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DEPARTMENTS

PEDIATRIC CARDIOLOGY TODAY

THE DEBAKEY VAD® CHILD: FIRST IMPLANTABLE VENTRICULAR ASSIST DEVICE FOR CHILDREN IN THE UNITED STATES (FINALLY, THE CHILD GETS ATTENTION!)

By David L.S. Morales, MD; Daniel J. DiBardino, MD; Charles D. Fraser Jr., MD

Nearly all published data and previous technical development with long-term mechanical assistance for the failing heart concern the adult patient. Adult mechanical circulatory assistance has reached a level of sophistication such that physicians are able to choose from a broad range of ventricular assist device (VAD) options and, thus, tailor device therapy to specific patient requirements. This has translated into improving results and declining operative mortality.

With the exceptions of extracorporeal membrane oxygenation (ECMO) or centrifugal circulatory support (Biomedicus) for acute and often "last resort" resuscitation, mechanical support of the pediatric patient with end-stage heart failure has largely been ignored intellectually and industrially because of the small number of patients. However, with the increasing success of both palliative and corrective operations for congenital heart disease, the fastest growing and soon to be the largest cohort of patients with congenital heart disease is the child and adolescent. In fact, there has been a decrease in the need for neonatal and infantile heart transplantation, and an increase in the number of older children with end-stage heart disease.

The DeBakey VAD® Child, an implantable VAD intended for children, is the first attempt to address this ever-growing population. Other devices have been developed for children and even neonates but none has gone through the arduous screening process of the Food and Drug Administration (FDA) to get Human Device Exemption (HDE) approval until now. The DeBakey VAD® Child was granted HDA approval by the FDA on February 5th, 2004. This device is based on the technology of the adult DeBakey VAD, the most widely used implantable axial-flow VAD with 246 world-wide implants to date. Developed in collaboration with the United States Aeronautics and Space Administration (NASA), Drs. Michael E. DeBakey and George P. Noon have designed a "C-cell battery" size pump that is highly durable and capable of providing full left ventricular support. The DeBakey VAD® Child system consists of the pump, Clinical Data Acquisition System, VADPAK, Patient Home Support System, Batteries, and ChargePAK.

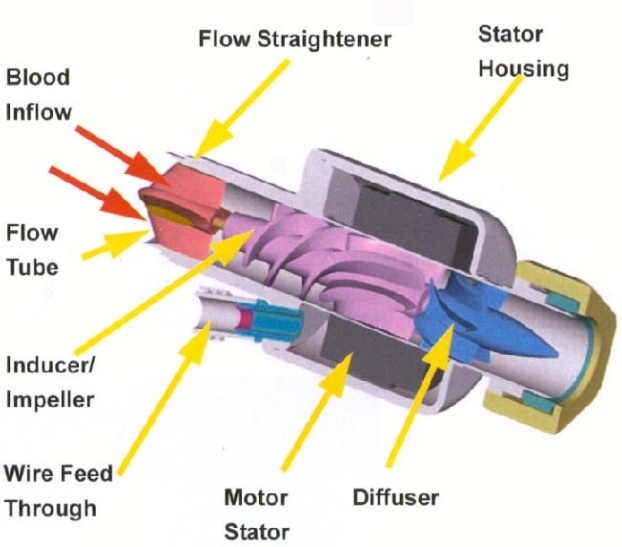

Figure 1. The MicroMed DeBakey VAD® Child Pump Components.

- The device is a lightweight miniaturized pump that is 30mm x 76mm and weighs 94 grams (less than 4 ounces). It is an electro-magnetically actuated fully implantable titanium axial flow pump capable of pumping in excess of ten liters per minute for use in a broad range of BSA ranges. Figure 1 demonstrates its

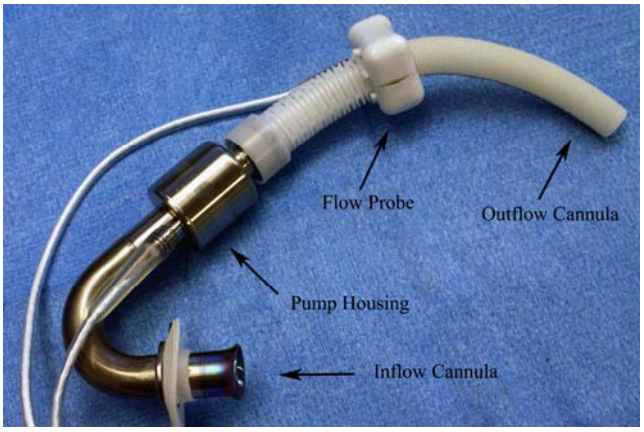

Figure 2a. The Assembled DeBakey VAD® Child Device

individual components. The inducer/impeller is the only moving part of the pump. It has six blades with eight magnets hermetically sealed in each blade. The inducer/impeller spins at 7,500-12,500 RPM and is driven by a brushless, direct current motor stator that spins the impeller by a changing electromagnetic field. All components are fully enclosed in a titanium flow tube that has been hermetically sealed. The inflow component of the pump consists of a titanium inlet cannula that is placed into the apex of the left ventricle. This inlet cannula has been specifically designed in angle, size and shape for a child's body habitus and cardiac size. The outflow component is fixed to a 12mm gel-weave graft that passes thru a flow transducer (Figures 2a & b) and is anastamosed to the ascending aorta. The intracorporeal components of the device are designed to allow application of the DeBakey VAD® Child to pediatric patients with a BSA of 0.7 m2 and above. The pump is connected to the Controller via a percutaneous cable that is passed through the skin. The percutaneous cable contains the pump power cable and the flow probe cable. A clear advantage of this device compared to other VADs is that this design makes the device almost completely silent.

- Initially, when the device is inserted and while the patient remains in the ICU, the percutaneous cable is attached to the Clinical Data Acquisition System, which is a panel PC used to monitor the patient, the pump's performance, and to adjust the operating parameters of the VAD. The system provides power to the unit and can be used to adjust the speed of the pump to increase or decrease blood flow.

- The VADPAK (Figure 3) houses the controller and two batteries in an ergonomically designed carrying case. The controller operates the VAD and displays key operating information about the pump including remaining battery life. It also sounds an alarm in the event power is inadvertently disconnected or upon detection of unusual operating conditions. Each battery is a 12-volt Nickel Metal Hydride Battery capable of powering the VAD for approximately 2.5 to 4 hours, giving a combined battery time of approximately 5 to 8 hours depending on the speed of the pump. The VADPAK, which weighs 5 pounds, thus allows for an average of seven hours of untethered mobility for the patient as well as the ability to engage in normal, everyday activities.

- The Patient Home Support System operates as a battery charger as well as a source of wall power for the controller during sleep and around the house.

- The ChargePAK is a mobile battery charger capable of charging two discharged batteries in 90 minutes.

"There are potentially two paths of VAD development for the pediatric population: A continuous flow pump (like the DeBakey VAD) or a pulsatile device."

There are potentially two paths of VAD development for the pediatric population: a continuous flow pump (like the DeBakey VAD) or a pulsatile device. There are several examples of the latter that have been successfully applied in Europe (Berlin Heart VAD, MEDOS-HIA-VAD), but none are currently available in the United States. Application of the axial flow DeBakey VAD in adults has demonstrated several advantages over pulsatile LVAD:(1,2)

1. No blood sack (potential area of hemostasis)
2. Small blood to device interface
3. No artificial valves
4. Only one moving part (less opportunity for wear and tear)
5. Lower power consumption
6. Small weight and size
7. Does not produce noise
8. Significantly lower incidence of pump infection
9. Significantly lower incidence of pump failure
10. Lower cost

Another benefit to the MicroMed DeBakey VAD® Child is its design which lends itself to improving quality of life by: the VADPAK's lightweight

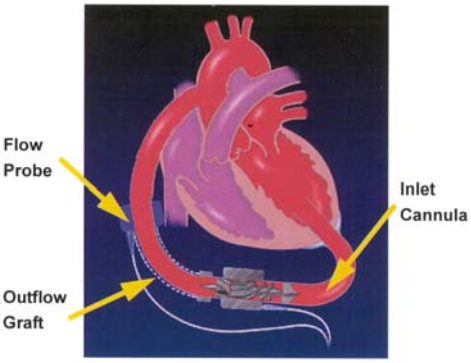

Figure 2b. Position of the Inlet Cannula and Outflow Graft.

which allows for untethered mobility for extended periods of time, its noiseless operation, and its ability to increase flow in response to increased activity and to regulate this appropriately via the device's pre-load.(2)

"Nearly all published data and previous technical development with long-term mechanical assistance for the failing heart concern the adult patient."

Several issues warrant consideration when discussing continuous flow VADs. The discussion of non-pulsatile flow and its short and long-term effect on organ function has produced enormous controversy, mostly focused on the use of the cardiopulmonary bypass machine and only more recently, focused on the application of longer-term support with axial flow pumps. There are strong arguments for both pulsatile and non-pulsatile flow modalities. Some investigators hypothesize that the important functions of gas, nutrient, and metabolic exchange between blood and tissue occurs in the capillaries where flow is non-pulsatile, thus obviating the need for a pulsatile device. Supporting this theory are the results of several studies documenting that flow volume is more important for perfusion than the form of flow.(2)

Another controversy is whether the DeBakey VAD is truly classifiable as a non-pulsatile pump because of the consistent finding in the adult population that after several days of support, pulsatility often develops in the arterial tracing. The output of the DeBakey VAD is dependent on the pressure difference in the inflow and outflow cannulas during the cardiac cycle. When the VAD is first placed in the failing left ventricle, there is often no change in pressure in the left ventricle during the cardiac cycle secondary to poor LV function. However, after several days of ventricular unloading, there is usually some element of LV recovery as demonstrated by increased contractility of the unloaded left ventricle (although not necessarily sustained recovery). This allows for meaningful cardiac contraction and thus rhythmic changes in the VAD inflow pressure during the cardiac cycle. This changing inflow pressure results in rhythmic pulsation of the VAD outflow, measured in both the outflow cannula flow meter and in the arterial waveform. The aortic valve does not open (as documented by echocardiogram) and, thus, prograde flow across the aortic valve is not responsible for this pulsatile waveform. The DeBakey VAD is, then, perhaps best classified as a "continuous flow VAD" rather than a "non-pulsatile device". Continuous flow from the DeBakey VAD has been shown clinically to provide good end-organ perfusion as measured by the indices of renal and hepatic function and to provide equal

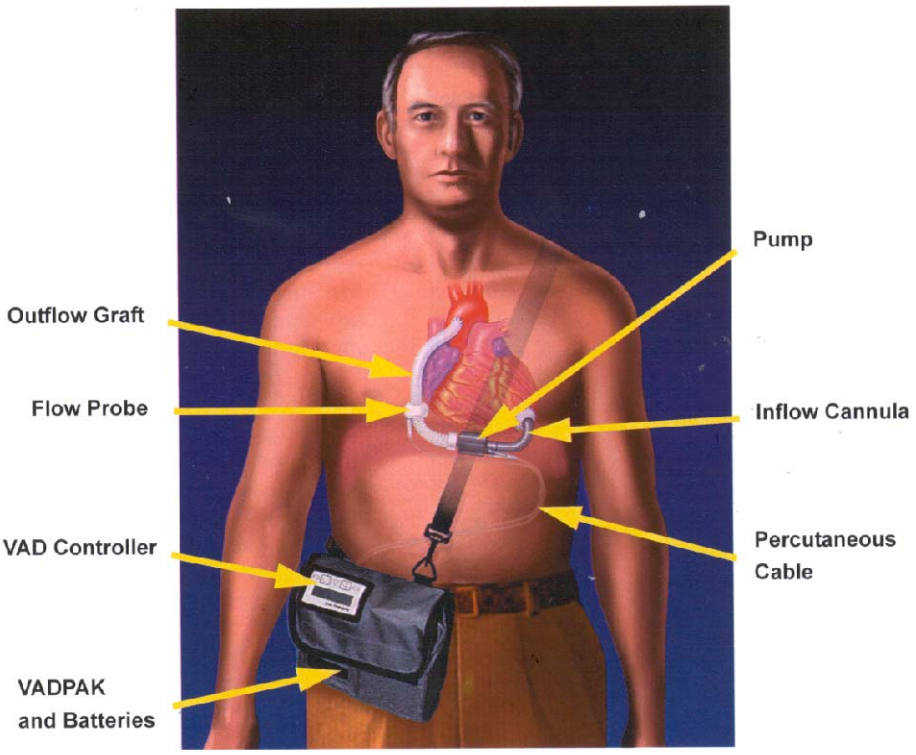

Figure 3. The MicroMed DeBakey VAD System in an Adult Patient.

neurological perfusion as pulsatile devices as measured by levels of S-100B protein and neuron specific enolase activity.(1,2,3)

"The need to effectively care for our growing population of children with heart failure is finally being heard at the industrial, NIH, and clinical levels."

In regards to hemolysis, the Debakey VAD has not shown a significant elevation in such indicies as mean plasma free hemoglobin levels or in clinical indicies such as increased transfusion when compared to non-axial flow VADs.(4) Therefore, the significance of hemolysis after DeBakey VAD implantation is concluded by most to be minor in the adult population. This has not been studied in the pediatric population. The inflammatory response to the Debakey device has been studied with preliminary investigations demonstrating that the activation of the inflammatory cascade (i.e. neutrophil elastase, tumor necrosis factor, and complement protein 3a) parallels that of pulsatile LVADs. There have been suggestions, however, of an increased activity in the "contact activation" branch of the coagulation pathway.(4) This, perhaps, speaks to the significant incidence of clot development in the pump of approximately 11% in the adult Debakey VAD population. It should be noted that about two thirds of these patients still go on to have successful outcomes and that there has been no incidences of strokes associated with pump thrombus.(1) This underscores the importance of establishing an effective anticoagulation protocol which is presently one of the main objectives of those using the DeBakey VAD. Such a protocol would probably entail heparin in the acute post-operative period followed by chronic anticoagulation with coumadin (goal INR of 2) and antiplatelet agents (i.e. ASA, Plavix).

All clinical data to date and theories concerning the role of axial flow technology and its interaction with human physiology are derived from our adult experience. With the recent initiation of an HDE for the DeBakey VAD® Child system, we undertook the first human implantation on March 26, 2004, and the system is presently the subject of a multi-center clinical trial in the United States for use as both a bridge to transplantation and for destination therapy. The REMATCH trial has demonstrated that application of long-term mechanical assist devices in the adult population as a destination therapy resulted in significant improvement in both overall survival and quality of life over medical therapy.(5) The plasticity of pediatric organs and of the heart, specifically, has led many to believe that myocardial recovery is not only possible but likely in a number of the subtypes of pediatric heart failure.

"All clinical data to date and theories concerning the role of axial flow technology and its interaction with human physiology are derived from our adult experience."

The need to effectively care for our growing population of children with heart failure is finally being heard at the industrial, NIH, and clinical levels. This is most clearly demonstrated by the DeBakey VAD® Child and by the recent National Heart, Lung, and Blood Institute request for protocols to develop mechanical support devices for the failing hearts of pediatric patients, for which it has committed 25 million dollars in research funding. This will hopefully ensure the development of novel pediatric mechanical devices in the future and provide congenital heart surgeons and pediatric cardiologists with the option of long-term implantable cardiac assistance for their patients with failing systemic ventricles.

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The MicroMed DeBakey VAD® is an investigational device and is limited by federal law for investigational use in the U.S.

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The Children's Heart Foundation
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THE AMPLATZER VASCULAR PLUG – AN ADDITION TO OUR INTERVENTIONAL ARMAMENTARIUM

By Ralf Holzer, MD; Qi-Ling Cao, MD; Satinder Sandhu, MD; Ziyad M. Hijazi, MD

INTRODUCTION

Percutaneous device closure of the persistent arterial duct (PDA) is a well-established interventional procedure. Over the years a wide variety of percutaneous devices have been used with a variable degree of success. The use of the Amplatzer Duct Occluder (ADO) has further improved the success rates of this procedure. However, the shape of the device is specifically designed for the most common Type A morphology of the PDA and is less suitable for the tubular Type C PDA, due to its mushroom-like shape with a larger retention disk at the aortic end. We describe the use of the novel Amplatzer Vascular Plug to close a Type C, PDA in an 8 months old infant.

Figure 1. The Amplatzer Vascular Plug.

DEVICE

The Amplatzer Vascular Plug (AGA Medical Corporation, Golden Valley, MN, USA) is made of nitinol wire mesh, an alloy of nickel and titanium (Figure 1). The device is self-expandable and has a cylindrical shape, the diameter of which determines the size of the device. In contrast to the Amplatzer Duct Occluder, the Vascular Plug has an equal diameter throughout its length and no retention disk on either end. The device is preloaded in a loader and available in sizes from 4-16 mm, requiring delivery sheaths size between 4-5 French (Fr) or coronary guiding catheters sizes 5-8 Fr. The length of the device is 7 mm (4-10 mm Plug) or 8 mm (12-16 mm Plug).

CASE REPORT

An 8 month old female infant was taken to the cardiac catheterization laboratory for elective closure of a persistent arterial duct (PDA). She was born at term and cardiac evaluation had been prompted by the presence of a heart murmur found on routine examination. Clinically, she had been well and asymptomatic and echocardiography demonstrated the presence of a moderate-sized PDA with continuous left-to-right shunt at a peak velocity in excess of 4 m/s. left atrium (LA) and left ventricle (LV) appeared to be mildly volume loaded. On examination prior to catheterization she had a 3/6 continuous murmur.

Cardiac catheterization was performed under general endotracheal anaesthesia, using vascular access via right femoral vein (4 Fr) and right femoral artery (4 Fr). Hemodynamic evaluation demonstrated distal left pulmonary artery pressures of 20/11 mmHg (mean 16 mmHg). There was no gradient to either branch pulmonary artery. Pressures in ascending aorta were 77/52 mmHg (mean 65 mmHg) and descending aorta 75/50 mmHg (mean 63 mmHg). Oxymetry data obtained in room air recorded no measurable step-up between superior vena cava (SVC) and the distal left pulmonary artery.

Angiography was performed in the descending aorta in lateral and 20º RAO projections demonstrating a slightly elongated tubular Type C PDA (Figure 2A, 2B). The PDA measured at its mid-portion about 6 mm in diameter and at the pulmonary artery end about 4.2 mm. Due to the elongated tubular morphology of the PDA, we decided to use a 6 mm Amplatzer Vascular Plug device for closure.

The PDA was crossed from the pulmonary artery using a 4 Fr Berman wedge catheter and a 0.018" "Wholey" wire (Mallinckrodt, Hazelwood, MO, USA). The catheter was exchanged to a 4 Fr long Mullins type sheath (Cook Inc., Bloomington, IN, USA) with the tip placed in the descending aorta. The device was advanced to the tip of the sheath and the sheath pulled back into the mid- portion of the PDA (Figure 2C). Repeated angiography obtained in the descending aorta near the PDA was used to confirm correct position of the tip of the sheath. The vascular plug was deployed inside the PDA and angiography obtained in descending aorta prior to release of the device demonstrated adequate device position (Figure 2D). The device was released

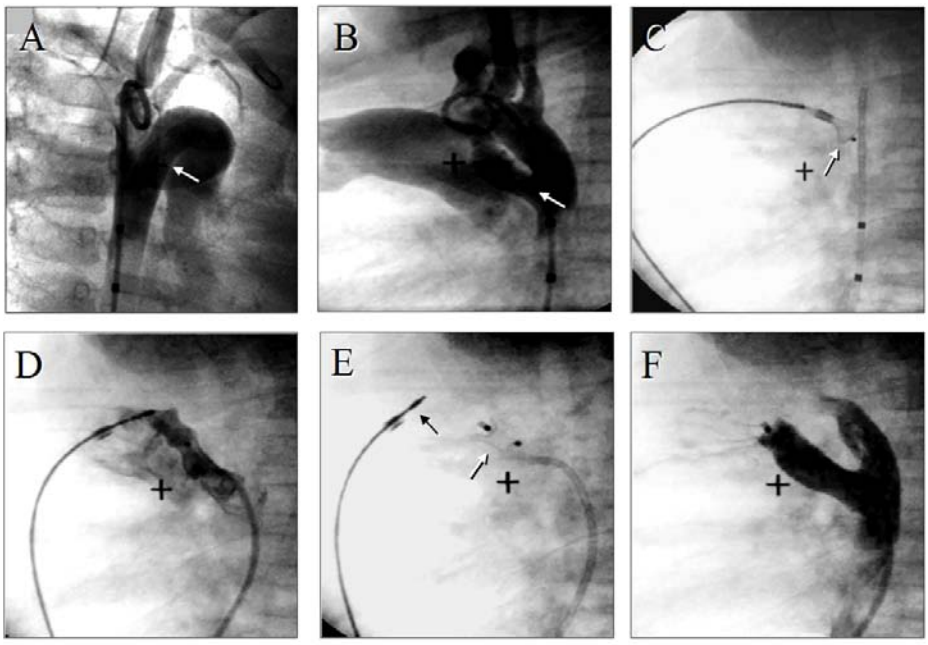

Figure 2. Angiography in descending aorta (RAO projection A, straight lateral B) demonstrating a moderate-sized tubular Type C PDA (arrows). Stages of PDA device closure using the Amplatzer Vascular Plug, all in standard lateral projection. C: The device (arrow) is being deployed within the distal portion of the PDA. D: angiogram after full deployment of the device demonstrating good position. E: The device (white arrow) is being released from the delivery cable (black arrow). F: Angiography after release of the device documenting good device position and no residual shunt.

(Figure 2E) and subsequent angiography in descending aorta documented complete closure of the PDA without residual shunt (Figure 2F). The device was neither protruding into left pulmonary artery nor into the descending aorta. The patient was discharged the same day and at six-weeks follow-up, echocardiographic evaluation documented excellent device position without residual shunt across the PDA.

DISCUSSION

A wide variety of devices have been introduced for transcatheter PDA closure since the first successful percutaneous closure reported by Porstmann and colleagues in 1967 (1), such as the Rashkind PDA double umbrella device, the Grifka Vascular Occluder, the Sideris Buttoned device as well as a variety of coils. The introduction of the Amplatzer Ductal Occluder (ADO) in 1997 has further improved upon the success rates of transcatheter PDA closure, especially for the typical "megaphone" shaped morphological Type A PDA.(2) Recent modifications of this device such as the angled Amplatzer Ductal Occluder may further increase the use of this device in even smaller patients. (3)

However, even though PDA of typical "Type A" morphology are usually successfully closed using the Amplatzer Ductal Occluder in the majority of attempts, other morphological PDA subtypes such as the tubular "Type C or D" PDA can pose a more significant procedural challenge.(4) Coil or device embolization is more frequently observed and the use of the Amplatzer Duct Occluder is limited through its retention disk which, when incorporated (and not fully expanded) into the tubular PDA, not infrequently leads to distortion of the device together with device elongation. The radial force of the unexpanded retention disk, when deployed inside the PDA, can also gradually exert a degree of forward pressure, thereby potentially leading to device protrusion into the LPA or even device embolization early after an initial "successful" PDA closure.

Hijazi recently first described the use of the Amplatzer Vascular Plug in 4.5 months old infant with Tetralogy of Fallot, to successfully occlude multiple aortopulmonary collateral vessels.(5) The device has several characteristics which make it specifically suitable for closure of tubular PDAs of Type C morphology. The lack of a retention disk allows safe deployment of this device within the PDA without device elongation and the length of the device of 7-8 mm should be acceptable for use in most of the tubular PDA even in smaller children, as the type C PDA usually have additional length when compared to Type A PDA. The requirement of smaller delivery sheath

"Percutaneous device closure of the persistent arterial duct (PDA) is a well-established interventional procedure."

is an additional benefit, specifically in smaller children.

In conclusion, we would like to emphasize the potential benefits of having this new device to close aorto-pulmonary collaterals and on occasions to close certain types of PDA's. Having this device in our armamentarium will certainly improve our abilities in managing patients with congenital heart disease.

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BOOK REVIEW: "IT'S MY HEART" PARENT BOOK

By James C. Huhta, MD

"It's My Heart", a publication of The Children's Heart Foundation (copyright 2003), is a unique book in many ways. First, it is published by the nonprofit foundation, Children's Heart Foundation, a 501C(3) not-for-profit organization, as an educational aid to parents of children with congenital heart disease. The Children's Heart Foundation is unique in that 100% of the revenues from their fundraising goes to children's heart research and through 2003, over $1.1 million has been raised to support 14 separate research projects.

"It's My Heart" takes the reader through an understanding of the basics of congenital heart disease. Step-by-step the family member of a child with congenital heart disease learns the anatomy and development of the normal heart and one-by-one, a primer on each of the congenital heart defects which may affect a child, are outlined in Chapter II, pages 19-84. We are reminded that congenital heart disease is America's number one birth defect, affecting nearly 1% of all newborns, and is even more prevalent when congenital heart disease is looked for at 12-weeks gestation with fetal echocardiography. The book is sponsored by a generous donation from Medtronic Corporation with additional support from the Gerber Foundation, WNUA Cares for Kids Foundation, Circle of Service Foundation, Inc., Winnetka Rotary and St. Jude Medical. However, the entire book is completely free of any commercial endorsements, or any sign of bias towards one product or another, which is laudable.

Reading these page-by-page descriptions of congenital heart defects made me wish that a book like this was available to the average 3rd year medical student who is struggling to understand what congenital heart disease is and how it affects the patients. A beautiful and simplistic approach to acquired heart conditions is presented on pages 85 - 94, including the concepts of congestive heart failure, endocarditis and myocarditis. I did not find specific reference or summary of the area of cardiac transplantation. However, it is perhaps beyond the scope of a book like this. An additional section in this area, for a later edition, would be useful to parents in that situation, or parents who are faced with the prospect of a child with a heart disease in which a heart transplant may be one of the options.

The section on diagnostic tests is especially brief and lucid and useful for parents who are bombarded by the many names of tests and procedures, and have no comprehension whatsoever what may be in store for them and their child during that test. This, combined with the outstanding chapter on preparing for hospitalization, Chapter X, pages 151 - 162 , is the highlight of this book.

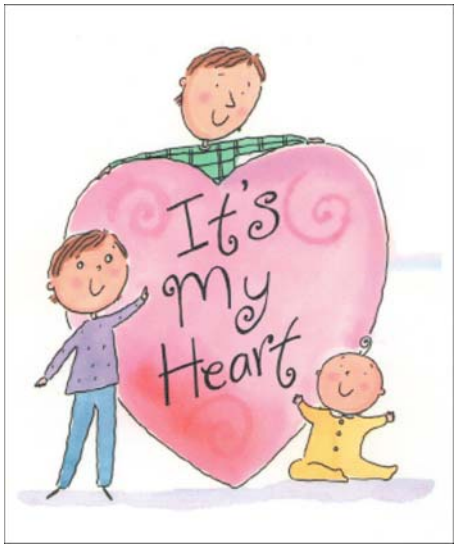

Figure 1. Book cover of "It's My Heart."

"Cardiologists should have many copies of this book on hand in their offices to hand to parents as they try to describe to them some of the complexities of anatomy and function which affect the child with congenital heart disease."

The section on issues for adults born with congenital heart disease was excellent and opened several doors for this pediatric cardiologist who is not very experienced in giving advice in this area. The Family Living Section, Chapter IX, pages 147 - 150, was outstanding, with many hints and excellent suggestions for families living with children affected by heart disease and at risk of having to be re-hospitalized. Cardiac surgery is covered operation by operation and procedure by procedure, in significant detail, so that nearly any operation which a child may be having for congenital heart disease can be found in this list and parents can begin to understand what will be done.

Entering the hospital with a child with congestive heart failure means learning an entirely new language. The section

on equipment, which defines each of the pieces of equipment which are used on the child, the section on medications outlining the names of many medications and the glossary of terms at the end are extremely valuable to the parent coping with a child recently diagnosed with congenital heart disease. Finally, additional resources are listed, including helpful websites, which parents can use for further education. Although many doctors have a certain dread of the "internet pathology" which parents seem to acquire from the internet, these sites have been chosen to inform and consistently support families, and I also recommend them. The organ transplant organizations are also mentioned in this section, and would make up for any lack of description of transplant in these previous chapters.

Cardiologists should have many copies of this book on hand in their offices to hand to parents as they try to describe to them some of the complexities of anatomy and function which affect the child with congenital heart disease. This simple style, written in laymen's language, is so very hard to achieve in any other type of textbook and the authors and the leaders of The Children's Heart Foundation are to be congratulated for this outstanding piece of work.

I am simply in awe of the energy of those who conceived the idea of a children's heart foundation, having achieved a significant step toward funding research into the causes of congenital heart disease who are now stepping out in another form of service in the area of education with "It's My Heart".

For comments to this article, send email to: JUNJCH@PediatricCardiologyToday.com

~PCT~

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Children's Heart Foundation "It's My Heart" Parent Book

"It's My Heart" is now available online at CHF's website. It is also available in hard-copy for $19.95; contact ruth@raphel.com or call 877.386.5925

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- ☑ Chapter 1: The Normal Heart
- ☑ Chapter 2: Congenital Heart Defects
- ☑ Chapter 3: Acquired Heart Conditions
- ☑ Chapter 4: Diagnostic Tests
- ☑ Chapter 5: Equipment
- ☑ Chapter 6: Surgical Procedures
- ☑ Chapter 7: Medications
- ☑ Chapter 8: General Issues for Adults Born with Congenital Heart Disease
- ☑ Chapter 9: Family Living
- ☑ Chapter 10: Preparing for Hospitalization
- ☑ Chapter 11: Glossary
- ☑ Chapter 12: Additional Resources

The Children's Heart Foundation
P.O. Box 244
Lincolnshire, IL 60069-0244
☎ 847.634.6474
🖷 847.634.4988

www.childrensheartfoundation.org

The Children's Heart Foundation

MEDICAL CONFERENCES

Society of Nuclear Medicine 51st Annual Meeting
June 19 - 23, Philadelphia, PA
interactive.snm.org

International Society for Minimally Invasive Cardiac Surgery (ISMICS) Annual Scientific Meeting
June 23 - 29, London, UK
www.ismics.org

American Society of Echocardiography - 15th Annual Scientific Sessions
June 26 - 30, San Diego, CA
www.asecho.org

2004 BSF Family and Scientific Conference—Barth Syndrome Foundation
July 7 - 12, Orlando, FL
www.barthsyndrome.org

The 2004 "Specialty Review in Pediatric Cardiology" Course
July 12 - 15, 2004, Chicago, IL
www.uic.edu/depts/ci/pcard04

The 31st International Congress of Electrocardiology
June 27- July 1, Kyoto, Japan
www.congre.co.jp/ice2004/

24th International Congress of Pediatrics - The IPA World Congress of Pediatrics
August 15 - 20, Cancun, Mexico
www.icp2004.com

European Society of Cardiology ESC Congress 2004
August 28 - Sep. 1, Munich, Germany
www.escardio.org

NIH (National Heart, Lung, and Blood Institute) - Symposium on Cardiovascular Regenerative Medicine
September 13-14, Bethesda, MD
www.nhlbi.nih.gov/meetings/

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CAMP DEL CORAZON: A DECADE OF MAKING A DIFFERENCE - A SUMMER CAMP AND MORE...

By Lisa Knight, RN

Every year in the United States, when medical professionals intimately involved in the care of children with congenital heart disease think about who could benefit from a summer camp experience, the faces of many patients come to mind. Pediatric heart disease exacts an additional emotional toll—feelings of inferiority, self-consciousness, anxiety, negative body image and self-worth is often a side effect in children and adolescents. Classmates and peers are typically the least compassionate, and are often the first to make fun of those who are "different." Therefore, organized group activities can be a tremendous stress for these children. These issues inspired the conception of Camp del Corazon.

Lisa Knight, R.N. and Kevin Shannon, M.D. founded Camp del Corazon in 1995. Ms. Knight is a Registered Nurse in Pediatric/Electrophysiology at UCLA Medical Center and Dr. Shannon is a Pediatric/Cardiologist at Mattel's Children's Hospital at UCLA. Together, the two run a very active Pediatric Electrophysiology Service at UCLA Medical Center. Under their leadership, Camp del Corazon was incorporated as a 501(c)(3) nonprofit organization.

Camp del Corazon is a medically supervised, residential summer camp located on Catalina Island in California for children ages 7–17 who suffer from congenital heart disease. The children served by this camp are often not eligible for most summer camps due to the complex medication regimes they may require, lack of medical supervision, or lack of resources to support their special needs. Camp is governed by a volunteer board of directors which is very active all year in planning the next summer's camping experience.

Located on Catalina Island, 22 miles off the mainland of California, the camp provides a full camping experience for youngsters, including sleeping in a cabin, cooking meals over an open fire, nature walks, hiking, climbing, boating, recreation and many other group activities. Evenings are spent around a campfire beside the ocean. Children are referred by physicians and nurses from everywhere in the United States. The camp has a web site to acquaint both medical providers and parents about its features. The children (and parents) fill out an application form; children are screened for suitability, admitted, and assigned to one of the weeks of camp operation. One of the criteria for admission is the consent of the child's cardiologist. The camp program is uniquely planned to meet the needs and activity level of its campers. Children are welcome to come back year after year, to reacquaint with old friends and meet new ones.

All camp sessions are staffed entirely by volunteers. Typically, five to eight physicians and 15 to 18 nurses volunteer each week of camp to provide medical care and supervision. In addition to trained medical staff, adults who suffer from congenital heart disease and heart transplants also volunteer; last year ten such adults volunteered. Camp del Corazon is currently accepting applications for the 2004 summer sessions. The leading need is for registered nurses who would assist in medication distribution, as well as live in the cabin groups. Both staff and camper application forms are online and downloadable from the web site.

"Camp del Corazon is a medically supervised, residential summer camp located on Catalina Island in California for children ages 7–17 who suffer from congenital heart disease."

It is the mission of Camp del Corazon to be the model for providing a safe, medically supervised camping experience for children with heart disease. The population of campers who benefit from this program ranges from children who have well-controlled arrhythmias to heart transplant candidates. Campers come from all over the United States, Canada and from as far away as New Zealand.

This summer, Camp del Corazon celebrates its 10th year of operation; looking with pride at the achievement. This is reflected in the growth of campership from 49 campers in 1995 to 300 campers in 2003. The goal is never to turn a camper away. This is proving to be increasingly difficult, as the number of applications received each summer steadily increases.

In addition to the summer camp program, each year Camp del Corazon presents the unique Family Weekend at Universal Studios Hollywood—a symposium for families to get together and meet with experts in the fields of Pediatric Cardiology and Adult Congenital Heart Disease. While parents and family members attend the symposium, the campers and their siblings enjoy the theme park under the supervision of volunteer staff.

This spring the camp expanded to offer a "Leadership Program." This novel program is designed to enhance leadership, communication and relationship skills to young adults with heart disease, ages 18–25, as they transition to young adulthood.

All programs offered are free. Camp del Corazon is funded through individuals, corporations, grants and fundraising events, as most families who endure the enormous financial burden of medical cost, find it difficult to expend money needed for the luxury of summer camp or additional programs.

The work of Camp del Corazon has proven that there is a tremendous need to increase the camper opportunity. They are currently looking for a new campsite that would allow for a six-week program that continues throughout the entire summer.

For comments to this article, send email to: JUNLK@PediatricCardiologyToday.com

~PCT~

Lisa Knight, RN
Executive Director
Camp del Corazon

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Camp Del Corazon

Camp Del Corazon Inc. is a 501(c)(3) non-profit corporation, providing a summer camp for children with heart disease for free. All proceeds are spent entirely on the camp, The camp is staffed entirely by volunteers.

For information, to volunteer, or to make a donation contact:

Camp Del Corazon, Inc.
11615 Hesby St.
N. Hollywood, CA 91601
☎ 818.754.0312
🖷 818.754.0842
www.campdelcorazon.org

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HIGHLIGHTS FROM THE 27TH ANNUAL SOCIETY OF CARDIOVASCULAR ANGIOGRAPHY & INTERVENTIONS SCIENTIFIC SESSION (APRIL 28 - MAY 1, 2004)

By Frank F. Ing, MD

The 27th Annual Society of Cardiovascular Angiography & Interventions Scientific Session took place on April 28-May 1, 2004 in San Diego, California. I had the privilege and honor of coordinating the program in my hometown. The program was well attended and quite successful. After the dust had settled, this year's SCAI meeting turned out to be the most attended to date, with over 900 registrants in total. There were 115 registrants identified as a pediatric cardiologist in addition to fellows, nurses and various health care workers and technicians involved with pediatric cardiology.

The pediatric program started with a keynote lecture given by Dr. Mark Galantowicz (Columbus, Ohio), entitled, "Integration of Interventions and Surgery in Congenital Heart Disease." It was refreshing to hear about a purposeful and methodical direction towards more collaborative efforts between the surgical and interventional disciplines from a surgeon's perspective.

There were three main speaker sessions, which focused on the "Cutting Edge of Pediatric Interventions." During the first session, various transcatheter management strategies of the single ventricle patient were discussed including: "Innovative transcatheter pulmonary bands" and "Hybrid palliation for hypoplastic left heart syndrome." There were also lectures on "Direct transthoracic access for cardiac catheterizations in the single ventricle," "Management of the Fontan baffle fenestration," and "Occlusion of collaterals."

The second session focused on the "Innovation, Collaboration and Controversy" in the pediatric interventional arena. During this session there were lectures on "Septal perforator occlusion in the transcatheter management of IHSS," "MRI guided cardiac catheterizations," "Interventions in the very small infant," "Cardiac catheterizations on ECMO patients," "The emergence of the valve stents" and the exciting and new arena of "Hybrid procedures." In the latter lecture, Dr. Evan Zahn (Miami Children's Hospital) outlined general principles and various lesions that can be co-managed by both the cardiovascular surgeon and the pediatric cardiology interventionist in either the cath lab arena or the operating suite. He pointed out the need for collaboration rather than competition between the two disciplines, working under the general principle of how one discipline's involvement can improve the results of the other discipline.

The third session was a special combined pediatric and adult session on the management of congenital heart disease. Lectures included discussion on the clinical trials of "Implantable valve stents," "A comparison of the various ASD and PFO occlusion devices including the Amplatzer, Cardio seal and Helix devices," "Septal rim considerations in ASD occlusion," "Anatomic considerations in difficult cases in PFO occlusion," "An update on transcatheter VSD closures," and two extraordinary lectures on "Interventions in coronary stenoses in patients with Kawasaki disease" and "Transcatheter management of coronary artery fistulas." Dr. Teiji Akagi (Kurume, Japan) discussed the long-term experience of his institution dealing with giant coronary aneurysms and stenoses in Kawasaki disease patients. Dr. Michael Nihill (Texas Children's Hospital) presented what appeared to be the world's largest collection of angiograms of coronary artery fistulas. Just when you thought he was done, another slide would appear with another unusual fistulous connection. The session lasted well past 6:00 p.m. The fact that most of the 200 attendees remained, in spite of the beautiful San Diego weather on a Friday afternoon, is a tribute to the excellent quality of the speakers. All in all, there were 19 invited speakers with extensive experience and background in pediatric cardiology interventions, of which three were renowned experts with an international background.

SCAI attendees—left to right: Dr. John Cheatham, Director, Cardiac Catheterization & Interventional Therapy; Professor, Pediatrics & Internal Medicine, Division of Cardiology, The Ohio State University; Dr. Frank J. Hildner, Founding Editor Catheterization and Cardiovascular Interventions; Anthony E. Carlson, VP & Founder of Pediatric Cardiology Today, and Dr. John W. Moore, Mattel Children's Hospital at UCLA, and Director of the Editorial Board for Pediatric Cardiology Today .

There were also two sessions involving 12 oral abstract presentations and 11 poster presentations. During the popular "I blew it" session, six interesting cases involving various complications and mishaps during coarctation stenting and delivery of occlusion devices were presented and discussed by the attendees. This forum permits a free discussion of how to avoid complications as well as how to get out of trouble when it is

Michael J. Cowley, MD, FSCAI, President of SCAI (The Society for Cardiovascular Angiography and Interventions)

encountered and provides an excellent learning experience for all interventional cardiologists, from neophytes to world experts. A second new session, "Hemodynamic and angiographic dilemmas" was initiated this year. Six cases of various interesting diagnostic dilemmas were presented to the audience for discussion. The "I blew it king" award was presented to Dr. Phil Moore (San Francisco) for his entertaining and "interesting" case involving transcatheter management of a combination coarctation of the aorta and PDA. Dr. TH Goh (Australia) won the best "Dilemmas" award.

"...the future of pediatric interventional cardiology will involve more collaboration with the cardiovascular surgeons in the arena of "hybrid" procedures...."

There were lively exchanges of ideas during the sessions. Three particularly memorable quotes were: "I wouldn't go poking a skunk," a reply by an attendee when asked what he would do on a particular difficult interventional case. Dr. KC Chan (Denver Children's Hospital) said, "That is like going into a lion's den wearing raw steak for loincloth" when he commended the willingness of Dr. Mark Galantowitz to attend and speak at an interventional cardiologist's conference. The best quote of the session belonged to Dr. Phil Moore when he was presenting his "I blew it" case. After Dr. Carlos Ruiz (Chicago) responded to his question on how to approach the case, Phil said emphatically, "I am glad there is someone who has just as bad judgment as I do!" Of course, it was all in jest.

Throughout the pediatric sessions, exciting new information was presented on the latest and greatest in pediatric interventions for congenital heart disease. It appears from the meeting, that the major thrusts for the future of pediatric interventional cardiology will involve more collaboration with the cardiovascular surgeons in the arena of "hybrid" procedures, the advent of the valved stents and transcatheter palliation of the single ventricle patients. Overall, it was an excellent meeting, but I am sure the 28th meeting to be held in Ponte Vedra Beach, Florida on May 4 - 7, 2005 will be even bigger and better! So please come join us. (www.scai.org)

For comments to this article, send email to: JUNFFI@PediatricCardiologyToday.com

~PCT~

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