World Society for Pediatric and Congenital Heart Surgery
Regional Meeting

KYOTO SYMPOSIUM

November 27-28, 2015
The Westin Miyako Kyoto, Japan

Ventriculo-Arterial Connections in Right and Left Heart

Endorsed by
The Japanese Association for Thoracic Surgery
The Japanese Society for Cardiovascular Surgery
Japanese Society of Pediatric Cardiology and Cardiac Surgery

Secretary:
Kyoto Prefectural University of Medicine Department of Pediatric Cardiovascular Surgery
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Administration Office:
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1-1-5-2E Maedaminami-machi, Toyohashi, Aichi 440-0851, Japan
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Greeting from the Local Host

Masaaki Yamagishi, MD, PhD
(Kyoto Prefectural University of Medicine)
Local Host, “Kyoto Symposium”,
Regional Meeting of the World Society for Pediatric and Congenital Heart Surgery (WSPCHS)

We are going to hold the “Kyoto Symposium” as a regional meeting of the World Society for Pediatric and Congenital Heart Surgery (WSPCHS).

WSPCHS was founded with the purpose of providing the best and highest level of medical and surgical treatments to children born with congenital heart diseases anywhere in the world regardless of their economic situations. In order to achieve this goal, conducting “Education, Research, Voluntary Social Service” is in its mission. WSPCHS is holding a major Scientific Meeting once every 2 years, as well as regional meetings all over the world between the Scientific Meetings. On the recommendation by Prof. Hiromi Kurosawa, President of WSPCHS, Kyoto Prefectural University of Medicine Department of Pediatric Cardiovascular Surgery has accepted to hold this regional meeting in Japan.

The meeting dates are November 27 and 28, 2015 and the venue is the Westin Miyako Kyoto at the foot of the Higashiyama Mountains, east of Kyoto. Kyoto at the end of November is the most beautiful season of the year because the autumn leaves are at their best. The Westin Miyako Kyoto has many famous sights within walking distance, such as Nanzenji Temple and Heian Jingu Shrine, which are famous for beautiful autumn leaves. We hope you would enjoy sightseeing in Kyoto after the meeting.

The theme of this regional meeting is decided as “Ventriculo-Arterial Connections in Right and Left Heart”. Even though biventricular outflow tract lesions are an important group of malformations in surgical treatment of congenital heart diseases, it is an area where a variety of problems remain to date, and development of the latest treatment such as tissue engineering is anticipated. We will cover such diverse malformations as tetralogy of Fallot, transposition of the great arteries, double outlet right ventricle, hypoplastic left heart syndrome and so on.

We believe this is a perfect opportunity to show cutting-edge surgical treatments of Japan to the world along with the latest surgical developments. We are also expecting many attendees from Asian countries.

As a keynote speech, by our special request, Prof. Anderson has agreed to give two lectures on anatomy, “Morphology of the Left and Right Ventricular Outflow Tracts” and “Morphogenesis of Outflow Tract Malformations”. This will be a golden opportunity for the young surgeons and cardiologists.

We also plan to hold “Jatene Memorial Lecture” and “Konno Memorial Lecture”, etc. Along with the many lectures by the world’s leading surgeons, we are also expecting fine presentations by the young surgeons and cardiologists from Japan.

We are looking forward to seeing you all in Kyoto full of beautiful multicolored leaves this autumn!
On behalf of the World Society for Pediatric and Congenital Heart Surgery, it is my great pleasure to welcome all of you to Kyoto.

The vision of the WSPCHS is “every child born anywhere in the world with a congenital heart defect should have access to appropriate medical and surgical care”. Under this vision, since 2007, meetings of the WSPCHS have been held in Washington, Montreal, Cairns, Shanghai, Guatemala, Istanbul, Lima, Sao Paulo and Cartagena.

The Kyoto Symposium is the first regional meeting of the WSPCHS in Japan and is hosted by Professor Masaaki Yamagishi, Kyoto Prefectural University of Medicine.

The program is substantial and fruitful. The main topic is Ventriculo-arterial connections in right and left heart. Professor Robert H. Anderson, London will give two keynote lectures. Many distinguished speakers from more than twenty-five countries will come and discuss about this important issue. In two Lunch Seminars, Ventricular Assist devices & Heart Transplantation in the world and the World Database will be highlighted.

I am sure that you will have a great experience in this fantastic scientific meeting and will enjoy a most beautifully colored Kyoto.
Dear colleagues and friends,

The World Society for Pediatric and Congenital Heart Surgery welcomes you to a special regional meeting, on November 27, 28, 2015 in Kyoto, Japan. The Kyoto Symposium will be hosted by Masaaki Yamagishi from the Kyoto Prefectural University of Medicine and by our distinguished President, Hiromi Kurosawa. This special meeting is endorsed by the following: the Japanese Society for Pediatric Cardiology and Cardiac Surgery, the Japanese Society for Cardiovascular Surgery and the Japanese Association for Thoracic Surgery. The World Society is proud to be collaborating with our Japanese colleagues and is thrilled to be in Japan with such a distinguished Faculty from all over the world!

We are honored to have among us Professor Robert H. Anderson from London, United Kingdom and Professor Roland Hetzer from Berlin, Germany. Among the many outstanding presentations, there will be 2 special lectures: the Konno Memorial Lecture, to be delivered by our President, Hiromi Kurosawa and the Adib Jatene Memorial Lecture, to be delivered by our Second Vice-President, Marcelo Jatene.

A highlight of the meeting will also be the Lunch Seminar on the World Database for Pediatric and Congenital Heart Surgery: Defining the future & the needs in Asia. Following the enthusiastic support expressed at the Sao Paulo, Brazil meeting in 2014 and the Cartagena, Colombia meeting in February 2015, the Governing Council has decided that the World Database will be established at the University of Alabama in Birmingham, USA under the leadership of James K. Kirklin. The Kyoto Symposium will undoubtedly be another milestone in the historic development of the World Database.

The Kyoto Symposium will be a fantastic occasion for pediatric and congenital heart surgeons and their colleagues from around the world to share ideas and the latest scientific information that will without a doubt greatly benefit the care of our patients.

It is therefore with great pleasure that we welcome all of you to historic Kyoto!
## Local Committee

**Chair:** Masaaki Yamagishi (Kyoto, Japan)  
**Co-Chair:** Hiromi Kurosawa (Tokyo, Japan)

- Hajime Ichikawa (Osaka, Japan)  
- Akio Ikai (Morioka, Japan)  
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- Shunji Sano (Okayama, Japan)  
- Takaaki Suzuki (Saitama, Japan)  
- Takayoshi Ueno (Osaka, Japan)  
- Naoki Yoshimura (Toyama, Japan)

## Program Committee

**Co-Chairs:** Masaaki Yamagishi (Kyoto, Japan)  
Hiromi Kurosawa (Tokyo, Japan)  
Christo I. Tchervenkov (Montreal, Canada)

- Hafil Abdulgani (Jakarta, Indonesia)  
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- Frank Edwin (Accra, Ghana)  
- Adel Elgamal (Mansoura, Egypt)  
- Kirsten Finucane (Auckland, New Zealand)  
- Jose Fragata (Lisbon, Portugal)  
- Viktor Hraska (Sankt Augustin, Germany)  
- Hajime Ichikawa (Osaka, Japan)  
- Akio Ikai (Morioka, Japan)  
- Yutaka Imoto (Kagoshima, Japan)  
- Jeffrey P. Jacobs (St Petersburg, USA)  
- Marshall L. Jacobs (Baltimore, USA)  
- Marcelo B. Jatene (Sao Paulo, Brazil)  
- Richard A. Jonas (Washington, USA)  
- Tae-Gook Jun (Seoul, South Korea)  
- Hideaki Kado (Fukuoka, Japan)  
- Masaaki Kawada (Tochigi, Japan)  
- James K. Kirklin (Birmingham, USA)  
- Martin Kostolny (London, United Kingdom)  
- Jinfen Liu (Shanghai, China)  
- Krishna Iyer (New Delhi, India)  
- Kiyozo Morita (Tokyo, Japan)  
- Hani Najm (Riyadh, Saudi Arabia)  
- Ericka Perez Albrecht (Cochabamba, Bolivia)  
- James St. Louis (Kansas City, USA)  
- Kisaburo Sakamoto (Shizuoka, Japan)  
- Piya Samankatiwat (Bangkok, Thailand)  
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- Masashi Takahashi (Niigata, Japan)  
- James S. Tweddell (Milwaukee, USA)  
- Takayoshi Ueno (Osaka, Japan)  
- Susan Vosloo (Cape Town, South Africa)  
- Qing-Yu Wu (Beijing, China)  
- Naoki Yoshimura (Toyama, Japan)
GENERAL INFORMATION

Dates
November 27 (Fri.) - 28 (Sat.), 2015

Theme
Ventriculo-Arterial Connections in Right and Left Heart

Local Host
Masaaki Yamagishi (Kyoto Prefectural University of Medicine)

Venue
Yamashiro-No-Ma, East Wing 2F, The Westin Miyako Kyoto
Keage, Sanjo, Higashiyama-ku, Kyoto 605-0052, Japan
TEL. +81-75-771-7111
http://www.miyakohotels.ne.jp/westinkyo/english/index.html

Registration
Nov. 27 7:30 - 16:00    Nov. 28 8:00 - 16:00
Medical doctor / General attendee       JPY 20,000
Co-medical (Nurse / Technician)       JPY 3,000
Student           Free
*Please bring a certificate / ID / Student card if you are nurse, technician or student.

Exhibition & Poster Posting
Nov. 27 & 28     8:30 - 17:00

Language
The official language of the symposium is English.

Meal
Lunch Box will be provided at Lunch Seminars.

Notice
Free Wifi is available at the venue.
Photography and video shooting without permission are prohibited.

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E-mail. wspchs-kyoto2015@heartorg.gr.jp
VENUE MAP

The Westin Miyako Kyoto, East Wing 2F

Exhibitors

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<th>Booth No.</th>
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Program
PROGRAM

Friday, November 27, 2015  8:15 to 17:45

08:15  Welcome from Local Host  Masaaki Yamagishi  (Kyoto, Japan)
08:20  Welcome from President, WSPCHS  Hiromi Kurosawa  (Tokyo, Japan)
08:25  Welcome from Executive Director & Founding President, WSPCHS  Christo I. Tchervenkov  (Montreal, Canada)

Special Morning Lecture  8:30 – 9:00

Chairman:  Hiromi Kurosawa  (Tokyo, Japan)

08:30  Morphology of the Left and Right Ventricular Outflow Tracts  Robert H. Anderson  (London, United Kingdom)

Session 1:  9:00 – 10:30

Surgery for LVOTO

Chairmen:  Masaaki Yamagishi  (Kyoto, Japan)
            Hiromi Kurosawa  (Tokyo, Japan)
            Christo I. Tchervenkov  (Montreal, Canada)

09:00  The complex spectrum of critical LVOTO:  Impact of associated mitral valve abnormalities & ventricular hypoplasia  Edward J. Hickey  (Toronto, Canada)
09:15  Surgical Aortic Valvuloplasty versus Balloon Aortic Valve Dilatation  Igor Konstantinov  (Melbourne, Australia)
09:30  Experience with the Ross and Ross-Konno Operation  Zohair Al-Halees  (Riyadh, Saudi Arabia)
09:45  Outcomes of small aortic prostheses in children and young adults  Drissi Boumzebra  (Marrakesh, Morocco)
10:00  Aortic root valve–sparing operations  Luca Vricella  (Baltimore, USA)
10:15  Critical LVOTO: Lessons learned from the STS Congenital Heart Surgery Database  Jeffrey P. Jacobs  (St. Petersburg, USA)
10:30 - 11:00  Break: Posters and Exhibits

Session 2: 11:00 – 12:30

Basic Science Session

Chairmen: Richard A. Jonas (Washington, USA)
            Adel Elgamal (Mansoura, Egypt)
            Toshiharu Shinoka (Columbus, USA)

11:00  Anomalies of ventriculo-arterial connections and immature brain development
       Nobuyuki Ishibashi (Washington DC, USA)

11:15  Tissue engineered valves
       Toshiharu Shinoka (Columbus, USA)

11:30  Development of cardiac tissues with the ability for independent cardiac assistance
       using cell sheet based tissue engineering
       Hidekazu Sekine (Tokyo, Japan)

11:45  Clustering of Random Events
       Tjark Ebels (Groningen, Netherlands)

12:00  The World Journal for Pediatric and Congenital Heart Surgery
       Richard A. Jonas Chairman, Publications Committee, WSPCHS (Washington, USA)

Lunch Seminar 12:30 - 13:30

Ventricular Assist Devices & Transplantation for Congenital Heart Disease: Current State of the Art

Chairmen: Beatriz Furlanetto (Sao Paulo, Brazil)
           James K. Kirklin (Birmingham, USA)
           Takayoshi Ueno (Osaka, Japan)

12:30  Evolution of Ventricular Assist Devices and the Berlin Heart
       Roland Hetzer (Berlin, Germany)

12:50  Current status of heart transplantation for CHD
       James K. Kirklin (Birmingham, USA)

13:10  History and current status of heart transplantation in South Africa
       Susan Vosloo (Cape Town, South Africa)

Co-sponsored by MEDICAL PINE CO., LTD.
Konno Memorial Lecture 13:30 – 14:00

Chairman: Masaaki Yamagishi (Kyoto, Japan)

13:30 | The Konno Operation
Hiromi Kurosawa (Tokyo, Japan)

Co-sponsored by Japan Lifeline Co., Ltd.

Session 3: 14:00 – 15:30

Complex Surgical Management RVOT

Chairmen: Sertac M. Cicek (Istanbul, Turkey)
Piya Samankatiwat (Bangkok, Thailand)
Naoki Yoshimura (Toyama, Japan)

14:00 | Surgical Treatment for PA, IVS
James D. St. Louis (Kansas City, USA)

14:15 | PA, IVS with RV Dependent Coronary Circulation
James D. St. Louis (Kansas City, USA)

14:30 | Surgical treatment of Tetralogy of Fallot, absent pulmonary valve syndrome
Richard A. Jonas (Washington, USA)

14:45 | Valve-sparing techniques for repair of Tetralogy of Fallot
Kisaburo Sakamoto (Shizuoka, Japan)

15:00 | Repair of PA, VSD, MAPCA’s
Takaya Hoashi (Osaka, Japan)

15:15 | Truncus arteriosus with interrupted aortic arch
Sertac M. Cicek (Istanbul, Turkey)

15:30 - 16:00 Break: Posters and Exhibits
Session 4: 16:00 – 17:45

Late Surgical Management RVOT

Chairmen:
James S. Twedell (Milwaukee, USA)
Ericka Perez Albrecht (Cochabamba, Bolivia)
Kisaburo Sakamoto (Shizuoka, Japan)

16:00  Late reoperations after repair of Tetralogy of Fallot
Jose Fragata (Lisbon, Portugal)

16:15  The Significance of Restrictive versus Nonrestrictive Physiology late after Repair of TOF
James S. Twedell (Milwaukee, USA)

16:30  Use of decellularized homografts for pulmonary valve replacement
Masamichi Ono (Munich, Germany)

16:45  Pulmonary valve replacement in Egypt: Current use and prostheses choice in Africa
Adel Elgamal (Mansoura, Egypt)

17:00  There is a role for mechanical valve prostheses for pulmonary valve replacement
Tjark Ebels (Groningen, The Netherlands)

17:15  PTFE patch for outflow tract reconstruction
Takako Miyazaki (Kyoto, Japan)

17:30  Pulmonary valve replacement with Contegra grafts and stented bioprostheses
Sertac M. Cicek (Istanbul, Turkey)

Welcome Dinner Reception  18:30 – 21:00
(All attendees: Free to join)

Venue: Aoi Den, East Wing 4F, The Westin Miyako Kyoto
Saturday November 28, 2015  8:30 to 17:45

Special Morning Lecture  8:30 – 9:00

Chairman:  Hiromi Kurosawa  (Tokyo, Japan)

08:30  Morphogenesis of Outflow Tract Malformations
Robert H. Anderson  (London, United Kingdom)

Co-sponsored by TERUMO CORPORATION

Session 5:  9:00 – 10:30

Complex Surgical Management: Conotruncal Anomalies I

Chairmen: Marcelo B. Jatene  (Sao Paulo, Brazil)
Susan Vosloo  (Cape Town, South Africa)
Takaaki Suzuki  (Saitama, Japan)

09:00  Challenges in surgical management of Tetralogy of Fallot in Bolivia
Ericka Perez Albrecht  (Cochabamba, Bolivia)

09:15  Effect of high altitude on timing and surgical treatment of patients
with conotruncal anomalies
Nestor Sandoval  (Bogota, Colombia)

09:30  Cardiac Surgery for Conotruncal Anomalies in Sub-Saharan Africa
Frank Edwin  (Accra, Ghana)

09:45  Yasui operation for interrupted aortic arch with LVOTO
Toshihide Nakano  (Fukuoka, Japan)

10:00  Primary Repair of Truncus Arteriosus: Alternatives to homografts
Jorge Cervantes  (Mexico City, Mexico)

10:15  AtrioVentricular Groove Patch Plasty for Anatomically Corrected Malposition
of the Great Arteries
Kiyozo Morita  (Tokyo, Japan)

10:30 - 11:00  Break: Posters and Exhibits
Best Paper Presentations

11:00
One-stage Repair of Transposition of Great Arteries and Coarctation of Aorta
Shu-chien Huang (National Taiwan University Hospital, Taipei, Taiwan)

11:10
Primary arterial switch operation in children presenting late with TGA / IVS
– Do we need Rapid two stage operations? –
Noritaka Ota (National Heart Institute Malaysia, Malaysia)

11:20
Long-term results of arterial switch operation for transposition of the great arteries and aortic arch obstruction
Hironori Matsuhisa (Kobe Children’s Hospital, Kobe, Japan)

11:30
Preoperative ratio of the diameter of the ascending aorta to main pulmonary artery predicts the postoperative right ventricular outflow obstruction after arterial switch operation
Yasutaka Hirata (The University of Tokyo Hospital, Tokyo, Japan)

11:40
Pulmonary translocation may be beneficial in left ventricular outflow tract outcome in patients with transposition of the great arteries and ventricular septal defect with pulmonary stenosis
Yasuhiro Kotani (Okayama University, Okayama, Japan)

11:50
Long-term results of Ross procedures in children under 15 years of age
Takeshi Hiramatsu (Tokyo Women’s Medical University, Tokyo, Japan)

12:00
A novel Technique of Making Super Flexible Replica of Complicated Congenital Heart Disease for Precise Understanding of Anatomy, Simulation of Surgical Operation, and Education for Trainees
Isao Shiraishi (National Cerebral and Cardiovascular Center, Osaka, Japan)

12:10
3D visualization of the cardiac conduction system in human heart specimens by the high-resolution phase contrast CT imaging
Gen Shinohara (Jikei University School of Medicine, Tokyo, Japan)
Lunch Seminar: 12:30 – 13:30

World Database for Pediatric and Congenital Heart Surgery: Defining the Future & the Needs in Asia

Chairmen: James K. Kirklin (Birmingham, USA)
Nestor Sandoval (Bogota, Colombia)
James D. St. Louis (Kansas City, USA)
Christo I. Tchervenkov (Montreal, Canada)
Kisaburo Sakamoto (Shizuoka, Japan)

12:30 Overview of the World Database for Pediatric and Congenital Heart Surgery
James K. Kirklin Chairman, Database Committee, WSPCHS (Birmingham, USA)

12:40 Minimal dataset for the World Database for Pediatric and Congenital Heart Surgery
James D. St. Louis Secretary, Database Committee, WSPCHS (Kansas City, USA)

12:50 The Use and Needs of Congenital Databases in Southeast Asia
Sivakumar Sivalingam (Kuala Lumpur, Malaysia)

12:55 The Use and Needs of Congenital Databases in Taiwan
Jun-Yen Pan (Kaohsiung, Taiwan)

13:00 The Use and Needs of Congenital Databases in Korea
Si Chan Sung (Pusan, Korea)

13:05 The Use and Needs of Congenital Databases in the Middle East
Hani Najm (Riyadh, Saudi Arabia)

13:10 The Use and Needs of Congenital Databases in China
Qingyu Wu (Beijing, China)

13:15 The Use and Needs of Congenital Databases in India
Krishna Iyer (New Delhi, India)

13:20 The Use and Needs of Congenital Databases in Japan
Yasutaka Hirata (Tokyo, Japan)

13:25 Concluding remarks

Adib Jatene Memorial Lecture 13:30 – 14:00

Chairman: Yutaka Imoto (Kagoshima, Japan)

13:30 Adib Jatene: The man besides the surgeon
Marcelo B. Jatene (Sao Paulo, Brazil)
Session 7: 14:00 – 15:30

Complex Surgical Management: Conotruncal Anomalies II

Chairmen: Hafil Abdulgani (Djakarta, Indonesia)
Jorge Cervantes (Mexico City, Mexico)
Hideaki Kado (Fukuoka, Japan)

14:00  Repair of DORV, Tetralogy type
Qingyu Wu (Beijing, China)

14:15  Repair of the Taussig-Bing Heart
Hani K. Najm (Riyadh, Saudi Arabia)

14:30  DORV with Doubly-committed VSD: Surgical considerations
Christo I. Tchervenkov (Montreal, Canada)

14:45  DOLV
Hiromi Kurosawa (Tokyo, Japan)

15:00  Biventricular Repair of ccTGA
Tae-Gook Jun (Seoul, Korea)

15:15  Surgical Treatment for ccTGA: the Taiwan Experience
Chung-I Chang (Taipei, Taiwan)

15:30-16:00  Break: Posters and Exhibits
Session 8: 16:00 – 17:45

Complex Surgical Management: Conotruncal Anomalies III

Chairmen: Zohair Al-Halees (Riyadh, Saudi Arabia)
Jeffrey P. Jacobs (St. Petersburg, USA)
Kiyozo Morita (Tokyo, Japan)

16:00 Arterial Switch Operation for TGA with Intramural Coronaries
Kirsten Finucane (Auckland, New Zealand)

16:15 Late Arterial Switch Operation after a Senning or Mustard
Shunji Sano (Okayama, Japan)

16:30 Late Presentation TGA
Krishna Iyer (New Delhi, India)

16:45 Long-term outcome of the Rastelli Operation for TGA, VSD, LVOTO
James K. Kirklin (Birmingham, USA)

17:00 Truncal switch for TGA, VSD, LVOTO
Masaaki Yamagishi (Kyoto, Japan)

17:15 Surgical Options for TGA, IVS and LVOTO
Martin Kostolny (London, UK)

17:30 Is there still a role for the Senning and Mustard Operation?
Rajesh Sharma (New Delhi, India)

17:45 Closing remarks
Hiromi Kurosawa (Tokyo, Japan)
President, WSPCHS

Zohair Al-Halees (Riyadh, Saudi Arabia)
Local Host, 5th Scientific Meeting, WSPCHS
October 27-30, 2016, Abu Dhabi, United Arab Emirates

Christo I. Tchervenkov (Montreal, Canada)
Executive Director & Founding President, WSPCHS
Oral & Poster Presentations
Oral Presentation 1

One-stage Repair of Transposition of Great Arteries and Coarctation of Aorta

Department of Cardiovascular Surgery, National Taiwan University Hospital, Taipei, Taiwan
OSHu-chien Huang

BACKGROUND: The combination of transposition of the great arteries and coarctation/interruption of the aorta (TGA/CoA,IAA) presents a surgical challenge. Since 2008, neonatal one-stage repair with concurrent aortic arch repair and arterial switch operation was preferred in our institute. We review the results of this strategy.

METHODS: Between 2008 and 2015, 10 patients with TGA (n=5) or Taussig-Bing anomaly (n=5) with CoA (n=7) or IAA (n=3) underwent a neonatal complete single-stage repair. Innominate artery was cannulated with Gortex graft for selective cerebral perfusion and arterial switch combined with aorta reconstruction. Lecompete maneuver was used in (9 of them). The VSD (n=9) repair was performed either through RA or RVOT incision. The infundibular muscle was routinely checked and relieved as feasible, pulmonary valve was dilated with Hegar dilator, but not trans-annular patch. The ASD fenestration was left as an escape shunt.

RESULTS: There was no hospital mortality. Two patients required re-operation for pulmonary stenosis, both had right coronary artery in front of pulmonary valve. Atrio-ventricular groove patch plasty was applied in both of them. Balloon dilatation was performed for residual CoA (n=1) and peripheral pulmonary stenosis (n=2). Overall 50% of them require re-intervention/re-operation without mortality.

CONCLUSIONS: Neonatal one-stage repair for TGA/CoA, IAA achieves excellent survival. Re-intervention is common and the special right atrial-ventricular groove patch plasty were needed when the right coronary artery crossed RVOT.

Oral Presentation 2

Primary arterial switch operation in children presenting late with TGA / IVS – Do we need Rapid two stage operations? –

Department of Cardiovascular Surgery, National Heart Institute Malaysia, Malaysia
ONoritaka Ota, Sivakumar Sivalingam, Pau Kiew Kong, Atsushi Tateishi
Mohammad Rokonujjaman, Laura Mazalan, Hew Chee Chin, Mohd Azhari Yakub

Objective: The surgical management of late referral infants with d-transposition of great arteries (TGA) and intact ventricular septum is a matter of debate. We introduced primary ASO for the patient with TGA/IVS who had more than 3.5mm of Posterior LV wall.

Methods: Between January 2013 and June 2015, 116 patients underwent ASO. 26 with TGA/IVS out of 116 patients underwent primary ASO at more than 30 days of age. All operations were done by two operators.

Results: The age (median) and body weight at the operation were 104 days (31_408) and 3.75kg (2.9_7.3). The cardiopulmonary bypass time (median) was 204.5 min (149_328), while mean aortic cross-clamp time was 104.5(70-161). There was no mortality. The duration (days)(median) of ICU stay, intubation and hospital stay were 8(4-34), 6(3-18), 16 (8-39) respectively. The thickness of posterior LV wall (pre-OP vs Post-OP)(mm) was (4.04±0.71 vs 5.90±1.3: P<0.0001) (interval: 11.8±6.5 days). One patient needed Post OP ECMO support for LV re-training. The Left atrial pressure (mmHg) (POD1 vs POD3) (21.5±4.9 vs 9±1.4: p=0.01) and the maximum blood Lactate level (mmol/deL) (5.6±2.5 vs 1.4±0.2: p=0.01) were significantly improved in the post-operative course. The patient with thin Pre-OP LV posterior wall (<4mm:n=13) had significantly longer ventilation time (days) (10.6±4.8 vs 4.8±1.7: p=0.0039) and ICU stay (days) (14±9.2 vs 7.5±3.5: p=0.025), compared with thick LV wall (>/>= 4.0mm) group.

Conclusions: The children older than 30days with TGA/IVS can benefit from primary ASO with acceptable results under our indication. However, we need further investigation for LV function.
Oral Presentation 3

Long-term results of arterial switch operation for transposition of the great arteries and aortic arch obstruction

1) Department of Cardiovascular Surgery, Kobe Children’s Hospital, Kobe, Japan
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OBJECTIVE: The aim of the study was to analyze our surgical outcome of transposition of great arteries (TGA) with aortic arch obstruction (AAO).

METHODS: A retrospective study was performed, and 25 patients with TGA (n=6) or Taussig-Bing anomaly (n=19) with AAO were identified between 1982 and 2015. Primary one-stage repair was performed in 4 patients. Two-stage repair was performed in the remaining 21 patients. Our current procedure of choice is two-stage correction with short-term bilateral pulmonary artery banding followed by correction (n=5).

RESULTS: One patient was lost after the first aortic arch repair and pulmonary artery banding. Two patients after bilateral pulmonary artery banding were converted to Norwood operation according to the intraoperative findings. Remaining 22 patients underwent corrective operation including arterial switch operation. There were 2 early and no late death. Overall survival was 91% at 15 years. One patient with multiple ventricular septal defects underwent heart transplantation due to cardiac dysfunction. Freedom from reintervention was 47% at 15 years. Two patients required left ventricular outflow tract surgery, 1 for aortic insufficiency, and the other for recurrent aortic arch obstruction. Four patients required reoperations (n=2) or transcatheter reinterventions (n=2) on the right ventricular outflow tract. At follow-up, all but one patients were in New York Heart Association functional class I. No patients had moderate or more neo-aortic insufficiency.

CONCLUSIONS: Two-stage correction for TGA with AAO still offers excellent survival benefit with low incidence of neo-aortic insufficiency.

Oral Presentation 4

Preoperative ratio of the diameter of the ascending aorta to main pulmonary artery predicts the postoperative right ventricular outflow obstruction after arterial switch operation

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Background: The result of arterial switch operation (ASO) has improved recently and current mortality in Japan is under 5% for transposition of the great arteries (TGA) without VSD. However, there is still long term morbidity including catheter intervention and surgery for the right ventricular outflow obstruction. We made a hypothesis that the ratio of the diameter of the ascending aorta to main pulmonary artery (AP ratio) is an important factor which influences the postoperative right ventricular outflow tract obstruction (RVOTO) because small ascending aorta will become the new main pulmonary artery. We investigated the relation of the AP ratio and the reoperation for the RVOTO.

Methods: Between March 2002 and October 2014, 38 patients underwent ASO for TGA or related defects including false Taussig-Bing with coarctation of the aorta. Fourteen patients (39%) had ventricular septal defect (VSD) and seven patients (15%) had coarctation of the aorta or interrupted aortic arch. Five patients underwent coarctation repair before ASO. The average follow-up period was 8.0±3.4 years.

Results: There was one hospital death (2.6%) and no late death. There were four reoperations for the RVOTO. The AP ratio of the patients who underwent the reoperations for the RVOTO was significantly smaller than those without reoperation (0.77 vs. 1.0 p=0.04).

Conclusions: The result of arterial switch operation is satisfactory but there is still unignorable long-term postoperative morbidity. Preoperative ratio of the diameter of ascending aorta to main pulmonary artery predicts the postoperative RVOTO. Surgeons should aware the possibility and take appropriate measures to avoid these postoperative complications whenever possible.
Oral Presentation 5

Pulmonary translocation may be beneficial in left ventricular outflow tract outcome in patients with transposition of the great arteries and ventricular septal defect with pulmonary stenosis

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Left ventricular outflow tract obstruction (LVOTO) is one of the issues after Rastelli operation in patients with transposition of the great arteries and ventricular septal defect with pulmonary stenosis (TGA/VSD/PS). Longer distance of LVOT routing is considered a risk for LVOTO and subsequent LV dysfunction. Pulmonary root translocation (PRT) is developed for better right ventricular outflow tract outcome, however, it may have a potential advantage for LVOT outcome. We sought to evaluate our initial experience of PRT, especially in LVOT anatomic outcome.

**Method and Result:** Since April 2011, 4 patients underwent PRT with Rastelli operation. Diagnosis includes TGA/VSD/PS in 2 patients and congenitally corrected TGA/VSD/PS in 2 patients. At surgery, the pulmonary artery was transected at the level of sinotubular junction and patch-closed using Glutaraldehyde-treated pericardium. After surgery, the distance between the top of the interventricular septum (IVS) and the aortic valve (AoV) by echocardiogram, where supposed to be a routing with VSD patch, was decreased from 28 to 21mm, 21.6 to 19mm, 22 to 15.8mm, and 28.2 to 22.8mm, respectively. No patients had a significant LVOTO nor aortic regurgitation after surgery.

**Conclusion:** Distance between the IVS and AoV was shortened after PRT due to a posterior shift of the aortic root. Long-term follow-up and further examination of the mechanism is necessary.

Oral Presentation 6

Long-term results of Ross procedures in children under 15 years of age

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**OBJECTIVE:** The current study aims to evaluate the long-term outcomes of Ross procedures in children under 15 years of age.

**METHODS:** Since 1996, 45 children under 15 years of age underwent Ross procedure including 12 Ross-Konno procedure. The ages at operation ranged from 6 months to 15 years old (average 9.2 years old). Regarding RV outflow tract reconstruction, several methods were employed (the autologous pericardial valve and conduit : 15, the xenopericardial conduit and ePTFE valve : 9, direct posterior wall reconstruction with monocusp patch : 9, allograft : 7, and old aortic root was : 5). The follow up period was 2-19 years (average 12.4 years.)

**RESULTS:** There were 1 hospital death (heart failure) and 1 late death (heart failure). The Kaplan-Meier survival rate was 95.6% at 10 years. There were 7 reoperations regarding autograft (AVR: 4, Konno: 2, Bentall: 1) due to progression of AR, and their age at Ross was 8-15 years old, and the ratio of aortic to pulmonary valve diameter at Ross was significantly larger in the reoperation group (1.19 vs 0.96, p<0.01). Regarding RV outflow tract stenosis, there were 10 PTA and 5 reoperations (RVOTR: 4, PVR: 1), but no reoperation was needed in allograft group.

**CONCLUSIONS:** The long-term results of Ross procedure in early children were satisfactory, which could avoid reoperation regarding autograft. However neo-AR progressed and reoperation was needed in some children over 8 years of age with size mismatch of aortic to pulmonary valve diameter, which must be followed up carefully.
**Oral Presentation 7**

A novel Technique of Making Super Flexible Replica of Complicated Congenital Heart Disease for Precise Understanding of Anatomy, Simulation of Surgical Operation, and Education for Trainees

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**Backgrounds:** Precise understanding of 3-dimensional anatomical structure is crucial for successful surgical operation in complicated congenital heart diseases (CHDs). Here we introduce a new technology that reproduces extremely flexible polyurethane biomodels of complicated CHDs by employing with stereolithography followed by vacuum casting.

**Methods:** The diagnosis of the patients who needs heart replicas included tetralogy of Fallot with pulmonary atresia, double outlet right ventricle with non-committed ventricular septal defect, hypoplastic left heart syndrome, tricuspid atresia, total anomalous pulmonary venous drainage, and congenitally corrected transposition of the great arteries. Three-dimensional volumetric datasets of MSCT angiography of congenital heart disease were converted into standard triangulated language files to make plastic stereolithographic biomodels representing outer and inner surface of the heart. Then, another outer mold was made with urethane with the outer surface biomodels as a cast. Then, rubbery polyurethane was injected between the outer and inner molds under the vacuum condition. After solidification of the urethane, the molds were carefully removed and the final biomodels were obtained.

**Results:** Wide variety of biomodels of complicated CHDs from neonates to adults were reproduced. This technology allowed surgeons to precisely understand the internal chambers of the heart and allowed them to perform simulation surgery by way of cutting and suturing like a real heart tissue. These polyurethane biomodels were instructive for medical students, young surgeons, patients and parents to understand the complex structures and hemodynamics of the disease.

**Oral Presentation 8**

3D visualization of the cardiac conduction system in human heart specimens by the high-resolution phase contrast CT imaging

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**Purpose:** The feasibility of visualization of the atrioventricular (AV) conduction axis in human whole heart specimens by means of a synchrotron radiation phase-contrast computed tomography (PCCT) was tested.

**Method:** 4 formalin-fixed autopsy specimens of normal whole heart (age 0-155days, size 2-4x3-6cm) in saline were enrolled. Images were collected in the Biomedical Imaging Centre BL20B2, SPring-8 Synchrotron facility, Hyogo, Japan, with PCCT system consisted of Talbot interferometer. Obtained PCCT image sequence (12-20μm/voxel) was 3 resliced on optimal angle to observe the AV conduction axis. Serially traceable structure with characteristic shape around AV septum was searched. After PCCT, specimens were pathologically examined.

**Result:** In the resliced PCCT image, low density structure was distinctly recognized from surrounding tissue. It was detected in AV septum, penetrating into central fibrous body, extended on top of inter-ventricular septum, and bifurcated onto both side of ventricular septum. These structures were comparable with AV conduction axis in pathological observation. From images sequence, major subdivisions of the AV conduction axis were visualized within 3D heart structure.

**Conclusion:** The visualization of AV conduction axis within whole heart specimens was feasible by the use of PCCT, and verified by subsequent histological examination. Non-destructive evaluation of AV conduction axis in cardiac specimens and its 3D representation may allow more comprehensive examination of the conduction tissue in congenital heart anomalies. Especially, 3D imaging is beneficial for understanding the anatomical variation in rare congenital heart anomaly such as corrected transposition, double inlet ventricle, which can verify the adequacy of surgical procedure.
**Poster Abstracts**

**POSTER 1**

The “Excluding” Suture Technique for Surgical Closure of Ventricular Septal Defects – A Retrospective Study Comparing The Standard Technique

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**Background:** Conventional methods of closure of ventricular septal defects (VSD) involve placement of sutures approximately 4 - 5 mm from the posterior inferior margin. This study compares the conventional method with an alternative technique wherein sutures are placed along the edge of the defect thereby “excluding” the conduction system and the tensor apparatus of the tricuspid valve from the suture line.

**Methods:** Between January 2013 and May 2015, 339 consecutive patients were retrospectively reviewed and divided into two matched groups. Group A (n = 154) underwent closure using the alternative technique and Group B (n = 185) with the conventional method. Patients with isolated VSD’s (n = 110) were analyzed separately as were infants within this subset.

**Results:** Immediate postoperative results were similar with no statistically significant differences in either group in terms of incidence of complete heart block (p = 0.11), residual defects or postoperative tricuspid regurgitation. Aortic cross clamp times (p = 0.19), and hospital mortality were also similar. Incidence of temporary heart block that reverted to sinus rhythm was more in the conventional method group (Group B) (p = 0.04) as was right bundle branch block (p = < 0.05) in all subsets of patients analyzed.

**Conclusion:** Surgical closure of VSD’s can be accomplished by placing sutures along the margins or away with comparable results. The incidence of RBBB seems to be more with the conventional method of VSD closure. The “excluding” technique may be easier to perform when the tensor apparatus of the tricuspid valve lies across the posterior inferior margin of the defect.

**POSTER 2**

Konno procedure for left ventricular outflow tract stenosis after repair of intermediate atroventricular septal defect

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The left ventricular outflow tract of atrioventricular septal defect (AVSD) patient is longer and narrower than the normal patient. Therefore, it is likely to associate left ventricular outflow tract stenosis (LVOTS) with AVSD. The case was 15-year-old girl with no genetic defect or associated malformation. She went through repair of intermediate AVSD and common valve plasty by cleft closure and annuloplasty at the age of 7-month-old. Due to Mitral valve stenosis, Mitral valve replacement using SJM Regent 17MM was followed at the age of 6. Since then, Left ventricular-Aortic Pressure gradient (LV-AO PG) gradually raised up to 60mmHg and LVOTS also developed because of artificial mitral valve jet out LVOT. Furthermore, an aortic valve regurgitation (AR) occurred at the same time. At the age of 13, resection of subaortic membrane, myectomy of left ventricular outflow tract, and aortic valvuloplasty were performed. However, the postoperative catheterization study revealed the existence of LVOTS and AR that we performed Konno procedure. Postoperative course after the Konno procedure was uneventful and LV-Ao PG was decreased to 20mmHg. She was discharged from the hospital at postoperative day 18. No reoccurrence is seen at postoperative 3 month.
POSTER 3

Hybrid Approach As The First-stage Palliation To Cases Of Interruption Of Aortic Arch With Small Aortic Valve

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Background: Open heart surgery for Interruption of aortic arch (IAA) in neonate period is still high-risk, because of complications as a low birth weight, other morphologic anomalies, and especially hypoplastic aortic valves (AV). Therefore, we have taken the hybrid approach with bilateral pulmonary artery banding (bi-PAB) and ductal stent insertion (DSI) as the first stage palliation for those cases. After this palliation, the growth of aortic valve might be also expected in the waiting time.

Methods: Six cases of IAA with small AV were performed the hybrid approach in neonate period, from 2010 to 2014, in our institute. (Mean age:6.8 days, mean body weight:3.2 kg, mean Z-value of AV:-8.3) Postoperative clinical courses and the results of 2nd stage procedure were reviewed in those cases.

Results: Bi-PAB and DSI were done under general anesthesia and median sternotomy approach in all patients. No mortality or severe morbidity was found in all and 5 of six patients could discharge from hospital within 1-1.5 months after the surgery. None had needed an additional catheter intervention or surgical procedure until next surgery. All of them were accomplished 2nd stage procedure, 3 had biventricular repair and other 3 were undertaken arch-reconstruction with A-P shunt successfully. The growth of AV was recognized in 4 patients before 2nd surgery.

Conclusions: The hybrid approach as the first stage palliation could be useful not only to avoid a high-risk open heart surgery in neonate but also to manage times for 2nd stage procedure in cases of IAA with small AV.

POSTER 4

Bentall operation for AAE/AR after Senning and Rastelli in an adult case with cTGA/VSD/PA

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Background: AAE and AR are sometimes problematic after double switch operation for cTGA. We experienced a rare case of AAE and AR after Senning and Rastelli procedure for cTGA/VSD/PA.

Methods and Results: A 25-year-old man was diagnosed as cTGA/VSD/PA in neonate and underwent Senning and Rastelli procedure at the age of seven. He needed a reoperation for left ventricular outflow tract stenosis (LVOTS; maximum pressure gradient, 80 mmHg ), mild AR and right ventricular outflow conduit failure at the age of 15. He was implanted a pace maker because of complete atrioventricular block after the reoperation. He presented with residual LVOTS (pressure gradient, 40 mmHg), AAE (aortic annular diameter, 33.4 mm), progressive AR (moderate at the age of 23 and severe at 25) and low left ventricular ejection fraction (36%) with left ventricular dysynchrony. We performed the third operation, Bentall procedure, LVOTS release and cardiac resynchronization therapy at the age of 25. Histological examination of the aortic wall have revealed fibrosis without cystic medial necrosis. The postoperative course was unremarkable. LVOT flow decreased from 2.9 to 0.7 m/sec. BNP decreased from 148 to 85 pg/ml.

Conclusions: AAE and AR are observed more often in TOF than cTGA. The pathophysiology has been reported to be increased aortic flow and histological abnormalities of the aorta (fibrosis and elastic fragmentation) beginning as early as infancy. We speculate that the same mechanism as TOF is involved in this case of AAE and AR after surgery for cTGA/VSD/PA.
POSTER 5

The experience of Re-Konno aortoventriculoplasty

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Background: Although Konno aortoventriculoplasty (KAVP) is an effective measure to relieve severe LVOT associated with aortic root narrowing, some cases have to undergo re-operation due to valve associated complications. We experienced three cases of Re-KAVP and report these cases with considerations.

Case1: Twenty-two years old woman diagnosed with CoA and SAS underwent aortic arch plasty at 8 months, subaortic muscle bundle resection at 4 years and KAVP (SJM 21mm) with MVR at 6 years. Thrombosed prosthetic valve due to cessation of warfarin was detected 16 years after KAVP. She underwent re-Konno with mechanical valve (SJM 21mm).

Case2: Twenty-nine years old man diagnosed with congenital AS underwent KAVP (SJM 19mm) at 12 years. Thrombosed prosthetic valve due to cessation of warfarin medication was detected 17 years after KAVP. He underwent re-Konno with mechanical valve (On-X 23mm).

Case3: Thirty-three years old woman diagnosed with congenital AS underwent KAVP (CEP 23mm) at 24 years. She selected a bioprosthetic valve to bear a child. Prosthetic Valve Failure was detected 9 years after KAVP. She underwent re-Konno with mechanical valve (ATS 22mm) and MVR.

All cases showed good postoperative course and no rhythm disturbance.

Discussion: Re-Konno is complicated operation with risks of bleeding, conduction disturbance, and LV dysfunction. We performed careful reoperation to reduce these complications.

POSTER 6

Transmitral myectomy and mitral valve replacement in a pediatric patient with hypertrophic obstructive cardiomyopathy and degenerative mitral valve

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Experiences of surgical management of hypertrophic obstructive cardiomyopathy (HOCM) in pediatric population are limited. Transaortic approach may have disadvantages because of limited operative view in small patients and thus can increase the risk of injury to the aortic valve, while it has been a standard approach in adults. We present an alternative transmitral approach in a child with HOCM. A 4-year-old boy with Noonan syndrome was referred to us for surgery of HOCM and mitral regurgitation (MR). His body weight was 11 kg. Echocardiography showed hypertrophic ventricular septum located 1.5 cm below the aortic valve and severe MR. Cardiac catheterization revealed 80-mmHg gradient across the left ventricular outflow tract (LVOT). The mitral valve was exposed through a left atriotomy. As the mitral valve was not repairable because of severely degenerated valve leaflets, both leaflets were removed and mitral valve replacement (23 mm, On-X) was performed. The hypertrophied ventricular septum was resected over the mitral annulus before valve implantation. The pressure gradient across the LVOT was decreased to 8 mmHg at 4 months after surgery. Transmitral septal myectomy was safely and effectively performed. Transmitral approach may be an option of surgery for HOCM in a pediatric patient, especially who needs a concomitant mitral procedure.
**POSTER 7**

**Pulmonary valve replacement for pulmonary regurgitation after TOF repair**

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**Background:** Optimal timing of pulmonary valve replacement (PVR) for pulmonary valve regurgitation (PR) after congenital heart disease repair is indicated by various parameters. In our institution, we adopt the following parameters of cardiac MRI; PR ratio > 35%, RVEDVI > 150 ml/m². We investigated our surgical results of the PVR for PR after TOF repair.

**Patients and method:** We investigated 20 cases who underwent cardiac MRI before and after PVR. Age and body weight at the time of PVR was 15.0 ± 3.8 years and 42.7 ± 13.0 kg. The changes in size and stroke volume of ventricles measured by cardiac MRI, cardiothoracic ratio, blood BNP concentration, electrocardiogram QRS width and peak VO2 were compared. The follow-up period was 3.5 ± 1.4 years.

**Result:** Postoperative cardiac MRI was performed after 14.3 ± 19.2 months. After PVR, RV volume is reduced as follows; RVEDVI (158.5 ± 32.6 to 88.1 ± 20.8 ml/m²; p < 0.01), RVESVI (74.2 ± 25.5 to 60.3 ± 15.0 ml/m²; p < 0.01), RVSVI (39.7 ± 6.6 to 42.8 ± 5.8 ml/m²; p = 0.05) and LVSVI (40.5 ± 6.0 to 42.9 ± 8.7 ml/m²; p = 0.06) were showed a trend to increase. Cardiothoracic ratio (56.5 ± 6.6 to 52.1 ± 5.1%; p < 0.01) was reduced significantly. Otherwise, blood BNP concentration, QRS width and peak VO2 were not changed.

**Conclusion:** The normalization of RV volume and improvement of cardiac function were obtained by PVR. Surgical indications of our institution using cardiac MRI seemed to be reasonable, however further consideration is necessary.

**POSTER 8**

**Successful staged repair of Holmes’ heart with AP window**

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Double inlet left ventricle (DILV) is a very rare congenital anomaly which occurs in about 5 - 10 of 100,000 live births, and Holmes’ heart is a rare form of DILV characterized by normally related great arteries.

We report 2-year-old male case of Holmes’ heart with aortopulmonary window (AP window) which reached Fontan circulation. The patient was delivered at 39 weeks of gestational age. He underwent the bilateral pulmonary artery banding on postnatal day 7 to control the pulmonary blood flow. While observing the pulmonary vascular growth by angiography and enhanced computed tomography, surgical debanding and transcatheter balloon dilatation of bilateral pulmonary arteries were carried out in stages to get ideal pulmonary vascular bed growth. Subsequently, at 14 months of age the bilateral bidirectional Glenn procedure with division of the main pulmonary artery in a more distal portion of the AP window was performed. And finally, the extracardiac total cavopulmonary connection was performed at 25 months of age. Good Fontan circulation establishment was confirmed with a post-operative cardiac catheterization. In spite of extremely rare heart structure, we succeeded in arrival to Fontan completion by collaboration of the surgery and catheter intervention. To our knowledge, there is no previous case of successful staged repair of Holmes’ heart with AP window.
**POSTER 9**

**Six years follow up of a case: Aortic translocation using the hemi-Mustard procedure for congenitally corrected transposition of great arteries with restrictive VSD and pulmonary stenosis**

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In congenitally corrected transposition of the great arteries (ccTGA), restrictive ventricular septal defect (VSD) and mild pulmonary stenosis (PS) are contraindications to the double switch procedure because of postoperative left ventricular outflow tract obstruction. We describe a case report of ccTGA with mid-term follow up of aortic translocation using the hemi-Mustard procedure after left ventricular training.

A new-born boy was diagnosed having ccTGA with VSD and mild PS without tricuspid regurgitation (TR). However, he developed moderate TR and cardiac catheterization showed low pressure of the anatomical left ventricle, restrictive VSD, and mild PS at his 2 years of age. When he was 5 years old, he underwent pulmonary artery banding. At 7 years of age, surgical repair was performed. After transection of the aortic root and mobilization of the left coronary artery, the aortic root was partially harvested and rotated to the pulmonary annulus with left coronary artery re-implantation. The outlet septum was completely divided. The VSD was closed using a 0.6-mm-thick expanded polytetrafluoroethylene (ePTFE) patch. A hemi-Mustard procedure was then performed using the ePTFE patch. The right ventricular outflow tract was reconstructed using a 20-mm-wide ePTFE graft with handmade trileaflet valve. Finally, cavopulmonary anastomosis was performed. He discharged postoperative day 24 uneventfully.

Postoperative 5-year catheterization showed good biventricular function, no biventricular outflow obstruction, no aortic and pulmonary regurgitation, and low cavopulmonary pressure (11 mmHg).

Currently, the patient remains well in sinus rhythm without limitation of his life, and is classified as New York Heart Association class I.

**POSTER 10**

**Stuck aortic valve 3 years after the Konno operation**

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The Konno procedure was introduced to allow aortic valve replacement with an adequate sized mechanical valve for patient with a small aortic annulus. Mechanical aortic valve obstruction is a rare but life-threatening complication. We experienced a case of re-Konno operation for stuck aortic valve 3 years after the primary Konno operation.

The patient is a 5 year old girl who had undergone VSD patch closure at the age of 6 months. A Konno operation with prosthetic aortic valve (16mm ATS bi-leaflet mechanical valve) was performed at the age of 2 year after subaortic membrane resection at the age of one due to subaortic stenosis. The patient had no clinical symptom during ambulatory follow up. But increased traseaortic gradients was observed again on echocardiography, 3 years after from the surgery. The stuck one-side aortic leaflet was confirmed using fluoroscopy. At the re-Konno operation, we found the pseudointima inside the prosthetic graft and it was dissected from the graft. The one-side aortic leaflet was completely obstructed by the pseudointima. As membranous subaortic stenosis was also progressed, we decide to perform a Konno operation again. The patient was discharged in general good condition.

The mechanical stuck valve due to dissection of the pseudointima after a Konno operation is rare.
POSTER 11

**Therapeutic experience of secondary subaortic stenosis**

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Secondary subaortic stenosis has been reported after surgical repair of several congenital heart defects, including univentricular heart requiring the Fontan procedure, ventricular septal defect, tetralogy of Fallot, double outlet right ventricle, abnormal ventriculoarterial connections, partial and complete atrioventricular septal defect common atrium, and aorticopulmonary window with or without an initial left ventricular outflow tract obstruction. The fibrous change occurs most often after repair of coarctation of the aorta, Fontan procedure, or Rastelli operation. However, there is little report on its surgical treatment. We report five cases of surgical treatment for secondary subaortic stenosis.

The initial operations were performed for the following diagnosis: interruption of aortic arch with ventricular septal defect, coarctation complex, intermediate atrioventricular septal defect, ventricular septal defect and left ventricular outflow tract obstruction. Median age was three years, and median body weight was 10.8 kg.

Surgical treatments for secondary subaortic stenosis included one modified Konno procedure and four fibrous tissue resection. One case resulted in early death, and the other four cases had good early postoperative course. Re-resection of fibrous tissue was required in one case two years after the first subaortic tissue resection. Of the three cases in which long-term follow up was available, nonrelated aortic valve stenosis had progressed in one case, and the other two cases presented pressure gradient 60 mmHg and 40 mmHg.

Surgical treatment of secondary subaortic stenosis was almost satisfactory. However, potential progression of subaortic stenosis and other valve diseases calls for careful long-term follow up.

POSTER 12

**Left ventricular outflow tract obstruction subsequent to repair of ventricular septal defect and aortic arch obstruction**

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**Objectives:** Left ventricular outflow tract (LVOT) obstruction may develop subsequent to intracardiac repair of ventricular septal defect (VSD) with aortic coarctation (CoA) or interrupted aortic arch (IAA). We performed retrospective review to identify risk factors of developing LVOT obstruction (LVOTO) after repair.

**Methods:** Patients with VSD with CoA or IAA deemed to have adequate LVOT at the time of repair were included in this study. LVOTO was defined as pressure gradient of 20 mmHg or more across LVOT detected by ultrasound study. Possible explanatory factors for developing LVOTO included birth weight, neonatal aortic annular diameter (AAD), neonatal LVOT diameter, ratio of neonatal LVOT diameter to AAD, and AAD at the latest follow-up. AAD and LVOT diameter were measure by parasternal long axis ultrasound view.

**Results:** Two patients with IAA type A, six patients with IAA type B, and six patients with CoA with the follow-up period ranging from 13 months to 112 months (median 42 months) were enrolled. LVOTO developed in four patients with the pressure gradient between 20 mmHg and 88 mmHg. Patients with LVOTO and without LVOTO had similar birth weight, neonatal AAD, neonatal LVOT diameter, and AAD at the latest follow-up. Ratio of neonatal LVOT diameter to AAD of 0.8 or less was identified as a risk factor of developing LVOTO.

**Conclusion:** LVOTO developed in 29% of patients after repair of VSD with CoA or IAA. Ratio of neonatal LVOT diameter to AAD of 0.8 or less was a predictive factor of developing LVOTO after repair.
**POSTER 13**

**Indonesian Strategy in Managing TGA- IVS in late presentation**

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The surgical management of infants older than 2 weeks with d-transposition of great arteries and intact ventricular septum (IVS) is a matter of debate. It was previously suggested that the primary arterial switch operation is a feasible strategy for patients with transposition of the great arteries and intact ventricular septum (TGA-IVS) up to age 2 months. But problem in Indonesia, some patients came in late presentation. The aim of this study was to assess the surgical outcome of the strategy in managing children with d-transposition of great arteries and IVS presenting beyond 6 weeks of age.

**Method:** The clinical records of the children (more than 6 weeks age) with d-transposition of great arteries and IVS, who underwent primary or staged ASO at our institute between January 2011 to June 2015 were reviewed. Patients were divided in two groups, primary ASO, and staged ASO. Left ventricular geometry and interventricular septal motion on the transthoracic cross-sectional echocardiogram were taken to assess the left ventricle preparedness.

**Results:** Total of 8 children (age ranging from 6 weeks to 6 years) with d-transposition of great arteries and IVS underwent primary ASO (66.7 %) or staged ASO (33.3 %). The body weight mean was 4.9 kg, the mean cardiopulmonary bypass time was 183 minute, while mean aortic cross-clamp time was 123 minute. There are differences between primary or staged ASO. Duration of TTE (time to extubation) of primary ASO had a median of 79 hour while staged ASO had a median of 69 hour. Mortality was found in 1 patient of staged ASO during their hospital stay. The children who had severely regressed left ventricle (banana-shaped left ventricular geometry) were operated with integrated extra corporeal membrane oxygenation-cardiopulmonary bypass (ECMO-CPB) circuit for left ventricular re-training. The children with regressed left ventricle required longer ventilatory time and inotropic support.

**Conclusion:** The children older than 6 weeks with d-transposition of great arteries and IVS can benefit from primary or staged ASO with acceptable results. However, the need for mechanical support in some of the older patients may limit the widespread adoption of primary ASO, and as alternative staged ASO could give the same result.

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**POSTER 14**

**Factors of the possibility for biventricular repair on interruption of the aortic arch after bilateral pulmonary banding**

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**Background:** We have performed bilateral pulmonary banding (bil PAB) for interruption of the aortic arch (IAA) with low birth weight or subaortic stenosis (SAS) as the first palliation.

**Object and Methods:** Between 2006 to 2015, to assessed factors of biventricular repair on 9 cases of IAA after bil PAB, we reviewed the cardiac catheterization and angiography.

**Results:** Biventricular repair was done for 6 patients (Group B) and univentricular repair for 3 patients (Group U). All patients survived. Type of IAA, location of VSD, association of 22q11.2del and association of aberrant of right subclavian artery were not significantly different between Group B and Group U. Timing and weight of bil PAB were significantly different between Group B and Group U. (P=0.02). Mean PA pressure and PA index after bil PAB were not significantly different between Group B and Group U. % of normal LVEDV, % of normal mitral valve diameter, and % of normal aortic valve diameter before bil PAB were not significantly different between Group B and Group U. % of normal SAS (that is defined as the ratio subaortic stenosis diameter to normal of aortic valve diameter) before bil PAB in Group B (60-68%) was significantly larger than that in Group U (47-60%)(P=0.04).

**Conclusion:** The most important factors of biventricular repair on IAA after bil PAB are not pulmonary blood pressure and diameter of pulmonary artery, the degree of SAS. When % SAS is under 60%, the tract of left ventricular does not grow after bil PAB.
**POSTER 15**

Midterm result of arterial switch operation for double outlet right ventricle

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**Background:** The purpose of this study is to evaluate the early and midterm results of the arterial switch operation of double outlet right ventricle with subpulmonary ventricular septal defect (Taussig-Bing anomaly [TBA]).

**Methods:** From 2005 to 2015, 11 patients with TBA underwent arterial switch operation (ASO). Five patients were neonates. Age at ASO ranged 9 days to 5 months (median 26 days). Seven patients had previously undergone palliative procedure (pulmonary artery banding [PAB] in 7, arch reconstruction in 3). Unusual coronary pattern was seen in 6. Aortic arch obstruction (AAO) was complicated with 5. Relation of the great arteries was side-by-side in 9 and anteroposterior in 2. All but 1 patients performed Lecompte modification.

**Results:** Follow-up period was 3.1 ± 3.6 years. There were 3 hospital death (coronary ischemia in 2, sudden death in 1). From 2009, no hospital death was occurred, survival was 72.7% at 5 and 10 years after ASO. No late death was recognized during the study period. Two patients required re-operation (pulmonary artery plasty in 1, tricuspid valve repair and re-VSD closure in 1). Freedom from re-operation was 65.6% at 5 and 10 years after ASO. Statistical analysis revealed no significant risk factor for hospital death and re-operation. Moderate aortic valve insufficiency was seen in patient with prior PAB, no significant left ventricular outflow obstruction was recognized.

**Conclusion:** Early and midterm outcome of ASO for TBA is acceptable and has improved without late mortality. Further follow-up is necessary especially for the pulmonary artery and aortic valve regurgitation.

**POSTER 16**

Early definitive repair in pulmonary atresia with intact ventricular septum

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**Objective:** Management of pulmonary atresia with intact ventricular septum (PAIVS) depends on tricuspid valve annulus diameter (TVd) and/or right ventricular end-diastolic volume (RVEDV). Some reports reveal that exercise capacity after BVR decrease with age. We hypothesize BVR for PAIVS with early right ventricle overhaul (RV overhaul) might preserve good RV function and exercise capacity. Our early definitive repair strategy for PAIVS is first bilateral pulmonary artery banding (bPAB) if needed to avoid cardiopulmonary bypass in early neonate, secondary BVR or 1.5VR with RV overhaul in neonate or early infant.

**Methods:** Since 2007, 8 cases was diagnosis as PAIVS and we underwent this strategy in 6 cases (2 cases underwent UVR due to sinusoidal communication.). We report the clinical outcome and progression of RVEDV and TVd of this strategy.

**Result:** 4 cases in 8 PAIVS cases underwent bPAB at mean 8.3 d.o. (One case underwent UVR.). One case underwent RV overhaul, pulmonary valvotomy and BT shunt at 57 d.o., and intent to treat 1.5VR because of small RV volume (22% of normal). Other 5 cases underwent RV overhaul, pulmonary valvotomy and ASD partial closure at mean 30.8 d.o. intended to treat BVR. 2 cases need tricuspid valvuloplasty to gain tricuspid orifice and performed BT shunt. RVEDV was improved 71.8% to 98.6% of normal and getting good progression in each cases. Postoperative TVd is 89% of normal and also have good progression.

**Conclusions:** Although we need long-term clinical feature of our Strategy for PAIVS, early definitive repair is acceptable in early outcome.
**POSTER 17**

Our Surgical Experience of TGA with Left Ventricular Outflow Tract Stenosis

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**Background:** Since Half-turned truncal switch operation (HTTSO) was reported by Yamagishi M (2003), we also apply the procedure to dTGA or DORV / TGA with LVOTS. We reviewed our four surgical cases of TGA with LVOTS in this ten years.

**Patients and Method:** Median age and body weight at operation were respectively 16 (range : 5-32) months and 9.5 (range : 7-10) kg. We measured diameter of pulmonary valvular annulus of all cases by MDCT. When the diameter was over 50% of normal, we select HTTSO. A case whose diameter was 32% of normal was underwent intracardiac rerouting and right ventricular outflow tract repair with monocusp patch. Pattern of coronary arteries was Shahar type 1 in all.

**Results:** There was no operative and late death. Postoperative chylothorax was occurred in 1 case (HTTSO). Median postoperative period was 44 (range : 10-71) months. There was one reoperation for right ventricular diverticulum (intracardiac rerouting case). Median postoperative RV-PA pressure gradient of three HTTSO cases was 43 (range : 30-56) mmHg. Their PR grade are mild degree in all cases.

**Conclusion:** Our midterm results indicate that HTTSO seems to be a good surgical alternative for the treatment of patients with TGA / LVOTS.

**POSTER 18**

Outcome after total repair of tetralogy of Fallot

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**Background:** The purposes of this study were to review our early and midterm outcomes after repair of tetralogy of Fallot (TOF) at single institution.

**Methods:** A total of 41 patients (male:female=28:13) who underwent total repair of TOF between February 2006 and August 2015 were retrospectively reviewed. The median age at surgery was 1.7 years (range 0.4-2.2 years), and body weight was 9.8kg (range 5.5 -14.8kg). Fourteen patients were underwent Blalock-Taussig shunt previously. Kaplan-Meier analyses were done for patient survival, freedom from re-operation and re-intervention.

**Results:** Hospital mortality was 2.4% (1 patient). Type of right ventricular outflow tract (RVOT) reconstruction procedure were (1) non transannular incision (main PA patch:11 patients (26.9%), main PA and RV patch:13 patients (31.7%)),(2) transannular incision (monocuspid valved outflow patch without bulging sinus:9 patients (21.9%), Nunn repair:6 patients (14.6%)) and (3) RV-PA valved conduit :2 patients (5.9%). Re-operation or re-intervention was required in 12 patients (5 in non transannular incision group, 7 in tansannular incision group). The most common causes of re-operation or re-intervention were residual shunt in 4 patients and stenosis of RVOT or pulmonary artery in 8 patients. Overall freedom from re-operation was 97.4% at 1 year, 87.6% at 3 years and 83.8% at 5 years. Freedom form re-operation and re-intervention was 94.6% at 1 year, 73.0% at 3 years and 64.2% at 5 years.

**Conclusion:** Total repair of TOF can be performed with a low mortality rate. However, after surgery re-operation or re-intervention rate remain relatively high.
**POSTER 19**

Initial result of Ross-Switch-Konno operation

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Surgical management of TGA with LVOTO has wide variety of treatment options, and recently, LVOTO is a great concern after complete repair of this group of the patients. Half-turned truncal switch operation or Nikaido operation receive more attention to solve this problem. The issue of these procedures was technically demanding.

Recently, we started the Ross-switch-Konno operation program, and we described the initial result of this procedure. Between 2012 and 2015, 4 patients underwent Ross-Switch-Konno operation in our hospital. Age and body weight at the operation was 21±9 months, and 10.1±1.3kg. Three patients had previous modified BT shunt, and one patient had ASD enlargement before this procedure.

In this procedure, after cardiac arrest, ascending aorta was transected, and both coronary buttons were resected, similar to arterial switch operation, and aortic root was harvested as pulmonary homograft of Ross operation. Pulmonary artery was transected and infundibular septum was divided until VSD. The harvested aortic root was half turned, and posterior half of the aortic annulus is sutured to the pulmonary valve annulus, and right ventricular septal defect was closed with patch, making straight LVOT. Coronary button and ascending aorta were sutured to neo-aortic root. Cardiopulmonary bypass time was 330±44 min, and cross-clump time was 199±24 min. All 4 patients discharged home without complications.

Our initial result of Ross-switch-Konno operation was promising, and the indication of this procedure needs careful considerations.

**POSTER 20**

A preferable approach to persistent truncus arteriosus complicated by severe truncal valve regurgitation and crossed pulmonary arteries in early infancy

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A full-term female neonate weighing 2,690 g was referred to our hospital because of heart murmur. She was diagnosed as Collett and Edwards’ type 1 persistent truncus arteriosus, large ventricular septal defect, right aortic arch, crossed pulmonary arteries, quadrucuspid truncal valve and severe valvular regurgitation, by echocardiography and three dimensional contrast-enhanced 256-multislice computed tomography. Truncal valve regurgitation gave rise to recurrence of suspected necrotizing enterocolitis and failure to thrive. Catheterization at the age of 3 months showed Sellers 4 truncal valve regurgitation and left pulmonary artery hypertension. Furthermore, right pulmonary artery was stretched and stenosed by enlarged truncus arteriosus. Therefore, at 4 months of age and a body weight of 3.7 kg, she underwent truncal valve reconstruction that contained tricuspidization, cusp extension with ethanol-treated autologous pericardium and ascending aortic plication. Concomitantly, she received palliative right ventricular outflow tract reconstruction with 8 mm expanded polytetrafluoroethylene bicuspid-valved conduit with clip and right pulmonary artery plasty using fresh autologous pericardium. Her truncal valve regurgitation improved from severe to mild, and her body weight began to increase. A subsequent radical operation will be planned in future. Persistent truncus arteriosus complicated by crossed pulmonary arteries may predispose to right pulmonary artery stenosis. Our procedure is a reasonable alternative to persistent truncus arteriosus complicated by severe truncal valve regurgitation, crossed pulmonary arteries, and right pulmonary artery stenosis in early infancy.
**POSTER 21**

**Unusual association of systemic semilunar valve stenosis in double outlet right ventricle with pulmonary semilunar valve atresia: a case report**

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**Introduction:** Systemic semilunar valve stenosis in cyanotic congenital heart disease is rare. We describe a neonate with pulmonary atresia, ventricular septal defect (VSD) and associated aortic valve stenosis. It is difficult to plan optimal surgical strategy because there are biventricular outflow tract obstructions.

**Case report:** Three days old, 2,210 grams male baby was referred for evaluation of cyanotic congenital heart disease. Examination of the neonate showed mild central cyanosis, cardiomegaly, single 2nd heart sound and an ejection click followed by grade 3 ejection systolic murmur at left 2nd intercostal space. Trans-thoracic echocardiography showed situs solitus, levocardia, normal systemic and pulmonary venous connections and atrio-ventricular concordance. There was no atrio-ventricular valve stenosis or regurgitation. There was a large malaligned subarterial VSD with bidirectional shunt. One great artery was overlying VSD (50% rule) and was arising from the ventricular mass, and was continuing as the arch of aorta. The semilunar valve of this great vessel was tricuspid and markedly dysplastic with peak instantaneous gradient of 40 mmHg. The pulmonary arteries, which were confluent, arose from the undersurface of the aortic arch which is the typical location of patent ductus arteriosus (PDA) in duct dependant pulmonary circulation. We demonstrated the pulmonary annulus and the atretic pulmonary valve. We then diagnosed double outlet right ventricle, pulmonary atresia and aortic valve stenosis. We firstly performed Brock operation and PDA ligation at sixteen days, and secondly Rastelli operation and VSD closure without aortic valvuloplasty at seven months, with improvement of aortic valve stenosis.

**POSTER 22**

**Two cases of persistent truncus arteriosus with anterior origin of a main pulmonary artery**

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**Abstract:** We report two cases with persistent truncus arteriosus whose pulmonary arteries arise from the front wall of the ascending aorta. In the two cases, the right coronary artery arises from the front surface of the ascending aorta near the site of the origin of the pulmonary trunk. That is unusual form of truncus arteriosus.

A three year-old female patient had persistent truncus arteriosus, right aortic arch, major aortopulmonary collateral arteries (MAPCAs), and 22q11 deletion syndrome. The truncal valve is tricuspid. There was no truncal valve regurgitation. She is waiting for intracardiac repair (Rastelli procedure). Her sister and brother both had tetralogy of Fallot with absent pulmonary valve. Another three year-old male patient had persistent truncus arteriosus, MAPCAs, 22q11 deletion syndrome, and tracheobronchomalacia. The morphology of truncal valve is unspecified. The truncal valve regurgitation is mild. He underwent unifocalazation of MAPCAs and modified BT shunt. He needed tracheotomy and mechanical ventilation for tracheobronchomalacia. He is also waiting for Rastelli procedure. He has no family history of heart disease.

**Conclusion:** Persistent truncus arteriosus caused by the failed development of truncus arteriosus into separate aorta and pulmonary artery. The 22q11 deletion syndrome is characterized by outflow tract malformations that include persistent truncus arteriosus. It was identified that Tbx1, the major candidate gene for 22q11 deletion syndrome, is required for outflow tract development. Both patients could have similar mechanism of development in embryonic stage.
POSTER 23

A novel alternative technique in the Norwood procedure for hypoplastic left heart syndrome: "Chimney reconstruction" of the arterial trunk

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While the use of patch supplementation, especially pulmonary homograft, in the Norwood procedure has become the current mainstream in the United States and European countries, the scarce availability of homografts in Japan necessitates aortic arch reconstruction with either autologous tissue from great vessels, or glutaraldehyde-fixed pericardium as supplementary material. However, patch materials have some critical problems such as the lack of growth and the aortic arch obstruction followed by calcification or degeneration. On the other hand, the reconstruction with autologous tissue alone carries a risk of the narrowing of aorto-pulmonary space and subsequent compression of the left pulmonary artery. In order to solve these problems, we developed a novel technique of aortic arch reconstruction without patch material. This "chimney reconstruction" utilizes the anatomical characteristic of HLHS that the two orifices of right and left pulmonary arteries arrange longitudinally in the pulmonary trunk. Technically, the two orifices were excised en bloc as a U-shaped cuff from the pulmonary trunk, instead of transecting of pulmonary trunk just beneath the bifurcation and the posterior U-shaped defect of the pulmonary trunk was longitudinally closed without any patch supplementation and formed into a tubular shape. This has the feature of longitudinal extension and horizontal plication of the pulmonary trunk, and enables us to avoid the compression of the left pulmonary artery by securing a wide aorto-pulmonary space and possibly preventing future enlargement of the neoaortic root. This technique is a novel and useful alternative technique for aortic arch reconstruction of HLHS without supplementary material.

POSTER 24

Two-patch repair technique for aortico-left ventricular tunnel enables long term good outcome only by initial operation

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Aortico-left ventricular tunnel (ALVT) is a rare congenital malformation, which shows an abnormal communication between the aortic root and left ventricle. Over one hundred cases of ALVT ware reported from all over the world. Untreated cases of ALVT ware reported to show lethal course by progression of AR and left heart failure.

Thus, early operation of ALVT closure after diagnosis has encouraged, and good short term outcome has reported on over 80% of cases of ALVT. Although, rarity of ALVT causes to less reported cases of long term followed-up ALVT. Large scale reports of ALVT has also rarely seen, and operative method of ALVT is varied by institution. Most reported operative method of ALVT is closure of aortic orifice by patch closure or direct suture. But the problem of closure of aortic orifice is growth of AR in long term and needing aortic valve replacement in many cases.

We experienced three cases of ALVT from 1994 to 2014. Age of patients was from four month to four years old. As operative method, two patch repair technique, patch closure of both aortic and left ventricle orifice of ALVT, was used for all cases. The two cases have past 20 years after operation. They needs no re-operation and has good course with trivial to mild AR. The other case also have good course. Two patch repair technique for ALVT seems to be useful method to enable good long term post-operative course only by initial operation.
POSTER 25

Impact of intraoperative pericardial real-time three-dimensional echocardiography on surgical intracardiac rerouting in double outlet right ventricle and transposition of great artery

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Background: Three-dimensional assessment of intracardiac anatomy real-time three-dimensional esophageal echocardiography (TEE) would be useful for surgical correction in the congenital heart disease. However, TEE cannot be applied for the patients less than 15kg.

Purpose: To assess the impact of intraoperative pericardial real-time three-dimensional echocardiography (PRT3DE) on the intracardiac rerouting in double outlet right ventricle and transposition of great artery.

Methods: 12 patients were enrolled in this study. (median age of 2 yrs : 5days-10yrs, BW 7.9kg: 2.3-30kg) PRT3DE was performed, immediately after the chest opening, and put the ultrasound probe directly onto the pericardium to collect 3D volume data. Then, we reconstructed 3D images by online workstation system (QLab) and use the image as surgical guide. We compared the actual surgical findings to those in the 3D images viewed from surgeon’s position and those in the 2D images.

Results: We could reconstruct good quality 3D images within 15 minutes in all patients (100%). These images were well-matched surgical findings and provided comprehensive information whether VSD rerouting and closure would be applied or not, when comparing to those of 2D images. In 7 patients , we decide to perform VSD rerouting or closure by using 3D guide. These 7 patients underwent the intracardiac correction successfully.

Conclusions: PRT3DE is feasible and useful to obtain detail information for intracardiac rerouting in double outlet right ventricle and transposition of great artery with complicated 3D structures and enables both cardiovascular surgeons and cardiologists to share the ‘surgeon’s view’ in the operating room for surgical planning.

POSTER 26

The Diagnosis of Hypoplastic Aortic Arch and Validation of the Surgical Procedure According to its Morphological Characteristic

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Purpose: Diagnostic criteria for hypoplastic aortic arch (HAA) have not been clearly established yet. We asked whether there were any HAA or not in patients with CoA, and the surgical procedures were valid using our numerical cut-off value derived from arch parameters in preoperative CT.

Method: We have extracted 16 patients (one simple CoA and 15 CoA complex cases) with preoperative CT data with arch procedure from 2005 to 2015. Mean age was 34.9 days (3-140) and mean BW was 3.0kg (1.9 -5.7).
To diagnose HAA, we measured each aortic diameter at mid portion of ascending aorta (Ao), BCA (area A), lt.CCA (area B), lt.SCA (area C) and expressed the ratio of each area to Ao. We diagnosed them as HAA when one area did not reach the cut-off value, at least (area A: 65%, area B: 55%, area C: 45%). Additionally, the length of long axis between the arch vessels, and isthmus were measured. We diagnosed this length as long segment, when the length was more than the cut-off value (Average+0.5SD).

Results: There were 10 patients who underwent EAAA, and 6 pts. underwent SCF. Re-intervention free rate was 100%. All cases included one and more hypoplastic area (single ‘hypo’ in 7 pts, double in 4 pts, and all area in 5 pts). Only one patient with EAAA procedure, had a single hypo area, but he had plural long segments. All SCF cases had only one hypo plastic area. It was likely that large number of long segments could be seen more in EAAA cases.

Conclusions: Consequently, our surgical strategy for these pts. were valid from our criteria for HAA. So, this criteria seemed to have advantages of precise understanding of anatomical characteristics of arch, and appropriate planning for the surgical procedure.
POSTER 27

A Palliative Rastelli procedure in VSD, PA, ASD and PLSVC with small LV ~ a case report

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Case report: Drainage of a persistent left superior vena cava to the coronary sinus (CS) is a common congenital lesion associated with dilatation of the coronary sinus. The significant dilatation of the CS can contribute to the obstruction of left ventricular (LV) inflow. We would report that it was experienced the surgical treatment of a 2-years-old boy who had VSD, PA, ASD and PLSVC with small left ventricle after Both systemic-pulmonary artery shunts. Both systemic-pulmonary artery shunts were performed in the patient until 2-year-old. However, each left ventricular volume (respectively, 66% of Normal and 74% of Normal) which was calculated by 3D-Cardiac echogram and MRI was very small. Therefore, we could not choose a definitive operation. A palliative Rastelli procedure was scheduled in a 2-year-old boy weight 7.5kg.

Surgical findings: The pulmonary angioplasty using a piece of auto pericardium and right ventricular outflow tract reconstruction with 10mm Fan-shaped ePTFE valved conduit with bulging sinuses, closure of atrial septal defect were performed under cardiopulmonary bypass. Post-operative course was much smoothed. The 3D-Cardiac echogram showed that the left ventricular volume and the left outflow tract had been already enlarged at discharged. He is waiting for definitive repair.

Conclusions: The palliative Rastelli procedure including closure of atrial septal defect was a very useful and alternative method.

POSTER 29

Long-term outcome of Damus-Kaye-Stansel procedure using aortic flap technique after pulmonary artery banding in functionally univentricular heart with systemic ventricular outflow tract obstruction

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Objectives: Damus–Kaye–Stansel (DKS) procedure is a useful method to relieve the systemic ventricular outflow tract obstruction (SVOTO) in functionally univentricular heart. While the “double-barrel” modification has reduced the incidence of complications such as a semilunar valve regurgitation, adjustment of big discrepancy of the size between the new root and the narrow ascending aorta remains a technically demanding issue. We aimed to evaluate the long-term outcome after the modified “end to side” DKS procedure using aortic flap technique without any prosthetic materials, which we had adopted for some cases after pulmonary artery banding (PAB).

Method: Nine patients who underwent the DKS procedure using aortic flap technique between 1999 and 2010 were retrospectively reviewed. Anatomic indications were SVOT through intraventricular communication (n=6) and morphologically developed subaortic conus (n=3). Seven patients had SVOT gradient (range 13-21 mmHg) at the time of DKS. All had a prior PAB. Other prior palliations included arch repair (n=5) and arterial septectomy (n=2).

The median age at the time of DKS was 13 months (range 3-28 months) and the median body weight was 6.9 kg (range 3.0-12.6 kg). Concomitant procedures were BCPS (n=7) and RV-PA shunt (n=2).

Results: Follow-up period was 12.3 ± 3.4 years (range 5.3-16.0 years). There was no operative mortality and no late death. All patients subsequently underwent TCPC at the median age of 3 years (range 2-5 years). None of the patients developed any SVOTO throughout the follow-up period. Regurgitation of the pulmonary valve estimated by echocardiography at the latest follow-up was none to trivial in 7 patients and mild in 2. Regurgitation of the aortic valve was none to trivial in all patients.

Conclusion: The long-term outcomes after the modified DKS procedure using aortic flap technique were satisfactory with good semilunar valves function. It can be an alternative for “double-barrel” DKS in patients with a smaller ascending aorta and prior PAB.
**POSTER 30**

The successful repair of anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) with severe mitral valve regurgitation, a case report

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**Abstract:** Anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) is a very rare congenital heart anomaly. This anomaly gives serious challenges from its diagnostic to its repair. We present a case of 8 months old baby girl with ALCAPA and severe mitral valve regurgitation. The patient came to our hospital with dyspnea, coughing, and failure to thrive. Decreased left ventricle function was remarkably visible from the echocardiography, also there was severe mitral valve regurgitation. From catheterization the origin of the left coronary artery from pulmonary artery was confirmed. The ALCAPA was successfully repaired by transferring the left coronary artery ostium from pulmonary artery to the aorta, and the mitral valve was also repaired. The patient stayed for 3 days in intensive care unit and was discharged after 7 days. The successful management of ALCAPA is a challenge due to its difficulties in diagnosing as well as repairing and its postoperative management. It can be well achieved by good teamwork and support.

**Keywords:** aicapa, coronary, congenital, case

**POSTER 31**

Late Presentation of Tetralogy of Fallot with Absent Pulmonary Valve, case report

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OSatria G, Fitria L, Prakoso R, Budiwardhana N, Busro PW

**Abstract:** Congenital absence of the pulmonary valve (APV) associated with Tetralogy of Fallot (TOF) is a relatively rare cardiac malformation. Etiologic factors for TOF with APV are not known in most cases. Chromosomal abnormalities, absence of the ductus arteriosus, and other theories have been proposed. We have experienced a patient of pulmonary valve absence associated with TOF, who was presented with severe respiratory distress and heart failure. Echocardiography has shown Perimembranous Ventricle Septal Defect, Narrowing of Right Ventricular Outflow Tract and APV. Bronchial compression was confirmed from the CT scan. Total correction of TOF, Plication of Pulmonary Artery and implantation of Bio Valve was performed. Early corrective surgery with implantation of valve conduit in right ventricular outflow tract and plication of pulmonary arteries to relieve bronchial compression is indicated in all patient.

**Keywords:** Tetralogy of Fallot, Absence of the Pulmonary Valve, Congenital, Case
POSTER 32

A successful operation of Ross Procedure in patient with severe aortic stenosis with long QT syndrome, case report

Mikarina Asali, Fitria L, Atmosudigdo IS, Budiwardhana N, Busro PW

Abstract: The Ross procedure is the preferred aortic valve replacement (AVR) choice in small children. Nonetheless, it is a complicated surgery and there are concerns that subsequent cardiac reoperations are exceptionally complex and associated with high morbidity and mortality. A 3-years-old girl came to our center with dyspnoea on effort. An echocardiographic showed severe aortic stenosis caused by bicuspid valve of the aorta, severe mitral regurgitation and mild tricuspid regurgitation. The Ross Procedure and mitral valve repair was performed. The diagnostic data, and the operative procedure are described. Preoperative and postoperative nursing management is addressed including pediatric intensive care protocols. The patient had suffered from recurrent torsades de pointes ventricular tachycardia and was diagnosed with long QT syndrome in intensive care unit postoperatively. The child’s postoperative hospital course was 15 days. Mitral regurgitation and pulmonary hypertension are being managed with ramipril and recurrent torsades de pointes ventricular tachycardia is managed by multiple unsynchronized cardioversion.

Keywords: Severe aortic stenosis, Ross Procedure, Long QT syndrome

POSTER 33

A successful Cone Procedure operation in patient with Ebstein's anomaly and subarterial doubly-commited ventricular septal defect: A case report

Regina M. Liyanto, Busro PW, Marwali E, Harimurti GM, Parmana A

Abstract: Ebstein's anomaly repair in pediatric is a challenging procedure performed in Indonesia. Anatomical repair of Ebstein's anomaly with cone procedure has demonstrated promising survival benefits in several studies, however due to the small number of cases in Indonesia, the successful repair has not been widely reported. This is a report on a successful Ebstein's anomaly repair in a 4 years old girl with Ebstein's anomaly and subarterial doubly-commited VSD with cone procedure. The diagnostic data, and the operative procedure are described.

Keywords: Ebstein's anomaly, Cone procedure, Ventricular septal defect
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