The acquired cardiac disease domain: the next 5 years†

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Summary

At a recent in-house meeting at the European Association for Cardiothoracic Surgery (EACTS) headquarters in Windsor, the Chairs of the four domains were asked by the President to present their perception of the next 5 years in their respective domains. This review represents a distillation of our discussions on adult cardiac surgery. Advances in technology and imaging are having a radical effect on the working lives of surgeons. In clinical practice, the growth of heart teams and the breaking down of artificial barriers between specialties are altering the way we practice for the better. We see the development of hybrid approaches to many areas such as coronary artery surgery and operations on the thoracic aorta. These changes require careful analysis to ensure that they produce better outcomes that are also cost-effective. All health-care systems are at breaking point, and it is our responsibility to harness new technology to benefit our patients. This is all part of placing the patient at the centre of our activities. Hence, we see the involvement of patients in the design and analysis of clinical trials, which also require great mutual trust and cooperation between surgeons in different countries. Because of the dramatic changes in the pattern of working, we have had to alter our patterns of training and education, and we will continue to make significant innovations in the future. These are exciting challenges that will keep us all busy for the next 5 years at least.

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As the Danish physicist, Niels Bohr, observed, predictions are always difficult, especially about the future. Although change has always been a feature of cardiac surgery and 5 years may not seem so long, modern technology has hastened the rate of change greatly. This article has been written in response to the President's call at a meeting of the Domains at European Association of Cardiothoracic Surgery (EACTS) headquarters in February of this year. In the last 5 years, we have witnessed that the pattern of work alters significantly within hospitals such that the emphasis is now on working as a team in place of an all-powerful titular unit head dominating clinical practice. Rapid and profound advances in technology and in imaging, including echocardiography, computerised tomography and magnetic resonance imaging have transformed the arena in which surgeons work.

CLINICAL PRACTICE

The exponential increase in transcutaneous aortic valve replacement from 0 to 30,000 implants in 10 years indicates how successful, exemplified by Arterial Revascularisation Trial Study (ARTS) and more recently by a registry study in UK, to compare conventional AVR with transcatheter aortic valve implantation (TAVI) [4, 5]. National registries are in place throughout Europe. This could be an opportunity for a European TAVI registry co-ordinated by EACTS with European Society of Cardiology and funded by the EU. These studies are vital, as over the next 5 years we need to establish how significant the problem of systemic embolism really is during TAVI procedures and whether the presence of a mild or moderate paravalvular leakage into a concentrically hypertrophied ventricle retards remodelling and shortens life expectancy [6]. Surgeons working within TAVI teams need to lead on these matters so that our patients can be presented with clear information on the risks and benefits involved [7]. Transcutaneous valve repair or mitral valve replacement are at an earlier stage of development, but these procedures need to be evaluated by prospective studies, as is happening with the Endovascular Valve Edge to Edge Repair Study II (EVEREST II) randomized controlled trial, which is comparing the mitraclip against conventional mitral valve repair or replacement. As surgeons, we are in a very privileged position between the inventor and the bedside.

The heart team approach has already borne fruit in the management of coronary artery disease. Increasingly, surgeons and cardiologists discuss cases together and offer the patient real choices. The SYNERGY between percutaneous coronary intervention with TAXus and cardiac surgery (SYNTAX) trial has been extremely influential in this endeavour [8–10]. However, there is
much more to be done. If two internal mammary arteries appear better than one, why is it, on the basis of national audits in North America and Europe, that most surgeons are not doing this? This may be because the evidence so far is Class II and the ART randomized trial that reported similar outcome results between single and double internal mammary grafts to the left ventricle at 1 year [11, 12] has yet to report its 10-year results. Increasingly, surgeons are trying to ‘soften the blow’ and reduce morbidity for the patient. A number of units in most European countries now have hybrid operating rooms that can and are being used to facilitate a hybrid approach to coronary artery surgery. Thus a patient can receive a left internal mammary artery to left anterior descending via an atraumatic small incision with soft tissue retraction only and drug eluting stents (DES) to the remaining vessels [13]. Will DES have a higher patency rate than vein grafts at 10 years?

The hybrid approach is likely to become much more common in surgery of the thoracic aorta. A number of studies have already demonstrated that transcatheter endovascular aortic repair (TEVAR) results in significantly less mortality and morbidity, but over the next 3 years multiple computerised tomography scans will often be performed and re-interventions may be required [14]. The preference for TEVAR over conventional surgery remains controversial, especially where the arch is concerned, because of the unpredictability of stent deployment in this area. Surgery has become much safer, but there is still a considerable morbidity. Combined operations involving stents and de-branching are being evaluated, but a large systematic multi-centre study is required at this time while clinical equipoise regarding the best treatment still exists. This type of surgery is a further example of the importance of close teamwork between interventionist and surgeon, in the planning, the execution and the post-operative care and follow-up. A recent two-centre randomized controlled trial in lone atrial fibrillation has shown that surgical ablation was superior to catheter ablation in achieving freedom from left atrial arrhythmias after 12-month follow-up, but the procedural event rate was significantly higher for surgical, compared with catheter, ablation [15]. This has opened the door to surgeons interested in arrhythmia and also raises the possibility of more hybrid procedures [16]. It is likely that the hybrid operating theatre will become an essential piece of capital equipment in all cardiac surgical units.

Surgery for heart failure has not, so far, lived up to its promises. Heart transplantation has become a niche activity because of the shortage of donor organs, and ventricular assist devices, while being able to transform desperately ill patients, remain expensive with activity limited to only a few centres. It is likely within the next 10 years that the cost of these devices will come down and the current push towards miniaturization will be successful. Trials conducted with and financed by commercial companies serve to heighten awareness of new technology, but we need large independent randomized trials funded by charities and central government agencies to provide the level of evidence we need to make these difficult decisions. Cost-effective studies are urgently required in this sector.

While there remains a severe shortage of donor hearts, and the prospects for novel cell or gene therapy are unlikely to reach the clinic in the next 5 years, surgeons have attempted salvage coronary artery surgery with or without surgical remodelling. The Surgical Treatment for Ischaemic Heart Failure (STICH) trial [17], published in 2009, concluded that adding surgical ventricular reconstruction to reduce ventricular volume to coronary bypass grafting does not improve symptoms or exercise tolerance and fails to lower the death rate or readmission to hospital. Predictably, this raised a great deal of controversy, was disappointing in its result and has led to a marked reduction in patients with significant ventricular akinesia being referred for ventricular restoration surgery. The problems with this study and its analysis are well reviewed by Buckberg and Athanasuleas [18]. It should serve as a warning to surgeons when organising large multi-centre trials that recruitment is the overriding concern and that diluting the entry criteria significantly affects the final analysis. From a methodological point of view, the trial was well done but the majority of patients were not those whom the original trial enthusiasts had intended to be included. Furthermore, it was not possible to ‘blind’ a study of this type and there was much variation in the technique of the operative procedure itself.

CLINICAL TRIALS

Despite the lifesaving nature of cardiac surgery and the impact of a large number of patients undergoing heart surgery on health care resources, few patients undergoing heart surgery participate in clinical studies or trials. More importantly, new surgical procedures and devices are often incorporated into clinical practice without an objective evaluation of their relative benefit over established procedures. It is particularly important to ensure the safety and efficacy of such treatments compared with less-risky, less-expensive and less-invasive treatment options. The evolution of the use of cardiac surgery in modern medical practice warrants the application of clinical studies to discriminate among the relative benefits of new procedures when compared with standard treatments and interventions.

There is an urgent need within Europe to form a Cardiovascular Surgery Clinical Network for relatively small, short-term clinical studies. Such a network would be even more useful when larger multi-centre studies are being planned. A similar arrangement is in the place of North America based in the USA but including centres in Canada. This network could be an important step in developing a culture of systematic scientific clinical evaluation within the field of cardiac surgery that would inform the use of new interventions in surgical practice and improve the scientific basis of care in cardiovascular disease. Our Association needs to work with the EU to achieve this aim.

SURGICAL EDUCATION AND TRAINING

Serious adverse clinical events after modern cardiac surgery are uncommon. As a result of current working practice, junior doctors have a reduced contact with seriously ill patients, and although well supervised, lack experience. Unless action is taken now, this lack of experience will continue into their consultant practice, resulting in a major problem with decision-making. A series of carefully simulated scenarios, performed regularly during their training programme, will fill the gap in their experience, increase their confidence in dealing with difficult problems and above all enhance the performance of the whole team looking after these patients.

In 2009, EACTS released a new guideline [19] that included emergency chest opening as the first step in managing a cardiac arrest in a post-cardiac surgical patient. This low-frequency, high-
risk event involves members of three different teams (surgery, critical care and cardiology) working together in unfamiliar circumstances and is ideally suited to benefit from simulation training. However, inter-professional team training for this emergency would be seriously compromised if the appropriate cardiothoracic surgical team members did not participate. Through innovative training models, we can engage senior surgical trainees and consultants through face, content and construct validity. Simulation is widely accepted as a method of reducing trainees and consultants through face, content and construct validity. The SOURCE Registry: what is the learning curve in trans-apical aortic valve implantation clinical trials: a consensus report from the Valve Academic Research Consortium. Eur Heart J 2011;32:205–14.


CONCLUSION

There is much to be done and a great deal of enthusiasm among the members of the adult cardiac domain. Together we can make a difference. We need energy and commitment to implement these ideas for the benefit of our patients.

Conflict of interest: none declared.

REFERENCES


