

Editorial

Cardiothoracic surgery as part of safe executive surgery

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Cardiothoracic surgery – an evolving and safe surgical discipline

Traditional cardiac surgery includes full sternotomy and the use of cardiopulmonary bypass, which have been in use for the better part of a century. The safety and success of cardiac surgery have been determined by mastering traditional surgical skills. The cardiac surgeon is recognized as the ultimate leader of the operating team, and the surgeon takes full responsibility of the surgical outcome.

Safety in cardiothoracic surgery requires contemporary knowledge on the efficacy and security of both traditional and modern surgical procedures. Expertise in cardiothoracic surgery mandates not only mastering technical issues during surgery, but also necessitates vast knowledge on available surgical options. Cardiac surgery now encompasses major advances in adapting small incisions, favoring endoscopic approaches and even robotic techniques, which often replace the need of full sternotomy. Transcatheter procedures enable the implantation of new surgical devices percutaneously. Modern hemostatic surgical cutting instruments, tracheal and esophageal stents, intrabronchial valves and plugs, as well as three-dimensional video technology, have expanded the armamentarium of thoracic surgeons. Treatment of thoracic cancer has improved with evolving imaging technologies. Accurate cancer staging obtained by lymph node sampling and dissection add to the efficacy of overall surgical care. Radical resections have become feasible through small incisions. Video-assisted thoracic surgery has enabled early surgery to patients with pleural infections, benign pulmonary, pleural and esophageal diseases, including palliative care.

On the other hand, more than 25 years after the first coronary artery bypass grafting without cardiopulmonary bypass, substantial information still support the use of cardiopulmonary bypass to reduce postoperative cardiac events and to secure long-term survival. Despite major advances in the technology of coronary artery intervention, coronary artery bypass grafting offers superior long-term graft patency in patients with complex coronary artery stenosis and left main vessel disease.¹ Non-medical reasons such as social security, health care system and fashion may influence surgical decision-making, which should not be made at the expense of patient security or based on compromised solution in terms of long-term outcome.

Clearly, future cardiothoracic surgeons require training in catheter-based procedures.² Education on catheter-based procedures expands the expertise of the surgeon to lead the surgical team. To decide for the most adequate, secure and suitable treat-

ment for the individual patient, the future cardiothoracic surgeon needs to master both technical issues of catheter-based procedures and knowledge on the outcome of the specific procedure.

Threats and challenges of safe cardiothoracic surgery

The transcendence of cardiothoracic surgery into the percutaneous world may face several challenges, including local circumstances, financial realities, treatment cultures, and often competing interests among colleagues. Any surgical technique requires a significant amount of experience and repetition for competence, but traditional surgery continues to play a crucial role in patient care as transcatheter procedures may also lead to complications. The ability to treat potential complications aids in controlling percutaneous procedures as well.

The ability to sense tissue and to be perceptible to the sense of touch are delicate features of any surgeon.³ Technology has not yet been extended to transferring the sense of touch. Machine learning, wire technology and robotics do not encompass tissue palpation and the sense of soft and hard tissue, and does not differentiate changes in temperature. Decision-making based on quantification, binary digits, flashing lights or warning alarms is regarded as synthetic. The reaction time to complications is prolonged or even disregarded based solely on synthetic alarming, which is often disturbing and unfriendly. The human being is programmed to become numb to repeated irritants.

Lean, efficient, and fast track programs are the present norm, when institutions and individuals compete for numbers, rank, and significance, but efficiency does not guarantee sustainable outcome. The optimal treatment for each patient is the most important facet in practicing medicine. Increasingly sick patients create clear challenges for safe surgery and mastering everything alone may become a waring task in the long run.

Accountability and supportive teamwork enhances safety

The solution is to be able to work together with representatives of cardiology, anesthesiology, radiology, geriatrics, pediatrics, and many other fields. Competitive attention between traditional surgery and transcatheter techniques is no longer a rational endeavor.

Selection of intervention, treatment or diagnostic procedures are only selected upon medical terms. The required treatment path is planned after team discussion and the execution of the surgical plan is directed to a suitable surgical team. Surgical cases are shared collectively among colleagues and distributed according to the competence and experience of the individual surgeon.⁴ A functioning team secures competence and takes mutual responsibility, and the success of the safe treatment pathway pertains to

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all members of the team. Each subspecialty maintains their own expertise that is amenable to the individual case.

Surgery in itself is only part of the treatment protocol. Cardiothoracic surgery is being transformed into a new discipline encompassing mastering principles of negotiation in between consultants representing several other subspecialties. Instead of seeking a patient for a definite treatment or intervention that is mastered by a know-it-all specialist, the patient is referred to a group of experts that contemplates different treatment options and selects a treatment pathway suitable to the individual patient. The treatment pathway may include several interventions in a hybrid fashion. Coronary bypass surgery may be performed using partial sternotomy together with percutaneous coronary intervention with cardiopulmonary bypass through the femoral vessels. Transarterial valve replacement and endovascular treatment of the aorta including a local surgical bypass of the head vessels may replace more complex and invasive surgery of the aorta. Depending on the acuity of the disease, such as during aortic dissection and endocarditis, the decision for the individual treatment requires prompt planning and submission to a multi-talent team with active members representing many of the subspecialties ready for an efficient execution of a specific treatment protocol.

From the patient's point of view, a seemingly dull and uneventful operation without surprise is often the most secure operation. The aim is to make the surgical procedure fluent while minimizing risks and complications. A straightforward approach using a transfemoral wire technique to implant a cardiac valve may suffice, when a long-term outcome is not aimed for in a frail patient. A patient with intravenous drug abuse may benefit from extended radical surgery due to endocarditis. A pregnant woman with cardiomyopathy and cardiac valve disease may not require immediate surgery and obligatory anticoagulation. A mutual decision with the patient requires maturity, knowledge on surgical techniques, and clinical experience. Mutual accountability supports the responsible surgeon to execute the surgical plan in a secure way. Trustworthy teamwork enhances efficacy and efficiency, and hospital administration may rely on the expertise of the surgical team as a whole to defend the surgical decision-making even legally.

Creating trust and maintaining safe teamwork

The scientific community may help in building trust among peers by adding deeper understanding of our mutual mission to

aim for sustainable health care. Being able to participate as a team member requires trust and accountability. Didactic meetings and open discussion with peers in a secure and friendly environment increase the social cohesion of fellow clinicians. Learning from each other is the basis for teamwork. The percutaneous interventions were initiated as an experimental research project, and the prototype for the transcatheter aortic valve replacement device was developed using an experimental animal model. Studies on physiology, pathology, treatment protocols, and practice with devices are feasible as research projects.⁵ Basic, translational and clinical sciences may increase the creative needs to develop safe surgery as a teamwork mission.

Conclusion

The surgeon is responsible for the overall surgical process, but the open-minded cardiothoracic surgeon is ready to ponder different treatment options based on traditional and contemporary knowledge to secure safe surgery. Peers and colleagues representing other medical fields may help in the decision-making of the treatment choice for an individual patient. During the execution of the surgical operation, the cardiothoracic surgeon has to trust and keep members of the surgical team accountable for their input in order not to derail from the planned treatment path. Aiming at patient safety during cardiothoracic surgery signifies contemporary knowledge on different surgical options, control of technical challenges and adaptation to supportive teamwork.

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