ESTS Presidential Address

Creative destruction: a new era in the field of thoracic surgery†

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Ladies and gentlemen, dear members and guests,

Thank you for attending the 23rd Conference of the European Society of Thoracic Surgery in Lisbon. Here in the audience, I see many familiar faces from our previous meetings, Antalya and Elancourt Schools and other thoracic society meetings. I recognize leaders from our sister societies and expert surgeons whose work I greatly admire. I would like to welcome you all to the biggest ESTS event of 2015.

Before we begin, I would like to express my deep sorrow for the loss of a Turkish chest surgeon 2 days ago. Kamil Furtun was shot in the hospital and died of his injuries. He was a brilliant chest surgeon, a lot of sick patients benefitted from his expertise. He will be sorely missed.

I would also like to honour the memory of one of the visionary founders of our society of General Thoracic Surgery. Today's congress would not be possible without our past leaders’ dream of developing the field of thoracic surgery and revolutionary changes to many of the procedures in our field. I regret to be the one to inform you that our beloved first president Dr Ingolf Vogt Moykopf recently passed away in March. He will always be remembered as a surgical innovator, clinical and research scientist, educator and mentor to the many surgeons who had the opportunity to know him. Surgeons from around the world have shared their condolences. Let us take a moment of silence to remember our first president, Ingolf.

I would also like to thank our amazing councillors for all of their collaboration. Thank you to the great directors for all of their hard work. Thank you to the officers for your excellent leadership. I would especially like to recognize Sue Hesford for her exceptional direction and efforts. Of course, I could not be here today without the immense support of my loving family and my wife Ebru.

Today, I would like to speak on creative destruction and the new era of thoracic surgery. Many of us here feel like we are in a wind of change with the adoption of innovative ideas, techniques and devices happening at breakneck speeds. It is uncertain if this fast pace has allowed us to adequately test and validate the ideas, properly implement them into educational programmes or follow safety precautions. This has deeply affected our field of surgery and the fate of our surgeons and patients over the past two decades. The variety of options increases decision-making dilemmas for surgeons and patients who question what procedures to accept.

In this address, I will first illuminate the sources of the current uncertainty and confusion about fast technological innovation in the field of modern thoracic surgery. Secondly, I will describe the impact that this has on educational policy, transparency and social communication, and how the current generation of surgeons can position themselves as leaders in the field of thoracic surgery. Finally, I will discuss morality and professionalism in this rapidly changing era of medicine.

Although there has been great progress in surgery, the adopted innovation has increased the cost of procedures. For example, patients favouring minimally invasive surgery may be a factor in some surgeons’ choices of what techniques to learn and when, and because of this young surgeons question what path to follow and what position to take in their education. They ask themselves how soon they should learn the latest technological innovative developments and whether they should become proficient of a particular technology like uni-port VATS or robotic surgery in the field of thoracic surgery or stay cross-disciplinary generalists with broad capabilities in the treatment of infectious diseases or classical open surgeries. Young surgeons wonder whether to pursue open surgery, minimally invasive surgery or both. They should learn mediastinal, lung cancer, chest wall, oesophageal, tracheal, emphysema surgeries in addition to transplantation, trauma, endobronchial treatment and surgery for infectious diseases. If they choose not to specialize in open surgery, I doubt they will be ready to respond to catastrophes that would require expert open surgical techniques such as bronchial or vascular sleeve resections or the treatment of a major vascular bleeding.

Most mentors currently have a consensus to instruct classical open surgery techniques first, closed, minimally invasive techniques, second, and the latest technological developments before they are widely accepted.
SOURCES OF CONFUSION IN THE PRACTICE OF THORACIC SURGERY

The source of confusion in the practice of thoracic surgery begins with the definition of 'innovation' specifically the difference between surgical and technological innovation in surgery [1]. The Declaration of Helsinki authorizes physicians and surgeons to try unproven treatments when nothing else works, to save life, re-establish health or alleviate suffering. Analytical, improvisational and creative surgeons seek to solve and fix individual patient problems [2]. All of these small changes that surgeons make to technique eventually add up to surgical innovation, an evolution with unknown consequences to safety and reliability in the field [3]. Surgical innovation is a new evolving intervention with uncertain effects, side-effects, safety, reliability and complications [4].

Patients hold similar attitudes towards new techniques not yet fully studied or accepted by surgical societies. Consumer society regularly accepts the new and displaces the old without hesitation. Consumer optimism for new techniques often strongly persuades the directors of medical institutions in addition to the surgeons [5]. Of course, new does not necessarily mean improved. Personally, I define surgical innovation as the new techniques, developed through the creative hands and minds of the surgeons, that give better results than any existing ones.

Some examples of surgical innovation include mediastinoscopy, extended resections for lung cancer, the replacement of a resected, cancerous oesophagus with other tissues, lung transplantation and tracheal surgery. Imagine a patient who had a lung transplantation or a major resection such as en bloc vertebrae and lung who now enjoys life cured from disease. I predict that future surgical innovation will allow the safe and total replacement of the trachea and oesophagus, lung, chest wall and diaphragms, either from self tissues or allogenic tissues. In addition, I expect surgical innovation to increase longevity in the treatment of emphysema, mesothelioma, lung metastasis and other rare tumours of the thoracic cavity. Now that would be true progress.

Unlike surgical innovation, I observe that the technological innovation happening in our field does not focus on increasing patient longevity and survival. Technological innovation includes better image control and the transfer of surgeon capability into the chest cavity via single or several holes. VATS lobectomies are still lobectomies whether they are performed from 1 or 3 holes or via the transfer of your capabilities through a robot or sticks which benefit the patient with pain reduction and its results. Although technological innovation does not increase the cure rate, it contributes by decreasing the trauma, pain and complications from surgery shorter recovery times and earlier returns to work. More importantly, some technology contributes to true surgical innovation. I think the best ever combination of technological and surgical innovation may be the cochlear implant. It brings a great benefit to the patient. Another great example is the extracorporeal life support system that gives cardiac patients a chance to wait for a heart while in the comfort of their home. Unlike a cardiac patient on artificial heart, a patient with totally destroyed lungs on the waiting list for a lung transplant stays intubated or on an ECMO in the ICU. This achievement would require a combination of surgical and technological innovation. We desperately need a device to allow emphysema patients to breathe. As you may notice, surgical innovation aims to heal, cure, increase longevity, improve the quality of life, ensure productivity and offer long-term benefits.

I am a strong proponent of minimally invasive surgery and a leader for both VATS and robotic surgery in my geographical region. But I often question why I offer my patients these technologically innovative surgical procedures. They are useful for early postoperative recovery but more importantly I notice that patients have a more positive perception of minimally invasive surgeries which facilitates their acceptance of a major, yet, necessary surgery. Minimally invasive surgery takes up to 60% of my practice. I ask myself if it would make any difference if I performed operations from a small thoracotomy. I must say that this question discomforts me.

Although some studies do not show a clinical difference between mini-open and VATS approaches, nearly all of the chest surgeons are rushing to learn hole video surgeries. But why? This is a technological innovation with the benefits of a shorter drainage time, shorter hospital stay and increased acceptance for adjuvant chemo-treatment.

In recent years, several technological innovations in surgery have focused primarily on the cosmetic outcomes for the patients. Basically, patients may prefer procedures that either relocate or eliminate scars. Their demands and expectations may drive the availability of certain procedures. Examples include natural orifice transluminal endoscopic surgery (NOTES), single-incision laparoscopic surgical (SILS) techniques and remote access approaches to thyroidectomy (e.g. robotic assisted transaxillary thyroidectomy). Patients, the consumers, push for the technological innovation of hole surgery mostly for cosmetic reasons.

CREATIVE DESTRUCTION

Joseph Schumpeter, an Austrian-American economist and political scientist, popularized the concept of 'creative destruction' using entrepreneurial technological innovation for market power in the economy.

Many economists argue that this coexists with Adam Smith's concepts of the invisible hand and price competition. Technological innovation creates temporary monopolies with additional benefits that provide incentives for the development of new innovation. The key players of creative destruction include entrepreneurs, venture capitalists, innovators and influencers. They create something new to destroy the previous thing. As new instruments take hold, those with the knowledge to use them also become popular. Those who do not adopt the new techniques for whatever reason, whether professional, ethical, personal, may lose popularity. The push for innovation destroys old schools of thought and turns over the practitioners, educators and mentors.

EDUCATION, TEACHING AND LEARNING IN THE ERA OF CREATIVE DESTRUCTION

Part of a surgical education requires fostering innovative thinkers. Surgical training programmes have built a long-standing tradition and excellence to maximize surgical residents' academic potential. As academic surgeons, we ensure that innovation continues through research. Training in cognitive and technical skills, development of clinical knowledge and maturity, preparative and postoperative care, the prevention and management of complications and, most importantly, the acquisition of surgical judgement are key elements of surgical education.
Residency programmes may not provide a standardized education of the requisite operative skills of all of the minimally invasive surgical procedures available today. As a result, many surgical residents fail to acquire a basic maturation of training and experience in minimally invasive surgery. Today, young surgeons often go in search for novel surgical techniques not found in residency programmes. They seek to develop minimally invasive surgical skills. The speed of the development of technological innovation in healthcare builds a ‘catch the last train’ effect on our young surgeons. They are in a position to choose their educators and mentors. As I instruct surgical techniques at wet labs, I have observed that many young surgeons are seeking novel techniques before they are even competent in basic skills.

From apprenticeship to YouTube

Since publication takes 1–3 years, textbooks may not keep up with the pace of innovation. Young surgeons tell me that they turn to master classes, CDs and YouTube to learn new surgical techniques and its application on human anatomy. A recent study shows that surgeons are more likely to perform new techniques and advanced surgical procedures after attending master classes [6].

ESTS stared to peer review the surgical videos on YouTube to improve this educational platform.

From apprenticeship towards simulation

Surgeons need more practice, training and assessment to gain cognitive and technical skills [7]. Simulation software has the potential for high-quality, competence-based training programmes in laparoscopy techniques, surgical scenarios, thoracoscopy and robotic surgery. I expect simulation, virtual reality and Internet-based electronic learning to be part of the selection, training, credentialing and remediation of physicians and surgeons. Future surgeons may eventually perform an operation on a projectable palpable hologram of the patient and deliver the data set before performing the actual surgery with robotic assistance. It appears to be that technological innovation will greatly contribute to education in thoracic surgery.

From apprenticeship towards mentoring and proctorship model

The simulation model of education does not render the chiefs and mentors obsolete. In robotic surgery, for example, proctors directly supervise and observe the trainee, safely introduce the techniques, give instructions, guide the transition from mastery to performance and take over the operation via the mentoring console when necessary [8, 9].

Increased transparency and scrutiny

has greatly improved the observation of surgery. Before this technology, apprentices assisting the first surgeon could hardly follow the techniques, especially from small thoracotomy. Surgeons have high-quality vision via cameras and TV monitors in the operating room, which allows everyone to follow the surgeon and learn through the observation of anatomy and check the reasons for complications. Overall, this transparency and scrutiny of VATS has increased the quality of minimally invasive surgery. For instance, a high level of scrutiny has forced all surgeons to become competent at mediastinal lymph node dissection with minimally invasive techniques. For example, the surgeon operating a robot is better at lymph node dissection not only due to the robot’s capabilities, but also due to this scrutiny. Surgeons started to self-check their surgeries, and this resulted in an overall increase in the quality of open surgeries. These videos will document the rare operations, increase observation and scrutiny and develop better oncological and technical competency.

Development and dissemination of knowledge

Historically, academic surgical centres have developed new techniques and technology through research and early clinical work approved through an institutional review board. Interestingly, the laparoscopic technique broke this model. As patients demanded the laparoscopic technique, this held market power. Private practice surgeons in North America disseminated the laparoscopic technique without the usual protocols, assessments and oversight [10]. Let us consider laparoscopic cholecystectomy as a recent example of creative destruction. Early laparoscopic cholecystectomies took longer, and were more complicated and costly than open surgery. The New York State Department of Health tabulated the complications of laparoscopic cholecystectomy and demonstrated a 15-fold increase in the risks of injury to the common bile duct compared to the conventional open approach [11]. Surgeons should have abandoned the technique [12].

Does this sound familiar to you? Robotic surgery is significantly more time-consuming, expensive and cumbersome than the conventional surgeries. Who thinks that the robotic surgery will disappear in the history of thoracic surgery? In my part of the world, robotic surgery increases also via private healthcare systems. I feel like history of laparoscopic cholecystectomy and the development of robotic lung surgery show a kind of similarity.

Each new technique has a learning curve for surgeons in training. Patients encounter increased risks while the surgeon and surgical team are new to the procedure and still in the learning curve. The same procedure may be safe in the hands of one experienced surgeon but may be risky if done by another surgeon on the learning curve. Entrepreneurs generally publish the risk of certain procedures as a part of marketing and generalize the risks. To announce a real surgical risk of a certain procedure excluding the impact of the surgeon, thousands of cases should be collected [13]. ESTS database is present for this reason. The risk rates obtained and given by the large data collection centres may be different than that of given by the innovator. Innovators, generally given surgeons, may have better patient selection, may have better postoperative standards for care or even may do this novel surgery better than any of us. Could anyone in this room explain to me why there should be a mortality rate difference in a lobectomy patient whether performed by VATS or robotics or open techniques in a large-scale data. If the pain is the cause of the all mortality difference, then why don’t we stop pain. I am convinced that the answer leads to creative destruction.

Positioning of young surgeons and mentors

In 2005 my mentor, Prof Dr Kalayci, urged me to start VATS lobectomies for lung cancer. He may have noticed the worldwide
maturation of the technique and my own maturation in thymus surgery with minimally invasive techniques. We depend on our chiefs and mentors to envision the proper timing for the maturation of new techniques and our abilities as surgeons. Unfortunately, I lost my mentor, fortune teller and the greatest surgeon I have ever seen 1 month after this talk. My generation witnessed a paradigm shift in surgery for early-stage lung cancer. We will continue to rely on our chiefs and mentors to navigate upcoming technological innovation. Young surgeons should carefully consider, filter and prioritize these available options. Please ask these questions to yourselves about the technological innovation: Is this a real clinical need? How much will this add to my current techniques? Is this financially viable? Can the average surgeon adopt this? Is this a wise investment of my time and energy?

MORAL ISSUES AND PROFESSIONALISM

What makes an innovation ethically acceptable?

Conflict of interests. The explosion of technological innovation in the healthcare market offers powerful incentives of finance, market share, academic credit and professional recognition that threaten to compromise physicians’ independent judgement and loyalty to patients [14, 15]. As surgeons determine both who needs the surgery and who performs the operation, the preservation of their independent judgement and ability to choose in the best interest of the patient are essential [16]. Of course, we must keep in mind that surgical innovators may also maintain relationships with the manufacturers of technological innovation with the benefits of patients in mind. Surgeons and societies are in a position to tell the medical industry what to focus on. Our constitution says: ESTS does and will develop all educational activities and scientific programmes, and develop policies independent of Medical Industry influence.

Consent. Surgeons who respect the best interest of the patients fully explain the track record of unproven surgical or technological innovation as part of acquiring patient consent [17]. Participants undergoing innovative interventions should be informed of the novelty [17]. Transparency is key for consent. According to the Declaration of Helsinki, we can only use unproven innovation after seeking expert advice, gaining the informed consent of the patient.

Validity. Unplanned experience during an emergency situation, animal studies and demonstrations in the anatomy or pathology laboratory may validate innovation. Field strength is also important for the validity of innovation. If an innovative operation is to be performed, it would be better, if performed in an institution with sort of field strength, but above all with congenital consultative traditions between various clinical and basic science involved. Also innovative operations should be carried out in a hospital where there is sufficient support for undertaking such a step.

Competence. As this innovation is uncharted territory, only the most competent masters with the highest probability of success and the lowest risk of complication should attempt the unproven innovation.

Cost. The rapid rise of technological innovation and their temporary monopolies are considered responsible for the skyrocketing cost of healthcare at 2–3 times the rate of inflation. This additional cost makes certain procedures financially difficult for the wider population. The private healthcare system patients are generally the first to have access to the most recent technological innovation. That is why the dissemination of the most recent surgical innovations does not enter the state and public hospitals. Each healthcare system in each country should publish the complete price comparison tables of their available procedures [18].

North American hospitals consistently publish their prices. Most of the time, we surgeons follow the American hospital pricing system because they consistently publish their prices, which almost always demonstrate that VATS and open lobectomies are almost the same price. American prices are on par with the Group A private hospitals in my country. However, the pricing system in public healthcare shows 4–5 times higher prices for VATS lobectomies compared to open surgeries in my country.

Clearly, excellent open surgeons are in high demand to continue to serve the majority of the population in developing countries. Countries with limited resources for public healthcare should still take the cost into consideration to best serve the people with the highest quality of open surgery. If we run after these technological innovations, the benefits should far outweigh the costs. For example, the expensive cochlear implant technology offers the priceless gift of hearing to the deaf. Every country has different healthcare systems with different pricing systems that surgeons should take into careful consideration [18].

Cosmetics of surgery and ethics. Patients may have a right to prefer cosmetic incisions [19]. Thyroid surgery is a wonderful case for recent developments. To avoid scars on the neck, surgeons use technological innovation as instruments. For example, the robotic axillary breast approach has recently gained popularity. There is a recent thyroid surgery technique performed through the floor of the mouth without any incision in the neck. The question is: to what extent, if any, should cosmetic preferences influence surgeons’

In our field of surgery, if the risk of morbidity and mortality outweigh the possible cosmetic benefits, then the procedure should be abandoned. Surgeons educated by mentors should have the capability to judge and assess this.

Professionalism. Professionalism involves the excellent skill, good judgement, responsibility, polite behaviour, discipline and adherence to ethical principles. Physicians have a social contract to adhere to the main principles of patient welfare, patient autonomy and social justice. As professionals, physicians have five types of relationships [20]. To the patient, society, healthcare system, other physicians and the self. A professional physician meets the expectations of all of these while keeping the patient relationship at the centre. Society gives us the privilege of professional autonomy, self-regulation and recognition in return for our accountability, ethical standards and altruism in delivering healthcare [21]. Altruism or selflessness, a concern for the welfare of others, is the most important part of being a surgeon and physician. The ‘altruistic manner of delivering care’ emphasizes that the benefit of the patient takes paramount importance regardless of any other possible benefits to the surgeon. As mentors and educators, we can teach our residents how to practise professional behaviour. But no amount of knowledge or mentoring compensates for a lack of good character [22]. In addition, the pace and increasingly commercial nature of healthcare may erode our societal values if we do not obey the rules of ethics and professionalism [23].

History will judge our work.
CONCLUSION

During my presidential address, I tried to give a snap shot of the current economical issues, technology and safe adoption in creative destruction. Actually, the last decade of technological innovation has helped us a lot to decrease our morbidity, to increase the capability and quality of surgery, to educate many highly skilled and qualified young surgeons. However, technological innovation has not yet prolonged the survival of our cancer patients. In our field, we still have not invented an operation that improved the quality of life as the cochlear implant has for ear surgery or as the life extension support system has for cardiac surgery. Now, what we need is to educate, train and guide innovative young surgeons who have the potential to seek the cures for these miserable diseases as well as competent surgeons who can perform high-quality surgeries at low costs.

I have two final messages:

To the technological device manufacturers: We appreciate your innovations to ease the practice of surgery, to decrease the rate of complications and to reduce postoperative hospital stays. However, in human society, there are millions of people waiting to be cured from cancer and yet untreatable diseases. In the development of new equipment, please focus on longevity, long-term survival and complete treatment so we can get closer to a treatment or as the life extension support system has for cardiac surgery. Now, what we need is to educate, train and guide innovative young surgeons who have the potential to seek the cures for these miserable diseases as well as competent surgeons who can perform high-quality surgeries at low costs.

The European Society of Thoracic Surgeons will be with you as it has been for the past 23 years.

REFERENCES