The Basic Echo Boards Review Course

October 14, 2011 • Palmer House Hilton • Chicago, IL

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Course Objectives
At the conclusion of this course, attendees will:
1) be better prepared to take the Basic Echo Board Examination; and
2) have received a comprehensive review of the basic principles of hemodynamics and image acquisition and interpretation.

Course Description
1) This course is designed to benefit anesthesiologists who plan on taking the Basic Echo Board Examination.

2) It will be conducted in a written board format via an interactive examination with an audience response system consisting of written and video-based questions followed by explanations and discussions.

3) There will be an interactive review of the basic principles of ultrasound physics, hemodynamic principles, image acquisition and anatomical interpretation.

Course Faculty

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The faculty for this meeting are not members of the National Board of Echocardiography's Board of Directors nor its affiliated Exam Committees.

Register online at www.scahq.org

This course is not endorsed or sponsored by the National Board of Echocardiography.
Staying on the Path; what lies ahead: Challenges, Opportunities and Realities

In my first President’s Message I referred to an era of certain change for our profession and shared with you my confidence that we will meet challenges and turn opportunities into realities. I outlined a number of initiatives, steps, and commitments that you should expect from your society and here I wish to provide a status report on many of those steps.

“We will be more attentive to membership needs”. Back in October 2010, the SCA sent a survey to its members through Survey Monkey to better understand the wants and needs within the membership. Although the results are still being analyzed some interesting data has emerged. When asked “What benefits of SCA membership are most beneficial to you?”, the response from nearly 90% stated that their answer was the subscription to our journal, Anesthesia & Analgesia, while over 50% said reduced fees for CME activities, and over 40% responded that they enjoy the dedicated Members’ Only section on our website. Other interesting information derived from the survey demonstrated that 65% of us have attended an SCA sponsored meeting this past year with the majority attending the annual meeting (70%) followed by our Echo meeting (46%) and the Update on CPB meeting (17%). We will provide more feedback from this survey when further analysis is completed. In the meantime it is my pleasure to report that the SCA has been working with HindSite, Inc. to reorganize and fundamentally reshape its website. As stated in my inaugural President’s Message this is a priority. It is expected that this new face of the SCA will be available soon and will incorporate many electronic learning features and include a dedicated SCA section for member communication as well as a SCA monograph, guidelines and newsletter reference library. This website is currently in its beta test of development and will be soon released for viewing and review in an open comment period. We expect that during this open comment 30-day review period the opportunity to make edits and corrections will be discovered. Therefore during this time we wish to encourage everybody to take it for a test drive and provide us with your feedback. Please recognize that your careful attention for our need to make corrections will greatly be appreciated and welcomed.

“We will continue to develop state-of-the-art educational programs”. The SCA has teamed up with Heartweb to launch a self-directed professional development program in echocardiography and clinical ultrasound. “SCA On-CUE” is the first On-line Clinical Ultrasound and Echocardiography Course provided to our members by the SCA. The program, based on the highly successful University of Melbourne distance education course is divided into two levels, with Level I providing knowledge base for basic sonographer with a TTE and surface ultrasound focus, and Level II providing additional knowledge for advanced diagnostic echocardiography including TEE. Discussions are currently underway between the SCA together with the ASA and the NBE to utilize this platform as a way to provide TEE cases for review that can be applied toward certification requirements.

“We will continue to strengthen relationships with other societies”. The STS has recently requested that the SCA conduct a 4-hour course at their next annual STS meeting in Fort Lauderdale this coming January to help train cardiac surgeon basic TEE interpretation skills. The SCA will be providing independent CME for this session at that meeting. I have asked Drs. Bob Savage, Gregg Hartman, and Kathy Grichnik to lead the effort to develop core content. This invitation reflects important recognition of others for the leadership role our society has played to set the standard for TEE education.

“We will develop the next generation of leaders”. The Echo meeting in 2013 will be chaired by Drs. Madhav Swaminathan, Nikolaos Skubas and Doug Shook. The committees of the SCA with appointed chairs are as follows;

Bylaws ........................................ Adam Lerner (mentored by Glenn Gravlee)
Economics/Government Affairs ........................................... Chris Troianos
Electronic Communications ................................................. Jim Lynch
Fellowship Program Directors ................................. Mark Stafford-Smith
International .............................................................. Al Perrino
Membership .............................................................. Glen Murphy
Interdisciplinary Professional Practice .............................. Mike D’Ambra
Newsletter ................................................................. Hong Liu
Publications ............................................................ Shamsuddin Akhtar
Research ................................................................. Hilary Grocott

Each of these chairs (most new, some incumbent) have been instructed to seek out new members for their committees who want to get involved with the SCA. Please contact the SCA office to let us help you get involved in an area that you feel you can help.

“We will remain committed to the DATABASE project”. We continue to work with the STS on an agreement for an adult CV anesthesia database that is likely to be a modular component of the existing STS database. The reason for exploring an opportunity to work out an agreement to collaborate and share resources with the STS rather than build this from scratch is because the SCA is an established and highly respected benchmark for outcomes data in adult cardiac surgery. The potential to add anesthesia data fields to an existing mature dataset will enable our society to “hit the ground running” and also establish an important alignment of anesthesia inputs to corresponding surgical inputs to better understand cardiovascular perioperative outcomes. The data field working group led by Dr. Joseph Mathew has been actively working on refining the CV anesthesia data fields to be included into the CV anesthe

As we progress toward an agreement, one thing remains certain moreover than any other and that is the success (or failure) of this project will depend on institutional site participation and individual commitment. We need to be committed to the adult cardiac anesthesia database project because it will allow us to assume a leadership role in understanding and advocating best practice and provide a valuable resource to advance patient care and the practice of CV anesthesia. This will not come without effort or cost. The SCA is able to provide starting funds to support the process and launch the project. Once launched, each participating site will be expected to input data into the system and provide annual support to pay for overall program quality control and benchmarked data reporting back to their institution. It is expected that the costs to each participating institution will be about $2700/year. We welcome and need your feedback on this plan soon. In the weeks to come I have asked the officers of the BOD to personally contact many of you to share information, seek your feedback and inquire about your willingness to participate. In the meantime, please don’t hesitate to contact the SCA office to ask questions. They will be asked to forward all inquiries that they can’t answer directly.
Reducing the cardiac risk of patients undergoing major noncardiac surgery is important. Beta-blockers have been advocated as a pharmacologic intervention to achieve this goal. There have been numerous studies that have attempted to identify the best time to administer beta-blockers and the patients who would most benefit from this therapy.

Lindeau, et al, analyzed 782,969 patients from the Premier database to characterize the risk of death in patients undergoing major noncardiac surgery. Propensity score matching was used to compare those who had received beta-blockers within one-to-two days of admission with those who did not receive them. Patients were risk stratified according to the Revised Cardiac Risk Index (RCRI). For this classification, each of the following is assigned a single point: diabetes mellitus, ischemic heart disease, cerebrovascular disease, renal insufficiency, and high-risk surgery. In high-risk patients with an RCRI of 4 or greater, the odds ratio was 0.58 (95% CI 0.50-0.67). However, in low risk patients, those with RCRI of one or less, there was no benefit with the use of beta-blockers. In fact, the odds ratio for patients with an RCRI of 0 was 1.36 (95% CI 1.27-1.4) indicating possible harm for this patient population. These results suggest that although high-risk patients may benefit from receiving beta-blockers, low risk patients may be harmed by universal administration of beta-blockers. It is important to note that this study is limited by the lack of information concerning dosages and types of beta-blockers, and the unknown timing of beta-blocker administration with respect to surgery.

The POISE study aimed to study the effects of a single dosing regimen of a beta-blocker in a large study population. Extended release metoprolol was administered in a randomized controlled fashion to patients undergoing noncardiac surgery. The dose of metoprolol was 100 mg orally 2-4 hours prior to surgery. The dosage of metoprolol in this trial clearly resulted in poor outcome. The POISE trial was associated with an increase in postoperative mortality (OR 3.93, 95% CI 2.57-6.01) and one-year mortality (OR 1.96, 95% CI 1.49 to 2.58). Similar to the Lindeau study, these results are complicated by the fact that patients have numerous different beta-blocker drugs and dosing regimens. These results also may not be reflective of the general population because 95% of the patients in this study were male veterans.

Although beta-blockers remain promising in reducing the cardiac risk in patients undergoing noncardiac surgery, the topic of perioperative use of beta-blockers on cardiovascular and cerebral vascular events will most likely remain debatable. It appears that high-risk patients may have more benefit from beta-blockers than low risk patients. In addition, the acute withdrawal of beta-blockers in the perioperative period may be associated with some adverse effects. Despite these limitations, beta-blockers are an important pharmacologic method for decreasing the risk of stroke and death in certain patient populations. Large randomized controlled studies are needed to improve our understanding of ideal perioperative use of beta-blockers.

References

Beta Blocker Therapy Controversy Update

By Colleen Moran, MD and Yong G. Peng, MD, PhD
University of Florida, Gainesville, FL
Association of Operative Time of Day With Outcomes After Thoracic Organ Transplant


Reviewer: Mojca Remskar Konia, MD
University of Minneapolis, Minneapolis, MN

Abstract Excerpt
George et al present a retrospective cohort study that investigated short-term outcomes following heart and lung transplant performed during daytime or night-time. The primary end-point of the study was the mortality at 30 days, 90 days and 1 year after operation. The authors also followed complications such as the need for reoperation, pacemaker placement, non-cardiac surgery, infection, cerebro-vascular accident and airway dehiscense as secondary outcomes. United Network of Organ Sharing data was used.

27,118 patients were included in the study. Patients with re-operation, pediatric patients, combined heart-lung transplant and insufficient data on the time of surgery were excluded. 8,346 had heart transplant surgery during day-time and 8,227 during night-time. 5,179 patients had lung transplant surgery during day-time and 5,366 during night-time. The patients undergoing heart transplant during day-time differed from patients undergoing surgery during night-time in: creatinine (higher: 1.37 vs. 1.34, p=0.03), mean pulmonary artery pressure (lower: 28.37 vs. 28.77 mmHg, p=0.03), pulmonary capillary wedge pressure (lower: 18.83 vs. 19.20 mmHg, p=0.01), inotrope administration (higher: 45.75 vs. 44.04, p=0.03), ventricular assist device (lower: 21.71 vs. 23.33, p=0.04) and the presence of hypertension (lower: 18.92 vs. 20.69, p=0.004). The patients undergoing lung transplant during day-time differed from patients undergoing surgery during night-time in: age (lower: 31.56 vs. 33.48, p=0.04), white race (higher: 86.75 vs. 85.20, p=0.02), idiopathic pulmonary fibrosis (lower: 27.52 vs. 29.31, p=0.04), FVC (higher: 50.22 vs. 49.41, p=0.02), ICU stay prior to surgery (lower: 4.52 vs. 5.53, p=0.02), and the presence of hypertension (lower: 20.66 vs. 22.80, p=0.008). In unadjusted analysis the day-time heart transplant surgery was not associated with better outcomes at 30 days (p=0.78), 90 days (p=0.93) or 1 year (p=0.46). Also for patients with VADs, there was no difference between patients who had surgery during day-time or night-time (30 day – p=0.87, 90 day – p=0.63, 1 year p=0.98). For lung transplants the day-time surgery was not associated with improved survival at 30 days (p=0.13) or 1 year (p=0.08). However at 90 days the outcomes of day-time patients were better (p=0.03). Multiple regression analysis demonstrated worse outcomes only for night-time lung transplant surgery patients at 90 days (p=0.02). The main observed complication increased during night-time lung transplant surgery was airway dehiscence (p=0.02).

The authors conclude that there is no clinically significant difference in outcomes of day-time and night-time thoracic transplant surgery.

Reviewer’s Comments
Ever since the publication of the Institute of Medicine report entitled “To Err is Human” there has been an increased emphasis on finding ways to improve patient safety (1). One of the proposed reasons for medical errors has been physician fatigue. Hence a significant number of papers in surgical literature have investigated the effects of night-time surgical procedures on patient outcomes. Studies in orthopedic surgery, solid organ transplant surgery, and cardiology have shown worse outcomes in patients undergoing procedures at night (2-5). In contrast the presented study shows that there is no clinically significant difference in outcomes (6). Where does that leave us? The fact of the matter is that especially for transplant surgery the time of operation is and will remain somewhat unpredictable. The surgeries will therefore need to happen at night-time whether studies on fatigue confirm that night-time is less favorable for patient outcomes or not. However, acknowledging human limitations and implementing system-based practices, which increase safety, including improvements in teamwork and communication that promote situational awareness, leadership, closed loop communication, critical language, assertive communication, adaptive behavior and workload management, and introduction of check-lists and others may improve patient outcomes during day and night time (7-9). On a more personal note, the effects of fatigue and sleep deprivation on the mood and general physical well being of people is well documented. Physicians and institutions need to consider the physician’s overall well being as an integral part of patient-oriented care.

References
Transcatheter versus Surgical Aortic-Valve Replacement in High-Risk Patients

Smith CR et al., for the PARTNER Trial Investigators. 

**Reviewer:** Henry Liu, MD 
*Tulane University Medical Center, New Orleans, LA*

**Background**
This study by Smith and coauthors is a multicenter clinical trial conducted in 25 medical centers (22 in USA, 2 in Canada and 1 in Germany). Surgical replacement of stenotic aortic valve has been shown to improve symptoms and survival overall. Less invasive strategies, such as the transcatheter aortic valve replacement, may be more desirable in some patients with increased risk for surgery from advanced age, poor left ventricular function and/or other significant co-morbidities. Hence they conducted the study to compare the transcatheter aortic-valve replacement with the conventional surgical aortic valve replacement in this subgroup of high-risk patients with severe aortic stenosis. They hypothesized that transcatheter aortic valve replacement is not inferior to conventional surgical aortic replacement. The study was designed by the sponsor, Edwards Life-sciences, and by the executive committee which included the first two authors of this publication.

**Method**
The authors enrolled 699 patients (out of 3105 patients screened) with severe aortic stenosis (aortic valve area less than 0.8 cm2 plus either a peak velocity 4 m/s or mean pressure gradient 40 mmHg) and cardiac symptoms (NYHA Class II or worse). These patients were evaluated based on their femoral anatomical conditions and categorized to separate those eligible for transfemoral placement from those who would require transapical approach. Then the patients were randomized into two groups: transcatheter aortic-valve replacement with a balloon-expandable bovine pericardial valve or surgical aortic valve replacement. They used the SAPIEN heart-valve system by Edwards Life-sciences. The authors excluded the following patients: bicuspid, noncalcified aortic valve, coronary artery disease requiring revascularization, a left ventricular ejection fraction of less than 20%, an aortic annulus diameter of less than 18 mm or more than 25 mm, severe (4+) mitral or aortic regurgitation, a recent neurologic event, and severe renal insufficiency. The primary end point was the death rate (from any cause) at one year.

**Results**
The authors found that the rates of death from any cause at 30 days were 3.4% in the transcatheter group (348 patients, 244 transfemoral and 104 transapical) and 6.5% in the surgical group (351 patients) (P = 0.07), and 24.2% and 26.8% respectively at 1 year (P = 0.44). The difference of -2.6 percentage points (two-sided 95% confidence interval [CI], -9.3 to 4.1; upper limit of the one-sided 95% CI, 3.0 percentage points) was within the prespecified noninferiority margin of 7.5 percentage points (P = 0.001 for noninferiority). The rates of major stroke were 3.8% in the transcatheter group and 2.1% in the surgical group at 30 days (P = 0.20) and 5.1% and 2.4%, respectively, at 1 year (P = 0.07). At 30 days, major vascular complications were significantly more frequent with transcatheter replacement (11.0% vs. 3.2%, P<0.001); adverse events that were more frequent after surgical replacement included major bleeding (9.3% vs. 19.5%, P<0.001) and new-onset atrial fibrillation (8.6% vs. 16.0%, P = 0.006). More patients undergoing transcatheter replacement had between-group difference. Statistically, only the following three comparisons yielded significant difference: at one year the transcatheter group has higher rate of major vascular complications than surgical group (11.3% vs 5.5%, P<0.001); transcatheter group has significantly lower rate of major bleeding events than surgical group (14.7% vs 25.7%, P<0.001).

**Conclusion**
In patients with severe aortic stenosis who are at high risk for operative complications and death, surgical aortic valve replacement and balloon-expandable transcatheter replacement were associated with similar mortality at 30 days and 1 year and produced similar improvements in cardiac symptoms. The authors concluded that the transcatheter aortic valve replacement is an alternative to the surgical replacement in a well chosen, high-risk subgroup of patients with aortic stenosis.

**Comment**
Overall this is a well designed study, which compared the transcatheter aortic valve placement, a newer and less invasive technique, with traditional surgical aortic valve replacement in a subgroup of patients who had increased risks for surgery due to various risk factors (advanced age, poor LV function, significant co-morbidities). The hypothesis is transcatheter aortic valve placement is no inferiority to surgical approach and the study proved the hypothesis is true. However, the rates of death at 30 days were 3.4% in the transcatheter group and 6.5% in the surgical group (P = 0.07) and 24.2% and 26.8%, respectively, at 1 year (P = 0.44), obviously transcatheter group had lower death rates both at 30 days and one year. It is possible that, if the sample size is large enough, transcatheter technique might be statistically proved to be significantly better than surgical technique in terms of improving survival in short term, though transcatheter technique seemed to carry higher incidence of stroke and major vascular events.

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**Persistent Racial Disparities in Survival After Heart Transplantation**

Vincent Liu, MD, MS; Jay Bhattacharya, MD, PhD; David Weill, MD; Mark A. Hlatky, MD. *Circulation* 2011;123:1642-1649.

**Reviewer:** Richa Dhawan, MD 
*University of Chicago Medical Center*

**Abstract Excerpt**
This is a retrospective cohort study using data from the United Network of Organ Sharing looking at adult primary heart transplant recipients from 1987 to 2009. Over this time approximately 8000 nonwhite patients and 30,000 white patients underwent orthotopic heart transplant. They excluded patients who lacked data on ethnicity or did not have follow-up data. The primary end point was all-cause mortality after transplantation. The follow-up time ranged from 478 to 3304 days.

There were baseline differences between the two groups. Nonwhite patients were younger, likely to be female gender, and had higher rates of diabetes and end-stage renal disease. Black patients were more likely to be transplanted for nonischemic cardiomyopathy and had higher rates of HLA...
antigen mismatch. There were also socioeconomic differences such as lower rates of college education, private insurance, and lower income among black and Hispanic recipients.

After multivariable adjustment for recipient, transplantation, and socioeconomic variables, only black recipients were at an increased risk of death (hazard ratio, 1.34; p<0.001). Unadjusted five-year mortality among black recipients was 36.7% and 29.4% among white recipients (p<0.01). Black recipients were more likely to die from graft failure or cardiovascular cause (p<0.001). They were less likely to die of infection or malignancy (p<0.001). Black recipients were more likely to be hospitalized with the first 2 years after transplantation (40% vs. 34%, p<0.001). Black recipients had higher rates of noncompliance with immunosuppressive drugs.

Reviewer’s Comments

As the contribution of nonwhite patients to the pool of American organ recipients continues to grow, it is important to risk stratify these patients to improve outcomes. Discrepancies in health care utilization and outcomes based on race have been well described. The underlying cause is multifactorial and may be related to socioeconomic difficulties, education, access to health care, as well as differences in progression of disease. In this study, Liu et al. adjusted for many of these confounding factors and found that death from organ rejection and non-compliance with immunosuppression was significantly higher in black transplant recipients. This is an important finding, in that it allows a specific focus for intervention. Non-compliance with medication may be due to a lack of education on the role of immunosuppression and organ health, poor access to medication, cost, or lack of nursing and family to help with activities of daily living.

The authors also found that black recipients had higher HLA antigen mismatch, which may impact the serum drug concentration required to achieve adequate immunosuppression. There is sparse data on specific differences in pharmacokinetics and pharmacodynamics of immunosuppressive agents among nonwhite organ recipients. Immunosuppressants are toxic and potent, and the side effects associated with their use may be life threatening (malignancy, infection). This paper does not address whether specific side effects in nonwhite recipients contributed to noncompliance. Additional research should focus on identifying the underlying causes of poor immunosuppression among black organ recipients.

Autoimmune Sensitization to Cardiac Myosin Leads to Acute Rejection of Cardiac Allografts in Miniature Swine


Reviewers: Laura C. Myers, BA and Theodore A. Alston, MD, PhD
Massachusetts General Hospital, Harvard Medical School

Abstract

Understanding the process of organ rejection is of great interest given its contribution to morbidity and mortality among transplant recipients. Currently, it is thought that rejection occurs via so-called allorecognition in which the immune system responds to proteins and peptide antigens of the major histocompatibility complex (MHC). Recent studies suggest an additional mechanism of rejection whereby autologous proteins like cardiac myosin (CM, found in all heart tissue) become targets of an immune response, similar to donor MHC proteins. Instead of an alloresponse, this mechanism represents an autoimmune response. These Harvard investigators previously found that mice immunized to CM prior to transplantation develop early rejection. Additionally, attenuation of the immune reaction to myosin has been shown to decrease the rate of rejection and prolong graft survival.

In this paper, autoimmunity to CM was induced in large animals supported by their native hearts but receiving accessory hearts transplanted intrabdominally. Four pigs were immunized with CM prior to transplant with minor-antigen mismatched donors. The immunized swine had increased rate of acute rejection compared to four controls that received transplants without having been immunized.

Three of the four immunized swine developed high titers of serum CM antibodies that persisted until the day of transplantation, as well as a positive delayed-type hypersensitivity (DTH) response to intradermal CM at 2 wk after immunization. Interestingly, these three swine all developed acute rejection based on histology of the myocardium at about 3 mo post transplantation. Meanwhile, the remaining pig that had been immunized was found to have waning CM antibody titers on the day of transplantation and a negative DTH response. That animal did not develop acute rejection. Although the number of animals is small, this suggests that a response to CM occurs before histological evidence of acute rejection. It may be causative.

Comments

This paper suggests that rejection may result when an autoimmune response develops against CM, rather than against MHC peptides. That hypothesis is based on the serologic presence of CM auto-antibodies and histologic evidence of rejection in transplanted pigs that were immunized to CM prior to transplantation compared to pigs that were not immunized.

This novel mechanism of acute rejection raises many questions. For instance, it is unclear why the native heart would be spared from the autoimmune response. Perhaps inflammation associated with the surgery itself disrupts the donor heart tissue in a way that makes cardiac myosin more immunogenic. It would be interesting to measure serum antibodies to CM in patients after heart surgery in which the myocardium underwent the same period of ischemia as would occur during a transplant. The presence of serum auto-antibodies in surgically manipulated but non-transplanted hearts would strengthen this hypothesis.

Studies have shown that other types of autologous proteins play a role in acute rejection of other solid organs such as lung and kidneys. Since CM is specific to heart tissue, one question is whether there are antigens expressed in every tissue that drive an extensive autoimmune response or whether each organ has specific antigens that drive organ-specific rejection.

Lastly, consideration of how the intra-operative anesthetic plan affects this autoimmune response may be important. For instance, it is possible that using non-histamine-releasing drugs may temper the inflammatory state associated with this type of rejection.

We thank Prof. Madsen for the opportunity to discuss the paper with him.
Pathological Healing Response of Explanted MitraClip Devices


Reviewer: Hong Liu, MD
UC Davis Health System, Sacramento, CA

Background
The safety and effectiveness of the MitraClip device (Abbott Vascular, Menlo Park, CA) is being evaluated in the Endovascular Valve Edge-to-Edge Repair Study (EVEREST) clinical studies. The healing response after device implantation has not previously been characterized in humans.

Methods and Results
A total of 67 explanted devices (implantation duration, 1 to 1878 days) from 50 patients were submitted for histological evaluation. Explants were analyzed in 4 implantation intervals: acute (≤30 days; n=7), subacute (31 to 90 days; n=23), chronic (91 to 300 days; n=18), and long term (>300 days; n=19). The acute healing response consisted of platelet/fibrin deposition. The subacute response exhibited granulation tissue with early fibrous encapsulation (pannus). The chronic response was characterized by various degrees of tissue bridging between the device arms. The long-term healing response demonstrated collagen-rich matrix (by type I collagen), incorporating the device components with complete encapsulation by organized, fibrous growth. In long-term devices with minimal surgical disruption, a fibrous tissue bridge (mean area, 7.39±4.3 mm²) was observed over and between the device arms, resulting in atrial tissue continuity between the 2 valve leaflets. Devices demonstrated no evidence of endocarditis, mechanical wear, component fracture, or corrosion up to the time of explantation (median, 119 days; first and third quartiles, 42 and 365 days).

Conclusions
In all patients, device mechanical integrity was maintained up to the time of explantation. Four phases of physiological healing were observed: platelet and fibrin deposition, inflammation, granulation tissue, and finally, fibrous encapsulation. Long-term device fibrous encapsulation with extension over adjacent mitral leaflets and tissue bridge formation adds structural stability.

Comment
Mitra regurgitation remains one of the most common forms of valvular heart disease. There are more than 250 000 patients diagnosed with significant mitral regurgitation each year in the US. Available treatment options have been limited to surgical repair or replacement and only 20% of patients with significant mitral regurgitation actually undergo surgery, with most being managed medically. However, in elderly patients with coexisting conditions that preclude surgery, MitraClip may prove to be a useful procedure. In EVEREST II, 279 patients with significant mitral regurgitation (3+ to 4+) were randomized 2:1 to the MitraClip procedure or to surgical repair or replacement at the surgeon’s discretion. The authors demonstrated the primary safety end point significantly favored the percutaneous procedure at 30 days, with less than 10% of patients experiencing a major adverse event, as compared with 57% of the patients treated surgically. Need for blood transfusions was the main driver of the safety end point, with a difference of 8.8% vs. 53.2%. The study was designed to allow removal of clips and conversion to surgery if clinically warranted at any time after device implantation. In this study, the authors examined 67 explanted devices and the analysis provided insights into the time course of healing and documented mechanical stability over time. In addition, the data were stratified between patients with degenerative versus functional mitral regurgitation to elucidate potential differences in healing between these two very different disease entities. The final conclusion was that factors other than device healing likely explained the persistence or return of mitral regurgitation in this group of explanted patients. The formation of tissue bridge and fibrous capsule around the device may favor long-term durability. This procedure could be beneficial for patients with severe mitral regurgitation who could not tolerate open-heart surgery.

Universal Noninvasive Detection of Solid Organ Transplant Rejection


Reviewers: Mark A. Meyer, MD, MPH and Theodore A. Alston, MD, PhD Massachusetts General Hospital, Harvard Medical School

Abstract
Heart transplant recipients require frequent endocardial biopsies to monitor for signs of organ rejection. Investigators at Stanford propose a technique requiring only venous blood samples as a less invasive alternative. They determined levels of donor-derived cell-free DNA in the plasma of heart recipients. Those levels correlated with biopsy evidence of rejection.

Donor DNA was typed from banked splenocytes from the donor, and recipient DNA was typed from peripheral white cells from the recipient. Distinguishing donor from recipient DNA depends on the presence of single nucleotide polymorphisms (SNPs). SNPs are slight DNA sequence variations that occur between individuals. Taken in aggregate, these SNPs may be used as a “fingerprint”, allowing the authors to identify the person from whom a DNA sample originates.

In absence of clinical rejection, less than 1% of the plasma DNA of heart recipients was derived from apoptosis of donor cells. The “apparently normal” value was about 0.5%. In event of mild rejection, the level rose to 3 or 4% and correlated well with biopsies. In comparison to endomyocardial biopsy, a threshold of 1.7% donor DNA exhibited an 83% true positive rate and 16% false positive rate of rejection.

Comments
In an early version of this test, Y-chromosome DNA of male heart donors was assayed in the blood of female heart recipients. This method is relatively simple but is applicable to only about a quarter of heart recipients. The assay of SNPs allows for a more widely applicable measure of transplant rejection.

In the year following a heart transplant, a patient might require twelve or more biopsy procedures via central venous cannulation, each calling for fluoroscopy and perhaps five biopomme specimens (http://www.columbiasurgery.org/pat/hearttx/faqs_hearttx.html#biopsy). There is some risk of arterial puncture, ectopy, tricuspid valve injury, and so on. A peripheral blood test will prove a very attractive alternative.

The strategy outlined in this paper ought to become generally useful in transplantation monitoring.

Continued, next page >>
Preoperative Factors Associated With Adverse Outcome After Tricuspid Valve Replacement


Reviewer: Hong Liu, MD
UC Davis Health System, Sacramento, CA

Background

Preoperative factors associated with increased mortality and worse outcome after tricuspid valve replacement in patients with severe tricuspid regurgitation are poorly understood.

Methods and Results

We retrospectively analyzed 189 patients (37% men; age, 67.5±11.3 years) who underwent tricuspid valve replacement for severe tricuspid regurgitation. Operative mortality rate was 10%, and was associated with intra-aortic balloon pump (odds ratio, 3.2; 95% confidence interval, 1.9 to 5.6; P<0.0001) or the presence of severe symptoms (New York Heart Association class IV relative to classes II and/or III) at the time of surgery (1.7; 95% confidence interval, 1.05 to 2.8; P=0.02). At the end of follow-up (29.3±27.1 months), 70 patients (37%) died, 6 (3%) needed tricuspid reoperation, and 41 (21.7%) were readmitted for heart failure. Seventy-eight patients (41.3%) were free from cardiovascular events (death, tricuspid reoperation, or heart failure admissions). The only echocardiographic parameter independently associated with adverse outcomes was a decrease in the right index of myocardial performance (RIMP) ratio. All-cause mortality was independently associated with a higher Charlson index (hazard ratio, 1.18; 95% confidence interval, 1.01 to 1.36; P=0.03), shorter right index of myocardial performance ratio (0.91; 95% confidence interval, 0.87 to 0.96; P=0.005), and preoperative New York Heart Association IV class (1.71; 95% confidence interval, 1.3 to 2.2; P<0.0001). In 68 patients with isolated tricuspid valve replacement, the associations between short RIMP ratio, high Charlson index, New York Heart Association class IV, and increased mortality remained significant.

Conclusions

Tricuspid valve replacement for severe tricuspid regurgitation can be performed with an acceptable operative mortality if patients undergo surgery before the onset of advanced heart failure symptoms. Late mortality is associated with a high preoperative Charlson index, short RIMP ratio, and advanced New York Heart Association class.

Comment

Patients with untreated severe tricuspid regurgitation (TR) may deteriorate and develop severe symptoms of heart failure, progressive biventricular dysfunction, and even death. The vast majority of these patients are treated medically, and a referral for surgical correction of TR is often delayed until patients develop significant symptoms from TR. Information on the outcome of TV surgery is scarce and the hospital mortality ranging from 8.8% to 25% and 5-year actuarial survival rates around 40%. The main finding of this study is that good outcomes for TVR are achievable in properly selected patients. The mortality is reduced to 6% when patients are operated on in an earlier symptomatic state (NYHA < IV) or when hemodynamically stable (no need for IABP). Furthermore, if the patient is operated on before echocardiographic evidence of increased RV filling pressure, survival may be improved even further. It is believed that the prior poor outcomes of TR surgery are related to the difficulty in interpreting symptoms as caused by TR and in making a clinical diagnosis, which leads to delaying surgery until a very advanced stage. The RIMP is the ratio of RV systolic time spent on no forward flow (the tricuspid closure-opening time (TCO) – ejection time (ET)) over the time of forward flow (ET), and it is a well-recognized echocardiographic parameter assessing RV function. A short TCO (resulting in a short RIMP) was found to be significantly associated with adverse outcome. Basically, the conclusion is that patient with a severe TR and poor RV function with a increased RV filling pressure are at increased risk of morbidity and mortality after TV surgery and surgery should be considered before the development of advanced heart failure or echocardiographic evidence of increased RV filling pressure.
Support Our Profession

Cardiovascular anesthesiology, as we all agree, is a vastly rewarding profession. The SCA Foundation exists to ensure that our profession remains at the forefront of medicine. We do so through:

- funding research internationally;
- expanding educational opportunities and mentoring for our fellows; and
- improving patient care through our FOCUS initiative for patient safety by identifying preventable errors and their causes.

Research. Education. Patient Care. These are our vehicles for success and we must have your help. Join us in insuring the future of our profession.

Donations to the SCA Foundation can be made directly to the SCA Foundation, 2209 Dickens Road, Richmond, VA 23230 or via online at our website, www.scahqgive.org.

More about the SCA Foundation, including our recent annual report, can be found online.

Research Funding Leads to Results

Tomas Drabek, M.D., Assistant Professor at the University of Pittsburgh School of Medicine received an SCA Starter Grant to study “The Effect of Microglial Activation on Neurologic Outcome after Deep Hypothermic Circulatory Arrest in Rats.”

At the time of receiving the grant, Drabek noted, “I feel extremely honored as a recipient of the SCA Starter Grant. I would definitely suggest that my peers apply if they have a project pertinent to the field of cardiac anesthesia. The SCA Foundation represents one of the few funding agencies that is focused on the patient.”

Dr. Tomas Drabek’s 2008 SCA Starter Grant was an important step in the development of preliminary data for a successful American Heart Association grant application, various publications, and a boost for his academic career.

As his SCA Foundation funded work progressed and is now complete, Dr. Drabek has seen tremendous results from his efforts. The project generated three published papers in Resuscitation, Anesthesia & Analgesia, and six abstracts. The grant-supported research also generated data for multiple local presentations to other fellows and medical students and prompted numerous awards, including the Young Investigator Award presented to Manuella Lahoud-Rahme, M.D. at the 6th Resuscitation Science Symposium of the American Heart Association. Most importantly, this funded research led to Drabek receiving a Beginning Grant-in-Aid from his local chapter of the American Heart Association to further the research.

This continuous success in obtaining funding, publishing activity, and teaching resulted in Dr. Drabek receiving a permanent position within his department and achieving the rank of Assistant Professor. He also has been accepted for the ABA “Alternate Entry Path” through which outstanding anesthesiology academicians moving to the United States can become productive members of U.S. academic anesthesiology programs.

FOCUS Update

The FOCUS LENS project, performed in collaboration with Peter Pronovost and the Quality Safety Research Group at Johns Hopkins University, has been completed, and the results are being published. Currently three publications have been published and four more are in the process of being written. Look for these papers by your FOCUS investigators!

The data from this project was also used by Dr. Pronovost to win a research grant from the Agency for Healthcare Research and Quality. This grant will fund implementation and evaluation of a series of interventions and tools developed by QSRG and FOCUS investigators.

The interventions and tools are being implemented at 17 FOCUS and two JHU sites and will cover the continuum of cardiac care from admission to discharge, with study “bundles” for the operating rooms, the intensive care units, and the cardiac general care units. The key outcomes that will be measured are surgical site infections, central line infections, ventilator associated pneumonia, and overall mortality.

The teams from the sites met for a full day of discussion and preparation in Baltimore on May 24 and have begun the baseline data collection phase. Implementation of the tools will begin in the next few months – watch for further updates!