

How to Fix a Broken Heart: Waikato Cardiothoracic Unit Mitral Valve Workshop Review

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SODOTO: **See one, do one, teach one** – these are the three essential steps described in Kolb's model of experiential learning. Kolb described the learning process to occur through absorbing concepts and continuously reforming them through experience.¹ Patients provide us with the best learning opportunities, as these interactions help us amalgamate information into a story that makes sense. Similarly, surgical skills are acquired through repetition and experience, making simulation training valuable for learning. Unfortunately, medical students have a paucity of surgical skills training.² To mitigate this shortcoming, Mr David McCormack invited several medical students to the Mitral Valve Workshop, hosted by the Waikato Cardiothoracic Unit. The workshop taught skills in cardiothoracic surgery in a fun, practical way, and offered an invaluable insight into this specialty and what common operations entail.

The afternoon was broken down into three informative sessions and two practical sessions, all dedicated to the mitral valve: its anatomy, imaging, and surgical techniques involved in its repair and replacement. The sessions encompassed all aspects of the SODOTO framework, which helped us learn about the mitral valve and its repair. As students, we are commonly taught concepts in isolated blocks, but in this workshop the bigger picture was emphasised throughout the session.

"Anatomy is repetition" and is essentially the fundamental basis of surgery. The afternoon commenced with Mr McCormack recapping the anatomy of the mitral valve. We reviewed its location, relationships to other structures, components, and functional anatomy using illustrations, diagrams and photos. The cardiovascular anatomy from preclinical years, which was once a distant memory, came flooding back. The next speaker was cardiologist and intensivist, Dr Pranesh Jogia. Dr Jogia guided us through mitral and aortic valve imaging, with an emphasis on transesophageal echocardiography. These imaging tools enable surgeons to have a thorough understanding of the patient's anatomy, which allows for effective preoperative planning. Dr Jogia's talk showcased the importance of interdisciplinary communication, which is a crucial aspect of delivering the best care for cardiothoracic patients. The theory behind the anatomy and imaging of the mitral valve prepared us for the "see one" part of the experiential learning cycle.

Associate Professor Adam El Gamel, who is an expert in the field of aortic valve replacements, mitral valve annuloplasty, coronary artery bypass surgery and more, was next to speak. He led us through the steps involved in mitral valve annuloplasty, using videos of operations as

a learning aid. The videos highlighted both technical surgical skills and clinical decision-making under pressure.

Assoc Prof El Gamel also elucidated the concepts involved in mitral valve replacement, while emphasising the burden of Rheumatic Heart Disease (RHD) on the Waikato population. We learned about bioprosthetic valves versus mechanical valves. Mechanical valves require patients to be on warfarin for life to prevent complications related to thrombosis, whereas bioprosthetic valves work well but need re-operation before mechanical valves barring any complications. Despite the advantages and complications of each valve type, survival outcomes for bioprosthetic and mechanical valves are no different.³ This presentation highlighted the importance of research to achieve optimal patient outcomes. Mitral valve repair and replacement are common procedures performed at the Waikato Cardiothoracic Unit. A common indication for this operation in New Zealand is mitral regurgitation secondary to RHD. In New Zealand, RHD is seen at a rate of 3.5 cases per 1000⁴, with an average of 159 deaths attributed to RHD per year.⁵ In contrast, other OECD countries report 0.3 cases per 1000.³ Other indications for mitral valve repair or replacement that are prevalent in New Zealand include infective endocarditis and ischaemic heart disease.⁶ This workshop delivered the population health aspect of the mitral valve, an important part of all medical fields, highlighting the need for surgeons to speak up about public health issues.

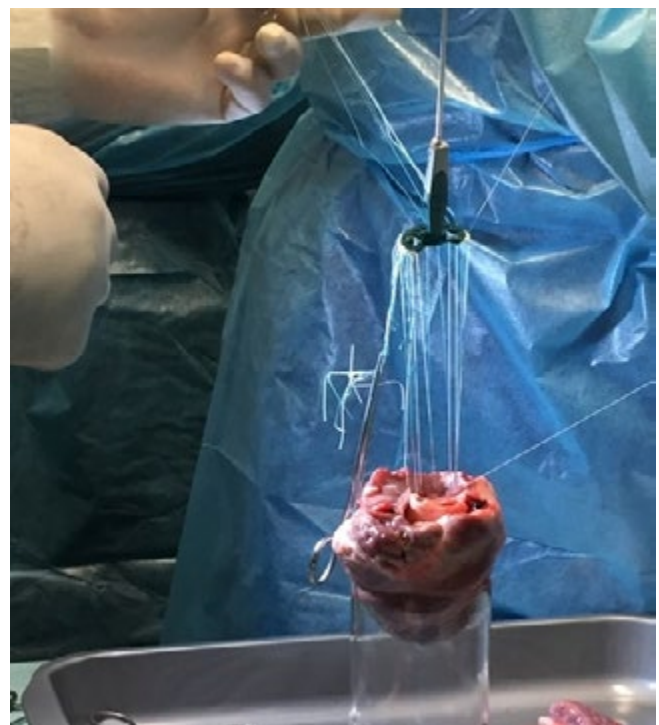


Figure 1. Annuloplasty
Sutures are threaded through the mitral valve into the ring, ready to be pushed downwards and secured.

In the first practical session, we gathered around Mr Nick Odom, an experienced cardiothoracic surgeon, as he demonstrated a mitral valve repair; prosthetic ring is sutured around the mitral valve annulus to increase its ability to support the valve. The resulting reconstructed valve had a narrower orifice, increasing leaflet coaptation and preventing regurgitation. We watched as he threaded the double ended suture through the mitral valve, and secured the ring down with hand ties. As we witnessed Mr Odom fix a broken heart, we completed the “see one” step of the experiential learning cycle.

Then it was our turn – we excitedly sat down next to our pig heart to commence the operation. Forceps in one hand and needle holder in the other; we carefully pierced the trigone at the golden ninety-degree angle. Through cycles of pronation and supination, we threaded the sutures around the valve. The sutures were threaded through the prosthetic ring in a horizontal mattress fashion. To complete the annuloplasty, the ring was pushed down onto the valve and secured with surgical knots (Figure 1). With the support of various demonstrators, we completed the “do one” step of the experiential learning cycle.

As part of the second practical session, we watched Assoc Prof El Gamel as he demonstrated a mitral valve replacement. The steps in valve replacement were similar to that of an annuloplasty. The second time around, our confidence increased and we noticed a difference in the quality of our work (Figure 2). Anatomy is repetition – perhaps surgical skills are too. This exercise verified how practice and experience can pave the way to success in surgical skills. At the completion of our valve replacement, we propelled saline down the left atrium to test the success of our operation. We watched our valve leaflets fill with saline; just like a hot air balloon as taught in preclinical anatomy. Through repetition and individualised feedback from the surgeons, we fixed our first broken-hearted pig.

The mitral valve workshop was a highly rewarding, enjoyable and fun learning experience, putting us in the shoes of a cardiothoracic trainee. It gave us an insight into the specialty, allowing us to decipher whether cardiothoracic surgery is a possible career option. While primarily aimed at junior doctors, the workshop catered to students too, with ample one to one interaction with cardiothoracic surgeons as tutors. The workshop demonstrated how daunting and technical procedures can be mastered through an eager attitude, patience, and supportive guidance. Through meeting fellow medical students of different year groups and countries, we fostered collegiality, mentorship, and friendships.

But then you may be wondering, how did we complete the “teach one” step of the experiential learning model? Throughout the entire afternoon, students helped each other and exchanged knowledge and skills acquired at different clinical campuses. This workshop nurtured the tradition of helping one another; as collegiality will prove to be useful throughout our entire career.

The mitral valve workshop provided an opportunity to learn surgical skills and delve into the world of cardiothoracic surgery in a supportive environment, and in a fun, hands-on manner. We highly recommend taking up opportunities like these, especially for those of us who are surgically inclined. Learning by seeing, doing and teaching ensures that we are equipped with the skills necessary to tackle surgical rotations in the future.

Mr David McCormack is always happy to assist students! Please do not hesitate to get in touch with him if you want to be invited to further courses, organise an elective or see operations. Get in touch with him via his email: David.McCormack@waikatodhb.health.nz

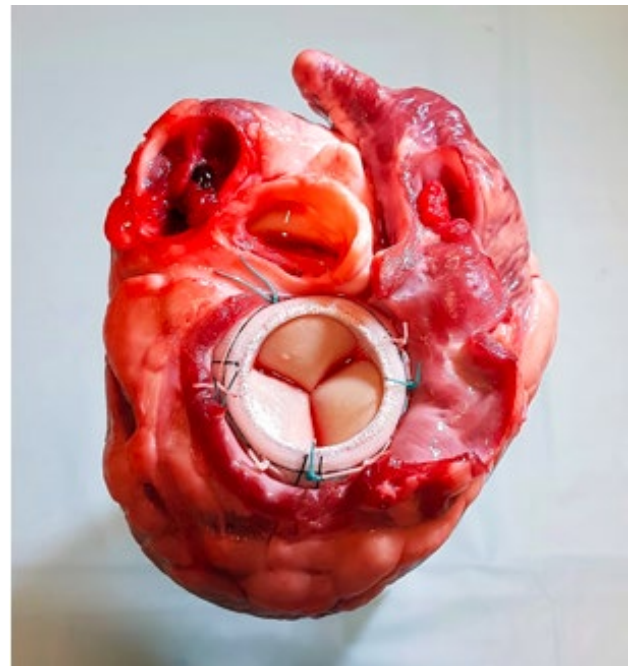


Figure 2. Mitral Valve Replacement
A completed prosthetic mitral valve replacement

Conflict of Interest: Chey Haran is the NZMSJ Editor-in-Chief. This article has gone through a double blinded peer-review process applied to all articles submitted to the NZMSJ and has achieved a standard required for publishing. The authors have no other conflicts of interests to declare.

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