Welcome to the Cardiothoracic Research Collaborative! We are a group of trainees committed to carrying out high quality multi-centre research projects to improve surgical practice and patient care.

A surgical odyssey

By Professor John Pepper

After qualifying in 1971 and doing two traditional house jobs as they were then called, my third job was an SHO on the cardiothoracic unit at Guy’s Hospital. Most of the work was congenital and valvular disease but coronary surgery was just coming in. This really attracted me as it was possible in most patients to make a difference and improve their lives. I was less interested in cancer because I felt that the survival of the patient was largely determined by the biological activity of the tumour and to a lesser extent by the surgery. It is not easy to undertake research as a registrar in a busy clinical service but there are always projects which are either on-going or waiting for someone to kick start them. If you can help with the construction of a database and make a contribution to a prospective clinical study, this is a great training ground for the future.

In 1980 I became a consultant cardiothoracic surgeon and was interested in myocardial protection, still far from perfect in those days, and in lung transplantation. We completed a

Editorial Team: AC Pinho-Gomes & A Protopapas
randomised trial of intermittent ischaemic arrest versus cold crystalloid cardioplegia. Outcomes were similar but the relationship between ischaemic time and myocardial damage was very close whereas there was much greater leeway with cold cardioplegia. I was able to carry out canine single lung transplantation and tried to use broncho-alveolar lavage (BAL) as a route to the diagnosis of rejection. Unfortunately it did not work out so easily but we did learn a great deal about the activity of lymphocytes in the alveolar spaces. I was very fortunate in being able to join a group of immunologists and I remember the horror in the eyes of our very bright research fellow when he started growing worms in the Petri dishes filled with BAL!

It was at this point that I realised that the dog was far from ideal as an animal model in an immunology study, and so we went to Groningen in the North of Holland to learn how to do lung transplantation in rats with the operating microscope. This was a much better model which allowed us to study different lymphocyte populations during the process of rejection. I recruited a bright young girl recently out of college who proved to very adept and was able to do the procedure with an 8% mortality.

Later on I got interested in aortic valve substitutes, and especially stentless valves. Through the help of a young Chinese surgeon, we explored the changes which occur in left ventricular performance and effective orifice area (EOA) in the 24 hours following aortic valve replacement, using a high fidelity transducer-tipped catheter in the left ventricle and transoesophageal echo. This gave us pressure-dimension (volume) loops with every beat. We were able to explore myocardial protection, stunning and hibernation. Subsequently, I have collaborated with two clinical trial units and carried out ten randomised clinical trials (RCTs). This is a long game and you need data managers, statisticians and several other experts to reach a successful conclusion. RCTs are

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expensive but register high on the scale of evidence. It is very rewarding when some of this effort appears in international guidelines. One of the benefits of undertaking these trials is that it raises the quality of care in the hospital or unit where the trial is happening.

Nowadays, we involve patients in the construction of the protocol, decisions about the primary and secondary outcomes and the general worth of doing the study. This is always helpful and rewarding. You may find that one of the patients has worked for a large pharmaceutical company and has many years of experience conducting randomised trials. About 16 years ago a developmental engineer who has the Marfan syndrome came to our research group and suggested that for patients who present early in their natural history we could place a bespoke polyester sleeve around the aortic root and ascending aorta instead of performing a valve and root replacement or a valve sparing operation. The idea was to perform a high-resolution CT scan to obtain digital images from which we could build a specific model of the ascending aorta, through computer aided design (CAD) and rapid prototyping (RP). This is loosely referred to as 3D printing and was an area in which I was totally ignorant. Over a period of four years we carefully planned this procedure with computer engineers, the patient and a renowned cardiac morphologist. This is an example of personalised or precision medicine. Approximately 83 of these procedures have been carried out with one early death. It is too early to be definitive about the role of this procedure but we think it holds promise and we await the 10-year results.

Collaboration with scientists, other specialists and your patients is fun and rewarding. But you need a partner who has infinite patience and is very supportive!

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Reflections on latest breaking news

LMD: ongoing controversy on PCI vs CABG...

The question of whether PCI with a drug-eluting stent (DES) should be preferred as an alternative to CABG surgery in patients with left main (LM) coronary artery disease was met with conflicting data from two late-breaking clinical trials presented at TCT 2016 that could shift practice depending on interpretations.

PCI with an everolimus DES was noninferior to CABG for the primary composite clinical end point in EXCEL, while PCI with a biolimus DES did not meet noninferiority for the primary end point of 5-year major adverse cardiac and cerebrovascular events (MACCE) in NOBLE.

So, if the EXCEL results suggested that PCI could be considered an acceptable or even preferred revascularization modality for selected patients with LM CAD, the NOBLE results supported that CABG was superior to PCI. Therefore, rather than clear the air, those trials fuelled this longstanding controversy.

Cardiologist and Cardiothoracic Surgeons will probably interpret the findings of those trials differently, particularly due to the subtle methodological differences between the two trials, and thus the ultimate impact of those results on international guidelines is difficult to anticipate.

Furthermore, 10-year follow-up results will hopefully shed light into the evolution of some hard clinical endpoints, such as revascularisation, target vessel myocardial infarction and mortality. For the time being, until long term results are available, decision making will continue to depend on a multidisciplinary assessment by a heart team, but necessarily involving the patient as well. It is increasingly crucial to present the evidence hitherto available to patients so that they can make informed decisions and participate in the discussion on the pros and cons of different revascularisation strategies. Indeed, if there is anything certain about surgery in the 21st century is that patient involvement and individualised decision making are paramount.
The ART of the randomised trial: 5-year follow-up

We are convinced that the manuscript will generate record citations and intense scientific and editorial debate. The primary conclusion was, perhaps surprisingly, that: ‘Among patients undergoing CABG, there was no significant difference between those receiving single internal-thoracic-artery grafts and those receiving bilateral internal-thoracic-artery grafts with regard to mortality or the rates of cardiovascular events at 5 years of follow-up’.

Without aspiring to discuss fully this trial, we note with interest the more than 15% failure in performing the intervention in the double ITA arm (learning curve?) and that the equipoise so far observed may alter the status quo in coronary revascularisation. The esteemed authors state that: ‘The absence of any midterm benefit from bilateral over single internal-thoracic-artery grafting in our trial might have several explanations’, and they proceed to discuss several explanations, like the high rate of optimal medical therapy. Whichever such explanation we accept, the disappointment for the advocates of double internal thoracic arteries will remain, at least until the final outcomes are available. It is important not to overlook the fact that this trial was designed for a 10-year outcome and interim results although important are not definitive.

We await the discussion of the paper with great interest. It will certainly affect at least one of the nascent projects of our Collaborative...

Promising ‘momentum’ for advanced HF

Patients with advanced heart failure who received the investigational (in the US) HeartMate 3 left ventricular assist system (LVAS) and those who were implanted with the long-available HeartMate 2 (both from St Jude Medical) had a similar risk of having a disabling stroke within 6 months, but the newer device was less...
likely to develop thrombosis or otherwise malfunction and require replacement. These were the interim 6-month findings in 194 patients from the ongoing Multicenter Study of MagLev Technology in Patients Undergoing Mechanical Circulatory Support Therapy with HeartMate 3 (MOMENTUM 3), a trial that will randomize 1028 patients and follow them for 2 years. The most important finding was that there were fewer reoperations with the HeartMate 3 as opposed to the HeartMate 2, because the newer LVAS reduced pump thrombosis, which remains the main driver of reoperations. Eliminating thrombosis is particularly beneficial for patients who receive an LVAS as destination therapy. The other adverse events and improvements in quality of life were similar in both patient groups. However, long-term data are needed to determine whether there will be a significant impact on long-term survival, adverse events, and quality of life that will make LVAD support a viable or even competitive alternative to heart transplantation.

Our selection of ‘must read’

Association between physician teamwork and health system outcomes after coronary artery bypass graft

Circ Cardiovasc Qual Outcomes 2016

Just because it’s Christmas… a time of fraternity and friendship!

“Health systems with physicians who tend to work together in tightly-knit groups during CABG episodes realize better surgical outcomes. As such, delivery system reforms focused on building teamwork may have positive effects on surgical care.”

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Updates on our projects

‘The Academic Cardiothoracic Surgeon’

What is the past and current research experience of CT Trainees? And what are their future research plans? As the number of CT professors plunges down, concerns over the future the academic CT surgery grow louder. However, the dearth of hard evidence on the actual experience and interest of CT trainees hinders any efforts to attract and retain CT surgeons in academia. The survey has been sent to all NTN’s. We rely on your collaboration to make this project a great success!

Management of primary spontaneous pneumothorax

This RCT is currently at the planning stage, with an extensive multidisciplinary team working hard to secure funding and write up a systematic review to support the protocol.

RVISCO – Regional Variations in Cardiac Surgery Outcomes

This study is ongoing and a large team of collaborators are currently collecting data in Cardiothoracic units across the UK. Deadline is in December, so don’t forget to submit the data from your unit!

The CTRC wishes all Cardiothoracic Surgeons and their families a very happy Christmas.

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