

IL

HEALTH CARE POLICY AND CARDIOTHORACIC SURGERY

Bruce Keogh

National Health Service in England, UK

The National Health Service in England treats a million patients every day. There are 14.5 million hospital admissions a year of which only 50,000 relate to cardiac surgery so policies for improving care need to be generic. We have recently restructured the service to make clinical outcomes the currency of the service, to embed clinical leadership at all levels of the service and to give patients more influence over their treatment. To ensure that there is a focus on outcomes we have developed a national outcomes framework to assess progress in five areas: reduction in premature mortality, improving lives of people with long term conditions, improving outcomes for short episodes of care, improving safety and improving patient service and satisfaction. These all fit within a legally binding definition of clinical quality using the three domains of effectiveness, safety and patient experience. A good service must be good in all three domains.

In a tax funded system, ensuring appropriateness of care whilst promoting innovation is a challenge. For cardiovascular and thoracic surgery, this means adherence to evidence based guidelines and making more data on outcomes available to the public at an institutional and surgeon level using outcomes defined by the profession.

Current challenges remain the rapid uptake of new technologies and the configuration of paediatric cardiac surgery.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PL1-1

THE FUTURE OF CARDIOTHORACIC SURGERY

Douglas E. Wood

Professor and Chief, Division of Cardiothoracic Surgery, Vice-Chair, Department of Surgery, Endowed Chair in Lung Cancer Research, University of Washington, USA

Cardiothoracic surgery is undergoing major changes related to evolving technology, changes in the educational paradigm, and evolution of health care policy. Many see these changes as a threat to the stature and viability of cardiothoracic surgery. However, these changes create tremendous opportunity to broaden our skills and our scope of practice, as well as to better prepare the next generation of CT surgeons for a successful career in helping patients with cardiothoracic disease.

Cardiothoracic surgery training in the US is undergoing a quiet revolution. Huge changes have taken place in the past 10 years that are changing the face of cardiothoracic surgery residencies and the seriousness with which cardiothoracic leadership is addressing future educational needs. The most substantive changes are probably the creation of integrated cardiothoracic surgery residencies, the development of two pathways of index cases to board eligibility, and the incorporation and empowerment of the Joint Council for Thoracic Surgery Education (JCTSE).

The development of transcatheter aortic valve replacement (TAVR) is a prime example of how new technology can be successfully leveraged to simultaneously provide advances in patient care and growth in the specialty of cardiothoracic surgery. Cardiothoracic surgeons and cardiologists have developed a critical partnership that has evaluated the first phase of TAVR in select patients as a heart team. With commercialization of TAVR, cardiothoracic surgeon and cardiology leadership have worked closely with policymakers to develop an important national framework for centers qualified to perform TAVR, as well as the combined surgical/cardiology composition of TAVR implantation.

New technology is impacting general thoracic surgery in a more indirect way. The recent publication of the National Lung Screening Trial (NLST) has shown a 20% reduction in lung cancer mortality in high-risk patients undergoing low-dose CT screening. The resulting changes in policy for CT screening and increased identification of early-stage cancers is expected to require an increased delivery of general thoracic surgery services across the United States. However, thoracic surgery practice in the United States is still largely performed by non-specialist surgeons, i.e. those without training or certification in cardiothoracic surgery. A challenge in the United States is to develop policy that directs patients to specialty care while not compromising access to thoracic surgical services. This is an effort being addressed by health services researchers, cardiothoracic surgeon leaders, and health care policy makers in the US.

PL1-2

FUTURE OF CARDIO-THORACIC SURGERY

José L. Pomar

Hospital Clinico de Barcelona, Department of Cardiovascular Sugery, Spain

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PL1-3

FUTURE OF CARDIO-THORACIC SURGERY

Pedro Jose del Nido

Boston Children's Hospital, Harvard Medical School, USA

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PL1-4

A GLOBAL VIEW OF THE FUTURE OF CARDIOTHORACIC SURGERY

Chuen Neng Lee

Chairman, University Surgical Cluster, National University Health System, Singapore, Head, Department of Surgery, School of Medicine, National University of Singapore, Deputy Director, National University Heart Center Singapore, Senior Consultant Surgeon, Department of Cardiac, Thoracic & Vascular Surgery, Singapore

"The best way to predict the future is to invent it" Alan Kay 1940

Like all things, CT surgery's future is greatly influenced by many global issues.

We can modify the course of some these issues, if we recognize the significance, and adjust our specialty's development plans accordingly, although a large portion is beyond our control.

- 1)Major economic trend. Funding, accessibility, affordability can be a problem for many countries, although less so in Asia. Adjustments would need to be made.
- 2)Demographic changes may imply increasing patient volume and complexity for surgeons. This would have impact on training, manpower supply and facility planning.
- 3)Technology. Rapid advances, disruptive new technology will continue to affect our practice fundamentally. Careful evaluation of the long term outcomes, modification of training programs will be key to adjust to these changes.
- 4)Training. Darwinian principle mandates we produce better next generations than us. We must focus on training if we are not to degenerate.
- 5)Regulatory environment. This is expected to be increasingly restrictive, with impact on innovation. New ideas may come more from countries friendly to innovation.
- 6) Surgical ethics. Surgical ethics may be compromised in a world of financial pressures. The long term deleterious effect of our specialty would be serious.
- 7) political turmoil and inaptitude, worsening security situations in countries currently with good standard of CT surgery may be damaging at unimaginable magnitude.

International collaborations will be a key to optimize our collective talents in areas such as training programs and opportunity, technological advances, informing health system policy makers, transfer of knowledge and systems.

Our task is to recognize and adjust, plan ahead.

PL2-1

LEADERSHIP ACADEMY OF THE AMERICAN ASSOCIATION FOR THORACIC SURGERY

Fred A Crawford

Department of Surgery, Medical University of South Carolina, USA

A leadership academy was formed by the AATS in 2008 with the goal to "conduct educational, mentoring, and other programs and activities to further the development of the current and future leaders of the specialty of cardiothoracic surgery." The first programs, directed to individuals interested in becoming a CT division chief occurred in 2009 and 2010. Subsequent programs have been directed to different audiences including current division chiefs and individuals just starting in an academic practice of cardiothoracic surgery. Objective data regarding success is lacking, but all 36 participants in the 2009 and 2010 academies continue in academic surgery; 31 of 36 are division chiefs, section chiefs, or hold endowed chairs; and of these 31, 17 were appointed after attending the Academy. Six participants in the first two programs served on the faculty of 2012 program demonstrating their continued development as leaders. Success has been attributed to several factors including limited number (maximum 20) participants with a 1:1 participant-to-faculty ratio, required attendance by the entire faculty for the entire meeting, assigned seating at all functions necessitating mingling of faculty and participants, and unexpected enthusiastic discussion by the entire faculty on each topic. Rigorous evaluation of the program topics and speakers by both participants and faculty has led to program changes over time as well as to changes in the faculty. The AATS obviously does not believe that a one-day leadership course can impart more than a small fraction of the knowledge necessary to be an effective leader. To that end, recent responsibilities of the leadership academy have grown to include the annual "Developing the Academic Surgeon" program at the AATS, the annual Cardiothoracic Surgical Leadership Roundtable meeting at the AATS, and the two and one-half day intensive Brandeis University Surgical Leadership course. AATS leadership believes these and possibility future ventures may contribute significantly to the development of future leaders in cardiothoracic surgery.

PL2-2

LEADERSHIP IN THORACIC AND CARDIO-VASCULAR SURGERY: A PRACTICAL AFFAIR

Ludwig Karl von Segesser

Department of Surgery, CHUV, Switzerland

There are many theories about leadership, but a leader in thoracic and cardio-vascular surgery at a university hospital has to excel in at least three fields: clinical work, education, and research. Hence, the first condition for somebody who wants to become a leader in thoracic and cardio-vascular surgery is to become a good surgeon.

Because surgery is skill based, it requires a lot of practice. The training requirements for surgery are typically estimated at 10'000 hours. Part of this can be in silico, in vitro and in the lab. But skills alone are not enough, because failures are either due to problems with the technique or problems with the indications. The success rate can be improved by experience, and that is the reason why the estimate for the training period in surgery is rather 10 hours per day for 10 years and more. For the patient however, surgical competence alone is not enough, it has to be paired with availability, which in turn adds even more hours.

A competent and available surgeon has to make this known. In other words, a network has to be built, and this starts with the patients on one side and the referring colleagues on the other. Teaching is certainly also an important activity for reaching a broader audience and the same holds true for publishing.

The next issue is how to make a difference, and for this one has to know its own results, and the results of others in order to bench mark the activities, and to recognize weaknesses and opportunities which in turn drive the fields of research and development.

Research and development are the cornerstones for bringing thoracic and cardio-vascular surgery to the next level. The constant search for improvements has brought us to the current level, but this is not enough and thus leads the way to new approaches at a higher level performance wise, cost wise or both.

There are many other competences which can be helpful for a leader in thoracic and cardio-vascular surgery including know how in strategic thinking, management (procurement, sales, finance), human resources, diplomacy, media, etc. However, best possible surgical practice and patient care are the prime ingredients for durable success.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PL2-3

FORWARD AND LIVE TOGETHER WITH PATIENTS

Shinichi Takamoto

Mitsui Memorial Hospital, Japan

Medical care had been carried out with Doctor-centered concept formerly but recently it has been changed with Patient-centered concept. However, medical professionals sometimes have been mentally and spiritually suffered from unreasonable stress, egoism and arrogance of monster patients. As patients want to be cured and survive, medical professionals also want to live and to find a reason to live.

Medical knowledge is widely and rapidly expanding just like Big Universe. Even medical professionals know a very little about human body, Small Universe. Difference of medical knowledge between Professionals and Patients are very small in Universe. Why medical professionals are permitted to undergo medical care to Patients? It is because Patients have "Life" which could allow professionals' mistake. We, professionals should not be arrogant but be humble to patients recognizing as an equal human. We should be forward together with patients who have lives. In Japanese we would say "Live Together with Patients", since to live in Japanese includes mental and spiritual living, wider than in English. It is simple but vital words to inspire the suffering people. These words have been often talked after East Japan Disaster and have encouraged lots of people in difficulty because these are based on our basis of "Life". If our medical professionals could follow this concept, both patient and doctor could be healed and relationship between two would be improved and young surgeons could do their duties with more reliance and ease.

Medical care should be based on this concept "Live together with Patients" and next generation of our professionals should recognize this concept for patients and our professionals.

PL3-1

THE ROLE OF NON-TECHNICAL SKILLS IN ENHANCING OPERATING ROOM TEAM PERFORMANCE AND PATIENT SAFETY

Steven Yule

Department of Surgery, Harvard Medical School, USA

This presentation will introduce the concept of non-technical skills and offer ways in which structured analysis of behavior in the Operating Room (OR) can be used to enhance performance in cardiothoracic surgery. Particular focus will be placed on the NOTSS (Non-Technical Skills for Surgeons) system. NOTSS is a behaviour rating system that allows valid and reliable observation and assessment of four categories of surgeons' non-technical skill: situation awareness, decision making, communication & teamwork, and leadership (see table 1 for skills taxonomy). An adapted model of systems design was used to guide the iterative development of NOTSS through three phases of work from task analysis, through system design, to evaluation (1). The system is in surgical language for suitably trained assessors to observe, rate and provide feedback on non-technical skills in a structured manner. NOTSS has been tested for reliability and independently tested in a trial of workplaces assessment systems in the OR with promising results (2). Subsequent phases of work have used the NOTSS system for debriefing trainees after surgery and coaching non-technical skills in surgical simulation. The Royal College of Surgeons of Edinburgh has been successfully running a NOTSS Masterclass in observing and rating behaviour for attending surgeons since 2006. Faculty development has also occurred for groups in the United States, Japan and Australia where NOTSS has been adopted by the Royal Australasian College of Surgeons as part of their competence assessment system. Current applications of NOTSS in cardiothoracic surgery to identify non-technical predictors of performance, improve safety during cardiopulmonary bypass, and enhance team performance during simulated crises will be discussed.

For further details go to: www.scholar.harvard.edu/yule

(1) Yule, S., Flin, R., Maran, N., Rowley, D. R., Youngson, G.G. & Paterson-Brown, S. (2008). Surgeons' non-technical skills in the operating room: Reliability testing of the NOTSS behaviour rating system. *World Journal of Surgery*, 32, 548-556

(2) Crossley, J., Marriott, J., Purdie, H., & Beard, J.D. (2011). Prospective observational study to evaluate NOTSS (Non-Technical Skills for Surgeons) for assessing trainees' non-technical performance in the operating theatre. *British Journal of Surgery*, 98, 1010-1020

PL3-2

PATIENT SAFETY

Thoralf M Sundt

Department of Surgery, Harvard Medical School/ Massachusetts General Hospital, USA

The past decade he has seen remarkable attention paid to the topic of patients safety by the medical community. Only a few years ago the terms “preventable adverse event”, “error”, and “patient safety” were uncommonly employed in our literature, and so ill understood that editors of our journals requested definitions. Now the topic has become so widely accepted that sessions at major national and international meetings such as this focused specifically on safety, and approaches to improve outcomes by focusing on error specifically, no longer raise curious questions regarding their utility. Institutional programs have become formalized with safety committees and safety officers. Programs to submit safety reports via computerized systems are commonplace and institutional quality and safety committees are increasingly viewed as means by which practitioners can communicate effectively with hospital administration to improve the conditions under which patient care is delivered.

Significant challenges in advancing patient safety remain, however. Interventions that have proven effective in other industries are deployed with variable consistency in medicine. Briefing and debriefings, efforts to flatten hierarchy and improve interdisciplinary communication are hindered by the hectic tempo of medical practice as well as the individualistic character of practitioners. Physicians, and particularly surgeons, tend to be individualistic and independent minded individuals who value autonomy and are accustomed to working alone to master a field of study. These are the very characteristics that allowed us to successfully compete with others to enter the field. Unfortunately they work against us as we try to shift our mind sets to systems of care and team approaches to care delivery. Safety is generally accepted to be a system property, and therefore if we are to optimize it we must function effectively as members of that system and leaders of those teams. With leadership, however, comes the imperative of effective “followership”. We must understand how we fit within systems and how we can facilitate the empowerment of those around us.

The benefits to ourselves into our patient's are many fold. It is worth the effort to change our way of thinking; it is also a challenge to ourselves and can actually be fun!

PL3-3

PATIENTS SAFETY: A ROLE OF ACADEMIC SOCIETY FOR CARDIOVASCULAR SURGERY

Yuichi Ueda

Department of Cardiovascular Surgery, Tenri Hospital, Japan

I have for many years chaired the Quality and Patient Safety Committee of the Japanese Society for Cardiovascular Surgery (JSCVS) under the Presidency of Dr. Takamoto. We have been coping as quickly as possible with the problems encountered in cardiovascular surgery in Japan. The principal activities were to receive requests from the hospitals concerned, to recommend external Committee members, to have an analysis of the causes and an assessment of quality made from the standpoint of a professional society for cardiovascular surgery. This kind of activity in an academic society has been quite unique. The JSCVS established eight subdivisions of Japan, in order to focus mainly on the preservation of patient safety. I am again considering plans for improving the coverage by setting up more subdivisions in neighboring areas to encourage closer contacts and richer interchanges. In addition, together with the provision of safety information, we will endeavor jointly to prevent any recurrence of medical accidents. I believe that the surgical specialty society has the duty to play a major role in the training and education of young surgeons aspiring to become professional cardiovascular surgeons.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PL4-1

ADULT CARDIAC DATABASE IN NORTH AMERICA

Frederick L. Grover

Department of Surgery, Division of CT Surgery, University of Colorado School of Medicine, Anschutz Medical Campus, USA

The STS Adult Cardiac National Database was initiated in 1990 and had very rapid growth in hospitals and patients entered. The primary goal of the database was to allow surgeons to have access to their own data to compare their risk adjusted results to those of their national and regional peers for the purpose of quality improvement. In 1997, an effort was begun to improve the data quality and auditing and database staff were hired to support the effort. In 1998, the STS contracted with the Duke Clinical Research Institute to perform the data warehousing and analysis.

The STS was the first professional organization to seek approval of their measures by the National Quality Forum, a multi stakeholder health policy organization in Washington, DC. The STS gained a positive reputation outside of cardiothoracic surgery with the government and health policy organizations. Currently the Adult Database has 1071 participating groups, which is more than 90% of practicing surgical groups in the United States, and more than 5.1 million surgical records entered and 8 % of programs are audited annually. Risk models have been developed for CABG, valve and CABG/valve procedures. In addition, a three-star composite rating for coronary bypass has been developed, and an AVR/CABG composite score is in the process of being developed. Risk adjusted mortality for CABG has decreased by more than 60% after beginning the Database. Over 40% of STS members are voluntarily publicly reporting the CABG composite three-star outcomes on the STS and Consumer's Reports websites.

Active research has been performed using the databases and has led to the ASCERT Trial by linking STS, American College of Cardiology, and Medicare databases to study the relative efficacy of CABG vs. PCI. TAVR pre and post marketing surveillance has been developed in collaboration with Medicare, the FDA, and the ACC.

PL4-2

CARDIOVASCULAR SURGERY DATABASE IN ASIA

Noboru Motomura

Department of Cardiothoracic Surgery, University of Tokyo, Faculty of Medicine, Japan

Since several series of cardiovascular surgery database have been successfully conducted in the world, the ASCVTS has tried to build up the international database in Asia. In Asia some countries have own domestic database. Japan, Korea, Thailand, Saudi Arabia are those countries. Some hospitals have their own database, but they do not have a nationwide database. Singapore, India, Bangladesh, China are those countries. In other countries cardiovascular surgery database is not run systemically.

Japan has a nationwide cardiovascular surgery database; Japan Cardiovascular Surgery Database (JCVSD). It covers almost all hospitals in Japan which exceeds 650 units all over Japan. Korea has another style of national database. The number of variables in each case is small but it collects from all over Korea. Saudi Arabia is using a company driven vender to collect and analyze their data. This vender is handling many other hospitals in Asia, like Singapore, Hong Kong, Beijing.

In this session, the state of the ASCVTS Database will be updated and the result of international multi center analysis will be presented.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PL4-3

CONGENITAL CARDIAC DATABASE IN NORTH AMERICA

Marshall L. Jacobs

Pediatric and Congenital Heart Surgery, Cleveland Clinic, USA

The Society of Thoracic Surgeons Congenital Heart Surgery Database (STSCCHSD) collects and analyzes data from 105 participating centers. The cumulative number of operations coded in the STSCCHSD at the time of the second 2012 Harvest was over 250,000. Cases entered over the past four years numbered 130,823. This represents participation by 84% of pediatric heart surgery centers in the US and accounts for over 90% of the total cases. Data is harvested and outcome reports are generated twice a year. All data is de-identified. Reporting of mortality is now based upon "Operative Mortality" which is defined as: "(1) all deaths, regardless of cause, occurring during the hospitalization in which the operation was performed, even if after 30 days (including patients transferred to other acute care facilities); and (2) all deaths, regardless of cause, occurring after discharge from the hospital, but before the end of the thirtieth postoperative day." Stratification of cases based upon complexity and procedural risk has moved from systems based largely on expert opinion (RACHS-1 and Aristotle) to the use of the empirically derived STS-EACTS Mortality (STAT) Categories which are based on objective data. An additional empirically based tool to analyze morbidity has been developed.

Fields added to the Database collect information related to 21 Pediatric Cardiac Surgery Quality Measures proposed by the STS, including Process and Outcome Measures related to both mortality and morbidity. Linkage of the STSCCHSD to administrative data has facilitated comparative effectiveness research regarding the use of various medications in management of congenital heart surgery patients as well as an evaluation of variation in risk-adjusted infection rates across participating centers, and association with hospital mortality rates and post-operative length of stay (PLOS). Variation in hospital costs across participating centers, together with possible associations between cost and PLOS and complications rates are currently being evaluated.

PL4-4

EACTS CONGENITAL DATABASE FOR QUALITY IMPROVEMENT IN CONGENITAL HEART SURGERY

Bohdan Maruszewski

Children's Memorial Health Institute, Poland

The EACTS Congenital Database is the biggest Congenital Heart Surgery (CHS) registry in Europe. Since 1999 157 772 procedures performed in 173 active centers from 46 countries from all continents have been reported. That includes 29 328 neonates, 52 292 infants, 64 168 children and 11 984 adults. 22% of data are submitted from outside of Europe.

EACTS Database uses International Nomenclature for Pediatric and Congenital Heart Surgery (www.ipccc.net/) and minimum Data Set, same as STS and Japanese CHS registries.

The data are anonymous and only submitters have an access to their own and aggregated national reports. The aim of this registry is to allow comparison of individual and units outcomes and performances. The outcomes are risk stratified using Aristotle Basic Score and EACTS/STS Mortality Score (STAT score).

Since 2004 the data have been verified during 49 site visits and using methodology that allows verification of 100% (12 fields) of the Minimum Data Set.

The database users have an access to over 300 on line tabular reports and graphs comparing their own outcomes with those of other users and mean values for all patients, specific diagnoses and procedures including age groups.

More than 40 papers have been published presenting joint work with the STS Congenital Database. The EACTS/STS Mortality Score was developed using data from both registries.

In some countries the EACTS Database is used as a national quality assurance tool (Poland, Netherlands, Belgium and recently Australia and New Zealand).

The ultimate goal of the EACTS Database has always been to help defining optimal surgical treatment (gold standards) for certain diagnoses, procedures and subsets of patients exposed to incremental mortality and morbidity risk factors. And finally to improve early and late survival rates, as well as quality of life of surgically treated patients with Congenital Heart Disease across the globe.

PL4-5

JAPAN CONGENITAL CARDIOVASCULAR SURGERY DATABASE FOR QUALITY IMPROVEMENT

Arata Murakami¹, Shinichi Takamoto², Hiroaki Miyata³, Noboru Motomura¹, Syunji Sano⁴

¹Department of Cardiac Surgery, The University of Tokyo, Japan, ²Mitsui Memorial Hospital,

³Department of Health Quality Assurance, the University of Tokyo, Japan, ⁴Department of Cardiac Surgery, Okayama University, Japan

Japan congenital cardiovascular surgery database (JCCVSD) started data registry on web-base at August 2008. At the end of December 2012, the cumulative procedures was 27,167, and the participants 111. JCCVSD published the first risk model (J Thorac Cardiovasc Surg, in press), and by audit, accuracy of mortality was 99%. From January 2013, the Japanese board of cardiovascular surgery extract data from JCCVSD for board certification.

Quality improvement of cardiovascular surgery is supported not only by the quality of surgeons, but also by the quality of hospital system, etc. Elimination of "the tail" does little to affect overall system quality. NSQIP has shown patient outcomes are improved by comparative assessment of risk-adjusted performance of hospitals, followed by dissemination of practices of best-performing hospitals.

Database tell us "what we are doing". Database is a strong tool to assess quality, and through database, appropriate "quality improvement" will be achieved by 1) eliminate unnecessary variation* (e.g. standardize processes), 2) achieve & document continuous improvement (in care processes & outcomes).

S1-1

BLENDEN AND DISTRIBUTED LEARNING IN OPCAB SURGERY

Paul Sergeant, Jan Van Hemelrijck, Matteo Pettinari

Gasthuisberg University Hospital, Cardiac Surgery Department, Belgium

The implementation of OPCAB coronary surgery has been very variable from region to region and the anticipated risk-reduction has not always been apparent, sometimes even the opposite. The science of learning and implementing a new technology has indeed not been applied.

The failure of implementation of any new technology is based on a series of causes as there are: drivers, financial issue, technological pull (patients, real world events, surgeons, anesthetists, cardiologists), technological push, departmental organization (routines, leadership styles, clinical pathways ...), the crew resource management, the individual physician but also the implementation and the training process. OPCAB has never been defined formally and there are so many different systems used that this definition can probably never be fixed anymore. There are different monitoring, anesthesia, anticoagulation, stabilization, enucleation systems, no-touch aorta, different shunting concepts and ischemia response systems. A Machiavellistic approach would probably accept any method, conditional of proof of absence of ischemia and conversion through extreme monitoring of enzymatic release and annihilation of stroke and early mortality. Interesting to note is that in the concepts that have proven to fail, the concept was never questioned.

The training process at KU. Leuven is addressed through 470 three-day individualized courses. Three-hour low fidelity simulation classes worldwide use an anastomotic curriculum training towards anastomoses in reduced and unstable airspace. A new cloud-based system called "my virtual anastomosis" follows up the simulation courses and allows a qualitative and quantitative interface between scholar and evaluator. Several hundred young surgeons have entered this distant technical learning pathway.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S1-2

OPCAB IN USA

Omar Lattouf

Emory University, Division of Cardiothoracic Surgery, USA

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S1-3

OPCAB IN KOREA

Ki-Bong Kim

Department of Thoracic and Cardiovascular Surgery, Seoul National University Hospital, Korea

Since 1977 when a compulsory health insurance program was introduced in Korea, the number of open heart surgery increased dramatically. However, most of those cardiac surgeries were for valvular and congenital heart diseases until middle of 1990s. The annual number of coronary artery bypass grafting (CABG) in 1994 increased over 500 cases, which was 37% of valvular surgery.

With the rapid increase in the aging population and the changes of westernized dietary habit in Korean people, the annual cases of CABG (1,611 cases) increased over those of valvular surgery (1,570 cases) in 1999. The increasing number of percutaneous coronary interventions by aggressive cardiologists, Korean cardiac surgeons have adopted new technologies in the field of CABG, such as OPCAB, total arterial revascularization, endoscopic harvesting of saphenous vein or radial artery, and intraoperative verification of graft patency. Among 2,651 isolated CABGs in 2011, 1,600 cases (60.4%) were performed as OPCAB. OPCAB is currently becoming the standard CABG in Korea.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S1-4

CABG IN CHINA: IS THE PUMP STILL A CONCERN?

Song Wan

Department of Surgery, The Chinese University of Hong Kong, Hong Kong

Cardiovascular diseases are the topmost cause of death in China, which kills about 3.5 million people each year (i.e., at least 9590 Chinese die from cardiovascular disease every day). It is understandable that, unlike in some developed countries, the amount of annual CABG operations in China had been kept in an escalating trend throughout the past decade. While according to the Western criteria there are many “young” patients in this part of the world, it is widely recognized that Chinese patients undergoing CABG are sicker and older nowadays than those in the decades earlier. As far as the technical aspects are concerned, the off-pump approach is arguably still the preferred choice in mainland China. Recent national registry statistics indicated that more than half of the total CABG operations are done without the use of cardiopulmonary bypass. However, it is noteworthy that particularly over the recent few years the pump seems no longer a major concern in China. Compelling evidence from some leading Chinese centers even suggested that the long-term outcome following the off-pump approach may not be as superior as previously estimated, when compared to that following conventional CABG. On the contrary, majority of the CABG cases in Hong Kong are performed on pump. Taken together, the overall outcomes of surgical myocardial revascularization in China have surely fulfilled international standards as reflected by the evolving national CABG registry data.

S1-5

OPCAB IN JAPAN

Shuichiro Takanashi

Sakakibara Heart Institute, Japan

Modern cardiac surgery would not have been evolved without cardiopulmonary bypass, although it has been associated with substantial morbidity. In consequence OPCAB become popular in Japan. According to the published data, off-pump CABG has been shown to reduce operative mortality and incidence of stroke. Unfortunately, the target of RCTs are mostly low-risk patients, which seems to be a reason of their negative results. Kobayashi reported that off-pump CABG had better 3 year-results in all-cause death, cardiovascular death, myocardial infarction, repeat revascularization, and composite events compared to PCI with bare metal stents. This benefit is greater in high-risk patients than low-risk patients. Puskas also said that the off-pump has lower mortality than on-pump group obviously. There have been many reports which off pump CABG is not superior to on-pump CABG.

In Japan, off-pump rate is greater than 60% in all isolated CABG. The use of drug-eluting stents by interventional cardiologist may facilitate this trend. However, diffusely diseased vessels remain a challenge for both interventional cardiologists and cardiac surgeons, even if different kind of interventional new devices will be available. One of the answers for this problem seems to be “onlay patch bypass grafting” with or without endarterectomy. This method holds promise for patients a long term survival and good quality of bypass graft. In conclusion, long-term outcome after OPCAB was comparable to the conventional coronary artery bypass grafting. Off-pump CABG is associated with decreased mortality and morbidity after coronary artery bypass grafting. Off-pump CABG may prove superior to conventional CABG in appropriately selected patients.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S1-6

OPCABS IN INDIA

Vivek Jawali

Fortis Hospitals, CT Surgery, India

Off Pump Coronary bypass graft surgery began in India in 1992 with the initiation and the efforts of Dr Vivek Jawali at Bangalore. Presently India performs nearly 100,000 CABGs annually out of which approximate 65% of the CABGs are OPCABS.

Initially till 1994, they were performed without any stabilizers and allied hardware. In 1994 the initial, though experimental hardware from, CTS, Medtronic were used. By 1996 with use of disposable and userfriendly hardware, the reproducibility and outcomes improved dramatically. Now every center in India (almost 300 of them) performs majority or at least some part of their CABGs off pump.

Detailed statistics of Indian CABGs will be presented.

S2-1

SURGICAL EDUCATION IN USA

Jeffrey Rich

STS, USA

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S2-2

CARDIOTHORACIC SURGERY TRAINING AND ASSESSMENT IN THE UK

Timothy R Graham

Cardiothoracic Surgical Unit, Queen Elizabeth Hospital, UK

Cardiothoracic surgery has approximately 320 consultant surgeons in UK and Ireland.

Around 80 are thoracic surgeons and around 30 are congenital cardiac surgeons. There is a reducing number of mixed adult cardiothoracic surgeons in the UK as specialist practices develop.

There is an ongoing debate within the specialty about how/whether we should develop into subspecialisation for NHS service delivery and the subsequent training of an appropriate consultant workforce.

Since 2008 we have had reasonably balanced workforce planning with an agreed total consultant workforce of around 320 – 340 consultants predicted in the UK and Ireland over the forthcoming 5 years. This planning has predicated the annual number of national trainees appointed through our annual national (UK) selection process – currently approximately 25 trainees per annum. We currently have only a small excess of CCT holders (trainees completed training) awaiting consultant posts and several vacancies are pending.

Areas to be covered:

UK Training pathway

Roles and Responsibilities of Training Agencies including the Specialty Advisory Committee (SAC)

Impact of European Working Time Directive

Quality Assurance of Training

Curriculum in Cardiothoracic Surgery

National Selection and Recruitment and Workforce Planning

UK standards for curriculum and assessment systems and the role of the Regulator (GMC)

Intercollegiate Specialty Fellowship Examination (test of summative knowledge)

Objective Outcomes of training and assessment

Tim Graham

February 2013

S2-3

SURGICAL EDUCATION IN RUSSIAN FEDERATION

Leo A. Bockeria

Bakoulev Scientific Center for Cardiovascular Surgery, RAMS, Russia

Postgraduate education includes the same stages for all clinical specialties. After graduating from the medical institute, which lasts for six years (yrs), the student is getting the diploma of medical doctor. After that for one year hi is specializing in surgery, therapy or obstetrics and gynecology. For most gradulators that is the start of practice. Further education consists two yrs ordinatura at medical university hospital or at scientific and research institute. Next step for the best is aspirantura for three yrs. Within this time the young surgeon (not older than 35 yrs old, normally 26-30 yrs old) is specializing in some subspeciality and preparing a dissertation to become a candidate of medical sciences (probably equal to PhD). With this degree he may have a position of Docent or Leading scientific worker. To become a full professor is necessary to prepare and defend the dissertation for the degree of Doctor of medical sciences.

At a moment the Ministry of Public Health is preparing new regulation for continuous education.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S2-4

CARDIOTHORACIC SURGICAL TRAINING IN SINGAPORE

Huat-Seong Saw

Cardiothoracic Surgery, Mount Elizabeth Medical Centre, Singapore

There are two training systems in Singapore in the nation's two designated cardiothoracic centers. Both systems require the trainee to be registered in a residency program for a period of 6 years after which is an exit examination.

System 1: This is broken into 2 parts. Part I involves a general surgical curriculum. On successful completion of this module the trainee will be gazetted an advanced surgical trainee and will now undergo specialty training.

System 2: This is a direct approach where the trainee is plunged into specialty training from day one.

Both systems have its advantages and disadvantages (these will be discussed).

Trainers in both institutions are currently looking into how to ensure that the tenure of training is more gainfully utilized so that at exit point, we end up with a competent, compassionate, cognitive and innovative cardiac surgeon. The involvement of regional professional associations, such as the ASCVTS, could standardize training across nations.

S2-5

SURGICAL EDUCATION IN EAST ASIA

Thomas A. Pezzella

International Children's Heart Fund, USA

The population of East Asia continues to grow, as well as the economies. Cardiac surgery continues to grow as well. There is increased demand for access and availability. This requires financial support, as well as well trained hospital personnel. There are less applicants for cardiothoracic residency training. This is due in part to few organized teaching programs, as well as poor education/training, and less attractive job opportunities. This is not confined to East Asia. An overview of these problems and challenges is presented, with insight into proposed solutions.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S2-6

SURGICAL EDUCATION IN INDIA

Kunal Sarkar

Rabindranath Tagore International Institute of Cardiac Sciences, India

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S2-7

PRESENT AND FUTURE OF THE JAPANESE BOARD OF CARDIOVASCULAR SURGERY

Kazuhiro Hashimoto

Cardiac Surgery, Jikei University, Japan

The Japanese Board of Cardiovascular Surgery was established by 3 surgical societies, Japanese society for thoracic surgery, cardiovascular surgery and vascular surgery, in 2002. Since 2002, in order to enhance the quality of the society, some revisions regarding surgical experience, the establishment of both a punitive clause, as well as a retraining program have been carried out.

The number of cardiac surgical cases for applicants was increased to 50 cases from 20 cases. As well, cases in the institutions (<40 of open heart surgeries/y) were not accepted as experienced cases.

The average number of board examinees in the last 3 years was approximately 150 people. The pass rate is 70% for those aged 37-39 years. The number of specialists is 1,814 at present and it has decreased slightly from 2,002 in 2008. This decrease is the result of some members not being renewed. One hundred cases of experience were demanded for the renewer over five years, and this was a big hurdle.

The number of the training institutions stands at 482. The number is still increasing, and the policy of consolidation is ongoing. Complicating this process is the great number of relatively small institutions. In this situation, it is difficult to educate residents and update the board at the same time. This tendency is particularly true in the field of congenital surgery. This consolidation may cause concern regarding a medical collapse in rural areas. Most Japanese citizens strongly want to receive high level of care locally, and although the consolidation is not necessarily agreeable, it may be unavoidable. It is a fact that there are many institutions which maintain good results by great effort and the self-sacrifice of the surgeons even in institutions with a low number of surgeries, but we hope it is the ongoing process of our refinement that will ultimately ameliorate difficult working condition.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S3-1

HEART TRANSPLANTATION IN KOREA

Pyo Won Park

Samsung Medical Center, Seoul, Korea

The first heart transplantation (HTx) was carried out in 1992 in Korea. Since then, 770 HTx were performed until the end of 2012. The annual numbers of HTx were between 10 to 30 until 2006. However, the number of HTx has increased to 84 in 2008 and 107 in 2012. The possible reasons for the recent increase of HTx could be the rapid change of funeral pattern from burial to cremation (burn to ashes), extensive focus on organ donation in mass media and more frequent use of marginal cardiac donor in urgent patients.

The recent causes of brain death in Korea include cerebrovascular accidents(49%), head trauma (28%) and asphyxia (15%).

The mean waiting time for the recipient to heart transplantation was 56 days in 2008 and was increased to 126 days in 2012. The waiting time of status 0, 1, 2 and 3 were 31, 112, 144 and 213 days respectively.

Nowadays, implantable ventricular assist device is not officially available in Korea.

A case of implantable LVAD (Heartmate II) was performed for destination therapy as an investigator initiated study last year.

The most popular device of cardiac support for bridge to heart transplantation is peripheral ECMO or central LVAD with centrifugal pump.

Overall 1 and 5 year survival were 86% and 75%. The 1 and 5 year survival rate of status 0, 1 and 2 were 70% and 57%, 86% and 74% and 87% and 79% respectively.

Medium and long-term cardiac supporting devices are required to improve the survival rate of critical patients with severe heart failure in Korea.

S3-2

HEART TRANSPLANTATION IN TAIWAN

Shoei-Shen Wang, Nai-Kuan Chou, Nai-Hsin Chi, Shu-Chien Huang, His-Yu Yu, I-Hui Wu, Yih-Shang Chen, Wen-Jer Ko, Shu-Hsun Chu

National Taiwan University Hospital, Taiwan

The first successful heart transplantation in Taiwan was performed by Professor Chu at National Taiwan University Hospital (NTUH) on July 17, 1987. From July 1987 to December 2012, 1354 heart transplantations were performed. The main indication was congestive heart failure with maximal $\text{VO}_2 < 10 \text{ mL/kg/min}$, intractable heart failure with maximal $\text{VO}_2 < 14 \text{ mL/kg/min}$, or other end-stage heart failure with no conventional correctable heart surgeries. The most common etiology was dilated cardiomyopathy, and the second was ischemic cardiomyopathy. The age ranged from 4 months old to 74 years old with male predominant. There were 18 centers authorized for heart transplantation, including 8 in the north Taiwan, 4 in the middle, 5 in the south, and 1 in the east. More than 90% of the heart transplantations were performed in the north Taiwan and the NTUH has the largest series of cases. More than 470 cases have been performed at NTUH with the largest annular transplantation number of 42 in 2005.

Because extracorporeal membrane oxygenation (ECMO) support is a very popular mechanical circulatory support in Taiwan, many patients were bridged with ECMO to transplantation, including both the donors and the recipients. In our series 23% were bridged with ECMO, while 50% were bridged with ECMO in 2010. The survival rate of the recipients bridged with ECMO was poorer than that of non-supported ones

According to the Bureau of National Insurance of Health (NIH) there were 399 heart transplantations from 2006 to 2010, including 134 at NTUH, 100 at Cheng Hsin General Hospital (CHGH), 39 at Tri-Service General Hospital (TGH). The 1-year survival rate at NTUH, CHGH, TGH and whole country was 84.8%, 84.2%, 78.8% and 79.9% , respectively; and the 3-year survival rate was 79.4%, 76.4%, 58.9% and 72.1%, respectively. In selected cases joining international clinical trials, no operative mortality was noted, and the 1-year survival rate was 97.7%, while 3-year was 88.2% at NTUH.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S3-3

HEART TRANSPLANT IN THAILAND

Pat Ongcharit

Cardiothoracic Surgery Unit, Department of Surgery, Chulalongkorn Hospital, Thailand

First heart transplant in Thailand was done in December 1987 at Chulalongkorn hospital to be the first in Southeast Asia and second in Asia. The first recipient still survive as a longest living heart transplant recipient in Asia. The early period result was successful with low mortality rate. There were 5 centers actively performing heart transplant during 90s. The total number of heart transplant was 155 cases up to date.

From year 2000 to 2010, heart transplant program suffered from the change of National Health Service scheme not funding heart transplant. Number of transplant reduced to few cases per year with only 2 transplant centers left. National Health Service resumed funding for transplant in 2011 caused to yearly number to increase to 8 and 12 cases in 2011 and 2012.

The outcome of the largest series of heart transplant (n = 80) showed one month, one year and 5 year survival were 83%, 56% and 37% respectively in overall group but improved to 93%, 79% and 64% respectively in post year 2002 subgroup. The major causes of death were rejection (39 %), infection (27 %) and graft failure (8 %). The indication for heart transplant were dilated cardiomyopathy (59%), ischemic heart disease (27%) and valvular heart disease (9%).

The main problems in heart transplant program in Thailand are number of donor, financial support and inadequate advance heart failure support during pre transplant period.

S3-4

HEART TRANSPLANTATION IN JAPAN

Junjiro Kobayashi

Department of Cardiovascular Surgery, National Cerebral and Cardiovascular Surgery, Japan

After legislation about organ donation and transplantation from brain dead patients became effective heart transplantation in Japan restarted in 1999. However, because written consent for organ donation had been required from each individual before brain death, the number of heart transplants remained limited to 66 cases for 11 years. Therefore more than 90% of candidate patients had been waiting more than 2 years on left ventricular assist system (LVAS). Since 2010, the revised Japanese law on brain death and organ transplantation accepted consent for brain death organ donation from the family. As a result, the number of organ donations has increased ten-times and approximately 45 organ donations and 28 heart transplants were achieved in 2012. Between March 1999 and February 2013, a total of 152 patients with end-stage heart failure underwent heart transplantation in Japan, and the early and late survival rates appear better than those reported in 2011 by the Registry of ISHLT. Although only a few patients have reached 10 years follow-up, so far none has died or required retransplantation due to allograft coronary artery disease (CAD). However, one patient required off-pump coronary artery bypass grafting in my institute due to allograft CAD. Recently, limitation of recipient age has elevated to 65 years of age in accordance with increase of aged donor. We had to make efforts to obtain sufficient donors to shorten the waiting time on LVAS, which should significantly decrease premature deaths and strokes while on the waiting list.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S4-1

TISSUE VALVE IN EUROPE

José L. Pomar

Hospital Clinico de Barcelona, Department of Cardiovascular Sugery, Spain

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S4-2

LONG TERM OUTCOME OF TISSUE VALVE IN NORTH AMERICA

Frederick L. Grover

Department of Surgery, Division of CT Surgery, University of Colorado School of Medicine, Anschutz Medical Campus, USA

A recent ten year review of 108, 687 AVR's from the STS Database found that 78.4% are now tissue that mechanical have declined to 28.5%. Comorbidities increased over a ten year period but risk adjusted mortality improved. A review of the STS Database from 2000-2007 for isolated MVR's found in those who had isolated mitral regurgitation (47,126) mitral valve repair increased from 51% to 69%. Among those who had MVR, there was a significant decrease in the use of mechanical valves from 68% to 37%. For AVR, most recommend bioprosthetic valves in patients 65 years and older because of longer valve durability in the older patients and avoidance of anticoagulation. A study of St. Jude's Biocor tissue valve found freedom from reoperation for structural heart deterioration of 86% at twenty years in patients 65 years or older. A study of the Carpentier-Edwards aortic valve revealed that only 2.6% of patients required reoperation for failure at 15 years, with structural deterioration the cause in 50% of those patients. Risk stratified freedom from reoperation for structural valve deterioration at 15 years was 34.7% for patients less than 65, at 89.4% for those 65-75, and 99% for those greater than 75 years old. A study using the Hancock and Carpentier-Edwards porcine prostheses revealed the need for reoperation for valve failure occurring at an average of ten years post operatively for MVR as compared to ten to twelve years for AVR. In an older cooperative study with fifteen years of follow up, valve failure occurred in the Hancock porcine aortic valves 26% of the time, 44% for the time in the mitral MVR. In patients greater than 65 years of age or older, the AVR bioprosthetic failure was only 9% at fifteen years. A Cleveland Clinic study revealed Carpentier-Edwards aortic pericardial bioprosthesis freedom from explantation with structural valve issues was 99%, 94%, and 74% at five, ten, and fifteen years. Jameson's studies found that the Perimount pericardial prosthesis outperformed the Carpentier-Edwards porcine in freedom from deterioration. In regard to tricuspid valve replacement, the Montreal group found that the the five year freedom from tricuspid reoperation was 91% for mechanical valves and 97% for biologic valves. They concluded that biologic prosthetic valves in the tricuspid area were a good option even in young patients, because many of them had limited life expectancy because of non valve related associated issues. Transcatheter bovine pericardial AVR has been introduced and studies from the Partner Trial have shown minimal gradients across the valve, but at 30 days moderate or severe perivalvular regurgitation of 12.3% as compared to only 0.9% in conventional open AVR, and at one year, 6.8% vs. 1.9%.

S4-3

TISSUE VALVE EXPERIENCE IN INDIA

Arkalgud Sampath Kumar

Cardiac Surgery, Pushpanjali Crosslay Hospital, India

Background: There is limited experience with bioprosthetic heart valve implantation in India and results and follow-up are not available. This study aims to assess the suitability of the bioprostheses in the Indian population and impact on their quality of life.

Patients and Methods: Between January 2000 and December 2006, 457 patients underwent bioprosthetic valve replacement. Their age ranged from 20 -77 years with a mean age of 55.5 ± 9.3 years. A total of 559 bioprosthesis were implanted: of these 200 (43%) were mitral valve replacements (MVR), 154 (33.7%) aortic valve replacements (AVR), 102 (22.3%) double valve replacements (DVR) and one (0.2 %) tricuspid valve replacement (TVR). **Results:** There were 11 (2.4%) early and 3 late deaths (0.7%). Post-operative gradients were low. Actuarial survival at 60 months was $95.1 \pm 2.2\%$. The actuarial event free survival was $87.9 \pm 5.7\%$ at 60 months. Advantages were freedom from thromboembolism (97.6%), infective endocarditis (98%), haemorrhage (99.7%), Paravalvular leak (99.3%), valve dysfunction (100%) and re-operation (100%). Assessment of quality of life using the standard World Health Organization questionnaire for quality of life yielded satisfactory results.

Conclusions: Bioprosthesis are particularly suited for older age patients in our country and are associated with a good quality of life. However long-term results on valve function are awaited.

S4-4

TISSUE VALVE IN INDONESIA

Tarmizi Hakim

National Cardiovascular Center Harapan Kita Hospital, Indonesia

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S4-5

LONGEVITY OF PERICARDIAL VALVE IN AORTIC POSITION IN JAPANESE POPULATION

Kenji Minakata, Ryuzo Sakata

Department of Cardiovascular Surgery, Kyoto University Graduate School of Medicine, Japan

The aortic valve replacement (AVR) is the most common valve surgery in both Western countries and Japan. According to the recent ACC/AHA treatment guidelines, tissue valve is recommended for AVR in patients at age 65 or older. However, there is no clear evidence that this can be applied to the Japanese patients. In fact, there are significant differences between the Western and the Japanese populations in terms of general background, postoperative medical care, and especially life expectancy. Therefore, we have organized a multi-center study group, which we call the CEPIA-J study group (Longevity evaluation of Carpentier-Edwards Pericardial valve In Aortic Position in Japanese patients). The aim of this study was to assess the long-term durability of pericardial tissue valves and identify the predictors to influence the outcomes in Japanese patients undergoing AVR. We retrospectively enrolled 574 Japanese patients who underwent AVR with Carpentier - Edwards pericardial valve between 1985-2001 in 9 centers, and collected baseline characteristics and conducted follow-up survey to identify the long-term outcomes including all-cause death, cardiac death, reoperation due to structural valve deterioration, and valve-related adverse events such as thromboembolic events. The statistical analyses are now being conducted at the time of abstract submission. This is the first large-scale, multi-center observational study to assess the durability of tissue valves in Japanese patients which was extended up-to 25 years. The results will be presented in this session. And these derived from this study will definitely yield significant implications upon the selection criteria of prosthetic valves not only in patients undergoing AVR but in patients who may be candidates for up-coming new technology such as trans-catheter aortic valve implantation.

S5-1

LUNG TRANSPLANTATION IN KOREA

Hyo Chae Paik, Seok Jin Haam, Gi Jong Yi, Suk Won Song, Soon Chang Hong, Jin Gu Lee, Chang Young Lee, Doo Yun Lee, Dong Uk Kim

Department of Thoracic and Cardiovascular Surgery, Yonsei University College of Medicine, Seoul, Korea

Background: Lung transplantation (LTx) is a well-known treatment option for end-stage lung diseases. The first LTx in Korea was successfully performed in July, 1996, and it is now performed in 7 hospitals with the total number around 130 cases as of end of 2012. The aim of this study was to review the medical record of a single institutional data.

Methods: This is a retrospective review of the medical records of 69 LTx cases in 65 patients during the period from July 1996 to December 2012.

Results: The operation consisted of single lung transplantation in 12 cases, bilateral sequential single lung transplantation in 54 cases, and heart-lung transplantation in 3 cases. A 139 patients were on the waiting list from 1996 to Dec. 2012. Twenty-six were lost from the follow-up, and 37 patients (32.7%) died before the transplantation, and seven patients are still on the waiting list. The average waiting time was 104.8 ± 144.7 days (range; 1~951 days). The mean age of the recipients were 46.6 ± 12.0 years (range; 20~69 years). The donors consisted of 55 males and 14 females with the mean age of 35.9 ± 12.9 years (range; 10~56 years). The most common early complications were bleeding necessitating re-thoracotomy. The mean survival period was 13.6 ± 22.9 months (range, 0-124.3 months) and one and five year survival rate was 60.7% and 32.5%. respectively. The operative mortality was 27.5% (n=19), and the mean survival period was 13.6 ± 22.9 months (range, 0-124.3 months).

Conclusions: The number of LTx has increased in recent years which may had an effect in improving the patient survival.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S5-2

LUNG TRANSPLANTATION FROM DONORS AFTER CIRCULATORY DEATH

Dirk Emiel Marie Van Raemdonck¹, Geert M Verleden²

¹*Thoracic Surgery, University Hospitals Leuven, Belgium,*

²*Pneumology, University Hospitals Leuven, Belgium*

Lung transplantation is limited by the number of suitable donors after brain death (DBD). Some transplant programs have embarked on using circulation-arrested donors, so called non-heart-beating donors (NHBD's) or donors after circulatory death (DCD).

Research has shown that lung tolerance to warm ischemia is around 60 min, leaving some time to organize organ recovery from these donors [1]. Four types of DCD's are described according to the 1995 Maastricht classification [2]. Recently, adding a fifth category with lung donors after euthanasia [3] was proposed for countries with an existing legal framework [4]. Our group in Leuven has reported good outcome in recipients transplanted with lungs recovered from this specific type of donors [5].

Recent studies have shown that lungs from both controlled [6-13] and uncontrolled [14] DCD's can be successfully transplanted, although the practice is not authorized by law in all countries. The incidence of severe primary graft dysfunction using lungs from uncontrolled donors, however, was reported to be somewhat higher compared to brain-dead donors [14]. This is an indication that pulmonary grafts with longer warm ischemic periods should be tested first by means of ex vivo lung perfusion (EVLP) prior to acceptance and subsequent transplantation [15-17].

Between 01/01/2007-01/08/2012, 307 LTx were performed at our institution including 41 from DCD's augmenting the number of transplants by 15.4% in that period. Agonal phase after ventilatory switch-off to circulatory arrest was 13±8 min followed by 12±4 min warm ischemia prior to pulmoplegia. Total ischemic times were 295±56 min for 1st lung and 465±101 min for 2nd lung. Hospital mortality was 5%. Survival and freedom from BOS at 1, 3, and 5 years was 93%, 74%, 74% and 90%, 81%, 65%, respectively.

In conclusion, lung transplantation from DCD's is increasing worldwide with recipient outcome equivalent to DBD's. The experience is limited to controlled DCD's in most centers. Pretransplant lung assessment with EVLP is indicated in donors with a long agonal and/or warm ischemic period before or after circulatory death.

S5-3

LIVING-DONOR LOBAR LUNG TRANSPLANTATION IN JAPAN

Hiroshi Date

Department of Thoracic Surgery, Kyoto University, Japan

Living-donor lobar lung transplantation (LDLLT) was developed to offset the mismatch between supply and demand for those patients awaiting cadaveric lung transplantation. During the past several years, reports on LDLLT have been most exclusively from Japan where the average waiting time for a cadaveric lung is more than 800 days.

As of 2012, lung transplantation has been performed in 282 patients in Japan. Among them, 125 patients (44%) received LDLLT and 157 patients (56%) received cadaveric lung transplantation (CLT).

Immediate family members (relatives within the third degree or a spouse) have been the only donors in Japan. Potential donors should be competent, willing to donate free of coercion, medically and psychosocially suitable, fully informed of the risks and benefits as a donor, and fully informed of risks, benefits, and alternative treatment available to the recipient.

In our experience, all donors were well alive after donor lobectomies. Morbidity was found in about 15%, most commonly re-accumulation of pleural effusion and prolonged air leakage. Forced vital capacity was $89.4 \pm 6.6\%$ of the preoperative value 12 months after donor lobectomy. All donors have returned to their previous life styles without any restrictions.

We performed LDLLT in 79 patients from October 1998 through December 2012, 47 at Okayama University and 32 at Kyoto University. There were 57 females and 22 males with ages ranging from 6 to 64 years (average 32.8 years). Twenty of the patients were children and 59 were adults. The most common indication was interstitial pneumonia ($n = 23$), followed by bronchiolitis obliterans ($n = 20$), idiopathic pulmonary arterial hypertension ($n = 16$). All 79 patients were very sick and required oxygen inhalation preoperatively. Forty five patients (57%) were bed bound and 9 (11%) were on a ventilator.

Bilateral LDLLT was performed in 68 patients and single LDLLT was performed in 11 small patients. All procedures required cardiopulmonary bypass. There were six early deaths and seven late deaths during a follow-up period of 1-171 months. The 5 and 10-year survivals were 86% and 78%, respectively.

LDLLT can be performed for various lung diseases and appears to provide similar or better survival than cadaveric lung transplantation. However, LDLLT should be performed only for sick patients by a well-organized transplant center because of possible serious complications in living donors.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S6-1

ROBOT-ASSISTED THORACOSCOPIC TOTAL MEDIASTINAL LYMPHADENECTOMY FOR ESOPHAGEAL SQUAMOUS CELL CARCINOMA IN THE PRONE POSITION

Ichiro Uyama, Koichi Suda, Yoshinori Ishida, Seiji Satoh

Department of Surgery, Fujita Health University, Japan

Purpose: Meticulous mediastinal lymphadenectomy frequently induces recurrent laryngeal nerve palsy (RLNP). Surgical robots have been developed to help surgeons perform operations with impressive dexterity and precise dissection. The objective of this study is to determine the impact on short-term outcomes of robot-assistance in thoracoscopic total mediastinal lymphadenectomy in the prone position for the treatment of esophageal squamous cell carcinoma including RLNP.

Methods: A single institutional non-randomized prospective study was performed. The patients (n=36) with resectable esophageal squamous cell carcinoma were divided into two groups: Patients who agreed to robot-assisted thoracoscopic esophagectomy with total mediastinal lymphadenectomy performed in the prone position (n=16, robot-assistance group) without insurance reimbursement, and those hoping to undergo the same operation without robot-assistance but with health insurance coverage (n=20, control group). These patients were observed for 30 days postoperatively to assess short-term surgical outcomes.

Results: Robot-assistance significantly reduced incidence of vocal cord palsy (p=0.018) and hoarseness (p=0.015), and duration of ventilator dependency (p=0.025). There was no in-hospital mortality in either group. There were no significant differences between the two groups regarding patient backgrounds, except for the use of preoperative therapy (robot-assistance group < control, p=0.003). There were no significant differences in estimated blood loss, operation time, number of dissected lymph nodes, completeness of resection, or the incidence of the other complications, except for anastomotic leakage (p=0.038).

Conclusions: Robot-assisted thoracoscopic esophagectomy with total mediastinal lymphadenectomy is feasible and safe. This method may show promise in preventing RLNP.

S6-2

LYMPH NODE DISSECTION OF ESOPHAGEAL CANCER BY ROBOTIC AND THORACOSCOPIC SURGERIES

Hirokazu Noshiro, Osamu Ikeda, Masako Urata

Department of Surgery, Saga University Faculty of Medicine, Japan

A thoracoabdominal esophagectomy for esophageal cancer is a severely invasive procedure. A thoracoscopic esophagectomy may minimize injury of the chest wall and reduce the surgical invasiveness. Conventional thoracoscopic procedures are performed in the left lateral-decubitus position. Recently, procedures performed in the prone position have received more attention. A thoracoscopic esophagectomy in the prone position is technically safe and feasible, and provides better surgeon ergonomics and better operative exposure, especially, around the esophageal hiatus and the left recurrent laryngeal nerve during an aggressive esophagectomy. Moreover, in our country, robotic surgery has belatedly started at December 2009 after the da Vinci SHD in Intuitive Inc. had the Pharmaceutical approval. However, robotic surgery for digestive organs has still no approval for the highly advanced medical technology, and no dramatic progress in health care system was found. Therefore, robotic surgery for esophageal cancer is performed only as a medical treatment at own expense. We introduced the da Vinci SHD first among the national universities, and the robotic surgery has already been conducted for patients with digestive cancer from April 2010. We introduced the robotic surgery into esophageal cancer smoothly. In such a type of surgery that attempts to save the complicated nerves and vessels, the merits of the da Vinci SHD such as the high vision 3D and articulated arm are expected to contribute to further advance in surgical technique of laparoscopic surgery. In this session, we herein report our thoracoscopic and robotic surgical technique for esophageal cancer.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S6-3

LYMPH NODE DISSECTION OF ESOPHAGEAL CANCER BY VARIOUS APPROACHES: THORACOSCOPY AND OPEN SURGERY

Simon Law

Department of Surgery, The University of Hong Kong, China

The optimal extent of lymph node dissection has been one of the most controversial topics in esophageal surgery. It varies from the minimalist method involving almost no systematic lymphadenectomy, to an extended approach often involving three-field dissection. The surgical approach for access is closely related to the technique of lymphadenectomy and is no less controversial.

The largest randomized trial comparing open transhiatal with minimal lymphadenectomy vs. open transthoracic extended lymphadenectomy for adenocarcinoma of the lower esophagus demonstrated a trend towards survival advantage for type I lower esophageal junction cancer, especially in those with limited nodal burden. Morbidity rates seem higher with the more aggressive method. There has been other published data showing the benefits of extended nodal dissection; some of which are based on statistical analysis of large patient cohort from international centers. There does seem to be ample evidence to prove the survival benefits of extended lymphadenectomy, though increased morbidities are expected.

When extended surgery is carried out, one key question is whether minimally invasive techniques could reproduce the same dissection as open thoracotomy approach. A recently published randomized trial comparing MIE (thoracoscopy and laparoscopy) vs. open approach showed that pulmonary morbidity rates were higher in the open approach. The number of lymph node harvested was similar. Although carried out in the West, a substantial proportion of patients had squamous cell cancers of the middle third.

The optimal approach to esophagectomy remains controversial and answers are not going to be conclusive in the near future. In expert hands however, it seems that similar results can be achieved. Patient selection is important, and surgeons must tailor their approach for individual patients.

S6-4

LYMPH NODE DISSECTION ALONG THE BILATERAL RECURRENT LARYNGEAL NERVE VIA TRANSTHORACIC APPROACH –SAFE AND RELIABLE PROCEDURE USING NERVE RETRACTOR–

Yoshiaki Kajiyama

Department of Esophageal & Gastroenterological Surgery, Juntendo University, Japan

The most frequent site of lymph node metastasis in thoracic esophageal cancer is “along the bilateral recurrent laryngeal nerve”. In these areas we recognize lymph node metastasis in almost one-thirds of all patients (34%). Lymph node dissection along the bilateral recurrent laryngeal nerve is crucial from both curative and safe point of view. We have to dissect these lymph nodes completely without complication. Before dissecting these nodes, I isolate the recurrent laryngeal nerve in full length using nerve retractor in my left hand. Then I can dissect lymph nodes safely and completely. The mean number of dissected lymph nodes along the recurrent laryngeal nerve was 8.1 (right: 4.0, left: 4.1) in 1,334 pts. Last year the frequency of temporal recurrent laryngeal nerve palsy following surgery was only 5%.

The keys of this procedure are:

1. Accurate understanding of topographical anatomy around bilateral recurrent laryngeal nerve.
2. Gentle and soft retraction of right vagal nerve and left recurrent laryngeal nerve using nerve retractor in my left hand.
3. Isolation of left recurrent laryngeal nerve in full length from neck to the inside of aortic arch.
4. Avoidance of the use of energy devices despite of small bleedings.
5. Rotation of trachea by pulling up the tracheo-esophageal muscle in order to secure the good operating field around the left recurrent laryngeal nerve.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S7-1

CHIMNEY AND RETROGRADE IN-SITU BRANCHED STENT-GRAFTING FOR THE TREATMENT OF ARCH ANEURYSMS

Takao Ohki, Kota Shukuzawa, Yuji Kanaoka

Department of Surgery, Jikei University School of Medicine, Japan

Objectives: Thoracic endovascular aneurysm repair (TEVAR) has gained wide acceptance and there has been a significant increase in the amount of aneurysms treated by TEVAR. TEVAR can replace the conventional open repair for the treatment of descending aortic Aneurysms. However, an endovascular technique alone is often not applicable for aortic aneurysms because of anatomical features such as involving the neck/visceral branches. Total arch repair (TAR) is the gold standard therapy for arch aneurysm, however, there is room for improvements. We present the outcome of our endovascular strategy for arch aneurysms.

Methods: During the last 3 years, we performed Chimney technique (38 cases) and the Retrograde In-situ Branched Stent grafting (RIBS, 7 cases) to treat 45 patients with arch aneurysms all of whom were considered to be at high risk for TAR. The chimney technique involves a uni or bi-lateral common carotid artery exposure and insertion of a small diameter covered stent to preserve cerebral flow in conjunction with the deployment of the main endograft in the ascending aorta. The RIBS method was developed in an aim to reduce gutter endoleak associated with the Chimney technique. The RIBS procedure is performed by puncturing the main endograft in a retrograde manner and followed by balloon dilatation and covered stent deployment.

Results: The mean aneurysm diameter (short axis) was 6.6 cm. The overall OR time was 318+/-126 minutes and blood loss was 703+/-730 ml and 12(26%) patients required blood transfusion. Endoleak was encountered in 3(7.9 %) cases and all were among the Chimney patients as a result of gutter EL. There were no cases with endoleak among the RIBS patients. There was one mortality (2.2 %) that resulted from intraoperative retrograde type A dissection. Stroke occurred in 1 case (2.2%) but it was minor and resolved completely. Combined stroke death rate was 4.4%. During a mean FU of 11.2+/-6.9 months, no aneurysm rupture has been encountered.

Conclusions: Both the Chimney technique and the RIBS procedure are safe and effective and can be considered as an alternative option for those patients unfit for TAR. RIBS appear to be advantageous in further eliminating gutter endoleak.

S7-2

TEVAR IN HONG KONG

Stephen W.K. Cheng

Department of Surgery, The University of Hong Kong, Queen Mary Hospital, Hong Kong

TEVAR has gained a wide acceptance in the treatment of thoracic aortic diseases since its inception in 2000 in Hong Kong. The dominant devices are the Cook TX2 and Medtronic Valiant. In the past 5 years 85% of thoracic aneurysms and type B dissections were treated by TEVAR. The overall mortality of traditional open surgery is high, 20.3% for elective cases and 28.4% for emergencies. The corresponding mortality for TEVAR is 4.7% and 19.6%. The highest mortality for TEVAR occurred in emergency repair for aneurysms (28.6%), while lowest was in elective treatment for dissections (4.3%).

Treatment of chronic dissections with TEVAR continues to be our main challenge. In our experience of 72 cases 82% required proximal landing in zone 2 or less. The rates of stroke, paraplegia, and retrograde dissection was 3%, 3%, and 6% respectively, with an overall mortality of 6%. Five year survival was 85%, with only one aorta related death. Reintervention at 5 years was 19%, the majority after 4 years and for distal stent graft tearing the dissection flap (18%). Volume expansion >10% occurred in about 25% of cases. Long term success (survival, no reintervention and no expansion) appears to be higher in younger patients, early intervention, and smaller aortic diameter.

Fenestrated and branched grafts can be used for extending endovascular treatment to thoracoabdominal aortic aneurysms with encouraging results. However custom-made arch options are still not widely available in Hong Kong. Surgeons relied on traditional debranching, and subclavian and carotid chimney techniques to extend proximal landing zones. With the arrival of branched grafts in the arch and ascending aortic devices with lower profile, further expansion of the indication of TEVAR is to be expected.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S7-3

TEVAR FOR TYPE B AORTIC DISSECTION IN TAIWAN

Chun-Che Shih

Institute of Clinical Medicine National Yang-Ming University Division of Cardiovascular Surgery Taipei Veterans General Hospital Taipei, Taiwan

Objectives

This study analyzes the experience using hybrid endovascular stent-graft repair of acute complicated and chronic type B aortic dissection aneurysm, and assesses proximal and distal aortic morphological changes of the mid-term results

Subjects

Between November 2006 and March 2011, 99 consecutive patients related with aortic dissection were treated via endovascular repair. The patients were divided into an acute complicated dissection group (n=33) and a chronic dissection aneurysm group (n=28). Serial computed tomographic images were obtained to evaluate the changes of true and false lumen diameter at four levels during the postoperative period.

Results

The stent-graft was successfully implanted in all patients (100%), and low peri-operative morbidity (3.6%) of stroke and paraplegia. The cumulative survival rates were similar (77.6% and 89.0%, $P=.585$) in a mean follow-up period of 24.1 ± 15.6 months. Although the complete regression rate of the thoracic false lumen down to the diaphragm was statistically insignificant in the two groups ($P=.068$), a tendency of propitious remodeling in the acute dissection complicated group could be seen (54.8% vs. 30.8%). During follow-up, they were less prominent at the distal aorta in the chronic dissection group. Intimomedial erosion of the distal end of the stent-graft occurred in both acute (n=6, 18.9%) and chronic (n=10, 35.7%) ($P=.121$) dissection settings. The intimomedial erosion appeared in mean follow-up of 14.0 ± 4.8 months in the AD group and 24.8 ± 5.9 months in the CD group.

Conclusions

Endovascular stent-graft implantation is feasible for type B aortic dissection and has low early and mid-term mortality and morbidity in both the acute and chronic phases. Although early intervention might result in more favorable aortic remodeling with a higher possibility of complete regression and lower risk of late distal erosion, longer-term follow-up still necessitates continuous careful surveillance of the entire aorta, especially the distal condition.

S7-4

TEVAR IN EUROPE

Martin Czerny

Cardiovascular Surgery University Hospital Berne, Switzerland

The intention of this presentation is to provide the interested physician with an overview of the early and current development of thoracic endovascular aortic repair (TEVAR) in Europe. We will address initial results, expectations, certainties as well as disappointments in various underlying pathology. A specific focus onto the development of supraaortic rerouting procedures will be provided and their value in the current setting will be described especially in the light of simultaneous improvements in conventional aortic arch surgery. We will address the need and value of branched devices especially within the aortic arch and will also address the ascending aorta as a next target for endovascular therapy. Finally a critical appraisal of the current status of TEVAR in Europe will be given.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S7-5

TWENTY YEARS EXPERIENCE OF ENDOVASCULAR AORTIC REPAIR FOR THORACIC AORTIC PATHOLOGIES

Toru Kuratani¹, Masaaki Kato², Yukitoshi Shirakawa¹, Kazuo Shimamura³

¹Department of Minimally Invasive Cardiovascular Medicine, Osaka University, Japan, ²Cardiovascular Surgery, Morinomiya Hospital, Japan, ³Cardiovascular Surgery, Osaka University, Japan

Thoracic aortic pathologies are extremely burdensome to treat, due to their surgical invasiveness and complexity. Meanwhile, medical therapy is not a suitable alternative method for the prevention of aortic aneurysm rupture. Therefore we have no other choice of surgical treatment. Unfortunately, conventional surgical treatment for aortic aneurysms is highly invasive, and the results are unfavorable. So less invasive surgical techniques are necessary, and we believe thoracic endovascular aortic repair (TEVAR) serves such a purpose. In Japan, since performing the original TEVAR with a custom-made device on a Type B aortic dissection in 1993, we have developed and performed a number of surgical techniques throughout the past 20 years. In Japan, over 10000 TEVAR cases using commercially available stent-grafts have been performed since 2008. Japan is still under constraint of Japanese Committee of stent-graft management's guidelines, and still has a big device lag which is the biggest problem in Japan. In our institution, we performed 2413 aortic surgeries with stent grafts from 1993, and these are 76.3% of all the aortic surgeries. 1656 cases were TEVAR including hybrid operation (aortic arch: 731 cases, thoracic descending: 794 cases, thoraco-abdominal: 131 cases). Of these TEVAR, 551 cases were type B aortic dissections. Moreover, hybrid endovascular repair, i.e., the open stent graft technique (363 cases) and debranching TEVAR (368 cases), has been performed for aortic arch pathologies since 1997. Satisfactory early and long-term outcomes have been recently achieved with simple TEVAR and also debranching TEVAR. The next target of debranching TEVAR is likely off-pump total arch repair with TEVAR (zone 0 aneurysms). This presentation reports on the positive early and long-term results attained from our twenty years experiences of TEVAR in Japan.

S8-1

SUTURELESS VALVES

Michael A. Borger

Leipzig Heart Center, Leipzig, Germany

Transcatheter aortic valve replacement (TAVR) is starting to impact on the number of patients being referred for conventional aortic valve replacement (AVR) surgery in Europe. Lessons learned from the percutaneous coronary intervention story tell us that patients are willing to accept a less invasive procedure that may not be as efficacious as the more invasive gold standard. Offering minimal invasive surgery (MIS), without compromising on patient safety or outcomes, will be an important method of ensuring that the AVR operation does not become extinct. Although MIS AVR has existed for over 20 years, the acceptance rate has been dismal among cardiac surgeons with less than 10% of AVR procedures currently being performed in this manner. One of the reasons for the low MIS AVR penetrance is the technical difficulties that are involved with performing this operation.

Sutureless and rapid deployment aortic valves offer a method by which surgeons can more easily perform MIS AVR, as reflected by the short myocardial ischemic and cardiopulmonary bypass (CPB) times as described in multiple case series. Performance of a MIS AVR procedure in less than one hour is achievable with these devices. More importantly, however, is the notion that these devices may lead to the widespread adoption of MIS AVR surgery. In addition, sutureless and rapid deployment valves represent an important addition to the surgeon's armamentarium when dealing with patients who will benefit from a reduced myocardial ischemic time i.e. patients with left ventricular dysfunction or those requiring complex multivalve or combined procedures.

Three different sutureless and rapid deployment valves are currently approved for clinical use in Europe – the Medtronic Enable, the Sorin Perceval S, and the Edwards Intuity valves. Over 3000 patients have been treated with these devices to date. Early and medium-term outcome data reveal very short ischemic and CPB times, exceptional hemodynamic performance, and low paravalvular leak and pacemaker rates. Although durability remains to be determined, these devices represent a significant development in the history of AVR surgery.

S8-2

VALVE HOMOGRAFTS

Carlos A. Mestres

Senior Consultant, Department of Cardiovascular Surgery, Hospital Clinico - University of Barcelona, Barcelona, Spain

Aortic valve homografts have been used in clinical surgery since 1962, when Donald N. Ross and Brian G. Barrat-Boyes introduced them in practice following the laboratory work by Duran and Ganning late in the fifties of the XXth Century. They are the true natural stentless valves to which any comparison should be made. Difficulties in harvesting, processing and storage lead to a progressive abandonment of homografts for routine aortic valve replacement. Learning curve like for pulmonary autografts, is cumbersome and needs substantial investment in time. Initially used for aortic valve replacement in young patients (<40 years), aortic homografts were indicated for any valve disease at different ages. Early results depended upon in the preservation methodology until cryopreservation became a reality. Following the results reported by O'Brien, it became clear that cryopreservation methodology improved results as valve survival beyond 10 years was reported. The advent of second and third generation of stented bioprostheses and pericardial xenografts and more recently of stentless valves combined with the problems with availability, rendered aortic homografts as the best valve replacement device under a major indication, infective endocarditis. Excellent long-term follow-up results were reported by Yankah et al at different time intervals.

At our Institution, valve homografts including aortic and mitral valves have been used since 1992. The main indication in current times is infective endocarditis. Long-term results after surgery for acute infective endocarditis (AIE) related to the valve replacement device remain unclear. We retrospectively analyzed the outcome of surgically treated AIE of the aortic valve comparing the 15-year mortality of three types of implanted valve: tissue valves, mechanical prostheses and homografts. Patients with AIE included in our Institutional prospective database. Long-term survival according to the three different types of device was analyzed. Predictors of early- and long-term survival were analyzed with a regression model. To allow for extended follow-up 148 consecutive adult patients with AIE, 117 (79.05%) on native aortic valve and 31 (20.94%) on prosthetic aortic valves underwent surgical treatment; there were 107 (72.30%) men and 41 (27.70%) female, median age 56.40 ± 15.8 years; median logistic EuroSCORE 28.56 ± 22.28 . There were 53 mechanical, 92 tissue valves and homograft implants. The patients with a tissue valve had lower 15-year mortality risk than patients with mechanical prosthesis and homografts. Homograft implantation had the worst prognosis when analysis was performed from the day of the operation (Day 0) as the patient condition was worst. Among the predictive factors in term of long-term survival logistic EuroSCORE ($p=0.000$), NYHA class ($p=0.000$), liver insufficiency ($p=0.026$), pericardial effusion ($p=0.012$), pulmonary hypertension ($p=0.000$) and major complications (fistula, abscess and ventricular septal defect) ($p=0.012$) were identified. Streptococcus species (34.4%) was the most frequent causative micro-organism.

Bioprostheses for valve replacement in aortic valve AIE have the best results in term of survival. Homograft implantation had also the same excellent prognosis when analysis was performed after discharge. Preoperative status, co-morbidity, anatomical conditions play a role in the prediction of surgical success in the long-term so that preoperative risk stratification may help more clearly identify patients with higher risk of mortality.

Homografts in the tricuspid position had excellent results up to 15 years as they produced competent valves and reduce the risk of right ventricular failure over time.

S8-3

AORTIC VALVE RECONSTRUCTION WITH AUTOLOGOUS PERICARDIUM: MEDIUM-TERM RESULTS

Shigeyuki Ozaki, Isamu Kawase, Hiromasa Yamashita, Shin Uchida, Yukinari Nozawa, Takayoshi Matsuyama, Mikio Takatoh, So Hagiwara

Department of Cardiovascular Surgery, Toho University Ohashi Medical Center, Japan

Objective: To know the feasibility of original aortic valve reconstruction, consecutive 404 cases were reviewed.

Methods: Aortic valve reconstructions have been performed for 404 patients from April 2007 through September 2011. All patients were retrospectively reviewed. There were 289 patients with aortic stenosis and 115 with aortic regurgitation. One hundred two patients showed bicuspid valves, 13 showed unicuspid valves, and two showed quadricuspid valves. Mean age was 69.0 ± 12.9 years old. Preoperative echocardiography revealed peak pressure gradient averaged 79.6 ± 32.5 mmHg with aortic stenosis. Surgical annular diameter was 20.3 ± 3.2 mm. Procedure is based on the independent tricuspid replacement. After the distance between commissures is measured with original sizing instrument, glutaraldehyde-treated pericardium is trimmed with original template and sutured to annulus.

Results: There was no conversion to prosthetic valve replacement. There were 7 in-hospital mortalities by non-cardiac cause. Echocardiography one week and 3.5 years after surgery revealed peak pressure gradient averaged 19.8 ± 10.2 and 13.8 ± 3.7 mmHg. Two patients needed reoperations for infective endocarditis. The other patients showed less than mild aortic regurgitation. No thrombo-embolic event was recorded. Mean follow-up was 16.7 ± 13.1 months. Freedom from reoperation rate was 96.2% with 53 months follow-up.

Conclusions: Medium-term results were excellent. Original aortic valve reconstruction was feasible to the patients with various aortic valve diseases.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S8-4

A NEW TYPE OF MITRAL VALVE REPAIR FOR COMPLICATED PATHOLOGY

Hitoshi Kasegawa, Minoru Tabata, Tomohiro Fukui, Shuichiro Takanashi

Department of Cardiovascular Surgery, Sakakibara Heart Institute, Japan

OBJECTIVE: To report a new type of mitral valve (MV) repair which consists of the construction of a stentless mitral valve using autologous pericardium before institution of cardiopulmonary bypass and the implantation of the valve.

METHODS: We developed a novel stentless mitral valve (NORMO) which is anatomically similar to native MV. The valve is formed by suturing two leaflets, made from pericardium, to a flexible ring. Each end of long leaflets is connected to papillary muscles which makes large coaptation area. After confirming its excellent performance and function using an original pulsatile simulator developed for analyzing the hydrodynamic function of the MV, we successfully performed a new type of MV repair using the NORMO valve for six patients with complex MV disease who hoped MV repair.

RESULTS: Through median sternotomy, fresh autologous pericardium was harvested and cut along with specially designed template of the NORMO valve and sutured to the flexible ring (Duran ring, Medtronic Co.). Competency of the valve was confirmed in saline bath before institution of cardiopulmonary bypass in each case. In all cases, after removing native mitral valve, the NORMO valve made from nontreated fresh autologous pericardium was implanted using continuous suture to the mitral annulus, and fixation of the legs of the NORMO valve to two papillary muscles was performed using mattress stitch. Postoperative echodoppler assessment of all cases revealed none or only trivial regurgitation by 18 months after the operation,

CONCLUSIONS: We reported a successful MV Repair using autologous pericardium and flexible ring. We believe this operation could be an alternative to conventional MV repair especially for those patients with complex pathology.

S8-5

BEATING MITRAL VALVE REPAIR : TECHINIQUE AND RESULTS

Hirokuni Arai, Taiju Watanabe, Tsuyoshi Hachimaru, Susumu Manabe, Tomohiro Mizuno

Department of Cardiovascular Surgery, Tokyo Medical & Dental University, Japan

OBJECTIVE: To accomplish more perfect mitral valve plasty (MVP) in complex mitral lesion and to avoid myocardial ischemic injury in functional MR, we established safe and secure beating MVP procedure.

METHODS: On pump beating MVP was performed through median sternotomy without aortic cross clamp. To avoid air embolism during the procedure, a vent cannula with pressure monitoring line was inserted into the left ventricular (LV) apex and was connected to the suction circuit equipped with a small reservoir chamber. During adjustment of the artificial chordae length and evaluation of the residual MR for additional repair procedure, this chamber was filled with blood and the height of the fluid level of this chamber was adjusted to load the LV. The LV systolic pressure was monitored to keep it slightly lower than the systemic perfusion pressure to avoid ejection through the aortic valve.

RESULTS: Beating MVP was performed in 71 cases: degenerative MR (45), functional MR (25) and congenital double orifice mitral valve (1). Ring annuloplasty was performed in all cases. Artificial chordae of ePTFE was used in 34 cases (1-8pairs per patient). In 13 out of 25 functional MR cases, sub-valvular procedure (i.e. 2nd chordae cutting and/or papillary muscle relocation) was also performed. 9 cases were re-do cases. 18 CABG, 30 tricuspid annuloplasty and 29 Maze procedure was also performed. There was no air embolism. Post operative MR on discharge was less than mild in all cases.

CONCLUTIONS: With this procedure, more perfect and fine adjustment of the leaflet coaptation was accomplished under physiologically beating heart on direct vision. In the most severe functional MR cases, beating MVP was especially effective to determine the papillary muscle relocation distance exactly. Beating MVP would be an effective technique to accomplish more perfect MVP and expand the indication of MVP in difficult cases.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S9-1

DIAGNOSIS AND TREATMENT OF MARFAN SYNDROME

Duke Cameron

Cardiac Surgeon-in-Charge, The Johns Hopkins Hospital, USA

The Marfan syndrome is the most inherited disorder of connective tissue. The incidence is approximately 1 in 10,000 births, and it affects men and women equally. The diagnosis is still made largely on clinical manifestations according to the Ghent criteria. The cardinal features are ocular (lens dislocation), skeletal (arachnodactyly, tall stature, kyphoscoliosis and pectus), and aortic aneurysm. The last is the most common cause of premature mortality. Untreated, MFS shortens life expectancy by about a third, and the most common cause of death is aortic dissection and rupture. In the current era, life expectancy now approximates the normal population; this is due to better clinical recognition (facilitated by a distinct phenotype), aggressive screening and monitoring for aneurysm disease, medical management (β blockers and ARBs), and continued refinement of surgical procedures to prevent aortic catastrophe. In general, prophylactic aortic root replacement is indicated with the sinuses exceed 5 cm, though special circumstances may justify earlier intervention: rapid enlargement, progressive aortic valve insufficiency, unexplained chest pain.

The Bentall procedure has provided safe, durable, and reproducible protection from ascending aortic dissection and rupture and remains the gold standard for prophylactic surgery. Valve sparing operations have been equally safe and provide an attractive alternative to the prosthetic valves, but their longterm durability in MFS remains uncertain. Late survival after root replacement is limited mainly by distal aortic dissection and arrhythmias, which should be the focus of future clinical investigation. New insights into the pathogenesis of MFS suggest an important role of dysregulation of the cytokine TGF- β ; experimental work with TGF- β blockade in a MFS mouse model have led to clinical trials of Losartan to prevent aneurysm development.

References

- Judge DP, Dietz HC. Marfan's syndrome. *Lancet* 2005; 366: 1965–76
- Gott VL, Greene PS, Alejo DE, et al. Replacement of the aortic root in patients with Marfan's syndrome. *N Engl J Med* 1999; **340**: 1307–13.
- Bentall H, De Bono A. A technique for complete replacement of the ascending aorta. *Thorax* (1968), 23, 338.
- Cameron DE, Alejo DE, Patel NA, et al. Aortic root replacement in 372 Marfan patients: evolution of operative repair over 30 years. *Ann Thor Surg* 2009; 87:1344-1350

S9-2

DIAGNOSIS AND TREATMENT OF MARFAN SYNDROME

Thoralf M Sundt

Department of Surgery, Harvard Medical School/ Massachusetts General Hospital, USA

In recent years awareness of Marfan syndrome and its related disorders such as Loeys-Dietz, Ehlers-Danlos syndrome and other connective tissue disorders has increased as has the importance of multidisciplinary care in the management of the many manifestations of these conditions. While the most dramatic complications are cardiovascular in nature, and hence commanded the attention of cardiovascular surgeons for some time, the medical ailments that plague these individuals touch on the fields of orthopedics, ophthalmology neurology and of course genetic counseling. It is increasingly clear that the most appropriate care is delivered in a multidisciplinary context.

From the standpoint of the cardiovascular surgeon we most often encounter patients with Marfan syndrome in the setting of aortic aneurysmal disease or dissection. Occasionally the patient will present with significant mitral insufficiency, however this is remarkably uncommon. The advances in cardiovascular surgery have had a dramatic impact on the life expectancy of the patient with Marfan syndrome and it is now expected that at institutions with special expertise and focus, these operative procedures can be performed with mortality risk in the low single digits. Our counterparts in the medical specialties are so impressed with the surgical results that the criteria for prophylactic intervention are increasingly aggressive. The advent of valve sparing root surgery has been a major advance in this regard. The durability appears favorable, and this procedure is rapidly becoming the standard of care in many instances.

As surgeons we most often meet the patient after the diagnosis has been established. We should, however, be aware that Marfan syndrome remains principally a clinical diagnosis based on physical findings and family history. Genetic testing is helpful if positive but cannot rule out the condition. It may also be helpful in elucidating related conditions causing familial thoracic aortic aneurysmal disease. The most practical implication of the diagnosis of course is a more aggressive approach the prophylactic repair and replacement of the aorta. In this setting of aortic dissection a more frequent pattern of follow-up is advisable for those patients with connective tissue disorders; accordingly a close collaboration between surgical and medical specialties is critical.

S9-3

PHENOTYPES OF MARFAN SYNDROME; COMPARISON WITH OTHER HEREDITARY AORTOPATHY SYNDROMES WITH DISTINCTIVE CLINICAL FEATURES

Hiroko Morisaki, Takayuki Morisaki

Department of Bioscience and Genetics, National Cerebral and Cardiovascular Center Research Institute, Japan

Marfan syndrome (MFS) is a heritable disorder of the connective tissue characterized by cardiovascular, skeletal and ocular manifestations caused by mutations in *FBN1* gene. Loeys-Dietz syndrome (LDS), a recently identified disorder caused by mutations in *TGFBR1* or *TGFBR2* genes, has many features similar to MFS but its cardiovascular involvement tends to be more diffuse and severe and sometimes results in early dissection even in young childhood. These two syndromes should be differentially diagnosed and managed properly since dissection in LDS can occur at smaller aortic diameters than in MFS. Although most LDS patients exhibit several unique features including bifid uvula/cleft palate, hypertelorism, blue sclerae, translucent skin, craniosynostosis and arterial tortuosity, many of them have been misdiagnosed as MFS since they often fulfill the former Ghent criteria for MFS. Also recent molecular biological advances have prompted the molecular diagnosis of other related MFS-like syndromes caused by *SMAD3*, *TGFBR2* or *SKI* gene mutations, as well as other heritable aortopathy caused by mutations in other connective tissue genes. Accurate molecular diagnosis is essential not only for the improvement of the care but also for genetic counseling for the families. Since 2002, we have genetically confirmed 325 MFS with *FBN1* mutations, 54 LDS with *TGFBR1/TGFBR2* mutations, 21 vascular EDS with *COL3A1* mutations, 25 TAAD (thoracic aortic aneurysm and dissection) with *ACTA2* mutations, and 30 other heritable aortopathy syndromes with *SMAD3*, *TGFBR2*, *SKI*, *MYH11*, *FBLN4*, *SLC2A10*, *FLNA*, *COL1A2*, or *COL5A1* gene mutations. Although there are some discriminating clinical features in gene-specific manners, it is generally not easy to distinguish MFS from other disorders.

Particular phenotypes corresponding to the specific genetic condition (MFS, LDS and others) and genotype-phenotype correlation will be discussed based on our study.

S9-4

SURGERY FOR MARFAN SYNDROME PATIENTS IN JAPAN

Kenji Minatoya

Department of Cardiovascular Surgery, National Cerebral and Cardiovascular Center, Osaka, Japan

Reduced life expectancy in patients with Marfan syndrome (MFS) is supposed to be related to cardiovascular abnormalities, of which aortic root dilatation and aortic complications account for the majority of deaths. Recent improvement of surgical methods for cardiovascular surgery accelerates the efforts in the field of surgery in patients with MFS. The quality of life of them is presently more pursued.

Thus, when operation is performed for acute aortic dissection in patients with MFS, total arch replacement with root replacement at one time is a standard strategy. Implantation of elephant trunk at the arch replacement is strongly recommended for potential surgical treatment in their future.

Valve-sparing root replacement (VSRR) is currently a first choice for annulo-aortic ectasia (AAE) in MFS. AAE is supposed to be a gambit of acute aortic dissection in MFS, prophylactic valve-sparing root replacement is, therefore, aggressively performed when the diameter of the root reaches around 45mm. Pregnancy is a great risk of aortic complications in patients with MFS. When unexpected AAE is found during pregnancy in patients with MFS, aggressive surgical treatment, such as VSRR is consequently performed, even with fetus in utero.

Staged replacement of thoracoabdominal aorta was selected mainly to prevent from spinal cord injury in the past. Extended replacement, however, currently is preferred for the cases with chronic aortic dissection in patients with MFS. We opt deep hypothermia with circulatory arrest (DHCA) for the extended graft replacement in patients with MFS, and they are rather young and usually tolerate DHCA well.

Cardiovascular events could be happening after one surgery in the patients with MFS. Cautious follow-ups and timely treatments, therefore, are extremely important and essential in their life span. To do so, Marfan clinic with various co-workers plays an important role. We battle the cardiovascular diseases in MFS together with the patients.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S9-5

OUTCOMES AFTER VALVE-PRESERVING ROOT SURGERY FOR PATIENTS WITH MARFAN SYNDROME

Takashi Kuniyara, Hiroaki Takahashi, Diana Aicher, Hans Joachim Schaefer

Department of Thoracic and Cardiovascular Surgery, University Hospital of Saarland, Germany

Backgrounds: Choice of root procedure for patients with Marfan syndrome (MFS) seems still controversial. We have applied both forms of valve-preserving root repair to this subgroup equally according to their root geometry until 2007, then we have performed remodeling alone thereafter. We sought to review our mid-term results after valve-preserving root surgery for patients with MFS.

Methods: Since 1995, 719 patients underwent valve-preserving aortic root surgery, of whom 41 patients with MFS (30 ± 12 years, 22 male) underwent either remodeling ($n=29$) or reimplantation technique ($n=12$) and were followed-up echocardiographically. Outcome with regard to late aortic valve regurgitation (AR) \geq II and reoperation on the aortic valve was compared between MFS patients and the matched cohort.

Results: Baseline characteristics and operative data were similar between the groups. Actuarial freedom from AR \geq II at 7 years was 86 ± 8 % in MFS patients and 90 ± 10 % in matched non-MFS patients ($P=0.94$). Actuarial freedom from reoperation at 7 years was 90 ± 7 % in MFS patients and 100 % in non-MFS patients ($P=0.79$). Aortoventricular junction diameter did not increase over time both in MFS patients (23.8 ± 2.0 mm to 23.2 ± 3.4 mm) and non-MFS patients (24.0 ± 2.7 mm to 24.6 ± 3.2 mm). In Cox's proportional hazard's model, no independent risk factor including MFS was found for recurrent AR or reoperation. Within the MFS patients, remodeling and reimplantation provided almost identical freedom from late AR \geq II and reoperation up to 5 years postoperatively ($P=0.55$, 0.99, respectively).

Conclusions: Stability of valve-preserving aortic root repair is comparable between patients with or without MFS. Both forms of valve-preserving root repair can provide similar mid-term results for MFS patients primarily according to their root geometry. Long-term follow-up data with more patients will be needed to confirm this evidence.

S9-6

RISK MODEL OF CARDIOVASCULAR SURGERY IN MARFAN PATIENTS USING THE JAPAN ADULT CARDIOVASCULAR SURGERY DATABASE

Takeshi Miyairi¹, Hiroaki Miyata², Noboru Motomura³, Tohru Suzuki⁴, Daigo Sawaki⁴, Hideyuki Shimizu⁵, Tsuyoshi Taketani¹, Sumiko Miura¹, Takayuki Ohno¹, Takayoshi Kusahara¹, Youshin Ri¹, Shinichi Takamoto¹

¹Department of Cardiovascular Surgery, Mitsui Memorial Hospital, Japan, ²Department of Healthcare Quality Assessment, Graduate School of Medicine, University of Tokyo, Japan, ³Department of Cardiovascular Surgery, Graduate School of Medicine, University of Tokyo, Japan, ⁴Department of Cardiovascular Medicine, Graduate School of Medicine, University of Tokyo, Japan, ⁵Department of Cardiovascular Surgery, Graduate School of Medicine, University of Keio, Japan

Objective:The aim of this study was to evaluate the short-term operative results of patients with Marfan syndrome who underwent thoracic or abdominal aortic surgery in a 4-year period in Japan.

Methods: Data were collected from the Japan Cardiovascular Surgery Database (JCVSD). We retrospectively analyzed the data of 848 patients with Marfan syndrome who underwent cardiovascular surgery between January 2008 and January 2011. Logistic regression was used to generate risk models.

Results: The early mortality rate was 4.4%(37/845). Odds ratios, 95% confidence intervals, and P values for structures and processes in the mortality prediction model were as follows: "renal insufficiency" (odds ratio, 11.37; confidence interval, 3.72-34.66; P < .001); "respiratory disorder" (odds ratio, 11.12; confidence interval, 3.20-38.67; P < .001); "aortic dissection" (odds ratio, 13.02; confidence interval, 2.80-60.60; P = .001); "pseudoaneurysm" (odds ratio, 11.23; confidence interval, 1.38-91.66; P = .024); "thoracoabdominal aneurysm" (odds ratio, 2.67; confidence interval, 1.22-5.84; P = .014); "and "aortic rupture" (odds ratio, 4.23; confidence interval, 1.26-14.23; P = .002).

CONCLUSIONS: This study demonstrated that renal insufficiency and respiratory disorder had great impact on operative mortality of Marfan patients undergoing cardiovascular surgery. Because patients with aortic dissection or aortic rupture showed high operative mortality, patients with Marfan syndrome should be closely followed up and elective surgery is mandatory to improve the operative results.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S10-1

EVIDENCE OF A VICIOUS CYCLE IN MITRAL REGURGITATION WITH PROLAPSE: SECONDARY TETHERING DUE TO PRIMARY PROLAPSE DEMONSTRATED BY 3-DIMENSIONAL ECHOCARDIOGRAPHY EXACERBATES REGURGITATION

Yutaka Otsuji¹, Kyoko Otani¹, Masaaki Takeuchi¹, Kyoko Kaku¹, Nobuhiko Haruki¹, Hidetoshi Yoshitani¹, Masataka Eto², Masahito Tamura³, Masahiro Okazaki⁴, Haruhiko Abe⁵, Yoshihisa Fujino⁶, Yousuke Nishimura⁷, Robert Levine⁸

¹Second Department of Internal Medicine, University of Occupational and Environmental Health, Japan, ²Department of Cardiovascular Surgery, University of Occupational and Environmental Health, School of Medicine, Japan, ³Kidney Center, University of Occupational and Environmental Health, School of Medicine, Japan, ⁴Wakamatsu Hospital, University of Occupational and Environmental Health, School of Medicine, Japan, ⁵Department of Heart Rhythm Management, University of Occupational and Environmental Health, School of Medicine, Japan, ⁶Department of Preventive Medicine and Community Health, University of Occupational and Environmental Health, School of Medicine, Japan, ⁷Department of Cardiovascular Surgery, University of Occupational and Environmental Health, School of Medicine, Japan, ⁸Cardiac Ultrasound Laboratory, Massachusetts General Hospital, Boston, MA, USA

Background: In patients with mitral valve (MV) prolapse (MVP), non-prolapsed leaflets are often apically tented. We hypothesized 1) that secondary left ventricular (LV) dilatation due to primary mitral regurgitation (MR) causes papillary muscle (PM) displacement, resulting in this leaflet tenting/tethering and 2) that secondary tethering further exacerbates malcoaptation and contributes to MR severity.

Methods and Results: Three-dimensional (3D) transesophageal echocardiography (TEE) was performed in 25 patients with posterior leaflet (PML) prolapse with an intact anterior leaflet (AML) and 20 controls. From 3D zoom datasets, 11 equidistant antero-posterior cut planes of the MV at mid-systole were obtained. In each plane, tenting area of non-prolapsed leaflet and prolapse area of prolapsed leaflet were measured. Prolapse/tenting volume of each region was obtained as the product of inter-slice distance and the prolapse/tenting area. AML tenting volume and whole leaflet prolapse/tenting volume were then obtained. The PM tethering distance between PM tips and anterior mitral annulus was measured from 3D full-volume datasets. The severity of MR was quantified by vena contracta area (VCA) extracted from color 3DTEE datasets. AML tenting volume was significantly larger in patients with PML prolapse compared with that in controls (1.2 ± 0.5 vs. 0.6 ± 0.2 ml/m², $p < 0.001$). Multivariate regression analysis identified independent contribution to AML tenting volume from an increase in PM tethering distance. Multivariate regression analysis identified independent contributions to MR severity (VCA) from both whole leaflet tenting volume ($r = 0.44$, $p < 0.05$) as well as prolapse volume ($r = 0.44$, $p < 0.05$). AML tenting volume decreased along with LV volume and PM tethering distance post-repair ($n = 8$, $p < 0.01$).

Conclusion: These results suggest that primary MVP with MR causes secondary mitral leaflet tethering with PM displacement by LV dilatation, which further exacerbates valve leakage, constituting a vicious cycle that would suggest a pathophysiologic rationale for early surgical repair.

S10-2

SCREENING PROCESS FOR HF PATIENTS CARDIOLOGIST'S PERSPECTIVE

Yeo Khung Keong

National Health Center, Singapore

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S10-3

THE MULTI-DISCIPLINARY TEAM; WHAT IS REALLY INVOLVED ???

Randolph Chitwood

Department of Cardiovascular Sciences, Brody School of Medicine, East Carolina University, USA

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S11-1

LVAS IN NORTH AMERICA

Jeffrey Rich

STS, USA

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S11-2

VENTRICULAR ASSIST DEVICES FOR CARDIAC FAILURE : WHAT IS NEW IN 2013 ?

Daniel Loisan

Institut de Cardiologie, La Pitié Hospital, Paris, France

Ventricular assist devices (VAD) permit major progress in the management of acute and chronic advanced cardiac failure.

In acute cases, para-corporeal VADs allow immediate hemodynamic stabilisation, optimal recovery of the advanced organ dysfunction and prolonged waiting time up to months until weaning or cardiac transplantation. They achieve better results than a more simple technique such as ECMO and similar results than a more complex and invasive technique such as Cardiowest total artificial heart, as shown in our recent studies.

In advanced cardiac failure, the second generation implantable left VAD (mostly HeartMate II in Europe and US) permit 80 to 90% survival rate at one year, with an acceptable rate of adverse events. The good experience in temporary long term support has led to propose permanent implantation in patients non eligible for transplantation. Worldwide experience is growing exponentially. The most recent data will be presented. The third generation continuous flow pumps (HeartWare, HeartMate III) might further improve these results. Nevertheless, more progress is still needed to propose VAD therapy as an alternative to transplantation in an eligible patient : the cable issue, the duration of fully autonomous life have to be improved. Further progress in prophylaxis of embolic and septic complications are also needed. Integration of VAD therapy in a cardiac failure clinic should permit an optimized patient selection and a better post implant management. The recent progress achieved in VAD therapy suggest that the space left to a novel total artificial heart is shrinking everyday.

S11-3

DESTINATION THERAPY USING LVAD TECHNOLOGY

Yoshifumi Naka

Department of Surgery, Columbia University College of Physicians and Surgeons, USA

The syndrome of heart failure has assumed epidemic proportions worldwide. For advanced heart failure, newer medical therapies including comprehensive neurohormonal blockers targeting the renin-angiotensin and adrenergic system, resynchronization therapy, and surgical interventions including high risk coronary revascularization, mitral valve repair/replacement, and surgical ventricular restoration improving pump function, ischemia, and arrhythmias, have become available during the last decades. Nonetheless, heart transplantation remains as the gold standard for those with end-stage heart failure, but only addresses epidemiologically trivial number of patients, ie around 2000 transplants per year in the United States. Destination therapy with the HeartMate XVE left ventricular assist device (LVAD) emerged as an alternative therapy to heart transplantation and was expected to disseminate rapidly upon the approval by the regulatory agencies following the successful REMATCH trial. Unfortunately the number of those receiving the destination therapy with LVAD in US is slightly over 150 cases per year, which is far below the requirement of heart replacement therapy. There are mainly three pain points: indisputable mortality, non-neglectable adverse events, and significant cost. Since the new rotary pump technology has theoretical advantages over the first generation device, HeatMate XVE, such as reduced surgical trauma, lowered risk of perioperative bleeding, reduced infection, improved durability, and improved QOL, it was considered to potentially solve the three pain points. A miniaturized axial flow pump, HeartMate II was approved by US FDA for bridge-to-transplantation (BTT) use in 2008 and destination therapy (DT) in 2010 based on the trial result showing enormously positive survival and quality of life benefits over the first generation HMXVE. Since then HMII has been widely used as BTT and DT all over the world. A third generation pump HVAD was recently approved by FDA for BTT and its DT trial has completed enrollment and is waiting for data collection and analysis. There are a few more devices on the near horizon for clinical trials. The current status of these pumps in US and the author's experience with them will be discussed in the paper.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S11-4

LVAS IN KOREA

Kyung Sun

Department of Thoracic and Cardiovascular Surgery, Korea University Medical Center, Korea

As for LVAS in Korea, there is no commercially available one for either internal or external use so far.

Recently HeartMate II (Thoratec Laboratories, US) has been on KFDA-approved clinical trial for destination therapy, and the first case was successfully implanted on the 75 years old male patient in August, 2012, and he is doing well at home. There are 2 other landmark events of VAS application in Korea. One was Heartmate I implantation in 2000 (Thoratec Laboratories, US) for the use of bridge-to-transplantation. The patient had been on LVAS support for 17 months and undergone heart transplantation successfully. The other was AnyHeart implantation in 2001 (NewHeartBio, Korea) for the salvage of dying patient. The device had worked perfectly for 2 weeks, and unfortunately, the patient died of pre-existing liver failure.

The potential market of mechanical circulatory devices in Korea is worthy of close attention. Considering the volume of major cardiovascular operations (n=7714 in 2011) and the number of heart transplantation (n=98 in 2011) out of the number of patients in the waiting list (n= 327 in 2011), there must be certain demands of VAS supply. Take the ECMO for an instance, the market sized has been increased rapidly.

We have 2 commercially available ECMO systems in Korea: EBS (Terumo, Japan) and PLS (Maquet, Germany). The ECMO data collected from Korea National Health Insurance & Assessment Service, importing agencies showed a total of 3939 cases has been reported nationwide from the year of 2006 to 2011 (1128 cases in 2011). The number of hospital applying ECMO is also increasing significantly at each year, from 57 hospitals in 2010 to 86 hospitals in 2011. Market share ratio of the companies is approximately 1:4.

With respect to R&D, there have been many attempts to develop Korean mechanical devices such as K-ECLS, AnyVAD, AnyHeart, I-VAD, VICT, K-Centrifugal pump, T-PLS, KH-VAD, K-Banana VAD and so on. Of them, T-PLS (Newheartbio, Seoul), a pulsatile ECLS, has been approved by KFDA and commercialized in both Korean and China.

Together with Heartmate II, other devices including Cleveland Heart (Cleveland Heart, US) and Pediatric Excor (Berlinheart, Germany) are also expected to be on Korean surgeon's hand within years. Meanwhile, re-trial of domestic LVAS development program is expected to start again.

(I acknowledge the helps from Dr. Jung JS and Dr. Son HS of Korea University, as well as Dr. Chung ES of Inje University)

S11-5

RECENT PROGRESS OF LVAD THERAPY AND ITS CLINICAL IMPORTANCE FOR END-STAGE HEART FAILURE IN JAPAN

Shunei Kyo¹, Takashi Nishimura¹, Osamu Kinoshita², Koichiro Kinugawa¹, Minoru Ono²

¹Department of Therapeutic Strategy for Heart Failure, University of Tokyo, Japan,

²Department of Cardiac Surgery, University of Tokyo Hospital, Tokyo, Japan

Over the past three decade, considerable innovations and progress in VAD (ventricular assist device) technology have provided increasing options for circulatory support in patients with end-stage heart failure in the world. As implantable LVADs (iLVAD) continue to evolve through miniaturization and increased durability, the prospect of minimally invasive LVAD implantations as a means to avoid riskier transplant operations and concomitant complications is becoming a reality.

However, we still have a several subjects to be solved in LVAD therapy for the end-stage heart failure in Japan. Indication of iLVAD is strictly limited for BTT (bridge to transplantation) in Japan whereas DT (destination therapy) indication has been approved and insurance reimbursed in the western countries since ten years ago. Recently, the indication of HTx was expanded for patients with age between 60 and 65 years old, therefore, use of iLVAD is automatically expanded. We don't have any pediatric VAD for pediatric heart transplantation despite quite long waiting period is expected also for pediatric HTx. With the dearth of donor organs, we are preparing ourselves to integrate non-biological alternatives for the benefit of advanced heart failure patients who may consider or are required to consider options other than transplantation. Destination therapy may soon become the gold standard option for a larger population of heart failure patients, of various statuses, in the future.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S12-1

CURRENT CONSENSUS AND FUTURE PERSPECTIVE FOR MULTIMODAL TREATMENT FOR ESOPHAGEAL CANCER

Yuko Kitagawa

Department of Surgery, Keio University School of Medicine, Japan

In the field of multimodal treatment for esophageal cancer, there have been several clinical trials in the West demonstrating the superiority of preoperative chemo-radiation therapy in comparison with surgery alone. However, it must be admitted that one of the most conspicuous features, and one which in the minds of many constitutes, a critical limitation of the above Western studies, has been the extremely poor outcome of the surgery-alone groups. On the other hand, Japanese surgeons believe that the relatively acceptable local tumor control by transthoracic radical esophagectomy obviates the need for preoperative radiation therapy.

The Japan Clinical Oncology Group (JCOG) has conducted multicenter, multi-modality prospective clinical trials for the treatment of esophageal cancer for more than 30 years, giving full regard to these considerations. Recently, a JCOG study (JCOG9907) demonstrated significantly better overall survival after preoperative chemotherapy with 2 courses of cisplatin plus 5-fluorouracil followed by surgery, in comparison with postoperative chemotherapy for resectable cStageII/III thoracic squamous cell esophageal cancer. Although the current Japanese standard for resectable cStageII/III esophageal squamous cell carcinoma is preoperative chemotherapy with cisplatin plus 5-fluorouracil, subgroup analysis has shown survival benefit in cStage III to be insufficient. Therefore, development of more effective pre-operative treatment is required. Now, JCOG is preparing to conduct a 3-arm randomized controlled trial comparing preoperative chemo-radiation therapy with cisplatin plus 5-fluorouracil and preoperative chemotherapy with docetaxel in addition to cisplatin and 5-fluorouracil (DCF) to standard preoperative treatment with cisplatin plus 5-fluorouracil (JCOG1109). This study should be a significant milestone for surgical oncology in examining the possible additive efficacy and safety of preoperative chemo-radiation which is the current standard in the West.

S12-2

ADJUVANT TREATMENT IN ESOPHAGEAL CANCER

Young Mog Shim

Department of Thoracic Surgery, Samsung Medical Center, Korea

Objective Esophageal cancer is not a common malignancy, but it is quite lethal. Therefore various articles considering adjuvant treatment including large-scaled or randomized controlled trials were published. However debate about the necessity of adjuvant treatment still remained. The purpose of this presentation was to analyze its clinical impact of each adjuvant treatment in esophageal cancer, then to propose guidelines about adjuvant treatment and future research directions.

Methods Pubmed research was performed. Recently published article (within 10 years) with large-scaled retrospective study or randomized controlled trials were selected as references. However important or milestone study was used although it was an old one. The clinical experience of Samsung Medical Center and on-going global clinical trials were added in the end of this presentation.

Results Studies comparing the survival benefit between surgery alone and surgery with adjuvant chemotherapy did not prove a survival differences. However adjuvant radiotherapy showed survival gain in advanced or high risk esophageal cancer then a surgery alone. The clinical impact of adjuvant chemoradiation was hard to conclude due to lack of clinical evidences. The recent comparative study of neoadvant and adjuvant treatment, named JCOG 9907 concluded that neoadjuvant chemotherapy showed survival benefit then an adjuvant one. The clinical experience of Samsung Medical Center showed similar result that there was not an overall survival benefit in adjuvant treatment group. On-going trials about adjuvant treatment were not actively proceeded nowadays.

Conclusions Adjuvant chemotherapy would not be effective in esophageal cancer, but adjuvant radiotherapy showed survival benefit, especially in advanced disease status or high risk group. Comparative study considering adjuvant and neoadjuvant protocol is required to make a clear treatment guideline for esophageal cancer.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S12-3

NON-OPERATIVE MANAGEMENT OF ESOPHAGEAL SQUAMOUS CELL CARCINOMA AFTER NEOADJUVANT CHEMORADIATION: PATIENT SELECTION AND OUTCOME ANALYSIS

Yin-Kai Chao, Yi-Cheng Wu, Hui-Ping Liu, Yun-Hen Liu, Ming-Ju Hsish

Department of Thoracic Surgery, Chang Gung Memorial Hospital, Taiwan

Background: Two randomized trials have shown that in patients with good response to neoadjuvant chemoradiotherapy(nCRT), non-operative approach(additional CRT) had equal survival to scheduled esophagectomy . However, controversy exists because of the high locoregional recurrence (LR) following a non-operative approach. Endoscopic complete response(e-CR) determined by endoscopic finding is a good criteria for predicting local control after definitive CRT. We evaluated whether e-CR could also be used to select patients for non-operative treatment after nCRT.

Methods: We retrospectively analyzed esophageal squamous cell carcinoma (SCC) patients with e-CR after nCRT between 1999 and 2006. Patients were divided into 2 groups by the type of treatment given after e-CR (group A: scheduled esophagectomy; group B: no scheduled surgery and continue CRT).

Results: There were 71 and 79 patients in group A and B with similar pre/post nCRT characteristics. Despite similarity in survival and recurrence between groups, the recurrence site differed significantly. LR occurred more frequently in group B, whereas systemic recurrence was the predominant failure pattern in group A ($P < 0.001$). With use of multivariate analysis on group B, we determined that pretreatment depth of tumor invasion $\geq T3$ (odds ratio [OR]: 11.19; 95%CI:1.4~89; unfavorable, $P = 0.023$) and tumor length ≥ 6 cm (OR: 3.069; 95%CI: 1.17~8.1; unfavorable, $P = 0.023$) were predictors for LR. Patients with initial clinical T2 and < 6 cm tumor had comparable LR (5%) to the surgery group; these patients were candidates for nonoperative treatment after nCRT.

Conclusion: In esophageal SCC patients who achieved e-CR after nCRT, pretreatment tumor depth and length were good indicators to select candidates for non-operative treatment.

S12-4

THE TREATMENT OUTCOME OF NEOADJUVANT CHEMOTHERAPY OR CHEMORADIOOTHERAPY FOLLOWED BY TRANSTHORACIC ESOPHAGECTOMY WITH EXTENDED LYMPH NODE DISSECTION FOR ADVANCED ESOPHAGEAL CANCERS

Yasushi Toh, Akinori Egashira, Manabu Yamamoto, Kippei Ohgaki, Kazuhito Minami, Yoshiko Kondo, Shinnichiro Maehara, Yasuharu Ikeda, Yoshihisa Sakaguchi, Takeshi Okamura

Department of Gastroenterological Surgery, National Kyushu Cancer Center, Japan

Aim: To clarify the clinical significance of neoadjuvant treatments followed by transthoracic esophagectomy with extended lymph node dissection for patients (pts) with advanced esophageal cancer (EC) in a single institute.

Patients: [Group 1] Thirty-seven pts with resectable EC who underwent neoadjuvant chemotherapy (NAC) consisting of 2 cycles of CDDP+5-FU (2009-2012, mean age: 63.0, Male/Female=26/11, cStagell/III/IVa=10/26/1 by classification of the Japan Esophageal Society [JES]). [Group2] Forty-three pts with cT4 (overt T4: n=31) or cT4-highly suspected (T4-susp: n=12) ECs who underwent concurrent neoadjuvant chemoradiotherapy (neoCRT) using CDDP+5-FU plus 30-40Gy irradiation (1997-2007, mean age: 61.8, Male/Female=33/10, cN0/1/2/3/4 [by JES criteria]=23/4/13/1/2). After neoadjuvant treatments, transthoracic esophagectomy with three-field lymph node dissection was performed for most of the pts.

Results: [Group 1] Response rate of NAC was 48%. 3 pts showed progress diseases (unresectable). 86% of pts could undergo 2 cycles of chemotherapy and adverse effects of grade 3 or 4 by NAC were observed in 19%. Pathological effects of NAC were grade 0/1a/1b/2/3 [JES criteria] in 1/23/4/3/3 of resected pts, respectively. Three year overall survival rate (OS) was 68% (75% in the resected cases, follow-up period: 19 - 1252 days, mean 318 days). Recurrences have occurred in 12 of 34 resected pts (distant organ in 6 pts, lymph node in 8 pts). [Group 2] Response rate of neoCRT was 84%. Five year OS (5-OS) was 37% (overt T4: 23%, T4-susp: 62%) and that of the responders was 44%. 5-OSs with cN0 and cN(+) pts were 50% and 18%, respectively. No increase of postoperative complications was observed in pts with neoCRT.

Conclusions: Planned esophagectomy after NAC for resectable advanced EC or neoCRT for cT4 or T4-suspected EC can be a choice of the treatment modalities for those pts. Considerable number of recurrence has already occurred in NAC group, suggesting that more effective chemotherapy regimens are expected to control micrometastasis.

S13-1

INDUCTION CHEMORADIO THERAPY FOLLOWED BY SURGERY FOR CLINICAL T3 OR T4 NON SMALL CELL LUNG CANCER

Shinichi Toyooka¹, Kazuhiko Shien¹, Junichi Soh¹, Keitaro Matsuo², Masaomi Yamane¹, Takahiro Oto¹, Mitsuhiro Takemoto³, Katsuyuki Kiura⁴, Hiroshi Date⁵, Shinichiro Miyoshi¹

¹Department of Thoracic Surgery, Okayama University Hospital, Japan, ²Division of Epidemiology and Prevention, Aichi Cancer Center Research Institute, Japan, ³Department of Radiology, Okayama University Hospital, Japan, ⁴Department of Respiratory Medicine, Okayama University Hospital, Japan, ⁵Department of Thoracic Surgery, Kyoto University Graduate School of Medicine, Japan

Purpose: We previously reported that induction CRT followed by surgery is a promising treatment for patients with stage III non small-cell lung cancer (NSCLC), especially N2 disease. As evidence regarding trimodality therapy for clinical T3 or T4 (cT3-4) without N2-3 disease in randomized controlled trials remains scarce, second-best evidence from retrospective studies comparing two approaches should be considered. In the present retrospective study, we examined the usefulness of trimodality therapy for patients with cT3-4 LA-NSCLC, compared with patients who underwent initial surgery.

Methods: Between 1997 and 2009, a total of 76 LA-NSCLC patients with cT3-4 underwent surgery. Among them, 36 patients underwent induction chemoradiotherapy with docetaxel and cisplatin plus concurrent radiation followed by surgery (IC group). The other 40 patients initially underwent surgery (IS group). The outcomes of the IC and IS groups were then investigated. To minimize possible biases caused by confounding treatment indications, we performed a retrospective cohort analysis by applying a propensity score (PS). Patients were divided into three groups according to PS tertiles, and comparisons between the IC and IS groups were made by PS tertile-stratified Cox proportional hazard models.

Results: For the entire cohort, which had a median follow-up duration of 48 months, the 3- and 5-year overall survival rates were 83.8 and 78.9%, respectively, in the IC group, versus 66.8 and 56.5%, respectively, in the IS group. ($P = 0.0092$). After adjustments for potentially confounding variables, the IC group continued to have a significantly longer overall survival than the IS group ($P = 0.0045$). In addition, when the analysis was limited to 52 patients with cT3-4N0 or N1 disease, the IC group had a significantly longer overall survival than the IS group after adjustments for confounding variables ($P = 0.019$).

Conclusions: Our study indicates that trimodality therapy is highly effective in patients with cT3-4 LA-NSCLC.

S13-2

INDUCTION CHEMORADIO THERAPY AND SURGERY FOR C-N2,3 NON-SMALL CELL LUNG CANCER

Hiroyasu Yokomise

Department of General Thoracic Surgery, Kagawa University School of Medicine, Japan

[Purpose]The standard and optimal therapy for resectable c-N2 non-small cell lung cancer (NSCLC) is still controversial. The ACCP Evidence-based Clinical Practice Guidelines concluded that in NSCLC patients with N2 disease identified preoperatively, definitive concurrent chemoradiotherapy was recommended. We have reported that the feasibility and the promising results of surgery after induction chemoradiotherapy for c-N2,3 NSCLC. In the present study, we evaluated the relationship between the survival and biomarkers in c-N2,3 NSCLC treated by surgery after induction chemoradiotherapy.

[Methods]Patients with pathologically proven NSCLC with bulky cN2,3 disease. Fifty-seven patients underwent an operation after chemoradiotherapy from 2000 to 2009. Carboplatin-Taxane was used. Two cycles of chemotherapy were performed with concurrent radiation (50Gy). IIIA/B;44/13, Ad/Sq/others;25/28/4, lobectomy/pneumonectomy;38/19. Immunohistochemistry was performed in patients but twelve pathologically complete response (PCR) cases (21.1%) to evaluate intra-tumoral biomarkers; excision repair cross-complementing 1 (ERCC1), Class III β tubulin (tubulin), thymidylate synthase (TS), and ribonucleotide reductase large subunit 1 (RRM1).

[Results]High expression of ERCC1, tubulin, TS, RRM1 was observed in 25 (55.6%), 19 (42.2%), 20 (44.4%), 25 (55.6%). The 5-years overall survival (5-y-s) of all 57 patients was 48.2%. Low expression of ERCC1 is a favorable prognostic factor. (5-y-s;61.2% vs 31.0%, $p=0.044$). As with ERCC1, low expression of tubulin, TS and RRM1 was favorable prognostic factor. ($p=0.025$, $p=0.039$, $p=0.037$). The 5-y-s was significantly better in patients with simultaneous low expression of ERCC1 and tubulin than with simultaneous high expression of ERCC1 and tubulin (70.3% vs 13.0%, $p=0.0028$). There was no correlation between RRM1 and ERCC1, tubulin expression ($p=0.072$, $p=0.12$). The simultaneous low expression of ERCC1 and tubulin was significant prognostic factor ($p=0.0059$).

[Conclusion]The c-N2, 3 NSCLC patients with simultaneous low expression of ERCC1 and tubulin were promising candidates for surgery after carbo-taxane chemoradiotherapy.

S13-3

MULTIMODALITY THERAPY IN KOREA

Sanghoon Jheon

Thoracic and Cardiovascular Surgery, Seoul National University College of Medicine, Korea

The outcomes after curative surgery with or without adjuvant therapy were not satisfactory for stage III lung cancer. Therefore multimodal approach including neoadjuvant chemotherapy or chemoradiation was introduced since late 80's. The purpose of neoadjuvant therapy was as follows; a) improved likelihood of patients completing the planned total dose of chemotherapy, b) the ability to assess tumor response as a prognostic marker, c) the ability to treat micrometastatic disease preoperatively, and d) the possibility of improving resectability through tumor regression. Since most of large-scale trials were fail to prove the benefit of neoadjuvant chemo(radio)therapy or were closed prematurely, the exact benefit of neoadjuvant treatment has not been fully evaluated. However, it is generally accepted that neoadjuvant treatment followed by surgery has significantly improved the overall results of treatment for patients with stage III NSCLC as well as for those with locally invasive tumors, and is equivalent to and absolute benefit of 6% increase in overall survival. (ref: Cochrane review 2009)

In Korea, most large tertiary hospitals follow the principle of multimodal treatment strategy for stage III NSCLC (similar with the NCCN guidelines), such as neoadjuvant chemotherapy or chemoradiation followed by surgery and adjuvant therapy. However, the decision criteria for neoadjuvant treatment vary among hospitals. Some centers prefer clinical radiologic findings from CT and PET-CT and others prefer invasive but accurate staging using mediastinoscopy. Recently, EBUS and EUS have greatly substituted the role of mediastinoscopy in many hospitals in Korea. Neoadjuvant therapy is generally composed of at 2-3 cycles of platinum-based combination chemotherapy with or without concurrent radiation, but newly developed target agents began to be used in some particular group of patients with distinct clinicopathologic features.

S13-4

The Management of Patients with Stage IIIA Non-Small Cell Lung Cancer with N2 Mediastinal Node Involvement

Douglas E. Wood

Professor and Chief, Division of Cardiothoracic Surgery, Vice-Chair, Department of Surgery, Endowed Chair in Lung Cancer Research, University of Washington, Seattle, Washington, USA

The management of patients with Stage IIIA (N2) non-small cell lung cancer (NSCLC) remains the most challenging domain in thoracic oncology. Notwithstanding improvements in the staging system, the determination of “operable” stage IIIA (treated with induction therapy followed by surgery) versus “inoperable stage IIIA (treated with definitive chemotherapy and radiation therapy) remains controversial. Moreover, some investigators doubt the role of surgery at all highlighting the importance of careful selection of patients and the practice of multidisciplinary evaluation prior to the initiation of therapy.

While the use of induction therapy has become the standard of care for potentially operable patients with stage IIIA NSCLC, the use of preoperative chemotherapy or preoperative concurrent chemoradiation therapy represents yet another potential controversial issue. In addition, the determination of nodal pathologic “down-staging” is only variably used for patient selection for surgery after induction therapy.

Although randomized phase III trials failed to show a survival benefit from surgery after chemotherapy and radiotherapy, they do not account for the heterogeneity of N2 disease and are compromised by imprecise staging, slow patient accrual, and poor surgical outcomes perhaps due to surgery performed by surgeons without thoracic surgery specialization. Surgery should be considered in select patients with N2 disease with single station and non-bulky (< 3cm) disease as long as surgery can be accomplished with low morbidity (specialized surgeons in high volume centers). There is no consensus regarding the best neoadjuvant approach and chemotherapy or chemoradiotherapy are both reasonable choices. Decisions regarding the role of surgery, as a part of the treatment plan, should be made prior to the initiation of therapy. The presence of a dedicated thoracic oncology multidisciplinary team is a key to making optimum and individualized therapeutic decisions for these patients, and offers the best opportunity for long-term survival.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S14-1

Ludwig Karl von Segesser

Cardio-Vascular Research, Department of Surgery, CHUV, Switzerland

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S14-2

CHANGE OF DESCENDING AORTIC FALSE LUMEN AFTER CONVENTIONAL REPAIR OF ACUTE TYPE I DISSECTION; IS IT ALWAYS UNFAVORABLE?

Kay-Hyun Park

Seoul National University Bundang Hospital, Seongnam, Korea

Frozen elephant trunk (FET) is expected to prevent later dilatation of descending aorta after repair of acute type I dissection. Considering the risk and lack of solid evidence for the long-term benefit, it would be relevant to differentiate the patients who may get benefit from FET from those who may not.

Sixty three patients who underwent surgery for DeBakey type I acute dissection and serial CT scanning were studied. Morphologic parameters were compared between preoperative, early postoperative, and the last CT scans at proximal, middle, and distal descending thoracic aorta (DTA). The mean interval of early and last CT follow-up was 5.4 days and 31.0 months after surgery.

Defining “favorable” early postoperative change as complete false lumen (FL) thrombosis and/or true lumen (TL) expansion ($>50\%$ of aortic diameter), they were observed at proximal DTA in 46% of patients. Juxta-anastomotic FL thrombosis was significantly associated with favorable early changes.

In the late images, proximal DTA FL was completely thrombosed or resolved 42.9%. Improvement, defined as complete FL thrombosis + diameter decrease $\geq 5\text{mm}$, occurred in 36.5%. By multivariate analysis, favorable early change was significantly predictive of later improvement. Proximal DTA FL improved in 69% of patients who had favorable early postoperative changes.

Incidence of FL improvement was similar between proximal and distal DTA (36.5% vs. 30.2%). Worsening (overall diameter increase $\geq 10\text{mm}$, $\geq 5\text{mm}$ within the first year, or later TL collapse) was more frequent in distal DTA (41.3% vs. 25.4%).

In summary, favorable changes early after surgery and further later improvement in proximal DTA occurred in more than 1/3 of patients. They led to further improvement in the majority. FL worsened more frequently in distal DTA. FET would have not given further benefit to such cases. FET might have improved mid-term change in 1/3 of patients who showed worsening of proximal DTA.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S14-3

IMPROVEMENT OF STRATEGIES IN PATIENTS WHO HAVE ACUTE TYPE A AORTIC DISSECTION WITH CORONARY ARTERY DISSECTION

Kiyotaka Imoto

Department of Cardiovascular Surgery, Yokohama City University Medical Center, Japan

Objective: To identify risk factors for mortality and establish improved treatment strategies in patients who have acute type A aortic dissection with coronary artery dissection.

Methods: From January 1994 through December 2011, we performed surgery in 516 patients with acute type A aortic dissection. We studied 75 (15%) of these patients who had coronary artery dissection. Myocardial ischemia was present in 48 (64%) of the 75 patients. The culprit coronary artery was the right coronary artery (RCA) in 26 patients, the left coronary artery (LCA) in 19, and the RCA + LCA in 3. For coronary artery reconstruction, preoperative coronary stent placement was done in 7 patients (RCA, 4; LCA, 3), aortic root replacement in 14, coronary artery bypass grafting in 23, and biological glue application in 28. The relations of preoperative risk factors and coronary artery reconstruction procedure to in-hospital death and postoperative low cardiac output syndrome (LOS) were analyzed using Fisher's exact test.

Results: Hospital death was 18/75 patients (24%), 16/48 (33%) among patients with ischemia and 2/27 (7.4%) without ischemia. The culprit lesion involved the RCA in 4/26 patients (15%), the LCA in 9/19 (47%), and the RCA + LCA in 3/3 (100%). Factors related to operative mortality were ischemia ($P = 0.019$), LCA territory ischemia ($P = 0.003$), and preoperative cardiopulmonary arrest ($P = 0.013$). Postoperative LOS was less common in patients with coronary stent placement ($P = 0.042$).

Conclusions: In patients who undergo surgery for acute type A dissection with coronary artery dissection, preoperative cardiopulmonary arrest and myocardial ischemia (particularly LCA territory ischemia) negatively affect survival outcomes. Early revascularization by coronary stent placement is effective for preventing postoperative LOS.

S14-4

SURGICAL STRATEGY FOR ACUTE TYPE A AORTIC DISSECTION

Norihiko Shiiya, Naoki Washiyama, Kazuhiro Ohkura, Katsushi Yamashita, Daisuke Takahashi

First Department of Surgery, Hamamatsu University School of Medicine, Japan

To improve the operative outcome of acute type-A aortic dissection, prompt relief of circulatory collapse as well as mechanism and organ-specific strategy to deal with vital organ malperfusion are necessary. Technical refinements to avoid anastomotic blood leakage into the false lumen are also important to improve long-term outcome.

As a brain protection method, we use selective cerebral perfusion. Femoral artery is usually selected as a principal arterial inflow site, especially when for cardiogenic shock. Axillary or innominate artery is used as additional inflow site(s), to avoid brain malperfusion and retrograde brain embolism, and is connected to a selective perfusion circuit. Cerebral and mesenteric malperfusion may need to be addressed first. Decision not to reperfuse the brain may sometimes be required. It should be noted that dynamic malperfusion within the innominate artery or thoracoabdominal aorta can be reversed by such peripheral perfusion.

For proximal aortic anastomosis, we use a Dacron graft strip inside, which dramatically reduced suture hole bleeding, and Teflon strip outside, together with Bioglue within the false lumen. Aortic root is replaced only when annuloaortic ectasia is present or intimal tear is present within the root. Distal extent of replacement is decided to include the entry tear site. For total arch replacement, we put mini-elephant trunk into the true lumen to promote thrombosis of distal false channel. After hemiarch replacement, false lumen patency is high when dissection is circumferential or is extended into the innominate artery. We recently have introduced partial arch replacement for such a patient, where separate graft reconstruction of the innominate artery enables insertion of a mini-trunk to the proximal arch to expect higher rate of false lumen thrombosis. This separate graft may also serve as a donor artery of debranching bypass, in case the false lumen remains patent.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S15-1

CYTOKINES, STEM CELLS, AND TISSUE ENGINEERING TO REBUILD THE HEART

Y. Joseph Woo

Cardiovascular Surgery, University of Pennsylvania School of Medicine, USA

Myocardial injury and heart failure are projected to become a worldwide health crisis. Current therapies have moderate effectiveness, applicability, and availability. Novel regenerative and repair therapeutic strategies have been researched and clinically investigated with widely varying yet encouraging results. Current efforts are focused upon identifying optimal cell types, supportive delivery platforms, and adjunctive recovery modalities such as mechanical circulatory support. Several prospective multicenter trials developed and funded through the US NIH will hopefully address and perhaps answer several of the key pertinent questions along the road to formulating a highly effective clinical myocardial repair therapy.

S15-2

STEM CELL THERAPY USING AUTOLOGOUS MYOBLAST SHEETS FOR SEVERE HEART FAILURE

Yoshiki Sawa

Department of Cardiovascular Surgery, Osaka University Graduate School of Medicine, Japan

Recently cell therapy was introduced to clinical setting and proved safety and feasibility, but results were inadequate for complete regeneration of heart failure. We developed cell sheet technology and introduced this to the treatment of severely damaged myocardium. We implanted myoblast sheets to the impaired heart in small and large animal models. In a series of pre-clinical trial, we proved that myoblast sheets could regenerate the impaired heart mainly by paracrine effect. Evidenced by these pre-clinical trials, we applied myoblast sheets to DCM patient receiving LVAD and showed the recovery from LVAD.

To achieve the complete myocardial regeneration by a second generation of cell sheet, the delivery of many cells to the impaired myocardium and the development of autologous beating cells are most crucial. The development of cardiomyocyte sheets derived from iPS cells was succeeded and demonstrated functional recovery in rat MI model. To improve the number of delivered cells, we implanted co-cultured cell sheets combined myoblasts with adipose tissue derived mesenchymal stem cells which activate the paracrine effect of myoblast sheets, leading to the enhancement of myocardial regeneration in rat MI model. We succeeded in making thick cardiac tissue with rich vascular network by cell sheet polysurgery technique in porcine model.

More recently, we prepared sheet-shaped cardiomyocyte grafts from mouse iPS cells and measured cardiac performance by cardiomyocyte sheets implantation in mouse myocardial infarction model. Cardiomyocyte sheets from mouse iPS cells on the heart of mouse myocardial infarction model resulted in improving their heart functions. Cardiomyocyte sheet derived from iPS cells are a viable option as an autologous cell source for cardiac repair and a powerful tool for cardiovascular research.

Newly developed cell sheet technology may be a promising armamentarium for complete regeneration of severely damaged myocardium.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S16-1

SURGICAL AND MEDICAL TREATMENT STRATEGIES BY LUNG BIOPSY DIAGNOSIS FOR EISENMENGER SYNDROME

Shigeo Yamaki

Japanese Research Institution of Pulmonary Vasculature, Japan

Lung biopsy was performed in patients with congenital heart disease who were clinically diagnosed as Eisenmenger syndrome to help guide treatment decisions.

[Methods] As of 2012, we have performed pulmonary biopsies in a total of 1830 patients, of whom 200 had been diagnosed as Eisenmenger syndrome. Patients were classified by lung biopsy diagnosis as: phase 1, those with an index of pulmonary vascular disease (IPVD) of 2.0 or lower for whom radical surgery was indicated; phase 2A, those with an absolute operative contraindication or extremely thickened media of the small pulmonary arteries; phase 2B, those with an IPVD of 2.1 or higher for whom radical surgery was not indicated; phase 3, those with stable Eisenmengered lung circulation with established collateral circulation.

[Results] Phase 1 patients (50%) were operable but have an absolute contraindication to medical treatment with pulmonary vasodilators before surgery. For all phase 2A patients (15%), radical surgery was deemed possible, in the form of pulmonary artery banding with concomitant treatment with pulmonary vasodilators. For phase 2B patients (15%), radical surgery was not indicated. In phase 3 (20%), due to the establishment of collateral circulation which completely alters the pulmonary circulation, patients can be followed without treatment consisting of pulmonary vasodilators if symptoms are stable (NYHA Class I or II). However, for patients with symptoms rated NYHA Class III or higher, aggressive use of pulmonary vasodilators starting at low doses was considered appropriate.

[Conclusion] Radical surgery is indicated based on lung biopsy findings in many patients despite the diagnosis of Eisenmenger syndrome. Since lung biopsy can help determine whether surgery or medical therapy is indicated, it is extremely useful in guiding treatment strategy.

S16-2

MEDICAL TREATMENT OF PULMONARY ARTERIAL HYPERTENSION AND PULMONARY VASCULAR DISEASE ASSOCIATED WITH CONGENITAL HEART DISEASES

Yoshihide Mitani¹, Hideto Shimpō²

¹*Department of Pediatrics, Mie University Graduate School of Medicine, Japan,*

²*Department of Thoracic and Cardiovascular Surgery, Mie University Graduate School of Medicine, Japan*

Recent understanding of the pathogenesis of pulmonary arterial hypertension (PAH) has led to the development of multiple PAH-specific therapies. Clinical trials and experiences using these targeted therapies, in fact, produced effective medical treatment toward Eisenmenger syndrome, and gave an insight into the potential treatment and repair approach for the borderline PAH associated with congenital heart diseases (CHD), the pulmonary vasculopathy in Fontan track and hypoplastic pulmonary arteries in pulmonary atresia with VSD. In this presentation, the speaker would overview recent evidence and experience related to the impact and issues of PAH-specific therapies in these pulmonary vascular diseases associated CHD.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S16-3

SIX YEARS RETROSPECTIVE STUDY OF VSD WITH SEVERE PULMONARY HYPERTENSION IN NATIONAL CARDIOVASCULAR CENTER HARAPAN KITA HOSPITAL, JAKARTA, INDONESIA

Dicky Fakhri

Head of Pediatric and Congenital Cardiac Surgery Division, National Cardiovascular Center Harapan Kita Hospital, Jakarta, Indonesia

We have retrospectively evaluated the data in our center concerning isolated VSD with severe pulmonary hypertension in the period of 2007-2012. From the data we collected, there are 104 VSD cases with severe pulmonary hypertension (11,25% from all 924 cases of isolated VSD cases within the study year).

We report a total of 104 patients, where 44 patients were diagnosed by catheterization with mean Pulmonary Arterial Resistance to be 9.60 wood unit and mean Pulmonary Arterial Pressure (mPAP) mean to be 55,53 mmHg. The remaining of the patients in this study was diagnosed by echocardiography.

From this population, we report 50 males and 54 females with age distribution within the range of 1 month to 34 years old and body weight ranging from 2.4 to 52 Kilograms.

The distribution of surgical techniques used are; VSD closure with patch in 99 patients, VSD closure with PFO creation in 1 patients, VSD closure with fenestrated patch in 2 patients and 2 patients with PA Banding only.

Nitrite oxide was used in 2 patients only and Iloprost was used in 17. The length of stay (LOS) in ICU varies from 1 to 19 days (with mean = 2.74 days) and one mortality is reported within 5 years of our observation.

S16-4

SURGERY FOR COMPLEX CHD WITH PAH

Krishna S. Iyer

Fortis-Escorts Heart Institute, New Delhi, India

Untreated complex congenital heart lesions with increased pulmonary blood flow are prone to early and aggressive onset of pulmonary vascular obstructive disease PVOD eg, TGA with VSD, Complete AVSD, Truncus Arteriosus etc.

In developed countries most such patients undergo surgery before the onset of significant PVOD. In developing countries problems related to late referral are common and many patients with complex CHD present for the first time for surgery with severe PAH and significant PVOD. Management of such patients is often difficult. Issues that arise are:

- 1) Assessment of operability: Cardiac catheterization remains the commonest method of deciding operability but is prone to procedural as well as operator error especially in situations where there is intra-cardiac mixing eg. in TGA. Response of PVRI to 100% oxygen is often used to determine operability but it is not yet clear as to what numbers reliably predict post-operative reversal of PAH.
- 2) Surgical strategies that have been used to reduce the post-operative mortality include leaving a valved fenestration at the level of the atrial or ventricular septum to provide decompression of the right heart in the event of a PAH crisis. Staged procedures may also be done as in TGA.VSD where an arterial or atrial switch may first be performed followed by a delayed closure of the VSD if there is evidence of a drop in PVRI.
- 3) Peri-operative pulmonary hypertension is managed by multiple strategies including ventilator manipulation and pharmacotherapy. Early extubation to non-invasive ventilation is preferred in patients with a reactive pulmonary vascular bed. Close attention needs to be paid to prevent lung de-recruitment.
- 4) Residual PAH following correction will need long term pulmonary vasodilator therapy with Sildenafil or Bosentan. Follow up cardiac catheterization dictates dosage and duration of therapy.

S16-5

SURGICAL RESULTS FOR THE PATIENTS WITH FUNCTIONAL SINGLE VENTRICLE HAVING HIGH PULMONARY ARTERY PRESSURE

Shingo Kasahara, Takuya Goto, Michihiro Okuyama, Masataka Hirata, Junko Kobayashi, Suguru Tarui, Shuuta Ishigami, Takuya Kawabata, Yosuke Kuroko, Zenichi Masuda, Kou Yoshizumi, Sadahiko Arai, Shunji Sano

Department of Cardiovascular Surgery, Okayama University School of Medicine, Japan

[Objectives] The Fontan operation has been proposed as definitive palliation for an increasing variety of hearts with complex univentricular anatomy. Staged strategy attributed good outcome for this group. However, despite the improvements in surgical strategy, the factor of high pulmonary pressure has been still interrupted the way to FONTAN. We evaluate the surgical outcome of single ventricle focusing on the high pulmonary artery pressure.

[Methods] Patients with functional single ventricle who underwent the Fontan procedure were identified between 1991 and 2012. These patients divided into two groups. One was the group having high pulmonary artery pressure (HiPA: more than 15mmHg), another was the group having low pulmonary artery pressure (LoPA: less than 15 mmHg).

[Results] A total of 336 patients (47 HiPA, 289 LoPA) were included. Median follow up was 6.3 years (1month to 21 years). Early mortality in HiPA was 6.4% and 0.3% in LoPA, however, late mortality was 9.1% in HiPA and 4.1% in LoPA. Overall freedom from death was 94.7% at 20 years in LoPA, 75.9% at 20 years in HiPA. Preoperative median CTR (55% vs 53%, $P=0.048$), median AVVR grade (2 vs 1, $P=0.045$), median RAP (9mmHg vs 5mmHg, $P<0.01$) and median EDP (8mmHg vs 6mmHg) were significant higher in HiPA group comparing in LoPA group.

[Conclusions] Late outcome of the Fontan circulation is encouraging, however, preoperative elevated PA pressures have an adverse influence late outcome. We suggested more aggressive low flow strategy is important for ventricular performance and PA pressure.

S17-1

CURRENT STATUS OF ROBOTIC SURGERY FOR LUNG AND MEDIASTINUM

Ralph Schmid

University Hospital Berne, Division of General Thoracic Surgery, Switzerland

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

S17-2

ROBOTIC SURGERY FOR THORACIC DISEASES

Dae Joon Kim

Department of Thoracic & Cardiovascular Surgery, Yonsei University College of Medicine, Korea

Video-assisted thoracic surgery (VATS) has been accepted as a standard procedure for various thoracic diseases. It causes less surgical trauma, and elicits less immunologic responses. Many studies has demonstrated that VATS offers many clinical advantages such as a less wound pain, a shorter hospital stay, and a better cosmetics. However, it carries some inherent limits which are barriers to propagation of minimally invasive surgery. In VATS, we need to interpretate the surgical images on a 2-dimensional monitor during a whole procedure because there is no perception of depth. VATS instruments offers only a 4-degree of freedom, and a fulcrum effect is cumbersome to carry a fine, meticulous dissection. In addition, VATS has serious ergonomic problems since the procedure is done in atypical posture for a long time.

Since late 1990s, a surgical robot has been used in order to overcome the limitations of VATS. A da Vinci system (Intuitive Surgical, CA, USA) is the most commonly employed system so far. It offers a 3-dimensional images, a 7-degree of freedom, and a tremor filtering. Robotic surgery is very useful for procedures in a narrow space, such as radical prostatectomy, or colorectal surgeries. In a field of thoracic surgery, some non-randomized observational studies has bee done for mediastinal, pulmonary, and esophageal diseases. Most of them reported that a robotic surgery is a feasible and a safe procedure, but there is no randomized study which compares VATS and robotic surgery. When we utilize a robotic system to certain procedures which are routinely performed with VATS, we should consider several factors as the following; 1) Can it reduce mortality and morbidity significantly?, 2) Can it provide more meticulous dissection?, 3) Is there any possibility to cause harms to a patient?, 4) Can we expect that a learning curve is shortened?, 5) How do we deal a higher cost for managing the system?

In this lecture, we'll review the current status of robotic surgery for thoracic diseases, and discuss about the future application of it.

S17-3

ROBOTIC SURGERY FOR GENERAL THORACIC DISEASE IN JAPAN

Hiroshige Nakamura

Department of General Thoracic Surgery, Tottori University Faculty of Medicine, Japan

Robotic surgery has become a great interest with our thoracic community. However, the spread of robotic thoracic surgery has been delayed, particularly, still behind in Japan. During about past 3 years, total 4244 robotic surgeries were done in Japan. Only 175 cases (4.1%) of robotic thoracic surgeries were performed. I think one of the greatest reasons for the delay is that thoracic operations are primarily one of resection rather than reconstruction. However, in Japan we have now over 70 robots. I made a retrospective analysis of our experiences of robotic surgery and also discuss about its efficacy and current problems.

We performed 35 da Vinci surgeries from January 2011 to December 2012 in our hospital. There were 19 Pts. for primary lung cancer. In our experiences, right upper lobectomy including one bronchoplasty was the most frequent. Regarding the mediastinal disease, we performed 16 Pts. of robotic surgery. 8 Pts. were MG including 5 Pts. of thymoma. 3 Pts. had only thymoma. There were no conversions during operation and no serious postoperative complications. In learning curve, we are gradually saving both the operative and console time. Moreover, the efficiency and safety improves with the progress of the acquiring skills. According to our limited experiences, probable advantageous procedures for robotic surgery would be "Extended thymectomy for MG", "Large sized mediastinal tumor", "Lymph node dissection of lung cancer", "Bronchoplasty", and so on. However, it is unclear whether technical advantages are directly connected to merits for patients or not. Problems concerning the cost and education also have not been solved. Although evidence is insufficient for robotic thoracic surgery, it may be an extension of thoracoscopic surgery. To promote further robotic surgery, the acquisition of certain technique, establishment of educational program, and coverage by national health insurance are necessary.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS1-1

AORTIC VALVE REPAIR IN CHILDREN AND YOUNG ADULTS

Pedro Jose del Nido

Cardiovascular Surgery, Boston Children's Hospital, USA

Aortic valve disease is the third most common congenital left heart lesion, affecting 8% of all children born with heart defects. Balloon dilatation has had a major impact on neonatal and young infant survival. However, this palliative technique often results in progressive aortic valvar regurgitation, which requires surgical intervention later in life. Aortic valve replacement (AVR) in children, while feasible particularly with the availability of small diameter prosthesis, carries a significant early and late morbidity and mortality, such that by 10 years following AVR only 47% of children are alive and without valve re-replacement. For this reason, alternative procedures such as aortic valve repair (AVre) remain an attractive option.

Currently, components of the repair such as: analysis of mechanisms of valve dysfunction, precise leaflet and root geometry, and repair patch size, must be made intra-operatively while the heart is arrested and the aorta open. In experienced centers, however, the short and long-term results of AVre are comparable to those of the Ross operation, with the advantage that with AVre the pulmonary root is not sacrificed. It is also important to note that AVre is successful even though the focus of the repair is only on restoring valve geometry. However, accurate repair requires experience regarding both leaflet patch geometry and patch material properties (stress-strain relationship), since pericardial patch distention under physiologic pressures is different than that of native leaflets.

Surgical techniques are now relying more on pre-operative imaging for surgical planning. 3D echocardiography has made a significant impact on surgeon's ability to visualize the pathology prior to the operative procedure. Knowledge of normal valve geometry and standard repair techniques has made the repair procedure more reproducible. The current main limitation is the absence of leaflet tissue that is pliable, elastic, and durable.

VS1-2

AORTIC VALVE REPAIR

Christian Brizard

Royal Children's Hospital, Australia

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS1-3

MITRAL VALVE ANALYSIS : HOW DO I DEFINE THE VALVE LESION ON THE TABLE

Phan Van Nguyen

Cardiac Surgery Department, Heart Institute, Viet Nam

- Valve analysis is one of the most important step in reconstructive surgery of mitral valve incompetence .

- From 1992 to 2004 , 1279 patients with severe MR underwent reconstructive techniques at the Heart Institute - Viet Nam . Valve analysis was based on Carpentier's functional classification and reference point method . The feasibility of repair was different between valve pathology : Rheumatic (77%) , degenerative (92%) , endocarditis (72%) and congenital (98%) .

- Patient selection for valve repair was based on TEE per-op and especially the valve analysis by the surgeon per-op. From this analysis , we decide the techniques used for each patient .

- For degenerative MR : 94% leaflet prolapse (rupture and/or elongation of chordae)

- For rheumatic MR : Type IIA + IIIP (25%) (feasibility of repair was 80%)

Type IIIA + IIIP (75%) (feasibility of repair was 50 - 60%)

Combined lesions (5%) (feasibility of repair was less than 50%)

- Severe leaflet retraction was presented in 16.5% of rheumatic MR and leaflet extension with autologous pericardial patch was a good solution for this lesion .

- Conclusion :

* Valve analysis is a key of mitral valve repair

* Never think that just one technique is enough to repair a rheumatic mitral valve incompetence .

* A good mitral valve repair means the valve should have good function for at least 10 years after operation

VS1-4

MITRAL VALVE REPAIR

Sertac Cicek

Anadolu Medical Center, Turkey

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS1-5

PULMONARY VALVE REPAIR

William Brawn

Birmingham Children's Hospital, UK

The need for pulmonary valve repair or replacement is usually associated with stenosis of the right ventricular outflow tract in association with Fallot's Tetralogy and various forms of pulmonary atresia. The underlying problem of repairs associated with these conditions is that there is no suitable valve replacement yet available. Ideally one would like to place a competent valve during such repairs but it would need to be of viable tissue such as maybe acquired through stem cell manipulation. At this time however no such valve or manipulation is available although attempts are being made to develop such valve substitutes.

Reconstruction or repair of pulmonary valve during primary correction of the lesions mentioned can be accomplished by use of foreign materials such as pericardium or goretex patches. There are also many innovative methods reported of creating pulmonary valves or pulmonary valve conduits to reconnect the right ventricle to the pulmonary arteries with a competent outflow tract. In some countries homograft donated valves are available and quite commonly used. However the application of a complex reconstructive procedure to the pulmonary valve at primary repair is still relatively unusual and quite difficult. Usually the right ventricular outflow tract incompetence is tolerated over many years by the right ventricle until such time a dilatation occurs with volume loading. At that time a competent pulmonary valve is usually placed and that may be many years after the repair. In general late after the primary repair a prosthesis is placed in the right ventricular outflow.

Our own practice at this time is to try not to reconstruct or repair the pulmonary outflow tract at the time of Fallot's repair of pulmonary atresia repair but to accept that the pulmonary incompetence is well tolerated for many years and then replace the pulmonary valve when necessary in an older patient.

VS1-6

EXPANDED POLYTETRAFLUOROETHYLENE VALVED CONDUITS AND PATCHES WITH BULGING SINUSES AND FAN-SHAPED VALVES IN RIGHT VENTRICULAR OUTFLOW TRACT RECONSTRUCTION

Takako Miyazaki, Masaaki Yamagishi

Department of Pediatric Cardiovascular Surgery, Kyoto Prefectural University of Medicine, Japan

Right ventricular outflow tract (RVOT) reconstruction is one of the most distinctive surgical procedures in the treatment of congenital heart disease. While many materials can be used in RVOT reconstruction, there is currently no satisfactory material for RVOT reconstruction especially in younger children. To date, expanded polytetrafluoroethylene (ePTFE) valved conduits and patches may be a good option for RVOT reconstruction. We have developed an ePTFE valved conduit and patch with bulging sinuses and fan-shaped ePTFE valve leaflet aiming to enhance the long-term valve function which will be attributable to the vortex flow along the sinuses.

Conduits were chosen for patients with pulmonary atresia, truncus arteriosus or Ross candidates who had discontinuity between the right ventricle and the pulmonary artery. Conduits were also used in adolescents and adults who needed pulmonary valve replacements. On the other hand, we used patches in cases of tetralogy of Fallot or other congenital cardiac disorders with a narrow pulmonary annulus. Autologous tissue such as pericardium was often used to reconstruct the posterior wall of the RVOT in neonates and infants who had discontinuity between the right ventricle and the pulmonary artery. The anterior wall of the RVOT was covered using the ePTFE valve patches. We attempted to position the valve at the same location as the native pulmonary annulus. When the valve is forced to locate at the distal position of the native pulmonary annulus, the valve was positioned to avoid compression by the sternum.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS2-1

TRICUSPID VALVE REPAIR

Shunji Sano

*Department of Cardiovascular Surgery, Okayama University Graduate School of Medicine, Dentistry
and Pharmaceutical Sciences, Japan*

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS2-2

THE CONE REPAIR FOR EBSTEIN'S MALFORMATION: OPERATIVE TECHNICAL VARIATIONS

Jose Pedro da Silva¹, Luciana Fonseca da Silva²

¹Cardio- Thoracic Surgery, Hospital Beneficencia Portuguesa of Sao Paulo, Brazil, ²Hospital Beneficencia Portuguesa and Federal University of Sao Paulo, Brazil

Ebstein's malformation is a multifaceted congenital heart disease affecting the tricuspid valve and right ventricle. The wide variety of anatomical and pathophysiological presentations of Ebstein's malformation has made it difficult to achieve uniform results with its surgical repair. In 1993, we developed a new surgical technique which main features are to undo most of the tricuspid valve anatomical defects that occurred during its embryological development and create a cone-like structure from all available leaflet tissue. This operation aims to cover 360° of the right AV junction with leaflet tissue, allowing leaflet to leaflet coaptation. This mimics the normal TV anatomy and differs from previously applied procedures that result in a monocusp valve coapting with the ventricular septum. In this video presentation, we show the surgical maneuvers we have used in order to obtain the best functional tricuspid valve in several anatomical variations of Ebstein's malformation. The importance of extensive mobilization of displaced and tethered tricuspid leaflets in order to permit a good leaflet to leaflet coaptation after the cone construction is highlighted. This technique was performed in 127 patients with a hospital mortality rate of 3.0%, good clinical outcome, and only one tricuspid valve replacement was needed. Echocardiograph results showed good anatomic and functional tricuspid valves at immediate and long-term postoperative follow-up.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS2-3

EDGE-TO-EDGE TECHNIQUE IN REPAIRING ATRIOVENTRICULAR VALVE ASSOCIATED WITH FUNCTIONALLY SINGLE VENTRICLE

Makoto Ando, Yukihiro Takahashi

Pediatric Cardiac Surgery, Sakakibara Heart Institute, Japan

Atrioventricular valve regurgitation develops in a significant proportion of patients having functionally single ventricle: management of which being especially important for successful completion of the Fontan operation. Compared with mitral valve, tricuspid and common atrioventricular valves are structurally not suitable for sustaining systemic blood pressure, and prone to develop regurgitation. For the repair of these valves, annuloplasty techniques or modifications to the subvalvular apparatus may not be effective. Edge-to-edge technique (E-E) involves suturing of the two major leaflets: anterior to septal leaflet in tricuspid and bridging leaflets in common atrioventricular valve. This may not only eliminate central regurgitation but also improve other leaflet coaptations, and prevent progressive annular dilatation.

Until February 2012, 456 patients underwent single ventricular palliations at our institute. Of them, 134 patients underwent repair or replacement of the atrioventricular valve. Six patients had undergone repairs in the referring hospital. In our institute, valve replacement was performed in 12 patients and closure of one of the two coexisting valves in 9. In the remaining 107 patients, E-E was employed for repair in 67 patients and the other technique (NEE) in 40. Six of the NEE group underwent re-repair using E-E. The morphology of the valve included mitral in 5 (E-E 1, NEE 4), tricuspid in 46 (E-E 24, NEE 22), and common in 56 (E-E 42, NEE 14). The postoperative degree of regurgitation was less than mild in 84.1% of the E-E group and 60.5% of the NEE group ($p=0.0078$). The freedom from reoperation was $66.2 \pm 8.8\%$ at 15 years in the E-E group and $49.4 \pm 13.2\%$ in the NEE group.

E-E was especially effective for tricuspid or common atrioventricular valve regurgitation associated with functionally single ventricle. The technique is effective in reducing atrioventricular valve regurgitation, thereby assuring successful Fontan completion and improving patients' quality of life.

VS2-4

COMMON AV VALVE REPAIR

Hani Najm

King Abdullah Cardiac Center, Saudi Arabia

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS3-1

CONTEMPORARY MITRAL VALVE REPAIR TECHNIQUE

Hiroyuki Tsukui

Department of Cardiovascular Surgery, Tokyo Womens Medical University, Japan

Mitral valve (MV) repair has several advantages over MV replacement, including lower operative mortality, improved left ventricular function, lower freedom from reoperation and complications related to anticoagulation, and superior long-term survival.

Annual report from Japanese Association for Thoracic Surgery showed the number of MV repair increased from 1,844 cases in 2000 to 5,383 cases in 2010. In 2000, the majority of MV disease including MV stenosis and regurgitation was treated by MV replacement (n=3,991, 68.4%) rather than MV repair (n=1,844, 31.6%). In 2010, MV repair was underwent in 55.8% (n=5,383) of MV disease, whereas MV replacement was done in 44.2% (n=4267).

Carpentier's technique, which incorporated both leaflet repair by quadrangular resection and annuloplasty, has been the gold standard for treatment of MV regurgitation. Other techniques including triangular resection, butterfly resection, non-resection with folding, and artificial chordae (Loop technique) enable us to repair complex MV pathology. Recently, MV repair for rheumatic MV stenosis has started.

In this session, we would like to discuss the perspective of MV repair in Asia.

VS3-2

RHEUMATIC MITRAL VALVE REPAIR: TECHNIQUES & LONG-TERM RESULTS

Jeswant Dillon, Mohd Azhari Yakub, Kiew Kong Pau, Paneer Selvam Krishna Moorthy, Mohd Nazeri Nordin

Department of Cardiothoracic Surgery, National Heart Institute, Malaysia

Objective

Contemporary experience with mitral valve repair in the rheumatic population is limited. We aim to examine the long-term outcomes of rheumatic mitral valve repair, identify predictors of durability and to compare with repairs for degenerative mitral valves. Certain rheumatic lesions remain a challenge to repair and techniques peculiar to rheumatic mitral repair are described and analyzed.

Methods

Rheumatic and degenerative mitral valve repair cases from our repair registry were prospectively analyzed. The primary outcomes investigated were mortality, freedom from reoperation and freedom from valve failure. Logistic regression analysis was performed to define predictors of reoperation and valve failure.

Results

Between 1997 and 2010, 627 rheumatic mitral valve repairs were performed (46.7% of all mitral repairs). The median age of the rheumatic group was 28 years. In-hospital mortality was 2.4% and late mortality 0.3%. Freedom from reoperation for rheumatics at 5 and 10 years were 92.5% and 87.3% respectively, comparable to that for degenerative valves at 91.8% and 91.8% ($p=0.787$). Freedom from valve failure for rheumatics at 5 and 10 years were 85.6% and 72.8%, whereas for degenerative repairs were 88.7% and 82.4% respectively ($p=0.448$). In rheumatic patients, repair at younger age, mixed mitral disease, lack of annuloplasty ring and residual MR > 2+ were independent predictors of reoperation and valve failure.

Conclusion

The durability of mitral valve repair in rheumatic disease in the current era has improved and is comparable to the outstanding durability of repairs for degenerative disease. Modifications of standard repair techniques, adherence to the importance of good leaflet coaptation and strict quality control with stringent use of intra-operative transesophageal echocardiography have all contributed to the improved long-term results.

VS3-3

MITRAL VALVE REPAIR FOR SEVERE DEGENERATIVE MITRAL REGURGITATION

Yukikatsu Okada

Department of Cardiovascular Surgery, Kobe City Medical Center General Hospital, Japan

Background: Mitral valve repair is widely accepted as the procedure of choice for severe degenerative mitral regurgitation (MR). However, long-term outcome following this surgical treatment is limited. The aim of this study was to access long-term results of more than 10 years after surgery.

Patients and methods: Between January 1991 and December 2010, consecutive 654 patients with severe degenerative MR underwent mitral valve repair. Mean age was 56 ± 15 years (1-88 years); 385 (59%) were male. Atrial fibrillation was associated in 97 patients (15%). There were 76 patients (12%) with anterior leaflet prolapse, 232 patients (35%) with bileaflet prolapse, and 346 patients (53%) with posterior leaflet prolapse. Surgical procedure consisted of resection and suture technique for posterior prolapse, chordal reconstruction using ePTFE sutures (CV-5) for anterior prolapse, and combination of these techniques for bileaflet prolapse. Ring annuloplasty was applied for all patients. Mean follow-up period was 7.5 ± 4.9 years. Total follow-up period was 4940 patient-years.

Results: There were 10 hospital deaths (1.5%). Actuarial survival at 15 years was $78 \pm 3\%$. Freedom from thromboembolic events, recurrent MR ($>2+$), and reoperation at 15 years were $79 \pm 3\%$, $95 \pm 2\%$, $94 \pm 2\%$, respectively. There were no significant differences in freedom from recurrent MR between the types of prolapse. Event free survival at 15 years was $74 \pm 3\%$. Risk factors of event free survival were atrial fibrillation and age.

Conclusions: Mitral valve repair for severe degenerative MR is highly reliable and durable procedure. Early surgery is recommended to obtain event free survival following mitral valve repair.

Videos in this patient series are presented.

VS3-4

MULTIPLE NEO-CHORDAE CREATIONS WITH 'LOOP-IN-LOOP TECHNIQUE' IN MITRAL VALVE REPAIR

Ryohei Yozu, Kazuma Okamoto, Hidenobu Takaki, Mikihiro Kudo

Department of Surgery, Keio University School of Medicine, Japan

OBJECTIVE

In mitral valve repair, the importance of multiple neo-chordal creations is increasing and 'loop technique' is a good solution, especially via minithoracotomy approach. However, pre-measuring and deciding the length of the neo-chordae is not easy. To realize physiological mitral repair, 'Loop-in-Loop technique' was introduced in mitral repair.

METHODS

Clinical result of mitral repair using 'Loop-in-Loop technique' was verified retrospectively. The 'loop-in-loop technique' was a new technique for ePTFE (CV-5 or CV-4) neo-chordae creation which is consisted with a short (5mm) primary loop set attached to the papillary muscle and a secondary loop attached to the prolapsed portion of the leaflet. The length of the created neo-chordae is dependent on the length of the second loop.

RESULTS

In consecutive 68 cases (minithoracotomy:63 fullsternotomy:5), there was no mortality and major morbidity. The average number of neo-chordae was 3.7 (1-8). Neo-chordae was created to the anterior leaflet in 48 cases. In those cases, bileaflet chordal creation was done in 33 cases. In 19 cases, resection of the posterior leaflet was added. In all cases, mitral annuloplasty with a Carpentier-Edwards Physio II annuloplasty ring was added. The average ring size was 32.8 (26-40). During follow-up of 224.3 days (7-578), all patients survive. Rate of freedom from mitral regurgitation more than moderate was 94.1% in 106.0 days (4-427).

CONCLUSIONS

Durability of 'Loop-in-Loop technique' for mitral repair was secure and safe. It is an effective option in order to realize comfortable mitral valve repair in complex mitral pathology.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS3-5

MANAGEMENT OF POST MITRAL VALVE REPAIR SAM (SYSTOLIC ANTERIOR MOTION)

Weerachai Nawarawong

Chiangmai University, Thailand

Systolic anterior motion of mitral valve is the systolic displacement of the distal portion of the anterior leaflet of the mitral valve towards the left ventricular outflow tract. It will result in left ventricular out flow tract obstruction and Mitral regurgitation. SAM is the result of a discrepancy between the amount of valvular tissue and the mitral valve area, so it is commonly occurred in Hypertrophic obstructive cardiomyopathy (HOCM) when you have small orifice area but normal amount of valvular tissue or in Barlow's disease after mitral valve repair, where the excessive valvular tissue with orifice area is restored to normal or overcorrected by undersized annuloplasty. The risk factors for SAM are : Excess valvular tissue and Undersized annuloplasty. Minor risk factors are : Narrow aorto-mitral angle ,Hyperkinetic small ventricle, Septum bulging, Abnormal configuration of anterior leaflet. SAM can be avoided by paying attention to the following things : The height of the posterior leaflet should be between 10-15 mm, anything more than 20 mm should be reduced. Care must be taken not to over corrected the annulus, classic ring or physio II ring should be used if there is a discrepancy between the height and the intertrigone distance.

Sytolic Anterior Motion after valve repair can be corrected with optimization of the ventricular volume. Most of SAM will disappear within days or weeks after surgery due to remodelling. If significant MR persisted, corrective procedures including reduction of the leaflet height especially posterior leaflet, and replace the old ring with a larger annuloplasty ring will often solve the problem.

VS3-6

A 10-YEAR, SINGLE CENTER EXPERIENCE OF MINIMALLY INVASIVE MITRAL VALVE REPAIR

Jae Won Lee

Asan Medical Center, Seoul, Korea

Objective: To review a 10-year, single center experience of minimally invasive mitral valve (MV) repair.

Methods: From 2002 to 2012, 1192 cases of minimally invasive cardiac surgery were performed (826 cases assisted by AESOP 3000, and 366 cases assisted by da Vinci system), of which 528 patients with isolated mitral regurgitation (MR) underwent MV repair either using AESOP (n=338) or using da Vinci (n=190). A 4- or 5-cm right minithoracotomy with peripheral cardiopulmonary bypass and transthoracic aortic cross-clamping was used in all cases. Transesophageal echocardiography was used intraoperatively to estimate the results and regular transthoracic echocardiographic follow-up was performed.

Results: Minimally invasive MV repair was performed without any intraoperative conversion to sternotomy. Various repair techniques including ring annuloplasty (100%), neo-chordae formation (44.2%), leaflet resection (44.2%), commissuroplasty (35.3%), sliding annuloplasty (2.6%), chordal transfer (2.1%), papillary muscle release (1.6%), and leaflet augmentation (1.1%) were utilized. Concomitant maze were performed in 127 patients (24.1%). There was no 30-day mortality. Postoperative complications included postoperative bleeding in 22 (4.1%), newly required dialysis in 4 (0.8%), stroke in 3 (0.6%), and low cardiac output in 1 (0.2%). Based on echocardiography at pre-discharge, MR repair was successful with no/trivial or mild residual MR in 98.4%, and without any mitral stenosis. Serial echocardiographic follow-up (> 6 months) was possible in 464 patients (304 in the AESOP group, and 160 in the da Vinci group) with a median follow-up of 50.2 months and 19.4 months respectively, during which freedom from MR (> 2+) at 5 years was 84.3%. Reoperation for MV problem was required in 10 patients (1.9%), which was due to significant MR in 5, infective endocarditis in 3, and mitral stenosis in 2.

Conclusions: Minimally invasive MV repair is technically feasible and efficacious in terms of utilizing various types of repair techniques with reasonable outcomes.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS4-1

ROBOTIC SURGERY IN CHINA

Changqing Gao

PLA General Hospital, China

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS4-2

ROBOTIC CARDIAC SURGERY

Randolph Chitwood

Department of Cardiovascular Sciences, Brody School of Medicine, East Carolina University, USA

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS4-3

ROBOT-ASSISTED MITRAL VALVE SURGERY

Go Watanabe

Department of General and Cardiothoracic Surgery, Kanazawa University, Japan

Objective: Improvements in endoscopic technology, closed-chest cardiopulmonary bypass, and cardioplegic arrest have stimulated the development of minimally invasive cardiac surgery. Especially in mitral valve surgery, totally-endoscopic robot-assisted mitral valve plasty(MVP) is one of the least invasive cardiac surgeries.

Patients and methods: Between December 2005 to January 2013, Our team performed 183 robot-assisted cardiac surgeries, and patients who underwent a robot-assisted MVP were identified. After establishment of cardiopulmonary bypass like the MICS procedure, 6 ports were made in the right chest and robot-assisted MVP was performed using the da Vinci Surgical System (da Vinci; Intuitive Surgical Inc., Sunnyvale, CA). A transthoracic aortic cross-clamp and cardioplegic needle was set under robotic maneuver, and all MVP were performed using standard techniques. Resection and re-suture for the posterior leaflet lesion and chordal replacement (loop technique) for the anterior leaflet lesion were mainly performed, and annuloplasty bands were placed for all cases. Depending on a case, sliding plasty, edge-to-edge approximation was added.

Results: There were 52 patients (33 male and 19 female) who underwent robot-assisted MVP for severe mitral regurgitation. Average operative/cardiopulmonary bypass/cross clamp time were $300.6 \pm 43.8 / 179.3 \pm 30.0 / 102.6 \pm 20.3$ minutes. Mean postoperative ventilator time was 8.2 ± 17.6 hours. Seven patients received intraoperative blood transfusions. Three cases needed reoperation for hemostasis, and there were no mortalities.

Conclusion: Based on our experience, robot-assisted MVR provides an effective treatment for mitral valve regurgitation.

VS4-4

MINIMALLY RESECTION APPROACH IN MV REPAIR : SIMPLIFIED AND PHYSIOLOGIC

Taweesak Chotivatanapong

Department of Cardiovascular Surgery, Central Chest Institute of Thailand, Thailand

MV Repair for problem of Type II with excessive tissue of leaflet usually involves resection of excessive tissue and appropriate surgical technique to restore type I movement. Although the approach has been effective in repairing the mitral valve, certain problems exist and may compromise success and good long term results. Recently, based on understanding of the importance of role of coaptation in MV repair, several innovative techniques of minimally resection of leaflet tissue have been introduced for MV repair and proved to be safe, physiologic and more simplified.

This VDO presentation will depict 3 situations of severe MR that can be successfully repaired by this approach .

1. Large prolapse of P2 with type II lesion. A lesser resection of leaflet with a small double wedge resection techniques has been used in this situation to achieve good valve competency, more valve tissue for coaptation and effective prevention of SAM.
2. Commissural prolapse, type II with severe MR: This complex lesion can be effectively repaired in a more simplified and reproducible way by a double bracing technique without resection of commissural tissue. The technique effectively abolish commissural prolapse, excessive length of chords and MR without the need of complex resection of commissure.
3. Excessive AML, type II with severe MR : Use of neochordal replacement and folding plasty have been applied without resection of leaflet to repair this problem. It avoids the need of complex resection and sliding plasty techniques.

In conclusion, minimally resection approach has been used to repair the mitral valve and proved to be safe, effective, simplified and physiologic. The approach should be considered as another alternative for MV repair.

VS4-5

MINIMALLY INVASIVE VALVE SURGERY THROUGH RIGHT MINI-THORACOTOMY

Taichi Sakaguchi, Toshinori Totsugawa

Department of Cardiovascular Surgery, The Sakakibara Heart Institute of Okayama, Japan

Minimally invasive approaches have been shown to have several advantages over conventional sternotomy in terms of better cosmetics and faster recovery. We use right mini-thoracotomy approach for mitral or aortic valve surgeries. This presentation will focus on technical aspects of our mini-thoracotomy approach.

A 6- to 8-cm skin incision is made in the right chest below the nipple, lateral to the midclavicular line. The chest is entered in the 4th (or 3th) intercostal space. We use the same incision approach for mitral and aortic valve procedures. CPB is established with the femoral arterial / venous cannulation. In mitral valve surgery, SVC drainage is added through direct cannulation or percutaneous jugular venous cannulation. The ascending aorta is cross-clamped with a flexible clamp or transthoracic clamp inserted through the 3rd intercostal space. After exposing the valve, procedure is performed in a standard way. In this presentation, our surgical techniques, tips and pitfalls of minimally invasive valve surgery will be introduced.

VS4-6

TOTAL ENDOSCOPIC MITRAL VALVE SURGERY USING 3D HI VISION CAMERA SYSTEM

Masahiko Kuinose, Hitoshi Ogino, Katsuhiko Matsuyama, Nobusato Koizumi

Department of Cardiovascular Surgery, Tokyo Medical University, Japan

MICS surgeons have to select direct vision, endoscopic vision or robotic procedures. Video assistant procedure requires a definite leaning curve and a different surgical attitude. We select total endoscopic procedure with 3D Hi vision exposure.

Under general anesthesia with differential lung ventilation, a 5 cm-right anterior mini-thoracotomy in the right 4th intercostal space was made followed by cardiopulmonary bypass. The 3D camera was inserted from the middle axillary line and 3D converter allowed visualization of the mitral valve apparatus. The 3D image was displayed on the 32 inch-monitor (Panasonic co. Ltd, Tokyo, Japan) through the polarizing glasses (SHINCO OPTICAL Co. Ltd, Tokyo, Japan).

We have kept performing MICS, starting from the atrial septal defect (ASD) repair and expanding its indication to treatments for atrial fibrillation, mitral and tricuspid valve diseases. During mitral valve repair, we do need an endoscope which is able to get a conspicuous surgical view. We have firstly induced 3D Hi Vision endoscope to MICS. The device enables us to get three-dimensional view of mitral valve structure and high-quality result of valve repair. Moreover, there are some pitfalls in MICS through right intercostal mini-thoracotomy, which should be always taken care of. These are aortic dissection or venous injury when cannulation of CPB, incomplete aortic clamping, air embolism, tie down trouble due to unfamiliar with knot pusher, insufficient oxygenation during one-lung ventilation, pneumothorax, and hemostatic confirmation of chest wall using endoscope. In addition, the point to go on with this procedure is to cooperate with not only anesthesiologists but also clinical engineers or scrub nurses and to work as a “team”.

In conclusion, the benefits of this technology enable us to achieve a sense of distance and depth in real time, which is essential for mitral valve surgery, with which we cannot achieve with two-dimensional endoscope.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS5-1

LONG-TERM RESULTS OF KONNO, ROSS, AND ROSS-KONNO PROCEDURES FOR COMPLEX LEFT VENTRICULAR OUTFLOW TRACT OBSTRUCTION

Takeshi Hiramatsu, Gohki Matsumura, Mitsugi Nagashima, Kenji Yamazaki

Department of Cardiovascular Surgery, Tokyo Women's Medical University, Japan

OBJECTIVE: The current study aims to evaluate the long-term outcomes of the Konno, Ross, and Ross-Konno procedures.

METHODS: Since 1984, 63 patients underwent the Konno procedure, and 76 patients underwent the Ross procedure including 12 Ross-Konno procedure. The ages at operation ranged from 1 year 9 months to 37 years in the Konno group, and 6 months to 43 years in the Ross group. Regarding RVOTR at Ross, the autologous pericardial valve and conduit was used in 26 patients, the ePTFE valve was used in 30 patients, direct posterior wall reconstruction with monocusp patch was used in 10 patients, and homograft was used in 10 patients.

RESULTS: There was 1 hospital death (myocardial infarction) and 6 late deaths (sudden death: 2, heart failure: 2, infectious endocarditis: 1, traffic accident: 1) in the Konno group, and 1 hospital death (heart failure) and 1 late death (heart failure) in the Ross group. The Kaplan-Meier survival rates were 91.9% in the Konno group and 97.2% in the Ross group at 10 years. There were 11 reoperations in the Konno group (reKonno procedure, 5 ((thrombosed valve, 3; pannus formation, 1; IE, 1)); mitral valve replacement, 3; coronary artery bypass grafting, 2; grafting of the descending aorta, 1), and 1 balloon dilatation for recoarctation and 7 PTA were required. In the Ross group, there were 7 reoperations regarding autograft (AVR: 5, Konno:1, Bentall: 1), and 3 reoperations and 14 PTA regarding RVOTS. The event-free rates including all events were 75.2% in the Konno group and 48.8% in the Ross group at 10 years. In the long-term period, the results of echocardiography revealed good cardiac function in both groups.

CONCLUSIONS: The Konno, Ross, and Ross-Konno procedures are effective and safe for the treatment of complex left ventricular outflow tract obstruction and for the preservation of ventricular function.

VS5-2

PROPHYLACTIC DKS ANASTOMOSIS AT THE SECOND PALLIATION FOR SINGLE VENTRICULAR REPAIR

Hajime Ichikawa¹, Koji Kagisaki¹, Masatoshi Shimada², Koji Kagisaki¹, Toshikatsu Yagihara³, Takaya Hoashi¹

¹*Pediatric Cardiovascular Surgery, National Cerebral and Cardiovascular Center, Japan,*

²*Nagano Prefectural Children's Hospital, Matsumoto, Nagano, Japan,*

³*Rinku General Hospital, Izumisano, Osaka, Japan*

Systemic ventricular outflow obstruction after Fontan type operation causes short and long term problems by complicating the hemodynamics. It is obvious that patients like single left ventricle with bulbo-ventricular foramen develops left ventricular outflow obstruction (LVOTO) after Fontan operation, therefore, these patients require “Damus-Kaye-Stansel (DKS)” type anastomosis to prevent LVOTO. Not only with this type of anatomy, all the patients with subaortic conus has potential to develop ventricular outflow obstruction after Fontan type operation, since the ventricular volume reduction occurs after Fontan type operation, this tendency is exaggerated.

It is our institutional strategy to perform DKS anastomosis at the second palliation aiming Fontan type operation to fix the problem before ventricular volume reduction occurs and to avoid complex surgical procedures at the time of Fontan completion.

Between 1996 and 2005, 25 patients underwent bidirectional Glenn anastomosis and DKS procedure and followed for more than 5 years. All patients underwent pulmonary arterial banding as a first-stage palliation. Eleven out of 25 were accompanied with coarctation or interruption of the aorta which were repaired at the time of first stage palliation. For successful DKS procedure at the second-stage palliation, it is essential to avoid turbulent blood flow after the DKS anastomosis to reduce energy loss, to avoid semilunar valve regurgitation. To achieve this, a proper position of PA banding tape at the first-palliation is also crucial. If the PA banding tape is located too close to the pulmonary commissure, the pulmonary valve can easily be damaged. The operative procedure includes transections of aorta and pulmonary artery at the same level, smooth side to side approximation of the both great vessels to form a single ventricular outflow and the anastomosis of distal ascending aorta and the ventricular outflow tract.

The operative procedure is shown in the video.

Of the 25 patients, three patients died before the completion of Fontan procedure. However, none of the patients showed outflow obstruction. Of the 22 survivors after the completion of Fontan procedure, The average ventricular volume were 187 ± 74 % of normal before the second stage to 73 ± 14 % of normal 5 years after Fontan operation. No patient showed a significant outflow pressure gradient. In summary, this prophylactic DKS procedure is safe and effective to prevent the occurrence of ventricular outflow obstruction.

VS5-3

YASUI OPERATION FOR CONGENITAL HEART DISEASE WITH LEFT VENTRICULAR OUTFLOW TRACT OBSTRUCTION

Toshihide Nakano, Hideaki Kado, Hideki Tatewaki, Kazuhiro Hinokiyama, Daisuke Machida, Go Yanase, Noriyoshi Ebuoka, Hidekazu Matsumae

Cardiovascular Surgery, Fukuoka Children's Hospital, Japan

OBJECTIVE: We reviewed our surgical technique and the results of Yasui operation for complex congenital heart disease associated with left ventricular outflow tract obstruction (LVOTO).

METHODS: Fifteen patients who underwent Yasui operation from 1985 to 2012 were reviewed. Intracardiac diagnosis was AS+VSD in 7, AA+VSD in 4, AS+DORV in 3, and AS+DOLV in 1. Type of arch obstruction was IAA in 7, CoA in 3 and hypoplastic arch in 2. Ten patients underwent palliation prior to Yasui operation (bilateral PAB in 8, arch repair+PAB in 1, and Norwood in 1), and 1 patients developed LVOTO after one stage correction for IAA+VSD.

OPERATION: Cardiopulmonary bypass was established with total body perfusion technique to avoid circulatory arrest. Intraventricular buffing was designed to cover VSD and both aortic and pulmonary valves. VSD was enlarged if necessary. Aortic arch reconstruction was performed by CoA/IAA repair with Damus-Kay-Stansel anastomosis, or Norwood type reconstruction. Right ventricular outflow reconstruction was performed by valved conduit (n=12) or anterior monocuspid patch (n=2). Body weight at Yasui operation was 5.1 ± 2.6 kg and mean follow up time was 6.4 years (0.4 to 27.8).

RESULTS: There was no mortality. Reoperation was performed 8 times in 5 patients (recurrent coarctation repair in 1, resection of subaortic fibrous ring in 1 and modified Konno in 1, and RV-PA conduit exchange was performed in 5). Freedom from reoperation for LVOT was 76.2% at 10 and 20 years. Flow velocity at LVOT by the latest cardiac echo was 1.4 ± 0.8 m/s.

CONCLUSION: Results of Yasui operation for complex congenital heart disease associated with LVOTO was excellent. Staging strategy using bilateral PAB was useful in symptomatic neonate.

VS5-4

PRIMARY REPAIR OF LEFT VENTRICULAR OUTFLOW TRACT OBSTRUCTION ASSOCIATED WITH COARCTATION OF THE AORTA AND AORTIC ARCH OBSTRUCTION

William Brawn

Birmingham Children's Hospital, UK

In the presence of complex congenital heart disease associated with coarctation of the aorta and interruption of the aortic arch there is often associated left ventricular outflow tract obstruction. This obstruction may occur primarily in the neonates infant and it may also develop over time after repair of the arch obstruction and intracardiac lesions. It is commonly associated with a degree of hypoplasia of the aortic valve.

The arch obstruction can usually be repaired by resection of any narrowed area and direct anastomosis by extended aortoplasty or by back wall anastomosis and patching of the aortic arch down on to the ascending aorta with foreign material such as pericardium or pulmonary homograft material (as in Norwood I reconstruction of the aortic arch for Hypoplastic left heart syndrome). However correction of the left ventricular outflow tract obstruction in this situation can be very difficult. It is often problematic to make a judgement as to whether the left ventricular outflow tract can be enlarged and that this enlargement will last for the rest of the patients life or whether the outflow tract narrowing is so complex and the pathways are so Hypoplastic that its better to redirect the flow of blood from the left ventricle either through a Ross Konno type repair or through the creation of a double outlet left ventricle as in the Yasui type of repair.

The arch repair in a neonate is usually performed under continuous cardiopulmonary bypass with selective perfusion of usually the innominate artery, although many centres also perform this surgery under circulatory arrest at hypothermic temperatures. In essence however these complex intra cardiac and arch repairs require careful manipulation of cerebral protection techniques which may include hypothermia as well as limited cardiopulmonary bypass to the brain. Other centres particularly in Japan may favour total body perfusion.

One of the limiting factors to this type of surgery is the need to make a judgement about the relative size of the ventricles and as to whether the hypoplasia of the left ventricular outflow tract is also associated with a degree of underdevelopment of other left heart structures such as the mitral valve and left ventricular cavity itself. It is wise in certain instances to proceed directly to a univentricular type of repair and finally to a Fontan procedure.

VS5-5

MID- AND LONG TERM RESULTS OF REGIONAL PERFUSION IN THE PATIENTS WITH COARCTATION OF AORTA OR INTERRUPTED AORTIC ARCH

Kim Woong-Han

Seoul National University, Korea

Introduction : For past 15 years, I have used a technique of regional perfusion which includes selective cerebral perfusion and coronary perfusion during aortic arch repair in patients with aortic arch anomalies.

Patients and Methods : Total 168 patients(1998-2012), who underwent aortic arch anomaly repair using regional perfusion technique, were reviewed. We excluded the patients with single ventricle or without CPB support. Median age was 0.6 months(range: 1 day ~ 123.5 months), and median body weight was 3.2 kg(range: 1.2 Kg ~ 26 Kg). Initial diagnosis included simple CoA(n=112), or simple IAA(n=17), that were combined with only VSD, and complex CoA(n=23) or IAA(n=16). During the procedure of aortic arch repair, cerebral perfusion and coronary perfusion were maintained under the beating heart.

Results : Mean regional perfusion time was 26.5±9.9 minutes. We have 6 operative mortalities(3.6 %) because of postoperative ventricular dysfunction, sepsis, or hepatic failure due to combined other syndromes. Operative morbidities included chylothorax(n=4), vocal cord palsy(n=2), and phrenic nerve palsy(n=1). Four cases of aortopexy were performed in patients showing airway problem after aorta repair. There were 3 patients suffered from seizure(1.7%) but there was no paraplegia. Mean follow up duration was 5.2±3.7 years(range: 7 days~15 years). During the follow up periods we have 4.2 % of reintervention (balloon angioplasty or reoperation) rate(n=7) for stenosis of repaired aortic arch anomaly. Late mortality was occurred in 1(0.6%) due to hepatic failure after liver transplantation in patients with Alagille syndrome.

Conclusions : The technique of regional perfusion during the aortic arch repair showed low rate of neurological complications and acceptable surgical outcomes. By supplying continuous blood flow to brain during the aortic arch repair, it will also be expected to have neurologic benefit rather than circulatory arrest.

VS6-1

VALVE PRESERVING SURGERY OF THE AORTIC ROOT

Thoralf M Sundt

Department of Surgery, Harvard Medical School/ Massachusetts General Hospital, USA

Valve preserving approach to surgery on the aortic root had become widely accepted internationally. The earliest approach, originally described by Prof. Sir Magdi Yacoub, has been termed "remodeling" by some authors. While it retains some enthusiastic support, in large measure this technique has given way to the "reimplantation" technique developed by Tirone David. The "David" operation appears reproducible and T. chewable as it has a rapidly spread throughout the globe. Its adoption continues to increase. Its durability looks favorable. The risk associated is sufficiently low that many advocate its use in the setting of acute aortic dissection as an alternative to composite root replacement. The modifications and variations on the technique are as numerous as those for the maze procedure, again attesting to its robust concept and physiologic foundation. Techniques employing a single tube graft in the manner in which the procedure was originally described continued to be advocated by high-volume centers, as does the use of custom "Valsalva" grafts commercially available stimulating the normal anatomy of the root. My own preferred technique involves 2 grafts of different size to reproduce the anatomy. I find this simpler, easier and less expensive. It is clear, however, that excellent results can be obtained in any of a variety of manners and with any of these techniques. Having said all of this, the valve sparing root repair is not a trivial procedure to learn or perform. This procedure, like many complex procedures in cardiovascular surgery today, is best performed by individuals with a specific focus and interest in the field.-like any complex procedure there is nuance and with greater experience, a greater number of valves can be preserved and repaired.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS6-2

VALVE SPARING REIMPLANTATION WITH THE VALSALVA GRAFT

Ruggero DePaulis

Department of Cardiac Surgery, European Hospital, Rome, Italy

The operations starts with a complete root dissection and with excision of the dilated sinuses leaving just a 7-8 mm rim of tissue along the basal attachment of the valve cusps. A long strip of aortic tissue above the commissure is also useful to better mobilize and play with the commissural posts. Next, 4/0 pledgeted suture are inserted from the left ventricle inside out avoid any pinching of the valve leaflets. Usually 9 suture are placed, one at the nadir and two at each inter-commissural triangle. At this point the appropriate size graft is chosen by measuring the annulus diameter and adding 5 mm to compensate for the aortic thickness and at the same time to re-establish the right proportion between annulus and ST junction. The entire proximal collar of the Valsalva graft is trimmed out leaving only the skirt with its proximal sewing stitch line. At this point the height of the skirt needs to be adapted to the commissural height. If the skirt is longer than the commissures, a line is marked at the proper distance from the ST junction in order to ensure that, once the suture are passed at the base of the graft, the top of the commissure will reach the new ST junction.

The suture are then passed along the marked line, the graft is parachuted down and secured to the base of the heart. The graft is cut at an appropriate length in order to have a nice vision from inside. The commissure are retrieved and, properly spaced are fixed at the level of the ST junction. The three black lines at 120° apart facilitate a good geometric positioning of the commissure. Once the commissure are fixed to the ST junction of the Dacron wall, the valve is evaluated for a good leaflet coaptation. If it is satisfactory the valve remnants are attached to the Dacron wall by means of three 4/0 running sutures starting at the nadir of each cusp towards the top of each commissure. Once the valve is properly re-implanted, the coronary button are sutured to the corresponding sinus using 6/0 prolene suture. Finally, the procedure is completed by stretching the body of the graft, trimming it at the appropriate length, and suturing to the distal aorta.

VS6-3

AN EXPANSIBLE AORTIC RING TO STANDARDIZE A PHYSIOLOGICAL APPROACH TO AORTIC VALVE REPAIR

Cheol Hyun Chung¹, Emmanuel Lansac²

¹Department of Thoracic & Cardiovascular Surgery, Asian Medical Center, Korea, ²Cardiovascular Surgery Department, Institute Mutualiste Montsouris, France

Dystrophy of the ascending aorta includes three phenotypes characterized by dilation of the aortic annular base ($>25\text{mm}$) and sino-tubular junction ($>35\text{ mm}$), with thin and pliable cusps: 1) aortic root aneurysms (sinuses of Valsalva (SoV) $>45\text{ mm}$), 2) supra-coronary aneurysm (SoV $<40\text{ mm}$); 3) isolated aortic insufficiency (AI) (all diameters $<40\text{ mm}$).

The two original valve sparing procedures - remodeling of the aortic root and reimplantation of the aortic valve - focused on root reconstruction to reduce the dilated diameters in order to restore valve coaptation. The reimplantation technique performs external subvalvular aortic annuloplasty but withdraws the SoV and includes the interleaflet triangles within a graft tube, impairing root dynamics. In contrast, the remodeling technique provides more physiologic cusps' movements within three reconstructed sinuses, preserving root expansibility through the interleaflet triangles, but without addressing annular base dilation.

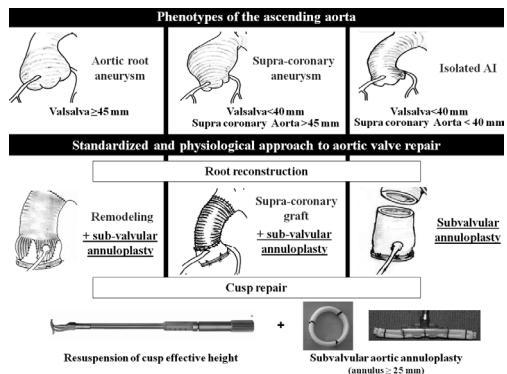
Furthermore, most valve sparing failures are due to cusp prolapse, either as a primary unrecognized lesion or induced after root reconstruction. Ideal procedures should treat annular base dilatation, while preserving root expansibility (interleaflet triangles) and vortices (SoV) as well as restoring cusp coaptation. Numerous technical variations have been described; this resulted in a lack of standardization and limited their widespread application.

Therefore we suggest a standardized approach to aortic valve repair, associating a physiological root reconstruction, with resuspension of cusp effective height, and an external subvalvular annuloplasty (CAVIAAR technique).

Depending on the phenotype, reduction of the sinotubular junction diameter will be achieved through a physiological root reconstruction according to the Remodeling technique (root aneurysm) or a supracoronary graft (supracoronary aneurysm). External annuloplasty is systematically added when aortic

annular base is $>25\text{ mm}$ using an expansible aortic ring.

Aortic annuloplasty combined with resuspension of cusp effective height are key steps for a reproducible aortic valve repair. Further clinical evaluation is needed to assess its durability.



VS6-4

CURRENT TECHNIQUE OF VALVE SPARING PROCESURES (DAVID'S REIMPLANTATION) IN AORTIC ROOT REPLACEMENT

Yutaka Okita

CVS, Kobe University, Japan

Current technique of David's reimplantation is reported. The ascending aorta was transected 1-2cm above the sinotubular junction. The coronary buttons are created. Minimum dissection of the coronary button is required. Dissection of the aortic root is achieved deeply to the aorto-ventricular junction. In left and non-coronary sinus, the dissection is done to the roof of the left atrium. Between the right and left coronary sinus, dissection is stopped at the aorto-pulmonary fibrous continuity. On the right coronary sinus, right ventricular muscle is dissected away from the root. The sinus Valsalva wall is resected leaving at least 5cm aortic tissue. Top of each commissures are tacked with by 5-0 polyethylene mattress sutures.

First row of the 3-0 braided polyester sutures with spaghetti are placed at the horizontal plain of the cusp nadir. At the membranous septum, the line of insertion is elevated for not to injure the conduction system. Usually 12 sutures are required to stabilize the aorto-ventricular junction.

The size of the Valsalva graft is determined by ventriculo-aortic junction diameter, length of the cusp free margin, height of the each cusp, sinotubular junction diameter, and the height of the commissure from the cusp nadir. The graft is out-inserted around the root and tying the sutures should not too tight otherwise the ventriculo-aortic junction is distorted. The height of the commissures should be kept as high as possible and should not deviate horizontally. In patients with bicuspid valve, the commissure orientation is kept to 180 degree.

Second row stitches are placed starting at the middle of the cusp. These sutures are should be water-tight.

If cusps are prolapsed, cusp repair is done. Free margin is plicated horizontally at the Arantius body adjusting to length of free margin of the reference cusp. The caliber is used to measure the effective height and the effective height is set to be 7-8mm. When a large fenestration exists, two rows of horizontal continuous mattress sutures of the ePTFE stitches are placed in the free margin.

In this stage, regurgitation test is done. The cardioplegic solution line is placed inside the graft and distal end of the graft was clamped. Crystalloid solution was infused through the cardioplegia line. The line pressure should be over 250 mmHg and the graft should be tense.

The coronary buttons are reattached to the side holes of the graft and the distal anastomosis to the aorta is done.

VS7-1

NEW INSIGHTS IN THE SURGICAL VENTRICULAR RECONSTRUCTION AND STICH TRIAL

Lorenzo Menicanti

Chief in Cardiac Surgery IRCCS Policlinico San Donato, Milano, Italy

Coronary artery disease is the most frequent cause of heart failure in the western societies and the HF can be the only mode of CAD presentation associated with increasing incidence and mortality.

Post infarction left ventricle remodeling is characterized by chamber dilatation and abnormal shape leading to systolic and diastolic dysfunction.

Early reperfusion salvages subepicardial but not subendocardial myocardium. The decline in prevalence of classical thin-walled left ventricle with clear demarcated zone between the contractile muscle and the diseased tissue determined by the aggressive initial management shows the possibility to interrupt the process before reaching the transmural stage.

Intensive medical management reduces symptoms and improves survival; however patients are high functional class (NYHA III-IV) have a poor 3 years prognosis with very high social and economical costs.

When after the occlusion of the Left Anterior Descending Coronary one-third or more of ventricular perimeter is involved, left ventricular volume increases, and the apical portion becomes rounded and subsequently involves also the basal portion. The pump function is globally depressed, these patients can be good candidates for SVR:

The success of this surgical procedure is based on volume reduction and the volume should be reduced in its septal, anterior and inferior component.

Recent papers demonstrated that here a cut of Left Ventricle volume can predict an important improvement in life expectancy in these patients, a LVESVI less than 70-60 ml/m². In the STICH trial this cut-off value was achieved in a small part of the population and in our understanding this is the reason of a global neutral result. More recently a subanalysis was performed in STICH population and the importance of this cut-off volume was confirmed.

According with data the SVR is a powerful tool to treat this type of patients, respecting right indication and correct surgical technique; the use of a sizer to calibrate the cavity can be very helpful. Studies are on going to incorporate in the procedure patches produced with biological matrix, to test the possibility to induce a circulating stem cells ingrowing.

This can be a very fascinating research field; in presence of positive results, this surgery would increase its strength.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS7-2

SAVE OPERATION

Hisayoshi Suma

Cardiovascular Surgery, Suma Heart Clinic, Japan

The SAVE (Septal Anterior Ventricular Exclusion) operation has been introduced to reconstruct a dilated left ventricle with akinetic septum due to ischemic and non-ischemic cardiomyopathy. The left ventricle is longitudinally incised anteriorly, and is thoroughly investigated by endocardial inspection and by palpation of the beating ventricular wall to detect the extension of the akinetic area. Endocardial interrupted mattress sutures with Teflon strip are placed along the posterior septum. This vertical suture line is important to from the ventricle ellipsoid shape. The anterior free wall is excluded by placing transmyocardial interrupted mattress sutures with Teflon strip. Then, these mattress stitches are sutured to the Dacron patch in a longitudinal oval shape (usually 1cm width and 3-4cm length), then excluded ventricular wall is closed to secure hemostasis.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

VS7-3

MITAL ANNULOPLASTY IN MITRAL REGURGITATION ASSOCIATED WITH SEVERE HEART FAILURE

Byung-Chul Chang, Jin Hong Wi , Su Kyung Chu, Sak Lee, Hyun Chul Chu, Young Nam Youn, Kyung Jong Yoo

Division of Cardiovascular Surgery, Severance Cardiovascular Hospital, Yonsei University, Seoul, Korea

It is well known that MR is associated with severe heart failure and with worse long-term outcomes. Symptoms of congestive heart failure and decreased LV function were thought to be indications for surgical mitral repair. However, it is unclear whether the MR is contributory or just a marker of progressive heart failure. Also there is controversy of mitral valve repair in long-term outcomes.

Between 2004 and 2012, 33 patients of moderate to severe MR associated with heart failure with LVEF less than 35% were operated. Mean age was 62 ± 10 years. The etiology of heart failure was idiopathic cardiomyopathy(CMP) in 13 and ischemic in 20. Baseline NYHA class were III in 18, IV in 15. Operatively, adequate size rigid annuloplasty ring was implanted in all patients except one with flexible ring. Concomitantly, coronary artery bypass surgery was performed in 18 and LV volume reduction surgery was done in 3 of ischemic CMP. There was 1 surgical death with sepsis. Mean follow-up was 44.8 ± 30.0 months. There were 2 late deaths of cardiac cause, 3 months postoperatively and the 1 and 5 year overall actuarial survival was $90.7 \pm 5.1\%$ and $86.4 \pm 6.4\%$ respectively (figure). Postoperatively, degree of MR was decreased less than grade 2 except 1 and was maintained during the follow up period. At mean follow-up of 33.2 months, echocardiography demonstrated that LVEF(25.9 ± 5.3 vs 33.2 ± 11.7 , $p < 0.001$), LVEDD(65.7 ± 8.0 vs 61.8 ± 9.0 , $p = 0.054$), and LVESD(56.3 ± 8.0 vs 51.5 ± 10.7 , $p = 0.034$) were changed significantly.

In patients with moderate to severe MR secondary to heart failure, mitral valve repair with adequate size mitral annuloplasty was feasible with relatively low mortality and was excellent functional recovery. In addition, long-term outcome such as NYHA class and parameters of echocardiography appeared to be excellent. These results encouraged us to continue adequate size mitral valve annuloplasty in moderate to severe MR associated with heart failure.

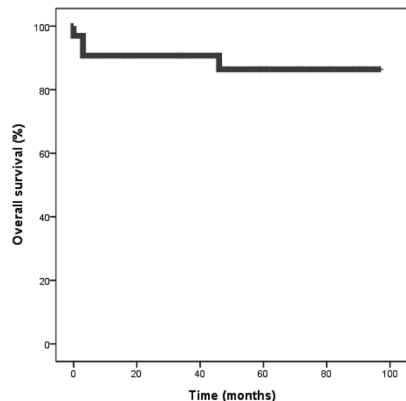


Figure. Kaplan Meier overall survival after mitral annuloplasty in moderate to severe MR associated with heart failure.

VS7-4

OVERLAPPING VENTRICULOPLASTY AND MITRAL COMPLEX RECONSTRUCTION

Yoshiro Matsui, Satoru Wakasa, Yasushige Shingu, Tomonori Ooka, Hiroki Katoh, Tuyoshi Tachibana, Suguru Kubota

Cardiovascular and Thoracic Surgery, Hokkaido University Graduate School of Medicine, Japan

OBJECTIVE: We have modified surgical ventricular reconstruction (SVR) methods and surgical approaches to functional mitral regurgitation for severely dilated heart. They were named as overlapping ventriculoplasty (OLVP) and mitral complex reconstruction (MCR).

TECHNIQUES: The concept of OLVP is LV volume reshaping without a patch or ventriculectomy. We make the longitudinal LV incision approximately 10 cm on the anterior wall along the left anterior descending artery. Then the free edge of the lateral side is sutured to the septal wall using cone-shaped sizer to determine the suture line to make LV shape ellipsoidal and not too small. When the antero-septal wall is not viable, the second layer is sutured just above the first suture line to prevent wall motion restriction by scar. This resembles the procedure reported by Guilmet or Stoney et al, but their indication was LV aneurysm and the lateral wall was largely covered by a scarred septal wall which may deteriorate diastolic function. When the antero-septal wall is viable, the medial side's edge is overlapped to the free wall. MCR consists of mitral ring annuloplasty, papillary muscle approximation (PMA), and papillary muscle suspension (PMS). PMA joins the entire papillary muscle side-by-side from the bases to the heads by pledgetted mattress sutures. Shortening the distance between the papillary muscles reduces the lateral and backward tethering of the mitral valve. PMS fixes the distance between the papillary muscles' heads and the mitral annulus with EPTFE suture. MCR is usually indicated when the papillary muscle distance in the end-diastole is greater than 30 mm in the short-axis view.

CONCLUSIONS: Although long-term prognosis of these procedures is undetermined, we believe that they are considered to be an important option of treatment at least as an alternative bridge to transplantation or artificial heart implantation.

PEL-1

TRANSFUSION-FREE CARDIOPULMONARY BYPASS IN NEONATES AND SMALL CHILDREN

Frank Merkle, Wolfgang Boettcher, Matthias Redlin, Roland Hetzer

Deutsches Herzzentrum Berlin, Germany

At the Deutsches Herzzentrum Berlin, a method for operating neonates and small children without the use of banked blood was developed over the course of the last decade. In a recent series of 288 pediatric patients, the effects of a comprehensive blood-sparing approach was investigated. The smallest neonate to undergo an operation without Cardiopulmonary Bypass (CPB) blood prime at our institution weighed 1.7 kg.

CPB technique involved a cardiopulmonary bypass circuit with a priming volume of 95ml for neonates with a body weight less than 3kg, and 110ml for neonates weighing more than 3kg. Larger children up to 15.9kg were operated on with a CPB prime of 200ml. Reduction of priming volume resulted from shortening of all CPB lines to the minimum, downsizing of all CPB lines, exclusion of unused CPB components, positioning of the CPB console in close proximity to the patient, use of a dedicated neonatal CPB console, use of vacuum-assisted venous drainage and from close co-operation between the perfusionist, cardiac surgeon and anaesthesiologist.

A total of 24.7% of these patients did not require any blood transfusion at all, whereas 51.7% of patients received intraoperative and postoperative blood transfusion. 23.6% of patients received post-operative blood transfusion only.

Transfusion-free CPB was technically feasible in approximately 50% of our pediatric patients, even in neonates and small children. During the development of the technique, it became apparent that very close team interaction is one of the keys to success. Next to suitable cardiopulmonary bypass equipment, the members of the operation room team are the factors that determine whether or not minimized pediatric cardiopulmonary bypass can be applied successfully.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PEL-2

UPDATE ON CARDIAC ANESTHESIA

Nian Chih Hwang

Department of Anaesthesiology, Singapore General Hospital, Singapore

New procedures

With continued advancement in the design of catheter-based device delivery system, stented-bioprosthetic valve can now be delivered percutaneous via the appropriate femoral vessel and be deployed at the aortic, pulmonary or mitral valve position, offering high risk patients hope when they would not have been suitable surgical candidates for surgical correction. Application of Mitraclip device and occluding devices for mitral paravalvular leak or the left atrial appendage may be performed in the cardiac catheterisation suite by interventional cardiologist. As general anesthesia is required to facilitate the application of transesophageal echocardiography for these procedures¹, the cardiac anesthesiologist must learn to adapt very quickly to the demands of the procedure and contribute as an effective and integral member of the team.

Current practice guidelines

Practice guidelines on preoperative fasting for healthy infants, children and adults were updated by the American Society of Anesthesiologists in 2011². The precautions and contraindications for the use of transesophageal echocardiography were updated by the American Society of Anesthesiologists and the Society of Cardiovascular Anesthesiologists Task Force on Transesophageal Echocardiography in 2010.¹ In the 2011 Update to The Society of Thoracic Surgeons and the Society of Cardiovascular Anesthesiologists Blood Conservation Clinical Practice Guidelines, there were eight areas of major revision and recommendations.³

Current research

Areas of continuing research include organ protection during cardiac surgery, determining the balance between an acceptable hemoglobin concentration transfusion trigger and the risk of homologous blood transfusion such as kidney injury, the appropriate dosing regime for tranexamic acid and balancing against the risk of postoperative seizure, and the cost and benefit of inhaled nitric oxide and prostacyclin in heart transplant and lung transplant recipients.⁴

References

¹ Anesthesiology 2010; 112:1–13.

² Anesthesiology 2011;114:495–511.

³ Ann Thorac Surg 2011;91:944–82

⁴ J Thorac Cardiovasc Surg 2009; 138:1417–24

PES1-1

BRAIN PROTECTION FOR COMPLEX AORTIC ARCH SURGERY

Yuichi Ueda

Department of Cardiovascular Surgery, Tenri Hospital, Japan

Technical management of cardiopulmonary bypass (CPB) is an integral component of successful cardiac surgery. In particular, complex thoracic aortic surgery requires more refined management of CPB. Because, brain protection during the interval in which normal circulation is interrupted is the most critical. As an adjunct to profound hypothermic circulatory arrest (HCA), retrograde (RCP) and selective antegrade (SCP) cerebral perfusion have been adopted with excellent results. It appears, however, that over the last decade SCP has gained greater acceptance as the “cerebral protection adjunct of choice” for arch repair with only a few institutes reporting the use of RCP.

Although dramatic improvements in surgical outcomes for aortic arch repair have been achieved, the incidence of stroke, temporary neurological deficit and fine neurocognitive changes still occur. As well as preventing ischemic brain injury, the prevention of stroke due to embolization of the thrombus or atheromatous debris is essential. Furthermore, many factors are associated with poor neurological outcomes, including emergency status, aortic dissection with malperfusion, degree of systemic atheromatous arterial disease, etc.

In this presentation, not only adjuncts for brain protection with SCP or RCP but also basic techniques including arterial cannulation, cooling and rewarming CPB will be elucidated.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PES1-2

FLOW MONITORING DURING ANTEGRADE CEREBRAL PERFUSION USING A SINGLE PUMP IN TOTAL ARCH REPLACEMENT

Hideyuki Shimizu, Akihiro Yoshitake, Toru Matayoshi, Masanori Morita, Satoshi Kawaguchi, Shinji Kawaguchi, Hidenobu Takaki, Takahito Ito, Shuji Haida, Akinori Hirano, Shinichi Taguchi, Ryohei Yozu

Department of Cardiovascular Surgery, Keio University School of Medicine, Japan

Background: Aortic arch surgery is challenging and the key to success is protecting the brain. We have perfused all three supra-aortic vessels with a single roller pump during aortic arch procedures since 1992. As the flow in each branch is not individually controlled under these conditions, we installed a Doppler flow-meter in the circuit and measured flow in the supra-aortic vessels to determine flow distribution during selective antegrade cerebral perfusion.

Methods: Between 2001 and 2011, 347 patients underwent aortic arch surgery using selective antegrade cerebral perfusion. Among them, 203 (159 men, 44 women; age, 27 to 84 years; elective, n = 158; urgent, n = 11; emergency, n = 34) underwent total arch replacement using a four-branched prosthetic graft while the flow of each supra-aortic branch was measured during selective antegrade cerebral perfusion.

Results: The respective mean flow rates in the brachiocephalic, left common carotid and left subclavian arteries and total flow rates were 5.8, 3.3, 3.3 and 12.5 mL/kg/min. The ratios of flow in these vessels to total flow were 46.5%, 26.5% and 27.0%, respectively, and they were not affected by the total flow rate. Three (1.9%) of 158 and five (11.1%) of 45 patients who underwent elective and emergency/urgent surgery died in hospital of pneumonia (n = 2), respiratory failure (n = 2), cerebral infarction (n = 1), arrhythmia (n = 1), sepsis (n = 1) and multiple organ failure due to acute aortic dissection (n = 1). Postoperative stroke occurred in 8 (3.9%) patients; four (2.5%) each were scheduled for surgery and emergency/urgent surgery. Temporary cerebral disturbances developed in 20 (9.9%) patients, 13 (8.2%) were scheduled for surgery and 7 (15.6%) underwent emergency/urgent surgery. Total flow in the supra-aortic vessels during selective cerebral perfusion was significantly lower in patients with, than without neurological complications (732 vs. 806 mL/min, p = 0.034). **Conclusions:** Total arch replacement under selective perfusion of three supra-aortic vessels using a single roller pump and monitoring the flow of each supra-aortic vessel provided clinically acceptable brain protection and achieved low mortality and morbidity rates. Blood flow seems to be distributed adequately when all supra-aortic vessels are perfused using a single pump during selective cerebral perfusion. However, monitoring flow rates in each supra-aortic vessel is recommended to detect kinking or mal-positioning of the perfusion catheter. Flow rate during selective cerebral perfusion is related to the incidence of postoperative cerebral complications.

PES1-3

Hidekazu Okitsu

Shizuoka City Hospital, Japan

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PES1-4

Toru Matayoshi

Keio University Hospital, Japan

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PES2-1

Long Cun

Fu Wai Hospital, China

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PES2-2

PERFUSION EDUCATION AND TRAINING IN JAPAN

Makoto Hibiya¹, Kiyoshi Yoshida², Naoki Momose³, Kyoichi Kemmoku⁴

¹*Faculty of Clinical Engineering, School of Health Sciences, Fujita Health University, Japan,*

²*Department of Clinical Engineering, Osaka Rosai Hospital, Japan,* ³*Department of Medical Engineering, Saitama Med. Ctr. Jichi Med. University, Japan,* ⁴*School of Biomedical Engineering, Saitama Medical University, Japan*

Certifications to perform clinical practice are practically national licenses in Japan.

It is indispensable requisites for a clinical technician to perform extracorporeal circulation as a Clinical Engineering Technologist (CET). A CET is an engineer who operates clinical equipment in the field of circulation, breathing, and metabolism.

The Ministry of Health, Labor and Welfare establishes required subjects in order for students to acquire this certification, and provides the official teaching guideline to training institutions.

Basic subjects, specialized subjects and trainings are also prepared to perform extracorporeal circulation, such as basic medicine, clinical medicine, basic engineering, Clinical monitoring devices, therapeutic apparatus, hemodialysis, respirator, extracorporeal circulation, medical safety, and so on.

The Japanese Society of Extra-Corporeal Technology in Medicine (JaSECT) certifies a Clinical Perfusionist (CCP), "Taigaijunken Gijutsu Ninteishi", jointly with other three societies to provide perfusion safety and to improve and/or maintain perfusion practice.

Essential requirements to be certified as a CET are gaining more than three years of perfusion practices, completing the JaSECT education curriculum, attending more than one educational seminar held by the Japanese Society for Artificial Organs, and operating perfusion cases of 30 or more.

The JaSECT education curriculum consists of 36-unit lectures, 27 hours, and one unit, 90 minutes, of practice training (troubleshooting). Those lectures are classified into three; basic perfusion, clinical perfusion, and applied perfusion.

Procedures for accreditation of a CCP at institutions in Japan is similar to that of American Board of Cardiovascular Perfusion (ABCP), although students, who learn perfusion to take CCP in the United State and Australia, are able to get a master's degree.

It will be expected to contribute to improvement of value in certification, perfusion study, and high standard of care, if a system which confers master's degrees to CCPs is employed in Japan.

PES2-3

PERFUSION EDUCATION IN THAILAND AND IN THE US

Paiboon Plookvongpanit

Surgey, Inland Cardiothoracic Surgical Associates, USA

Perfusion training in Thailand started as OJT (On-the-Job Training) programs in 1982 at three major hospitals in Bangkok. The first university-based perfusion course, Cardio-Thoracic Technology or CTT Program, was started in 1998 at Naresuan University. It is a 4-year Bachelor of Science degree that cross-trains students in cardiopulmonary bypass (CPB) techniques, procedures in cardiac catheterization laboratory, and non-invasive procedures such as echocardiography and ECG monitoring.

The first perfusionist training program in the US was started in 1969 at Cleveland Clinic Foundation. Over the next 33 years we see the number of perfusion programs went from a high of 35 down to the current level of 17.

Programs are generally 1 to 4 years in length, depending on the program design, objectives, prerequisites and student qualifications. Certificate programs require that applicants have a bachelor's degree.

Curricula of accredited programs include courses covering heart-lung bypass for adult, pediatric and infant patients undergoing heart surgery; long-term supportive extracorporeal circulation, monitoring of the patient undergoing extracorporeal circulation; autotransfusion; and special applications of the technology.

A two-part exam is required to become a certified clinical perfusionist and use the designation C.C.P. In the United States, this exam is administered and evaluated by the American Board of Cardiovascular Perfusion. In addition, there are recertification requirements for perfusionists in which proof of a minimum number of clinical procedures and attendance to scientific or educational meetings must be provided to American Board of Cardiovascular Perfusion. These recertification requirements and subsequent verification process occur every three years and are mandatory to maintain certified status to use the designation certified clinical perfusionist.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PES2-4

PERFUSION EDUCATION AND TRAINING IN EUROPE

Frank Merkle

Deutsches Herzzentrum Berlin, Germany

Perfusion Education and Training in Europe is organized individually in each country. Only in a small portion of Member States, the profession of cardiovascular perfusionist is nationally regulated. The European Board of Cardiovascular Perfusion (EBCP) was founded in 1991 as a supervising organization. Some of the goals of EBCP as an independent body in Perfusion Education and Training are establishing, monitoring and maintaining equality of standards and accreditation of perfusion education programmes as well as issuing a European certificate in perfusion. Currently, 24 European countries have delegates to the EBCP, as well as one affiliated country from outside of Europe.

Due to the historic development of the European Union, a multitude of cultural and educational settings exist in its member countries. These differences include language, organization and structure of the education system as well as differences in the organization and structure of the healthcare system. 13 Member States to the EBCP have accredited their Perfusion Education Programmes. Programme organizational structures as well as academic levels vary largely between countries and include vocational training programmes, Bachelor or Master degree courses. Upon graduation from these programmes, cardiovascular perfusionists may apply for EBCP examination. Under certain circumstances, the perfusion school graduates may receive their European certificate without further examination under the so called Harmonization Procedure. Certified European perfusionists need to re-certify every three years in order to keep their status.

For the future, it is expected that Perfusion Education and Training Programmes will be upgraded to academic level degree courses throughout the majority of European countries. The establishment of a European Common Platform for Perfusion Education is a long-term goal.

PES3-1

WHAT HAVE WE LEARNED AFTER 20 YEARS' EXPERIENCE?

Hsiao-Huang Chang

Division of Cardiovascular Surgery, Department of Surgery, Taipei Veterans General Hospital, Taiwan

Extracorporeal membrane oxygenation (ECMO) has been widely used in the treatment of severe cardiac or respiratory failure patients for over twenty years. Through the progress of ECMO machine, circuits, cannula as well as the implantation surgical techniques and post-operative care, the results of these critically ill patients are improving by times. We can see the improvement in many different patient groups. Because the results are changing, we can see the indications and contraindications are changing also. Some of the indications are straightforward and clear, like post-heart transplant right ventricle failure, acute myocarditis, and viral pneumonia with acute respiratory distress syndrome. ECMO could benefit certain percentages of these patients indeed. However, some of the indications and contraindications of ECMO therapy are still controversial, like age and underlying disease. In Taipei Veterans General Hospital, we started the ECMO program since September 1992. We have more than 700 ECMO implants since then. The general results are comparable to the international registry. In the meantime, we found some of the comorbidities and underlying problems of these patients could make a completely different result. The prognosis is significantly worse in patients who have interstitial lung disease, auto-immune disorder and malignancy. The indications of ECMO therapy of these specific patients should be carefully evaluated.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PES3-2

RESPIRATORY ECMO IN JAPAN

Shinhiro Takeda

ICU & CCU, Nippon Medical School, Japan

Although the survival rate of H1N1-related severe respiratory failure following ECMO therapy was high in several countries, that in Japan was very low. In Japan, no network system or center for ECMO therapy is available, and ECMO has been applied only at individual medical facilities in cases where this therapy was indicated. To improve the outcomes of ECMO therapy not only in Japan but also in other countries inexperienced with ECMO therapy, efforts should be made along the following lines: (1) supply ECMO equipment suitable for treatment of severe respiratory failure; (2) promote a full understanding of the ECMO treatment strategy by physicians and other medical staff; and (3) transfer patients to central facilities established for this therapy.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PES3-3

WHAT DO WE NEED FOR SUCCESSFUL STANDARD RESPIRATORY ECMO IN ADULTS?

Shingo Ichiba

Community and Emergency Medicine, Okayama University Graduate School, Japan

Patients who require Extra-Corporeal Membrane Oxygenation (ECMO) for severe but reversible acute respiratory failure are those who have failed to respond to appropriate conventional ventilatory management. Successful treatment of a patient requires appropriate patient selection and management of the patient's overall condition, including the related technical issues. There are two types of ECMO, venovenous (VV) and venoarterial, and VV ECMO is used in patients with respiratory failure.

The role of ECMO itself in adult has been less well established. Its role as an intervention for patients with severe respiratory failure and the associated evidence for this technique has been less clear. The CESAR trial evaluated the clinical and cost effectiveness of ECMO for adults with severe respiratory failure. It represents the most comprehensive randomized controlled trial undertaken on adult respiratory ECMO and it reported a survival benefit for patients referred to an ECMO center compared to those who received conventional management. With regard to safety, although this treatment carries high risks, extracorporeal circuits are now widely used in Japanese ICU settings, and clinical skills are well understood. However, we have limited equipment and man-power for providing appropriate ECMO therapy, compared with those of global advanced ECMO centers.

The concept of regionalization is one of the important issues for ECMO. The ECMO center should be based in the tertiary medical center with general critical care unit which can provide whole system care for these patients. For patients who are in a medical center that does not provide ECMO, transfer to another medical center to be evaluated for ECMO should be considered as soon as it is clear that the patient is not responding to conventional management. In ECMO center, the doctors with full knowledge of ECMO, cardiovascular surgeons, perfusionists and ECMO specialists who are ICU nurses with special skills managing ECMO patients at the bed side, should work as a team in order to achieve successful management of the patients on ECMO.

Most expert's opinions suggest that one ECMO center should aim to treat at least 10 patients per year to ensure patient safety and to maintain clinical skills. However, only 1 or 2 patients with respiratory failure on average have been treated in Japan in 2011, according to the survey conducted by Japanese Society of Research on Membrane Oxygenator. This is one of the most important issues to be considered in terms of providing standard ECMO treatment system in Japan.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

PES3-4

THE ROLE OF ECMO

Claudio Soto, E. Granger, F. Junius, A. Dinale, J. Cropper, R. Pye, A. Jackson, K. Dhital, P. Jansz, P. Spratt

Cardiothoracic Surgery, St.Vincent's Hospital, Australia

The first case of ECMO at St Vincent's Hospital using the current oxygenator technology was in 2004 for severe legionella pneumonia. Since this time the program has evolved from an "experimental salvage therapy" in terminally ill patients to a standard therapy for advanced respiratory and cardiac failure. Compared with the pre-2004 "lucky" survivors, patients now have dramatically improved survival rates with low morbidity and an expectation of returning to an almost normal quality of life. This presentation will outline the current status of ECMO at our institution: its role in long distance retrieval of patients from regional hospitals; CPR ECMO for in hospital cardiac arrest; bridge to organ recovery or transplantation. As a major transplantation and mechanical assist hospital, ECMO has a key role in supporting the Heart Lung Transplant program and providing a means of transporting critically ill patients to definitive care. The future of ECMO will be shaped by this critical role and will additionally benefit all applications of extracorporeal support.

NL-1

LEADERSHIP

Janet H Johnson

Cardiology, The Mount Sinai Hospital, USA

What is a leader? Who are our leaders? Are there only “born leaders” or can leadership be developed and nurtured. Are you a leader? Depending on whom you may ask, one may get a variety of answers to these questions. This talk will explore some of the key components of leadership and how they relate to an advanced practice providers. A leader must have a clear vision of how to achieve excellence. They must be able to envision future successes and make a plan of action to achieve that success. A leader must have a positive outlook, coupled with self confidence. There will be challenges, but if you believe in yourself others will also. Strategies are created to develop significant partners. A leader learns from mistakes. We all can make a mistake, but it is a leader who does not define it a failure, but as a learning experience. To keep leading, one must keep learning. No one can sustain a leadership position without continued professional development. Leaders touch a heart before they ask for a hand. There must be a connection to those that they lead. A leader must be a mentor and take a direct interest in the formal or informal guiding of others within the profession.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

NL-2

Physician Assistants and Nurse Practitioners in Cardiothoracic Surgery: A 40 Year Experience at Emory Healthcare

Dianne E. Bailey

Emory Center for Critical Care, USA

Physician assistants (PAs) and nurse practitioners (NPs) are non-physician healthcare providers (NPPs) that have been utilized in the Division of Cardiothoracic Surgery (CTS) at Emory University Health Sciences Center and Emory Healthcare since 1973.

Beginning in the Emory University Hospital (300 cardiac operations and 150 thoracic operations) with two graduates of the Duke University School of Medicine Physician Assistant Program, the Division of Cardiothoracic Surgery now employs 24 PAs and 4 NPs to assist in the preoperative evaluation, surgical assisting and postoperative management of approximately 2500 adult cardiac cases, 1400 adult thoracic cases and 800 congenital cases in five hospitals.

In the two largest of the five hospitals, the CTS NPs and PAs do not participate in CTS Intensive Care Unit (ICU) management, where the CTS team of the Emory Center for Critical Care (ECCC) -- 8 PAs, 7 NPs and rotating anesthesiology critical care faculty -- is responsible for "around-the-clock" ICU care.

PAs and NPs cooperate well with the CTS residents and fellows in preoperative, operative, and postoperative care, facilitating more operative experience for surgical trainees and improved quality, safety, efficiency, and patient satisfaction.

Although coming from different educational backgrounds (nursing school model versus medical school model), the scope of clinical practice for these NPPs varies little within the Division of Cardiothoracic Surgery of Emory Healthcare. Details of educational processes and clinical practice will be presented.

NL-3

ADVANCING NP, PA PRACTICE IN SOUTH KOREA (SNUBH EXPERIENCE)

Cheong Lim

Seoul National University Bundang Hospital, Korea

Setting up a PA program began in 2003 with opening of our new hospital. Initially PA system was introduced to compensate the shortage of residents in our field. However, it was not so long until we realized that it was more elaborate and valuable tool to manage the patient satisfaction and to improve the quality of care. As a result, the PA system in our hospital is essential and indispensable nowadays.

Our department runs two different types of PA's. The first one is nurse practitioner(NP), mainly working at the ward and out-patient department. They played a major role in managing not only the clinical, but also official works regarding the admission, operation, postoperative care, discharge planning, education, survey, inquiry and database management. Prompt and professional communication are the most important point to improve the level of total care, including the patient, family members, and all the related medical personells.

The second one is surgical assistants (SA), mainly working at the OR. They played a major role in preparing and participating the operation as the second assistant. Professional and skilled operative technique made it possible to improve our surgical results. They also participated in making various audiovisual contents including surgical photos, movies, records, and educational works.

In general, people may think that the PA or NP is a simple substitute of residents. However, our experience shows that the PA system is unique and more than we can imagine. It makes our customer satisfaction highest enough to help the patient be rehabilitated earlier and to improve the quality of life.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

NS-1

Lee Siu Yin

National University Hospital, Singapore

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

NS-2

Dorren Chew Mei Leng
National University Hospital, Singapore

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

NS-3

NURSE PRACTITIONERS TEND TO HELP CRITICAL HEALTHCARE SYSTEM

Pyng Jing Lin

Cardiac Surgery, Chang Gung Memorial Hospital, Chang Gung University, Taoyuan, Taiwan

Taiwan's apparently wonderful national health insurance system is based on the work performed by medical staffs in the healthcare system. How these hospitals are run has a direct impact on the quality of treatment and in the end it is the patients who are most affected. Registered nurses, resident doctors and interns from various medical facilities have been complaining about the conditions they are expected to work under.

Starting since 1987, there are more than 1,500 nurse practitioners (NPs) in Taiwan. They were senior nurses and get their positions after passing through strict training and national examinations. Their license should be renewed every 6 years after 180 hours continuous nursing & medical educations. NPs have played an integral role in the maintenance of a high standard of medical treatment in Taiwan. The continuous and comprehensive nursing and medical care that they provide, side by side with doctors, is especially important to critically ill patients. Due to a lack of resources, critical-care doctors have to struggle to divide their time between the operating theater, the emergency room and various examination rooms. Also, as residents are not always available or very decisive when it comes to treating critically ill patients, it is often NPs who provide the best support for critical-care physicians. NPs can write medical records, arrange laboratory tests or radiological studies, and prescribe medicines under clinical pathways or oral orders from the physicians. They can provide medical or nursing instruction, including preoperative or preprocedures explanations, to patient and their family. They also serve as good communicators between patient's family and the physicians.

NPs have become an important part of the maintenance and improvement of the quality of critical medical care in regional hospitals and medical centers all around Taiwan.

NS-4

CURRENT STATUS OF NURSE PRACTITIONERS IN KOREA

Ji Eun Han

Department of Thoracic and Cardiovascular Surgery, Seoul National University Bundang Hospital, Korea

With the change of medical environment in Korea, there is difficulty in recruiting thoracic residents. As a solution, Korean medical facilities are utilizing nursing staffs who had special training for patient care of thoracic and cardiovascular surgery, and they are called as nurse practitioners (NPs), physician assistants (PAs), or specialized nurses (SNs). The necessity of this kind of personnel is getting bigger in Korea.

The role of NP is variable according to institutional policy as well as the level of training and clinical experience. In general, NP works under supervision of medical doctors. They participate in the whole patient care, such as preoperative and postoperative patient education, postoperative patient care, patient follow up, transplantation coordinator work, data management, research work, etc.

In the difficult situation of recruiting thoracic residents, NP is able to replace their works and support medical doctors efficiently. Even in administrative aspect of the hospital, because NP is not rotating temporary position, it is not difficult to recruit nurses as NPs and train them for the dedicated jobs.

The main problem in utilizing NPs in Korea, especially in thoracic surgery, is that the status of NP is not established or certified by the government. Even though The Korean Association of Thoracic and Cardiovascular Surgery has provided educational program annually since 2011, the certification program by Korean government should be established as soon as possible. Because of this ambiguous condition, there may be conflicts between these people and residents and advanced nurse practitioners (ANPs), and even patients.

The nurse practitioner program in Korea has been developed to solve the shortage of thoracic residents and has performed its role successfully. However, we still need to define our work more in detail and promote ourselves to the certified status by the government.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

NS-5

PRESENT STATUS OF CRITICAL CARE ACTIVITY OF CNSS IN JAPAN

Akemi Utsunomiya

Cardiovascular Surgery of Hyogo College of Medicine Hospital, Adult Nursing, St Luke's College of Nursing, Japan

In Japan, specialized nurses (Certified Nurse Specialist ; CNS) were first introduced in the field of oncology and psychiatric nursing in 1995, and those specializing in acute care and seriously ill patients (critical care CNS) were introduced in 2005. I started my activity as a specialized nurse in critical care in 2005, working mainly in respiratory/cardiovascular care of surgical patients. Last year, the official number of approved CNS in critical care, like me, reached 100 in Japan. There are six categories of activity in the work of CNS such as practices, consultations, coordination, decision making care, education and researches. CNSs are in charge of promoting team medicine through these six roles. I would like to make a report of the status-quo of these activities, and the model performed in the perioperative nursing clinic of cardiovascular surgery at Hyogo College of medicine Hospital, which is rare in Japan where critical care activity is performed.

F-1

OFF-PUMP TECHNIQUE REDUCED OPERATIVE MORTALITY AND MAJOR COMPLICATIONS IN REDO CORONARY ARTERY BYPASS GRAFTING : A PROPENSITY SCORE ANALYSIS FROM A JAPAN CARDIOVASCULAR SURGERY DATABASE

Masahiro Dohi¹, Kiyoshi Doi¹, Hiroaki Miyata², Noboru Motomura³, Shuhei Fujita¹, Suguru Ohira¹, Tsunehisa Yamamoto¹, Taiji Watanabe¹, Kazunari Okawa¹, Shinichi Takamoto³, Hitoshi Yaku¹

¹Department of Cardiovascular Surgery, Kyoto Prefectural University of Medicine, Japan, ²Department of Healthcare Quality Assessment Graduate School of Medicine, The University of Tokyo, Japan, ³Department of Cardiac Surgery, Faculty of Medicine, University of Tokyo, Japan

Objective: The benefits of off-pump coronary artery grafting (OPCAB) have been demonstrated, especially in patients with high co-morbidity. Redo CABG is a still difficult entity of CABG, because patients are likely have multiple risk factors and often have diseased patent grafts in adhesion. The aim of the present study was to evaluate the effects of the OPCAB technique on mortality and morbidity of CABG from a Japan Cardiovascular Surgery Database (JCVSD).

Methods: We analyzed 46,576 patients who underwent isolated CABG through JCVSD between 2005 and 2011. Of these, we identified 892 (19.2%) patients who underwent redo CABG, including those who underwent OPCAB (n = 524; 58.7%) and on-pump CABG (n = 368; 41.3%). We used propensity-score (PS) matching with 13 preoperative risk factors to adjust for differences in baseline characteristics between the OPCAB and on-pump CABG groups. By one-to-one PS matching, we selected 200 pairs of OPCAB and on-pump CABG.

Results: There were no significant differences in patient background between the OPCAB and on-pump CABG groups after PS matching. The patients into OPCAB group had a lower tendency although there were no significant difference between two groups (3.5% vs 7.0%; P = .177). The OPCAB group had a significantly lower rate of composite mortality and major morbidities (11.0% vs. 21.5%; P = .006), prolonged ventilation (>24h) (7.0% vs. 15.0%; P = .016), shorter duration of intensive care unit (ICU) stay (the number of patients who stayed in the ICU for more than 8 days) (7.0% vs. 14.5% days; P = .023), and shorter mean operative time (353.7 min vs. 441.3 min; P < .0001) than the on-pump CABG group.

Conclusion: The off-pump technique reduced early operative mortality and the incidences of major complications in redo CABG.

F-2

DOSE SURGICAL APPROACH HAVE ANY IMPACT ON MORTALITY AND MORBIDITY AFTER BLALOCK-TAUSSIG SHUNT PROCEDURES. RISK MODELS BASED ON THE JAPAN CONGENITAL CARDIOVASCULAR SURGERY DATABASE

Takeshi Konuma¹, Hiroaki Miyata², Arata Murakami², Ai Tomotaki², Takao Goki², Goki Matsumura², Syunji Sano², Shinichi Takamoto²

¹Department of Cardiothoracic, Mie University, Japan, ²Japan Cardiovascular Surgery Database Organization, Japan

OBJECTIVE

To evaluate the impacts and the risk factors of surgical approach to mortality and morbidity after Blalock-Taussig shunt operation.

METHODS

Data were abstracted from The Japan Congenital Cardiovascular Surgery Database (JCCVSD; 2010 to 2012). Inclusion criteria was all neonate and infant who received a Blalock-Taussig shunt (BTS) without cardiovascular bypass. The risk factors of surgical approach, median-sternotomy and thoracotomy were assessed.

In addition we incorporated patient characteristics and risk factors to predict surgical outcome as propensity score matching model.

RESULTS

A total of 923 patients underwent BTS. Surgical approach was median-sternotomy in 292 patients (31.6%) and thoracotomy in 631 patients (68.3%). Diagnosis included Univentricular heart including PPA/IVS (32.5%), TOF (25.5%), DORV (11.7%), and neonate was 227 (24.6%) and infant was 692 (75.4%). In neonate median-sternotomy was 29.8% (87/205) and thoracotomy was 22.2% (140/491), and in infant median-sternotomy was 70.2% (205/292) and thoracotomy was 77.8% (491/631) ($p < 0.05$). Hospital mortality was 8.9% (26/292) in median-sternotomy and 3.2% (20/631) in thoracotomy patients. Propensity score matching model showed no differences in 30 days mortality (4.7%; 5.1%) and Hospital mortality (5.5%; 8.0%) between median-sternotomy and thoracotomy. Statistically there was not any preference at the point of view of surgical approach choice by diagnosis or low body weight or emergent operation. All median-sternotomy patients had preoperative risk factors (acidosis, mechanical ventilator, etc.) and only 78% of thoracotomy patient had preoperative risk factors ($p < 0.05$). There was not any difference in postoperative complications (permanent pacemaker (0%), neurological deficit (0.5%), infection (0%), circulatory support (0.4%), chest left open (0.2%), pulmonary hypertension crisis (0.2%)) except for mechanical ventilator support (2.9% in thoracotomy; 0% in median-sternotomy) between two surgical approaches.

CONCLUSIONS

Propensity score model showed mortality was not different by surgical approach at the BTS operation in neonate and infant in Japan. Postoperative complication was low in both procedures.

F-3

LVAD AS A NEW PLATFORM FOR SURGICAL STRATEGY FOR END-STAGE HEART FAILURE

Koichi Toda, Shigeru Miyagawa, Hiroyuki Nishi, Yasushi Yoshikawa, Satsuki Fukushima, Daisuke Yoshioka, Tetsuya Saito, Satoshi Kainuma, Takayoshi Ueno, Tohru Kuratani, Yoshiki Sawa

Department of Cardiovascular Surgery, Osaka University Graduate School of Medicine, Japan

Objective: Mechanical circulatory support with a continuous flow left ventricular assist device (LVAD) plays an important role in the treatment of end-stage heart failure. The aim of this study is to investigate clinical impact of continuous flow LVADs in comparison with non-LVAD strategy including surgical ventricular reconstruction with restrictive mitral annuloplasty (SVR+MAP) and cell therapy using myoblast cell sheets.

Methods: Between 2005 and 2012, 50 consecutive patients with end-stage heart failure were supported by continuous flow implantable LVADs (LVAD group). During the same period 59 patients underwent SVR+MAP (SVR+MAP group) and 17 patients were treated with cell therapy using myoblast sheet (cell sheet group) and postoperative outcome were compared among the groups.

Results: Preoperatively LVAD patients were younger and were more dependent on inotropic support (100% in LVAD, 7% in SVR+MAP, and 6% in cell sheet groups). On the other hand no difference was found in echocardiographic data including LVDd, LVDs, and LVEF. No mortality was encountered within 30 days after surgery and 3 years survival was 90% in LVAD group. SVR+MAP group demonstrated significant cardiac reverse remodeling indicated by 41 % reduction in LVESVI and increase in LVEF. Three years survival rate was 63% and multivariate analysis identified preoperative pulmonary hypertension was a significant predictor of recurrence of heart failure in SVR+MAP group. In cell sheet group all patients survived and cardiac reverse remodeling was recognized.

Conclusions: Our results indicated that long-term LVAD support may have survival benefit equivalent to heart transplantation and it may provide us a unique platform for cell therapy as well as back-up for recurrent heart failure after traditional surgical approach.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

F-4

18F-FAMT PET IS USEFUL FOR THE DIAGNOSIS OF LYMPH NODE METASTASIS IN OPERABLE ESOPHAGEAL SQUAMOUS CELL CARCINOMA

Makoto Sohda¹, Hiroyuki Kato², Shigemasa Suzuki¹, Naritaka Tanaka¹, Akihiko Sano¹, Makoto Sakai¹, Takanori Inose¹, Masanobu Nakajima¹, Tatsuya Miyazaki¹, Minoru Fukuchi¹, Hitoshi Ojima¹, Hiroyuki Kuwano¹

¹*Department of General Surgical Science, Gunma University Graduate School of Medicine, Japan,*

²*Department of Surgical Oncology, Dokkyo Medical University, Japan*

Background. The role and potential usefulness of PET scanning in certain tumors has been widely investigated in recent years. 18F-FAMT is an amino acid tracer for PET. This study investigated whether PET/CT with 18F-FAMT provides additional information for preoperative diagnostic workup of esophageal squamous cell carcinoma compared with that obtained by 18F-FDG-PET or CT.

Methods. PET-CT studies with 18F-FAMT and 18F-FDG were performed as a part of the preoperative workup in 21 patients with histologically confirmed esophageal squamous cell carcinoma.

Results. For the detection of primary esophageal cancer, 18F-FAMT PET exhibited a sensitivity of 76.2% whereas the sensitivity for 18F-FDG-PET was 90.5% ($p=0.214$). 18F-FAMT uptake in the primary tumors showed significant correlation with depth of invasion ($p=0.005$), lymph node metastasis ($p=0.045$), stage ($p=0.031$), and lymphatic invasion ($p=0.029$). In the evaluation of individual lymph node groups, 18F-FAMT-PET exhibited 18.2% sensitivity, 100% specificity, 71.9% accuracy, 100% positive predictive value (PPV) and 70.0% negative predictive value (NPV), compared with 24.2%, 93.7%, 69.8%, 66.6% and 70.2%, respectively, for 18F-FDG-PET. CT exhibited 39.4% sensitivity, 85.7% specificity, 69.8% accuracy, 59.1% PPV and 73.0% NPV. The specificity of 18F-FAMT-PET is significantly higher than that of 18F-FDG-PET ($p=0.042$) and CT ($p=0.002$). 18F-FAMT-PET did not have any false-positives compared to those with 18F-FDG-PET.

Conclusion. Our findings suggest that addition of 18F-FAMT-PET to 18F-FDG-PET and CT would provide more precise staging of esophageal cancer.

F-5

PREOPERATIVE LIPIODOL MARKING FOR SMALL-SIZED LUNG CANCERS

Junichi Shimada¹, Daishiro Kato¹, Masanori Shimomura¹, Hiroaki Tsuneduka¹, Shunta Ishihara¹, Satoru Okada¹, Takuji Yamagami², Rika Yoshimatsu², Hiroshi Miura², Osamu Tanaka²

¹Department of General Thoracic Surgery, Kyoto Prefectural University of Medicine, Japan,

²Department of Radiology, Kyoto Prefectural University of Medicine, Japan

[Objective] The strategy for small lung tumors is important because the precise imaging devices can find out them. We sometimes perform Video-Assisted Thoracic Surgery (VATS) for therapeutic resection and decision of the pathological diagnosis. The lung parenchyma is soft and deformable because of filled-air, so that the small lung tumors, such as bronchioloalveolar carcinomas, are difficult to find out from the surface of the lung. It is very important for surgeons to comprehend a tumor position exactly during the operation. We usually do preoperative lipiodol marking for small-sized lung tumors with a CT-fluoroscopy, and remove marked lesions under a X-ray fluoroscopy to make untouchable and invisible tumor into "visible target".

[Methods] We analyzed 330 lesions in 200 cases, in which the unconfirmed but lung cancer-suspected lesions are less 10 mm in diameter, or deep inside from the visceral pleura, or ground glass opacity.

One to three markings with lipiodol were done in each case. The tumor was 7.7 ± 5.1 mm in diameter. Before operation, we injected 0.1-0.6 mL lipiodol at the vicinity of the tumor with a CT fluoroscopy. In VATS operations, we checked and resected the lipiodol-marked lesion under a X-ray fluoroscopy.

[Results] This marking procedure took 24.7 minutes per lesion.

Pneumothoraces occurred as complications in 119 cases (59.5%). No air embolization was occurred. All lipiodol-marked lesions were detectable and safely resected. Pathological examinations revealed lung cancers in 47 cases, atypical adenomatous hyperplasia in 8 cases, and organized pneumonia in 104 cases. There were no histological modifications in and around lipiodol markings.

[Conclusions] The lipiodol marking with CT fluoroscopy before VATS operations is an useful technique for early and small lung tumors.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P

F-6

LONG TERM OUTCOME OF AORTIC VALVE AND ROOT REPLACEMENT WITH BENTALL PROCEDURE IN 1112 PATIENTS OVER THIRTY-FOUR YEARS. BOLOGNA'S EXPERIENCE

Luca Di Marco, Davide Pacini, Antonio Pantaleo, Paolo Berretta, Emanuele Pilato, Giovanni Pellicciari, Giuseppe Marinelli, Roberto Di Bartolomeo

Department of Cardiac Surgery, Bologna University School of Medicine, Italy

Objective. Aortic root replacement using composite graft represents the treatment of choice for a large variety of aortic root diseases. The aim of the current study is to evaluate the long-term results of this procedure.

Methods. Between 1978 and 2011, 1112 patients aged 58.8 ± 13.7 years (893 males) underwent aortic root composite graft replacement: 95 (8.5%) underwent Bentall operation, 992 (89.2%) were operated following the "button technique", whereas 25 (2.2%) underwent Cabrol technique. Six-hundred seventy eight patients (61%) had annuloaortic ectasia and 177 (15.9%) aortic dissection.

Results. Overall in-hospital mortality was 5.1% (57/1112). Independent risk factors for in-hospital mortality at logistic regression analysis were age ($p=0.051$, $OR=3.2$), preoperative NYHA class III-IV ($p=0.015$, $OR=5.9$), aortic dissection ($p=0.059$, $OR=3.6$) and Cabrol technique ($p=0.065$, $OR=2.2$). Overall actuarial survival at 5, 10, and 20 years was $83.8\% \pm 1.3\%$, $65.6\% \pm 2.6\%$, and $36.2\% \pm 5.1\%$, respectively. Multivariate analysis revealed preoperative EF $< 50\%$ ($p=0.057$, $OR=3.1$), postoperative neurologic complications ($p=0.013$, $OR=6.1$) and postoperative pulmonary complications ($p=0.046$, $OR=3.9$) to be significant predictors of late death. Freedom from thromboembolism, freedom from bleeding complications, and freedom from endocarditis was $90.1\% \pm 4.3\%$, $90.4\% \pm 3.1\%$, and $99\% \pm 0.4\%$ at 20 years, respectively. Freedom from aortic reoperation was $91.8\% \pm 2.1\%$ at 20 years, and was significantly lower in patients with aortic dissection.

Conclusions. Aortic root replacement for aortic root aneurysms can be performed with low morbidity and mortality and with satisfactory long-term results. Few late serious complications were related to the need for long-term anticoagulation or a prosthetic valve. Reoperation on the proximal or in the distal aorta was most commonly performed in patients with aortic dissection.

F-7

PROSPECTIVE RANDOMIZED CONTROLLED TRIAL COMPARE BETWEEN UNI AND BIPOLAR RADIOFREQUENCY ABLATION IN MITRAL VALVE DISEASE PATIENTS

Choosak Kasemsarn¹, Panissara Swangweaw¹, Piyawat Lerdsomboon¹, Vibhan Sungkahaphong²

¹Department of Cardiothoracic Surgery, Central Chest Institute of Thailand, Thailand, ²Department of Anaesthesiology, Central Chest Institute of Thailand, Thailand

Objective: The association between mitral valve disease and atrial fibrillation (AF) is common. The classical Maze demonstrated excellent result. A simplified Maze with radiofrequency ablation (RFA) is good result with low risk. In this study, we randomized compare between unipolar and bipolar RFA. in term of rhythm at 1 year.

Methods: From October 2007 to September 2011, a radiofrequency ablation concomitant with mitral valve operation was performed on 126 patients. All patients presented with permanent atrial fibrillation. The patients were randomly assigned into 2 groups: unipolar (n = 62) and bipolar (n = 62) RFA. The primary outcome measure was freedom from AF and atrial flutter at one year.

Results: At 12 months, among 115 survivors freedom from AF was present in 51 (87.9%) of 58 unipolar cohort and in 47 (83.9%) of 56 bipolar cohort ($p = 0.539$). Mean extra time during arrested heart for left side RFA 29.5 minutes for unipolar were and 37.2 minutes for bipolar ($p < 0.001$). Mean extra time during beating heart for right side RFA were 11.1 minutes versus 13.1 minutes (0.039). Mean total extra time were 40.6 minutes versus 50.3 minutes ($p < 0.001$).

Conclusions: Radiofrequency ablation combined with mitral valve surgery is safe and beneficial to continuous AF concomitant with mitral valve disease patients. Unipolar and bipolar irrigated radiofrequency ablation yield comparable rhythm success at 1 year but bipolar RFA takes longer operation time.

IL

PL

S

VS

PEL

PES

NL

NS

F

O

P