

Presidential address: An evolving discipline

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As I was debating and reflecting on what I would say today, I thought about my own personal experiences in cardiothoracic surgery and how so much has changed from the time I was a farm boy in North Carolina to becoming a cardiothoracic surgeon and now president of The Western Thoracic Surgical Association. I first recognize the great opportunities this wonderful profession has given me. For me, this was the American dream. Believing in this promise, I refuse to fall victim to the current era of despair in our profession: the complaints of reimbursement being too low, cardiologists taking all our business away, HMOs dictating patient care, our graduates unable to find jobs, and some of our colleagues believing our specialty has seen its golden years come and gone. All of these complaints do have some element of validity, but to effect change and alter the current circumstances, we have to understand more fully the sequence of events leading to these concerns. First, I accept the concept of change and know the only constancy is change. Therefore, I do not give into the psychology of the golden years of cardiothoracic surgery. Instead, I believe in the concept of cardiothoracic surgery as an evolving discipline and as such have much to look forward to. These times bring to mind a quotation from Henry Wadsworth Longfellow: "Look not mournfully into the past. It comes not back again. Wisely improve the present. It is thine. Go forth to meet the shadowy future, without fear, and with a manly heart."

As an evolving discipline, we need to understand the acrimony. Is the golden age past? The short answer is no. As a specialty, we are cardiac, thoracic, congenital, and vascular surgeons. Cardiac surgeons have to be careful not to imply the entire specialty is in trouble because coronary artery bypass surgery is down 25%. In fact, as I talk to my colleagues who perform thoracic surgery, it might be one of the most exciting times in nearly 80 years. Thoracic surgery has emerged from a palliative discipline of draining empyemas and cancer resections into a better understanding of the biology of lung and esophageal tumors. Resective therapy with careful staging and, if needed, adjuvant therapy offers cure to patients with lung cancer. Lung transplantation has developed from an experimental procedure in 1986 to an accepted form of therapy for end-stage lung disease. Last year, nearly 1100 lung transplantations were performed in the United States.¹ The 1-year survival after transplantation has increased from 60% in 1986 to as high as 90% in selected centers in the year 2003. These improved results are due to better immunosuppression and increased recognition and treatment of the various multifactorial causes of bronchiolitis obliterans. For example, this dreaded complication has been reduced by noting the relationship with gastroesophageal reflux and performing antireflux procedures. Living donor lung transplantations are being done with increasing frequency.

In 2003, at The American Association for Thoracic Surgery meeting in Toronto, we reported our 10-year experience with 128 lobar lung transplantations. Our conclusion was that this procedure is an ideal operation for children and young

patients with cystic fibrosis. Additionally, the incidence of bronchiolitis obliterans syndrome was half that of cadaveric lung transplantation. Lobar transplantation has developed from an experimental procedure beginning in 1990 to an accepted therapy for critically ill patients with end-stage lung disease.

These are a few examples of why thoracic surgery is very active and exciting. A barometer of this excitement is measured by the increasing numbers of entering thoracic residents who are choosing thoracic surgery as their subspecialty. Another discipline that has gained excitement and momentum over the past 20 years has been surgery for congenital heart disease. This evolution has progressed from palliative procedures, such as the Blalock-Taussig shunt for tetralogy of Fallot, to complete repair in the neonatal period. Whereas children would present with cyanotic heart disease and receive palliative procedures, now these neonates undergo total repair. This therapy limits the number of operations infants are exposed to and results in better outcomes without the interval mortality between palliation and corrective surgery. Hypoplastic left heart syndrome was a diagnosis with 100% mortality. Today these infants are undergoing first-stage palliation with greater than 85% success.² This tremendous progress has been made because of a few pioneers, such as Bill Norwood, not succumbing to risks and criticism. Instead he took the clinical problems as challenges and spent 10 to 15 years perfecting an operation that now saves hundreds of newborns. These pioneers did not accept the status quo but embraced the need for change and became part of the changing influence. They took lesions with poor outcomes and tried to make a difference, although success did not come quickly. Today I challenge all of us to accept this pioneering spirit as we approach our current challenges. In the short span of 20 years, we have taken a lesion (hypoplastic left heart) from a hopeless condition to now having surgical outcomes with greater than 80% survival.³

These few examples are representative of the exciting changes that have occurred in other disciplines within our specialty. If we try to understand why there is pessimism today, we need to understand the scope of the problems. Adult cardiac surgery has been prolific in terms of the number of patients treated and the number of surgeons rendering their care. Therefore, when a major change occurs in this discipline, its reverberations are felt throughout the specialty. As a consequence, the specialty as a whole now has a problem rather than a segment of the specialty. If we analyze the problem within adult cardiac surgery, do we conclude that it is all of adult cardiac surgery or just coronary bypass surgery? Over the past 20 years, coronary bypass surgery defined the practice of adult cardiac surgery. Coronary bypass operations comprised 80% to 90% of most cardiac surgeons' activity and therefore defined the value

most surgeons placed on their practice. Simply put, a cardiac surgeon was an adult cardiac surgeon who performed "X" number of bypass operations with "0" mortality. If this is the yardstick by which we measured our specialty, then it is easy for all of us today to understand the sense of frustration that has developed.

Rather than becoming frustrated and resentful of change, we need now, more than ever, to take on the pioneering spirit and be part of the evolution of our discipline. The indicator of needed change has been the downturn in the number of patients referred for coronary bypass operations. During the past year, the number of coronary artery bypass grafting (CABG) operations is down approximately 25%. This occurred as a result of many factors. Cardiologists have become successful in opening coronary blockages with balloons, stents, and now with improved drug-eluting stents. As cardiothoracic surgeons, we have not accurately answered the question of whether these procedures are better for the patient. Patients certainly like the concept of not having a large incision down the center of the chest. The patient keeps coming back for repeated procedures. It is almost as though the results of these stenting and balloon angioplasty procedures do not matter. We need to ask ourselves why this continues, particularly in patients with predictably poor outcomes.

I believe one answer is that we have totally capitulated our responsibility to our patients by not making them more aware of the alternatives. We have been too concerned about the business of our specialty and not upsetting the referring cardiologist. We accepted the 20% to 30% stent restenosis rate by not being more critical of these results. We are, through our silence, in agreement with this therapy, and the patients do not know better. We complain about not being held with the same regard as in the past. If we are going to regain self respect as a discipline, we have to stop behaving as technicians performing surgical procedures. We have to become physicians again; we have to look for better ways to treat our patients' problems. We have to persuade the cardiologist to look at cooperative trials comparing, for example, bypass surgery versus stenting in patients with 3-vessel disease and diminished ventricular function. A study from the Cleveland Clinic that looked at these 2 groups was reported in the *Wall Street Journal* in May 2004.⁴ The results confirmed that in the high-risk group, the stented patients had 2.5 times the mortality seen in those patients having bypass surgery. The high-risk group was defined by low ejection fraction (<40%), multiple-vessel disease, and diabetes. This study, now published in *Circulation*,⁵ is the first comparison in the past 5 years in which surgeons and cardiologists were willing to look at their data. The results confirmed what we have surmised. But until now, no group was willing to compare the data. It will take

many other studies to properly place both procedures in the correct patient care algorithm for the best outcomes.

Information and publications regarding our surgical outcomes are essential, but this is only one piece of the puzzle. We still have to understand that patients would prefer to have a catheter-based treatment rather than a huge surgical scar. How do we overcome this huge hurdle? I believe there are 2 ways we can approach this dilemma: results and technology. We have to continually assess our results, comparing them with outcomes that are medically produced in an unbiased fashion. We have to be willing to inform the patient of these results. This might represent reporting in less conventional medical publications, such as the *Wall Street Journal*. As editors of journals, we are aware of the impact factor. I would suggest that the impact factor of the *Wall Street Journal* article was far greater in terms of information to the patient than the same article just published in *Circulation*.

We now have patients coming to our office inquiring about the results and wanting to know more. With public communication, we can go directly to the patient and have the opportunity to explain treatment options. This has the much desired effect of circumventing the gatekeeper, in this case the cardiologist. I am not advocating a confrontation with our colleagues. We simply need a more level playing field. Other ways of making the patient more aware of treatment choices are public speaking and Internet access.

The next step in our evolution will involve better technology that allows truly minimally invasive procedures. Patients do not want large incisions. As surgeons, we have to accept and try to improve our minimally invasive skills. We have to exhibit restraint and investigate methods to which we were not exposed during our surgical residency. Coronary bypass surgery might have been the siren song that lulled us into complacency. For more than 20 years, we had no reason to change because the number of cases continued to grow and the results improved, with mortality and morbidity rates reaching 1% to 2%. We made the mistake of assuming the patients were seeking our procedures because of these outcomes. We failed to recognize the work of the cardiologist. We had become content with our procedure while cardiologists' continued to improve their therapy for coronary disease. Angioplasty and the early stents had high restenosis rates. This did not deter their pursuit of better stents. Now we have drug-eluting stents with the promise of a less than 10% restenosis rate.⁶

Our rebuttal during this time was mostly complaining. During this time, we have failed our patients because we have not continued to challenge ourselves and improve our procedures. We need to begin by offering minimally invasive revascularization with arterial grafts. The fright of the patient over the sternotomy can be partially overcome by small, less-invasive thoracotomy incisions. With arterial

grafts, we can tell our patients with confidence of superior results compared with those achieved with stents. As surgeons, we can tell the patient about the restenosis rate and the effect of taking anticoagulants to keep the stents patent. Although the restenosis rate is low, the uncertainty of this therapy has to be made clear to the patient. For example, if your patient is traveling in some other part of the nation or world, what happens when he or she gets chest pain? Does this patient call the nearest emergency department when he or she has chest pain, or does the patient take antacids and hope the pain is caused by bad pizza? These potential scenarios have not been explained. With bypass operations and small incisions, we can give our patients a more durable option.

Change and evolution are often difficult to embrace. However, if we accept that change is needed and become the mediators of that change, it becomes a part of our evolving specialty. There are numerous examples of this. Robotic assisted heart surgery is in its infancy. Whether you choose to embrace the technology or not, it cannot be ignored. Patients are exploring their options. When we first explored robotic assisted mitral valve surgery at the University of Southern California (USC), I was sure there would be a learning curve and that the operation that normally takes 2 to 3 hours would take twice as long. Then you ask yourself, "Why perform the surgery robotically?" I believe mitral valve surgery done minimally invasively is better for the patient. In my hands the robot made this minimally invasive procedure easier, more precise, and therefore a more durable repair for the patient. Since the initiation of robotic assisted mitral repair, we have completed 50 cases with excellent results. In addition, we have re-explored the insertion of polytetrafluoroethylene chords rather than leaflet resection and found the results comparable with those after resections and taking less time. Saving time means less time spent on cardiopulmonary bypass, which is good for the patient. The result for the patient is a small (4-6 cm) incision, fewer days in the hospital, quicker recovery time, and fewer days missed from work.

These are the reasons as cardiothoracic surgeons we have to explore new methods to better treat our patients. With these steady advances, we will regain the respect of our colleagues. Our patients will once again request and receive choices of treatment options based on evidence-based medicine rather than treatment based on who encountered the patient first.

Another challenge we face as cardiothoracic surgeons is the temptation to embrace all technology before it has been proved efficacious. This temptation is spurred by the desire to increase our practice during a time of a decreasing number of cases, the desire to be seen as on the leading edge, and last, the attempt to improve our marketing strat-

TABLE 1. A meta-analysis comparison of major cardiac events after on-pump and off-pump CABG

	No. of Patients	MI-stroke-death composite end point odds ratio
On-pump CABG	558	0.48 (<i>P</i> = .08)
Off-pump CABG	532	

CABG, Coronary artery bypass grafting; MI, myocardial infarction. Adapted with permission from Parolari et al.⁷

egy over that of our nearest competitor. This strategy will fail.

For example, approximately 5 years ago, off-pump CABG (OPCABG) was touted as the safest method of coronary revascularization. The claims were of fewer strokes, less blood use, fewer days in the hospital, and decreased costs. The scientific data to support these claims have been lacking. However, in a meta-analysis, Parolari and colleagues⁷ reviewed 9 studies with matched selection criteria. There were 558 patients in the routine CABG group and 532 in the OPCABG group. The composite end point consisted of death, stroke, and myocardial infarction. No advantage could be demonstrated by use of one technique over the other (Table 1). The problem with the study was the rather short-term follow-up.

Another end point examined by Khan and associates⁸ was graft patency. With 80% of patients undergoing angiograms at 3 months, the patency rate in the CABG group was 98% compared with 88% in the OPCABG group. With the purported advantages not being realized, the overall rate of OPCABG has leveled off at approximately 20% (Table 2).

This technology, although touted as a breakthrough, did not fulfill surgeons' expectations. Looking back, this might have been predicted. The OPCABG operation is much more difficult to perform. Rather than a motionless field, the surgeon once again is operating on a beating heart, similar to what was done in the early 1970s. The technology had regressed in hopes of avoiding the heart-lung machine and its complications. What we failed to factor in was the requirement for enhanced technical performance by the surgeon needed for OPCABG. In addition, the heart-lung machine has become safer with membrane oxygenators and heparin-coated circuits. The end result was that the heart-lung machine had evolved and improved at a faster rate than the technical skills of the surgeons performing beating-heart surgery. The anticipated lower stroke rate, lower blood use, and shorter hospital stays with OPCABG were not realized, and the patency rates of our grafts were lower. This chapter of evolving technology might be viewed by some as a step backward. However, the technology of heart stabilization, the search for sutureless anastomosis, and minimally inva-

TABLE 2. A randomized comparison of graft patency 3 months after on-pump and off-pump multivessel CABG

	No. of patients	Patency of grafts at 3 mo
On-pump CABG	50	98%* (127/130)
Off-pump CABG	54	88%* (114/130)

CABG, Coronary artery bypass grafting.

**P* = .002.

sive approaches has been a spin off of OPCABG. Although great for selected patients, OPCABG will be considered one of the stepping stones to the next evolution in coronary surgery. The message to take away is that the current proposed procedure might not be the answer to the current problem, but it might serve as a building block.

Another example would be Heartport technology, which was innovative and provided the foundation for our current era of minimally invasive surgery. The mistake of Heartport technology was not the technology per se but the marketing strategy of introducing it as a revolutionary new technique rather than as an adjunct to the surgeon. Today I view robotic surgery as robotic assistance for established surgical techniques of repairing mitral valves and performing coronary revascularizations.

I would like to comment briefly on the leveling of the playing field I spoke about earlier. Technology has advanced in all areas of the treatment of cardiovascular and cardiothoracic diseases, with advances in imaging being unsurpassed by any other field. In the future, this will provide opportunities for us as cardiothoracic surgeons. Imaging coronary arteries will not always be catheter based. Patients will undergo magnetic resonance imaging angiography or perhaps enhanced computed tomographic scanning, which will provide a roadmap for coronary lesions. Patients will view angiography as invasive, like invasive surgical intervention, and will choose another less-invasive way to have their heart disease diagnosed. Suddenly, the playing field changes. The physician making the diagnosis (radiologist-cardiologist) is no longer prescribing the therapy. The apparent ease of immediately treating the coronary lesions with the sheaths in the groin is gone. Patients will weigh their various options and make evidence-based decisions after gaining trust in the physician who is the messenger of this information. I believe the convenience of the therapy ("already in the catheterization laboratory sheaths in place") will be supplanted by evidence-based decisions.

As treating physicians, we have to be prepared to become more involved with our patients as they try to sort out the various options. If we are seen as unbiased with nothing to gain but the patient's health and interest, we will once again be held in high regard and, consequently, our self-esteem as a profession will be restored.

The golden age of cardiothoracic surgery has not passed. We are entering an exciting time of change and evolution in our specialty. Many new techniques will be pioneered, and our patients will benefit. More important, as trustees of our specialty, we have to communicate this to future surgeons. Our perceived enthusiasm for our specialty and its accomplishments will drive the next generation of surgeons. We will determine the caliber of students selecting our specialty. Since the peak in 1996, the number of college graduates choosing medicine is down by 26%.⁹ The number of medical students to choose surgery is also down by 7%.¹⁰ To compound the problem further, the number of surgical residents choosing our specialty is also down. Therefore, the pool of potential candidates to become cardiothoracic surgeons has dramatically dropped since 1996.

The next challenge we face is the exposure of medical students and surgical residents to our specialty. With the 80-hour work week, there are fewer general surgery residents on our services. The number of medical students choosing to rotate on our specialty is also down because of the decrease in emphasis of our specialty in the medical school curricula. To overcome these hurdles, we have to become excited once again by the specialty we practice. We have to convincingly tell our students and residents of the excitement of being a cardiothoracic surgeon. These potential students of our specialty will want to see our dedication to our specialty and the passion with which we practice first hand in operating rooms, research laboratories, and classrooms.

At USC, cardiothoracic surgery is seen as an exciting specialty with a bright future. We have become part of the medical school curriculum, with third- and fourth-year students rotating on our service. To make the rotation a teaching and learning experience, we have physician extenders to help with histories and physical examinations, discharge summaries, and chasing down laboratory values. This allows the students to come to the operating room to observe a patient having a robotic mitral valve repair. The general surgery resident is afforded the same opportunity. It is this group of students we have to impress to keep our specialty interesting. By doing so, we will continue to attract the brightest and best to our specialty.

I have often said that if I applied today, I could not get into the cardiothoracic program at USC because of the outstanding residents we have applying each year. Like trout fishing, the highly prized trophy fish (resident) has many lures to choose from. He waits until the very best comes along before taking the bait. We have to present the very best bait (an exciting and rewarding profession) if we are going to attract the very best to our specialty. Once a young resident expresses an interest, we have to foster their enthusiasm. The entry point to our specialty is often the

laboratory during their general surgery training. The young investigators in our laboratories at USC are exceptional. To have exceptional laboratory experiences for our students, we have to invest in faculty who will provide these experiences. This requires protected time, incentives for writing grants, and the rewards of a tenure track. This in turn is again a great investment in the future of our specialty because we are continuing the search for new and innovative therapies and techniques for the benefit of our patients. Once the student is involved with this activity, you will have hooked the trophy fish. If we look to the future as one with promise, our students will also be enthusiastic for the future of cardiothoracic surgery.

I would like to leave you with a quote from the late Charles Merriam, who was a political scientist. In 1934, he stated the following: "The future belongs to those who fuse intelligence with faith, and who with courage and determination grope their way forward from chance to choice, from blind adaptation to creative evolution."

It has been an immense honor to be president of The Western Thoracic Surgical Association, and I thank you for the opportunity.

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