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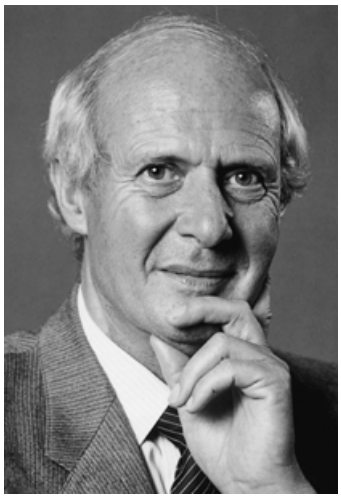

The Early History of Cardiac Surgery in New Zealand

Brian Barratt-Boyes, KBE, FRACS

The New Zealand story is, not surprisingly, very similar to the Australian one. Extra-cardiac surgery was begun in the 1940s by a group of courageous, well trained and experienced general surgeons with a thoracic-surgical interest and it was then carried forward in those early days by a newer generation with some training in the newly developed discipline of cardiac surgery. In New Zealand, the public hospital service has dominated the scene and was tightly controlled by the government Department of Health and the Director General of Health. The Advisory Committee of Thoracic Surgery decided in 1955 that Green Lane Hospital was to be the sole recognised cardiac surgical centre in the country. In retrospect this was a good idea because it concentrated the relatively few patients in one unit. A decade later it was agreed that Wellington Hospital should establish cardiopulmonary bypass capability, but it was not until 1973 that the Otago Medical School was approved as the sole South Island cardiac surgical unit.

Let us look first at the early Wellington Hospital experience (Fig. 1). I was a house surgeon there in 1950–1951 under the direction of Percy Gowland who, after his retirement as Professor of Anatomy in Otago had become the Director of Clinical Services. Wellington Hospital played an important part in early cardiac surgery in New Zealand (Table 1) because it had a group of very competent general surgeons who were bold enough to proceed (despite little thoracic and no cardiac training, as did their Australian contempories) with pericardiectomies and ligation of the ductus arteriosus. Drs McNickle and Luke successfully carried out New Zealand's first ductus ligation in 1944. An infected ductus was subsequent1y ligated by Orgias, no mean feat. James Baird (Fig. 2) was appointed in 1952, having trained at the Brompton Hospital and he began mitral valvotomy in 1953. Tim Savage was appointed in 1955 and atrial septal defect closure under hypothermia was begun in 1961. Baird was undoubtedly the moving force and the most important figure in Wellington cardiac surgery.

Returning to the first ductus ligation in 1944, Douglas Robb also tried to close a patent ductus in 1944 at Green Lane Hospital. The duct was infected and the patient died on the operating table. Robb was accused by a rather belligerent Hospital Board of carrying out experimental surgery and, as a result, no further cardiac surgery was done at Green Lane for another two years. Then, in 1946 a ductus ligation was performed successfully. This episode provides an interesting reflection on the courage of the surgeons in those days and the difficulties under which they worked.

In Dunedin Hospital at the Otago Medical School, John Borrie, who had spent 1951 and 1952 working at Green Lane Hospital, began in 1953 a series of ductus ligations, mitral valvotomies and pericardiectomies. In Christchurch Hospital the first mitral valvotomy was performed in 1964 by Milnes Walker who was Professor of Surgery at the University of Bristol. He was an outstanding example of a very competent general surgeon with an interest in cardiac surgery. I worked in his department for one year in 1956 as a Nuffield Travelling Fellow before returning to Green Lane. Heath Thompson carried on the work, undertaking similar procedures to those performed in Dunedin. The only other centre with a remote extra-cardiac connection was Waikato Hospital where two adventurous general surgeons performed a series of 15–20 internal mammary artery ligations before this procedure was totally discredited.

Figure 1. *Wellington Hospital 1999. In the 1940s the hospital was confined to the three-storey tiled-roof building in the right foreground.*

Table 1. *Wellington Hospital experience*

Year	Operation/Appointment	Surgeon
1944	Pericardiectomy	J. McNickle
1944	Ligation patent ductus	J. McNickle, E. Luke
1948	Ligation infected patent ductus	R. Orgias
1948	Pericardiectomy	R. Orgias
1952	James Baird appointed	
1953	Mitral valvotomy	J. Baird
1955	Tim Savage appointed	
1961	Atrial septal defect closure (hypothermia)	J. Baird

The rest of the New Zealand story (Table 2) belongs to Green Lane Hospital (Fig. 3). The original building on the site is the Costley Block which was built as a Home for the Aged Poor in 1890. Two subsequent ward blocks were added later to accommodate the increasing numbers but by about 1940, it was realised that tuberculosis was a major problem requiring special accommodation and treatment and that Auckland also required more general medical and surgical beds. A new six-story Main Block was completed and occupied by 1943, establishing the new general hospital with the main specialty of thoracic medicine and surgery. The name was changed, from the Auckland Infirmary to Green Lane Hospital in 1942 at the suggestion of Douglas Robb who was appointed that same year. Douglas had been in the wilderness for a number of years (as will be seen later) but the recommendation was made by his friend Chisholm McDowell for his appointment as a general surgeon having an intention to develop thoracic surgery, McDowell being the chest physician in charge at the new hospital. Edward Roche was appointed full-time cardiologist in 1944 and Rowan Nicks as full-time cardiothoracic surgeon in 1946. The cardiosurgical clinic was established in 1948 for the purpose of reviewing all patients seen each week and reaching a decision regarding their surgical management. This proved to be an important part of the Green Lane success story. The first personnel of the clinic (Fig. 4) were the superintendent Carl Gilberd as Chair, Robb, Nicks and Roche, and other cardiologists in the city who did not necessarily have beds in the hospital but were interested in attending and contributing. James Lowe was appointed in 1953 as the new full time cardiologist and became Chair. David Cole was appointed assistant cardiothoracic surgeon in 1955. A surgical laboratory was established in 1956 and was the foundation of our ability to rapidly develop open-heart surgery when I returned to New Zealand in 1957. Prior to 1956, experimental surgical work had been carried out by Robb and Nicks at the

Ruakura Animal Research Laboratory near Hamilton, which operated under the direction of Professor McMeekan.

The number of patients seen at the cardiosurgical clinic was large, and increased rapidly (Fig. 5) so that by the time heart–lung bypass commenced in 1958 there was a very significant pool of patients. Green Lane hospital cardiology department was a referral centre for patients with potential surgical problems only. In these early days this did not include coronary artery disease or hypertension, of course. It became evident early on that we required the services of a physiology technician to assist in the catheter room, the experimental laboratory and the operating room. James Lowe appointed Sidney Yarrow to this position in 1954. Sid had spent the Second World War as a radar technician in the Royal Navy emigrating then to New Zealand where he joined the New Zealand Navy. This experience served as an ideal basis for his tasks in cardiology and cardiac surgery, with instrumentation, strain gauges, pressure recorders, flow measurements, improvements to the Melrose heart–lung machine that were necessary before this could be used in patients and a myriad of other challenges, which included the construction of the first cardiac pacemaker in New Zealand in 1958. He was meticulous, hard working, knowledgeable and an invaluable colleague. We should also mention the anaesthetists who participated in this early phase, in particular Eric Anson and James Watt.

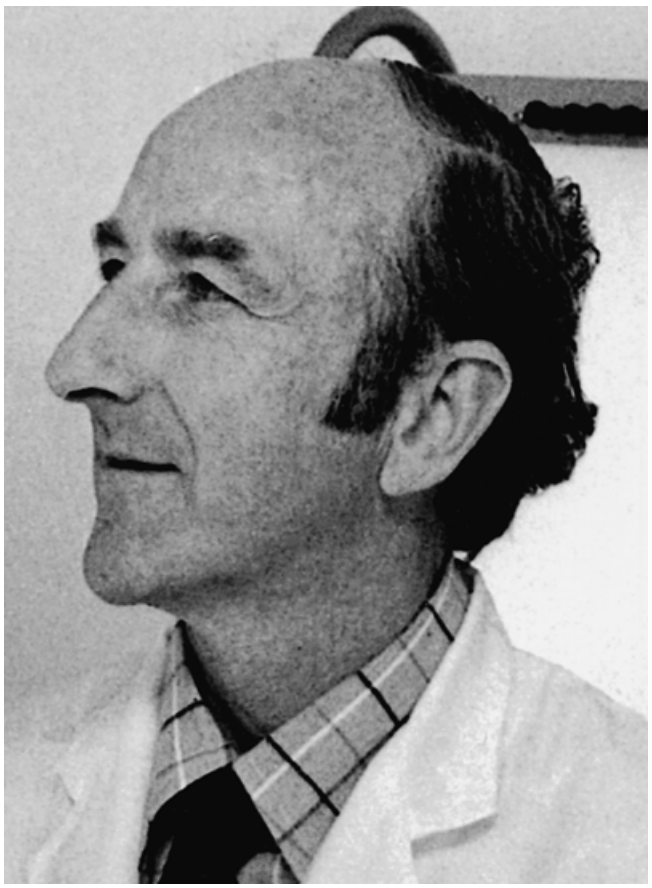

Figure 2. *Mr James Baird*

Figure 3. *Green Lane Hospital 1999. The Costley block is the brick building in the left foreground and the Main Block stands to its right. The eight-storey cardiac block in the rear was built subsequently.*

Table 2. *Green Lane Hospital: early events*

Year	Event
1942	Name changed from Auckland Infirmary to Green Lane Hospital
1942	Douglas Robb appointed
1943	Newly completed Main Block occupied
1944	Edward Roche appointed
1946	Rowan Nicks appointed
1948	Cardiosurgical Clinic established
1953	James Lowe appointed
1955	David Cole appointed
1956	Surgical Development Laboratory established
1957	Brian Barratt-Boyes appointed

Table 3. *Greeen Lane Hospital: cardiac surgery 1946–57*

Type of Defect	n	Deaths	World First	NZ First
Mitral valvotomy	161	10 (6.2%)	1948	1951
Pulmonary valvotomy	60	6 (10%)	1947	1953
Aortic valvotomy				
- calcified	16	8 (50%)	1950	1952
- non calcified	5	1 (20%)		
Blalock anastomosis	82	7 (8.5%)	1945	1948
Atrial septal defect	12	3 (25%)	1953	1954
Patent ductus closure	212	4 (1.9%)	1938	1944
Coarctectomy	43	2 (4.7%)	1944	1949
Pericardiectomy	20	0	1913	1940s

Figure 4. *Members of the original Cardiosurgical Clinic. Seated (from left) Rowan Nicks, Laurie Reynolds, Douglas Robb, Edward Roche and Carl Gilberd. Standing (from left) Keith Holgate.*

Dr Watt also played a very important role in the Australasian College of Anaesthetists.

The early operations performed at Green Lane Hospital are listed in Table 3, which includes the date the procedure was first introduced and when it was first performed in New Zealand. For most of the conditions this interval was short. The first mitral valvotomy was carried out by Gordon Murray from Toronto (Fig. 6) who visited Green Lane at the same time as Paul Wood from London. Closed mitral valvotomy remained in vogue for quite a long period (Fig. 7) and it was not until the mid- and later 1960s that we turned to open valvotomy under heart–lung bypass. Pulmonary valvotomy includes the Brock procedure for tetralogy of Fallot. An attempt was made to relieve calcific aortic stenosis using a Tubbs dilator passed retrogradely from the left ventricle, but the results, as in everyone's hands, were poor.

The 12 cases of atrial septal defect closure were performed under mild hypothermia with circulatory arrest, and had a 25% mortality rate. This was dramatically reduced using the atrial-well technique that I learnt from John Kirklin and Kirklin had learnt in Boston from Robert Gross, its originator. Our first paper on this subject was published in the *New Zealand Medical Journal* in 1959 with J.C.P. Williams as senior author. Williams was Jim Lowe's first cardiology registrar. The supra-aortic stenosis syndrome was named after him although it should have been called the Lowe syndrome. The atrial-well technique involved sewing a rubber well onto the lateral wall of the right atrium by excluding a portion of the wall with a clamp. When the clamp was removed, the well filled with blood, and then using fingers and long instruments we were able to work through the blood by touch and suture a patch into position, or use direct stitching, to close the defect (Fig. 8). David Cole (Fig. 9) learnt to perform this operation and proved an invaluable colleague. He was also the artist for the figure. The results of the technique in the first five years of our experience (Table 4) were very gratifying. The three partial atrio-ventricular canal patients were not suitable

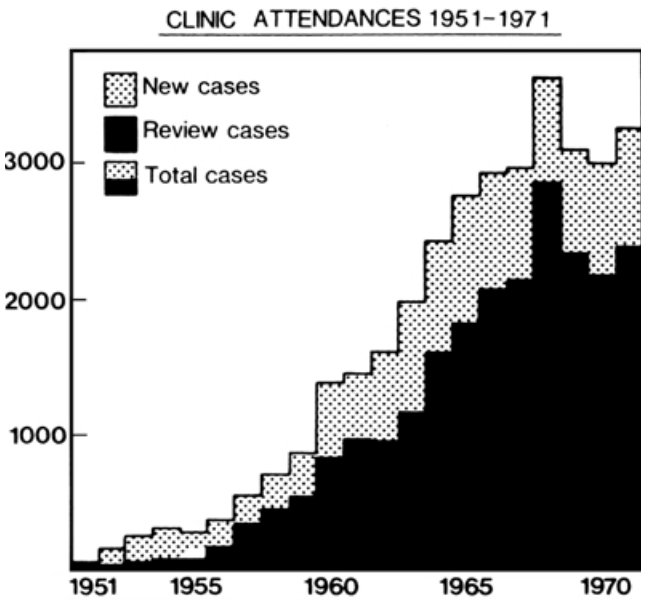

Figure 5. *Cardiosurgical Clinic attendances 1951-1971. Reproduced with permission from The Green Lane Saga by E. Roche and A. Roche.*

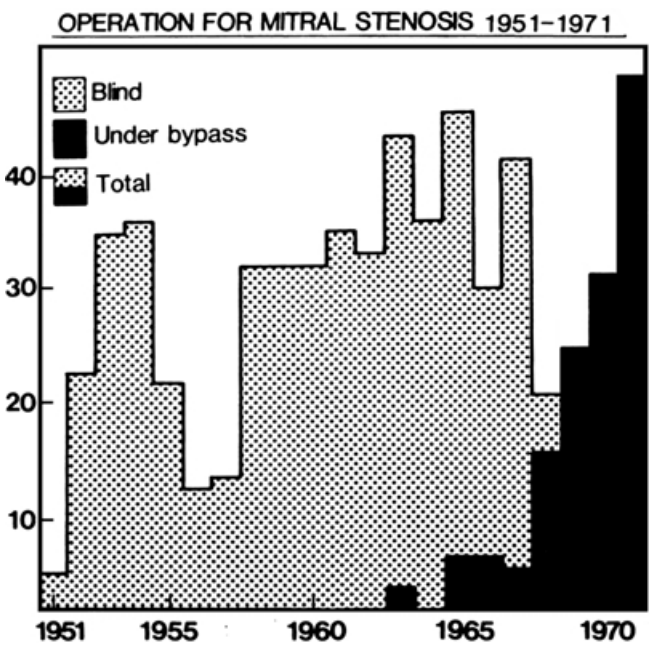

Figure 7. *Mitral Valvotomy at Green Lane Hospital 1951-1971. Reproduced with permission from The Green Lane Saga.*

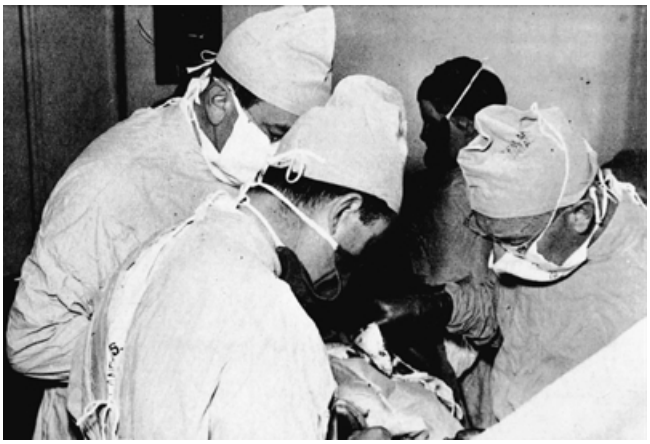

Figure 6. *Dr Gordon Murray (right) performing the first mitral valvotomy at Green Lane Hospital. Standing opposite are Rowan Nicks (foreground) and Douglas Robb.*

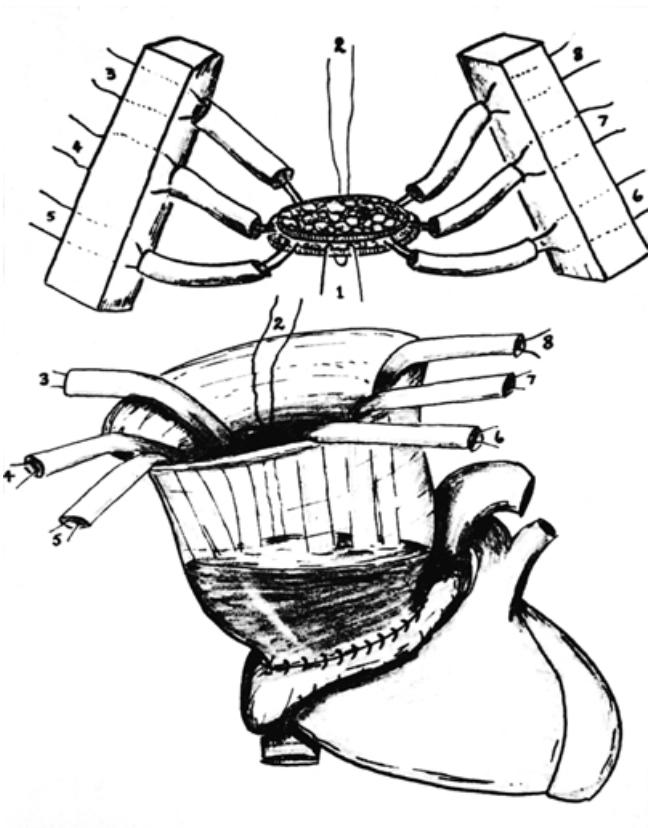

Figure 8. *Atrial-well technique for atrial septal defect closure. Top: The circular piece of ivalon sponge which will be used to close the defect has eight mattress silk sutures placed around its edge. Bottom: The sponge has been lowered into the well beneath the blood and the numbered and separated sutures are then passed in turn through the edge of the defect inside the heart.*

for this technique and reflect errors in selection in this early stage of our experience. On recatheterisation there was only one patient with a significant residual left-to-right shunt. These good results persuaded us to continue with this method for some years after bypass was introduced (Fig. 10) as this relieved the bypass load in those early days.

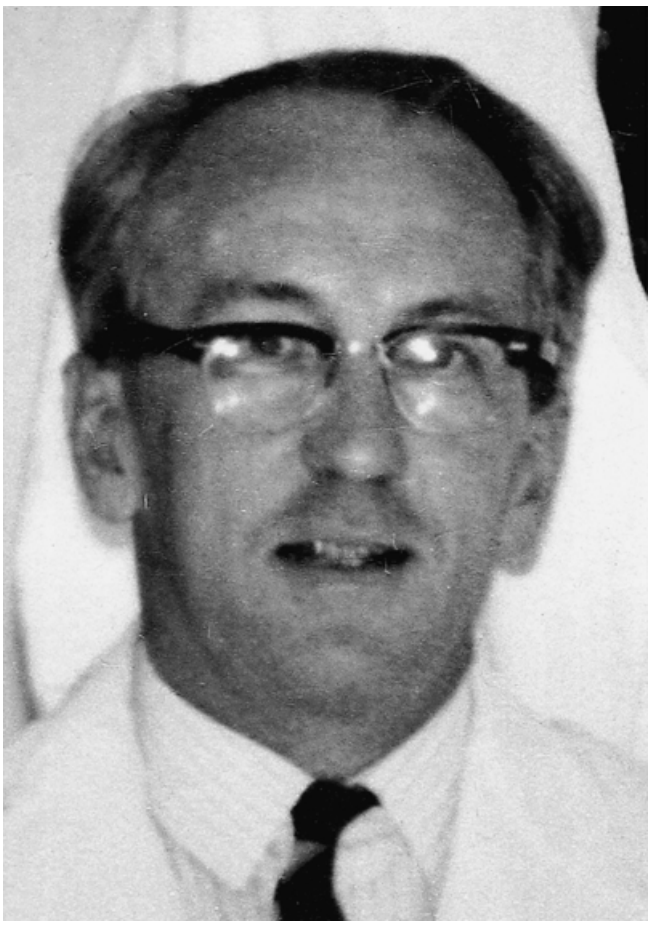

Figure 9. *Mr David Cole*

The other procedures listed in Table 3 carried a very acceptable mortality. The two coarctectomy deaths occurred in patients one and three in the series. All operations listed in the table were performed by Douglas Robb and Rowan Nicks.

There are four staff involved in this saga who more than justify brief biographical notes. First, Edward Roche (Fig. 4), the first full-time cardiologist at Green Lane Hospital. Dr Roche was awarded the Military Cross in the First World War and graduated from Guy's Hospital Medical School in 1925. He was a keen yachtsman and a member of the Royal Corinthian Yachting Club. He was appointed to Green Lane in 1944 and introduced cardiac

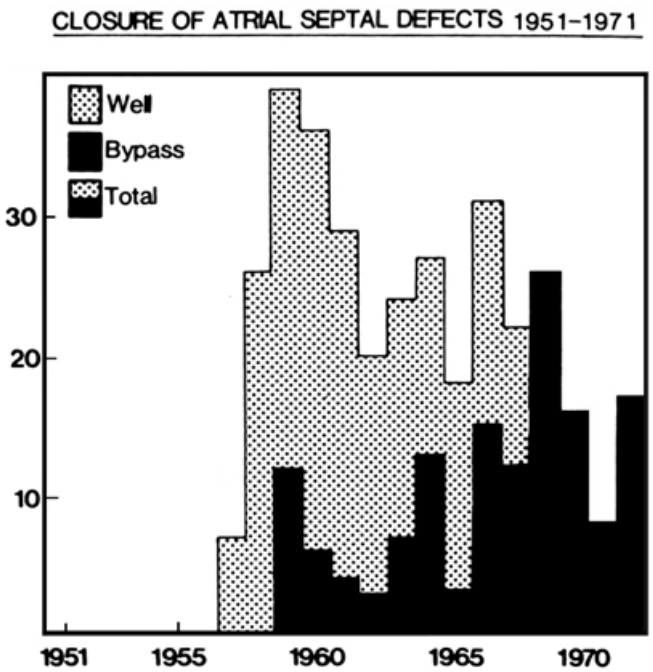

Figure 10. *Closure of atrial septal defects at Green Lane Hospital 1951-1971. Reproduced with permission from The Green Lane Saga.*

Table 4. *Atrial septal defect repair using atria-well technique, Green Lane Hospital 1957–61*

Type of Defect	n	Hospital Deaths	
Ostium secundum	108	2 (1.6%)	
Sinus venosus	9	1 (11%)	
Partial AV canal	3	1 (33%)	
	Catheterisation post-repair		
		P:S Flow Ratio	
		>1.5	<1.5
Ostium secundum	49	0	5
Sinus venosus	6	1	0

Figure 11. *Paul Wood and his assistants in 1952. From left to right – Back row: Ian Prior, Douglas Stuckey, Louis Vogelpeot, David Weitzman, Hugh Gilmour. Front row: James Lowe, Sheila Howarth, Paul Wood, Aubrey Leatham, David Short.*

catheterisation with the assistance of John Hinds, a chest physician, and Rowan Nicks. He remained in charge of the catheter laboratory until the arrival of James Lowe. He was a foundation member of the Cardiac Society of Australia and New Zealand and later its President. He wrote an authoritative history of the early days of Green Lane Hospital *The Green Lane saga*.

James Lowe was a graduate of Edinburgh University in 1940. He was born in Auckland but his parents did not think much of the Otago Medical School, selecting Edinburgh instead. He spent three years after graduation in the Royal Air Force, and from 1946 to 1948 he was registrar to Rae Gilchrist in Edinburgh. From 1951 to 1953 he was Paul Wood's first assistant working with many other colonials (Fig. 11). James was persuaded to return to Auckland by his father, and by Douglas Robb and Rowan Nicks, and was appointed full-time cardiologist-in-charge at Green Lane Hospital in 1953. He was a superb clinician in both adult and paediatric cardiology and a great teacher, gentleman and friend. He attended the operating room on Wednesday afternoons to observe and learn. In my view it is a great pity that current cardiology training programs have ignored the importance of exposing trainees to the operating room so that they are fully aware of actually how the various procedures are performed. Douglas Robb usually enjoyed Jim Lowe's comments, as on one occasion when Robb was performing a retrograde aortic valvotomy with a Tubb's dilator in a patient with calcific aortic stenosis. To Robb's question 'Have I achieved anything?' Jim Lowe, as he watched the aortic pulse tracing on the pressure recorder suddenly widen dramatically replied 'Yes, you have achieved a very great deal indeed!'

We turn now to Rowan Nicks, a New Zealander and an Otago graduate of 1936 (Fig. 4). Soon after graduating, he travelled to London and was a demonstrator in anatomy at the Middlesex Hospital in 1939. He was commissioned to the Royal Navy in the Second World War in 1940. He took part in the invasion of Sicily as leader of the First Mobile Field Unit, and later in Landing Craft Casualty Clearing Ship 253 he saw much of the horror of war along the coast of Greece and Italy. He trained in thoracic surgery at the Brompton after the war, and was appointed to Green Lane in 1947 at the age of 34. He established an arterial freeze-dried tissue bank for vascular surgery and was involved with Douglas Robb in all the early cardiac surgery. He left New Zealand to join the Royal Prince Alfred Hospital in 1956. His decision to move was the reason for my appointment at Green Lane. I had, prior to this position becoming available, been appointed to a similar post in Dunedin Hospital, which fortunately I had not accepted.

Last but by no means least, a brief description of Douglas Robb's achievements (Fig. 4). Douglas was a very major figure in Auckland and New Zealand surgery and as Rowan Nicks said in his autobiography *Surgeons all*, he was 'a restless giant of great capacity and indomitable determination'. He had wide interests including writing pamphlets campaigning for health reforms, and he was Chancellor of the University of Auckland and President of the British Medical Association. He was appointed a general surgeon to Auckland Hospital in

1928. Soon after, because of his interest in research, he became the first registrar of the Cancer Consultation Committee. He began by undertaking an audit of the results of treatment of uterine and rectal cancer and reported to his colleagues that the results were not good and perhaps could be improved by concentrating treatment in the hands of a few well trained surgeons. This was resented and he was forced to resign. In fact this changed the direction of his career for he then went to London and the Brompton hospital to learn something about thoracic surgery. On his return to Auckland he was appointed to the new Green Lane Hospital as a general surgeon with the intention of developing a new department of thoracic surgery operating initially on the many patients with tuberculosis being treated. He expanded the work to include vascular surgery and the new cardiac procedures, travelling to Baltimore to learn the Blalock operation from the master himself. Like Officer Brown, Douglas suffered from tuberculosis, and while this had a major influence on his early career he fortunately recovered.

I think we can look back with great pride at what these early pioneers, in the main, general surgeons, achieved. They laid a firm foundation for what was to follow.

Sir Brian Barratt-Boyes

Sir Brian Barratt-Boyes was the figurehead of cardiac surgery in New Zealand in the late twentieth century. Gaining the FRACS as a registrar before proceeding to overseas training was a rare feat in the 1950s, a feat attained by Barratt-Boyes, who was an early trainee in open-heart surgery in the USA. He brought the new technique back to Green Lane Hospital and, with his colleagues, achieved results that saw overseas surgeons coming to train in New Zealand. From the early 1960s, Sir Brian investigated allografts in animal models, biomechanics and clinical practice. This led in 1962 to the first fresh heart valve transplants. He was a world pioneer in homograft valve replacement and techniques of congenital heart surgery.