ISMICS 2016
WINTER WORKSHOP
October 28 [Fri.] - 29 [Sat.]

[Venue]
The Westin Miyako Kyoto, Japan

[Chairman]
Tohru Asai, MD, PhD
Shiga University of Medical Science

Secretariat
Department of Surgery,
Shiga University of Medical Science
Seta Tsukinowa-cho, Otsu, Shiga 520-2192, Japan

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Final program
Evolution or Revolution? Our time has come!

Dear friends and colleagues,

On behalf of the Organizing Committee, we would like to extend a warm welcome to all of you to attend the ISMICS 2016 Winter Workshop in Kyoto. It is my great pleasure to invite you to this Workshop, which will be held at the Westin Miyako Kyoto on Friday, 28th and Saturday, 29th of October 2016.

The program for this ISMICS workshop has been designed to offer you the foremost educational opportunities and hands-on sessions to enhance your skills and your understanding of the latest technologies. The scientific program will focus on the most advanced technologies, useful technical tips, and pitfalls. Cardiothoracic surgeons have faced overwhelming innovations and disruptive technologies in the past 20 years. We hope that the experience of this Kyoto ISMICS meeting will help you to take a real initiative and leadership role in future cardiothoracic therapeutics.

Kyoto is one of the most beautiful cities in Japan, and was the capital for 1000 years. Kyoto has preserved the traditions of Japanese culture while simultaneously adopting revolutionary innovation concepts throughout its history.

With your attendance, and with the informative presentations from all the speakers, and innovative integrated hands-on participants, we also hope this will be a memorable meeting for you and we are looking forward to your honored presence.
Dear Colleagues,

It gives me great pleasure to welcome you to the Winter Workshop 2016 of the International Society for Minimally Invasive Cardiothoracic Surgery (ISMICS). The Workshop will take place Oct 28 and 29, 2016 in Kyoto. ISMICS held its 2008 Winter Workshop in Okinawa and I am glad that we are returning to Japan.

Meeting chairman Prof. Tohru Asai, long-term ISMICS member and board member, and his organizing team have compiled an outstanding program which provides educational content across the whole spectrum of less invasive cardiovascular and thoracic surgery. The workshop offers hands on seminars and the opportunity to submit and present abstracts. The faculty includes the president, past presidents, and respected members of ISMICS and a number of leading Japanese minimally invasive cardiothoracic surgeons.

The first ISMICS Winter Workshop was held in 2002 in Delhi, India. Since then very successful further workshops were organized in Thailand, China, Australia, Turkey, Japan, Argentina, Peru, and Korea.

On behalf of the ISMICS Board of Directors I invite you to participate in an exciting 2016 ISMICS Winter Workshop in the beautiful city of Kyoto.

Johannes Bonatti MD
President
International Society for Minimally Invasive Cardiothoracic Surgery
Course Directors
Hirokuni Arai (Tokyo Medical and Dental University)
Toshiaki Ito (Japanese Red Cross Nagoya Daiichi Hospital)
Tadasu Kohno (Toranomon Hospital)
Toru Kuratani (Osaka University)
Takashi Nitta (Nippon Medical School)
Yoshiki Sawa (Osaka University)
Shuichiro Takanashi (Sakakibara Heart Institute)
Hitoshi Yaku (Kyoto Prefectural University of Medicine)

Program Committee
Hiroyuki Nishi (Osaka Police Hospital)
Kazuma Okamoto (Keio University)
Taichi Sakaguchi (The Sakakibara Heart Institute of Okayama)
Tomoaki Suzuki (Shiga University of Medical Science)
Minoru Tabata (Tokyo Bay Urayasu / Ichikawa Medical Center)
Motoshi Takao (Mie University)

Domestic Faculty
Kohei Abe (St. Luke’s International Hospital)
Atsushi Amano (Juntendo University)
Koji Chihara (Shizuoka City Hospital)
Hiroshi Date (Kyoto University)
Hirosato Doi (Sapporo Cardiovascular Clinic)
Kiyoyuki Eishi (Nagasaki University)
Sakashi Fujimori (Toranomon Hospital)
Toshihiro Fukui (Kumamoto University)
Yoshiaki Fukumura (Tokushima Red Cross Hospital)
Kyoji Hirai (Nippon Medical School Chiba Hokusoh Hospital)
Norihiko Ikeda (Tokyo Medical University Hospital)
Takeshi Ikeda (Toranomon Hospital)
Masayoshi Inoue (Kyoto Prefectural University of Medicine)
Yoshihide Irie (Iwaki City General Iwaki Koryo Hospital)
Norihiko Ishikawa (New Heart Watanabe Institute)
Tadashi Isomura (Tokyo Heart Center)
Hironori Izutani (Ehime University)
Hiroyuki Kamiya (Asahikawa Medical University)
Mitsuhiro Kamiyoshihara (Maebashi Red Cross Hospital)
Masaaki Kato (Morinomiya Hospital)
Keita Kikuchi (Wuhan Asia Heart Hospital)
Takeshi Kinoshita (Shiga University of Medical Science)
Jyunjiro Kobayashi (National Cerebral and Cardiovascular Center)
Masashi Komeda (Nozaki Tokushukai Hospital)
Hiroshi Kubota (Kyorin University)
Masahiko Kuinose (Kawasaki Medical School)
Atsushi Kurata (Yamato Seiwa Hospital)
Isao Matsumoto (Kanazawa University)
Shinji Miyamoto (Oita University)
Toshiaki Morikawa (The Jikei University School of Medicine)
Mingyoun Mun (The Cancer Institute Hospital Of JFCR)
Seichiro Murata (Itabashi Chuo Medical Center)
Akihiro Nabuchi (Showa University Northern Yokohama Hospital)
Hiroyuki Nakajima (Saitama Medical University International Medical Center)
Hiroshige Nakamura (Tottori University)
Hiroyuki Niinami (Saitama Medical University International Medical Center)
Motonobu Nishimura (Tottori Medical School)
Yoshiharu Nishimura (Wakayama Medical University)
Masami Ochi (Nippon Medical School)
Youhei Ohkawa (Hokkaido Ohno Hospital)
Hiroyuki Oizumi (Yamagata University)
Kenji Okada (Shinshu University)
Yoshitaka Okamura (Wakayama Medical University)
Yasuhide Okawa (Nagoya Heart Center)
Meinoshin Okumura (Osaka University)
Minoru Ono (The University of Tokyo)
Shin-ichi Osaka (IMS Katsushika Heart Center)
Toshiya Otsuka (Tokyo Metropolitan Tama Medical Center)
Shigeyuki Ozaki (Toho University Ohashi Medical Center)
Masaaki Sato (Tokyo University)
Toshihiko Sato (Kyoto University)
Toshihiko Shibata (Osaka City University)
Tomoki Shimokawa (Teikyo University)
Yasushi Shintani (Osaka University)
Takashi Suda (Fujita Health University)
Taijiro Sueda (Hiroshima University)
Yasushi Takagi (Fujita Health University)
Hiroyuki Tanaka (Niho University)
Masashi Tanaka (Nihon University)
Kazuo Tanemoto (Kawasaki Medical School)
Tadashi Tashiro (Fukuoka University)
Takeo Tedoriya (Ageo Central General Hospital)
Koichi Toda (Osaka University)
Hiroyuki Tsukui (Hokkaido Cardiovascular Hospital)
Yoshio Tsunezuka (Ishikawa Prefectural Central Hospital)
Naomichi Uchida (Tsuchiya General Hospital)
Hideichi Wada (Fukuoka University)
Go Watanabe (New Heart Watanabe Institute)
Hiroki Yamaguchi (Showa University Koto Toyosu Hospital)
Hiromasa Yamashita (Toho University Ohashi Medical Center)
Hitoshi Yokoyama (Fukusima Medical University)
Hidenori Yoshitaka (The Sakakibara Heart Institute of Okayama)
Ryohei Yozu (Keio University)

International Faculty

Niv Ad (Inova Heart and Vascular Institute, USA)
Husam H Balkhy (The University of Chicago Medicine & Biological Sciences, USA)
Johannes Bonatti (Heart and Vascular Institute Cleveland Clinic Abu Dhabi, UAE)
Anson Cheung (University of British Columbia, Canada)
Kuan-Ming Chiu (Far Eastern Memorial Hospital, Taiwan)
Taweesak Chotivatanapong (Central Chest Institute of Thailand, Thailand)
Francis Ferdinand (Albany Medical Center Hospital, USA)
T. Bruce Ferguson Jr. (East Carolina Heart Institute East Carolina Diabetes and Obesity Institute, USA)
Michael S. Firstenberg (The Summa Health Care System, USA)
Gabriele Di Giammarco (University G D’Annunzio-Chieti, Italy)
Paul Grundeman (University Medical Center Utrecht, The Netherlands)
Bob B. Kiaii (London Health Sciences Centre, Canada)
Marco Solinas (G. Pasquiniucci Heart Hospital, Gabriele Monasterio Foundation, Italy)
Young Tae Kim (Seoul National University Hospital, Korea)
Didier F Louimet (NYU Langone Medical Center, USA)
Poul Erik Mortensen (Odense Universitets Hospital, Denmark)
Simon C. Moten (Royal Melbourne Hospital, Australia)
Calvin Ng (The Chinese University of Hong Kong, Hong Kong)
Tom C. Nguyen (The University of Texas Health Science Center at Houston Careers, USA)
Kay-Hyun Park (Seoul National University Bundang Hospital, Korea)
Diego Gonzalez Rivas (Coruña University Hospital, UCTMI and Shanghai Pulmonary Hospital, Spain)
Igor Rudez (Dubrava University Hospital, Croatia)
Marc P. Sakwa (William Beaumont Health System, USA)
Piotr Suwalski (Central Teaching Hospital of the Ministry of the Interior, Poland)
Liang Tao (Wuhan Asia Heart Hospital, China)
Randall Wolf (Memorial Hermann Hospital, University of Texas Health Science Center - Houston Texas Medical Center, USA)
Tristan D. Yan (Macquarie University Hospital, Australia)
GENERAL INFORMATION

Dates
October 28 (Fri.) - 29 (Sat.) , 2016

Chairman
Tohru Asai (Shiga University of Medical Science)

Venue
The Westin Miyako Kyoto, Japan
Keage, Sanjo, Higashiyama-ku, Kyoto 605-0052, Japan
TEL. +81-75-771-7111
http://www.miyakohotels.ne.jp/westinkyoto/english/index.html

Registration
Oct. 28 7:30 - 17:00, Oct. 29 7:30 - 16:00
Doctor, Medical Researcher, General Attendee, Senior Medical Intern JPY25,000
Co-medical (Nurse, Clinical Engineer, etc.) Student, Junior Medical Intern JPY5,000
*1 Co-medical staff and Junior Medical Intern is required to bring a certificate or proof of the position.
*2 Student is required to bring the student ID or equivalent documents.

Exhibition & E-Poster session
Oct. 28 8:00 - 19:00, Oct. 29 8:00 - 18:00

Language
The official language of ISMICS 2016 Winter Workshop is English.

Meal
Lunch Box will be provided at Luncheon Seminars.

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

Secretariat
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Upon your participation to ISMICS 2016 Winter Workshop, credit from The Japanese Board of Cardiovascular Surgery shall be provided.
Upon your participation to both "Minimally Invasive Lung Surgery" and "Minimally Invasive Mediastinal Surgery" sessions, credit from The Japanese Board of General Thoracic Surgery shall be provided.
## AT A GLANCE & VENUE MAP

### Day 1
**October 28 (Fri.)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Main Hall (Yamashiro-No-Ma)</th>
<th>Exhibition Hall</th>
<th>Hands-on Room 1 (Yoshimizu-No-Ma)</th>
<th>Hands-on Room 2 (Shirakawa-No-Ma)</th>
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<tbody>
<tr>
<td>8:00-8:40</td>
<td>Coronary Revascularization</td>
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<tr>
<td>10:00-11:25</td>
<td>TAVI &amp; MICS AVR</td>
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<tr>
<td>12:00-13:00</td>
<td>Luncheon Seminar Co-sponsored by Medtronic Japan Co., Ltd.</td>
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**Hands-on Sessions**
- **Hands-on Room 1** (Yoshimizu-No-Ma)
  - The AVNeo OZAKI valve reconstruction Hands-on seminar
- **Hands-on Room 2** (Shirakawa-No-Ma)
  - Off-Pump Coronary Bypass (OPCAB) dry lab bootcamp

### Day 2
**October 29 (Sat.)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Main Hall (Yamashiro-No-Ma)</th>
<th>Exhibition Hall</th>
<th>Hands-on Room 1 (Yoshimizu-No-Ma)</th>
<th>Hands-on Room 2 (Shirakawa-No-Ma)</th>
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<tbody>
<tr>
<td>8:00-10:45</td>
<td>Minimally Invasive Lung Surgery</td>
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<tr>
<td>10:45-12:00</td>
<td>Minimally Invasive Mediastinum Surgery</td>
<td>E-Poster Session 3</td>
<td>Hands-on for MICS MVP training systems</td>
<td>Terumo’s Beating Porcine Heart off-pump CABG Model</td>
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<tr>
<td>12:00-13:00</td>
<td>Luncheon Seminar Co-sponsored by Century Medical, Inc.</td>
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**Hands-on Sessions**
- **Hands-on Room 1** (Yoshimizu-No-Ma)
  - Hands-on for MICS MVP training systems
- **Hands-on Room 2** (Shirakawa-No-Ma)
  - Terumo’s Beating Porcine Heart off-pump CABG Model
### Exhibitors

<table>
<thead>
<tr>
<th>Booth No.</th>
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<tr>
<td>1</td>
<td>Johnson &amp; Johnson, K. K.</td>
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<td>2</td>
<td>St. Jude Medical Japan Co., Ltd.</td>
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<td>3</td>
<td>Japan Lifeline Co., Ltd.</td>
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<td>4</td>
<td>NIPRO CORPORATION</td>
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<td>5</td>
<td>FASOTEC Co., Ltd.</td>
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<td>6</td>
<td>TeDan Surgical Innovations</td>
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<td>7</td>
<td>VITAL Corporation</td>
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<td>8</td>
<td>Nippon Covidien Ltd.</td>
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<td>Covidien Japan Inc.</td>
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<td>10</td>
<td>Hakuseisha CO., LTD.</td>
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<td>11</td>
<td>MC Medical, Inc. / KARL STORZ Endoscopy Japan K. K.</td>
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<td>R’ Tech Corporation</td>
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<td>13</td>
<td>ACP JAPAN CO., LTD.</td>
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<td>14</td>
<td>Unimedic, Inc.</td>
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<td>15</td>
<td>Fuji Systems Corporation</td>
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<td>16</td>
<td>Coca-Cola Customer Marketing Company Co</td>
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<td>17</td>
<td>Intuitive Surgical G.K.</td>
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<td>18</td>
<td>Date Medical Service Inc.</td>
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</tbody>
</table>
Hands-on Room Programs

Friday, October 28, 2016  9:00 to 18:30

Room 1 (Yoshimizu-No-Ma)

9:00-12:00
The AVNeo OZAKI valve reconstruction Hands-on seminar
Instructor: Shigeyuki Ozaki, Hiromasa Yamashita

The AVNeo OZAKI valve reconstruction is the method of new surgical technique using patient's own pericardium that has been devised by Professor Shigeyuki Ozaki (Toho University, Ohashi Medical Center, Japan). The harvested pericardium is formed into three leaflets using Ozaki sizer and template (Ozaki VRecSTM) and the leaflets are sutured to valve annulus. Reconstructed aortic valve behaves as naturally as original valve with excellent hemodynamics and does not require anti-coagulant therapy. OZAKI VRecSTM system was approved by Japanese PMDA and U.S. FDA in 2014. The hands-on will be a precious opportunity to use the actual device. This time Professor Ozaki himself will teach you how to perform the procedure (early registration recommended)! Please feel free to drop by and observe.

13:00-15:30
TAVI (Sapien) Hands on seminar for young surgeon
Instructor: Minoru Tabata, Hidenori Yoshitaka

It has been 2 years since TAVI was introduced in Japan, and now it is one of the standard procedures for frail AS patients.
In ISMICS 2016 Winter Workshop, we hold the hands-on seminar for young surgeons who have little chance to practice TAVI because of various reasons. With this practical lecture and the training using the real device, let's deepen your understanding of TAVI.
We wish a lot of surgeons who are interested in TAVI will join this great opportunity.

16:00-18:30
Perceval Sutureless Aortic Heart Valve (LivaNova)
Instructor: Simon C. Moten, Marco Solinas

LivaNova’s Perceval is a complete sutureless aortic valve that can reduce technical complexity and procedural time in both MICS and conventional AVR procedure. This biological valve has been mainly used in European countries and approved in U.S.. This valve is scheduled to be approved in Japan in the near future. This is the first time Hands-on training in Japan. Please feel free to drop in and observe at any time.

Room 2 (Shirakawa-No-Ma)

9:00-12:00
Off-Pump Coronary Bypass (OPCAB) dry lab bootcamp
~How Japanese CV surgeons brush up their skill of coronary anastomosis?~
Instructor: Kohei Abe, Hiroyuki Nishi, Yoshiharu Nishimura, Kazuma Okamoto, Hiroyuki Tsukui, Hitoshi Yokoyama

Seeking participants in Advanced Hands-on-session for Coronary Artery Bypass Simulator! Feedback and assessment will be provided by Japan's top surgeons! Would you like try out the Beating heart simulator "BEAT" and silicone vascular model YOUNG, developed by bioengineering PhDs in Japan, at the Off-Pump Coronary Artery Bypass (OPCAB) dry lab? Following the example of the U.S., Japan now requires 30 hours of Off-the-Job training (Off-JT) when obtaining certification as a cardiovascular surgeon specialist as of May 2016. Off-JT includes Dry lab, Wet lab, and Animal lab. However, enhancement of the dry lab, which is the most common daily routine training method, is needed to train young people. Japan is an advanced country of OPCAB, where more than 60% CABG are performed by Off-pump. In this program, a Japan developed OPCAB dry lab is provided. This is an excellent opportunity to receive technical training on beating-heart coronary artery anastomosis, which is essential for cardiovascular surgeons, and receive feedback and an evaluation from Japan's top surgeons. We welcome you to this exciting program in Kyoto, and seek to spread OPCAB to countries around the world. Let's meet in Kyoto!

13:30-16:00
Hands-on Seminar for Butterfly Technique Mitral Valve Repair
Instructor: Tohru Asai

Butterfly technique is a less leaflet resection technique for mitral valve repair, consists of two triangular resections. Aim of this hands-on is to understand the important concept of newly developed “control height reduction” of the posterior leaflet, and each participant will actually design a butterfly resection and perform the mitral valve repair procedure in the excised porcine heart model. The innovator, Tohru Asai, MD, will teach participants to perform the Butterfly repair in detail step-by-step.


Co-sponsored by : Edwards Lifesciences Corporation

Co-sponsored by : LivaNova

Co-sponsored by : EBM Corporation

Co-sponsored by : Edwards Lifesciences Corporation
Saturday, October 29, 2016  9:00 to 16:00

Room 1 (Yoshimizu-No-Ma)

9:00-12:00
Hands-on for MICS MVP training systems
Instructor: Kuan-Ming Chiu, Tom C. Nguyen, Hiroyuki Nishi, Kazuma Okamoto, Minoru Tabata
Simulations for MICS mitral valve repair is prepared in three settings, two dry-labs and one wet-lab including 3D-endoscopic setting. Participants rotate three tables and try all three systems during a three-hours course. This is a very precious chance to get a hands-on education from MICS experts and to know effective training systems which can be affordable in a private situation.

Room 2 (Shirakawa-No-Ma)

9:00-12:00
Terumo's Beating Porcine Heart off-pump CABG Model
Instructor: Kohei Abe, Toshihiro Fukui, Atsushi Kurata, Seiichiro Murata, Taiichi Sakaguchi, Tomoaki Suzuki
Terumo's Beating Porcine Heart system is a marvelous technology that realized a real OPCAB setting. We have never seen such a practical OPCAB system. The system makes its world debut in this ISMICS 2016 Winter Workshop in Kyoto. You will witness the amazing system firsthand in the autumn in Kyoto. We will welcome young trainees on Web who graduated within ten years or younger than 35 years old (born after 1981). Japan is the most advanced OPCAB country. Skillful Japanese OPCAB surgeon will teach you details one-on-one. Please register early on the Web.

Co-sponsored by : TERUMO CORPORATION

Room 1 (Yoshimizu-No-Ma) & Room 2 (Shirakawa-No-Ma)

13:00-16:00
Complete VATS lobectomy Hands-on Seminar  ~Conventional and Uniportal~
Instructor: Sakashi Fujimori, Kyoji Hirai, Young Tae Kim, Tadasu Kohno, Calvin Ng, Motoshi Takao, Diego Gonzalez Rivas, Toshihiko Sato, Takashi Suda
Learn about the most recent advances in complete VATS lobectomy in this hands-on. It will provide participants hands-on experience of complete VATS lobectomy both through the conventional standard approach with an ex-vivo lung (Course director: Tadasu Kohno, M.D., Toranomon Hp.) and the recently emerging uniportal approach with a novel simulator model (Course director: Takashi Suda, M.D., Fujita Health Univ.). You can discuss the technical issues of these challenging procedures with superb experts who gave the lecture during the morning. Therefore, we recommend you to take part in this course as a team of a board certified thoracic surgeon and a thoracic resident or fellow who work together in daily practice.

Co-sponsored by : Johnson & Johnson, K. K.
Main Hall Programs

Friday, October 28, 2016  8:00 to 18:40

Coronary Revascularization 8:00 – 9:40

Coordinator: Taichi Sakaguchi

Chairs:  Bob B. Kiaii, Hirokuni Arai, Masami Ochi, Hitoshi Yaku

08:00  ISMICS endoscopic conduit harvest consensus conference and statements
Francis Ferdinand

08:15  Intraoperative graft verification
Gabriele Di Giammarco

08:30  The acute physiology of surgical revascularization
T. Bruce Ferguson Jr.

08:45  Surgical Results of Off-Pump MICS CABG Under Direct Vision
Keita Kikuchi

09:00  Direct infusion method of diluted ICG with blood into the free graft using the SPY 3000
Masao Takahashi

09:10  Negative impact of prior percutaneous coronary intervention on graft flow and patency
after coronary artery bypass grafting
Hiroyuki Nakajima

09:20  Training simulator of internal thoracic artery harvest by using 3D printing technology
Toshiyuki Yamada

09:30  New dry-lab training model of endoscopic coronary anastomosis, as a step toward
totally endoscopic coronary artery bypass
Kosuke Ujihira

*Presentation with number (PO-XX): its abstract is listed in the abstract page (P25 -31)
TAVI & MICS AVR  10:05 – 11:25

Coordinator: Minoru Tabata

Chairs: Anson Cheung, Shuichiro Takanashi, Jyunjiro Kobayashi, Yoshihito Irie

10:05  TAVI for All-comers
       Anson Cheung

10:20  TA-TAVI
       Poul Erik Mortensen

10:35  TAVR: Past, present, and future
       Tom C. Nguyen

10:50  Aortic valve repair with bovine pericardium
       Liang Tao

       Soh Hosoba

11:10  The largest real world minimally invasive experience with a sutureless valve: results from a multicentre international registry
       Marco Solinas

Luncheon Seminar  12:00 – 13:00

Minimally Invasive Cardiac Surgery with Medtronic MICS Technologies

Chairs: Kazuo Tanemoto, Yoshitaka Okamura

12:00  Ultra fast track minimally invasive cardiac surgery-possible the new standard of care
       Bob B. Kiaii

12:30  Robotic mitral valve repair: Advanced technical aspects
       Didier F. Loulmet

Co-sponsored by : Medtronic Japan Co., Ltd.
Aorta / TEVAR  13:05 – 14:48

“Minimally invasive surgery in aortic surgery”

Coordinator: Hiroyuki Nishi

Chairs: Kay-Hyun Park, Hiroyuki Tanaka, Masaaki Kato, Naomichi Uchida

International session

13:05  Frozen elephant trunk with E-vita stent-graft  
       Igor Rudez

13:24  Minimal Access Aortic Surgery  
       Tristan D. Yan

13:43  Surgery for complications and failures of TEVAR  
       Kay-Hyun Park

Invited lecture

14:02  TEVAR for type B aortic dissection  
       Masaaki Kato

14:15  Open surgery for aortic aneurysm  
       Toshihiro Fukui

Oral presentation

14:28  OP-8  
       Total debranching TEVAR  
       Tomohiro Mizuno

14:38  OP-9  
       Hybrid aortic arch repairs  
       Kiyofumi Morishita

Coffee Break Seminar  15:00 – 16:00

Chairs: Takeo Tedoriya, Takahiro Takemura

15:00  OP-8  
       Perceval sutureless valves in Australia  
       Simon C. Moten

15:30  OP-9  
       Perceval sutureless valves in Europe  
       Marco Solinas

Co-sponsored by : LivaNova
Cardiac Robotic Surgery 16:05 – 16:50

Coordinator: Tomoaki Suzuki

Chairs: Didier F Loulmet, Tadashi Isomura, Minoru Ono, Norihiko Ishikawa

16:05  **Robotic TECAB using anastomotic connectors: State of the art in 2016**
Husam H Balkhy

16:20  **Robotic totally endoscopic coronary bypass surgery for multivessel disease**
Johannes Bonatti

16:35  **Current practice of ECMO and VAD**
Michael S. Firstenberg

Challenging Case Presentation 17:10 – 18:31

Coordinator: Kazuma Okamoto

Chairs: Niv Ad, Hitoshi Yokoyama, Koichi Toda

**Thoracic Procedures**

Commentator: Toshiya Otsuka

17:10  OP-10  **Free omental plombage using microvascular surgery for management of empyema cavity**
Masaya Tamura

17:19  OP-11  **Total endoscopic left ventricular epicardial lead implantation**
Yu Inaba

**Beating Heart Cardiovascular Procedures**

Commentator: Tom C. Nguyen

17:28  OP-12  **Experience of emergency on-pump beating total aortic arch and descending aortic replacement for ruptured chronic type B aortic dissection with thoracoabdominal aortic aneurysm**
Masahiko Ikebuchi

17:37  OP-13  **Beating heart minimally mitral valve surgery via right thoracotomy without aortic crossclamping in a patient with ischemic mitral regurgitation after CABG**
Yujiro Kawai

17:46  OP-14  **Beating aortic valve replacement for aortic stenosis with severe left ventricular dysfunction**
Kenji Iino
Transcatheter procedures

Commentator: Anson Cheung

17:55 | OP-15 | Successfully treated non-occlusive mesenteric ischemia after transcatheter aortic valve replacement
Masahiko Noguchi

18:04 | OP-16 | A case of paraplegia after TAVI
Aiko Sato

18:13 | OP-17 | Valve in valve aortic valve replacement with sutureless perceval S valve - a third treatment option besides surgical reoperation and TAVI
Daniel Chan

18:22 | OP-18 | Transcatheter plug closure of mitral paravalvular leaks by transapical approach
Yoshiaki Katada

Dinner Reception  19:00 – 21:00
(All attendees: Free to join)

Venue: Aoi Den, East Wing 4F, The Westin Miyako Kyoto
Minimally Invasive Lung Surgery 8:00 – 10:45

Coordinator: Motoshi Takao
Chairs: Hiroshi Date, Tadasu Kohno

Target Localization

08:00  Hybrids, magnets and 3D. New developments in minimally invasive thoracic surgery
       Calvin SH Ng
08:18  Minimally invasive surgery for small GGN - localisation and intra-operative diagnosis
       Young Tae Kim
08:36  Virtual assisted lung mapping (VAL-MAP) for intra-operative localisation
       Masaaki Sato

Multiple Port VATS

08:54  Complete VATS; Look-up settings
       Toshiko Sato
09:12  Complete VATS; Confronting upside-down settings
       Mingyon Munn
09:30  Complex resection with complete VATS
       Sakashi Fujimori

Reduced Port VATS

09:48  Japanese experience
       Kyoji Hirai
10:06  Uniportal VATS surgery
       Diego Gonzalez Rivas

Robot assisted lobectomy

10:24  Advances in RATS for lung cancer
       Hiroshige Nakamura
Minimally Invasive Mediastinal Surgery 10:45 – 12:00

Coordinator: Motoshi Takao

Chairs: Masayoshi Inoue, Takashi Suda

10:45  |  VATS for thymectomy  
               Yasushi Shintani

11:03  |  Complex resection; VATS for mediastinal tumor  
               Takeshi Ikeda

11:21  |  Subxiphoid approach for thymectomy  
               Takashi Suda

11:39  |  RATS for mediastinum  
               Hiroshige Nakamura

Luncheon Seminar 12:00 – 13:00

Trends and tips on Atrial Fibrillation: Road to less invasiveness

Chairs: Takashi Nitta, Taijiro Sueda

12:00  |  Surgical ablation for atrial fibrillation 2016  
               Niv Ad

12:30  |  Minimally invasive AF surgery, wisdom from 13 years experience (2003-2016)  
               Randall Wolf

Co-sponsored by: Century Medical, Inc.
Mitral Valve, MICS approach  13:00 –14:50

“Minimally invasive approaches and innovative techniques in mitral and tricuspid valve surgery”

Coordinator: Minoru Tabata

Chairs: Minoru Tabata, Hiroyuki Tsukui, Ryohei Yozu

13:00  Building a minimally invasive valve program - from the ground up  
Tom C. Nguyen

13:14  Endoscopic and robotic approach for minimally invasive mitral valve repair  
Kuan-Ming Chiu

13:28  Simple repair techniques for complex mitral valve disease  
Taweesak Chotivatanapong

13:42  Repair techniques for IE, complex tricuspid valve repair  
Hiroki Yamaguchi

Selected abstracts

13:56  MICS vs conventional  
OP-19  
Minimally Invasive versus Open Mitral Valve Repair for type dysfunction: A propensity-matched comparison  
Naonori Kawamoto

14:07  On-pump beating MVP  
OP-20  
On-pump beating heart mitral valve repair without aortic cross-clamping: tips tricks for safe practice  
Eiki Nagaoka

14:18  Totally endoscopic MVP  
OP-21  
Clinical Experience of total endoscopic cardiac surgery in 357 patients  
Xiangjun Zeng

14:29  Transax double valve  
OP-22  
Trans-right Axillary Double Valve Surgery  
Masayoshi Tokoro

14:40  Minimally invasive redo TV  
OP-23  
Benefits of a right anterolateral minithoracotomy rather than a median sternotomy in isolated tricuspid redo procedures  
Alkebaier Maimaiti
Coffee Break Seminar  15:00 – 16:00

Advanced technique and indication for AVR with SJM Trifecta GT

Chairs:  Hiroshi Niinami, Toshiaki Ito

15:00  Implantation Techniques and Results at MICS with Trifecta GT
Marc P. Sakwa

15:30  Transcatheter Aortic Valve Replacement and SJM Trifecta GT Experience
Anson Cheung

Co-sponsored by : St. Jude Medical Japan Co., Ltd.

Emerging Innovations  16:05 – 17:05

Coordinator: Tomoaki Suzuki

Chairs:  Paul Grundeman, Hirofumi Takemura, Tomoki Shimokawa, Tadashi Tashiro

16:05  Ultrastrong polymeric heart valve
Paul Grundeman

16:20  Infrared coagulator to treat atrial fibrillation, infectious endocarditis and cardiac tumors
Hiroshi Kubota

16:35  LA appendage closure
Piotr Suwalski

16:50  Totally Thoracoscopic Surgery for Stand-alone Atrial Fibrillation
Toshiya Otsuka
Award Finalist Presentation 17:10 – 17:50

Chairs: Tohru Asai, Takashi Nitta, Motoshi Takao

17:10 Accurate anatomic visualization of a patient-specific aortic root model by three-dimensional printing prior to aortic valve surgery
Kenichi Kamiya

17:18 A novel and easy method of adjustment of appropriate artificial chordal length in a patient with minimally invasive mitral valve repair
Kohei Horikawa

17:26 Median MICS ASD closure in pediatric population -The MICS performable by Under-40-
Noritaka Okada

17:34 Surgical outcomes of video-assisted thoracoscopic surgery for acute thoracic empyema using pulsed lavage irrigation
Yoshiteru Kidokoro

17:42 Robotically assisted internal mammary lymphadenectomy
Ludovic Melly
# E-Poster Session (Exhibition Hall)

**Friday, October 28, 2016**

## E-Poster Session 1  10:30 – 11:30

### PA1 (ASD, VSD, others)

<table>
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<tr>
<th>Time</th>
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<th>Author(s)</th>
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<tbody>
<tr>
<td>10:30</td>
<td>[PA1-1]</td>
<td>No-touch aorta robot-assisted cardiac surgery for atrial septal defect</td>
<td>Norihiko Ishikawa</td>
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<td>10:37</td>
<td>[PA1-2]</td>
<td>Percutaneous perventricular device closure of doubly committed subarterial ventricular septal defect: from the incision to a pinhole.</td>
<td>Ke Lin</td>
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<td>10:51</td>
<td>[PA1-4]</td>
<td>Cardiac shock 5 years after atrial septum occluder implantation.</td>
<td>Hiroshi Seki</td>
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### PB1 (Techniques, Devices)

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<tr>
<td>10:37</td>
<td>[PB1-2]</td>
<td>Safe peripheral cannulation for minimally invasive cardiac surgery</td>
<td>Daisuke Yasumizu</td>
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<td>11:00</td>
<td>[PB1-5]</td>
<td>A novel thermoreactive sternum close system to improve sternal stability in off-pump coronary artery bypasses grafting</td>
<td>Xian-ming Fu</td>
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<td>11:07</td>
<td>[PB1-7]</td>
<td>Assessment of Aortic Annulus Dimension Changes after Aortic Valve Reconstruction with Glutaraldehyde-Treated Autologous Pericardium by Multidetector Computed Tomography</td>
<td>Yoshitaka Yamamoto</td>
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Chair: Masashi Tanaka

Chair: Hiroyuki Kamiya

Chair: Hironori Izutani

Chair: Hiroyuki Nakajima
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<tr>
<th>PA2 (Aortic valve, MICS valve)</th>
<th>PB2 (MICS valve, Revascularization)</th>
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<tr>
<td><strong>Chair:</strong> Hirosato Doi</td>
<td><strong>Chair:</strong> Seiichiro Murata</td>
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<tr>
<td><strong>16:10</strong> [PA2-1] Minimally invasive aortic valve replacement and concomitant septal myectomy for the treatment of aortic stenosis with systolic anterior movement of the mitral valve. Toshinori Totsugawa</td>
<td><strong>16:10</strong> [PB2-1] Concomitant resection of the left atrial appendage and tricuspid annuloplasty during minimally invasive aortic valve replacement Nobuo Kondo</td>
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<tr>
<td><strong>16:17</strong> [PA2-2] Novel aortic annular fixation ring to ensure the precise annular size Kohei Abe</td>
<td><strong>16:17</strong> [PB2-2] Towards MICS for Tricuspid Regurgitation in patients with corrected transposition of great arteries (cTGA) Masashi Komeda</td>
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<tr>
<td><strong>Chair:</strong> Youhei Ohkawa</td>
<td><strong>Chair:</strong> Keita Kikuchi</td>
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<tr>
<td><strong>16:54</strong> [PA2-7] External suture aortic annuloplasty: less invasive approach to the aortic root and valve pathology Takashi Kunihara</td>
<td><strong>16:54</strong> [PB2-8] Failed sutureless repair for left ventricular free wall rupture caused by myocardial infarction Satoshi Sumino</td>
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<td><strong>17:01</strong></td>
<td><strong>17:01</strong> [PB2-9] Skeletonization technique of internal thoracic artery dissection without using the quick touch method Kouji Shimizu</td>
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</table>
E-Poster Session 3  9:30 – 10:21

**PA3 (TAVI)**

Chair: Yoshiharu Nishimura

09:30  [PA3-1] The early outcomes of transcatheter aortic valve implantation with alternative nonfemoral approach in our hospital
Tohru Takaseya

09:37  [PA3-2] Wire pull-through technique during transapical transcatheter aortic valve implantation for the patients with shaggy aorta
Masato Tochii

09:44  [PA3-3] Transapical aortic valve implantation and minimally invasive off-pump coronary artery bypass surgery
Daisuke Nakatsuka

09:51  [PA3-4] Short-term outcomes of transcatheter aortic valve replacement in patients with very severe aortic stenosis
Lizuku Yamashita

Chair: Takeshi Kinoshita

10:00  [PA3-5] Incidence, Etiology and Risk Factors of Unplanned Readmissions after Trans-Catheter Aortic Valve Replacement
Lucian Lozonschi

10:07  [PA3-6] Apical-access-related Pseudoaneurysm 1 year after Trans-catheter Aortic Valve Implantation
Akira Yamada

10:14  [PA3-7] Immediate and Intermediate Outcome After Transapical Transcatheter Aortic Valve Replacement.
Toshifumi Saga

**PB3 (Aortic)**

Chair: Kenji Okada

09:30  [PB3-1] Surgical Repair of Cervical Aortic Arch with Anomaly of Brain Circulation through Clamshell Incision
Toshihito Gomibuchi

09:37  [PB3-2] Total arch replacement using frozen elephant trunk via upper partial sternotomy
Yosuke Takahashi

09:44  [PB3-3] Aortic remodeling in Early term after total arch replacement with Open stent graft
Tomoya Uchimura

09:51  [PB3-4] Hybrid Repair of Distal Arch or extended Aortic Aneurysms
Keiichi Kimura

Chair: Shinji Miyamoto

10:00  [PB3-5] Super-fast Track Management with Extubation in the OR for Elective Total Aortic Arch Replacement. Is Total Aortic Arch Replacement always an absolutely invasive operation?
Masahiko Ikebuchi

10:07  [PB3-6] Hybrid Repair for Kommerell's diverticulum with right-side aortic arch
Minami Iio

10:14  [PB3-7] A case of total arch and descending aortic replacement for a Kommerell’s diverticulum with right aortic arch and abberant left subclavian artery by an ALPS (antero-lateral thoracotomy with partial sternotomy)
Ikuo Katayama
**E-Poster Session 4  10:30 – 11:40**

**PA4 (Arrhythmia, MICS Valve, others)**

<table>
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<tr>
<th>Time</th>
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<th>Speaker</th>
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<tr>
<td>10:30</td>
<td>[PA4-1] Minimally Invasive Surgical Repair of Combined Right Ventricular Pseudoaneurysm and Atrial Septal Defect through bilateral mini-thoracotomies.</td>
<td>Yosuke Hari</td>
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<tr>
<td>10:37</td>
<td>[PA4-2] Minimally invasive double valve replacement via right mini-thoracotomy</td>
<td>Toshinori Totsugawa</td>
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<td>10:44</td>
<td>[PA4-3] A novel and easy method of adjustment of appropriate artificial chordal length in a patient with minimally invasive mitral valve repair</td>
<td>Kohei Horikawa</td>
</tr>
<tr>
<td>10:51</td>
<td>[PA4-4] Total EndoMICS MVP for Mitral insufficiency by 3 port VATS system</td>
<td>Shoji Yamaguchi</td>
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**PB4 (Aortic STENT)**

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<th>Time</th>
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<tbody>
<tr>
<td>10:30</td>
<td>[PB4-2] Minimally supraaortic debranching for zone 1 TEVAR</td>
<td>Shinya Takahashi</td>
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<tr>
<td>10:37</td>
<td>[PB4-3] Complete Resection of Lung Cancer invading Aorta using Stent-graft</td>
<td>Kei Kazuno</td>
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<tr>
<td>10:51</td>
<td>[PB4-5] Surgical outcome of aortic arch repair with Najuta fenestrated stent graft</td>
<td>Yujiro Ito</td>
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**Chair:** Masahiko Kuinose

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<th>Time</th>
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<th>Speaker</th>
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<tr>
<td>11:00</td>
<td>[PA4-5] Standard MICS Aortic Valve Replacement</td>
<td>Hiroyuki Tsukui</td>
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<tr>
<td>11:07</td>
<td>[PB4-6] Analysis of left subclavian artery occlusion in debranching with endovascular repair</td>
<td>Shinji Kawaguchi</td>
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<tr>
<td>11:07</td>
<td>[PB4-7] A Case of Endovascular Aortic Repair with Chimney Graft Technique for Anastomotic Pseudoaneurysm in the Aortic Arch</td>
<td>Hajime Kinoshita</td>
</tr>
<tr>
<td>11:14</td>
<td>[PB4-8] Trans-Stent Graft Embolization For Type II Endoleaks After Endovascular Abdominal Aortic Repair.</td>
<td>Ryushi Maruyama</td>
</tr>
<tr>
<td>11:21</td>
<td>[PB4-9] A case of total debranching TEVAR for a patient with Kommerell</td>
<td>Mitsuru Yuzaki</td>
</tr>
<tr>
<td>11:28</td>
<td>[PB4-10] Hybrid treatments using thoracic endovascular aortic repair of an aberrant right subclavian artery with Kommerell’s aneurysm, treated 2 Cases.</td>
<td>Tomohiro Imazuru</td>
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</table>
E-Poster Session 5  13:00 – 14:20

PA5 (Thoracic)

Chair: Yoshio Tsunezuka

13:00  [PA5-1] Surgery for primary lung cancer combined with idiopathic interstitial pneumonia.  
Takahiro Iida

13:07  [PA5-2] Complete VATS for left S9+10 segmentectomy  
Aki Kobayashi

13:14  [PA5-3] Total thoracoscopic reoperation after ipsilateral anatomical major lung resection  
Takashi Ibe

13:21  [PA5-4] Video-assisted thoracoscopic surgery combined with extracorporeal membrane oxygenation: three case reports  
Fumi Ohsawa

13:28  [PA5-5] Dual-port thymectomy  
Kazuya Fujinaga

Chair: Isao Matsumoto

13:36  [PA5-6] A case of solitary fibrous tumor resected by uniportal VATS  
Naoko Kimura

13:43  [PA5-8] ICG-Fluorescence Navigated Thoracoscopic Segmentectomy  
Masayuki Nakao

13:50  [PA5-9] Subxiphoid single-incision VATS procedure for the treatment of bilateral spontaneous pneumothorax  
Hiroshi Kawai

13:57  [PA5-10] Surgical outcomes of video-assisted thoracoscopic surgery for acute thoracic empyema using pulsed lavage irrigation  
Yoshiteru Kidokora

14:04  [PA5-11] Robotic assisted internal mammary lymphadenectomy  
Ludovic Melly
Abstracts
Surgical Results of Off-Pump MICS CABG Under Direct Vision

Department Cardiac Surgery, Wuhang Asia Heart Hospital, Wuhang, China
Keita Kikuchi, Hong Zhou, Xufa Chen, Liang Tao

Objective: We report our surgical technique developed and short-term outcomes of patients who underwent off pump MICS CABG under direct vision by a single surgeon.

Methods: Consecutive patients who underwent MICS CABG using BITA or Single Internal thoracic artery (SITA) by a single surgeon at a Japanese heart center between February 2012 and November 2015 were reviewed retrospectively. The patient is positioned in 40-degree right lateral decubitus position. An 8-10 cm left lateral thoracotomy is made on the intercostal space (ICS) below the left nipple.

ITT harvesting
We harvest the right internal thoracic artery (RITA) first. The mediastinal space is dissected beneath the sternum until the right lung is visualized. The right lung is depressed by an octopus NAVA stabilizer that is inserted via subxiphoid incision. A 32cm dissecting hook-type harmonic scalpel is inserted through the surgical port to harvest the RITA with skeletonised fashion under direct vision.

Proximal anastomosis
After harvesting the RITA, the pericardium is opened completely, followed by proximal anastomosis with octopus NAVA stabilizer and Cygnet flexible side biting clamp.

Distal anastomosis
Three deep pericardial suture are placed just like OPCAB fashion to assist displacement of the heart. We use Star fish heart positioner which arm is removed and three deep pericardial sutures.

Results: 60 cases of off-pump CABG via a left thoracotomy incision were done, 27 cases were done with BITA. Multi-vessel MICS CABG was performed in 49 cases. There was no conversion to sternotomy however there was a conversion to use of cardiopulmonary bypass. The average number of distal anastomoses was 2.7 ± 1.2. The harvesting RITA was attempted in 27 cases and no major complications were encountered during RITA harvesting. Mean duration of the operation was 298 ± 98 minutes. Mean duration of ICU length of stay was 2.5 ± 2.8 days. There was one in-hospital mortality.

Conclusions: Off pump MICS CABG with BITA in a reproducibly manner under direct vision were done safely with new techniques. MICS CABG using BITA may have possibility to be a standard revascularization in coronary surgery. The procedure has a further potential for optimization with hybrid revascularization strategies.

Direct infusion method of diluted ICG with blood into the free graft using the SPY 3000

1) Department of Cardiovascular Surgery, Hiraosuka Kyosu Heart Center, Hiraosuka, Japan
2) Department of Cardiovascular Surgery, Odawara Municipal Hospital, Odawara, Japan
Masao Takahashi1, Keisuke Miyajima1, Hirohito Sugiyama1 Toshihiro Ishikawa2, Kazuyoishi Hatada2

Objective: The SPY system has been developed for fluorescence graft validation during CABG. We are the first site in Asia-Oceania region to use SPY Intraoperative Imaging System since 2002. Based on these experiences using previous SPY 2000 system, useful techniques using brand-new SPY 3000 will be demonstrated.

Methods: From March 2002 to November 2015, off pump CABG surgery was performed in 697 cases (147 MDCABG, 550 OPCAB). The SPY System (SPY 2000) has been utilized routinely for intra-operative graft validation of all 2329 distal anastomoses. Since July 2015, the brand-new SPY 3000 system was introduced in our institute for further examination. SPY 3000 has usual SPY grey mode and color mode. Quantification of the myocardial stain can be also evaluated.

The innovative technique was developed in order to avoid unnecessary distal anastomosis during surgery. After distal anastomosis using free graft was performed, the diluted ICG (indocyanine green) mixed with heparinized blood was directly infused into the graft by syringe. In case that the neighbor coronary branch could be stained, we could avoid the grafting to that. If the branch coronary could not be seen clearly, we should make the anastomosis to the branch.

Results: The direct infusion method was performed over several cases, who needed intraoperative decision whether the sequential bypass should be performed or not. Some cases could be avoided the sequential bypass grafting, because the neighbor coronary could be stained just after direct infusion of diluted ICG with blood. In SPY 3000, absolute values of myocardial perfusion intensity of fluorescence could be shown from 0 to 255 shades of grey.

Conclusions: Using the SPY system, technical error can be avoided intraoperatively. The direct infusion method with SPY 3000 may have the potential to reduce unnecessary sequential bypass grafting. The innovative intraoperative graft imaging technology will create new possibilities for CABG.
OP-5
New Dry-lab Training Model of Endoscopic Coronary Anastomosis, as a Step toward Totally Endoscopic Coronary Artery Bypass

Department of Cardiovascular Surgery, Teine Keijinkai Hospital, Sapporo, Japan

Objective: Totally endoscopic coronary artery bypass (TECAB) is technically demanding and challenging procedure. An effective training program for TECAB, however, is not studied well. Here we show our original dry-lab training system for non-robotic beating heart TECAB.

Methods: All items in this training were commercially based. We selected a boxed machine (BEAT-S1, EBM Corporation) which can create various pulsatile movements of artificial vessels. On its root, we set a 2-dimensional home-video camera and monitor. A multiple-headed plate was settled in front of the BEAT-S1. Through these holes a trainee inserted endoscopic surgical instruments and anastomosed the artificial vessels in the BEAT-S1 watching the monitor. The inner diameter of artificial vessel was 1.5 mm, and the anastomosis was running fashion using 7-0 or 8-0 single-arm suture. This training program is consisted by 4 stages. The 1st stage is to conduct conventional off-pump coronary artery anastomosis by a trainee alone. The 2nd stage is non-beating version, and the 3rd stage is beating version with this model. After a trainee gets accustomed to the 3rd stage, artificial vessel is exchanged to extremely fragile one for the sake of more practical training, and this is the 4th stage.

A trainee conducted 100 anastomoses at the 4th stage, and whole processes were recorded by the video camera. We analyzed various factors from the movies and evaluated the efficacy of this training program. The outcomes were compared between 2 halves of 50 consecutive anastomoses each and the learning curve results were evaluated.

Results: The comparison between 2 groups showed a significant decrease in anastomotic time (p<0.001) and vessel injury (p=0.014). On the other hand, the number of stitches increased in later half (14.0 vs 16.3, p<0.001). A significant learning curve was found. Ablations were for the anastomotic time (y [min] = 24.6 – 1.7ln(x)). We considered the quality of anastomosis acceptable after 47 anastomoses. No apparent injury occurred after the 70th anastomosis.

Conclusions: Learning curve issues must be involved in all steps of TECAB. Our dry-lab system can be an effective training method for TECAB anastomosis.

OP-6
Real world transcatheter versus surgical aortic valve replacement. Early commercial experience in Japanese institutions

Objective: The use of transcatheter aortic-valve replacement (TAVR) has been introduced in Japan for more than two years. We report our institutional results of TAVR compared to surgical aortic valve replacement (SAVR) at early stage of commercial experience.

Methods: We conducted a retrospective review on 136 consecutive patients who underwent on TAVR (any types of valve, any approaches) at Toyohashi Heart Center and Nagoya Heart Center 2/2014-4/2016. During same period, we reviewed on 189 patients with severe aortic stenosis underwent SAVR (with or without concomitant CABG) for comparison. The primary end point were death from any cause at 30 day and operative complications.

Results: The rates of death from any cause were 2.9% in the TAVR group and 2.1% in the SAVR group at 30 days (P = 0.64). The rates of major stroke were 1.5% in the TAVR group and 2.1% in the SAVR group at 30 days (P = 0.67). At 30 days, major vascular complications were significantly more frequent with TAVR replacement (5.9% vs. 0%, P=0.007), adverse events were not significantly different between two groups (TAVR vs. SAVR) included major bleeding (5.1% vs. 2.6%, P=0.23) and new pacemaker implantation (5.9% vs. 3.2%, P = 0.24).

Conclusions: Transcatheter and surgical procedures for aortic-valve replacement were associated with similar rates of 30-day mortality and stroke at early stage of commercial experience in Japanese institutions.
OP-9

Hybrid aortic arch repairs: a 9-year single-institutional experience of 150 patients

1) Department of Cardiovascular Surgery, Hokodate Municipal Hospital, Hokodate, Japan
2) Division of Thoracic, Cardiovascular and General Surgery, Hokkaido University, Sapporo, Japan
3) Department of Cardiovascular Surgery, Hokkaido University, Sapporo, Japan

Objective: Despite the evolution of technology, aortic arch aneurysms remain challenging in high-surgical-risk patients. Recently, hybrid arch repair has emerged as a potentially less invasive treatment. However, some reports showed that it was still associated with a considerably morbid and moribund mortality. The aim of this study was to analyze our results of hybrid aortic arch repairs.

Methods: From June 2007 to March 2016, 150 patients underwent hybrid arch repairs. The mean age was 74 years (range, 36-92 years), and 113 patients (75%) were men. Indications included degenerative aneurysm (119 patients), dissection (21), and stent-graft failure (6). Thirteen patients underwent emergency repairs due to rupture. The mean aneurysm size was 85.6±13 mm in diameter. The techniques of incorporating arch vessels into the repair have evolved over time. Initially, we created oval or scallop-shaped fenestrations in hand-made endografts (n=30). Subsequently, debranching and recanalization was performed using commercially available endografts (n=110). Recently, we have used surgeon-modified fenestration in combination with debranching in 40% of candidates for hybrid aortic arch repairs (n=20).

Results: The 30-day mortality was 1.3% (2/150 patients). Persistent neurologic deficits occurred in 3 patients and spinal cord injury in 4. Three patients required re-operation after graft occlusion without neurologic complications. Respiratory complications included prolonged ventilation longer than 3 days in 5 patients and tracheal reintubation in 1. Aortic dissection was observed in 3 patients, one of whom caused acute occlusion of the celiac trunk and super mesenteric artery. Eight patients had access site injury. Five of them required interventions. Two patients sustained ischemia in the head and were ventilated for more than 3 days. There were no other postoperative complications related to the arch reconstruction.

Conclusions: Hybrid arch repairs were able to reduce postoperative mortality in high-surgical-risk patients. However, these procedures were associated with long-term aneurysm-related complication rates. The evolving technology of preserving cerebral circulation has led to a decrease in incidence of type I endoleaks.

OP-10

Free omental plombage using microvascular surgery for management of empyema cavity

Department of Thoracic, Cardiovascular and General Surgery, Kansazawa University, Kansazawa, Japan

Masahiro Tamura, Isao Matsumoto, Daisuke Saito, Shuhei Yoshida, Hideki Morigaya, Kenji Iino, Seiichi Kakegawa, Hirochim Takemura

Objectives: We recently encountered two cases of intractable aspergillosis and one case of empyema with bronchial fistula. We used a free omental flap to fill the empyema space because the lesion was located in the apex of the thoracic cavity. We present the three cases with Video and discuss the pitfalls of this procedure.

Cases: Case 1: A 67-year-old male underwent thoraco-hymectomy combined with diaphragm and pericardium and lung resection for thymoma following reconstruction of the pericardium using artificial patch. Chemo-radiotherapy was performed for pleural dissemination and lymph nodes recurrence. Nine years after the operation, the patient had complained of fever and purulent sputum and was diagnosed as lung abscess of the left apex. Cavectomy of the left abscess cavity was performed. Seven months after cavectomy, the fenestrated cavity was filled and closed with a free omental flap and anastomosed to the auxiliary artery and vein. Nineteen months after the operation, lung abscess has not relapsed and the patient has followed an uneventful postoperative course.

Case 2: A 54-year-old male underwent a complete resection of a stage IIIIB adenocarcinoma by right upper lobectomy. Six months after the operation, chemo-radiotherapy was done for pleural dissemination. Fifteen months after the operation, the patient was complaint of fever and thoracic CT scans revealed a giant aspergillosis. The plombage of free omental flap with vascular anastomosis was performed. Six months following reconstructive surgery, there has been no recurrence of empyema and his wounds have healed satisfactorily.

Case 3: A 58-year-old female with dermatomyositis and interstitial pneumonia revealed empyema with lung fistula. Follow-up chest CT scan revealed that the cavity became considerable.

Conclusions: To enable maximum utilization of the greater omental flap, which is available in only a limited amount, it seems useful to prepare and graft a free omental flap making use of microvascular surgery.

OP-11

Total endoscopic left ventricular epicardial lead implantation

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Objective: Epicardial lead placement for biventricular pacing is often a rescue procedure for cases of anatomical variations of the coronary venous system. We report a case of successful total endoscopic left ventricular epicardial lead implantation in a patient with chronic heart failure due to pacemaker-mediated cardiomyopathy.

Methods: A 77-year-old man with pacemaker-mediated cardiomyopathy was referred to us. His medical history included atrial fibrillation and chronic heart failure. A DDD pacemaker was implanted through the left subclavian vein at age 70. From 1 year, the patient was hospitalized several times because of heart failure. Electrocardiogram showed a QRS duration of 184 msec. Transesophageal echocardiography showed diastolic dysfunction of the left ventricular wall motion and a low ejection fraction (57±1%). Cardiac resynchronization therapy was planned. Ventography showed occlusion of the left subclavian vein. The head cardiologist attempted an AV lead implantation percutaneously through the right subclavian vein, but insertion of the AV lead to the targeted coronary venous branch proved to be difficult. Thus, surgical implantation of the AV lead was planned. As maintaining circulation stability was thought to be difficult in the median sternotomy approach, the thoracoscopic surgery was performed. The patient was placed in the right lateral decubitus position under general anesthesia using a double lumen tube and right-sided ventilation. A main 15 mm port was placed at the posterior axillary line in the 6th intercostal space and a 10.5 mm camera port was placed at the main port. The electrode was placed in the pericardial cavity by pericardial suturing and pulled out from the anterior axillary line (6th intercostal space). The lead was tunneled to the left pectoral pocket and connected to the new generator.

Results: The 30-day mortality was 1.3% (2/150 patients). Persistent neurologic deficits occurred in 3 patients and spinal cord injury in 4. Three patients required re-operation after graft occlusion without neurologic complications. Respiratory complications included prolonged ventilation longer than 3 days in 5 patients and tracheal reintubation in 1. Aortic dissection was observed in 3 patients, one of whom caused acute occlusion of the celiac trunk and super mesenteric artery. Eight patients had access site injury. Five of them required interventions. Two patients sustained ischemia in the head and were ventilated for more than 3 days. There were no other postoperative complications related to the arch reconstruction.

Conclusions: Hybrid arch repairs were able to reduce postoperative mortality in high-surgical-risk patients. However, these procedures were associated with long-term aneurysm-related complication rates. The evolving technology of preserving cerebral circulation has led to a decrease in incidence of type I endoleaks.

OP-12

Experience of emergency on-pump beating total aortic arch and descending aortic replacement for ruptured chronic type B aortic dissection with thoracoabdominal aortic aneurysm

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Objective: We report our rare experience of emergency on-pump beating total aortic arch and descending aortic replacement for ruptured chronic type B aortic dissection. The patient was a 49-year-old man who was treated medically for acute type B aortic dissection with serious complications such as persistent respiratory distress, paraparesis, and renal failure, etc. In 2012, Follow-up CT showed remarkable aortic enlargement from the distal aortic arch to the infrarenal abdominal aorta as Crawford type II thoracoabdominal aortic aneurysm with patent false lumen in August 2013. He was urgently referred to us in sealed rupture state with left hemithorax and hemoptysis on March 13, 2014. Emergency operation was started via left lateral thoracotomy attempting extended descending aortic replacement under femoro-femoral cardiopulmonary bypass F-F (CPB). However, when the distal aortic arch was opened near the left subclavian artery under aortic cross-clamping, we noticed retrograde aortic dissection developed more proximally inside the non-aneurysmal aortic arch. Because of the limitation of the prepared F-F CPB system, we could not use cardioplegia and antegrade selective cerebral perfusion (SCP) simultaneously. Then, on-pump beating ascending aortic anastomosis was done with cross-clamping the proximal ascending aorta. The pulmonary artery was vented to unload the left ventricle. SCP was applied for brachiocephalic artery and left common carotid artery for brain protection. The rectal temperature was controlled around 34 degrees Celsius. Following the proximal aortic anastomosis, 3 arch branches were reconstructed. Then, distal aortic anastomosis was done slightly proximal to the diaphragm in double barreled fashion. The patient successfully survived such a serious situation. He was discharged from our hospital without new complications on postoperative day 27. This experience suggests on-pump beating total aortic arch replacement without hypothermia could be a therapeutic option in very limited cases (ex. patient with high titer of cold agglutinin) when standard open surgery and stentgrafting are not indicated.
Beating heart minimally invasive mitral valve surgery via right thoracotomy without aortic cross-clamping in a patient with ischemic mitral regurgitation after CABG

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Redo sternotomy in patients with patent left internal mammary artery-left anterior descending coronary artery (LIMA-LAD) bypass graft has a risk of graft injury. However, some patient requires mitral surgery due to ischemic mitral valve regurgitation after coronary artery bypass grafting (CABG). Mitral valve surgery via right thoracotomy is a good option for patients with mitral valve regurgitation after CABG. Here we report the case of beating heart minimally invasive mitral valve surgery without aortic cross-clamping in a patient with previous CABG. The case is 69-year-old male with previous CABG due to myocardial infarction. He had a dyspnea on exertion and admitted to our hospital. Echocardiography revealed severe mitral regurgitation and left ventricular (LV) dysfunction with LV ejection fraction of 22%. He became an inotrope dependent and required mitral valve replacement. Coronary angiography revealed patent LIMA-LAD graft. To avoid injuring the graft, we performed video assisted minimally invasive mitral valve replacement without aortic cross-clamping.

The operation was performed in left lateral decubitus position. Cardiopulmonary bypass (CPB) was instituted through the cannulation of the right femoral artery and superior vena cava. Thoracotomy was performed in the fourth intercostal space with the skin incision length of 7cm. A soft tissue retractor was inserted to the thoracotomy. A rigid three-dimensional endoscope was inserted through an 11 mm port in the fifth intercostal space and a 5 mm port was inserted in the third intercostal space for port access. The ascending aorta vent was inserted for air removal and the LV vent was inserted in the right superior pulmonary vein. Mitral valve replacement was performed through the dissection of the left atrium. The CPB time was 163 minutes and the operation time was 244 minutes. There was no neurologic, bleeding or wound complications. Beating heart minimally invasive mitral valve surgery via right thoracotomy without aortic cross-clamping may be performed safely and is a good option for a patient with LV dysfunction and patent LIMA-LAD bypass graft.

Beating aortic valve replacement for aortic stenosis with severe left ventricular dysfunction

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TAVR has become a standard treatment for high-risk patients with aortic stenosis. However, alternative treatments for patients who are ineligible for TAVR are controversial. We present a patient with severe reduced EF who underwent surgical AVR on beating heart for aortic stenosis. The patient was 56-year-old female who required 6 dopamine support due to congestive heart failure and diagnosed as severe aortic stenosis with bicusp lid valve. EF was 15%. On pump beating AVR was performed with selective antegrade coronary artery blood perfusion. Beating AVR could play a complementary role of conventional AVR and TAVR procedure.

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Beating heart minimally invasive mitral valve surgery via right thoracotomy without aortic cross-clamping in a patient with ischemic mitral regurgitation after CABG

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Beating aortic valve replacement for aortic stenosis with severe left ventricular dysfunction

OP-15

Successfully Treated Non-occlusive Mesenteric Ischemia After Transcatheter Aortic Valve Replacement

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Objective: Although non-occlusive mesenteric ischemia (NOMI) is a well-known rare complication of open heart surgery using cardiopulmonary bypass, there has been no previous report of NOMI after transcatheter aortic valve replacement (TAVR).

Methods and Results: We report the first case of NOMI after TAVR that was successfully diagnosed and treated by intra-arterial infusion of vasodilators into the superior mesenteric artery (SMA). An 80-year-old male with dyspnea referred to our hospital. Echocardiography showed severe aortic stenosis with normal ejection fraction. The renal function was normal, and no diuretics were used. Computed tomography (CT) showed heavily calcified ascending aorta, atherosclerotic abdominal aortic aneurysm and stenotic iliac arteries. Our heart team chose transapical TAVR for this high-risk patient with symptomatic severe aortic stenosis and peripheral vascular disease. The procedure was performed under general anesthesia. We successfully implanted a 23 mm prosthetic valve following the balloon valvuloplasty. Postoperatively, the patient was hemodynamically stable without inotropic or mechanical support. Postoperative echocardiography showed normal aortic pressure gradient, trivial paravalvular aortic regurgitation and good left ventricular function. No blood transfusion was required perioperatively. About 30 hours after the procedure, he developed severe abdominal pain and the blood test showed elevated serum lactate level. We suspected non-occlusive mesenteric ischemia and performed emergency selective angiography of the superior mesenteric artery, which showed vasospasm. We confirmed the diagnosis of NOMI, and then infused prostaglandin E2 (20 µg) into the SMA. Vasospasm of the SMA was dramatically relieved. Subsequently, we started continuous intra-arterial infusion of papaverine (40 mg/h). The abdominal findings gradually improved and the serum lactate level decreased to the normal level in 2 days. After the 48-hour infusion, we discontinued intra-arterial papaverine infusion and extubated the patient. The patient was discharged home without any organ damage.

Conclusions: We successfully diagnosed and treated NOMI after TAVR. We need to know that NOMI is one of potential events when the elevated serum lactate level and/or abdominal pain is seen after TAVR. Once NOMI is suspected, we should not hesitate to perform emergency selective angiography for the diagnosis and treatment.

OP-16

A case of paraplegia after TAVI

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Objective: We herein report a case of paraplegia after Trans-Apical Trans catheter aortic valve implantation (TA-TAVI). [Case] A 84-year-old man with severe aortic valve stenosis underwent TAVI in our department. Transapical approach was provided because of a right coronary artery (RCA) dominant type. The patient had a 48mm abdominal aortic aneurysm and his aorta from descending thoracic to thoracoabdominal area was covered with severe atherosclerosis, so called shaggy aorta. Procedure was successful, and he was extubated in the operating room. The postoperative clinical course was excellent on the first day. However, subcutaneous emphysema was onset on the next day despite of the chest drainage tube. In 3rd postoperative day, circulatory system was collapsed suddenly due to cardiac tamponade and emergent re-do thoracotomy was performed. Circulatory condition recovered soon and he was awake after 6 hours. He had no movement in his both lower limbs and neurological evaluation was paraplegia after surgery. It was not decided to drain cerebrospinal fluid (CSF) with the hope of improving the spinal cord perfusion because of the hemodynamic condition. Magnetic resonance imaging revealed spinal cord ischemic injury around Th10 level and acute multifocal infarction in his brain.

Conclusions: Shaggy aorta and low blood pressure due to tamponade after TAVI was thought to be a reason of spinal cord injury. We report this as a rare complication after TAVI.
Objective: The mitral paravalvular leak (PVL) of prosthesis valve is uncommon but still has reported incidence of 3% to 12.5%, and the redo mitral valve replacement in highly frail patients is in a critical issue. Recently, transcatheter aortic valve implantation (TAVI) is widely performed in Japan, and the transapical approach also becomes a common procedure in TAVI. We demonstrated our case using this transapical approach technique to perform a transcatheter plug closure of mitral PVL successfully.

Methods: 74 years-old woman after 3rd mitral valve replacement (MVR) represented severe hemolytic anemia and required repeat blood transfusion. Transesophageal echocardiography (TEE) showed severer PVL, in several sights, and she was too frail to receive the 4th MVR. Our heart-team discussed various treatment strategies, and decided to perform a transcatheter plug closure using transapical approach. Under the general anesthesia, a 16 Fr sheath was inserted via apex with a left mini-thoracotomy, and transcatheter plug closure was performed in the hybrid operating room.

Results: The patient has a good postoperative course. The PVLs were markedly reduced, and the level of LDH was decreased and a hemolytic anemia was also cured.

Conclusions: Transapical approach has been widely used in PTMC and ablation, and this procedure is well established. Compared transeptal procedure, transapical approach is slightly invasive. However, transapical approach provides a short and more linear access route to the mitral valve. We think that the transapical approach is an efficient and safe option for plug closure of the mitral PVL.

OP-19

Minimally Invasive versus Open Mitral Valve Repair for type II dysfunction: A propensity-matched comparison

Methods: Between January 2001 and April 2016, 545 patients underwent mitral valve repair for type II dysfunction (434 with conventional median sternotomy, 111 with minimally invasive approach). We performed a one-to-one matched analysis using the estimated propensity score based on 18 factors, which obtained 77 well-matched patients pair.

Results: Follow-up period in minimally invasive group was significantly shorter than in conventional group (1.4±1.1 year vs 7.5±3.7 year, p<0.0001). In-hospital death was none between conventional mitral repair group and minimally invasive group. Operation time was significantly shorter for the minimally invasive group (255.5±47.1 min vs 231.1±46.2 min, p=0.0003). Cardiopulmonary bypass time and cardiac arrest time were similar between 2 groups.

Conclusions: Postoperative complication and echocardiographic findings in minimally invasive group were similar to those for conventional group. Minimally invasive mitral valve repair is favourable with regards to shorter operation time, less blood transfusion, shorter extubation time, and shorter hospital stay.

OP-20

On-pump beating heart mitral valve repair without aortic cross-clamping: tips tricks for safe practice

Methods: After standard cardiopulmonary bypass with ascending aortic cannulation and bicaval drainage was established, a double-lumen venting catheter was inserted via left cephalic vein and was connected to the suction circuit equipped with a small reservoir chamber. During the leakage test, this chamber was filled with blood, and the height of the fluid level of this chamber was adjusted to load the left ventricle. The left ventricular systolic pressure was continuously monitored to maintain the LV pressure less than the aortic pressure. Temporary right ventricle pacing is also useful for patients with atrial fibrillation. Because left ventricle preload depends on its filling time, irregular heart beat may increase unexpected high systolic pressure. Other precaution to minimize the risk of air embolism include CO2 insufflation in the operative field, continuous aortic root venting and Trendelenburg position.

Results: Between 2004 and 2015, 92 patients with mitral regurgitation underwent on-pump beating heart mitral valve repair with this method. Concomitant procedures include 36 tricuspid valve repair, 25 Maze, and 22 coronary artery bypass grafting. There was no case of cerebral infarction.

Conclusions: On-pump beating heart mitral valve repair without aortic cross-clamping could be performed safely with some tips. To obtain safety margin, monitoring left ventricular pressure and aortic pressure is essential.
Clinical Experience of total endoscopic cardiac surgery in 357 patients

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We report our surgical results of totally endoscopic cardiac surgery.

PATIENTS
357 patients underwent totally endoscopic cardiac surgery without the robotic techniques between May 2009 and December 2015 were reviewed retrospectively.

Technique
The patients are positioned in a supine position and are intubated by a standard technique with a double-lumen tube for left lung ventilation.

2-stage venous cannula was cannulated via femoral vein to the inferior vena cava. And another venous cannula was inserted via internal jugular vein. An arterial cannula was also cannulated via femoral artery. Three small incisions are necessary for the procedure. The 1st incision was transverse in the 3rd intercostal space (ICS) in the right parasternal area about 4cm. The 2nd incision was in the 3rd ICS in the right mid-axillary line about 3cm long. The 3rd incision was in the 6th or 5th ICS between the right midclavicular and anterior axillary line about 2cm. All incision were opened by wound retractor without rib spreading. A 30 degree endoscope was inserted into the 3rd incision and a forceps is inserted into the 2nd incision, and a pair of scissors or a needle holder was inserted into the 1st incision.

Aortic cross clamp is done with a chlorhexidine via 2nd incision. The cardioplegia is given every 30 minutes via aortic root during cross-clamp. After then, each surgery was performed under endoscopic vision with usual procedure via sternotomy.

Results:
The mean age was 35.3 ±14.2 years old. 217 patients underwent atrial septal defect repair, 97 patients underwent mitral valve replacement or repair, 30 patients underwent ventricular septal defect repair and 13 patients underwent other operation.

All procedures were completed under endoscope. Average cardiopulmonary bypass time was 117.2 ±59.9 minutes. Aortic cross clamp time was 95.2 ±34.7min. One patient was converted to conventional sternotomy, because of the uncontrolled bleeding from the ascending aorta. No major complications was observed during peri-operative period. There was no mortality.

Conclusions: The technique of totally endoscopic operation was feasible and safe without the aid of a robotic device. This surgical procedure has a possibility as a standard surgery in the future.

Benefits of a right anterolateral minithoracotomy rather than a median sternotomy in isolated tricuspid redo procedures

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Objective: To compare results of tricuspid valve (TV) reoperation between incision via a right anterolateral minithoracotomy (RAMT) and median sternotomy (MS).

Methods: We performed a retrospective analysis of 49 patients who underwent isolated TV surgery as a reoperation at our institution between 2008 and 2015. Previous cardiac operations included mitral, aortic, and TV surgeries, atrial septal defect repair, and pericardiectomy. The mean age of the patients was 51.9 ± 12.8 years, 14 (28%) were male and 35 (72%) were female. Follow-up was 95% (38/40) complete, with a mean duration of 41.3 ± 19.5 months.

Results: Perioperative demographic and laboratory tests did not show any significant differences between the RAMT and MS groups. The drainage volume, total red cell unit, total serum volume and platelet were significantly different 1151.7 ±803.5 vs. 2276.2 ±1925.4, 4.8 ±4.1 vs 8.7 ±8.9, 478.2 ±488.9 vs 950.3 ±657.6, 0.04 ±0.21 vs 0.38 ±0.64 (p< 0.05), while other perioperative data were similar. There were no significant differences in early postoperative death and complications between the RAMT and MS groups. A multivariate linear regression analysis predicted that serum creatinine, age, and MS group were independent risk factors for bleeding. The Cox regression demonstrated that the MS group had a longer drainage duration (p < 0.05) and had a relative hazardous risk (HR) of 2.691 (1.328, 5.450 CI) compared with the RAMT group.

Conclusions: The RAMT approach is an alternative, safe, and feasible procedure for isolated TV reoperation. It has the advantages of less drainage and reduced requirement for blood products.

Keywords: retrospective, redo, isolated tricuspid operation, minimally invasive

Trans-right Axillary Double Valve Surgery

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Objective: Minimally invasive mitral valve plasty/replacement (MVP/MVR) and aortic valve replacement (AVR) are performed all over the world and MIMVP/MIMVR is usually performed through anterolateral thoracotomy and MIAVR is usually performed through partial sternotomy, or thoracotomy in the anterior chest wall. But there are few report of minimally invasive double valve replacement/repair. We adopted right lateral thoracotomy thorough right axillary skin incision as an alternative access for minimally invasive mitral valve and aortic valve surgery (TAX-DV surgery).

The purpose of this study is to evaluate its early outcomes. We introduce our methods of TAX-DV surgery with a short video.

Methods: Surgery: The patient was set in partial left lateral position, and cardio-pulmonary bypass was established through right femoral artery and vein. The 3rd or 4th intercostal thoracotomy was made through about 8cm right axillary skin incision. The ascending aorta was cross clamped and AVR and MVP/MVR were performed. Endoscopic assist was used, and all sutures were tied using a knot poster.

Patients: Between January 2012 and June 2016, 9 patients had undergone double valve surgery at our institution. All patients underwent AVR. Of them, 6 patients underwent mitral valve plasty, 2 underwent MVR and the other underwent commissurotomy. We evaluated the major adverse cardiac events (MACE), CPB time, post-operative length of stay and application of them.

Results: No patient was converted to standard full sternotomy from TAX-DV surgery. There were no in-hospital death and MACE. The mean length of ICU stay and Postoperative hospitalization were 1.2 ± 0.4days and 8.9 ± 2.4days respectively. Surgery time, Cardiopulmonary Bypass (CPB) time and cross-clamp time were 287 ± 82min, 206 ± 43min and 162 ± 30min, respectively.

Conclusions: TAX-DV surgery was cosmetically superior approach and reproducible. TAX-DV surgery was as safe as standard sternotomy.
Poster Abstracts

**E-POSTER PA1-1**

No-touch aorta robot-assisted cardiac surgery for atrial septal defect

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Objective: No-touch aorta robot-assisted cardiac surgery for atrial septal defect (ASD) repairs has been successfully performed on arrested hearts with robotic assistance. Our team used to perform conventional robotic ASD repair on arrested heart via 4 ports. Since June 2014, we started robotic ASD repair using no-touch aorta technique. Further more we introduced reduced port surgery in ASD repair recently. The present study assessed the feasibility, safety, and efficacy of totally endoscopic cardiac surgery using no-touch aorta technique for ASD.

Methods: Between June 2014 and June 2016, 20 consecutive patients underwent totally endoscopic ASD repair using the da Vinci surgical system (Intuitive Surgical Inc.) at our institute. Robotic ASD repair was performed in 8 men and 12 women with a mean age of 44.4 ± 16.7 years. All patients underwent a history and physical examination followed by chest radiography, computed tomography, and a transthoracic echocardiogram. All of the procedures were performed via 2 to 4 port incisions in the right chest. In the cases of 2 ports, one was the camera port, and the other was the port for the robotic instruments. Both robotic instruments were inserted through this port and crossed while being prevented from colliding with each other. The surgeon console was set to the reverse of default settings so that both masters would control the inverse instrument. Robotic ASD repair was carried out under ventilatory fibulation induced using combinations of an electrical fibrillator, injection of potassium, and hypothermia without aortic cross-clamping.

Results: All cases were repaired successfully without conversion to alternative surgical techniques, such as cardiogenic arrest, anterolateral thoracotomy, or median sternotomy. The mean operation, CPB, and VF times were 134.5 ± 30.5 min, 58.6 ± 18.1 min, and 10.9 ± 3.7 min, respectively. There were no operative deaths, strokes, other complications, or device-related complications. No patients needed blood transfusion during their hospital stay, and their cosmetic results were excellent.

Conclusions: Robot-assisted ASD repair using no-touch aorta technique was achieved safely with good clinical results and excellent cosmetic results.

**E-POSTER PA1-2**

Percutaneous perventricular device closure of doubly committed subarterial ventricular septal defect: from the incision to a pinhole

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Objective: As an alternative to open surgical repair, percutaneous device closure provides minimally invasive treatment for doubly committed subarterial ventricular septal defect. However, unlike percutaneous transcather access, a mini-thoracotomy is still needed. This report introduces the percutaneous periventricular device closure, a novel technique and its short-term results for this kind of defects.

Methods: Sixteen patients who had isolated doubly committed subarterial ventricular septal defect underwent percutaneous periventricular device closure. By puncturing the chest wall and subsequently the infundibulum of right ventricle under continuous guidance of transesophageal echocardiography, the guidewire and the delivery sheath were advanced into the heart to complete the perventricular closure. Closure outcomes and possible complications were measured in the hospital and during the one-year follow-up.

Results: Closure was successful in 15 patients (93.8%). There was no mortality, residual shunt, new valve regurgitation or arrhythmia peri-operatively or during the entire follow-up period. One patient developed pericardial effusion and tamponade, and was converted to mini-thoracotomy perventricular closure. The mean hospital stay was 3.5 ± 2.0 days (range, 3.0 to 6.0 days) and only one patient needed blood transfusion (6.3%).

Conclusions: Percutaneous periventricular device closure of isolated doubly committed subarterial ventricular septal defects appeared to be safe and efficacious with acceptable short-term outcomes. Larger studies and long-term follow-up are needed for further evaluation.

**E-POSTER PA1-3**

Transxiphoid Approach for the Repair of Atrial Septal Defects

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Objective: We used the transxiphoid approach for the closure of atrial septal defects (ASD) in selected cases from 2008 to 2012 to achieve minimally invasive procedures.

Methods: A total of 13 patients with ASD underwent complete repair using a transaxiphoid approach. The average age was 55.8 months, and the average weight was 15.4 kilogram. A total of 13 patients with ASD underwent complete repair using a transxiphoid approach in selected cases from 2008 to 2012 to achieve minimally invasive procedures.

Results: The mean operation time was 117.9 minutes, and the mean skin incision length was 54 mm. There were no intraoperative and postoperative complications.

Conclusions: Transxiphoid approach for the repair of ASD is feasible for the repair of ASD.

**E-POSTER PA1-4**

Cardiac shock 5 years after atrial septum occluder implantation

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Objective: Interventional treatments for different kinds of pathologies are becoming common due to the minimal invasive art and attractiveness. Since the introduction of the occluder for atrial septum defect (ASD), it has been worldwide applied and has now become a good option for patients with ASD and proper anatomical prerequisites. On the other hand, complications such as rest shunt or migration of the occluder causing embolization or perforation in the acute phase have been reported. We experienced a rare case of a patient who was referred to our institution due to cardiac tamponade and cardiac shock 5 years after an initial complication free closure of ASD with an Amplatzer occluder device.

Conclusions: Percutaneous perventricular device closure of isolated doubly committed subarterial ventricular septal defects appeared to be safe and efficacious with acceptable short-term outcomes. Larger studies and long-term follow-up are needed for further evaluation.
Transcatheter closure of secundum atrial septal defects using Amplatzer occluder device via the right internal jugular vein approach with total transesophageal echocardiography monitor

Objective: To occlusive secundum atrial septal defects using Amplatzer occluder device via the right internal jugular vein approach with total transesophageal echocardiography monitor.

Methods: From May 2009 to July 2016 there were 20 patients underwent this new method, the mean age was 26 ± 8.66 years old (ranged from 3 to 48 years), the mean ASD diameter is 18 ± 3.05 mm (from 5mm to 24 mm). After transesophageal echocardiography indentify of the secundum atrial septal defects, a Sheldinger technique was applied on right internal jugular vein, a 14F catheter which have a 45 degree angled end were delivered along the guiding wire located into the junction of the right internal jugular vein and until located in right atrium, and then, another angled 9F catheter were inserted into the lumen of this 14F catheter, which keep the 9F catheter with a nearly 90 degree right angle to cross the secundum atrial septal defects, after this deliver channel were maked, an Amplatzer occlusive device was delivered through the inner 9F catheter. By this double lumen angled catheter to located the Amplatzer occlude device to close the secundum atrial septal defect, all patients were diagnosed by transesophageal echocardiogram (TEE) and all the operations were performed under TEE monitor without any X-ray monitor or open chest procedures. After the occlude of the atrial septal defect and a single stitch to close the incision of the skin, the patients can walk freely after operation.

Results: mean operation time was 25 minutes (12 to 35 min), mean size of Amplatzer occlude device is 16 ± 4.33 mm (ASD diameter ± 4-mm-6mm), there is no death during the in hospital time and during the follow-up, and there is no low cardiac output syndrome post operation or residuary atrial septal defect and other morbidity.

Conclusions: A new double lumen catheter Amplatzer occlusive delivery device (China Invention Patent No:ZL 2010 1 0297213.7) was innovated and a right internal jugular vein approach was applied. This new Amplatzer occlusive delivery and right internal jugular vein approach to close the secundum atrial septal defect is a effective method and the short time follow up result is good, the occlusion of secundum atrial septal defects with total transesophageal echocardiography monitor can be a facilitate procedure applied on both children and adult.

Outcomes of Atrial septal defect closure via mini-thoracotomy – a single center experience

Objective: Although the trans-catherter closure of atrial septal defect (ASD) is a main stream recently, a surgical repair of ASD is still an option for patients who have complex anatomy or require concomitant procedure. As minimally invasive cardiac surgery (MICS) has been widely applied, we have adopted MICS to repair simple congenital heart defects (CHDs) such as ASD and PAPVC. In this study, we sought to clarify the validity of our approach.

Methods: Consecutive 256 patients (mean age 41.0±15.7 years, female 193) who underwent ASD repair via mini-thoracotomy approach between December 2000 and December 2015 in our institution were retrospectively reviewed. The variables collected for this study included age, height, weight, gender, diagnosis, aortic- cross-clamp time, cardiopulmonary bypass (CPB) time, and mortality.

Results: Mean aortic cross-clamp time was 51.5±24.5 minutes and mean CPB time was 155.0±34.5 minutes. The defect was secundum type in 238 patients, ostium primum in 5, unroofed coronary sinus in 4, patent foramen ovale in 4, sinus venosus type with partial anomalous pulmonary venous connection in 6, and single atrium in one. Concomitant procedures were tricuspid valve repair in 25, mitral valve repair in 6, and antithrommpy procedure in 8. Blood transfusion was used in 9 patients. No operative mortality occurred. Three cerebral infarctions occurred in which 2 patients had preexisted atrial fibrillation. One patient was re-operated for surgical bleeding from partial pleura. There was one conversion to large thoracotomy to place a cannula in an ascending aorta. New-onset arrhythmia occurred in 19 patients, in which 3 patients underwent permanent pacemaker implantation. Mean postoperative hospital stay was 7.9±7.5 days.

Conclusions: Mini-thoracotomy approach is useful to repair all types of ASDs. We can perform other procedures such as tricuspid valve repair and antithrommpy procedure with this approach safely and effectively.

Transareolar video-assisted approach to the atrial septal defect and tricuspid valve

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Objective: To perform ASD and tricuspid annoplassty via submammary video-assisted approach.

Methods: From May 2009 to July 2016 there were 20 patients underwent this new method, the mean age was 26 ± 8.66 years old (ranged from 3 to 48 years), the mean ASD diameter is 18 ± 3.05 mm (from 5mm to 24 mm). After transesophageal echocardiography indentify of the secundum atrial septal defects, a Sheldinger technique was applied on right internal jugular vein, a 14F catheter which have a 45 degree angled end were delivered along the guiding wire located into the junction of the right internal jugular vein and until located in right atrium, and then, another angled 9F catheter were inserted into the lumen of this 14F catheter, which keep the 9F catheter with a nearly 90 degree right angle to cross the secundum atrial septal defects, after this deliver channel were maked, an Amplatzer occlusive delivery device was delivered through the inner 9F catheter. By this double lumen angled catheter to located the Amplatzer occlude device to close the secundum atrial septal defect, all patients were diagnosed by transesophageal echocardiogram (TEE) and all the operations were performed under TEE monitor without any X-ray monitor or open chest procedures. After the occlude of the atrial septal defect and a single stitch to close the incision of the skin, the patients can walk freely after operation.

Results: mean operation time was 25 minutes (12 to 35 min), mean size of Amplatzer occlude device is 16 ± 4.33 mm (ASD diameter ± 4-mm-6mm), there is no death during the in hospital time and during the follow-up, and there is no low cardiac output syndrome post operation or residuary atrial septal defect and other morbidity.

Conclusions: A new double lumen catheter Amplatzer occlusive delivery device (China Invention Patent No:ZL 2010 1 0297213.7) was innovated and a right internal jugular vein approach was applied. This new Amplatzer occlusive delivery and right internal jugular vein approach to close the secundum atrial septal defect is a effective method and the short time follow up result is good, the occlusion of secundum atrial septal defects with total transesophageal echocardiography monitor can be a facilitate procedure applied on both children and adult.

Median MICS ASD closure in pediatric population -The MICS performable by Under-40-

Objective: To evaluate the performance of minimally invasive cardiac surgery (MICS) for the closure of atrial septal defect (ASD) in pediatric population under the age of 40.

Methods: Consecutive 256 patients (mean age 41.0±15.7 years, female 193) who underwent ASD repair via mini-thoracotomy approach between December 2000 and December 2015 in our institution were retrospectively reviewed. The variables collected for this study included age, height, weight, gender, diagnosis, aortic- cross-clamp time, cardiopulmonary bypass (CPB) time, and mortality.

Results: Mean aortic cross-clamp time was 51.5±24.5 minutes and mean CPB time was 155.0±34.5 minutes. The defect was secundum type in 238 patients, ostium primum in 5, unroofed coronary sinus in 4, patent foramen ovale in 4, sinus venosus type with partial anomalous pulmonary venous connection in 6, and single atrium in one. Concomitant procedures were tricuspid valve repair in 25, mitral valve repair in 6, and antithrommpy procedure in 8. Blood transfusion was used in 9 patients. No operative mortality occurred. Three cerebral infarctions occurred in which 2 patients had preexisted atrial fibrillation. One patient was re-operated for surgical bleeding from partial pleura. There was one conversion to large thoracotomy to place a cannula in an ascending aorta. New-onset arrhythmia occurred in 19 patients, in which 3 patients underwent permanent pacemaker implantation. Mean postoperative hospital stay was 7.9±7.5 days.

Conclusions: Mini-thoracotomy approach is useful to repair all types of ASDs. We can perform other procedures such as tricuspid valve repair and antithrommpy procedure with this approach safely and effectively.

Median MICS ASD closure in pediatric population -The MICS performable by Under-40-
E-POSTER PB1-1
Accurate anatomic visualization of a patient-specific aortic root model by three-dimensional printing prior to aortic valve surgery

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Objective: Aortic valve leaflet reconstruction surgery (AVLS) is one of surgical options for the aortic valve diseases (AVD). This complicated procedure, consisting of the leaflet reconstruction and the sinotubular junction (STJ) fixation, can be especially challenging by pathological changes of the aortic root. Preoperative images might be helpful to plan surgical procedures. However, measurement error may occur with current modalities, conveying false information. Three-dimensional printing (3DP) has possibility to provide personalized models visualizing spatial relationships of the heart. We aimed to replicate 3DP models and evaluate the compatibility in patients with AVD.

Methods: Enrolled patients planned for aortic valve surgery underwent contrast enhanced ECG-triggered cardiac computed tomography (CT). Axial images using a 64-row CT with slice thickness of 0.625mm were obtained during mid- to late diastole. Subtracted volume rendering CT data of aortic root were converted to stereolithography (STL) file in a 3D workstation. The 3DP models were constructed from STL file, employing a flexible material. Preoperatively, we assessed the structure of valve leaflets, commissures, coronary ostia, and inner diameter of the STJ. Anatomical configurations identified on the models were compared to native values in surgical procedures. Subsequently, operative outcomes were evaluated by postoperative CT images and echocardiogram.

Results: We report a 79-year-old woman with severe aortic stenosis. The produced model from preoperative CT images revealed equal-sized tri-leaflets with prominent calcification on non-coronary cusp. Aortic root components containing each commissures, coronary ostia, and aortic sinus wall represented preserved geometry. Furthermore, inner diameter of the STJ was directly measured 24mm. During 46US procedure, we confirmed our model accurately reflected the patient-specific aortic root structure including the measurement of STJ diameter. We created new leaflets using a template and the outer strip for the STJ fixation with glutaraldehyde-treated autologous pericardium based upon the STJ size of 24mm. Postoperative CT images demonstrated no deformity in aortic root with preserved fixed STJ. Functionally, transeosophageal echocardiogram showed sufficient leaflet coaptation without any regurgitation.

Conclusions: The 3DP aortic root model had notably high shape fidelity in patients with AVD. This method may potentially be a clinically feasible tool to optimize preoperative planning in complex surgical procedures for AVD.

E-POSTER PB1-2
Safe peripheral cannulation for minimally invasive cardiac surgery

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Objective: Minimally invasive cardiac surgery (MICS) has been widely adopted recently. However, we sometimes encounter complications related to peripheral cannulation for cardiopulmonary bypass (CPB). To assure safe cannulation procedure, we have taken certain routine checkup system. We describe this strategy and the results.

Methods: Between April 2014 and July 2016, 28 patients (mean age 61 years) underwent MICS, including 10 cases for aortic valve operation, 13 cases for mitral valve operation, 4 cases for atroium septum defect closure, and 1 case for coronary artery bypass grafting. Preoperative CT angiography was used to evaluate the characteristics of the iliofemoral artery, such as diameter, calcification, and tortuosity. Every operation was performed at the hybrid operation room so as to cannulate under fluoroscopic guidance. Near infrared spectrogram (NIRS) was used to monitor peripheral perfusion. Angiogram from inserted arterial cannula was performed recently to visualize blood flow to the ipsilateral lower extremity. Descending aorta was checked by transseosophageal echocardiogram at the initiation of CPB if retrograde aortic dissection has not occurred.

Results: We experienced no CPB-related complications. Two arterial cannulae were used in 7 patients (bilateral femoral arteries in 5 patients, one femoral and one axillary artery in 2 patients). We observed potential risk in venous cannulation under fluoroscopy in some patients, including migration of the guidewire into the right ventricle in 5 cases, trapped guidewire in the right atrium in 2 cases, and interference between wire and CV cannula in 1 case. We observed the decrease in the level of NIRS after the establishment of CPB in 3 cases. Distal limb perfusion was initiated in 2 cases, using 4Fr sheath inserted towards the distal, leading to improvement of the level of NIRS. Angiogram in 2 cases showed occlusion of the external iliac artery by the cannula, with superficial femoral artery perfused mainly through the ipsilateral hypogastric arteries.

Conclusions: We have successfully avoided serious complications related to peripheral cannulation by various preventive preoperative strategies.

E-POSTER PB1-3
Proposal for classification of needle driving techniques and its coding: Ten types of needle driving techniques based on the needle holding ways

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We reviewed the video records of 28 cases selected at random including mainly valvular and/or aortic surgery. These operations were performed by a couple of the right handed surgeons using Hagar-needle holder at our institution in March and April 2016. By careful analysis, we found that there were four basic needle holding ways and four concord needle driving techniques. Four basic needle holding were classified by positional relationship between the needle (N) and grasping hand (H) across the needle holder and the direction of the needle tip. We named ground 1 needle holding if N was opposite to H directing the surgeon’s (S) left side, ground 2 if N was opposite to H directing S’s right, zenith 1 if N was on the same side of H directing S’s left and zenith 2 if N was on the same side of H directing S’s right. The needle driving technique determined by ground 1 needle holding encoded G1. Similarly we gave the driving code of G2 for ground 2, Z1 for zenith1, Z2 for zenith 2 respectively. In addition to the four basic driving techniques we gave the code of G3 to the technique in which the needle held in ground 1 but the needle was driven from the surgeon’s left side to right side by taking an oblique stance and raising the right elbow. Moreover in the coding if the angle of needle in the needle holder was adjusted more wider or smaller than the right angle, the adjusted angles could be expressed by adding +/-a (about +/- 30 degrees) and +/-b (about +/- 60 degrees) at the end of driving code, e.g. G1+a, G2-b, Z1+b. There were another five special needle driving techniques (Z3,04,24,S1,52) which were less frequently used but very useful in the specific situations. The above mentioned 10 classification of needle driving techniques and its coding are very important in the operative record and surgical education as the standardization and so called common language.

E-POSTER PB1-5
A novel thermoreactive sternum close system to improve sternal stability in off-pump coronary artery bypass grafting

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Objective: Cerclage wire fixation remains the standard method of median sternotomy closure. However, it has been reported to be lack of sternal stability and sequentially result in serious sternal complications. Various modification techniques have been published to improve the sternal stability. A novel thermoreactive sternum close system -Seemine sternum embracing connector made of titanium-nickel memory alloy has been utilized for sternal closure after cardiac surgery in China. We assessed the early outcomes with such a sternal close system for sternal closure in comparison to the conventional wiring technique in off-pump coronary artery bypass grafting (CABG).

Methods: A total of 93 patients who underwent off-pump CABG by a single surgeon at our institute from December 2014 to April 2016 were enrolled. Forty patients received Seemine sternum embracing connector made sternal fixation (Seemine group), while 53 received conventional wiring technique (control group). The early outcomes, including the analgesic usage count, and the incidence of sternal wound infection was measured on computed tomography.

Results: No procedure associated mortality or mechanical sternal dehiscence occurred. In the Seemine group, the analgesic usage count postoperatively, sternal dehiscence incidence, superficial sternal wound infection incidence and hospital stay were compared. At discharge, the largest sternal displacement was measured on computed tomography.

Conclusions: Ectural closure using Seemine sternum embracing connector improves sternal stability, reduces the sternal complications and contributes to a more rapid post-operative recovery.
Objective: Aortic valve replacement (AVR) remains the standard surgical intervention for aortic valve disease and is preferred by many surgeons, despite its associated clinical issues. The clinical efficacy of aortic valve neo-cuspidization (AVNeo) with glutaraldehyde-treated autologous pericardium, the Ozaki procedure, has recently been reported. Although it is presumed to preserve the normal aortic annulus motion, changes to the aortic annulus during the cardiac cycle after AVNeo remain unclear.

Methods: From March to December 2014, aortic annular dimensions were measured for 23 patients; the sample included 8 patients who had undergone AVNeo, 10 patients with normal aortic valves, and 5 patients who had undergone AVR. Measurements were recorded using ECG-gated multidetector computed tomography (MDCT). Data were analyzed using automated aortic root analysis software. Post-operative peak pressure gradients for the AVNeo and AVR groups were compared.

Results: No statistically significant differences in annulus variation were observed between patients who had undergone AVNeo and those with normal aortic valves. Annular area was larger during systole than during diastole in both groups. Post-operative peak pressure gradients were significantly lower in the AVNeo group than in the AVR group.

Conclusions: The results of the present study demonstrated that aortic annular dimensions after AVNeo are similar to the dimensions of normal aortic valves. This was evidenced using ECG-gated MDCT, previously reported as the most reliable method, to evaluate annulus motion during the cardiac cycle. Lower post-operative peak pressure gradients might underlie the observed changes. These advantages will help in rectifying AVR defects.
Minimally invasive aortic valve replacement and concomitant septal myectomy for the treatment of aortic stenosis with systolic anterior movement of the mitral valve

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A 76-year-old female was diagnosed as having aortic stenosis and left ventricular outflow obstruction. An echocardiography revealed 39 mmHg of mean aortic valve pressure gradient and systolic anterior movement of the mitral valve with 86 mmHg of outflow pressure gradient. Surgery was performed via a right mini-thoracotomy through the 3rd intercostal space and cardiopulmonary bypass was established via femoro-femoral bypass. She underwent minimally invasive aortic valve replacement with a bioprosthesis after transaortic septal myectomy. The anomalous chords attached to the ventricular septum was also resected. A postoperative echocardiography showed no systolic anterior movement of the mitral valve.

E-POSTER PA2-2

Novel aortic annular fixation ring to ensure the precise annular size

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Objective: Subvalvular circular annuloplasty (SCA) is promising procedure to fix the annulus from the inside of an aorta without any dissection around the annulus. We have developed the novel annular ring to correct these problems.

Case: 70-year-old man with severe mitral regurgitation and moderate aortic regurgitation received both mitral and aortic valve repair. An ideal ring size is decided from the measurement by CT scan data. The ring is sewn into the aortic annulus with horizontal mattress fashion. Postoperative ultrasound showed trivial aortic regurgitation.

Conclusions: SCA is a precise procedure without any dissection around an aortic annu.
Minimally invasive aortic valve surgery. Safe transition from para-sternal access to para-pectoral access

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Yoshihito Sakon, Toshihiko Shibata

Objective: There is a steep learning curve to be conquered in minimally invasive cardiac surgery (MICS). Under limited experiences, establishing safe protocol for introduction of MICS aortic valve surgery is a challenge. We present our history of introducing MICS aortic valve surgery in our institute.

Method: Patients who had MICS aortic valve surgery from April 2014 to June 2016 were enrolled for this study.
1. Parasternal access: perpendicular skin incision along the right sternal border was made and the 3rd. and 4th. cartilage is transected, bended inwards. This technique allowed the use of conventional instruments, except for the flexible aortic clamp. Aortic crossclamp was placed vertically, just similar to the conventional operation.
2. Anterior mini-thoracotomy: The 3rd. intercostal space was opened, with 3rd. or 4th. cartilage is transected. Aortic crossclamp was conducted with either the Chitwood clamp or flexible clamp transversely.
3. Para-pectoral access: Skin incision is made along the lateral border of the greater pectoral muscle, space behind the muscle was dissected, and the 3rd. intercostal space was entered. Most of the techniques and instruments used are similar to the MICS mitral surgery.

Results: During the study period, 10 patients had MICS aortic valve surgery. Four patients suffered aortic stenosis, 4 aortic regurgitation, and 3 aortic valve tumor. Three cases of parasternal access were performed in the early period. Surgeons could feel confident of their techniques because most of the procedures were similar to the conventional sternotomy approach. 4 cases of anterior thoracotomy were then conducted, with the major technical deference being the horizontal skin insertion and transverse, instead of vertical in parasternal access. aortic clamp. More recently, para-pectoral access was adopted in 3 patients. These transitions were successful. During this period, 3D replica of the aortic valve were used for simulation of the procedure, leading to the planning of operation, to conquer the inexperience. Postoperative complications include paroxysmal atrial fibrillation in 4, hoarseness in 2, and mild paravalvular leak in one.

Conclusions: Transition from para-sternal to anterior mini-thoracotomy, followed by para-pectoral access was safely conducted. Simulation using 3D replica might have contributed to overcome the learning curve.

External suture aortic annuloplasty: less invasive approach to the aortic root and valve pathology

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Objective: In addition to aortic valve repair with or without root replacement, there are various approaches toward annular management. We have consistently performed external suture aortic annuloplasty for all patients because of its simplicity and predictability of postoperative annular size. We sought to disclose the effectiveness of this technique.

Methods: 35 patients (15±12 years, 29 male) underwent either isolated aortic valve repair (n=12) or aortic root remodeling (n=23) concomitant with external suture annuloplasty using CV-0 suture. There were 11 bicuspid valve (31%) and 9 acute dissection (26%) but no Marfan syndrome. Preoperative diameter of aorto-ventricular junction (AVJ), prosthesis used, and targeted annuloplasty size was 26.0±2.8 mm, 23.4±1.0 mm, and 21.0±1.0 mm for isolated repair, 27.1±2.9 mm, 24.4±1.0 mm, 22.2±1.2 mm for remodeling, respectively.

Results: There was no in-hospital mortality. Postoperative course was uneventful except two patients who required reoperation. One cause of recurrence was suture hole of very thin bicuspid cusp, which was repaired on the 1st postoperative day. Another was a hole in the middle of tricuspid cusp unrelated to suture line, which was replaced on the 7th postoperative day. Mean duration of cardiopulmonary bypass and aortic cross-clamp for isolated, elective cases was 92±34 min and 72±34 min for isolated repair and 137±21 min and 115±18 min for remodeling, respectively. Follow-up echocardiography found aortic valve regurgitation (AR) less than grade I in all cases except 2 cases who required reoperation. Late AVJ diameter and AR grade was 21.0±0.9 mm (almost similar with targeted annuloplasty size) and 0.6±0.4 at 6.7±5.6 months postoperatively for remodeling.

Conclusions: External suture annuloplasty seems simple and not time-consuming and can reduce annular size to exactly predicted diameter. However, this is evaluation with 2D echocardiography, thus evaluation with 3D echocardiography or 3D computer tomography with detailed, long-term follow-up will be necessary.
E-POSTER PB2-1
Concomitant resection of the left atrial appendage and tricuspid annuloplasty during minimally invasive aortic valve replacement

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Kenji Iino, Keiichi Kimura, Hirofumi Takemura, Genita Chikazawa, Hidenori Yoshitaka, Taichi Sakaguchi

Here we demonstrate concomitant resection of the left atrial appendage and tricuspid annuloplasty during minimally invasive aortic valve replacement via a right anterolateral thoracotomy. The left atrial appendage was well exposed by pulling the collapsed ascending aorta up and was safely resected with a surgical stapling device through the transverse sinus. Subsequently, tricuspid annuloplasty was performed using a semi-rigid ring and the aortic valve was replaced with a bioprostheses. We are planning to discontinue antiaggregation therapy with warfarin in the near future. Our procedure could be useful for prevention of thromboembolic as well as hemorrhagic complications.

E-POSTER PB2-2
Towards MICS for Tricuspid Regurgitation in patients with corrected transposition of great arteries (cTGA)

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Tricuspid regurgitation (TR) in cTGA patients has hemodynamically similar impact of mitral regurgitation for dilated cardiomyopathy and a major risk factor of late death. Early surgery for TR before irreversible myocardial damage of pathological right ventricle (rRV) develops is recommended by guidelines. For patients with this category, tricuspid valve replacement (TVR) rather than repair is recommended, since the valve structure is not suitable to support systemic blood pressure in those patients. To facilitate the timely surgery, we try to use MICS approaches.

Patients and Methods: 6 patients of TR with cTGA had TVR in the past 7 years; their age was 44+/=20 y.o. and there were 2 males. Preoperatively, NYHA class was 3.3+/=1.2, degree of TR 3.8+/=0.4, ejection fraction (EF) of rRV was 34.0+/=6.2%, and pulmonary artery pressure 48.4+/=29 mmHg. Recent 2 patients underwent TVR by left thoracotomy MICS approaches; indication was to avoid adhesion of 4th time redo in 1 and patient’s preference 1.

Results: All patients had TVR via left appendage. In MICS, exposure was satisfactory by carefully designed thoracotomy based on CT scan. Ascending Aorta was cross-clamped from the left side of the chest. Cardioplegia was given via Aortic root. There was no operative or late death.

Early postoperatively, NYHA class was 2.0+/=0.6 (p=0.025 vs. preop.), degree of TR 1.5+/=0.6 (p=0.008), ejection fraction (EF) of rRV 33.8+/=6.2, and pulmonary artery pressure 48.4+/=29. Patients with MICS approaches had impression of less pain and more satisfaction. Late postoperatively with the follow-up of 23+/=17 months, NYHA class was 1.4+/=0.5 (p=0.004 vs. preop.), degree of TR 0.6+/=0.5 (p=0.000), EF of rRV 37.8+/=13.1, and pulmonary artery pressure 22.2+/=11 (p=0.059).

Conclusions: Surgery for TR in patients with cTGA was safe and beneficial for at least mid-term. MICS approach tended to provide more satisfaction to the patients, and it may help more timely operation before irreversible myocardial damage develops.

E-POSTER PB2-3
On pump beating mitral plasty
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We have performed on pump beating mitral plasty for the low ejection fraction cases with severe mitral regurgitation. The indication of the procedure is:
- There is no prolapse lesion in the anterior leaflet
- 2. Tethering height is <10 mm
- 3. Tethering angle is <30 degrees

From March 2015 to June 2016, three patients underwent on pump beating mitral plasty. Median sternotomy was performed. Carbon dioxide was continuously insufflatted into the chest throughout the procedure to displace intracardiac air. After systemic heparinization, patients were placed on CPB. Temperature was maintained between 33 and 34 °C to allow operation on the empty beating heart. No retrograde perfusion of the coronary sinus was performed. Subsequently, tricuspid annuloplasty was performed using a semi-rigid ring and the aortic valve was replaced with a bioprostheses. We are planning to discontinue antiaggregation therapy with warfarin in the near future. Our procedure could be useful for prevention of thromboembolic as well as hemorrhagic complications.

E-POSTER PB2-4
Totally endoscopic mitral valve surgery using three dimensional endoscope

The Department of Cardiovascular Surgery, Sakai Central Hospital Advanced Care Center, Sakai, Japan

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Objective: Minimally invasive mitral valve surgery is associated with a decreased incidence of perioperative complications and faster recovery. This procedure is a wildly used technique with endoscopic assist. However two-dimensional endoscope or robotic assist is used for totally endoscopic procedure in many institution. We performed fully three-dimensional endoscopic procedure through 5-7cm right mini-thoracotomy without rib spreading from January 2013. We present the results of our early experience.

Methods: From January 2013 to April 2014, a total of 36 patients underwent full 3D endoscopic mitral valve surgery. 28 patients underwent mitral repair for severe degenerative mitral regurgitation or functional mitral regurgitation. 8 patients underwent mitral replacement for rheumatic disease or congenital mitral stenosis. The procedure was performed 5cm skin incision in male patients and 7-9cm intrammary skin incision in female patients using soft tissue retractor. 11mm endoscopic port, 5mm thoracic port and trans thoracic aortic clamp were used.

Results: The 3D totally endoscopic procedures were successful in all patients. Mean cardiopulmonary bypass time and cross clipp time were 152 minutes and 99 minutes, respectively. Resection techniques performed in 10 patients and chordal replacement performed in 10 patients. Combined procedure for both leaflets underwent in 3 patients. Ring annuloplasty was combined with those procedures in all patients. 2 patients underwent annuloplasty alone. Endocardial surgical Cox-Maze ablation for left atrium using pen type radiofrequency device was performed in 6 patients with persistent atrial fibrillation. No patients required conversion to sternotomy. There was no mortality and no re-exploration due to bleeding. All patients had no severe operative pain. 23 patients had no or trivial mitral regurgitation and 2 patients had mild regurgitation at discharge. 1 patients required re-operation due to recurrence of moderate regurgitation and 1 patients required due to hemolysis 2 month after operation.

Conclusions: Our experience is still in the early stages of learning curve. However we can perform complex procedure of mitral repair under fully endoscopic vision. The visualization of 3D endoscope gives excellent depth perception which helps safe procedure in fully endoscopic mitral surgery without high cost.
**E-POSTER PB2-5**

**Seventeen-year experience of off-pump coronary artery bypass in a single institution**

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Hidetake Kawajiri, Suguru Ohira, Kazuki Morimoto, Hitoshi Yaku

**Objective:** Purpose of this study was to evaluate the long-term results of isolated off-pump coronary artery bypass grafting (OPCAB) compared with on-pump coronary artery bypass (CABG) in our institution.

**Methods:** Between 1998 and 2015, 1302 isolated coronary artery bypass was performed in our institution. Patients with incomplete revascularization (n=156) was excluded and 1146 patients (OPCAB 935, CABG 211) were enrolled in this study. Preoperative risk factors were adjusted by stratification method using propensity score which calculated with 17 preoperative factors. Early results were evaluated by logistic analysis using propensity score adjustment. Long term results were estimated by Kaplan-meier method and cox regression analysis using propensity score adjustment.

**Results:** Thirty-day mortality was 0.6% (n=6) in OPCAB and 2.4% (n=5) in CABG (p=0.038) and stroke rate was 1.2% (n=12) in OPCAB and 4.3% (n=9) in CABG (p<0.008). After propensity score adjustment, in 30 day mortality, infection, and myocardial infarction more than 48 hours, and perioperative myocardial infarction, odds ratio of CABG was significantly higher than that of OPCAB. Cox analysis using propensity score adjustment showed no significant difference between two groups regarding hazard ratio of overall survival, cardiac mortality, major adverse cardiac and cerebrovascular event (MACCE), and coronary intervention. Kaplan-meier analysis showed there was no difference between two groups regarding graft patency, survival, and MACCE.

**Conclusions:** In our single institutional study, in early results, OPCAB is superior to CABG regarding mortality and morbidity. Long term results of OPCAB were identical to those of CABG.

**E-POSTER PB2-6**

**Graft selection and management of right coronary artery according to flow demand and severity of native coronary stenosis**

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**Objective:** Graft bypass to right coronary artery (RCA), it was generally considered that competitive flow occurs commonly and RCA area has small flow demand. Therefore, graft selection and surgical management for right coronary artery (RCA) is still matter of debate. We examined herein results of quantitative coronary angiography and postoperative outcome.

**Methods:** We retrospectively reviewed clinical records of 106 patients who underwent off-pump CABG including individual grafting to RCA and postoperative coronary angiography since 2007. Patients with two bypass grafts in the RCA region or sequential grafting were excluded. Forty-five patients were female and the mean age at the operation was 66±9 years. Of these, 141 patients had an in-situ gastroepiploic artery (GEA) and 65 patients had saphenous vein (SV). After completion of anastomoses, the heart was positioned normally, and graft flow was measured with transit-time flowmetry. Distal and proximal lesion was defined as #4, and #1−3, respectively. Low flow (LF) was defined as graft flow less than 25ml/min and not functional (NF) was defined as occlusion or stenosis.

**Results:** For distal lesion with SV and GEA, LF was 47% (8/17) and 57% (11/21), and NF was 4/17 and 6/21, respectively. In GEA to proximal lesion, the rate of LF for target with more than 1.27mm of MLD was 20%, while that for target with less than 1.27mm was as high as 50%. In total, 53 bypass grafts with LF, the cause of LF was extremely small revascularized area in 38%, history of inferior myocardial infarction in 36%, and collateral from ectatic left circumflex artery 8%, whereas competitive flow from native coronary artery only in 19%.

**Conclusions:** Currently, evaluation of native coronary stenosis is not sufficient. To the distal lesion, individual grafting lead to very high LF rate. Especially, GEA should be applied not individually, but sequentially with circumflex artery. When MLD is larger than 1.27mm in the proximal lesion, selection of SV is reasonable. Graft flow is proportional to flow demand, which is associate with the size and viability of relevant myocardial region.

**E-POSTER PB2-8**

**Failed sutureless repair for left ventricular free wall rupture caused by myocardial infarction**

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Ryuji Koshima, Hirotsuo Doi

**Case:** A 69-year-old female was referred to our institution for left ventricular free wall rupture (LVFWR) after emergency pericardial drainage. Cardiac CT scan demonstrated total occlusion of proximal LCX (#11) as well as moderate stenosis of mid LCAD.

**Clinical Course:** Emergency surgery via median sternotomy was carried out, which revealed epicardial hematoma on LV lateral wall (infarction site) without active bleeding. Fibrinogen based tissue adhesives and cellulose absorbable hemostat were applied to the ruptured site in multi-layers with thrombin/aprotinin glue. Postoperative course was uneventful under respirator. On POD 7, the patient suddenly became in cardiogenic shock in 3 hours after extubation, which resulted from recurrence of LVFWR. Emergency re-sternotomy was performed, and blow-out type LVFWR was identified on the same site. Linear suture repair on pump beating heart was done by interrupted 3-0 polypropylene (M-H) buttress sutures with a pair Teflon felt strips and over & over sutures. Postoperative course for next 8 days was also uneventful under respirator in intensive care unit. However, LVFWR occurred again on POD 15 after decreasing sedative agents. Emergency re-sternotomy was done and another blow-out LVFWR was found at the distal edge of previous repair suture line, that was repaired in the same manner but without CPB. Patient was sedated under respirator for 2weeks followed by tracheostomy on POD 53. Weaned from respirator safely on POD 51, the patient was discharged on POD 69 without any complications.

**Discussion and Conclusion:** Recently sutureless repair for postinfarction LVFWR have been reported. This less invasive sutureless technique is simple and expeditious, which can avoid suturing the fragile LV muscle and the use of CPB. However, it is associated with a potential risk of the re-rupture and the formation of pseudoaneurysm in the future. For this patient, stress of weaning from respirator was suspected as an occasion of re-rupture, but there was no predictive factor except incomplete coronary 1 formation on ECG retrospectively. The traditional more invasive suturing repair technique by direct suturing might be feasible even in the re-ruptured situation.

**E-POSTER PB2-9**

**Skeletonization technique of internal thoracic artery dissection without using the quick touch method**

Division of Thoracic and Cardiovascular Surgery, Department of Surgery, Shimane University, Matsue, Japan

Kouji Shimizu, Shoichi Suehiro, Teiji Oda, Kensuke Imai, Kazumra Kanetsuki, Megumi Itto

**Objective:** Ultrasonic complete skeletonization using the quick touch method is the gold standard when harvesting skeletonized internal thoracic artery. However, when an inexperienced person performs this technique, there is a risk of unexpected bleeding and graft damage. We performed ultrasonic complete skeletonization of the internal thoracic artery without using the quick touch method. Our technique is described as follows. The fascia is incised medially to the medial mammary vein for the whole length of the vessel, and the medial mammary vein is dissected along its whole length. Next, the internal thoracic artery is dissected with the ultrasonic scalpel only moved transversely between the artery and vein. It is important that the ultrasonic scalpel is slowly moving. Using this technique, we can harvest the internal thoracic artery within 10 to 20 min. This technique is especially useful in minimally invasive coronary artery bypass grafting.

**Conclusions:** The proximal lesion, selection of SV is reasonable. Graft flow is proportional to flow demand, which is associate with the size and viability of relevant myocardial region.
E-POSTER PA3-1

The early outcomes of transcatheter aortic valve implantation with alternative nonfemoral approach in our hospital

The Department of Surgery, Kurume University School of Medicine, Kurume, Japan

Objective: Kurume University Hospital started transcatheter aortic valve implantation (TAVI) in June 2014. The trans méthral (TF) approach is the first choice for access. However, some patients have iliofemoral vessel anatomies unsuitable for TF TAVI. This study reviews our 2-year institutional experience of alternative nonfemoral approach, transapical (TA), direct aortic (DA), and subclavian (SC), with standard femoral access in our hospital.

Methods and Results: A total of 38 TAVI cases were performed from June 2014 onwards. In our hospital, the TF approach was performed in 22 cases (F group), while alternative approaches (TA, DA, and SC) in 16 cases (A group). The T and A groups include CoreValve implantations; 2 and 2 cases respectively. All other cases underwent TAVI with Sapien XT. There were no significant differences in both the mean age and BSA between the F and A groups. The preoperative risk scores were similar in both groups; the mean logistic Euro, Euro II, STS scores were 16.4/18.7, 4.6/4.3, 7.3/7.1 in F/A group, respectively. All cases were performed under general anesthesia. The mean operative time in the F group (192 min) was longer than that of the A group (153 min) (P < 0.05). All implantations were successful. There were no major complications such as conversion to open surgery or the need for an additional valve implantation. We extubated in the OR 16 cases of the F group, and 12 cases of the A group. There were no significant differences in both groups regarding the mean lengths of hospital stay and hospital stay. Overall in-hospital mortality was 0. No patients had severe aortic regurgitation after the procedure. 3 patients had moderate aortic regurgitation (2 in the F group and 1 in the A group). Only 1 case (in the F group) died from pneumonia 3 months post-implantation. All other cases resulted in full survival without serious postoperative complications.

Conclusions: Our initial results for TAVI with alternative nonfemoral approach were excellent. In this era with a growing number of new devices and approaches available to us, more alternative approaches should be widely practiced and the use expedited by more surgeons.

E-POSTER PA3-2

Wire pull-through technique during transapical transcatheter aortic valve implantation for the patients with shaggy aorta

The Department of Cardiovascular Surgery, Fujita Health University, Toyoake, Japan

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Although transfemoral (TF) approach is the first choice with respect to the access site in trans-catheter aortic valve implantation (TAVI), transapical (TA) approach is generally accepted as an optimal treatment strategy in patients having shaggy aorta. Specifically in such patients, despite the lack of evidence, conventional TA-TAVI technique still has a potential concern that still guide wires or catheters may disrupt antithrombotic mass located in aortic arch or descending aorta. Therefore we introduced new technique, wire pull-through technique, for the patients with shaggy aorta during TA-TAVI. We report a case series of several patients undergoing the wire pull-through technique during TA-TAVI using the SAPEN XT (Edwards Lifesciences, Irvine, CA) transapical heart valve. In our experience, the pull-through system could be established within approximately 5 to 10 minutes. There were no complications concerning about the pull-through technique, and cerebral or peripheral embolization after the TA-TAVI combined with wire pull-through technique even in the patients with shaggy aorta.

E-POSTER PA3-3

Transapical aortic valve implantation and minimally invasive off-pump coronary artery bypass surgery

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Daisuke Nakatsuka, Jotaro Ho, Yui Kawano, Makoto Hibino, Shun Watanabe, Minoru Tabata

Objective: This study aims to report a case of combined transapical aortic valve implantation and minimally invasive off-pump coronary artery bypass for a high-risk patient with symptomatic severe aortic stenosis and coronary artery disease.

Methods: An 81-year-old high-risk female patient with symptomatic severe AS was screened for transcatheter aortic valve implantation. Preoperative coronary angiography showed a heavily calcified lesion and significant stenosis in the proximal left descending artery. Contrast CT showed severe calcification and tortuosity in the abdominal aorta. Our heart team planned simultaneous transapical aortic valve implantation and minimally invasive off-pump coronary artery bypass.

Results: We made an anterolateral thoracotomy via the 5th intercostal space and harvested a useful option for high-risk patients with severe aortic stenosis and coronary artery disease that is not feasible for percutaneous coronary interventions.

Conclusions: Our initial results for TAVI with alternative nonfemoral approach were excellent. In this era with a growing number of new devices and approaches available to us, more alternative approaches should be widely practiced and the use expedited by more surgeons.

E-POSTER PA3-4

Short-term outcomes of transcatheter aortic valve replacement in patients with very severe aortic stenosis

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Objective: The aim of this study was to clarify clinical outcomes of transcatheter aortic valve replacement (TAVR) and periprocedural echocardiographic changes in patients with very severe aortic stenosis (AS).

Methods: Very severe AS was diagnosed if peak aortic jet velocity measured by transthoracic echocardiography (TTE) was more than 5.0 m/s. Between October 2013 and May 2016, consecutive 138 patients underwent TAVR for AS. Of these, 27 patients described as Group V (9 males, 84.6±6.9 years old) were identified with very severe AS. The other 111 patients were classified as Group S (45 males, 83.6±5.4 years old). STS-PROM in Group V and S were 6.9±3.1% and 7.6±6.8%, respectively (P=0.94).

Results: Preoperative TTE in Group V and S revealed peak aortic jet velocity: 5.4±0.3 vs 4.1±0.5 m/s (p<0.0001), mean aortic valve pressure gradient (mPmg): 72.3±10.5 vs 41.7±10.4 mmHg (p<0.0001) and left ventricular mass index (LVMI): 128.5±30.2 vs 108.6±22.4 mm/m² (p=0.0069), respectively. Subaortic annular area detected by preoperative multidetector computed tomography in Group V and S were 408.6±62 vs 417.8±62 mm², respectively (p=0.58). 30-day mortality was observed in one patient of Group V (p=0.58). Postoperative TTE in Group V and S revealed peak aortic jet velocity: 2.1±0.5 vs 2.0±0.4 m/s (p=0.99), mPmg: 9.7±5.4 vs 9.0±3.4 mmHg (p=0.54) and LVMI: 122.6±24.9 vs 108.6±22.3 mm/m² (p=0.028), respectively. Postoperative mPmg20mmHg in Group V and S was observed in three (11.1%) and one (0.90%) patients, respectively (p=0.0042). 30-day mortality was observed in one patient of Group S (p=0.62). Cumulative 1- and 2-year survival rates in Group V and S were 86.6 vs 92.9% and 86.6 vs 89.2%, respectively (Log-rank p=0.45). Freedom rates from MACCE at 1 and 2 years in Group V and S were 83.5 vs 86.2% and 83.5 vs 82.6%, respectively (Log-rank p=0.89).

Conclusions: TAVR for very severe AS was feasible in short-term. Careful follow-up will be required for very severe AS, especially in patients without intended performance of transcatheter heart valve.
Incidence, Etiology and Risk Factors of Unplanned Readmissions after Trans-Catheter Aortic Valve Replacement

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Objective: Unplanned readmissions after initial hospitalization are frequent, significantly affecting clinical outcomes and patient quality of life. We analyzed the incidence, causes, and predictors of unplanned hospital readmissions after trans-catheter aortic valve replacement (TAVR).

Methods: We retrospectively reviewed 275 high risk patients (median STS risk score 8.4) undergoing trans-aortic valve replacement therapy (TAVR) at our institution from 01/2012-05/2016. Median follow-up time was 12 (Inter-Quartile Range [IQR]: 5, 18) months. Scheduled readmissions were excluded.

Results: Eighty-two (30%) patients were readmitted 144 times (1.8 times/patient) for the duration of follow-up. On multivariate analysis, OR time, ICU and hospital length of stay, in-hospital postoperative events, and previous cardiac surgery were risk factors associated with unplanned readmissions. Age, gender, BMI, STS risk score and TAVR access were not found to be risk factors for readmission. Thirty-seven (45%) of the readmissions were within 30-days post-discharge. Overall causes for readmission included cardiac (32%), respiratory (8%), neurological (6%) and infection (8%; Table 1). Leading causes for 30-day readmissions included cardiac (22%), respiratory (13%) and pain (11%). Median time-to-first readmission was 79 (IQR: 7-197) days. Median hospital length of stay at readmission was 3 (IQR: 1, 6) days. The 1-, 2-, 3- and 4-year freedom from first readmission was 74%, 60%, 51% and 51% respectively. Patients with unplanned readmissions had a significantly lower long term survival (p=0.014).

Conclusions: Unplanned readmissions are common during the first year after TAVR and nearly one third of them are cardiac related. Readmissions were associated with lower long-term survival of patients after TAVR.

Apical-access-related Pseudoaneurysm 1 year after Trans-catheter Aortic Valve Implantation

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Objective: The trans-apical approach for trans-catheter aortic valve implantation (TA-TAVI) is an alternative way for patient with difficulty for retrograde trans-arterial access. A pseudo aneurysm of the left ventricular apical access site is reported to develop in 2-6.6% of TA-TAVI patients. We experienced a patient with left ventricular pseudo aneurysm 1 year after TA-TAVI.

Methods: A 89-year-old lady underwent TA-TAVI on October 16th, 2014 followed by uneventful postoperative course. She examined by trans-thoracic echo on 1, 3, 6 months after surgery with no significant findings. At regular check-up on September 18th, 2015, significant pseudo aneurysm on left ventricular apex was detected by echo and finally diagnosed by CT scan. The operation was carried out through median sternotomy under cardiac arrest with CPB. The pseudo aneurysm was sealed by pericardium and contacted to the left chest wall. The left ventricular apex was repaired by felt-strip reinforced interrupted mattress sutures with 3-0 prolene with MH needle.

Results: The patient tolerated the operation well and discharged from our hospital with no complication on day 27 after surgery. On post-operative echo, function of the implanted valve was good and CT scan showed no residual pseudo aneurysm on left ventricular apex.

Conclusions: We experienced a patient who developed pseudo aneurysm on left ventricular apex 1 year after TA-TAVI. Regular and watchful follow-up by echo and CT is required.
E-POSTER PB3-1

Surgical Repair of Cervical Aortic Arch with Anomaly of Brain Circulation through Clam-shell Incision

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Cervical aortic arch is a very rare malformation and is occasionally accompanied by other cardiovascular anomalies. A 66-year-old male patient had a cervical aortic arch and aneurysm of the ductus arteriosus with agenesis of the bilateral internal carotid artery and isolated left vertebral artery. Three-dimensional CT angiogram demonstrated anomaly of brain circulation with the left vertebral artery only. A partial arch replacement was performed through a clam-shell incision along with reconstructions of left common carotid artery, left vertebral artery and extra thoracic left subclavian artery. The perioperative course was uneventful.

E-POSTER PB3-2

Total arch replacement using frozen elephant trunk via upper partial sternotomy

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Yosuke Takahashi, Takashi Murakami, Hiroichi Fuji

We presented a successful total arch replacement with frozen elephant trunk in 71 years old male who had a distal arch aneurysm. We selected minimally invasive vascular surgery via an upper partial sternotomy. Cardiopulmonary bypass was established from ascending aortic cannulation and femoral venous return. We selected moderate systemic hypothermia and selective antegrade cerebral perfusion during open distal aortic anastomosis. We used frozen elephant trunk using an open stent graft to cover the distal aortic arch aneurysm. Reconstruction of the neck vessels was performed from ascending prosthetic graft using trifurcated graft (12x8x8mm). This approach was safe and post-operative coarse was uneventful.

E-POSTER PB3-3

Aortic remodeling in Early term after total arch replacement with Open stent graft

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Motohiko Osako

Objective: J graft Open stent graft (OSG) has been accepted as a device to be able to perform extensive primary aortic repair. We assessed the aortic remodeling after total arch replacement with OSG in 5 patients that we experienced in our institute.

Methods: 5 patients (mean age 70 years old, Male 5) underwent total arch replacement using OSG between January 2016 and Jun 2016. Thoracic aortic disease was as follows; true aneurysm in 2, chronic type B dissection in 2, and acute type A dissection in 1. In all cases, the distal end of OSG reached to the same level as the 6th thoracic vertebra. The diameter of the aorta at the 6th thoracic vertebra was measured in CT scan before surgery and at 1 week after surgery.

Results: All patients were discharged without any major complications. The mean diameter of OSG was 29.6mm, and the length was 84mm. Mean operative time was 484 minutes, mean cardiopulmonary bypass time was 290 minutes, and circulatory arrest time was 89 minutes. The aortic diameter at the 6th thoracic vertebra was 39.6mm before surgery and 35.4mm at 1 week after surgery. The tendency of decreasing the diameter was found in cases of aortic dissection. The aortic lumen excluded by OSG was obliterated in all patients.

Conclusions: Aortic remodeling and obliteration of excluded lumen were observed after aortic repair with OSG even in early term after surgery. A larger and longer follow-up is necessary.

E-POSTER PB3-4

Hybrid Repair of Distal Arch or extended Aortic Aneurysms

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Objective: Patients with extended thoracic aortic disease may require more than one surgical intervention, but in cases with poor peripheral vascular access, retrograde stent graft delivery can be technically very challenging. We report one-stage treatment of extended thoracic aortic aneurysm with combination of elephant trunk technique and antegrade stent graft delivery.

Methods: From August 2014 to February 2016, 8 patients underwent hybrid repair (total arch replacement with elephant trunk technique and antegrade stent graft delivery) for extended thoracic aortic aneurysm or ruptured thoracic aneurysm. All were male and mean age was 71.6±8.2 years old. Indications were ruptured thoracic aneurysm (n = 3), extended thoracic aortic aneurysm (n = 5), difficulty in retrograde delivery (n = 3), or shaggy aorta (n = 1). Antegrade stent graft delivery was performed under mild hypothermic circulatory arrest in four patients, and after weaning from cardiopulmonary bypass (CPB) in remaining four. Concomitant procedures were performed in three patients including two coronary artery bypass graftings and one aortic valve replacement.

Results: Technical success was 100% and there was no in-hospital or 30-day mortality. Neurological events occurred in one emergency case (stroke and paraparesis). Mean follow-up was 8.7 months (range 3-19), during which no patient died. There was no aortic event, and secondary intervention was not required. No type III endoleak was seen. Aneurysm sac shrinkage of >5 mm was observed in five (62.5%) of these 8 patients. No aneurysm enlargement was seen in any patient.

Conclusions: The present one-stage antegrade approach can be an option for ruptured or extended thoracic aneurysms. When to deliver and deploy stent graft (under total circulatory arrest or after weaning from CPB) should be evaluated on the basis of each patient’s condition and anatomical characteristics.
E-POSTER PB3-5

Super-fast Track Management with Extubation in the OR for Elective Total Aortic Arch Replacement. Is Total Aortic Arch Replacement always an absolutely invasive operation?

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Objective: The aim of this study was to confirm feasibility and effectiveness of our super-fast track management with extubation in the operating room (OR) for elective total aortic arch replacement (TAR).

Methods: Thirty-four consecutive patients underwent elective TAR by single surgeon were retrospectively reviewed. Two reoperation cases following ascending aortic replacement for type A acute aortic dissection were included. Thirty-two cases were done through usual median sternotomy. Other 2 cases required additional intercostal thoracotomy. Concomitant procedures were CABG (4 cases), AVR (1), and partial lung resection (1). The operative procedure was simply standardized using 4-branched Dacron graft. Cardiopulmonary bypass (CPB) was started by antegrade fashion. Antegrade selective cerebral perfusion (SCP) was applied for cerebral protection. Distal aortic anastomosis was done first by open distal anastomosis technique under systemic circulatory arrest at rectal temperature 28 degrees Celsius. Then, antegrade systemic circulation was restarted via the side branch of the graft. After proximal aortic anastomosis, coronary circulation was restarted by declamping the graft. Finally, three arch branches were reconstructed under partial CPB condition.

Results: The median operation time was 261 (176-578) minutes. Duration of CPB, cardiac arrest, systemic circulatory arrest, and SCP were 158 (112-354), 84 (49-188), 48 (30-93), and 110 (77-221) minutes, respectively. Twenty-nine patients (85.3%) were extubated in the OR safely just after the procedure. Delayed extubation cases were 2 reoperation cases, 2 cases requiring additional intercostal thoracotomy, and 1 initial operation case under median sternotomy. That means 98.7% of the patients were extubated in the OR among 30 initial operation cases without additional intercostal thoracotomy, regardless of concomitant cardiac procedures such as CABG and AVR. After the successful extubation in the OR, 24 (82.8%) patients started meal and 20 (69.0%) started walking rehabilitation on the next day. Twenty-eight (96.6%) started meal and 27 (93.1%) started walking rehabilitation safely within 2 days.

Conclusions: Our super-fast track strategy with extubation in the OR for elective TAR was safely feasible and effective for early postoperative recovery. TAR is not always an extremely invasive operation, unless it is a reoperation case or extensive operation one requiring lung manipulation.

E-POSTER PB3-6

Hybrid Repair for Kommerell's diverticulum with right-side aortic arch

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Shinji Kawaguchi, Mio Kasai, Akinori Hirano, Kouki Ikebata
Yuta Asahara

Objective: Kommerell’s diverticulum (KD) with right-side aortic arch is relatively rare condition, and there is no consensus on the appropriate surgical strategy for that. Here, we report our experience with two cases of KD with right-side aortic arch that were treated with hybrid repair, combined open surgery and thoracic endovascular aortic repair (TEVAR).

Cases: Case 1: A 62-year-old man had history of localized dissection of right-side aortic arch treated with patch closure. During following up, computed tomography (CT) showed KD enlarging to 52mm in diameter. Total Arch Replacement (TAR) with elephant trunk was performed followed by the second stage TEVAR three months later. Three months after TEVAR, CT revealed no endoleak and the patient had no aortic event.
Case 2: A 62-year-old man was pointed out compression of esophagus by screening upper gastrointestinal examination. CT showed right-side aortic arch, KD (31mm in diameter), aberrant left subclavian artery. At the first stage TAR with elephant trunk was performed and the proximal of the left subclavian artery was ligated. As the second stage TEVAR was performed. Thirty-seven months after TEVAR, CT revealed no endoleak, the patient remains alive and complication free.

Conclusions: Kommerell’s diverticulum with right-side aortic arch can be treated with acceptable results through the use of hybrid repair.

E-POSTER PB3-7

A case of total arch and descending aortic replacement for a Kommerell's diverticulum with right aortic arch and aberrant left subclavian artery by an ALPS (antero-lateral thoracotomy with partial sternotomy)

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A 55-year-old man was referred to our hospital with a chief complaint of dysphagia 6 years after acute aortic dissection type B. Enhanced CT showed compression of the esophagus by a Kommerell’s diverticulum with a maximum diameter of 55mm involving the right-sided aortic arch and aberrant left subclavian artery. We performed total arch and descending aortic replacement, consisting of bypass grafting of the left subclavian artery with an antero-lateral thoracotomy with partial sternotomy (ALPS). The postoperatively he had right recurrent laryngeal nerve paralysis, but was discharged 14days after surgery. Total arch and descending aortic replacement for a Kommerell’s diverticulum by an ALPS approach is rare. ALPS approach for Kommerell’s diverticulum achieves safe surgery with good exposure.
E-POSTER PA4-1

Minimally Invasive Surgical Repair of Combined Right Ventricular Pseudoaneurysm and Atrial Septal Defect through bilateral mini-thoracotomies

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Case: A 28-year-old woman was referred to our institute for minimally invasive surgical repair of an idiopathic right ventricular pseudoaneurysm (RVPA). Since the pseudoaneurysm was located at the ventricular apex, resection of the RVPA through a left mini-thoracotomy on beating heart had been planned. However, intraoperative transesophageal echocardiography revealed an atrial septal defect (ASD), which was not detected by preoperative evaluations. Therefore, a simultaneous repair of the RVPA and ASD through bilateral mini-thoracotomies was performed.

Methods: A 5-cm right mini-thoracotomy was performed and the cardiopulmonary bypass was established using the peripheral access. The ascending aorta was cross-clamped and the ASD was directly closed. Next, a 5-cm left mini-thoracotomy was performed and the pericardium was opened near the apex, revealing that the entire both ventricles were covered with thickened visceral pericardium. Therefore, an extensive epicardectomy was performed. The RVPA was then resected and the defect was directly closed. The patient had uneventful postoperative course. The histopathological findings of the resected aneurysmal wall and pericardium were consistent with pseudoaneurysm and pericarditis.

Discussion: The etiologies of RVPA and pericarditis are unclear. Considering that the patient had a previous history of blunt chest trauma (detail unknown), we speculated that she might have a traumatic right ventricular perforation with transient pericardial effusion that led to later formation of RVPA and epicardial fibrotic change.

Conclusions: We report a successful minimally invasive repair of a rare case of combined RVPA and ASD.

E-POSTER PA4-2

Minimally invasive double valve replacement via right mini-thoracotomy

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Toshinori Totsugawa, Arudo Hiraoka, Kentaro Tamura, Hidenori Yoshitaka, Taichi Sakaguchi

A 79-year-old female having rheumatic heart valve disease underwent minimally invasive double valve replacement via right mini-thoracotomy. Surgery was performed via a right mini-thoracotomy over the 4th intercostal space. An arterial cannula was inserted into the right femoral artery and venous cannulae were placed into the superior vena cava and right femoral vein; cardiopulmonary bypass was then established. Left atrial Maze procedure and closure of the left atrial appendage were performed prior to valve surgery. The mitral valve was replaced with a bioprosthesis; subsequently another tissue valve was placed on the aortic annulus with double-needled pledgeted sutures.

E-POSTER PA4-3

A novel and easy method of adjustment of appropriate artificial chordal length in a patient with minimally invasive mitral valve repair

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We present our experience using the Memo 3D Rechord, a complete prosthetic ring associated with a temporary chordal guide system. This novel technique simplifies the implantation of PTFE neochordae without the need for measuring their length. A 59-year-old male with severe MR (P2-3 prolapse) underwent MICS MV repair. At first, PTFE suture is passed through the posterior papillary muscle. After parachuting the annuloplasty ring, PTFE chordae were passed through the loops, and the free margin of the P3 leaflet is brought to the posterior annulus. Then, PTFE was tied and the temporary loop system is removed, which provided appropriate chordal length.

E-POSTER PA4-4

Total EndoMICS MVP for Mitral insufficiency by 3 port VATS system

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We succeeded Complete Total endoscopic mitral valve repair for Mitral valve insufficiency in our institute. We introduced 3-Dimentional Endoscope (Karl-Storz, Germany) for this procedure. One 4 cm Skin incision and two ports (12mm) were made. Cardiopulmonary bypass was established via the femoral artery and femoral, jugular vein. The right sided approach was selected for exposing of mitral valve. The post operative echocardiogram revealed trivial regurgitation of mitral valve.
E-POSTER PA4-7

Minimally invasive mitral repair maze surgery, a comparative study to sternotomy approach

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Objective: To compare the results and freedom of AF between sternotomy and mini right thoracotomy approach in mitral valve repair-maze patients

Methods: This was a prospective non randomized comparative study. 110 consecutive patients undergoing mitral valve repair and Cox Maze IV during June 2004 and June 2014 were included, 70 sternotomy (I) and 40 mini right thoracotomy (II). Baseline data and perioperative events were compared. Freedom from AF was based on ECG 24 hours monitoring at 1, 2, 3, 6, 12, and 24 months. Failure was defined by any AF lasting longer than 30 seconds. All patients were follow up to two years.

Results: There was one operative mortality in group I (1.4%), 0 (0%) in group II. Early AF was found in 40 (69%), I and 26 (75%), II. Pase maker implantation was needed in 4 (5.8%), I and 1 (2.5%), II. Stroke event was 1 (1.4%), I and 0 (0%), II. Freedom from AF at one year and two years were 90% (I), 88% (II), 0.06, and 86% (I), 84% (II), P= 0.62, respectively.

Conclusions: Minimally invasive maze is an effective approach and can be applied to a group of concomitant mitral repair maze surgery patients with similar satisfactory results as the sternotomy approach.
Minimally supraaortic debranching for zone 1 TEVAR

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Chikara Ueki, Genichi Sakaguchi

Objective: Because distal aortic arch and proximal descending aortic pathology often migrate near neck vessels, total arch replacement or zone 0/1 debranch with thoracic endovascular repair (TEVAR) were required. We have introduced supraaortic debranching procedure with two incisions for zone 1 TEVAR since 2011 and achieved successful operative and mid-term results.

Patients and Methods: From 2011 to 2016, 16 patients with distal arch pathology underwent zone 1 debranching TEVAR. There were 13 male patients with ages ranging 67 to 94 years (mean age, 78.2±8.5 years). In 15 patients operation was performed in one stage, the other in two stages with Bentall procedure and coronary artery bypass grafting. Under general anesthesia, the right subclavian artery (RSA) was exposed through the right horizontal infraclavicular incision and the left carotid and left subclavian artery (LSA) were exposed through the left horizontal supraclavicular incision. For the left subclavian artery mobilization, the left sternocleidomastoid muscle was mobilized to the left side and the LSA was exposed through the lateral side of the left jugular vein, and the anterior scalene muscle was completely divided for exposure and arterial clamp of the LSA. At this moment, internal thoracic artery and vertebral artery were taped and the proximal side of the LSA was prepared for anastomosis. The RSA-LCA-LSA bypass was constructed by 8mm of prosthetic conduit. Then, the aortic stent graft was carefully placed from the distal side of brachiocephalic artery to the distal side of aortic pathology.

Results: There was no hospital death. One patient suffered from stroke and recovered almost completely. Spinal cord ischemia occurred in two patients; one resulting in paraplegia and one paraparesis discharging on foot. There was no major complication and mean postoperative hospital stay was 23.1 days. There was no wound infection, however, there were 3 patients who developed subcutaneous hematoma spontaneously recovered.

Conclusions: Supra-aortic debranching through minimal skin incision is safely and feasible procedure under precise understanding of anatomy.

Complete Resection of Lung Cancer invading Aorta using Stent-graft

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The patient was a 76-year-old man who presented to our hospital. He was found to have an abnormal shadow on the image on his visit to another hospital because of chronic obstructive pulmonary disease. On the basis of a full physical examination, this condition was diagnosed as cT4NOM0, stage IIA, squamous cell carcinoma. Tumor infiltration into the aorta was suspected in the preoperative computed tomography scan, and a diagnostic thoracoscopy was carried out. Upon the confirmation of tumor adherence to the aorta, a stent graft was inserted. After a certain period, left upper lobectomy and combined resection of the aortic wall at adhered lesion were carried out. The postoperative course was uneventful. The postoperative pathological examination revealed that the turica media of the aorta was also resected and the tumor infiltration was limited to the turica adventitia. Lung tumor infiltration into the aorta belonged to the T4 factor. As the treatment procedure, in addition to tumor resection, a extra-cardio-pulmonary bypass was used and combined resection of the aorta and graft replacement were carried out; however, these procedures are very invasive. This time, stent graft insertion was done to reinforce the resected part of the aortic wall. For the treatment of an aortic aneurysm, stent graft insertion is believed to be less invasive and cause fewer complications than does graft replacement, and is considered to be useful in treating this kind of case in a relatively safer manner.

Thoracic endovascular aortic repair for grade III-IV blunt traumatic aortic injury

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Chikara Ueki, Genichi Sakaguchi

Objective: Although blunt traumatic aortic injury is a rare condition in multiple trauma, it is the second/highest cause of posttraumatic death. Thoracic endovascular repair (TEVAR) has emerged as a less invasive alternative to open surgery. In this study, we reported the outcomes of TEVAR for grade III-IV blunt traumatic aortic injury.

Methods: From June 2013 to May 2016, 7 patients with grade III-IV blunt traumatic aortic injury were underwent TEVAR in our hospital. The clinical data of these patients were retrospectively reviewed.

Results: The mean age was 56 years (range, 25-84 years), and 4 patients were men. Four patients were involved in traffic accidents, and 3 patients had fallen from heights. All patients had concomitant injuries and the mean injury severity score (ISS) was 38 (range, 26-51). Patients were involved in traffic accidents, and 3 patients had fallen from heights. All patients had concomitant injuries and the mean injury severity score (ISS) was 38 (range, 26-51).

TEVAR was technically successful in all cases. None of the patients developed paraplegia. There were 2 patients who developed subcutaneous hematoma spontaneously recovered.

Conclusions: TEVAR is a reliable treatment for patients with grade III-IV blunt traumatic aortic injury. Patients with preoperative brain injury have a poor prognosis even after successful aortic repair.

Surgical outcome of aortic arch repair with Najuta fenestrated stent graft

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Objective: Thoracic endovascular aneurysm repair (TEVAR) for descending thoracic aorta is becoming an established repair, though TEVAR to the aortic arch is still in consideration. Najuta fenestrated stent graft (Kawasumi Laboratories, Inc, Tokyo, Japan) is a commercial endograft that allows access to the arch vessels, which can preserve the arch vessels. We evaluated the perioperative, and short term outcome.

Methods: Between July 2014 to June 2016, 31 patients underwent aortic arch repair with Najuta fenestrated stent graft. 25 patients were male, 6 were female. 26 cases were aneurysm (83.9%), and 6 were dissection (19.4%). Postoperative outcome, short term follow-up was evaluated. We routinely performed brain MRI on POD 5 to check how TEVAR covering the arch vessels would affect the brain. Postoperative CTs were performed 1 month, 3 months, 6 months , and every 6 months after surgery. All cases were elective. Proximal landing zone was 0 in all cases. Left subclavian artery (LSCA) was embolized in one case (3.2%), revasculaized with bypass in 25 cases (80.6%), fenestrated in 5 cases (16.1%). Left common carotid artery (LCCA) was revascularized with bypass in 6 cases (19.4%), fenestrated in 25 cases (80.6%). Brachiocephalic artery (BCA) was fenestrated in all cases.

Results: Technical success was 100%. Percutaneous peripheral intervention (PTA) for injury of iliac arteries were performed in 7 cases (22.6%). There was no operative death, thirty-day mortality was 1 (3.2%). ICU stay were 2.0±1.3 days(range 1-7) and hospital stay were 9.9±15.0 days (range 0-23). Morbidity included wound trouble in 3 (9.7%), reperfusion for bleeding in 1 (3.2%), myocardial infarction in 1 (3.2%), pancreatitis in 1 (3.2%), hoarseness in 1 (3.2%). There was no symptomatic stoke, but the postoperative MRI detected microinfarction in 22 (88.0%). Postoperative follow-up was 10.3±6.4 months (range 0-23). There was 1 late death for unknown reason (3.2%). Postoperative CT showed residual endoleak in 6 cases (19.4%), 1 pseudoaneurysm (83.9%), and 6 were dissection (19.4%). Postoperative follow-up was 10.3±6.4 months (range 0-23). There was 1 late death for unknown reason (3.2%). Postoperative CT showed residual endoleak in 6 cases (19.4%), 1 pseudoaneurysm (83.9%), and 6 were dissection (19.4%).

Conclusions: Despite high rate of micro cerebral infarction, there was no after affect or unknown reason (3.2%). Postoperative follow-up was 10.3±6.4 months (range 0-23). There was 1 late death for unknown reason (3.2%). Postoperative CT showed residual endoleak in 6 cases (19.4%), 1 pseudoaneurysm (83.9%), and 6 were dissection (19.4%).
E-POSTER PB4-6
Analysis of Left Subclavian Artery Occlusion in Debranching with Endovascular Repair

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Objective: Prevention of postoperative cerebral infarction is important at debranching with thoracic endovascular repair (TEVAR). We occlude left subclavian artery (LSA) by coiling, ballooning or vascular plugging before deployment of Stent-Graft in appropriate cases. This study aimed to analyze profitability of LSA occlusion.

Methods: Between November 2010 and March 2016, 84 consecutive patients underwent debranching with TEVAR at our institution. 31 patients was performed LSA occlusion. There were no significant preoperative differences between LSA occlusion patients and others including preoperative cerebral infarction.

Results: Postoperative cerebral infarction developed 11 patients. In LSA occlusion cases, only 1 patient developed and significant decrease the risk of postoperative cerebral infarction (p=0.04). Postoperative survival rate were not significant different (p=0.173). But in postoperative cerebral infarction patients, there were significant different against not strocked patients (p=0.007)

Conclusions: Postoperative cerebral infarction after debranching with TEVAR may leads to high mortality, so prevention of cerebral infarction is important. LSA occlusion may reduce postoperative cerebral infarction and mortality.

E-POSTER PB4-7
A Case of Endovascular Aortic Repair with Chimney Graft Technique for Anastomotic Pseudoaneurysm in the Aortic Arch

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We report the case of anastomotic pseudoaneurysm in the aortic arch treated successfully with thoracic endovascular aortic repair (TEVAR) accompanied by aortic arch debranching using the chimney graft technique.

A 65-year-old man with a hemi-arch replacement for acute type A dissection 12 years ago. The distal site of anastomotic pseudoaneurysm in the aortic arch was gradually dilated. Considering the patients advanced age and the previous sternotomy, we selected endovascular treatment. Before TEVAR, we conducted carotid debranching by using 8mm-7mm Y-graffing. The inflow was brachiophacalic artery and the outflow was left common carotid artery and left axillary artery. After that, we firstly deployed a stent-graft to brachiophacalic aortic arch. Secondly, by using rapid pacing, we deployed a stent-graft from ascending aorta to descending aorta (Zone 0). We successfully treated with 3 debranched TEVAR using the chimney graft technique. The patient tolerated this procedure well and no postoperative paraplegia nor new cerebral infarction were observed. Postoperative contrast-enhanced computed tomography shows no endoleak. We suppose to using the chimney graft technique should be an effective treatment option for patients with a high risk case for open surgery.

E-POSTER PB4-8
Trans-Stent Graft Embolization For Type II Endoleaks After Endovascular Abdominal Aortic Repair

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Objective: Aneurysmal sac growth with type II endoleak (EL) after endovascular aortic repair (EVAR) of abdominal aortic aneurysm (AAA) has been issues. There are some reports to treat type II EL vascular sources, such as laparoscopic or open surgical ligation of inferior mesenteric artery or lumen arteries, catheter coil embolization (through iliac branches, superior mesenteric artery), percutaneous thrombin injection, and so on. Further more, transcaval approach has been reported recently. We report this new method to embolize type II ELs through direct fenestration of stent graft (SG) using Radofrequency Energy Needle (RF Needle). RF Needle has been commonly used to fenestrate atrial septum for the catheter ablation of atrial fibrillation.

Methods (Case Report): A 78-year-old man had undergone EVAR using ENDURANT II. The enhanced computed tomography one year after operation showed an aneurysmal sac growth from 5cm to 6cm. Ultra sound examination confirmed L4 lumber arteries were the source of type II EL. Under general anesthesia, from the right femoral artery, the 8Fr introducer was placed, and RF Needle was induced to fenestrate the stent graft right leg. Fenestration was achieved successfully. Then the micro catheter reached the type II EL vascular source through the introducer. Histoacryl mixed with ethiodized oil was injected through the micro catheter, and angiogram showed type II vascular source was embolized successfully. Finally the SG leg device was deployed to close the fenestration.

Conclusions: Although endovascular reintervention for type II EL is still controversial, this method could be one of the alternative options.

E-POSTER PB4-9
A Case of Total Debranching TEVAR for a Patient with Kommerell

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Introduction: Kommerell’s diverticulum with right aortic arch (RRA) is rare. An open surgical repair is the first choice for the patients with Kommerell’s diverticulum with RRA, however, there are some difficulties including the choice of surgical approaches in an open surgical repair for this group of patients. There is still a controversy over whether TEVAR can be the first option as a treatment for Kommerell’s diverticulum with RRA. We report a successful case of debranching TEVAR for Kommerell’s diverticulum with RRA and aberrant left subclavian artery.

Case: A 62-year-old male has been pointed out an abnormal shadow in his chest X-ray since he was in his twenties. He was referred to our hospital for a surgical treatment because the recent chest CT has revealed Kommerell’s diverticulum with RRA and aberrant left subclavian artery. He did not have any symptom by narrowing of the trachea and esophagus. However, the decision was made to perform a surgical treatment due to the expansion of the aneurysm during our outpatient clinic follow-up. The operation was performed through median sternotomy. Firstly, an end to side anastomosis was performed between a main branch of a quadrifurcated graft and ascending aorta. Then, four branch of the quadrifurcated graft anastomose to bilateral auxiliary arteries and common carotid arteries. Finally three expandable stent grafts (44mm x 20cm, 44mm x 20cm, 42mm x 20cm) were placed from ascending aorta to descending aorta. The aberrant left subclavian artery was occluded by a percutaneous vascular occluder. The postoperative course was uneventful. The patient was discharged without any complications including stroke and an endoleak of the stent grafts. In conclusion, debranching TEVAR can be a useful option as a treatment for the patients with Kommerell’s diverticulum with RRA and aberrant left subclavian artery.
Hybrid Treatments Using Thoracic Endovascular Aortic Repair of an Aberrant Right Subclavian Artery with Kommerell’s aneurysm, treated 2 Cases

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Objective: Even if recent years’ report is seen, an aberrant right subclavian artery (ARSA) with or without an associated Kommerell’s diverticulum (KD) is a rare vascular anomaly. Patients with an ARSA may present with a variety of symptoms, including rupture. Options for repair include open, endovascular, and a hybrid approach, with no clear consensus on which is best because of the rarity of the anomaly. We present 2 cases that underwent hybrid thoracic endovascular aortic repair (TEVAR) and a systematic review of the literature.

Case reports: Hybrid TEVAR was performed in 2 patients with ARSA and right aortic arch (RAA) accompanied by Kommerell’s diverticulum and aortic aneurysm. In case 1, TEVAR and debranching in RAA was performed with 1-stage femoral approach. Case 2 was ruptured case. At first, TEVAR performed completely. But after operation, Patient had infection and esophageal perforation. Then total arch replacement and esophagus was removed.

Results: No endoleaks or aortic events were observed in either case during the observation period, and both patients had good postoperative clinical courses. Successful aneurysm exclusion can be accomplished with TEVAR following open left carotid-left subclavian bypass, maintaining upper extremities perfusion. Such hybrid techniques offer a decrease in mortality and complication rates. Herein, we describe a successful repair of an aberrant right subclavian artery with Kommerell’s diverticulum using this hybrid open and endovascular approach.

Conclusions: We report our experience with 2 cases that were treated with two different methods of hybrid TEVAR, and discuss the merits, problems and demerits of each treatment strategy.
Surgery for primary lung cancer combined with idiopathic interstitial pneumonitis

Methods: We retrospectively analyzed cases that underwent surgery in our department for primary lung cancer combined with IP from January 2005 to December 2014.

Results: The 141 patients (116 men, 25 women) were median age of 72 years (range, 36 to 87 years). We performed lobectomy in 114 cases, segmentectomy in 9 cases and wedge resection in 13 cases. Lobectomy and segmentectomy were performed in 2 lobectomy and wedge resection were done in 3. We treated 2 cases (1.4%) by open procedure and 139 cases (98.6%) by TS. The mean operation time was 186 min and mean blood loss was 232 ml. Seventy-seven lesions were squamous cell carcinoma and sixty-five lesions were adenocarcinoma. Pathological stage was IA in 49, IB in 39, IIA in 16, IIB in 9, IIIA in 27, and IIIB in 1. Idiopathic pulmonary fibrosis usual interstitial pneumonitis was histologically confirmed in 91 cases (64.5%). Thirteen patients (9.2%) experienced AE after surgery and 3/13 patients (23.1%) died of IP. Unexpectedly, non-UP pattern had a relatively impact on AE onset. There were no significant differences of the risk score between AE group and non-AE group.

Conclusions: Surgery for primary lung cancer combined with IP is feasible. The less invasive TS method could reduce acute exacerbation. More cases are required to accurately assess this.

Total thoracoscopic reoperation after ipsilateral anatomical major lung resection

Methods: Eight patients underwent a reoperation after major ipsilateral anatomical lung resection at our hospital from 2003 to May 2016. Of them, three treated with TS were enrolled and reviewed retrospectively. All three cases were preoperatively diagnosed with recurrent metastatic lung cancer.

Results: Case 1: A 75-year-old male. A thoracoscopic right lower lobectomy was performed for metastatic lung cancer 8 years after a right middle lobectomy. Difficult dissecting the pulmonary hilus required clamping and severing the pulmonary lobar root structure en masse (operation time, 240 min; blood loss, 100 g). A minor bronchopleural fistula developed postoperatively; however, the patient recovered after bronchoscopic intervention.

Case 2: A 57-year-old female. A thoracoscopic right residual superior segmentectomy and middle lobectomy were performed due to suspicion of metastatic lung cancer 2 years after a right basal segmentectomy. Due to pulmonary hilar adhesions, we clamped and severed the pulmonary lobar root structure en masse, with an additional middle lobectomy (operation time, 450 min; blood loss, 850 g).

Case 3: A 71-year-old male. A thoracoscopic right upper lobectomy was performed for metastatic lung cancer 3 years after a right lower lobectomy. The usual thoracoscopic lobectomy was performed, as the pulmonary hilus could be dissected (operation time, 270 min; blood loss, 100 g).

Conclusions: Total TS with en masse lobectomy was completed successfully when the initially resected lobe was the same or cranially neighboring to the second affected lobe, even if dissecting the pulmonary hilus was difficult. Pulmonary hilar adhesions are less expected when an initial caudal lobe surgery is performed. Total TS is more applicable when mediastinal lymph nodes are not dissected for metastatic lung cancer.

Complete VATS for left S9+10 segmentectomy

Methods: We experienced three patients in a severe condition who were placed on one-lung ventilation during video-assisted thoracoscopic surgery (VATS). We applied extracorporeal membrane oxygenation (ECMO) with good results. Here, we present the tips for and pitfalls of performing VATS in combination with ECMO.

Cases: Case #1: A 58-year-old male was admitted due to bilateral pneumothorax. Although the left pneumothorax was successfully treated, severe pulmonary fibrosis meant that we were unable to perform VATS under one-lung ventilation for the right pneumothorax. We therefore performed a VATS bullectomy in combination with ECMO. The patient was weaned off mechanical ventilation (MV) on the day of operation and discharged on postoperative day (POD) 15.

Case #2: A 48-year-old male was admitted with bilateral giant bullae. Because of the possibility that the ventilation pressure could expand the bullae during the operation, a VATS bullectomy was performed under ECMO. The patient was weaned off MV on POD 1 and discharged on POD 10.

Case #3: A 50-year-old female was admitted due to bilateral pneumothorax in combination with lymphangioleiomyomatosis. A simultaneous bilateral VATS surgical sheet-covering technique for pulmonary parenchyma was performed under ECMO. The patient was weaned off MV on POD 1 and discharged on POD 23 after the introduction of home oxygen therapy.

Conclusions: In all cases, patients were able to be taken off ECMO immediately after surgery. None of the three cases experienced complications either during or after surgical intervention. These results suggest that ECMO could be a useful, powerful, and satisfactory method in VATS with the added difficulty of one-lung ventilation under general anesthesia.
**E-POSTER PA5-5**

Dual-port thymectomy

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Dual-port thymectomy using subxiphoid approach was performed on an 82-year-old male with a thymic tumor. The operator performed the procedure via two ports that were placed below the xiphoid process and in the fifth left intercostal space at midclavicular line. The thymus including the tumor were elevated from the pericardium and the partial resection of pericardium and the wedge resection of the lung were made, as the tumor seems to invade them. The operation time was 3 hours and 42 minutes, and blood loss was 3g. The postoperative pathological diagnosis was stage III thymoma that invaded left lung tissue.

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**E-POSTER PA5-6**

A case of solitary fibrous tumor resected by uniportal VATS

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Here we report a case of solitary fibrous tumor being resected by means of a uniportal VATS.

A 55-year-old asymptomatic woman was referred to our hospital for an assessment of a 4-cm sized growing tumor in the left thorax. The tumor located just above the diaphragm, originated from the lung or pleura. Retrospectively, a chest X-Ray which had been taken 7 years ago didn't show any abnormal shadows. From its increase in size, there was a possibility of it being lung cancer, we recommended an operation for the purpose of diagnosis and treatment. The patient underwent operation by a uniportal VATS with a 2cm skin incision at the 7th left intercostal space. Observation by thoracoscopy revealed the well-defined tumor with a thin stalk originating from the visceral pleura of the left lower lobe. While holding the stalk with a device which can tie a string, a wedge resection of segment 10 of the lung with the tumor was performed. We closed up the incision after inserting a thoracic tube using the same incision. Operation time was 38 minutes and post operative course was uneventful. She was discharged from the hospital on the 2nd day after the operation.

Histopathology of the tumor showed a patternless architecture composed of spindle cells with hyalized stroma and vessels. The cells didn't exhibit marked cytological atypia nor hypercellularity. No necrosis was observed. Immunohistochemically, the tumor was stained positive with CD34, negative with S100 and CD68. Ki67 proliferation index showed less than 5% expression. The tumor was diagnosed as a benign solitary tumor.

From its location and shape of having a stalk, a solitary fibrous tumor, especially a visceral pleura originated type, is a good application of a uniportal VATS. Proper placement of an incision and an appropriate operative device makes it easy to perform this kind of operation.

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**E-POSTER PA5-8**

ICG-Fluorescence Navigated Thoracoscopic Segmentectomy

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Segmentectomy is a valuable option which combines curability and less-invasiveness for early stage peripheral lung cancer. Thoracoscopic segmentectomy should be performed by a minimally-invasive approach. However, the difficulty to detect intersegmental plane is the remaining issue. ICG-Fluorescence navigation is a simple and less-invasive method to detect it. We will show you our technique of ICG-F navigated thoracoscopic lingular segmentectomy. After ligation and cutting of vessels and bronchus of the lingular segment, ICG is administrated. Then, we can clearly identify intersegmental plane as dark and bright contrast.

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**E-POSTER PA5-9**

Subxiphoid single-incision VATS procedure for the treatment of bilateral spontaneous pneumothorax

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At present, the use of a lateral thoracic approach is the most common surgical approach for the treatment of bilateral spontaneous pneumothorax. However, a total of six incisions (3 incisions on each side of the chest) are required for the bilateral lung resections. Furthermore, the placement of the intercostal port will inevitably cause intercostal nerve injury, which may persist as lifelong post-thoracotomy pain syndrome. We previously reported a case on which we performed bilateral pulmonary metastatectomy using a subxiphoid single-incision approach. We report an operative procedure of subxiphoid single-incision video-assisted thoracoscopic surgery for the treatment of bilateral spontaneous pneumothorax.

The patient is placed in the supine position with patient’s legs spread, and the surgeon stand between the patient’s legs. A 3 cm transverse incision is made 1 cm below the xiphoid process. A port designed for single incision is then inserted into the subxiphoid incision, and CO2 is insufflated at a pressure of 8 mmHg. The surgeon dissects the thymus from the back of the sternum and incises the both mediastinal pleurae to reach the chest cavity. The bilateral bullectomies are performed using articulating surgical staplers through the subxiphoid incision.

Since the subxiphoid single-incision approach does not cause intercostal nerve injury, the postoperative pain is minimal. Moreover, this technique enables both lungs to be exposed via a single incision. Thus, it may be useful for conditions such as bilateral metastatic pulmonary tumors or bilateral pneumothorax. The major issue with this surgical method is the limited maneuverability of the instruments and the scope used because they interfere with each other through the single port. Additionally, from an anatomical perspective, resection of the dorsal portion of the lungs, which are furthest from the subxiphoid incision, may be difficult.

**Movie Presentation**

This video shows a subxiphoid single-incision VATS procedure for the treatment of bilateral spontaneous pneumothorax. We make a 3cm incision at 1 cm below the xiphoid process. And then, we insert a port designed for single incision surgery through the subxiphoid incision. We dissect the fatty tissue from the back of the sternum and open up the bilateral mediastinum pleurae to reach the both thoracic cavities. Then, we resect bilateral bullectomies with surgical staplers. After the test for air leakage, we cover bilateral resected area with the oxidized cellulose seats to prevent a recurrent pneumothorax.
E-POSTER PA5-10

Surgical outcomes of video-assisted thoracoscopic surgery for acute thoracic empyema using pulsed lavage irrigation

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Objective: Pulsed lavage irrigation, which is commonly used in orthopedic surgery, was usefully applicable to surgical treatment of acute thoracic empyema because of its effectiveness of debridement and drainage. We have used this technique in video-assisted thoracoscopic surgery (VATS). The aim of this study was to evaluate surgical outcomes of VATS for acute thoracic empyema using pulsed lavage irrigation.

Methods: We reviewed 75 patients with acute thoracic empyema who underwent surgical treatment by VATS between January 2005 and December 2015, and we analyzed surgical results and outcomes of these patients. For the surgical technique, the thickened pleura were decorticated under a thoracoscope, and pulsed lavage irrigation system was used after the intrathoracic space had become a single cavity. Lavage and suctioning were repeated with 3-10 liter of a pressurized warm saline solution.

Results: There were 63 male and 12 female with a median age of 64 years-old. Stages of thoracic empyema were I (exudative phase) in 1 (1%), II (fibrinopurulent phase) in 50 (67%), and III (organizing phase) in 24 (32%). The mean operating time was 123 minutes (Range: 60 to 261). All patients had good postoperative course. Seven patients had disease recurrence, and recurrence rate was 9.3%. Among these relapsed patients, one patient treated with anti-bacterial agents, five patients underwent re-drainage and only one patient needed an addition of open window thoracotomy.

Conclusions: VATS pulse lavage irrigation is useful and effective technique to treat acute thoracic empyema. Using this technique, it would be possible to shorten the operating time and reduce the rate of disease recurrence.

E-POSTER PA5-11

Robotic assisted internal mammary lymphadenectomy

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Objective: We report the case of a 58-year-old woman with the suspicion on a PET-scan of a lone internal mammary lymph node tumor 42 months after unilateral mastectomy for a breast cancer (pT2 pN1 M0) and adjuvant chemo-, radio- and hormoneotherapy. The ipsilateral lymphadenopathy was successfully resected in toto with the infiltrated internal mammary artery using the Da Vinci robot. The video illustrates the ease of the procedure, especially for a trained cardiac surgeon used to harvest internal mammary arteries. The first histopathological examination confirmed the diagnosis of a low differentiated carcinoma. This is the first report of a robotically assisted lymphadenectomy of the internal mammary lymph nodes in an oncological context.
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