CONGENITAL CARDIOLOGY TODAY

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

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Anomalous Origin of the Right Coronary Artery from the Pulmonary Artery: a Report of Two Pediatric Cases

By Joseph Tseng, BA; Timothy Law, BS; and Randy Richardson, MD

Introduction

The incidence of congenital anomalies of the coronary arteries has been reported to be 1% of the general population.[1] Anomalies can vary in presentation based on the origin, course, and termination of the vessels involved. Four possible types of anomalies of the coronary artery originating from the pulmonary artery are: anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA), anomalous origin of the right coronary artery from the pulmonary artery (ARCAPA), both coronary arteries anomalously originating from the pulmonary artery, and an accessory coronary artery from the pulmonary artery.[2] Of these variations, ALCAPA is the most common anomaly, with an incidence of 0.25-0.5%, compared to a rate of 0.002% for ARCAPA.[3-5] ARCAPA is typically diagnosed and visualized by Doppler imaging, with echocardiographic findings of intercoronary collaterals within the ventricular septum.[6,7] In cases where further confirmation of the diagnosis is necessitated, cardiac CTA with three-dimensional cardiac CT reconstruction has been an effective and important diagnostic tool.[8] We report two cases of ARCAPA initially, diagnosed with echocardiographic imaging with confirmation after three-dimensional CT visualization.

"ARCAPA is typically diagnosed and visualized by Doppler imaging, with echocardiographic findings of intercoronary collaterals within the ventricular septum.[6,7] In cases where further confirmation of the diagnosis is necessitated, cardiac CTA with three-dimensional cardiac CT reconstruction has been an effective and important diagnostic tool.[8]"

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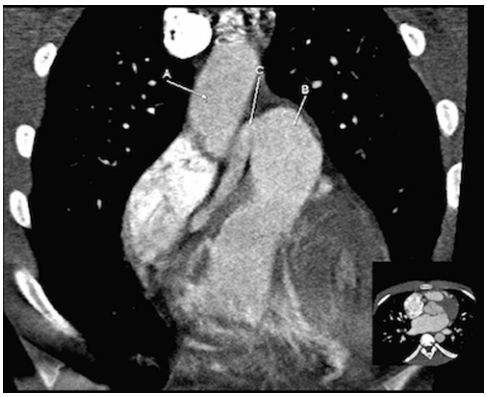
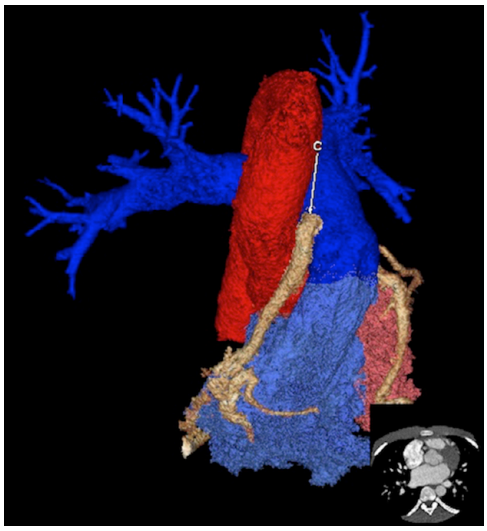


(a)



(b)

Figure 1: (a) CT revealing ARCAPA. (b) Three-dimensional cardiac CT reconstruction. Both images illustrate an anomalous right coronary artery originating from the main pulmonary artery and suggest collateralization between the anomalous right coronary artery with the LAD. A: aorta; B: pulmonary artery; C: anomalous right coronary artery originating from pulmonary artery.

Case Report 1

A previously healthy 17-year-old African American male was referred for a cardiologic workup after his primary pediatrician described an incidental murmur during a routine physical examination. He had no prior cardiovascular history and also did not have any significant past medical history except for mild asthma. He played basketball on a regular basis and tolerated it well, though he did describe minimal symptoms like occasional shortness of breath and fatigue with more strenuous exercise. No other cardiovascular risk factors were identified.

On physical examination, his vital signs were normal and he was not in acute distress. Cardiovascular exam revealed a regular rate and rhythm, with normal S1 and S2, and no signs of congestive heart failure. There was a 2/6 crescendo decrescendo systolic murmur in the left sternal border. There were no rubs or gallops. Respiratory exam was normal.

Echocardiogram revealed an anomalous origin of the right coronary artery from the proximal main pulmonary artery (PA). The left coronary artery had a normal origin and some distal branching. There was also some severe diffuse dilatation of the right coronary artery with continuous retrograde flow into the main PA. Numerous coronary collateral connections were also observed, with no evidence of a coronary fistula. There was borderline left ventricular dilatation with normal systolic function of ejection fraction of 60 to 65%. Very mild pulmonary and aortic valve regurgitation was also noted.

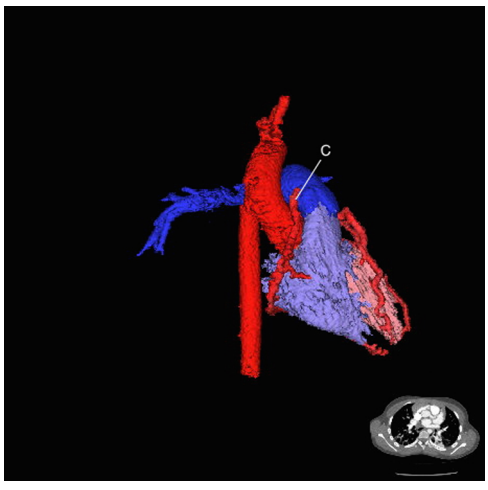
To confirm the anatomy, a CT angiogram was performed, which revealed an anomalous right coronary artery from the main PA (Figures 1(a) and (b)). The patient was then diagnosed with ARCAPA and was recommended for surgical correction through a right coronary reimplantation. A button transfer of the right coronary artery from the main PA to the most anterior sinus of Valsalva was successfully performed and the patient did well postoperatively.

Case Report 2

A previously healthy 5-yo female was referred for cardiology consult by her primary pediatrician after experiencing a near-syncopal episode while playing with her sibling. The patient appeared pale, mottled, and had cyanotic lips. There was no previous medical history of syncopal episodes and no prior cardiovascular history. She was an active participant in cheerleading and denied signs of exercise intolerance. On review of systems, she reported no complaints of headache, shoulder, chest, or abdominal pain. Perinatal history was found to be negative for complications and family history was found to be negative for sudden death and perinatal complications. On physical exam, the patient's vital signs were normal and was in no acute distress. Cardiovascular exam revealed regular rate and rhythm with normal S1. A very faint grade 1/6 soft systolic murmur was appreciated at the left mid-sternal border. There were no clicks, rubs, or gallops. Neurologic and respiratory exams were normal.

Echocardiogram was performed and demonstrated reverse flow in the right coronary artery into the pulmonary artery, which suggested an anomalous right coronary artery from the main pulmonary artery. A CT angiogram was subsequently performed which confirmed ARCAPA (Figures 2 (a) and (b)). There was a noticeable right coronary artery fistula with the right ventricle. An enlarged, tortuous left coronary artery and tortuous left anterior-descending artery were appreciated which suggested a fistulous communication between the right and left coronary systems with possible steal phenomenon. Some mild narrowing of the right upper lobe bronchus was noted.

A surgical reimplantation of the right coronary artery into the aorta was performed successfully without complications. A fistula between the right coronary artery and right ventricular outflow



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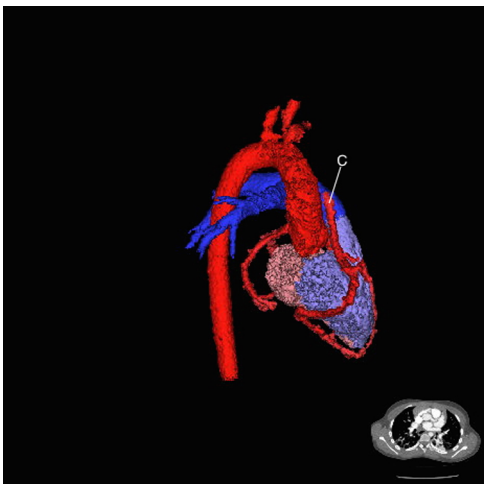

(b)

Figure 2. Three-dimensional cardiac CT reconstruction (a) Right lateral view. (b) Right posterolateral view, illustrating the extensive collateralization between the anomalous RCA and the LAD. C: anomalous right coronary artery originating from pulmonary artery.

tract was dissected and repaired. Transesophageal electrocardiogram performed post-operatively revealed good flow into the right coronary artery. The patient did well postoperatively.

Discussion

First described in 1885 by Brooks, ARCAPA has since only been described in the literature just over one hundred times.[8] Despite its rarity, ARCAPA can be a serious condition, as patients may present with angina, myocardial infarction, arrhythmias, congestive heart failure, and sudden death. It can be also be associated with other congenital defects such as Tetralogy of Fallot or aorticopulmonary window.

Generally, however, patients with ARCAPA are asymptomatic until they present in adulthood due to complaints of angina and shortness of breath.[4] We describe the cases of two pediatric patients diagnosed and managed at our institution by various imaging modalities.

The pathophysiologic effects of ARCAPA are due to the direction of blood flow in the coronary artery and the resultant impact on oxygen delivery to the myocardium. This condition is relatively benign in the fetus, as high pulmonary vascular resistance causes blood to flow from the PA into the anomalous coronary artery. As the pulmonary vascular resistance falls after birth, collaterals develop and flow in the anomalous coronary artery reverses, creating a coronary steal phenomenon. Collateralization typically occurs between the LAD and the anomalous RCA, and the degree of this process largely determines outcome.[9] Our cases highlight the varying presentations of ARCAPA, with the older pediatric patient (Case 1) presenting with an incidental murmur, and the younger pediatric patient (Case 2) presenting with a near-syncopal episode.

Initial imaging investigation of ARCAPA often relies on echocardiography, which demonstrates abnormal flow within the coronary arteries. In the literature, typical echocardiographic findings include intercoronary collaterals within the ventricular septum, dilated coronary arteries, and anomalous origin of the RCA with retrograde flow from the RCA into the MPA.[10] Although echocardiography provides great utility in the initial investigation of ARCAPA, two-dimensional imaging may not always provide complete clarity,[4] and CT is typically done to confirm the diagnosis as well. In both of our cases, a 3D-CT angiogram was the confirmatory imaging modality of choice.

Management of ARCAPA involves surgical reimplantation of the anomalous RCA onto the aorta. This procedure is done by transection of the RCA, ligation of the stump at its origin on the PA, and anastomosis of the proximal RCA on to the aorta. Reports on follow-ups after surgical repair of ARCAPA are rare, with one series describing a patient who developed a clot in the RCA four years after reimplantation. It is thought that this occurred due to dilatation of the coronary vessel before repair, and the authors recommend annual echocardiographic screening until the coronary artery returns to normal size.[4]

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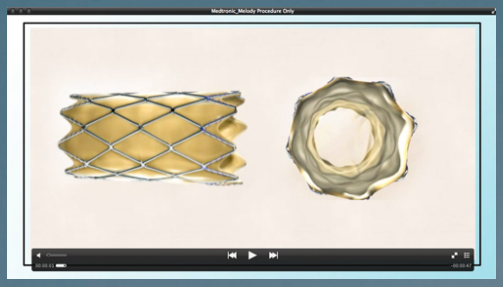

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Brief Introduction of Corresponding Author

Joseph Tseng is currently a third year medical student at Creighton University School of Medicine, Phoenix Regional Campus. He is from Southern California and completed his Bachelor of Arts in molecular biology at Pomona College.

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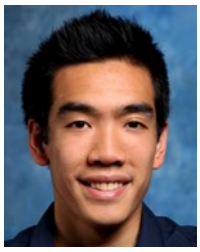

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Letters to the Editor

Congenital Cardiology Today welcomes and encourages Letters to the Editor. If you have comments or topics you would like to address, please send an email to: LTE@CCT.bz, and let us know if you would like your comment published or not.

MARCH MEDICAL MEETING FOCUS

10th IPC Workshop
March 19-21, 2015; Milan, Italy
www.WorkshopIPC.com

Overview: IPC will give attendees an update on the most important and innovative interventional procedures for the treatment of congenital and structural heart disease from fetus to adulthood. There will also be a pre-course on Mar. 18th at the San Donato Hospital.

International Faculty will Present a Scientific Program:
- Lectures
- Lunch symposia
- Interactive sessions
- Satellite transmissions of live cases
- Technical exhibition and a poster session

AEPC (The Association for European Paediatric and Congenital Cardiology) will organize lunch sessions specifically dedicated to young investigators.

Meeting Topics Include:
- Catheter interventions in fetus and neonate
- Stenosis/Hypoplasia of pulmonary arteries and veins
- Atrial septal defect
- Engineering
- Nightmares in the cath lab
- PFO
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- Pulmonary valve replacement
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For More Information or to Resister:
http://www.workshopipc.com

Deadline for registration: March 10, 2015

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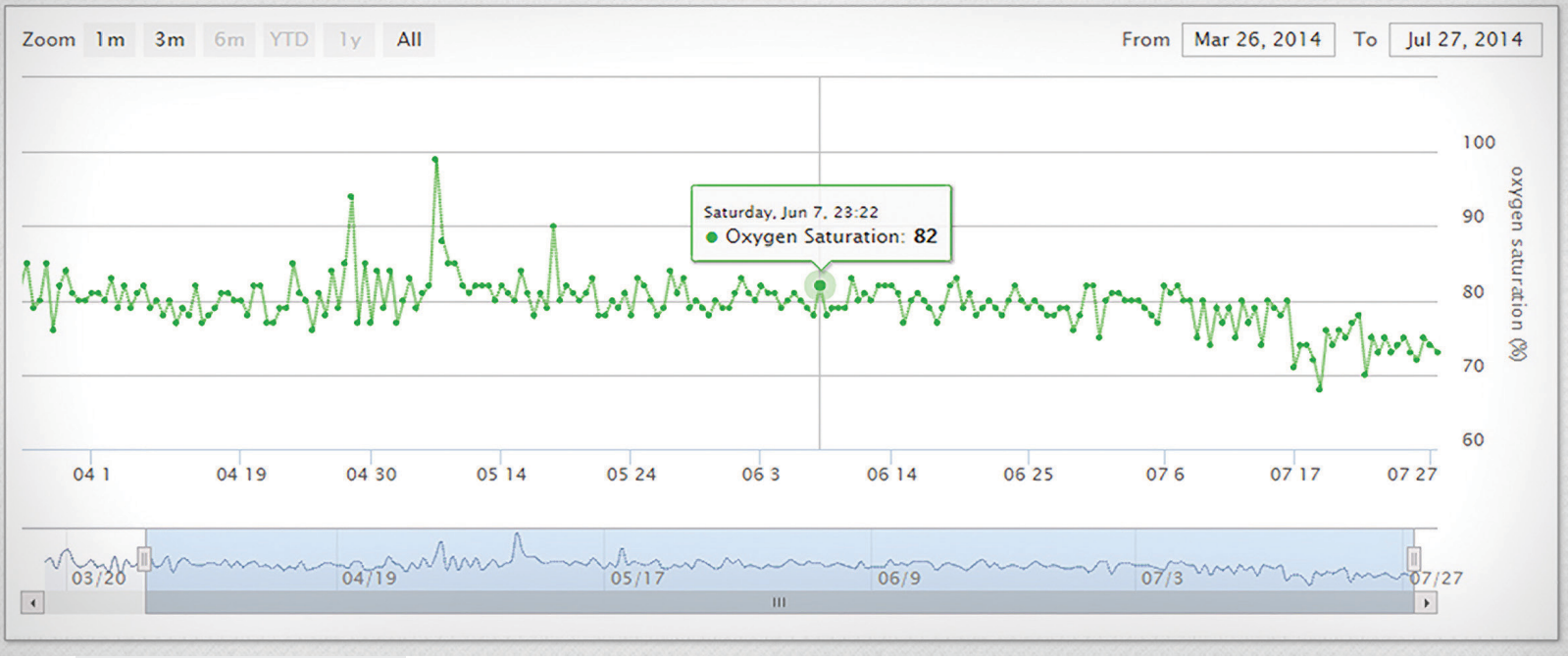

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CHILDREN'S MERCY KANSAS CITY

The Fourth Annual Fetal Echocardiography Symposium at UCLA Meeting Review

By Mark Sklansky, MD

The Fourth Annual Fetal Echocardiography Symposium at UCLA was held on October 18, 2014, in the Tamkin Auditorium of the Ronald Reagan UCLA Medical Center in Los Angeles, California. With over 200 people in attendance, this year's symposium was a phenomenal success, the best yet of this series of annual day-long symposia on fetal echocardiography.

The only such course offered on the West Coast of the United States, the UCLA *Fetal Echocardiography Symposium* has become a widely-trusted and respected annual update and review for everyone involved with scanning the fetal heart -- sonographers, obstetricians, maternal-fetal medicine specialists, pediatric cardiologists and respective trainees. Again directed by Dr. Mark Sklansky, co-directed by Dr. Greggory DeVore, and presented in conjunction with Dr. Gary Satou, this year's symposium invited back nationally-acclaimed sonographer Tracy Anton, and also included state-of-the-art presentations by Dr. Lami Yao (Associate Professor of Obstetrics/Gynecology at Wayne State University School of Medicine, Detroit), and Dr. Miwa Geiger (Director of Fetal Cardiology at Mount Sinai Hospital, New York), both nationally renowned experts and speakers.

As in prior years, the symposium provided an intensive series of clinically-oriented

presentations replete with tips and pearls for imaging the fetal heart. Following several presentations on normal anatomy and basics of how to optimize the image, focused talks on evaluation of specific cardiac lesions of the four-chamber view, outflow tracts and three-vessel view were presented, as well as advanced talks on quantitative cardiac evaluation, first trimester imaging, and cardiomyopathy. In addition, live-scanning sessions by Drs. DeVore and Sklansky demonstrated many of the concepts discussed during the day, as well as real-time 3D/4D scanning using a state-of-the-art matrix probe. Just before lunch, a special session with testimonials by families with children with Congenital Heart Disease emphasized the importance of prenatal detection.

In addition to an exceptional series of didactic presentations and live-scanning sessions, the symposium offered a full array of exhibitors showcasing the latest in ultrasound technology, including state-of-the-art ultrasound systems from GE, Philips, Samsung and Mindray-Zonare. The symposium also offered an outstanding opportunity to fellows and other trainees to network and meet with prospective employers, as well as an opportunity for everyone to catch up with colleagues and meet new friends. Dates for next year's symposium will be announced in the near future; please contact Dr. Mark Sklansky (msklansky@mednet.ucla.edu) for further information.

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Medical News, Products & Information

Complied and Reviewed by Tony Carlson, Senior Editor

For Cardiac Arrest, Epinephrine May Do More Harm than Good: Study Questions Current International Guidelines for Resuscitation

For patients in cardiac arrest, administering epinephrine helps to restart the heart but may increase the overall likelihood of death or debilitating brain damage, according to a study published December 1st, 2014 in the *Journal of the American College of Cardiology.*

The study offers new data in an ongoing debate over the risks and benefits of using epinephrine to treat cardiac arrest, an often-fatal condition in which the heart stops beating. Epinephrine, also known as adrenaline, is a hormone that stimulates the heart and promotes the flow of blood. Current international guidelines recommend administering 1 milligram of epinephrine every 3-5 minutes during resuscitation.

"The role of epinephrine is more and more questionable in cardiac arrest," said the study's lead author Florence Dumas, MD, PhD, of the Parisian Cardiovascular Research Center in France. "We need to constantly assess our procedures and protocols to make sure that the use of epinephrine is effective and done at the correct time."

She added that this study underscores the need for caution when using epinephrine. Administering epinephrine to patients in cardiac arrest has been shown to improve the chance of restarting the heart, known as return of spontaneous circulation or ROSC. But the new study adds to mounting evidence suggesting the drug harms patients' chances of surviving past the post-resuscitation period with brain function intact.

Dumas and colleagues analyzed hospital records for more than 1,500 people admitted to a large Parisian hospital over a 12-year period. Patients included in the analysis had suffered out-of-hospital cardiac arrest, been resuscitated and achieved ROSC. Nearly three-quarters of the patients had received at least one dose of epinephrine.

The primary outcome measured was discharge from the hospital with normal or only moderately compromised brain functioning. Sixty-three percent of patients who did not receive epinephrine achieved this outcome, compared to only 19% of those who received epinephrine.

Patients receiving higher doses of epinephrine fared worse than those with lower doses. As compared to patients who received no epinephrine, those receiving 1-milligram doses were 52% more likely to have a bad outcome and those receiving 5-milligram or larger doses were 77% more likely to have a bad outcome.

Timing also appears to be an important factor. Patients receiving epinephrine in the later stages of resuscitation were more likely to die than those who got their first epinephrine dose shortly after collapsing. The adverse effects of epinephrine appeared to be unaffected by the use of post-resuscitation medical treatments, such as techniques to cool the body to reduce tissue damage or interventions to restore the flow of blood through blocked arteries.

The patients who had not received epinephrine typically had other characteristics that improved their outlook. For example, patients in this group were generally younger and more likely to have been near a witness when they collapsed. However, the research team employed a variety of robust statistical methods to account for these differences.

Dumas said the results do not necessarily indicate an immediate need to change the guidelines, however. "It's very difficult, because epinephrine at a low dose seems to have a good impact in the first few minutes, but appears more harmful if used later," said Dumas. "It would be dangerous to completely incriminate this drug, because it may well be helpful for certain patients under certain circumstances. This is one more study that points strongly to the need to study epinephrine further in animals and in randomized trials."

In addition to further research on epinephrine, Dumas said the study reinforces the need to continue investigating other drugs and drug combinations that might offer safer alternatives to epinephrine during cardiac arrest.

Each year, more than 420,000 cardiac arrests occur in the United States. Its immediate cause is typically an abnormality in the heart's rhythm, which can result from numerous risk factors including: Coronary Artery Disease, heart attack, an enlarged heart or other heart conditions. Cardiopulmonary resuscitation and defibrillation are the primary treatments.

For more information, visit cardiosource.org/ACC.

Speedy Heart Transplant for Kids Better than Waiting for Perfect Match

Children who receive a heart transplant as soon as a suitable donor is available are predicted to have better quality-adjusted survival -- even if they have antibodies that may attack the new heart -- than children who wait for a donor to which they do not have antibodies according to research presented at the American Heart Association's Scientific Sessions 2014.

When the costs of care while waiting for an urgent transplant are considered, transplantation with the first suitable heart is also cheaper than waiting for a better-matched organ, researchers said.

In the same way that a vaccine activates the body's immune response to fight off a virus, a donated organ can trigger antibodies to fight off foreign tissue. Because of the risk of severe rejection after transplantation, experts traditionally believed that children with these antibodies should wait for a heart that won't activate an antibody response.

But patients with the antibodies in their blood are at high risk of dying while waiting for a perfect match, said Brian Feingold, MD, MS, study lead author and Medical Director of Pediatric Heart and

Heart-Lung Transplantation at Children's Hospital of Pittsburgh of UPMC and Associate Professor of the University of Pittsburgh School of Medicine in Pennsylvania.

He noted that as many as 20% of children waiting for a heart transplant may have antibodies.

Researchers examined data of more than 2,700 children listed for transplant since 1999. Patients' average age was 5 years and 45 percent were female. More than half were Caucasian, 23% were African American and 15% were Hispanic. About half of the children were born with heart disease and all urgently needed a heart transplant.

Researchers compared 10-year survival after being listed for transplant using two opposing strategies: waiting for a donor heart to which the candidate does not have antibodies or taking the first suitable offer, regardless of potential problems that antibodies may pose. The study found that accepting the first suitable offer, regardless of antibody concerns, is predicted to:

- increase survival from the time of listing by more than 1 year (adjusted for quality of life) as compared to waiting for transplantation based on antibody status,
- cost an average $122,856 less than waiting for transplantation based on antibody status.

"Our analysis shows that denial of listing for transplant, solely on the basis of having too many antibodies, is unwarranted," Feingold said. "One of the next questions is whether low levels of antibodies identified using modern antibody detection techniques are clinically meaningful. Are they a harbinger of problems to come, or just a 'false positive' that potentially alters our care of patients with important effects on survival and costs of care?"

For their study, researchers obtained 1999-2009 patient data from the Organ Procurement and Transplantation Network. Cost data came from the Children's Hospital of Pittsburgh of UPMC and the public Healthcare Cost Utilization Project Kids' Inpatient Database.

Researchers were able to control for antibody status, wait-list time and wait-list survival, post-transplant survival in the presence or absence of a positive crossmatch, and costs. They didn't specifically examine rejection rates, nor did they examine treatments other than heart transplant or outcome among patients without antibodies.

As of June 2013, nearly 3,500 patients were waiting for a heart transplant, according to American Heart Association statistics.

Co-authors are: Steven A. Webber, MBChB, MRCP; Cindy L. Bryce, PhD; Heather E. Tomko, MS; Seo Y. Park, PhD; William T. Mahle, MD; and Kenneth J. Smith, MD. Author disclosures are in the manuscript.

The National Center for Advancing Translational Sciences and the National Institutes of Health funded the study.

Surgeons Use 3-D Printed Model of Heart to Treat Patients with Disorders

An experimental 3-dimensional printed model of the heart may help surgeons treat patients born with complicated heart disorders, according to research presented at the American Heart Association's Scientific Sessions 2014.

Most heart surgeons use 2D images taken by X-ray, ultrasound and MRI for surgical planning. However, these images may not reveal complex structural complications in the heart's chambers that occur when heart disease is present at birth (congenital heart defects), as opposed to developing later in life within a structurally normal heart.

Heart Failure/Transplant Cardiologist Advertisement

The Division of Cardiology at the Ann & Robert H. Lurie Children's Hospital of Chicago and the Department of Pediatrics at Northwestern University's Feinberg School of Medicine in Chicago is seeking a full-time BC/BE pediatric cardiologist to participate in our Heart Failure and Transplant Program. The individual must be an M.D. or D.O. and eligible for an Illinois medical license. The position includes an academic appointment of Instructor, Assistant or Associate Professor on the non-tenure track determined by qualifications. Salary is commensurate with qualifications.

The candidate will participate in inpatient and outpatient consultation and management of heart failure/transplant patients. Additional areas of clinical expertise such as VAD experience and/or transplant immunology are desirable. An interest in clinical or translational research and completion of a fourth year fellowship or several years of experience as a transplant specialist are desirable.

Opportunities exist for clinical research and collaboration through the Stanley Manne Children's Research Institute of Chicago; teaching of housestaff is an important role.

Ann & Robert H. Lurie Children's Hospital of Chicago is ranked among the nation's top 10 children's hospitals. Our Heart Center includes 33 attending cardiologists, nine categorical cardiology fellows, two senior CICU fellows and several additional advanced fellows, three pediatric cardiac surgeons, an accredited congenital heart surgery fellowship program, and a dedicated cardiac anesthesia service. Our cardiac surgeons perform over 400 cardiac operations per year and achieve outcomes that rank among the best in the nation (STS-CHS Database). We also have one of the highest volume heart transplant programs in the country and a busy mechanical cardiac support program (VAD, ECMO & E-CPR). Our cardiac program is the largest in Illinois and provides expertise in echocardiography, electrophysiology, interventional cardiac catheterization, heart failure/transplant, adult congenital heart disease, cardiac critical care and preventative cardiology. Cardiac intensive care services are provided in the state-of-the-art 36-bed Regenstein Cardiac Care Unit.

Located in the heart of downtown Chicago, the hospital is near miles of open lakefront full of scenic points and recreational opportunities. An abundance of cultural activities including museums, music, world-class restaurants and upscale shopping make this city a great place to live, work and play.

Proposed starting date is July 1, 2015. Applications will be accepted until the position is filled. Interested applicants should forward letter of intent, curriculum vitae, and three (3) references to:

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But with standard 2D images as a guide, doctors now can build a detailed 3D model of the heart from various materials, such as plaster or ceramic, to reveal even the most complicated structural abnormalities.

"With 3D printing, surgeons can make better decisions before they go into the operating room," said Matthew Bramlet, MD, study lead author and Assistant Professor of Pediatric Cardiology and Director of the Congenital Heart Disease MRI Program at the University of Illinois College of Medicine in Peoria. "The more prepared they are, the better decisions they make, and the fewer surprises that they encounter."

"When you're holding the heart model in your hands, it provides a new dimension of understanding that cannot be attained by 2D or even 3D images. What once was used to build trucks, we're using now to build models of hearts."

Researchers used an inexpensive plaster composite material to create heart models of a 9-month-old girl, 3-year-old boy and a woman in her 20's, all of whom had complex congenital heart defects. After studying the models and traditional images, surgeons successfully repaired severe heart abnormalities in all three patients.

"You could see that if you make this compromise here, you could fix this problem, and go from a single-ventricle to a two-ventricle repair," Bramlet said. "That is the difference, potentially, between a life expectancy of two to three decades, versus four, five or six decades."

Researchers caution that this was a small study and 3D printing is still an emerging technology that is not approved by the Food and Drug Administration. The University's collaborator, the Jump Trading Simulation and Education Center in Peoria, made the printer available for the study.

Co-authors are Randall Fortuna, MD, and Welke Karl, MD. Author disclosures are in the manuscript.

Private donors supported the study.

For more news from the AHA's Scientific Sessions 2014, follow on Twitter @HeartNews #AHA14.

Archiving Working Group
International Society for Nomenclature of Paediatric and Congenital Heart Disease
ipccc-awg.net

I-PASS Reduces Medical Error Injuries During Patient Handoff by 30%

Citations: *New England Journal of Medicine*, Nov. 6, 2014

Newswise — Bethesda - Improvements in verbal and written communication between health care providers during patient hand-offs can reduce injuries due to medical errors.

Reported in the Nov. 6th, 2014, N*ew England Journal of Medicine*, researchers at Walter Reed National Military Medical Center (WRNMMC) and the Uniformed Services University of Health Sciences (USU) recognized this critical safety concern and teamed up with nine civilian hospitals to develop I-PASS (www.ipasshandoffstudy.com/about), an original system of bundled communication and team-training tools for hand-off of patient care between providers. The study revealed a remarkable 30% reduction in injuries due to medical errors after its implementation across all 9 institutions.

According to the Joint Commission (a non-profit organization that accredits and certifies more than 20,500 health care organizations and programs in the United States and whose accreditation and certification is recognized nationwide as a symbol of quality that reflects an organization's commitment to meeting certain performance standards), ineffective hand-off communication is recognized as a critical patient safety problem in health care; in fact, an estimated 80% of serious medical errors involve miscommunication between caregivers during the transfer of patients. The hand-off process involves "givers," those caregivers transmitting patient information and transitioning the care of a patient to the next clinician, and "receivers," those caregivers who accept the patient information and care of that patient. In addition to causing patient harm, defective hand-offs can lead to delays in treatment, inappropriate treatment, and increased length of stay in the hospital.

As the first military hospital to adopt the I-PASS hand-off bundle, which includes training in team communication skills, a verbal hand-off process organized around the verbal mnemonic "I-PASS" (Illness Severity, Patient Summary, Action List, Situational Awareness and Contingency Planning, and Synthesis by Receiver), a written or computerized hand-off tool that reflects the verbal mnemonic, a faculty development and observation program, and an institutional dissemination campaign, Walter Reed Bethesda has now implemented I-PASS for use across multiple disciplines to create an institutional transition of care policy.

According to one of the lead investigators COL Clifton E. Yu, Chief, Graduate Medical Education at Walter Reed Bethesda, "Not only is Walter Reed National Military Medical Center the only military hospital to be involved in the study, but we are also the only study site that was not a major children's hospital. Taking advantage of that fact, we decided to work towards adapting the curriculum for dissemination across multiple clinical areas, to include: adult medicine, surgery, and nursing environments. As our successful institutional roll out is evolving, we are setting the national standard and precedent for the use of I-PASS in all clinical and nursing domains where transitions of patient care typically occur."

"Training in team communication skills is a critical element of the I-PASS Hand-off Bundle and, given the DoD Patient Safety Program's longstanding interest and expertise in this area through their initial development of the TeamSTEPPS program (Team Strategies and Tools to Enhance Performance and Patient Safety, now jointly sponsored by the Agency for Healthcare Research and Quality), it seemed a natural fit to have WRNMMC and USU investigators take the lead on developing this aspect of the I-PASS curriculum. After completing training as a TeamSTEPPS Master Trainer, I was able to leverage my new knowledge and skills in order to adopt key elements of TeamSTEPPS into the team communication skills

training for I-PASS. As it happens, our inclusion of TeamSTEPPS components into I-PASS dovetails perfectly with WRNMMC's current roll out of full TeamSTEPPS training hospital wide," said Army Maj. (Dr.) Jennifer Hepps, Assistant Professor of Pediatrics at USU.

"We were able to use the expertise of USU's Val G. Hemming Simulation Center to create role plays and videos simulating handover scenarios. These simulations helped to teach faculty and residents the best practices in transitions of care between patient teams," said Joseph Lopreiato, MD, MPH, Professor of Pediatrics and Associate Dean of Simulation at USU. "Thanks to the support from the USU administration, our Simulation Center was able to contribute to this groundbreaking research that will go a long way toward reducing medical errors in the transitions of patient care."

"Patients are at the center of everything we do," said Brig. Gen. Jeffrey B. Clark, Director of the Walter Reed National Military Medical Center. "By quickly adopting the IPASS transitions of care principles for all healthcare teams, we simultaneously bring state-of-the-art healthcare to our patients and teach the next generation of healthcare team members what right looks like."

"A great medical team is like a great relay team: individual effort matters, but victory comes from smooth hand-offs," said Arthur Kellermann, MD, Dean of USU's F. Edward Hébert School of Medicine.

Drs. Yu, Hepps, and Lopreiato are also co-investigators in two follow-on multi-center studies involving I-PASS at WRNMMC that include:

- Family Centered I-PASS Projected funded by Patient Centered Outcomes Research Institute (PCORI), (www.pcori.org) evaluating effectiveness of involving all team members, including nursing and families, in communication of medical information
- Mentored I-PASS Implementation Project funded by Society for Hospital Medicine (SHM), examining how to implement I-PASS at other large academic medical institutions

Boston Children's Hospital (www.childrenshospital.org) served as the lead site for the study, while Brigham and Women's Hospital served as the data-coordinating center. Additional facilities that reported on the results of implementing I-PASS through their pediatric residency programs include:

- Benioff Children's Hospital, University of California San Francisco (www.ucsfbenioffchildrens.org)
- Cincinnati Children's Hospital Medical Center, University of Cincinnati (www.cincinnatichildrens.org)
- Doernbecher Children's Hospital, Oregon Health Sciences University (www.ohsu.edu)
- Hospital for Sick Children, University of Toronto (www.sickkids.ca)
- Lucile Packard Children's Hospital, Stanford University (www.stanfordchildrens.org)
- Primary Children's Hospital, University of Utah (intermountainhealthcare.org)
- St. Louis Children's Hospital, Washington University St. Louis (www.stlouischildrens.org)
- St. Christopher's Hospital for Children, Drexel University (www.stchristophershospital.com)

Pregnant Women with CHD May Have Low Complication Risks During Delivery

American Heart Association Meeting Report Abstract 19082. Pregnant women with Congenital Heart Disease (CHD) had very low risks of arrhythmias (irregular heart beat) or other heart-related complications during labor and delivery, according to research presented at the American Heart Association's Scientific Sessions 2014. However, such women were more likely to undergo

cesarean section and remain in the hospital longer, researchers said.

"We are pleased to find the risk of complications are not as high as expected in women with congenital heart disease," said Robert M. Hayward, MD, lead study author and a cardiac electrophysiology fellow of the University of California in San Francisco. "While we don't know why these women have longer hospital stays, it's possible their doctors are keeping them admitted for extra observation."

Previous research has found that childbirth is a time of increased risk for complications in women with congenital heart disease, but little is known about what those cardiovascular risks might be.

CHD occurs when there is a problem with the structure of the heart at birth. Congenital heart defects affects about 8 of every 1,000 infants born – about 32,000 infants each year in the United States. Today, there are more than 1 million Americans living with congenital heart disease. Improvements in the treatment of congenital heart disease has helped more women reach childbearing age.

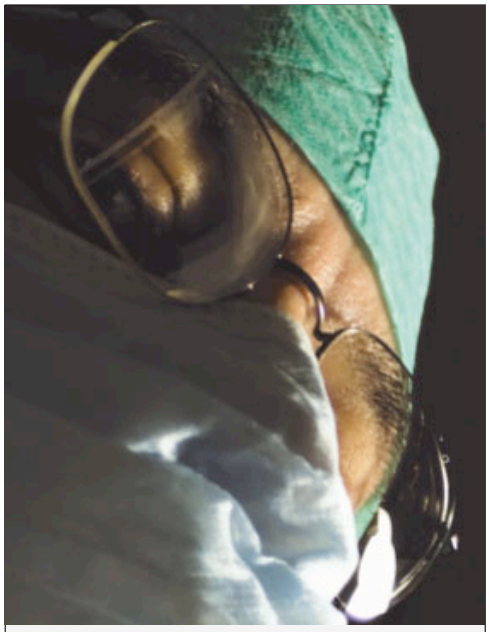
Researchers analyzed medical records of more than 2.7 million women who gave birth in California. Among this group, 3,218 women had non-complex congenital heart disease and 248 women had Complex Congenital Heart Disease (CCHD), whose conditions were more advanced and had likely warranted surgical treatment during early childhood.

Researchers found:

- Reports of heart failure, arrhythmias and cardiac arrest were low for all three groups of women.
- In-hospital death rates were not significantly higher for women with complex congenital heart disease.
- 47% of women with complex congenital heart disease underwent cesarean section compared to 40% of women with non-complex congenital heart disease and 33% of women without congenital heart disease.
- Women with complex congenital heart disease remained in the hospital on average 5 days, compared with women with non-complex congenital heart disease (3.4 days) and women without congenital heart disease (2.5 days).
- A history of congestive heart failure was more common in women with complex congenital heart disease (8.1%) versus 2.6% of women with non-complex congenital heart disease and 0.08% in women without CHD.

Hayward cautions that their study offers only a snapshot in time and does not address the maternal health of those with congenital heart disease during pregnancy or postpartum, nor does it look at fetal health during pregnancy.

"The data allows us to see associations, but it does not suggest any cause and effect," Hayward said. "We'd like to look at the period after delivery to see if there were any new admissions, heart failure or other complications to develop a better understanding of the health needs of maternal patients with congenital heart disease."



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