

# One Hundred Years of Orthopaedic Education in Singapore

W Wang,<sup>1</sup>MBBS (Lond), FRCS (Glas), D Phil (Oxon), EH Lee,<sup>1</sup>MD, FRCS (C), FRCS (Glas & Edin), HK Wong,<sup>1</sup>M Med (Surg), FRCS (Glas), MCh (Orth) Liv

## Abstract

The Department of Orthopaedic Surgery at the University of Malaya (in Singapore) was established in 1952. Prior to this, the teaching of Orthopaedic Surgery at the University was undertaken by the Department of Surgery under the Professor of Surgery and Professor of Clinical Surgery. From a course consisting of 15 weekly classes on fractures for 18 undergraduates in the late 1930s, and the clinical postings in orthopaedic surgery for over 40 students in 1952, the programme now encompasses an exposure to musculoskeletal diseases and trauma in all 5 years of the undergraduate course. Over this time, the spectrum of clinical conditions has also changed, and with it the emphasis on the conditions to be taught; from that dealing primarily with tuberculosis of bones and joints, poliomyelitis, and childhood deformity, to those resulting from degenerative disorders, sports injuries, industrial and motor vehicle accidents, and cancer. The students are now taught orthopaedic surgery in all the major public hospitals. Local postgraduate training programmes for orthopaedic surgery started in the 1980s. From 1993, a more structured training and assessment programme was introduced for basic and advanced training in surgery and orthopaedics. Advanced trainees rotate through the various teaching hospitals to expose them to a wider range of orthopaedic problems as well as teachers. The postgraduate training programme is now well established, and Singapore is accredited by the Royal College of Surgeons of Edinburgh as an orthopaedic training centre for higher surgical training.

Ann Acad Med Singapore 2005;34:130C-136C

**Key words:** History, Musculoskeletal disease, Postgraduate training, Specialist accreditation, Undergraduate teaching

## Introduction

In looking at the history of orthopaedic education in Singapore, one must place our local setting in the worldwide perspective. Officially, the academic Department of Orthopaedic Surgery in Singapore (in what was then the University of Malaya, now the National University of Singapore) was only set up in 1952, nearly fifty years after the founding of the Medical School in Singapore in 1905. Up till that time, orthopaedic surgery in Singapore, and orthopaedic education in the Medical School, was carried out at the Department of Surgery. It must, however, be realised that as a separate and distinct academic discipline, orthopaedic surgery is mostly a phenomenon of the 20th century. Even though the practice of clinical orthopaedics has been in evidence throughout the centuries since ancient Egyptian times, orthopaedic surgery as an entity practised by specialised orthopaedic surgeons evolved relatively

recently. It was mainly in the early 1900s that new institutions and associations that established Orthopaedic Surgery as an individual and growing specialty were set up. Orthopaedic surgery as a separate academic discipline was an even more recent phenomenon, with the first Chair of Orthopaedic Surgery in Britain being conferred on Girdlestone at Oxford only in 1937. Taken in this context, the development of orthopaedic education in Singapore has not lagged too far behind.

## The Early Years: 1905 to 1951

Prior to the establishment of the Department of Orthopaedic Surgery in the University of Malaya, orthopaedic work was carried out by general surgeons, who performed all types of surgery.<sup>1,2</sup> Similarly, the teaching of orthopaedic surgery in the Medical School was undertaken by the staff from the Department of Surgery, under the

<sup>1</sup> Department of Orthopaedic Surgery

National University of Singapore, Singapore

Address for Correspondence: Associate Professor Wong Hee Kit, Department of Orthopaedic Surgery, National University of Singapore, 5 Lower Kent Ridge Road, Singapore 119074.

Professor of Surgery and the Professor of Clinical Surgery. In the early years leading up to the First World War, archived records did not mention any separate syllabus addressing orthopaedic-related subjects, apart from regular classes in osteology that were conducted by the Department of Anatomy.<sup>3,4</sup> However it may be inferred that orthopaedic conditions and their management were part of the surgical syllabus, judging from the records of the 1920s, when examination syllabi began to be archived. For example, the 1927 Final Professional Examination for Surgery included the question, “Give the diagnosis, pathology symptoms, etc. treatment of Tuberculosis of the hip joint.”<sup>5</sup> From this and other questions, it seems that much emphasis was placed on tuberculosis and trauma. In fact, it has been recounted that by the 1930s, orthopaedics and trauma accounted for a large proportion of the cases seen at the Department of Surgery,<sup>2</sup> and by 1934, road traffic accidents accounted for 683 out of 3296 admissions for trauma.<sup>6</sup> In 1939, the St Andrew’s Orthopaedic Hospital was established. In the early years, it catered primarily to patients with bone and joint tuberculosis.<sup>1</sup> This hospital became part of the rotation for the surgical students.

It would appear that the end of the 1930s saw a groundswell in the teaching of orthopaedic surgery in Singapore, due in no small measure to the enthusiasm of Professor DEC Mekie and Mr JAP Cameron (later the first Professor of Orthopaedic Surgery) from the Department of Surgery at what was by then the King Edward VII College of Medicine. From 1938 to 1939, Professor Mekie officiated as Professor of Surgery in place of the incumbent Professor Munro who was on home leave, and Mr Cameron took on the role of Acting Professor of Clinical Surgery. As recorded in the Annual Report of 1938-39, it was planned that “*the teaching of the modern treatment of fractures will be expanded so that the students may be able to attend a comprehensive course (i.e., one year) dealing with all types of fractures both theoretically and practically in addition to the teaching of elementary orthopaedics.*”<sup>7</sup> The Acting Professor of Clinical Surgery personally conducted a course of fifteen weekly classes on fractures ending with a class examination on the subject, and it was noted that “fourteen senior and four junior students attended this course”.<sup>8</sup>

The Second World War unfortunately interrupted this planned programme of expansion in orthopaedic education, and during this period the medical college was supplanted by the Syonan Medical College instituted by the Japanese Military Occupation in Singapore. After the war, the King Edward VII College of Medicine resumed classes in June 1946, with orthopaedics continuing under the aegis of the Department of Surgery. Visits by students to the St. Andrew’s Orthopaedic Hospital continued, and there were the occasional visiting experts such as Brigadier CM

Marsden, who gave a course of twenty lectures in fractures in 1948.<sup>9</sup> At about this time, there were also some attempts to develop research within the department, and the work included clinical research on “*Tuberculosis of the hip – Surgical therapy methods of Arthrodesis.*”<sup>9</sup>

Despite such activities catering to orthopaedic education within the Department of Surgery, pressure was growing to establish a separate Department of Orthopaedic Surgery. The rationale for this was set out in the 1950-51 Annual Report of the University of Malaya:

“Specialisation ... is seen throughout the world of surgery. It becomes necessary when the technical methods associated with certain procedures develop increasing complexity and specificity, when the ancillary methods associated with certain procedures multiply and assume special importance, and when the division of the main subject grows in magnitude and importance so that it demands the undivided attention of the workers in the more limited field of work. For many years orthopaedic work has been developing in Singapore and Malaya, the progress has been slow and gradual but the cumulative results have gone far towards the establishment of an Orthopaedic Department ... Academically, orthopaedic surgery is everywhere recognised as one of the major divisions of surgery. The importance of the training in this branch of work both at under and post-graduate levels is very great, the field of research still undeveloped and considerable and the opportunities for expansion in Malaya unmeasured. The decision therefore to recognise the importance of this branch of surgery by the creation of a Chair in Orthopaedic Surgery is timely and reflects the appreciation by the University of the responsibilities it bears in the development of surgical services in Singapore and Malaya and of the potentialities and scope of orthopaedic surgery as an academic subject.”<sup>10</sup>

The Souvenir Publication commemorating fifty years of medical education in Malaya summarised this succinctly: The establishment of a separate Orthopaedic and Accident and Traumatic Branch of the Surgical Service was a logical development of the rapid urbanisation and industrialisation of Singapore.<sup>11</sup> Thus, orthopaedic surgery was finally given recognition as a separate surgical and academic specialty in Singapore.

### The Post-War Era: 1952 to 2005

JAP Cameron, who had previously been so instrumental in the development of orthopaedic teaching in the Department of Surgery, was duly elected to the Chair as the first Professor of Orthopaedic Surgery. He must have felt

a sense of vindication, as he recalled in his inaugural address, "It was once said to me in Singapore in the early 1930s when I was agitating for the development of Orthopaedic and fracture work that there was not enough of this type of work to justify it. The inauguration of this chair has surely proved its need, and the important role which orthopaedic surgeons will have to play in undergraduate and postgraduate education in the future of this country."<sup>12</sup> His first Annual Report as a separate Department of Orthopaedic Surgery (Trinity Term, 1952) enumerated only two academic staff: himself and one lecturer, Dr Khong Ban Tze.<sup>13</sup> In addition, there was one medical officer and three house officers. In addition to their teaching duties, this rather skeletal staff undertook care of patients in 147 third-class beds and 12 first- and second-class beds in the General Hospital, as well as 84 children at St. Andrew's Orthopaedic Hospital, 40 cases of poliomyelitis at Middleton Hospital and 60 adult orthopaedic patients at Tan Tock Seng Hospital. Professor Cameron obviously felt his straitened resources acutely, yet seemed determined to make the best of the situation. He recorded,

"It is obvious that the introduction of medical students to a Department not as yet blessed with the essentials necessary for carrying out orthopaedic work is premature. Yet a start has been made and 28 students were posted for orthopaedic instruction during the Trinity Term. 16 systematic lectures

were given by the Professor on fractures and Orthopaedic Surgery and 11 clinical lectures in the Wards during the term. 14 Tutorials were given by Dr Wilkinson and Dr Khong Ban Tze. Clerking of cases in the Wards and attendance at the out-patient clinics were carried out during the term. The lack of Orthopaedic Registrars and lecturers has been greatly felt ... I am of the opinion that systematic lectures are necessary and should if possible be held at times outside the allotted time for clinical work, and that, as soon as facilities are available, the student should be able to take a more active part in the practical work of the unit."<sup>13</sup>

Soon after its inception, Dr Anders Karlen from Stockholm, Sweden, joined the department as Lecturer and Chief Assistant. In 1955, when Professor Cameron returned to Britain, Dr Karlen was appointed to the Chair of Orthopaedic Surgery, a post he held till 1960.

During the 1950s, detailed records were kept of the teaching activities, class lists and examination questions and results of the Department of Orthopaedic Surgery, and these offered a fascinating insight into the milieu of the times.<sup>14</sup> At this time, the activities of the department centred on undergraduate teaching; postgraduate orthopaedic education in Singapore would only develop during the following decade. The report for the Michaelmas Term of 1952 set out the components of the syllabus, which consisted

DEPARTMENT OF ORTHOPAEDIC SURGERY TIME TABLE MICHAELMAS TERM 1953.						
Time	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8.30	Systematic Lecture (Prof. Cameron)	Section A Operations (Prof. Cameron)	General Cleaning of Theatres and Out-patient Dept. Wd 22.	Section B Operation (Mr. Karlen)	Section C Questions (Prof. Cameron)	STAFF MEET ROOMS.
10 a.m. - 12.30	Section A Fracture C.F. Clinic Ward 22 Section B Operations: 8.30 a.m. (Mr. Karlen) Tutorial 1) 10.15 - 11.30	Section B Orthopaedic Out-pt. Clinic Students' Clinic 10 - 11 a.m. (Mr. Karlen)	Section E. 10 a.m. S.F. Followup Cases, Artificial Limbs, Physiotherapy Cases, Ward 21 Section E. Ward Clinical Lectures for Students, 10 - 11.30 (Mr. Karlen)	Section A Fracture & C.F. Clinic Wd 22 Students' Clinic 10 - 11.30 (Prof. Cameron) Students' Physio. Tutorial Wd 23.	Section C Fracture C.F. Clinic Wd 22 Ward Clinical Lectures (Wd 23) (Mr. Karlen) Tutorial 22.30 - 12.30	
		AFTE		WED		
2.15 - 4.30 p.m. For Reading Research Etc.	MEETINGS, ETC. Consultations by Appointment (Prof. Cameron)	Ward Work, etc. Visits (T.F.S.H. Middleton Singapore)		Ward Work, etc. Consultations by Appointment (Prof. Cameron)		
		3 p.m. to 4 p.m. Systematic Lecture (Prof. Cameron)		2 p.m. - 3 p.m. Systematic Lecture (Prof. Cameron)	Ward Work etc. Visits (Singapore Middleton T.F.S.H.)	

Fig. 1. A timetable for the Orthopaedic Surgery Posting in 1953. This timetable is also that of the clinical work week for the Department.

of a systematic course of 30 lectures on orthopaedics and fractures, ward clinics (bedside teaching) and outpatient clinic teaching, weekly combined clinical lectures on various surgical subjects, 6 lectures and demonstrations on physiotherapy, visits to St Andrew's Hospital for the treatment of bone and joint tuberculosis, ward work consisting of case-taking and clerking (6 conditions to be recorded by each student), twice-weekly tutorials, and a written class examination at the end of the term (Fig. 1). Then, as now, students were expected to show initiative: *"The time available for this work (clerking of cases) is limited and depends largely on the enthusiasm and energy of the student ..."* Students that term included VK Pillay (later Professor of Orthopaedic Surgery and Head of the University Department of Orthopaedic Surgery "C", 1967-1971) and N Balachandran (later Clinical Professor of Orthopaedic Surgery and Head of the Government Orthopaedic Unit "O").

In 1955, Dr (later Professor) Karlen assumed the position of Head of Department, and in 1958, started a separate Burns Unit, which remained as part of the Department of Orthopaedic Surgery till 1972.<sup>15,16</sup> In those days, the trainees were sent to Britain for specialist training for one to two years before sitting for examinations.<sup>1</sup> By the 1960s, however, the department was able to report that it was "now adequately staffed, in the main by Malaysian graduates with overseas experience and degrees. The work of the Department continues to expand and at the same time specialist lines within the sphere of Orthopaedics are being developed by members of the staff".<sup>17</sup> With the increasing demands for clinical orthopaedic care, a separate Government Orthopaedic Unit called the "O" Unit was set up in 1959, while the University Department was termed the "C" Unit.

In 1961, Professor Donald Gunn assumed headship of the department. He was remarkable both for being a great teacher and academician, as well as being instrumental (together with Dr Khong Ban Tze) in setting up the departmental orthopaedic slide library, a massive collection of teaching slides widely acknowledged to be one of the largest and most complete in the world.<sup>16,18</sup> The slide library continues to be a prime and invaluable resource for orthopaedic undergraduate and postgraduate teaching in the department today. The 1960s also saw the emergence of Singapore on the international orthopaedic scene, with representations in international conferences in India, Great Britain, Germany, Honolulu and Australia. In 1964, Singapore was the venue for the first international conference of orthopaedic surgeons held in South East Asia.<sup>17</sup>

In 1967, the first local Professor of Orthopaedic Surgery, VK Pillay, was appointed, and during his headship, the

foundations for postgraduate training in orthopaedics were laid, with the local Master of Medicine (M Med) (Surgery) degree gaining the recognition of the University of Liverpool, thus enabling local M Med graduates to sit for the MCh Orthopaedics degree directly. Postgraduate training was further developed during the headships of Professor PB Chacha (1972 to 1980), Professor K Bose (1980 to 1998), Professor EH Lee (1998 to 2001), Professor K Satku (2001 to 2004) and Associate Professor HK Wong (2004 to date), and its regional reputation was enhanced by a steady stream of visiting trainees and fellows from neighbouring countries. Today, there is a comprehensive undergraduate teaching programme that is undergoing further refinement, and a strong postgraduate curriculum that includes an annual Postgraduate Course in Orthopaedic Surgery, which is now in its 26th year and attracts participants from countries around the region.

Over the years, the University Department of Orthopaedic Surgery has also changed its name and location. In 1980, with the formation of the National University of Singapore from the merger of the University of Singapore and Nanyang University, the University Department of Orthopaedic Surgery "C" was renamed the National University of Singapore (NUS) Department of Orthopaedic Surgery. In 1985, the NUS Department shifted from its premises at the Singapore General Hospital to the newly completed National University Hospital (NUH) located within the NUS campus at Kent Ridge.

### Undergraduate Teaching Today

From a course consisting of 15 weekly classes on fractures for 18 undergraduates in the late 1930s, and the clinical postings in orthopaedic surgery for over 40 students when the Department was established in 1952, the programme now encompasses an exposure to musculoskeletal diseases and trauma in all 5 years of the undergraduate course, for an enrolment of up to 230 undergraduates in each year. This growth is not unexpected with the rapid industrialisation and modernisation of Singapore in the intervening years. Over this time, the spectrum of clinical conditions has also changed, and with it the emphasis on the conditions to be taught; from that dealing primarily with tuberculosis of bones and joints, poliomyelitis, and childhood deformity, to those resulting from degenerative disorders, sports injuries, industrial and motor vehicle accidents, and cancer. The increasing expectations of patients, together with an increasingly challenging medico-legal climate in recent years, have also made it necessary to include ethics and communication skills in the curriculum.

In the first 2 (preclinical) years of the present undergraduate programme, the Department is actively involved in the medical curriculum's integrative teaching

and learning programmes like the Physician Development Programme (PDP), Special Study Modules (SSM), Undergraduate Research Opportunities Programme (UROP), and the Clinical Skills Foundation Course. For example, in the Clinical Skills Foundation Course, second-year students acquire basic clinical, communication and procedural skills during an 8-week integrated course that is conducted with the Department of Surgery. The main systematic posting in orthopaedic surgery takes place over 8 weeks in the third or fourth undergraduate year. During this posting, the students are exposed to the whole range of orthopaedic care, from ward work to outpatient care, emergency cases and rehabilitation. The teaching programme consists of bedside tutorials, ambulatory teaching at the outpatient clinics (Fig. 2), clinical slide presentations, and weekly lectures and seminars. With the trend towards late evening and same-day admissions for elective surgery, and more time-sensitive patient-centred outpatient care, the student today has fewer opportunities to see elective orthopaedics. To overcome this, the Department has introduced ambulatory teaching at the outpatient clinic, where there is protected time for the clinical teacher and the students to participate in this activity. Teaching is performed on a patient who has completed his/her consultation with his doctor. The students maintain a logbook of the clinical cases they have seen, and are assessed on write-ups of clinical cases and their psychomotor skills. A clinical test is held at the end of the posting. In the fifth year, there is a 2-week student internship programme in which students shadow house officers in preparation for their imminent duties. A summary of the undergraduate programme for the main systemic and the final year students is shown in Figure 3.

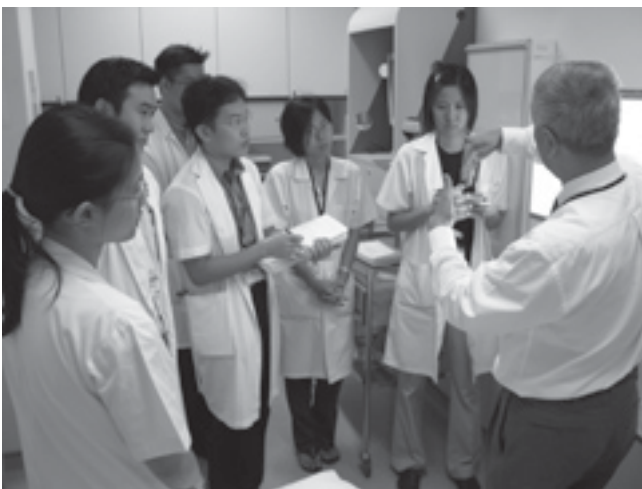


Fig. 2. Adjunct Professor Casey Chan emphasising a point during ambulatory teaching at the Orthopaedic Specialist Outpatient Clinic in the National University Hospital.

When the University Department of Orthopaedic Surgery was first established in 1952, there were only 2 academic and 4 clinical teaching staff, and all orthopaedic teaching was done there. Today, with the task of educating 230 medical undergraduates a year, the NUS Department of Orthopaedic Surgery's 13 academic staff are assisted by 76 clinical faculty members in the five major public hospitals. The students are posted to the Orthopaedic Departments of Alexandra Hospital, Changi General Hospital, National University Hospital, Singapore General Hospital, and Tan Tock Seng Hospital for their clinical postings in their third, fourth, and fifth years. In each hospital, a senior clinical faculty member coordinates the clinical teaching activities with the support of the respective hospital's Associate Dean and Orthopaedic Head of Department. Centralised teaching takes place at the National University Hospital during the first week (the Orthopaedic Foundation Course), and thereafter once a week during the main systemic clinical posting in Years 3 and 4 (Fig. 3).

### Postgraduate Teaching and Training

Postgraduate surgical training in Singapore has largely been based on the UK model as most of our surgeons in the past have had part or all of their training and certification in UK. In the 1960s, trainees sat for the primary fellowships of either the Australasian College or one of the UK Colleges of Surgeons and many went on to do the MCh (Ortho) in Liverpool. After the formation of the Postgraduate School of Medical Studies at NUS, the M Med (Surgery) was first conferred in 1970 with 2 graduates. Having obtained the M Med (Surgery), the trainees could then proceed to Liverpool for the MCh (Ortho). The first Postgraduate Course in Orthopaedic Surgery was held in 1980. This became an annual event sponsored by the Postgraduate School for Medical Studies, NUS (Fig. 4). From 1986, all orthopaedic trainees had to undergo basic surgical training for 3 years, after which they sat for the M Med (Surgery) examinations jointly held with the FRCS (Edin) examinations in Singapore. After the completion of basic surgical training, the candidates trained for a minimum period of 3 years in orthopaedic departments in the government hospitals before they were certified as orthopaedic surgeons.

From 1993, a more structured training and assessment programme was introduced for basic and advanced training in surgery and orthopaedics. Following 3 years of basic surgical training, a 3-year advanced orthopaedic training programme leading to an exit assessment was formalised. From 1997, the Specialist Training Committee decided to rotate all advanced trainees through the various teaching hospitals to expose them to a wider range of orthopaedic problems as well as teachers. This paved the way for the accreditation of Singapore by the Royal College of Surgeons of Edinburgh as an orthopaedic training centre for higher

Foundation Course Week (at National University Hospital)										
Week 1	Week 2 – 4			Week 5 – 7						
	NUH	SGH/ KKWCH	TTSH	CGH	AH	NUH	SGH/ KKWCH	TTSH	CGH	AH
<b>Year 3 &amp; Year 4 (Main Systemic Posting)</b>  Weeks 2 to 7	Clinical Groups 1,2,3	Clinical Groups 4,5	Clinical Groups 6,7	Clinical Groups 8,9	Clinical Group 10	Clinical Groups 6,7,10	Clinical Groups 8,9	Clinical Groups 1,2	Clinical Groups 4,5	Clinical Group 3
	(1) Clinical teaching for the students comprises:- i. Ward work (clerk, present and discuss inpatients) ii. Outpatient clinic sessions (observe outpatient treatment) iii. Orthopaedic emergency work iv. Operating theatre sessions (observe surgery) v. Bedside tutorials (held in the ward) vi. Ambulatory teaching (held in the outpatient clinic) (2) Centralised teaching (seminars and professorials) is conducted every Thursday in NUH. All students to attend. (3) Visits to the following centres are arranged and all students to attend: i. Cerebral Palsy Centre (Spastic Children's Association) ii. Sports Medicine and Research Centre (Singapore Sports Council) iii. Ang Mo Kio Rehabilitation Centre (4) Continual assessment (Multiple Choice Questions and OSCAs) and psychomotor skill assessments are held in NUH at the end of week 4 and week 8 End of Term Clinical Test (1 long and 3 short cases) Continual Assessment (Multiple Choice Questions and OSCAs) Psychomotor Skills Assessment									
Week 8										
<b>Year 5 (Student Internship Programme)</b>  Weeks 1 & 2	NUH	SGH/KKWCH	TTSH	CGH	AH	TTSH	CGH	CGH	CGH	AH
	(1) Students function like junior house officers. Their clinical duties comprises the following:- i. Clerk inpatients ii. Follow ward rounds iii. Observe and assist practical procedures iv. Assist in outpatient clinics and operating theatres v. Attend night duties (2) Two half days of centralised teaching are conducted in NUH on Monday of week 1 and Friday of week 2. (3) Continual assessment (Multiple Choice Questions and OSCAs) is held in NUH at the end of week 2 (Friday)									

AH: Alexandra Hospital; CGH: Changi General Hospital; KKWCH: Kandang Kerbau Women's and Children's Hospital; NUH: National University Hospital; SGH: Singapore General Hospital; TTSH: Tan Tock Seng Hospital

Fig. 3. Orthopaedic undergraduate teaching programme for years 3, 4, and 5 students – 2004, Department of Orthopaedic Surgery, National University of Singapore.

surgical training.

In 2000, the MRCS (Edin) was offered jointly with the M Med (Surg) Part I Examinations, as the FRCS (Edin) was being phased out. At around the same time, the M Med (Ortho) was introduced so that the candidates interested in advanced training in Orthopaedic Surgery could have more in-depth training in Orthopaedics after the completion of their MRCS (Edin). Also, from 2000, Singaporean orthopaedic trainees were allowed to sit for the Joint Hong Kong/FRCS (Edin) orthopaedic exit examinations held in Hong Kong.

With strong linkages with the Royal College of Surgeons of Edinburgh and an accredited training programme in Singapore, the first joint exit orthopaedic examinations with the Royal College of Surgeons of Edinburgh were held in Singapore in 2003. This also led to a reciprocal arrangement with Hong Kong whereby candidates from both countries can sit for the joint examinations with the Royal College of Surgeons of Edinburgh. Successful candidates would then hold an FRCS (Edin) in Orthopaedic Surgery as well as their own country's exit certification (FAMS in Singapore and FHKCOS in Hong Kong). With this arrangement, orthopaedic surgical training and certification in Singapore has finally come of age and reached an international standard.

In addition to the training courses above, which are specifically linked to specialist examinations and certification, orthopaedic trainees have the opportunity to learn through lectureships and training courses sponsored by the Ministry of Health, NUS, and major hospitals in Singapore. Some of the lectureships and training courses include the Human Resource Development Programme (HMDP) Visiting Expert sponsored by the Ministry of Health, and the VK Pillay and RWH Pho Lectureships sponsored by the NUS Department of Orthopaedic Surgery. Basic and advanced subspecialty surgical skills workshops are regularly organised by the Singapore Orthopaedic Association and the orthopaedic departments of the major hospitals.

### The Challenges Ahead

As part of the medical team, it is important for orthopaedic teachers to contribute to the overall development of the student as a caring, knowledgeable and competent doctor. To this end, orthopaedic teaching must not only encompass the surgical aspects of disease, but also the more human aspects of communication skills, professionalism and ethics. Technological advances must be taken in stride but must not be allowed to take over the human aspect of the practice of medicine. Students must be made aware of the importance of the doctor-patient relationship and must continually upgrade their knowledge and skills even after graduation. For most of the past century, orthopaedic education, both



Fig. 4. A student presenting a case to Professor James B Richardson during the 22nd Postgraduate Course in Orthopaedics in 2001.

at undergraduate and postgraduate level, has predominantly focused on the transfer of knowledge and “hard” skills necessary to practice orthopaedic surgery to serve the basic needs of a developing nation. Our challenge for the next century is to equip our future doctors and orthopaedic surgeons with both “hard” and “soft” skills to enable them to practice competently, professionally, and with compassion in a modern and developed Singapore.

### REFERENCES

1. Pillay VK. Early history of surgical subspecialties in Singapore: Orthopaedic surgery. *Ann Acad Med Singapore* 1992;21:207-10.
2. Nambiar RM. Surgery in Singapore: the Scottish link. *Ann Acad Med Singapore* 1990;19:299-307.
3. The Straits and Federated Malay States Government Medical School. Syllabus 1908.
4. The Straits and Federated Malay States Government Medical School. Syllabus 1915-1916.
5. King Edward VII College of Medicine. Syllabus 1927.
6. Lee YK. A brief introduction to the early history of surgery in Singapore (Part III). *Singapore Med J* 1997;38:353-5.
7. King Edward VII College of Medicine. Annual Report 1938.
8. King Edward VII College of Medicine. Annual Report 1948.
9. University of Malaya. Annual Report 1949-50.
10. University of Malaya. Annual Report 1950-51.
11. Souvenir Publication: Fifty Years of Medical Education in Malaya. Malaysia: University of Malaya, 1955.
12. Cameron JAP. The development and future of orthopaedics. *The Medical Journal of Malaya* 1953;7:235-43.
13. University of Malaya. Annual Report 1951-52.
14. Department of Orthopaedic Surgery, National University of Singapore. Student Records and Term Reports (departmental archives).
15. Department of Orthopaedic Surgery. Cast in Gold – Commemorating 50 Years of Dedication to Excellence in Orthopaedic Education, Research and Clinical Service. Singapore: National University of Singapore, 2002.
16. Satku K. History of the orthopaedic specialty in Singapore. *Ann Acad Med Singapore* 2002;31:551-7.
17. Souvenir Publication: Sixty Years of Medical Education. Singapore: National University of Singapore, 1965.
18. 75 Years (1905-1980) of Medical Education. Singapore: National University of Singapore, 1980.