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AMPLATZER DUCT OCCLUDER® VS COILS IN MONGOLIA

By Hideshi Tomita, MD; Noriyuki Haneda, MD; Kenji Kuroe, MD; Shunji Nogi, MD; Hideaki Ueda, MD; Kenji Kishida, MD; Takashi Higaki, MD; Yasunori Horiguchi, MD; Jun Furui, MD; Masamichi Tamura, MD; Hidemi Takada, MD; Fumitoshi Tsurumi, MD; Shinichiro Tanaka, MD; Hiroshi Yano, MD

AMPLATZER Duct Occluder® or Coils for transcatheter occlusion of patent arterial duct; a cost comparison of devices used by a volunteer team of Japanese physicians in the setting of a humanitarian, heart-saving project in Mongolia.

Introduction

Since October 2001, members of a group of Japanese pediatric cardiologists have visited Mongolia once or twice a year to do diagnostic and interventional catheterizations.[1] Considering the limited medical resources available in Japan for this project and the limited resources in Mongolia, as well as cost, risk and benefit, we focused our activities on screening by echocardiography, transcatheter closure of patent arterial duct, balloon dilation of pulmonary stenosis and coarctation, and diagnostic catheterization. For the first two visits, there was no cine, no video, nor any other X-ray recording or replaying equipment; consequently, we judged the size and morphology of the patent arterial duct by rapid hand injection. For the third visit, we moved to the Shastin

Central Clinical Hospital, an adult cardiology and cardiovascular surgery center, has the only cine angiography machine in Mongolia, to do catheterizations. Until the fifth visit, we used only coils; 0.038 or 0.052 inch Gianturco coils, Flipper coils, or Platinum coils (Cook Inc., Bloomington, IN, USA), for patent arterial duct closure, as coils are the only devices available in Japan for this procedure. On the sixth visit, in 2005, we introduced the AMPLATZER Duct Occluder® (AGA Medical Co, MN, USA) for the first time.

We analyzed the cost effectiveness of introducing the AMPLATZER Duct Occluder® for transcatheter occlusion of patent arterial duct in this voluntary humanitarian heart-saving project.

Subjects

Sixty-one Mongolian patients with patent arterial duct, who underwent attempted transcatheter occlusion in the four visits from 2002 to 2005 at the same hospital and by the same team, were included in this study. During this period, coils (0.052 and 0.038 inch Gianturco coil, Flipper coil, Platinum coils) were used in 41 patients (Coil group), while the AMPLATZER Duct Occluder® was first used in 2005 and applied in 20 patients (AMPLATZER group), whose minimum ductus diameter was estimated to be greater than 2.5 millimeters by Doppler echocardiography.

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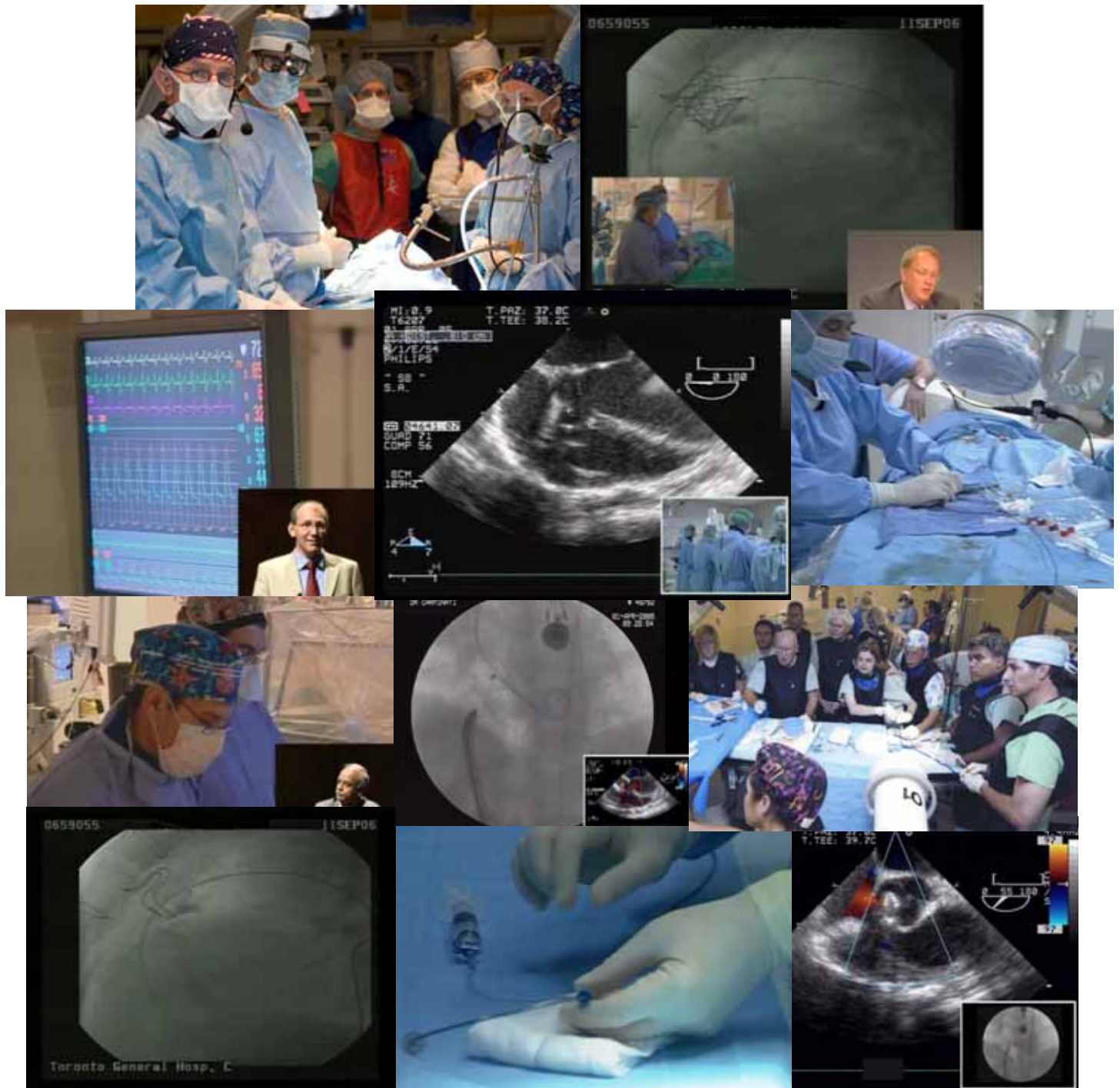
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Devices	Cost (US \$)
Sheath	51.2
Long sheath (6, 8 French)	40.2
Long sheath (6, 8 French)	188.0
Guiding catheter for PCI	341.9
Balloon angiographic catheter	170.9
Catheter (JR, Multipurpose, Pig-tail)	54.74
Guidewire	41.9
Contrast (50 milliliters)	179.9
0.052" Gianturco coil (2 in one package)	129.1
Flipper coil, Platinum coil	568.4
Delivery system (Flipper coil, Platinum Coil)	180.3
Bioptome (3 French)	726.5
Goose neck snare	486.3

	Coil (n=41)		AMPLATZER® (n=20)		P
	Range	Median	Range	Median	
Age	7m-29y	3y	11m-16y	2y6m	ns
Weight (kg)	5.0-7.0	13	6.8-51.0	13.6	ns
Minimum diameter (mm)	0.8-8.0	3.3	2.5-10		< 0.05
Less than 2.5	7 cases	2 cases			
2.5-2.9	7 cases	3 cases			
3.0-3.4	9 cases	4 cases			
Greater than or equal to 3.5	18 cases	11 cases			

Number of coils	n	Cost (US \$)		
		Range	Mean	SD
1	8	183.8-995.7	798.1	265.8
2	15	970.9-2042.7	1756.5	273.2
3	8	1940.2-3285.5	2582.2	446.7
Greater than or equal to 4	6	2300.9-3965.4	3276.1	614.4

Minimum diameter (mm)	n	Cost (US \$)		
		Range	Mean	SD
Less than 2.5	7	183.8-1552.1	849.3	401.4
2.5-2.9	7	995.7-2367.5	1677.7	425.8
3.0-3.4	7	970.9-4679.5	2329.7	1172.3
Greater than or equal to 3.5	17	1673.5-10281.2	3067.6	2004.5

Complications	Cost (US\$)
Migration, successful retrieval, and successful re-deployment (2 patients)	3354.7, 4679.5
Migration, unsuccessful retrieval, and surgery	1986.3 plus surgery
Two additional sessions following severe hemolysis after the 1st session	10281.2

Methods

For small patent arterial ducts, we principally used a Flipper coil, introduced retro- or pro-gradely, while for medium-sized patent arterial duct, our first choice was prograde deployment of a 0.052 inch Gianturco coil using a bioptome as reported by Grifka et al.[2] We occasionally used a 0.038 inch Gianturco coil or a Platinum coil, depending on the availability of coils, which varied with the budget in each year. The AMPLATZER Duct Occluder® was deployed as reported previously.[3, 4]

We usually used the following devices for the diagnostic catheter prior to the transcatheter closure: two sheaths, one for femoral vein and the other one for the femoral artery, one each of the following: a balloon angiographic catheter, a pig-tail catheter, and a guidewire, and contrast of 50-100 milliliters. Cost for these devices were excluded from the cost for transcatheter closure. As our project is staffed by volunteers, we only compiled the cost of devices for transcatheter occlusion of a patent arterial duct, while hospital charges, such as catheterization fees, anesthesia,

pharmacy, and physician's charges were not included. Coils and all other medical resources, except for the AMPLATZER Duct Occluder®, were supplied by the Japanese distributor, while the AMPLATZER Duct Occluder® was provided by China. Prices for medical resources from Japan were listed in Table 1,

while the AMPLATZER Duct Occluder® and its delivery system was supplied for 1500 US\$/device and 150 US\$/ one system, respectively. Although some devices were supplied at a discount price, we retrospectively calculated the cost based on the normal price in each country at the rate of 117 yen to the U.S. dollar.



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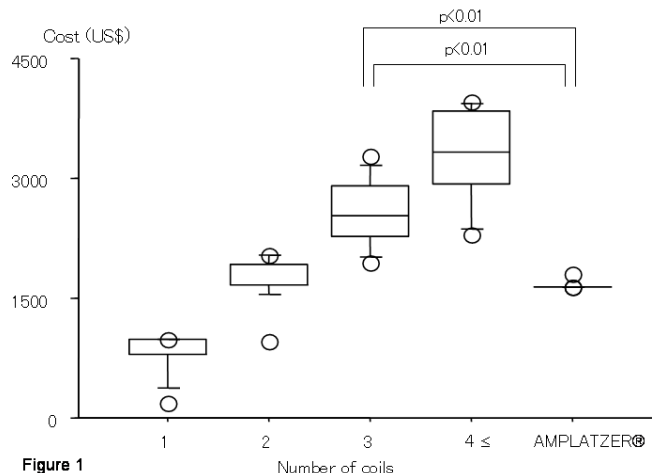


Figure 1

Figure 1: Cost comparison between coils and AMPLATZER Duct Occluder[®] depending on the number of coils used for occlusion. When we used 3 or more coils, the cost for devices was more expensive in the Coil group than in the AMPLATZER group.

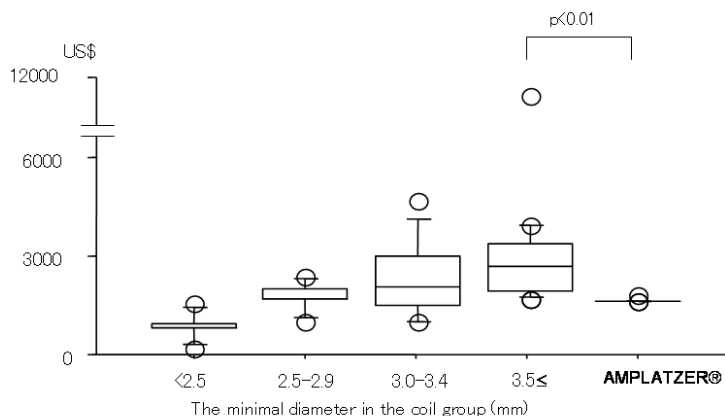


Figure 2

Figure 2: Cost comparison between coils and AMPLATZER Duct Occluder[®] depending on the minimum diameter of the patent arterial duct. The average cost for patent arterial duct greater than or equal to 3.5 millimeters was more expensive in the Coil group than in the AMPLATZER group.

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The leader of our team, Noriyuki Haneda, was given a temporary medical license from the Ministry of Health for Mongolia, while the other doctors were permitted to do any medical activities in Mongolia under his supervision. The AMPLATZER Duct Occluder[®] was approved also from the Ministry of Health for Mongolia, while its implantation was performed with an official distributor and proctor of AGA Medical Co., Larry Meng. Informed consent for transcatheter occlusion of a patent arterial duct either with coils or the AMPLATZER Duct Occluder[®] was obtained from the patients or patient's parents by not only Mongolian but also Japanese doctors.

Significant differences among the groups were detected by qui-square test of analysis of variance. A post-hoc test was done by Fisher's PLSD using STAT-View version 5.0 (SAS Institute Inc. Cary, USA). A probability-value less than 0.05 was taken as statistically significant.

Results

There was no significant difference in age and body weight between the two groups, while the minimum diameter in the AMPLATZER group (median, 4 millimeters) was larger than in the Coil group (median, 3.3 millimeters, probability-value less than 0.05, Table 2).

In the AMPLATZER group, all patent arterial ducts were closed without any complications. In the Coil group, the patent arterial duct was closed in a single session in 37 patients. Three patients had complications caused by migration, and one patient had a complication with hemolysis.

Migrated coils were retrieved and the patent arterial duct was closed in a second session in 2 patients, while one patient needed surgical retrieval and patent arterial duct ligation. Hemolysis was abol-

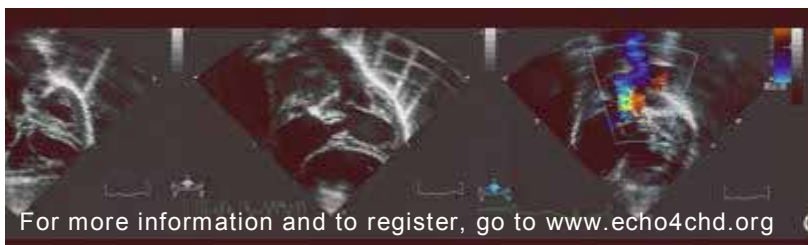
ished in an additional two sessions with 14 coils total. In all, the patent arterial duct was closed with coils in 40 patients. All the patients, other than those who needed an additional session because of migration or hemolysis, were discharged on the day after the procedure. There was no statistically significant difference in the frequency of complications and the complete closure ratio, between two groups.

As we used 20 AMPLATZER Duct Occluder[®] devices (1500 US\$/device) and 21 delivery systems (150 US\$/one system) in 20 patients, the cost for AMPLATZER Duct Occluder[®] closure was 1657.5 US\$/patient.

The average cost for coil occlusion depends on the number of coils used. The actual average cost for a single, 2, 3, and 4 or more coils was 798.1, 1756.5, 2582.2, and 3276.1 US\$, respectively (Table 3). When we used 3 or more coils, the cost for devices was more expensive in the Coil group (Figure 1). The actual average cost for transcatheter occlusion of patent arterial duct with a minimum diameter of less than 2.5 millimeters, 2.5-2.9 millimeters, 3.0-3.4 millimeters, and greater than or equal to 3.5 millimeters was 849.3, 1677.7, 2329.7, and 3067.6 US\$, respectively (Table 4). The average cost for a patent arterial duct greater than or equal to 3.5 millimeters was more expensive in the Coil group than in the AMPLATZER group (Figure 2). As the medical cost for patent arterial duct ligation is only 10 US\$ in Mongolia, it is meaningless to calculate the total cost in the patient who needed surgical retrieval of coils and patent arterial duct ligation. However, in the four patients, who were complicated by migration of coils or hemolysis, the cost for coil occlusion was double or more than AMPLATZER Duct Occluder[®] (Table 5). The minimum diameter of the patent arterial duct in these patients was greater than or equal to 3 millimeters.

Discussion

Patent arterial duct is a common problem in Mongolia because of the high altitude. Prior to 2005, we had visited Mongolia six times, and had attempted coil occlusion of a patent arterial duct in 49 patients. In this project, both transportation and the cost of medical supplies depended on donations by the Japanese people, making the budget quite limited. For the first two visits, all catheterizations were done at a hospital which had no cine angiography machine, but only had a portable X-ray fluoroscopy machine for the gastrointestinal tract. As this machine had no recording system for graphic data, we only had poor data on the minimum diameter and angiographic morphology of the patent arterial duct. [1] Consequently, we analyzed the data of the 41 patients treated in the last four visits. We used mainly 0.052 inch Gianturco coils for a moderate-sized patent arterial duct until the fifth visit, because the coil was still the only device for transcatheter occlusion of patent arterial duct approved in Japan. Multiple coils were frequently needed, and one patient who had complications due to migration of multiple 0.052 inch Gianturco coils needed surgery. Considering cost effectiveness and the safety of using a single AMPLATZER Duct Occluder[®] rather than multiple coils, we decided to introduce the AMPLATZER Duct Occluder[®] to our project. Thanks to the AGA Medical Co., 20 AMPLATZER Duct Occluders were provided at a discount price in 2005 from China, while coils were supplied by the Japanese distributor. Consequently, we compared cost effectiveness between the coil and the AMPLATZER Duct Occluder[®] based on the assumption that we had bought these devices for the normal price in each country.



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Because of the limited number of devices, we used AMPLATZER Duct Occluder® for selected patients with a patent arterial duct of a minimum diameter of 2.5 millimeters. Consequently, this study has the limitation of being a non-randomized retrospective study. The minimum diameter of the patent arterial duct was slightly larger in the AMPLATZER group, however, age and body weight were comparable in the two groups. We mainly used a 0.052 inch Gianturco coil, however, we occasionally used other types of coils depending on availability of coils which was determined by the limited budget. The actual normal price of a Flipper coil and a Platinum coil was more expensive than ordinary Gianturco coils, but they were supplied at a discount price. Use of such coils obviously makes the actual procedure cost more expensive. Despite these limitations, the AMPLATZER Duct Occluder® was more cost effective when we used 3 or more coils, and when the minimum diameter of a patent arterial duct was greater than or equal to 3.5 millimeters. Kumar, RK recommended using an AMPLATZER Duct Occluder® or surgery for any patent arterial duct greater than 6 millimeters in small children (greater than 4 millimeters for children less than 5 kilograms), as coils larger than 10 millimeters tend to be too large for the descending aorta.[5] In our previous study, the maximum diameter of patent arterial duct which could be closed with coils was 5.6 millimeters.[6] Therefore, around 6 millimeters will be the minimum diameter limit which can be closed even by using multiple 0.052 inch Gianturco coils. The cost for the 4 patients with complications caused by migration of coils or hemolysis was far more expensive, while one patient needed surgery. As the cost of coil occlusion for the 3.0-3.4 millimeters patent arterial duct was comparable to the AMPLATZER Duct Occluder®, we believe the AMPLATZER Duct Occluder® should be used for smaller patent arterial ducts, around 3 millimeters, in the unique setting of our voluntary activity.

Cost effectiveness of medical resources may not be the same from country to country, because the system which determines their prices is different. In this study, medical resources other than the AMPLATZER Duct Occluder®, were distributed from Japan, while the AMPLATZER Duct Occluder® came from China. Consequently, we could not compare the cost of devices to normal Japanese prices. As our project is volunteer-based, we did not analyze hospital and physicians charges in the cost. Hospital stay after the procedure was similar in 2 groups except for patients who needed the second session or surgery. We believe these fees are negligible in Mongolia compared to the cost of devices for

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transcatheter occlusion of a patent arterial duct, considering the fact that the total medical cost for patent arterial duct ligation is only 10 US\$ in Mongolia.

“Since October 2001, members of a group of Japanese pediatric cardiologists have visited Mongolia once or twice a year to do diagnostic and interventional catheterizations.”

In conclusion, transcatheter occlusion of a patent arterial duct using an AMPLATZER Duct Occluder® was more cost effective for a patent arterial duct greater than or equal to 3.5 millimeters, or for a patent arterial duct which needed 3 or more coils to close than the use of coils, in the situation of a heart saving project in Mongolia, where an AMPLATZER Duct Occluder® was distributed from China, with other medical resources from Japan.

Acknowledgements

The AMPLATZER Duct Occluder® could not have been introduced to this project without support from AGA Medical Corporation and Dr. Larry Meng from Beijing Since Medical Scientific Co.

We thank Dr. Peter M. Olley, Professor Emeritus of Pediatrics, University of Alberta, and Dr. Setsuko Olley for language consultation.

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HIGHLIGHTS FROM THE 43RD ANNUAL MEETING OF THE JAPANESE SOCIETY OF PEDIATRIC CARDIOLOGY AND CARDIAC SURGERY

By Professor Toshio Nakanishi, MD and Virginia Dematatis, Congenital Cardiology Today, Staff Editor

The 43rd Annual Meeting of the Japanese Society of Pediatric Cardiology and Cardiac Surgery (JSPCCS) was held at the Keio Plaza Hotel in Shinjuku, Tokyo, Japan on July 3-7, 2007. The meeting was attended by over 1400 pediatric cardiologists, cardiac surgeons, pathologists, nurse-practitioners and others from Japan, Canada, England, Scotland,

Brazil, Italy, Germany, Poland, the Netherlands and the United States. The size, quality and scope of the meeting were very impressive. The majority of the meeting was in Japanese and included talks on a wide range of topics given by distinguished faculty from major cardiac centers in Japan including: The Heart Institute, Tokyo Women's Medical University; National Cardiovascular Center, Osaka and Fukuoka Children's Hospital, Fukuoka. "Long-term Problems in Complex Congenital Heart



Left to right: Drs. Edward L. Bove, Robert H. Anderson, Prof. Hiromi Kurosawa and Yasuharu Imai.



Left to right: Drs. John Cheatham, Toshio Nakanishi, Prof. Hiromi Kurosawa, and Gil Wernovsky.



Left to right: Drs. Hideshi Tomita and Toshio Nakanishi.

Disease," "Management of Arrhythmia in Congenital Heart Disease," and "20 Years After Fontan Operation" were some of the topics discussed. The English language sessions covered a broad range of topics such as: "Long Term Outcome of Hypoplastic Left Heart Syndrome," "What Every Ablationist Needs to Know about Cardiac Anatomy," "Surgery without Heart Block," "Medical Management of Dilated Cardiomyopathy in Children," "Hybrid Approach to

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Congenital Heart Disease,” “How to Set up a Hybrid Catheterization Laboratory in a Small Space,” “ASD Closure by Catheter Intervention,” to name a few.

“The 44th Annual Meeting (JSPCCS 2008) will be held on July 2-4, 2008 in Koriyama City, Fukushima Prefecture, Japan.”

The fact that this meeting is the 43rd joint meeting of a society that includes over 2000 members (both pediatric cardiologists and cardiac surgeons) is of particular note, as it is only recently in the United States and other countries that joint meetings have begun to be held. The Japanese understood early on the advantages of having these two groups meet together to discuss topics

concerning congenital heart disease and issues unique to the pediatric population.

The meeting was planned by Prof. Hiromi Kurosawa, President of the Organizing Committee, Prof. Kazuaki Ishihara, Secretary General and Prof. Toshio Nakanishi, Chief of the Department of Pediatric Cardiology of the Tokyo Women’s Medical University. These gentlemen organized and hosted a comprehensive and interesting program, as well as a variety of congenial social events. Japanese pediatric cardiologists and surgeons, foreign faculty and guests gathered at both formal and informal events where they were treated to traditional Japanese cuisine and enjoyed the opportunity to get to know one another. One social highlight was the Welcoming Dinner, which included both Japanese and foreign faculty. It began with warm greetings from Prof. Kurosawa and Prof. Nakanishi and was followed by a number of toasts and brief

speeches from some of the English-speaking faculty, including: Drs. Edward L. Bove, Anton E. Becker, Robert H. Anderson, John Cheatham, Zahid Amin and John Moore. One highlight of the dinner was the presentation of flowers from Masataka Nakayama, the grandson of Dr. Toshiko Nakayama, Executive Trustee of the Alumni Association, Tokyo Women’s Medical University, to Prof. Kurosawa, who had successfully performed heart surgery on the young boy. The room erupted into warm applause as Prof. Kurosawa accepted the flowers.

The 44th Annual Meeting (JSPCCS 2008) will be held on July 2-4, 2008 in Koriyama City, Fukushima Prefecture, Japan. Abstract submission is welcome from all over the world. All inquiries should be sent to the homepage of the JSPCCS (<http://JSPCCS.umin.ac.jp/>).

~CCT~

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HIGHLIGHTS FROM THE 2007 INTERNATIONAL SYMPOSIUM ON THE HYBRID APPROACH TO CONGENITAL HEART DISEASE (ISHAC)

By John P. Cheatham, MD and Mark E. Galantowicz, MD

The International Symposium on the Hybrid Approach to Congenital Heart Disease (ISHAC) held its second annual meeting on June 27 – 29, 2007 at the Hilton Easton Town Center in Columbus, Ohio. Two hundred fifty congenital heart surgeons, interventional cardiologists, nurse practitioners, and other healthcare professionals from 25 states and 17 countries on five continents attended. Over one third of the attendees traveled over 2500 miles to attend ISHAC, while a post meeting survey indicated that 95% plan to return to another ISHAC meeting.

ISHAC brings together many of the leaders in Hybrid therapy to discuss how collaboration between interventional cardiology and cardiothoracic surgery can enhance care to pediatric and adult patients with complex congenital heart disease. The Hybrid ap-

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proach strives to improve clinical outcomes by marrying transcatheter therapies of the interventional cardiologist with the operative advances of the cardiac surgeon, thereby reducing the risks associated with each individual approach. It may also be possible to reduce the accumulated risks over time for patients with complex congenital heart disease (CHD) by using Hybrid therapies.

Forty invited speakers discussed how to begin a hybrid program, outlined current perspectives and challenges with Hypoplastic Left Heart Syndrome, muscular VSD treatment, complex stent therapy, and non-surgical implantation of cardiac valves with highlighted dis-

cussions of fetal cardiac therapy and new device designs and techniques. ISHAC concluded with a far-reaching view of the future. Nine live cases were performed from Columbus Children's Hospital Hybrid Cardiac Catheterization Suites and the University Laboratory Animal Resources, Experimental Surgi-



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cal Suites (ULAR). Dr. Jeffrey Feinstein, utilizing the audience response system, documented significant differences in

current practice in the preferred treatment in these cases. For example, the initial approach to a 5 kg patient with multiple mid-muscular VSD was identified as surgery – complete repair (33%), surgery – PA Band (29%), transcatheter device (7%), and perventricular device (29%) before the live cases demonstrated the ease and advantages of a Hybrid perventricular approach in selected individuals.

Drs. Dietmar Schranz (Giessen, Germany) and Mark Galantowicz (Columbus, OH)

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Faculty: J.V. Aranda, MD, PhD, FRCPC, FAAP, Medical Director, Clinical Research Center, Children's Hospital of Michigan Detroit, MI; Lance A. Parton, MD, Division of Newborn Medicine, NICU, Maria Fareri Children's Hospital at Westchester Medical Center Valhalla, NY; and C. Michael Cotten, MD Assist. Clinical Professor of Pediatrics Neonatal-Perinatal Medicine, Duke University Medical Center, Durham, NC.

In this live program, the expert faculty will review key epidemiologic and clinical issues involved with PDA; discuss the benefits and risks of surgical and medical therapies; compare drug therapies including indomethacin and intravenous ibuprofen; describe the role of prostaglandin inhibitors; and discuss pharmacologic options and pharmacoeconomic issues.

Learning Objectives: Upon completion of this activity, participants should be able to: Review key epidemiologic, pathophysiologic, and clinical issues involving PDA; Examine various PDA treatment options; Evaluate clinical pharmacology, experience and considerations involved with the pharmacologic options used in treating PDA; and Discuss the role of IV cyclooxygenase (COX) inhibitor therapy in PDA

Accreditation and Certification: This activity has been planned and implemented in accordance with the Essential Areas and policies of the ACCME through the joint sponsorship of the Annenberg Center for Health Sciences at Eisenhower and Akita Biomedical Consulting. The Annenberg Center is accredited by the ACCME to provide continuing medical education for physicians.



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Program Coordinators: John J. Lamberti, MD, Eugene and Joyce Klein Director of the Children's Heart Institute Rady Children's Hospital - San Diego Professor of Surgery - University of California, San Diego, School of Medicine - San Diego, CA; John W. Moore, MD, MPH, Director, Division of Cardiology - Rady Children's Hospital - San Diego Professor of Clinical Pediatrics Chief, Section of Cardiology - Department of Pediatrics University of California, San Diego, School of Medicine - San Diego, CA; Anthony C. Chang, MD, Medical Director, Heart Institute - Children's Hospital of Orange County Orange, CA

Program Monitor: Rayburn R. Skoglund, MD, Director, Continuing Medical Education Rady Children's Hospital - San Diego, CA.

Course Co-Directors: Drs. Emile Bacha, Dr. Peter Block, Mario Carminati, John Cheatham, Ted Feldman, Carlos Pedra, Mark Reisman, and Robert Sommer.

Guest Faculty Includes: Daniel Bernstein, MD; Alfred Woodley; Edward L. Bove, MD Ronald Bronicki, MD; Christopher Caldarone, MD; John P. Cheatham, MD; Paul A. Checchia, MD; Anne Dubin, MD Jeffrey R. Fineman, MD; Mark Galantowicz, MD; Nancy S. Ghanayem, MD; Frank L. Hanley, MD; Jeffrey P. Jacobs, MD; Marshall L. Jacobs, MD; James Lock, MD; Constantine Mavroudis, MD; Ralph S. Mosca, MD; James C. Perry, MD; Vaughn A. Starnes, MD; Sarah Tabbutt, MD, PhD; James S. Tweddell, MD; and William G. Williams, MD.

The program examines the early surgical management of the most complex defects and the late surgical management of previously repaired complex congenital heart disease. Internationally renowned authorities in cardiovascular surgery, cardiology and critical care medicine have been invited to participate in the program.

Objectives: ♥Evaluate contemporaneous management strategies for HLHS by comparing early, mid-term and late morbidity and mortality, including Late Neurodevelopmental Assessment. ♥Understand the role of the stage I Hybrid Procedure in the modern management of HJHS. ♥Understand the management options for older patients with late onset complications of the Fontan circulation. ♥Understand the latest concepts in the management of Tetralogy of Fallot with MAPCAS. ♥Understand the timing and role of surgery in the management of right ventricular dysfunction occurring long after the surgical treatment of Tetralogy of Fallot or Transposition of the Great Vessels. ♥Understand modern concepts of critical care management including the use of the newest pharmacologic agents and mechanical assist devices.



outlined their institutions' experiences with HLHS to date. These results were discussed along with the traditional Norwood and Sano procedures and compared quite favorably. Many centers are beginning to implement new Hybrid management strategies and report their early results. The experiences from Dante Pazzanese (Sao Paulo, Brazil) were outlined by Dr. Carlos Pedra along with those from Evelina Children's Hospital (London, UK) by Dr. Shakeel Qureshi and the Cardiovascular Institute & Fuwai Hospital (Beijing, China) by Dr. Shengshou Hu. Each presenter described an improved outcome at their respective institution with the initiation of Hybrid programs learned from the 1st ISHAC Symposium and Workshop in 2006.

A session on the Hybrid approach to complex muscular VSD was highlighted with lectures from Dr. Mario Carminati (Milano) and Dr. Zahid Amin (Omaha). Dr. Ziyad Hijazi (Chicago), with the assistance of Dr. Emile Bacha (Boston) and Dr. Dan Rowland

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(Houston), and Emile Bacha. Live case transmissions of these techniques were performed by the Miami team and Drs. Ralf Holzer and Alistair Phillips from Columbus. Drs. Philipp Bonhoeffer (London) and Ziyad Hijazi discussed possible Hybrid approaches for implantation of a valve stent in the pulmonary and aortic positions, with a highlight of Dr. Hijazi using a 33 French sheath to deliver the Edward's valve stent perventricularly during a live case demonstration from ULAR. The 2nd day culminated with two very unique demonstrations: (1) the use of real time 3-D Echo guidance for closure of VSD by Dr. Nikolay Vasilyev (Boston), and (2) the use of "Histotripsy" High Intensity Focused Ultrasound to create an ASD by Drs. Achi Ludomirsky (St. Louis) and Zhen Xu (Ann Arbor). A discussion of present and future fetal therapy by Dr. Wayne Tworetzky (Boston) and advanced imaging for Hybrid therapies by Dr. Craig Fleishman (Orlando) followed Dr. Chris Caldarone's stimulating update of transcatheter Fontan completion at Sick Children's Hospital, Toronto.

One of the many highlights of ISHAC was the keynote presentations by pioneers in the field, Dr. Michael J. Tynan and Dr. Aldo R. Castañeda. Each addressed the question, "How do you safely perform procedures that have never been performed before?" Both speakers gave unique perspectives as to how they performed procedures for the 1st time, taking care to insure safety but to go "where no man before has gone". The lectures were thought-provoking to all who attended and gave everyone aspirations of greatness.

On the 3rd day, a unique offering of ISHAC is the optional Skills Workshop, which has become the trademark of ISHAC and distinguishes it from all other meetings. Participants gain practical exposure to common Hybrid procedures through animal models developed by Workshop Directors, Drs. Ralf Holzer & Alistair Phillips, and Valerie Bergdall, DVM, along with her spectacular staff. The chosen animal models simulate human anatomy and facilitate hands-on learning of perventricular closure of muscular VSDs, intraoperative stent placement into branch pulmonary arteries, and placement of pulmonary artery bands and/or flow restrictors followed by placement of a PDA stent (for Hybrid Stage I palliation of HLHS). Other Hybrid materials and "wet labs" were also available for all who attended. The Workshop is the true highlight of ISHAC; just ask the attendees and faculty!

The importance of a global approach to congenital heart disease was highlighted with the announcement of the Fung/Wexner Endowment to foster international exchange in congenital heart disease. Mrs. Abigail Wexner, Chair of the Board of Trustees at Columbus Children's Hospital, successfully completed the London Marathon. In recognition of this accomplishment, Mr. and Mrs. William Fung of Hong Kong donated the start-up funds that

(Columbus), demonstrated a live case of perventricular closure of muscular VSD, while Drs. Amin, Hakan Akintuerk (Giessen), and Qi-Ling Cao (Chicago) demonstrated a novel way to treat membranous VSD using a Hybrid approach. A comprehensive afternoon session on the Hybrid approach to HLHS included different techniques to control pulmonary blood flow, creation of an adequate-size ASD, and treatment of retrograde aortic arch obstruction were presented by 15 faculty members from South America, Europe, and North America. Live transmission of Hybrid Stage I palliation in a baby with HLHS was demonstrated by Drs. Cheatham, Galantowicz, and Sharon Hill, ACNP, with a lively discussion amongst attendees and other faculty members.

On the 2nd day of the Symposium, the Hybrid approach to delivery of stents in the aorta, pulmonary artery, and other unusual locations were discussed by Drs. Evan Zahn (Miami), Audrey Marshall (Boston), Redmond Burke (Miami), Frank Ing



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were matched by Mr. and Mrs. Wexner. Specific projects supported by the endowment will be determined by Drs. John P. Cheatham, Timothy Feltes, and Mark Galantowicz, Co-Directors of The Heart Center.

Tours of the Hybrid Cardiac Catheterization and Operating Suites at Columbus Children's Hospital were available to participants and extremely well received. These suites are equipped with technology that allows point-to-point connectivity within the campus using the Teleconference Center and to any site inside or outside the United States. A prototype 5 Axis Flat Panel Detector C-arm (Toshiba CF-i/BP) was designed, tested, and installed in the Hybrid Catheterization Suites, allowing unparalleled patient accessibility to all members of the team. In addition, a prototype Hybrid Cardiothoracic Operative Suite was being built and design plans were made available for participants to review.

While ISHAC is an intellectually stimulating, professionally challenging forum to discuss the latest developments in congenital heart disease, it is also a place to relax and renew the fellowship of old friends, while enjoying the opportunity to make new acquaintances. The Gala Dinner was held at the historical Rotunda and Capitol Atrium of The Ohio Statehouse where President Abraham Lincoln made a public address. The evening of fellowship was topped off with a performance by Dr. Philip Bonhoeffer, who was accompanied by Casey Westfall of the Columbus Symphony Orchestra, and The Children's Choir of Columbus.

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We look forward to seeing everyone at ISHAC 2008, scheduled for June 16-18th in Columbus, Ohio. Dr. Edward L. Bove and Dr. Terry D. King will be our Keynote speakers. So, mark your calendars now!

~CCT~

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