consultants  
is an affiliate of Pediatrix Cardiology Specialists



An Equal Opportunity Employer

Heart Valves • Cannulae • Oxygenators & Filters • RVOT Conduits • Ablation Technologies • Pacemakers • ICDs



*Committed to providing more options  
for the lifetime care of patients  
with congenital heart disease.*





Arizona Pediatric  
Cardiology Consultants



## PEDIATRIC CARDIOLOGIST Tucson, Arizona

Due to expansion we are seeking a third BC/BE Pediatric Cardiologist to join our Tucson practice. Our practice is part of a 17-member group with offices in the Phoenix and Tucson metropolitan areas. For the Tucson practice we are recruiting a generalist with experience in echocardiography, including trans-esophageal and fetal echo. And, it would be helpful but not essential if one is able to do simple diagnostic catheterizations. In the spring of 2009 we will be moving into a new state-of-art office located a half mile from the main hospital. In addition to our main office, we also see patients in several satellite offices. We cover two main private hospitals and one university hospital.

The Phoenix and Tucson practices are both engaged in clinical research and cover teaching rotations for residents and medical students. Receive a competitive income and outstanding benefits including health, life and disability insurances, paid malpractice insurance and CME allowance.

Tucson has more than 27,000 acres of parks, nearly 40 golf courses and, in addition to boating and fishing, is only 35 miles from snow skiing. With the feel of a small town, but all the amenities of a major city, Tucson is the number one resort destination in the Southwest.

Arizona Pediatric Cardiology Consultants is an affiliate of Obstetrix Medical Group, Inc.

For information, please contact  
Lori Abolafia, Physician Relations Specialist  
[lori\\_abolafia@pediatrix.com](mailto:lori_abolafia@pediatrix.com)

Pediatrix Medical Group  
1301 Concord Terrace  
Sunrise, FL 33323

800-243-3839 ext. 5209  
[www.obstetrix.com/apcc](http://www.obstetrix.com/apcc)

( $P=0.086$ ); however, a statistical relationship was present between death and ventricular morphology ( $P=0.049$  with coefficient of 0.67) (Table 4).

Other variables which are enrolled in this adjusted analysis including age, main pulmonary artery stenosis, atrioventricular regurgitation and previous history of palliation were not found to be associated with increased mortality or unstable hemodynamic (Table 4).

### Discussion

Early after Fontan operation is the crucial period of patients' hemodynamic adaptation with the newly established cardiovascular anatomy. This is demonstrated in our study by occurrence of the majority of mortality during the early post-operative period. Another report showed 22 death (9.8%) early after the Fontan operation.<sup>5</sup>

Although the mean age and weight of patients with unstable hemodynamics were lower, nevertheless, they were not statistically remarkable. This is also supported by another report.<sup>6</sup>

We could not find statistical association between preoperative  $O_2$  saturation or  $PO_2$  and unstable hemodynamic or death (Table 1). Therefore, severity of cyanosis before surgery may not be a risk predictor of the Fontan procedure.

Pump time was an important predictor of hemodynamic disturbances and death. Thus, increasing the pump time was positively related to these undesirable outcomes. Jacobs ML and colleagues<sup>3</sup> noted the definite adverse effect of pump and cross clamp time prolongation on pulmonary, cardiovascular, renal or central nervous systems complications. Therefore, avoidance of aortic cross-clamping and deep hypothermic circulatory arrest is considered important.<sup>3</sup> Adachi I and colleagues<sup>7</sup> believe that off-pump Fontan obviates adverse inflammatory reaction on pulmonary circulation.

Although there are some reports about postoperative effects of fenestration including pleural effusions and hospital stay<sup>6,8</sup>, we could not find this association.

Association of left ventricular morphology and increased mortality was indicated by means of multivariate analysis; nevertheless, other reports do not support our result.<sup>6,9</sup>

Suitable pulmonary resistance either by means of lower pressure or normal branch diameters and distribution is essential for improving postoperative outcome.<sup>2,8</sup> Although, mean pulmonary artery pressure was under 15 mm Hg in the majority of patients and less than 20 mm Hg in the remainder, nevertheless, our study indicated that even a little increase over 15 mm Hg might jeopardize the post-operative patients' status. Hosein RB.M 6 and colleague reported that increased mean pulmonary artery pressure ( $>15$  mm Hg) was definitely associated with abnormal hemodynamic status and death.<sup>6</sup>



7<sup>th</sup> International Workshop  
on Interventional  
Pediatric Cardiology



ISHAC 4<sup>th</sup> International Symposium  
on the Hybrid Approach to  
Congenital Heart Disease

Workshop IPC & ISHAC - March 22-25, 2009 - Milano Convention Center, Milan, Italy

[www.WorkshopIPC.com](http://www.WorkshopIPC.com)



# PICS-AICS 09

Pediatric and Adult Interventional Cardiac Symposium

JUNE 21-23, 2009  
**CAIRNS**  
**AUSTRALIA**

AT THE 5th WORLD CONGRESS OF PAEDIATRIC CARDIOLOGY AND CARDIAC SURGERY (WCCPCS)

[www.picsymposium.com](http://www.picsymposium.com)

## Course Directors:

*Dr. Ziyad M. Hijazi, Dr. William Hellenbrand, Dr. John P. Cheatham, Dr. Carlos Pedra, and Dr. Geoffrey K. Lane*

## Course Co-Director:

*Dr. Zahid Amin*

- **FOCUSING ON THE LATEST ADVANCES IN INTERVENTIONAL THERAPIES FOR CHILDREN AND ADULTS** with congenital and structural heart disease, including the latest technologies in devices, implantable valves, stents and balloons. Special sessions will provide an in-depth focus on septal defect closure, coarctation stenting, embolization therapies, emerging new imaging modalities for cardiac intervention, and hybrid intervention for HLHS.
- **BREAKOUT SESSIONS** for all professionals who work in Pediatric and Adult Cardiology, the catheterization lab and operating room.
- **HOT DEBATES** between cardiologists and surgeons on controversial issues on intervention for congenital and structural heart disease.
- The popular session "**MY NIGHTMARE CASE N THE CATH LAB.**"
- **LIVE CASE DEMONSTRATIONS** from multiple international venues featuring approved and non-approved devices will be transmitted daily from many cardiac centers around the world. During these live cases, attendees will have the opportunity to interact directly with the operators to discuss the management options for these cases.
- **ACCREDITATION** - CME accreditation will be available. Please see the PICS website for detailed information.
- **ABSTRACTS** - Interventional abstracts will be presented at the World Congress meeting June 22-26, 2009.

## REGISTRATION INFORMATION

This year's PICS-AICS meeting will take place June 21-23, 2009 in Cairns, Australia. PICS-AICS is a sub specialty meeting of the World Congress meeting. For more information go online to: [www.picsymposium.com](http://www.picsymposium.com)



[www.picsymposium.com](http://www.picsymposium.com)



Higher mortality in patients with previous pulmonary artery banding might be due to higher mean pulmonary artery pressure before the operation.

Some types of Fontan procedure were associated with increased adverse outcomes, especially when an adjusted multi-variable analysis was made. Thus, higher frequency of mortality and hemodynamic instability were found in patients with atriopulmonary connection followed by lateral tunnel procedure. Its adverse outcomes were essentially due to right atrial dilation and turbulent circulation instead of straight flow in this chamber which would follow by ineffective atrial inflow and output, higher incidence of arrhythmias and also cloth formation.<sup>11</sup> In our study hemodynamic disturbances and mortality were more frequent in those patients with lateral tunnel procedure in comparison to extra-cardiac conduit; however, it was not statistically significant. Nevertheless, this difference may in part be due to more prolonged pump time in the lateral tunnel operation.

According to some reports, the extra-cardiac conduit coupled with minimal use of extracorporeal circulation is associated with favorable intraoperative hemodynamics, low fenestration rate, minimal risk of thrombosis or stenosis, and minimal early and late rhythm disturbance.<sup>12-14</sup>

In conclusion, shorter pump time and aortic cross-clamp time diminish early post-operative complications and mortality. Extra-cardiac conduit Fontans are more effective and safer due to shorter pump and/or cross-clamp times. Lower pulmonary vascular resistance and larger pulmonary arterial diameter support better post-operative hemodynamics. Because the early post-operative period is crucial for adaptations to new hemodynamics, even small disturbances may increase risk.

#### References

- Giardini A, Hager A, Napoleone CP and Picchio FM. Natural History of Exercise Capacity After the Fontan Operatrn. *Ann Thorac Surg* 2008; 85: 818-82.
- Yun TJ, Im YM, Jung SH et al. Pulmonary vascular compliance and pleural effusion duration after the Fontan procedure. *Int J Cardiol*, 2008, ahead of print.
- Jacobs ML, Pelletier GJ, Pourmoghadam KK et al. Protocols associated with no mortality in 100 consecutive Fontan procedures. Drexel University College of Medicine, USA, 2008.
- Proceleska M, Kolcz J, Januszewska K, Mroczek T and Malec E. Coagulation abnormalities and liver function after hemi-Fontan and Fontan procedures, the importance of hemodynamics in the early postoperative period. *Eur J Cardiothorac Surg* 2007; 31: 866-872.
- Earing MG, Cetta F, Driscoll DJ et al. Long-Term Results of the Fontan Operation for Double-Inlet Left Ventricle. *Am J Cardiol* 2005; 96: 291-298.
- Hosein RB.M, Clarke AJ.B, McGuirk SP. et al. Factors influencing early and late outcome following the Fontan procedure in the current era. *Eur J Cardiothorac Surg* 2007; 31: 344-353.
- Adachi I, Yagihara T, Kagisaki K et al. Preoperative small pulmonary artery did not affect the midterm results of Fontan operation . Department of Cardio-Thoracic Surgery, Royal Brompton Hospital, London, UK 2007.
- Fiore AC, Turrentine M, Rodefeld M et al. Fontan Operation: A Comparison of Lateral Tunnel with Extracardiac Conduit. *Ann Thorac Surg* 2007; 83: 622-630.
- Wisler J, Khoury PR and Kimball TR. The Effect of Left Ventricular Size on Right Ventricular Hemodynamics in Pediatric Survivors with Hypoplastic Left Heart Syndrome. Cincinnati Children's Hospital Medical Center 2007.
- Scheurer MA, Hill EG, Vasuki N et al. Survival after bidirectional cavopulmonary anastomosis. *J Thorac Cardiovasc Surg* 2007; 134: 82-89.
- Alphonso N, Baghai M, Sundar P, Tulloh R, Austin C and Anderson D. Intermediate-term outcome following the fontan operation. *Eur J Cardiothorac Surg* 2005; 28: 529-535.
- Petrossian Ed, Reddy M, Collins KK et al. The extracardiac conduit Fontan operation using minimal approach extracorporeal circulation. *J Thorac Cardiovasc Surg* 2006; 132: 1054-1063.
- Giannico S, Hammad F, Amodeo A, Michielon G et al. Clinical Outcome of 193 Extracardiac Fontan Patients. *J Am Coll Cardiol* 2006; 47: 2065-2073.
- Chowdhury UK, Airan B, Kothari SS et al. Specific Issues After Extracardiac Fontan Operation. *Ann Thorac Surg* 2005; 80: 665-672.

CCT

#### Corresponding Author

*Mohsen Shahidi, MD*  
 Department of Pediatric Cardiology  
 Rajaie Heart Center, Medical Science  
 University of Iran  
 Valiasr Ave., Next to Mellat Park  
 Tehran, Iran

Tel: +21 22435653  
 Fax: +21 22435653

E-mail: mohsenshahidi@yahoo.com

*Mohammad Yousef Arabbi*  
 Moghaddam, MD  
 Department of Pediatric Cardiology  
 Rajaie Heart Center  
 Tehran, Iran

*Nader Givtaj*  
 Department of Heart Surgery  
 Research department  
 Rajaie Heart Center  
 Tehran, Iran

*Hooman Bakhshandeh, MD*  
 Research Department3  
 Rajaie Heart Center  
 Tehran, Iran



**WELCOME**  
 to Las Vegas  
**LAS VEGAS**  
 NEVADA

**SCAI 32nd Annual Scientific Sessions**  
 May 6-9, 2009 • Caesars Palace, Las Vegas

Featuring Live Cases, Tracks in Pediatric and Structural Heart Disease and Much More!

**REGISTER NOW** at [www.scai.org](http://www.scai.org)

SCAI  
 The Society for Cardiovascular  
 Angiography and Interventions

# Welcome To Holland

This brief essay by Emily Perl Kingsley, was sent to us by the parent of child with Down Syndrome. We would like to share it with our readers, because it poignantly expresses feelings of many parents who have children with chronic cardiac and neonatal health problems.

"Welcome to Holland"© 1987 by Emily Perl Kingsley. All rights reserved. Reprinted with permission of the author.

I am often asked to describe the experience of raising a child with a disability - to try to help people who have not shared that unique experience to understand it, to imagine how it would feel. It's like this.....

When you're going to have a baby, it's like planning a fabulous vacation trip - to Italy. You buy a bunch of guide books and make your wonderful plans. The Coliseum. The Michelangelo. David. The gondolas in Venice. You may learn some handy phrases in Italian. It's all very exciting.

After months of eager anticipation, the day finally arrives. You pack your bags and off you go. Several hours later, the plane lands. The stewardess comes in and says, "Welcome to Holland."

"Holland?!?" you say. "What do you mean Holland?? I signed up for Italy! I'm supposed to be in Italy. All my life I've dreamed of going to Italy."

But there's been a change in the flight plan. They've landed in Holland and there you must stay.

The important thing is that they haven't taken you to a horrible, disgusting, filthy place, full of pestilence, famine and disease. It's just a different place.

So you must go out and buy new guide books. And you must learn a whole new language. And you will meet a whole new

group of people you would never have met.

It's just a different place. It's slower-paced than Italy, less flashy than Italy. But after you've been there for a while and you catch your breath, you look around.... and you begin to notice that Holland has windmills....and Holland has tulips. Holland even has Rembrandts.

But everyone you know is busy coming and going from Italy... and they're all bragging about what a wonderful time they had there. And for the rest of your life, you will say "Yes, that's where I was supposed to go. That's what I had planned."

---

***"I am often asked to describe the experience of raising a child with a disability - to try to help people who have not shared that unique experience to understand it, to imagine how it would feel. It's like this....."***

---

And the pain of that will never, ever, ever go away... because the loss of that dream is a very, very significant loss.

But... if you spend your life mourning the fact that you didn't get to Italy, you may never be free to enjoy the very special, the very lovely things ... about Holland.

CCT

Emily Perl Kingsley

E-mail: [EPK@neonate.biz](mailto:EPK@neonate.biz)



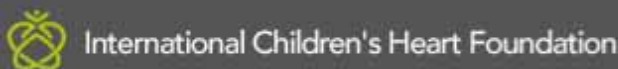
## Assistant-Full Professor, Clinical

The Department of Pediatrics at Louisiana State University Health Sciences Center in conjunction with Children's Hospital, New Orleans, LA, is seeking two (2) BE/BC pediatric cardiologists, with a special interest in electrophysiology and transplant cardiology, to join the 5 faculty members of a busy academic clinical and surgical heart program. This will be an open rank position, (Assistant - Full Professor, Clinical), with rank determined by the candidates' credentials and experience. Currently, over 300 cardiac catheterizations and 400 cardiothoracic surgeries are performed in infants, children and young adults each year. Opportunities are available for both clinical and basic research.

Interested applicants should submit c.v. and 3 letters of recommendation to:

**Robert J. Ascutto, Ph.D., M.D.**  
**Professor, Department of Pediatrics**  
**LSU Health Sciences Center,**  
**New Orleans**  
**Children's Hospital**  
**200 Henry Clay Ave.**  
**New Orleans LA 70118**  
**Tel.: (504) 896-9751**  
**FAX: (504) 896-3952**  
**E-Mail: [nrossa@lsuhsc.edu](mailto:nrossa@lsuhsc.edu)**

LSUHSC is an EEO/AA Employer.



### VOLUNTEER YOUR TIME!

We bring the skills, technology and knowledge to build sustainable cardiac programmes in developing countries, serving children regardless of country of origin, race, religion or gender.

[www.babyheart.org](http://www.babyheart.org)

The American College of Cardiology Presents

# CCS.09

Congenital  
Cardiology  
Solutions



March 29 – 31  
ORLANDO

Stay on the leading edge with the latest information on congenital heart disease. At the American College of Cardiology's Annual Scientific Session (ACC.09), the focused Congenital Cardiology Solutions track offers exciting opportunities to learn about updates in management and treatment of congenital heart patients, including new surgical and interventional techniques for treating adult, pediatric — and even fetal — patients.

CCS.09 Programming Features Hot Topics such as:

- CCS.09 Spotlight featuring a full day of groundbreaking live cases and discussion with the experts
- Factors impacting neurodevelopmental outcomes after cardiac surgery
- Advances in the care of the fetus with congenital heart disease
- Fontan late outcome and management of the failing circulation
- Complex transposition of the great arteries
- How to safely manage the physiological stresses of pregnancy
- Best practices for assisting patients and families through critical clinical transitions

Developed by and for pediatric and congenital heart disease cardiologists, nurses and surgeons, CCS.09 will address your concerns related to quality, collaboration and long-term patient care issues.

Register for a Full-Access pass and you can learn the latest in interventional and surgical procedures at i2 Summit, including special sessions dedicated to the latest catheter treatments for congenital heart disease.



[acc09.acc.org](http://acc09.acc.org)

Click on *Education* and *Congenital Cardiology Solutions* for more information.

## Medical News, Products & Information

### First Trial of Gene Therapy for Advanced Heart Failure Shows Promising Results

**Newswise** — Phase I results of the first clinical trial of gene therapy for patients with advanced heart failure show the approach to be promising, with improvements in several measures of the condition's severity.

In Phase I clinical trials, researchers test a new treatment in a small group of people for the first time to evaluate its safety, determine a safe dosage range, and identify side effects.

Patients enrolled in the multicenter CUPID trial (Calcium Up-Regulation by Percutaneous Administration of Gene Therapy in Cardiac Disease) undergo a minimally invasive cardiac catheterization procedure which introduces a specially engineered gene that stimulates production of an enzyme necessary for the heart to pump more efficiently.

NewYork-Presbyterian Hospital/Columbia University Medical Center was the first to offer the therapy in the New York City area. The Hospital is now recruiting patients for the Phase II CUPID trial to further assess safety and effectiveness in patients with advanced heart failure.

Data from the Phase I trial, which was initiated in May of 2007, were presented at the *American Heart Association (AHA) Scientific Sessions 2008* in New Orleans. Seven of nine patients who were given the drug showed improvements over six months in several areas: symptomatic (five patients), functional (four patients), biomarker (two patients) and left ventricular function/remodeling (six patients). Two patients with pre-existing antibodies to the viral vector delivery system did not show improvements. Importantly, the approach was shown to have an acceptable safety profile, as determined by an independent safety committee and by the study investigators.

"We are encouraged by these initial findings, which indicate that this therapy has the potential to help patients with

advanced heart failure," says Dr. Donna Mancini, the study's principal investigator at NewYork-Presbyterian Hospital/Columbia University Medical Center, where she is Medical Director of Cardiac Transplantation, and is a Professor of Medicine at Columbia University College of Physicians and Surgeons.

The Phase II randomized, double-blind, placebo-controlled clinical trial will compare the therapy at two- or three-dose levels with placebo. CUPID is expected to enroll 46 patients with advanced heart failure at 13 U.S. hospitals.

Gene therapy is a technique for correcting defective genes responsible for disease development by inserting genes into a patient's cells and tissues. In most gene therapy studies, a "normal" gene is inserted into the genome to replace an "abnormal" disease-causing gene. A carrier molecule called a vector must be used to deliver the therapeutic gene to the patient's target cells. Currently, one of the most common vectors is a non-pathogenic virus most people have been exposed to in adolescence that has been genetically altered to carry normal human DNA.

More than five million people in the U.S. have heart failure. Patients with a severe form of the disease have trouble breathing because the heart muscle is not strong enough to pump fluid out of their lungs. Approximately 70% die of the disease within 10 years, and the five-year survival rate is less than 50%. Heart failure is the only cardiovascular disease whose incidence has been increasing rather than decreasing in recent years.

The multicenter national trial is funded and administered by the Celladon Corporation of La Jolla, Calif. ([www.celladon.net](http://www.celladon.net)). The company has reported that the therapy, called MYDICAR<sup>®</sup>, has been shown to lead to significant improvements in heart function without significant safety concerns in numerous large-animal models of heart failure.

For more information, visit [www.nyp.org](http://www.nyp.org) or [www.cumc.columbia.edu](http://www.cumc.columbia.edu)

© 2009 by Congenital Cardiology Today (ISSN 1554-7787-print; ISSN 1554-0499-online). Published monthly. All rights reserved.

#### Headquarters

9008 Copenhaver Dr. Ste. M  
Potomac, MD 20854 USA

#### Publishing Management

*Tony Carlson, Founder & Editor*  
TCarlsonmd@mac.com

*Richard Koulibanis, Publisher & Editor-in-Chief*  
RichardK@CCT.bz

*John W. Moore, MD, MPH, Medical Editor/*  
*Editorial Board*  
JMoore@RCHSD.org

#### Editorial Board

Teiji Akagi, MD  
Zohair Al Halees, MD  
Mazeni Alwi, MD  
Felix Berger, MD  
Fadi Bitar, MD  
Jacek Bialkowski, MD  
Philipp Bonhoeffer, MD  
Mario Carminati, MD  
Anthony C. Chang, MD, MBA  
John P. Cheatham, MD  
Bharat Dalvi, MD, MBBS, DM  
Horacio Faella, MD  
Yun-Ching Fu, MD  
Felipe Heusser, MD  
Ziyad M. Hijazi, MD, MPH  
Ralf Holzer, MD  
Marshall Jacobs, MD  
R. Krishna Kumar, MD, DM, MBBS  
Gerald Ross Marx, MD  
Tarek S. Momenah, MBBS, DCH  
Toshio Nakanishi, MD, PhD  
Carlos A. C. Pedra, MD  
Daniel Penny, MD  
James C. Perry, MD  
P. Syamasundar Rao, MD  
Shakeel A. Qureshi, MD  
Andrew Redington, MD  
Carlos E. Ruiz, MD, PhD  
Girish S. Shirali, MD  
Horst Sievert, MD  
Hideshi Tomita, MD  
Gil Wernovsky, MD  
Zhuoming Xu, MD, PhD  
William C. L. Yip, MD  
Carlos Zabal, MD

#### FREE Subscription

Congenital Cardiology Today is available free to qualified professionals worldwide in pediatric and congenital cardiology. International editions available in electronic PDF file only; North American edition available in print. Send an email to Subs@CCT.bz. Include your name, title, organization, address, phone and email.

#### Contacts and Other Information

For detailed information on author submission, sponsorships, editorial, production and sales contact, current and back issues, see website or send an email to: INFO@CCT.bz.

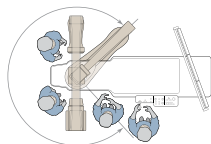
**Do you or your colleagues have interesting research results, observations, human interest stories, reports of meetings, etc. that you would like to share with the congenital cardiology community?**

Submit a brief summary of your proposed article to Congenital Cardiology Today at  
[RichardK@CCT.bz](mailto:RichardK@CCT.bz)



## The smallest lives often need the greatest access.

*(Our Infinix™-i cath lab provides room to operate on the smallest anatomy.)*



The slender c-arms of our Infinix-i cath lab positioners were built with design input from leading pediatric clinicians, not just engineers in faraway laboratories. Those arms are intricate mechanisms that articulate into optimal positions, yet are simple enough to be driven with one hand. They can be maneuvered in the perfect place, out of the way but right where your team needs them for the best possible access to the patient. Discover how Infinix-i can provide the room you need to operate. Get more details at [www.medical.toshiba.com](http://www.medical.toshiba.com).

