



THE HONG KONG COLLEGE OF ANAESTHESIOLOGISTS

香港麻醉科醫學院

NEWSLETTER
December 2004

In this issue...

Featured Articles

Anesthesia in mainland China

Clinical Investigations

Demand/good ratio for patient controlled analgesia

Post-Anesthetic Complications

Randomized study on LMA insertion

Case Reports

An Unanticipated difficult Extubation

College Business

An Anaesthetic Odyssey to Intensive Care, ASM 2004

Volume 13

Number 4

December 2004

Contents

Pages

3 Editorial

Featured Articles

4 Anesthesia in mainland China: its past and present

Clinical Investigations

11 Demand/good ratio: A useless number for patient-controlled analgesia?

17 Prevalence of Post-Anesthetic Complications

27 Randomized, double-blind comparison of fentanyl, morphine or placebo for LMA insertion

Case Report

33 An Unanticipated Difficult Extubation

College Business

38 Board of Education

40 Board of Accreditation

41 Board of Examination

44 Board of Pain medicine

46 Guidelines on pain management training (PM1V3, august, 2004)

48 Board of Intensive Care Medicine, New Policy on "Fellow *ad eundem*"

49 Board of Censor

52 *An Anaesthetic Odyssey to Intensive Care, ASM 2004*

53 Abstracts presented at the Annual Scientific Meeting in Anaesthesiology 2004,

58 19th Congregation, HKCA

61 Approved formal projects

Instruction to Contributors

We welcome contributions from invited guests and members / fellows of the Hong Kong College of Anaesthesiologists. Articles should be prepared with suitable word processing software. Figures, table, pictures and photo-micrographs should be saved in the same file. The file could be sent either by e-mail or by post (on a floppy disc or CD) to the Editor. Please indicate if the material has to be returned after the editorial processing. The article would be printed in the same way as it is submitted. The accuracy of the materials published is the responsibility of the contributors. The contributors must ensure that the materials submitted do not infringe copyright. The editorial board reserves the editorial right for selection of publication.

Disclaimer

Unless specifically stated otherwise, the opinions expressed in this newsletter are those of the author's personal observations and do not necessarily reflect the official policies of the Hong Kong College of Anaesthesiologists.

Editorial

This issue of the newsletter has made a radical change. Instead of pure light reading on College business, we have put in heavy scientific articles. These papers have been reviewed by our members in the formal project committee. They represent the hard work of our fellows and members in an attempt to advance science in the specialty. We are looking for more contributions, if you have a written manuscript and you are not sure where to send it to, please consider the College NEWSLETTER. All scientific submissions will be peer-reviewed. These papers will also be considered as “published articles” for the purpose of formal project requirement.

We are also pleased to bring you the second article of our series of papers on anesthetic practice in different part of the world. We are particularly grateful to Dr Henry Liu who has been working hard to fix the link for us. In this issue, Drs Guo, Yao and Liu share with us the scene in mainland China. Given that we are getting closer, in terms of economic, intellectual and cultural exchange, I am sure you will be interested in finding out what is happening there. Still to come in April, an article by Dr KC Wong (a well known American Anesthetist) will describe what he saw in Taiwan over the last twelve months (apart from the elections).

I hope you will enjoy this issue of the newsletter and your feedback is most important. On behalf of the Council, we wish everyone a Happy, Prosperous and Safe New Year.

Matthew Chan
Editor-in-Chief

The Editorial Board

Editor-in-Chief	Matthew Chan	
Board Member	Po Wah Cheung	David Lim
	Edmond Chung	HS Lim
	Douglas Fok	Vivian Ng
	Rebecca Kwok	Michael Poon
	W H Kwok	Eric So
	Bassanio Law	Steven Wong
	Anne Leung	SC Yu
	Carina Li	Timmy Yuen

Email: mtvchan@cuhk.edu.hk

Address: Department of Anaesthesia and Intensive Care, Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, NT, Hong Kong

Phone: 2632 2894; Fax: 2637 2422

Featured article

Anesthesia in mainland China: its past and present

¹Qulian GUO (郭曲练), M.D., ²Shanglong YAO (姚尚龙), M.D. and ³Henry LIU (刘恒意) M.D.

Department of Anesthesiology, Xiangya Hospital of Central South University, Changsha, Hunan, China;
Department of Anesthesiology, Union Hospital of Tongji Medical College, Wuhan, Hubei, China and Parish
Anesthesia Associates, New Orleans, Louisiana, USA

I. A history of anesthesia in China

Human activity in China began over 1.7 million years ago, and the use of plants as medicine can be dated back to the origin of mankind. As early men experimented with new plants in search of food, they also began to discover the effects that these plants had on the human body. But the use of herbal medicine, acupuncture, and other medical tools may have begun much earlier than is shown by the evidence we have found. In fact, the origin of the Chinese medical system is probably about 2,500 years old. Shen Nong (神农, 3494 BC), who spent his entire lifetime discovering new uses for plants, is credited as the first herbal doctor. Unfortunately, his discoveries pre-date written record and his legacy were carried through oral history alone. By 1500 B.C., references to herbal medicine were inscribed onto bones. In the 3rd century B.C., silk medical texts described the use of over 250 natural substances as medicine. The famous Pharmacopoeia of Shen Nong (*Shen Nong Ben Cao Jing*, 神农本草经) was written at about 500 B.C., detailing all the known herbal medicines of the time. The Yellow Emperor's *Internal Classic* (*Huang Di Nei Jing*, 黄帝内经) was written in about 200-300

B.C. and included the first explanations of the pathological concept, the diagnostic method, and treatment strategies. The theories described in this book and following books make up the system known as traditional Chinese medicine. In this book, for the first time, acupuncture was described for analgesia in trauma patients. Li Shizhen (李时珍, 1596 A.D.) wrote the *General Outlines and Divisions of Herbal Medicine*, also known as the *Materia Medica* (*Ben Cao Gang Mu*, 本草纲目), which was the greatest contribution to Chinese herbal medicine in history. The original work contained nearly 12,000 recipes, including 1,900 medicinal substances, and also contained records of the anesthetic effects of Datura plants. This encyclopedic work heralded a new era in the world history of pharmacology. Use of anesthesia in surgery in China can be traced back to Bian Que (扁鹊) and Hua Tou (华佗). Bian Que performed surgery with a special "toxic liquor (毒酒)" in the 2nd century A.D. Hua Tou invented "Ma Fei Sang (麻沸散)," a mixture of multiple herbal components and liquor, and used this herbal mixture to conduct abdominal surgery¹. Sun Shimiao in 652 A.D. and Wang Xi in 752 A.D. documented the analgesic effects of hemp. In 1743, Zhao Xueming used a mixture of plant juices for surgery.

Acupuncture is a very ancient form of healing which most likely pre-dates recorded history. The philosophy is rooted in Taoist tradition, going back for over 8,000 years. "Bian stones," stone medical tools, were used in ancient China to apply pressure to or puncture areas of the body. Archaeologists have recovered tools of this sort dating well back

¹Chairman, Department of Anesthesiology, Xiangya Hospital of Central South University, Changsha, Hunan, China; ²Chairman, Department of Anesthesiology, Union Hospital of Tongji Medical College, Wuhan, Hubei, China; ³Chief Executive Officer, Gasliu Corporation and a Staff Anesthesiologist at Parish Anesthesia Associates, New Orleans, Louisiana, USA

Address correspondence to: Dr Henry Liu, 29 English Turn Drive, New Orleans, LA 70131, USA Email: henryliula@yahoo.com

into the New Stone Age (8000-2000 B.C.). Hieroglyphs describing the use of Bian stones and early methods of Moxibustion appeared about 3,000 years ago. Books over 2,000 years old also make reference to the medical use of such tools. With the advent of metal crafting, metal needles began to be created. A set of nine distinct acupuncture needles made of silver and gold dating back to 113 B.C. was discovered. The aforementioned Yellow Emperor's *Internal Classic* (*Huang Di Nei Jing*, 黄帝内经) was the earliest book that described the precise use of acupuncture as we know it today. Throughout history, the techniques and tools of acupuncture have become further refined. The most significant milestone in the history of acupuncture occurred during the period of Huang Di (The Yellow Emperor, 2697-2597 B.C.). Around 1000 B.C., during the Shang Dynasty, hieroglyphs showed evidence of acupuncture and Moxibustion. Although bronze needles were excavated from ruins, Bian stones remained the main form of needle. During the Warren States Era (421-221 B.C.) metal needles replaced the bian stones. Four gold needles and five silver needles were found in an ancient tomb dating back to 113 B.C. The *Miraculous Pivot* names nine types of acupuncture needles. The *Historical Records* (史记) notes many physicians practicing acupuncture during this time. There are books in the year 215 A.D. that systemically show the use of acupuncture in treating headaches, toothaches, back pain, joint pain, etc. Sun Shimio wrote *Prescription with a Thousand Gold for Emergencies* (备急千金要方, 650-692 A.D.), a text including data on acupuncture from various scholars. During this period of time, acupuncture became a special branch of medicine and practitioners were dubbed acupuncturists. Acupuncture schools appeared, and acupuncture education became a part of the Imperial Medical Bureau. From the late 1950s to the 1960s, acupuncture research continued with further studies of the ancient texts, clinical effects on various diseases, acupuncture anesthesia, and acupuncture's effect on the internal organs. Undoubtedly acupuncture has been used in China for

thousands of years, but acupuncture anesthesia for surgical procedures has occurred only since the 1950's. The very first documented surgical case under acupuncture anesthesia was performed in 1958 in Shanghai.

In terms of resuscitation, Bian Que used pulse to diagnose death during the 4th and 5th centuries B.C. Zhang Zhongjing (张仲景) in the 2nd and 3rd centuries A.D. described a technique to resuscitate suicide patients with chest and abdominal compression and other physical stimulation. A mouth-to-mouth ventilation technique during resuscitation was also documented slightly later. In ancient China, people had already developed the prototypes of modern cardiopulmonary resuscitation techniques¹.

II. The development of modern anesthesiology in mainland China

Western style anesthesia was introduced to mainland China over 100 years ago. Foreign medical missionaries played a very important role in introducing modern anesthesiology into China. Reverend Dr Peter Parker, who received degrees from both the Yale divinity and medical schools, introduced ether anesthesia into China a year after its first public demonstration in Boston. At first, using a hastily made Chinese apparatus, Dr Parker extirpated two tumors from the arms of two patients. On October 4, 1847 he anesthetized a middle-aged farmer using an apparatus he received from Dr Charles Jackson of Boston for the separation of the eyelids from a case of symblepharon. Within a year, Dr Parker had learned about chloroform anesthesia from a pamphlet written by Dr James Young Simpson, and had used the new agent successfully in 8-10 additional cases. Foreign missionary doctors started anesthesia services at the Peking Union Medical Center (PUMC), creating a setting similar to those of major American universities of the time. At PUMC, for the majority of cases, two nurses, Helen Holland and Mary Swisher (who later married the Chief of Surgery at PUMC, Harry Loucks), with aid from the junior surgical staff, provided anesthesia. Ether and

nitrous oxide were the predominant anesthetics, although chloroform was used for trauma cases. Surgeons at PUMC also developed an active local and spinal anesthetic practice as an alternative to general anesthesia⁴. But only in the last 50 years has China progressed in modern anesthesiology from infancy to maturation. In this very dynamic period of time, there have been three major anesthesiology pioneers in China³: Drs Jone J. Wu, Deyan Shang, and Yung Shieh. They were all trained in the United States, and returned to China to establish academic anesthesiology practices there. They are credited with the development of modern Chinese anesthesiology. Through their tireless efforts, mainland Chinese anesthesiology has gradually built up excellence in clinical and scientific research through education, publication, and professional organization, all part of a blueprint they established many years ago and have implemented successfully over the last half-century. Some landmark achievements by these three pioneers in the development of modern anesthesiology in mainland China include the following: in 1950, Dr Jone Wu founded the first independent academic department of anesthesiology at Zhongshan Hospital of National Shanghai Medical College in Shanghai, China, which clinically served the six hospitals affiliated with the medical school; in 1954, Dr Wu published the first Chinese-language anesthesia textbook, with a second and expanded edition published in 1959; and in the early 1950s, Dr Wu also established the first blood bank in China. In 1957, Dr Deyan Shang established the first animal research laboratory in China to investigate invasive cardiothoracic anesthetic management, hypothermic anesthesia for cardiac surgery, and other resuscitative studies. In 1979, Dr Deyan Shang and others founded the Chinese Society of Anesthesiologists. Dr Shang was elected president of the society in the same year and held the post for the next five years. In 1984, Dr Shang was named emeritus president and counsel of the society. In 1981, the Chinese Journal of Anesthesiology was established with Dr Rung Shieh as the

founding Editor-in-Chief. In 1988, the Chinese Society of Anesthesiologists became a full member of the World Federation of Societies of Anesthesiologists³, and resumed the membership in 2004. Several anesthesiologists – Drs Li Xinfang (Shanghai), Tang Huiying (Beijing), and Wang Yuanchang (Tianjing) – also made great contributions to the development of modern anesthesiology in mainland China. Drs K.C. Wong, Ailun Luo, and Yuguang Huang, in cooperation with International Anesthesia Research Society (IARS), will soon publish the Chinese language version of “Anesthesia and Analgesia,” which is the official journal of IARS.

In the 1950s, anesthesia services in China could only apply simple ether drip induced general anesthesia, nitrous oxide, and procaine for spinal anesthesia⁴. Then, continuous spinal anesthesia and continuous epidural anesthesia were introduced into clinical practice. After that, sodium thiopental for the induction of general anesthesia was used. Sodium thiopental can be produced in mainland China, making the drug more readily available. Ketamine was then brought into clinical practice and was used widely, especially in pediatric procedures. Lidocaine, dicaine, and dibucaine were then introduced into clinical use as local anesthetic drugs, in addition to procaine. In the late 1950s, acupuncture anesthesia was pioneered and began to be used in clinical applications in 1958 in Shanghai. During the progress of cardiac surgery and neurosurgery, the concepts of controlled hypotension and deliberate hypothermia were adopted and put in clinical practice. In the 1970s, a complex combination of herbal medicines was developed for surgical anesthesia, but unfortunately achieved only partial success. After the early 1980s, many other currently used volatile agents were introduced into anesthetic practice, such as enflurane and isoflurane. Also during the 1980s, Intensive Care Units (ICUs) started to appear in many large hospitals in mainland China, and pain management services were booming in major cities in mainland China. Newer volatile agents such as desflurane and

sevoflurane became available in mainland China during the 1990s.

III. Organization of Departments of Anesthesiology in mainland China

Most academic anesthesiology departments in mainland China consist of the following components: preoperative anesthetic evaluation, clinical anesthesia, a post-anesthesia recovery unit (PACU), an Intensive Care Unit (ICU), a Pain Clinic, education and anesthesia research laboratories⁵.

1. Preoperative anesthetic evaluation

In most hospitals, preoperative anesthetic evaluation is done by designated anesthesia provider(s). In some major academic institutions, there are outpatient anesthesia clinics that serve the following functions:

(1) Site of preoperative evaluation of elective surgical patients. A designated anesthesiologist or anesthetist will interview the patient. A brief medical history will be taken and a physical examination will be conducted. Necessary laboratory tests and special examinations such as X-ray radiology, EKG, PFT, etc. may be ordered. Questions relating to anesthesia will be explained to the patient and patient's family and anesthesia consent will be obtained.

(2) Site of postoperative follow-up visits from surgical patients who are suffering complications or adverse outcomes. An outpatient anesthesia clinic is a place in which anesthetic complications can be diagnosed and managed accordingly. In some hospitals, if they don't have a outpatient anesthesia clinic, pain clinic may serve this function.

2. Clinical Anesthesia

The anesthesia department in most university hospitals has different divisions for anesthesia subspecialties such as cardiac surgery, neurosurgery, pediatric surgery, obstetric anesthesia, pain management, etc.; sometimes, designated staff anesthesiologists with subspecialty training or experience may be assigned to provide anesthesia for specialized

procedures such as open-heart surgery, craniotomy, or liver transplantation.

Quality assurance: every department has at least one personnel to monitor the department's mortality and morbidity rates. Any major complications are to be presented at weekly departmental meetings.

There are also regional quality-monitoring centers of anesthesia care in most areas of mainland China at the provincial or metropolitan level. These monitoring centers issue reports and alerts on a regular basis. They evaluate the quality of anesthesia care of the hospitals in the designated areas on a regular basis.

3. Post-anesthetic Care Unit (PACU)

Postoperative patients will be transferred to the PACU for recovery and observation. An anesthesiologist will be in charge of the PACU. PACU nurses are trained to take care of patients immediately after surgery. If patients are fully recovered from general anesthesia and their vital signs are stable, they will then be transferred to a regular ward or discharged. If patients are not stable or are suffering from major complications, they are transferred to the ICU for further management.

4. Intensive Care Units (ICU)

Most major hospitals in mainland China have an ICU. Most ICUs are managed by surgeons and anesthesiologists, although some are run predominantly by anesthesiologists. The ICU takes patients from the PACU, the OR, and/or the ER. The ICU is equipped with all kinds of vital sign monitors, ventilators, bronchoscopy equipment, defibrillators, and sophisticated intravenous infusion pumps.

5. Pain Management

Pain management services cover acute pain services, which include obstetric analgesia and postoperative analgesia, and chronic pain services, which are for the treatment of chronic pain patients. Obstetric analgesia with continuous epidural catheter is now widely used in some urban areas. Postoperative analgesic blocks and intravenous PCA (patient-controlled analgesia) are also widely used.

6. Education

For academic university hospitals, almost all anesthesia departments have designated personnel in charge of education and training. They arrange medical students' rotation to the department of anesthesiology and arrange for those practitioners who come back to the academic departments for further training. Resident anesthesiologists are considered faculty in mainland China, but they are closely supervised by senior anesthesiologists, at least for their first few years. Designated personnel also arrange medical school teaching; they are responsible for teaching anesthesia courses and resuscitation courses in the medical school's curriculum.

7. Anesthesia research laboratories

Most university hospitals have anesthesiology research programs. The research funding can come from various sources: the National Natural Science Foundation, the Ministry of Health, the Ministry of Education, the provincial level, the university level, and industries. Most young anesthesiologists in academic programs are involved in research to some extent.

All community hospitals at the county or higher level have a separate, independent Department of Anesthesia. These anesthesia departments are mainly composed of clinical anesthesia and a PACU, and may also include an ICU and Pain Management team. Smaller community hospitals or rural hospitals may not have an independent Department of Anesthesia but have anesthesia providers including anesthesiologist(s) and nurse anesthetist(s) within the hospital. Anesthesia providers are responsible for stat intubations in the hospitals, and may also be responsible for resuscitating patients in case of cardiopulmonary arrest.

IV. Management of anesthesia services in mainland China

1. Defining the scope of anesthesiology in China

The scope of anesthesiology in China is the same as it is elsewhere in the world. It includes

clinical anesthesia that covers pre- and post-operative visits, intraoperative management, intensive and critical care services, and pain management services, which include acute pain services and chronic pain management.

2. Personnel in the Department of Anesthesiology

- (a) Chairman: in charge of all activities; reports to the hospital's chief executive officer.
- (b) One to three Vice Chairmen: in charge of medical, educational and/or scientific affairs; report to chairman
- (c) Attending anesthesiologist(s): supervise resident anesthesiologists
- (d) Resident anesthesiologist(s): perform anesthesia and maintain anesthesia equipment and supplies
- (e) Anesthesia technician(s): help provide all the necessary equipment and supplies
- (f) Laboratory technician(s): help conduct scientific experiments and studies
- (g) Secretaries: help with administrative work

3. Resident anesthesiologists

Residents are responsible for daily preoperative visits of inpatients, and interview patients before surgery. They make sure that patients are ready for the scheduled surgery. They order all necessary tests and examinations, explain the procedure and anesthesia to the patients, and answer patients' questions. After the visit, they will discuss with the attending anesthesiologist(s) to formulate an anesthetic plan; for very complicated and difficult cases, more extensive consultation may be necessary. Resident anesthesiologists and nurse anesthetists are required to conduct postoperative visits and to write an anesthetic summary for each case.

V. Current status of anesthesiology in China

1. Manpower: over the last 50 years, anesthesiology in mainland China has been growing dramatically and has improved tremendously. Now the total number of anesthesia providers, including M.D. anesthesiologists and anesthetists, has passed 30,000.

2. Anesthesiology education and training programs: there are over 30 Colleges of Anesthesiology in China. Students admitted to these colleges receive systemic basic anesthesiology education and extensive clinical anesthesia training. Enrollment in these colleges totals over 1000 students per year. The total number of trainees with Ph.D.s or Master's degrees is 500-600 per year.

3. Anesthesia equipment: most anesthesia machines are now made in China. These domestic anesthesia machines are mainly used in mid- or lower level hospitals. Most anesthesia machines in major academic hospitals are imported, but most anesthesia-related equipment can be produced in mainland China. As a matter of fact, Chinese companies began to manufacture their own anesthesia machines in the 1930s³.

4. Acupuncture anesthesia: in 1980, the World Health Organization released a list of 43 types of pathologies that can be effectively treated by acupuncture. The use of acupuncture as anesthesia during surgery started in the 1950s in Shanghai. However, acupuncture anesthesia is rarely used in clinical practice nowadays, especially in major hospitals. Acupuncture anesthesia is occasionally used for some thyroid surgeries in some hospitals. Basic research regarding acupuncture is still very active, though – especially the applications of acupuncture in pain management.

5. Chinese Society of Anesthesiologists (CSA) and continued education: the CSA meeting is now an annual event instead of an event occurring every four years, as it was when the society had first been established. The format of the meeting is similar to that of the ASA (American Society of Anesthesiologists) Annual Meeting. The CSA Annual Meeting covers subjects from basic scientific research to clinical trials, offering continued education ranging from refresher courses to hands-on workshops. All practitioners are required to have more than 20 hours of continued education. The CSA is also setting up several committees, including committees on clinical anesthesia, Intensive Care Medicine, Pain Management, and Continued Medical

Education. There are meetings among the different anesthesiology subspecialties, which include neurosurgical anesthesia, cardiothoracic anesthesia, obstetric anesthesia, pediatric anesthesia, and Pain Management; but formal organization of the subspecialties is yet to be formed.

6. Pain management: obstetric analgesia is now widely used in major urban areas in mainland China, but in some remote areas and the countryside, this service is still lagging behind. Postoperative analgesia is well established, with some sophisticated options available in mainland China, such as Patient Controlled Analgesia (PCA). Chronic pain services are growing at a relatively slower pace. Chronic pain patients are mainly managed using medicine and some invasive blocks. More sophisticated invasive strategies – such as spinal cord stimulation, intrathecal pump, and continuous local anesthetic infusion pump – are emerging as new techniques, but currently are only available in limited areas.

In summary, anesthesia in mainland China has gone through thousands of years of evolution and development. From Hua Tou and Bian Que, to Li Shizhen, to Drs Wu, Shang, and Shieh, to today's anesthesia community, Chinese anesthesia providers have been building up excellence in education, clinical training, research, and publications. As the Chinese economy is booming, China is modernizing, and anesthesiology as a medical specialty will continue to grow and mature, to the benefit of the people of China and of the whole world.

References

1. Zhao Jun. Introduction of anesthesia, in *Modern Anesthesiology*, ISBN 7-117-02518-2/R 2519
2. Shieh Y: History of modern anesthesia in china, *Anesthesia: Essays on its History*. Edited by Rupreht J, van Lieburg MJ, Lee JA, et al. Berlin, Springer-Verlag, 1982, pp 224-7
3. Sim P, Du B, Bacon DR. Pioneer Chinese Anesthesiologists: American Influences. *Anesthesiology*. 2000. 93(1):256-264

4. Hune EH: Peter Parker and the introduction of anesthesia into China. *J History Med Allied Sci* 1946; 1:671-3



Drs Henry LIU (left) and Qulian GUO

5. Zeng Yinming. Organization and management of Anesthesia Department, in *Modern Anesthesiology*, ISBN 7-117-02518-2/R 2519



Dr Shanglong YAO (right)





The Hong Kong College of Anaesthesiologists Scientific Symposium

Date : 24 February 2005 (Thursday)

Venue : Miramar Ballroom C - E Penthouse, Hotel Miramar HK, TST

Program :

6:00pm	Reception
6:30 - 7:30pm	Lecture I & Q&A
7:30 - 8:30pm	Lecture II & Q&A
8:30 - 10:30pm	Chinese Dinner

Lecture I : Pre-operative Evaluation of the Airway - Why Bother?
Speaker : *Dr Steve Yentis* Consultant Anaesthetist and Honorary Senior Lecturer, Magill Department of Anaesthesia, Intensive Care and Pain Management, Chelsea and Westminster Hospital

Lecture II : The Role of Non-opioid Analgesics in the Perioperative Period
Speaker : *Prof. Paul White* Professor and Margaret Milam McDermott Distinguished Chair of Anesthesiology, University of Texas Southwestern Medical Center at Dallas

For registration, please fax 2807 2496 on or before 21 February 2005.

Continuous Medical Education Accreditation:

<i>Anaesthesiologists 1 point</i> <i>Dental surgeons 1 point (passive participation)</i> <i>Obstetricians & Gynecologists 1 point (non O&G)</i> <i>Othopedic surgeons 1 point (Cat B)</i> <i>Otorhinolaryngologists 0.5 point (Cat 3)</i>	<i>Australia & New Zealand College of Anaesthetists (ANZCA) 6 points</i> <i>Surgeons 1 point (passive)</i> <i>CU MCHK CME 2 points</i>
--	---

Sponsored by:



Pfizer Corporation Hong Kong Limited



Clinical Investigations

Demand/good ratio: A useless number for patient-controlled analgesia?

¹Michael POON, ²PP CHEN and ³Marlene MA

Department of Anaesthesia and Intensive Care, The Chinese University of Hong Kong, Prince of Wales Hospital, Hong Kong Special Administrative Region

Background: Patient controlled analgesia (PCA) devices are capable of recording and displaying the pattern of PCA usage. The demand/good ratio (DGR) is defined as the ratio of the number of PCA activation made by the patient to the number of successful PCA activation with actual analgesic delivery. We evaluate DGR as an objective measure of pain relief.

Methods: Seventy-one adult patients scheduled for abdominal surgery with general anesthesia were studied. All patients were American Society of Anesthesiologists physical status 1 to 3. Each patient underwent general anesthesia with muscle relaxation and controlled ventilation of the lung. In the recovery room morphine was titrated according to a protocol until the patient was comfortable. Each patient then received a PCA device programmed to deliver morphine according to a standardized protocol (1 mg boluses, lockout interval of 10 minutes and 4 hour limit of 0.3 mg/kg). No background infusion was prescribed. The patient was given the PCA button when he or she was fit for discharge from the recovery room. Each patient was followed up at 24 and 48 hour after surgery. Pain was rated using an 11-point visual analogue scale where 0 = no pain and 10 = worst pain. It was scored for both at rest and on coughing. Patients was also asked to rate their satisfaction with pain control from 1 (very dissatisfied) to 10 (very satisfied). The number of PCA demands, deliveries of opioid, and total morphine consumption up to the time of assessment were recorded. DGR was calculated by dividing the number of successfully delivered

doses by the total number of attempts.

Results: There was no correlation between the DGR and VAS for pain at rest and on coughing at 24 and 48 hours. There was also no correlation between satisfaction score and DGR at the two specified time periods.

Conclusion: DGR is not an objective assessment of postoperative pain.

Keywords: Demand-Good ratio, Intravenous Patient controlled Analgesia

Various methods have been used to evaluate pain after surgery.¹⁻³ As pain is an individual experience influenced by physiological and emotional factors, self-reporting methods (e.g. visual analogue scales, verbal numerical rating scale, verbal descriptor scale and McGill Pain Questionnaire) are among the most reliable indicators of postoperative pain.² However, they are uni-dimensional and represent an oversimplification of patient's experience.

Objective pain assessment can serve as adjunct or alternative to the subjective rating. They are particularly useful for patients who are unable to communicate their sufferings effectively. These include patients who are at the extremes of age, severely ill and mentally impaired.

PCA devices are capable of recording and displaying the pattern of PCA usage. The demand/good ratio (DGR) is defined as the ratio of the number of PCA activation made by the patient to the number of successful PCA activation with actual analgesic delivery.⁴ Previous investigation suggested that DGR correlated with the severity of pain.⁴ Thus, a patient with less than ideal pain relief may make more unsuccessful requests for analgesia than those with little pain. Therefore, DGR may

¹FHKCA, FANZCA, Associate Consultant, Department of Anaesthesia, Caritas Medical Centre, ²FHKCA, FHKAM, FANZCA, Dip Pain Mgt (HKCA), MHA, Consultant and Chief of Service, Department of Anaesthesiology, Intensive Care and Operating Services, Alice Ho Mui Ling Nethersole Hospital; ³RN, B Sc, Pain Nurse, Prince of Wales Hospital
Address correspondence to: Dr Michael Poon, Department of Anaesthesia, Caritas Medical Centre, 111 Wing Hong Street, Shamshuipo, Kowloon, Email: pooncm@ha.org.hk

be used as an objective method of pain assessment when using PCA.

This prospective study evaluated the use of the DGR as a measure of pain and analgesic adequacy.

Materials and Methods

The study was approved by the Clinical Research Ethics Committee. Written informed consent was obtained from each patient. Eighty-six adult patients of American Society of Anesthesiologists physical status 1 to 3, scheduled for abdominal or pelvic operations with general anesthesia were recruited. Patients were excluded if were morbidly obese, unable to understand the use of PCA or had history of allergy to opioids. Patients were also excluded if they had a history of opioid abuse or had been taking regular analgesics in the 2 weeks prior to surgery or receiving epidural or spinal anesthesia or regional nerve block in conjunction with general anesthesia.

Patients were seen at the time of their preoperative anesthetic visit. They were educated on postoperative pain management using PCA by the pain team according to our routine clinical practice. All patients were familiarized with the use of the Graesby 3300 PCA pump (Graseby Medical, Watford, Herts, UK). Explanation was given on pain measurement using VAS, satisfaction scores. Patients were also instructed to report side effects of PCA in the postoperative period.

Each patient underwent general anesthesia with tracheal intubation, muscle relaxation and controlled lung ventilation. Intraoperative, opioids in the form of fentanyl and or morphine were titrated according to the patient's requirement as judged by the anesthetist-in-charge.

In the recovery room, nursing staff recorded pain with VAS. Pain were treated with morphine, titrated according to a recovery room protocol (1 mg intravenous boluses every five minutes as required, with a maximum of 5-10 mg) until the patients were comfortable. The PCA pump was programmed to deliver IV morphine of 1 mg boluses, lockout interval of 10 minutes and 4 hourly limits of 0.3 mg/kg

with no background infusion. PCA machine was connected to a dedicated intravenous cannula inserted in the forearm. Patients were given the PCA button when they were fit for discharge from the recovery room.

After returning to the ward, patients used PCA for pain relief according to the pre-operative instructions. Adjunct non-opioid analgesics were not prescribed. Antiemetics were administered to treat nausea and vomiting upon patient requests. At the end of the study period, all patients received oral analgesics when allowed. PCA was discontinued when deemed to be appropriate. Nursing observations were carried at hourly intervals for the first 12 hours, followed by 2 to 4 hourly intervals according to patients' condition. These were recorded in the pain observation chart. Verbal pain score (VPS) at rest was recorded using an 11-point scale with zero defined as no pain and 10 the worst pain imaginable. Nausea, vomiting, dizziness, and pruritis were categorized as none, mild (no treatment required), moderate (treatment needed) or severe (persisted despite treatment). Sedation was assessed according to a 4-point scale: 0 = no sedation, s = sleeping, 1 = drowsy but easy to arouse, 2 = drowsy and difficult to arouse, 3 = unarousable. Vital signs recorded included respiratory rate, arterial oxygen saturation, blood pressure and pulse rate. Patients were also asked to rate their satisfaction with pain control from 1 (very dissatisfied) to 10 (very satisfied). The history of PCA use was read from the machine. The number of PCA demands, deliveries of opioid, and total morphine consumption up to the time of assessment were recorded. DGR was calculated by dividing the number of successfully delivered doses by the total number of attempts. Analgesic regime and any changes in setting during the period of PCA use were also recorded. The acute pain team visited each patient twice daily until PCA were stopped. The study team collected data at 24 and 48 hours after discharge from the recovery room.

The acute pain team was also asked to assess any patient whose pain was not

controlled by the PCA. If adjuvant therapy or changes to the PCA settings were required, the patient was excluded from the study and recorded as a complication or violation of protocol. If a patient's respiratory rate fell below eight breaths per minute or a sedation score of 4 was recorded, naloxone was administered and the patient was withdrawn and counted as respiratory depression.

Data were analyzed using a computer statistical package, SPSS (SPSS, Inc., Chicago, IL). VAS at rest and during exertion were correlated with DGR using linear regression. A *P* value less than 0.05 was considered significant.

Results

Eighty-six patients, aged between 28-74 years, scheduled for abdominal surgery were recruited into the study. Their median age was 44. Fifteen patients were excluded because of cancellation of surgery or incomplete data. Of the 71 patients with complete data for analysis, there were 64 female and 7 male patients. None of the patients experienced severe complications related to the use of PCA.

Analgesic usage, patient satisfaction with PCA on day 1 and 2 after surgery are presented in Table 1. Postoperative side effects are summarized in Table 2.

At 24 hours after surgery, there were no correlation between DGR and VAS for pain at rest ($n=71$; Pearson correlation coefficient, $r=0.06$; $P=0.60$) and on coughing ($n=71$; $r=0.22$; $P=0.07$, Figure 1). There was no significant correlation between satisfaction score and DGR ($n=71$; $r=-0.04$; $P=0.77$).

48 hour later, there were also no significant correlation between DGR and VAS for pain at rest ($n=60$; $r=-0.17$; $P=0.19$) and on coughing ($n=60$; $r=-0.03$; $P=0.84$). We did not detect any significant correlation between satisfaction score and DGR at 48 h ($n=60$; $r=-0.08$; $P=0.54$).

Discussion

Patient makes demand according to his needs (pain, anxiety, etc). PCA device delivers according to the settings made by anesthetists and patient's demand. It has been postulated

Table 1. Patient demographic and acute pain service data Parameters

	Values
Female : Male	64:7
Age (years), median (range)	44 (28-74)
VAS pain score at rest, median (range)	
24h	2.5 (0-10)
48h	1.5 (0-8)
VAS pain score on coughing, median (range)	
24h	6 (0-10)
48h	4.7 (0-10)
VAS satisfaction score, median (range)	
24h	8 (4-10)
48h	8 (5-10)
Morphine consumption (mg), mean (SD)	27 (19.5)
24h	42.4 (30.3)
48h	
Demand/good ratio, mean (SD)	
24h	2 (1.0)
48h	1.8 (0.9)

Table 2. Number of patients with postoperative side effects

Side effects	None	Mild	Moderate	Severe
Nausea and vomiting				
24h	35	20	15	1
48h	56	9	6	0
Dizziness				
24h	35	31	5	0
48h	56	14	1	0
Pruritus				
24h	62	9	0	0
48h	68	3	0	0

that the pattern of analgesic used by a patient may provide useful information regarding his pain level or the adequacy of analgesia. This is not surprising considering the original concept of the PCA was designed as a research tool for objective measurement of pain.⁵ DGR recorded by PCA devices has been suggested to be a useful measure of pain because it correlated with VAS.^{4,6} This is based on the idea that patients make PCA demands in order to maintain an analgesic level above the mean analgesic level above the mean effective analgesic concentration (MEAC).

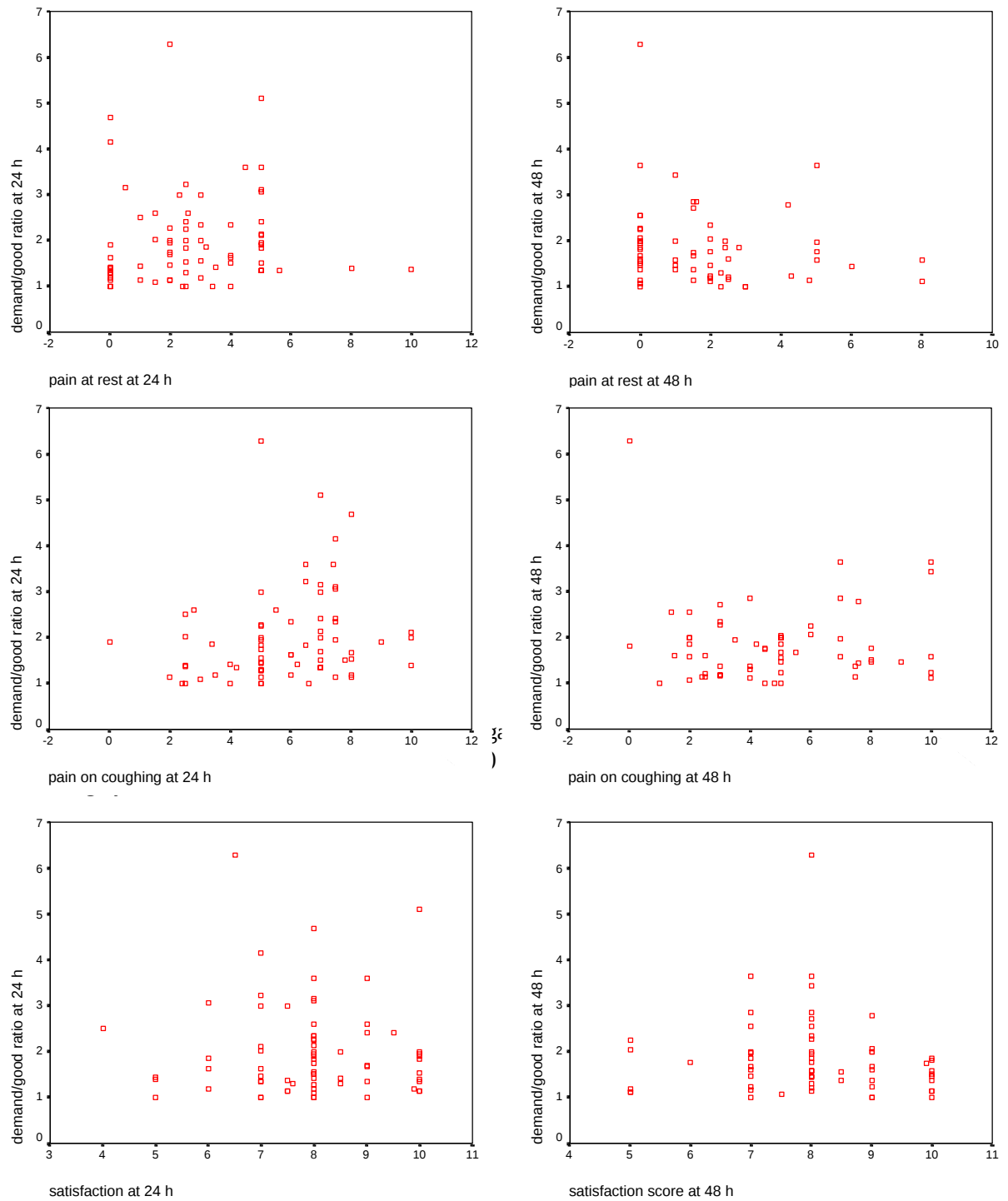


Figure 1. Scatter plot of demand/good ratio against cough at rest (top panels), on coughing (middle panels) and patient satisfaction (bottom panels) at 24 (left panels) and 48 (right panels) hours after surgery

Proponents argued that patients with less than ideal pain relief make frequent unsuccessful requests for analgesia during the lockout interval when drug was not delivered.⁴ Inadequate analgesia or pain should be associated with high DGR values.⁶ On the contrary, a low ratio suggests that the patients' demands were frequently met by drug delivery.

DGR is a variable almost always reported and discussed in clinical studies involving PCA. It has been used as indirect indicators of pain in a number of studies.⁶ It has several advantages over other pain measures. Measuring DGR is simple, quick to perform and is objective. DGR may be useful in pediatric patients, patients with language problems or patients in the intensive care units with their tracheas intubated. It measures the quality of analgesia over a period rather than a single measure at a point in time.⁶ It has also been claimed to be more sensitive than VAS.⁴

DGR as a measure of analgesia was evaluated in a study on the effects of background analgesic infusions in patients using PCA.⁴ In this study, 60 patients were treated with morphine following general surgery. They were allocated into three groups (1) no background infusion; (2) 1 mg/h or (3) 2 mg/h background infusion of morphine. Using regression analysis, the author reported significant correlation between with pain and DGR at both the 4 and 24 hours after surgery in all three groups ($P=0.0001$).⁴ This is also significant even adjusted for total analgesic consumption.⁴ However there has been no other study confirming these findings. On the contrary, there are reports suggested a lack of correlation between pain scores and DGR.^{6,7} In these studies, investigators evaluated the efficacy of additional IV morphine infusion to PCA in abdominal surgery. There was no difference in DGR between groups, despite a significant difference in VAS on movement and at rest.⁶

There are a number of reasons that may explain the disagreement. It has been suggested that patients make demands for various purposes.^{6,8} A demand may be made because postoperative pain was slowly becoming worse

and is now getting unacceptable. Alternatively, PCA button was pressed because the pain has suddenly worse (e.g. after coughing) or it may be pressed in anticipation of pain (e.g. from physiotherapy, wound dressing or a change of position). There is also evidence that some patients make PCA demand in response to time.⁸ With respect to PCA analgesic usage, a significant correlation between DGR and perioperative mood and emotional distress factors has been established.⁹ In general, preoperative depression, anxiety, irritability, anticipation of pain, and postoperative depression were significantly correlated with DGR.⁹ In particular, the degree of correlation was highest between DGR and ratings of postoperative depression.⁹ This suggests that patients with emotional distress were more likely to request higher dosage of analgesics, thus making more unsuccessful demands.⁹ On the other hand, patients who were clam and happy would report lower pain ratings and tended to use less PCA.⁹ These data suggested that patients use PCA not only for its analgesic properties, but also to assuage anxiety and mood.⁹ DGR and hourly analgesic use were unrelated to perceived support, locus of control, drug type, pain ratings, amount of time on PCA, or dissatisfaction with PCA.⁹

Poor understanding on the use of PCA may also affect the accuracy of DGR as a measurement of pain. In one audit on PCA morphine, the author noted that three patients misunderstood the PCA handset as a call button for nurses. We believe individual patient response introduces uncertainty in the assessment. DGR may not accurately reflecting the level of pain

Conflicting results may also due to the differences in methodology and patient population. Sample size may be too small to show a significant correlation. In this study, we correlate DGR with pain over two time points. It may be more relevant to establish correlation between DGR with a collective VAS over the same period of time. The VAS readings may be presented as a mean VAS measured at regular intervals (e.g. hourly) over the period examined. It has also been demonstrated in

most studies that DGR and VAS changes over time.⁶⁻⁸

In summary, although previous study had demonstrated a significant correlation between the DGR and the severity of pain, our data failed to reproduce the results. We concluded that DGR is not an objective assessment of postoperative pain.

Acknowledgement

We thank the nursing staff of recovery room, surgical and gynecology wards and all colleagues of the Department of Anaesthesia and Intensive Care of Prince of Wales Hospital for their help and cooperation during this study.

References

1. Ready LB, Edwards WT, eds. *Management of acute pain: a practical guide*. International Association of Study of Pain Publications, 1992:4-5.
2. Principles of acute pain assessment and management. In: *Acute pain management: scientific evidence*. National Health and Medical Research Council, 1998:11-19.
3. Macintyre PE, Ready LB. Acute pain - significance and assessment. In: Macintyre PE, Ready LB. *Acute Pain Management: A Practical Guide*. London: WB Saunders, 1996:1-12.
4. McCoy EP, Furness G, Wright PMC. Patient-controlled analgesia with and without background infusion. Analgesia assessed using the demand: delivery ratio. *Anaesthesia* 1993;48:256-65.
5. Tsui SL, Tong WN, Irwin M, Ng KFJ, Lo JR, Chan WS, Yang J. The efficacy, applicability and side effects of postoperative intravenous patient controlled morphine analgesia: an audit of 1233 Chinese patients. *Anaesth Intensive Care* 1996;24:658-64.
6. Dawson PJ, Libreri FC, Jones DJ, Libreri G, Bjorkstein AR, Royse CF. The efficacy of adding a continuous intravenous morphine infusion to patient-controlled analgesia (PCA) in abdominal surgery. *Anaesth Intensive Care* 1995;23:453-8.
7. Ginsberg B, Gil KM, Muir M, Sullivan F, Williams DA, Glass PSA. The influence of lockout intervals and drug selection on patient-controlled analgesia following gynecological surgery. *Pain* 1995;62:95-100.
8. Owen H, Kluger MT, Plummer JL. Variables of patient-controlled analgesia: the relevance of bolus dose size to a background infusion. *Anaesthesia* 1990;45:619-22.
9. Jamison RN, Taft K, O'Hara J, Ferrante FM. Psychosocial and pharmacologic predictors of satisfaction with intravenous patient controlled analgesia. *Anesth Analg* 1993;77:121-5.

Prevalence of Post-Anesthetic Complications

¹Chi Hung KOO, ²Chi Tim HUNG, ³ Kin Wai CHAN, ⁴Edmond Kin Nam CHUNG, ⁵Kim Ching LUI, ⁶Vincent Wing Kong NG, ⁷ Ling Dione SZETO, ⁸ Song Tuen TAN, ⁹Steven Ho Shan WONG and ¹⁰Fung Yi YICK

Department of Anaesthesiology, Queen Elizabeth Hospital, Hong Kong

Background: Most studies on postanesthetic outcome investigated only one aspect of anesthetic complications. This study aimed to look at the spectrum of complications and identify markers for postoperative complication.

Methods: This is a prospective observational survey. Patients on the elective and emergency lists of a tertiary hospital were recruited to the study over a period of 4 weeks. Relevant pre-operative data were collected. Each patient was interviewed by one of the investigators daily for the first 3 consecutive postoperative days. During each visit, patients were asked a set of standard questions and reported ratings of parameters related to anesthesia, cardiovascular, respiratory, neurological, renal and hematological complications. The follow up stopped when patient was discharged home, transferred to another hospital or died.

Results: 1,120 forms were collected and 912 patients were followed up during the four week period. Half of the patients had at least one significant pre-existing medical problem. General anesthesia with or without regional block (82.4%) is the main anesthetic technique. Intraoperative and/or recovery room problems occurred in less

than 10% of the cases. Fifteen percent of the patients received acute pain management after their surgery. The incidence of minor complications in the postoperative period (such as sore throat, postoperative nausea and vomiting, wound pain, muscle pain, pruritus, dizziness, headache) was comparable to that reported in literature. The severity of minor complications decreased with time. Pre-existing medical problems were significantly associated with potentially life threatening complications. The overall mortality rate was 1%. None of them related to anesthetic mishaps.

Conclusions: We may not be able to follow up all patients who had an anesthetic due to resources constraints. However, patients with co-existing medical problems and intraoperative adverse events are at risk of postoperative complications. These patients should be followed up for timely interventions.

Most studies on postanesthetic outcome investigated only one aspect of anesthetic complications (e.g. postoperative nausea and vomiting, adequacy of pain control).^{2-9,14,15,17,19,25,28,32-35} Few studies investigate the whole spectrum of anesthesia-related complications in the postoperative period for in-hospital,^{16,18,23,24,27,29,30} and day surgery patients.¹¹⁻¹³

The Hong Kong College of Anaesthesiologists²⁰ and the Australian and New Zealand College of Anaesthetists²¹ require trainees to follow up their patients after anesthesia, as part of the anesthetic training. This type of follow up will also detect early complications, facilitate doctor-patient relationship and improve the image of the specialty. This study aimed to look at the spectrum of complications and identify potential markers for postoperative complications.

¹MBBS, FANZCA, FHKCA, FHKAM (Anaesthesiology), Senior Medical Officer; ²MBBS, FANZCA, FHKCA, FHKAM (Anaesthesiology), Consultant and Chief of Service; ³MBBS, FANZCA, FHKCA, FHKAM (Anaesthesiology), Medical Officer; ⁴MBBS, FHKCA, FHKAM (Anaesthesiology), Associate Consultant; ⁵MBBS, FHKCA, FHKAM (Anaesthesiology), Senior Medical Officer; ⁶MBBS, Medical Officer; ⁷MBBS, FHKCA, FHKAM (Anaesthesiology), Associate Consultant; ⁸MB BS, FRCA, FHKCA, FHKAM (Anaesthesiology) Senior Medical Officer; ⁹MBBS, FANZCA, FHKCA, FHKAM (Anaesthesiology), Senior Medical Officer; ¹⁰MBBS, FHKCA, FHKAM (Anaesthesiology), Associate Consultant. Current address for Drs KW Chan and FY Yick, Princess Margaret Hospital; Dr Edmond Chung, North District Hospital, Dr LD Szeto, Tseung Kwan O Hospital,

Address correspondence to: Dr CH Koo, Department of Anaesthesiology, Queen Elizabeth Hospital, 30 Gascoigne Road, Kowloon, Hong Kong, Email at kooch@hutchcity.com

Methods and Materials

This is a prospective observational survey. Approval was obtained from the Hospital Ethics Committee. Every patient on the elective and emergency lists was recruited over a period of 4 weeks. Day surgery patients, patients receiving anesthetics outside of operating theatre and those receiving local anesthesia but requiring anesthetist standby were excluded.

The attending anesthetists were responsible for completing the case report form. Relevant preoperative data were collected. The information included patient demographics, operating surgical specialties, magnitude of the operation,¹ pre-existing medical problems, Goldman cardiac risk index (GCRI),¹⁵ previous anesthetic problems, current medications, surgical diagnosis and operation(s) performed, experience of the anesthetists, anesthetic techniques and types of anesthetic drugs used. Intraoperative and recovery room problems, blood loss and types of postoperative acute pain management were also recorded.

Every investigator was given a guideline on the definition of the parameters to be collected. Patients were interviewed by one of the investigators daily for 3 consecutive days. Verbal consent was obtained from the patient during the first interview in the ward.

At each visit, patients were asked to complete a set of standard questions and to rate a number of parameters by visual analog scale.

A total of 25 parameters were recorded each day. For patients with GCRI > 13, daily electrocardiograms (ECG) and serum cardiac enzyme levels were checked during the follow up.

Follow up was terminated if the patient was discharged home or transferred to a convalescent ward or another hospital or had died.

Technique of analysis

Postoperative anesthetic related complications were arbitrarily divided into 3 categories according to their likelihood of harm (Table 1).

In the analysis of minor complications, we did not assume absence of complication in patients who were discharged within 24 hours or lost to follow up. Therefore, the incidence of minor complication was calculated based on the number of patients that were successfully interviewed. However, we assumed that life threatening complications were absent if a patient was discharged within 24 hours or lost to follow up because they would not have been discharged if these complications were present.

We compare parametric data with analysis of variance and nonparametric data by χ^2 test. Multiple logistic regressions were used to detect the contribution of various co-existing medical conditions to the development of postoperative complications. Statistical significance was taken as $P < 0.05$.

Table 1. Classification of postoperative complications

Category	Category 1	Category 2	Category 3
Definition	Minor and low potential of life threatening complications	Potential life threatening complications	Severe life threatening complications
Examples	Sore throat Nausea Vomiting Wound pain Muscle Pain Dizziness Pruritus Headache Urinary retention Post Dural Puncture Headache Anesthesia-related neurological complications	Electrolyte disturbance Hypotension Hypertension New arrhythmia Deep vein thrombus Prolonged intubation and ventilation Respiratory depression Awareness Stroke Confusion	Coagulopathy Acute Renal Failure Acute Myocardial Infarction Cardiac arrest Congestive Heart Failure Aspiration Pulmonary embolism Respiratory failure requiring intubation

Results

The study was conducted for 4 weeks. 1,120 follow up forms were collected. Among those 1,057 patients had 1 anesthetic, 26 patients had 2 anesthetics and 4 patients had 3 anesthetics during the study period. 912 follow ups (81.4%) were done. The rest of the patients were discharged within 24 hours after anesthesia.

Patient characteristics

Age and sex distribution are shown in Table 2. The mean ($\pm$ standard deviation) age was 48 ($\pm$ 21) years. There were more female than male patients in the 21-40 years range. The ratio was reversed in the 61-80 year range. We performed more elective (65.3 %) than emergency cases (34.7%).

Forty-six percent of the patients had at least one pre-existing medical problem. Anemia was the most common one, followed by hypertension, hyponatraemia and diabetes mellitus. The prevalence of diabetes mellitus in this cohort of surgical patients was similar to that of the general medical population.²²

Twenty-nine patients with difficult airways were identified during preoperative assessment and 9 difficult intubations were encountered during induction of anesthesia. The anesthetic techniques and drugs used are shown in Table 3. For general anesthesia, intravenous induction (90%) was the most common technique. About 22% of the patients had central neural blockade either as the sole anesthetic technique or as an adjunct to general anesthesia. Of all the intravenous induction agents, propofol was the induction agent of choice (48%). Isoflurane (92%) was commonly used for maintenance of anesthesia. Suxamethonium was used in 23% of the elective cases and 58% of the emergency cases. The incidence was low in emergency cases because we used laryngeal mask airway in semi-urgent procedures.

Recovery room management

Almost 8% of the cases encountered at least one intraoperative or recovery room problems. Cardiovascular complications (37.2%) such as arrhythmia and hypotension were most

commonly reported. This was followed by problems associated with regional anesthesia (16.2%), and airway or respiratory problems (13.9%).

Most patients (57.2%) stayed in the recovery room for approximately 30 minutes before discharge to the ward. Six patients (0.5%) had recovery stay of more than 2 hours due to postoperative pain, respiratory complications and administrative problems. Nine percent of the patients did not go through the recovery room because they were transferred to ward immediately after surgery.

Acute pain management was provided to 15.3 % of the patients after surgery. The most common technique was intravenous patient controlled analgesia (48.2%), followed by epidural opioids (40%). The rest were epidural infusion of local anaesthetics and opioids (9.4%) and intrathecal opioids (2.3%).

Postoperative complications

The number of patients complained of minor complications (sore throat, postoperative nausea and vomiting, wound pain, muscle pain; pruritus; dizziness; headache) during the first 3 postoperative day is shown in Table 4. The severity decreased with time. However, for patients who received acute pain management, the severity of wound pain increased after the analgesic technique was taken off, especially during movement.

Blood transfusion was required in 7.4% of the patients. Most blood transfusions were given on the first postoperative day. The median requirement was 2 units. The reasons included ongoing blood loss ($n=38$), hypotension ($n=11$), inadequate intraoperative transfusion ($n=15$). Twenty patients had co-existing coagulopathy ($n=19$) and gastrointestinal bleeding ($n=1$).

Incidence of major complications is summarized in Table 5. Nine patients (0.8%) had myocardial infarction (with typical changes in ECG and plasma troponin I concentration). Three of these patients died. The incidence of major myocardial events for patients who had intermediate and major surgery was 1.06% and 0.93%, respectively.

Table 2 Characteristics of the patients

<i>Age group</i>	Male	Female
0-10	52	15
11-20	24	24
21-30	37	86
31-40	50	151
41-50	76	81
51-60	58	48
61-70	117	68
71-80	84	56
81-90	25	29
>90	0	6
<i>ASA Status</i>	Elective	Emergency
I	264	161
II	347	127
III	112	74
IV	8	26
V	0	1
<i>Goldman Cardiac Risk Index</i>		
Class I	849	
Class II	238	
Class III	33	
Class IV	0	
<i>Prevalence of co-existing medical problems (no. of patients)</i>		
Central Nervous System and neuromuscular problems (61)		
Cerebrovascular Accident	21	Dementia 4
Epilepsy	9	Parkinsonism 6
Psychiatric disease	9	Mental retardation 3
Muscular dystrophy	0	Malignant hyperthermia 0
Cardiovascular problems (133)		
Arrhythmia	40	Cardiogenic shock 6
Congestive heart failure	14	Hypertension 172
Ischaemic heart disease	67	Previous myocardial infarction 15
Valvular heart disease	20	Dilated cardiomyopathy 1
Respiratory and airway problems (99)		
Asthma	15	Chronic obstructive pulmonary disease 32
Pleural effusion	3	Pneumonia 6
Prior ventilation	18	Pneumothorax 1
Anticipated difficult airway	29	
Endocrine problems (125)		
Adrenal disease	2	Diabetes mellitis 83
Hyperthyroid	8	Hypothyroid 6
Pituitary disease	3	Obesity 25
Renal problems (33)		
Acute renal failure	8	Chronic renal failure 23
nephrotic syndrome	1	Glomerulonephritis 1
Haematological problems (220)		
Anemia	195	Coagulopathy 14
History of deep vein thrombosis	2	Chronic myeloid leukemia 1
Thalassemia	4	Thrombocytopenia 38
Connective Tissue Disease - rheumatoid arthritis and systemic lupus erythematosus (14)		

Table 3. Characteristics of surgical procedures and anesthesia techniques used

	Number	%
Specialty		
Cardiothoracic	59	5.27%
Dental, ENT , ophthalmic surgery	92	8.22%
General and pediatric surgery	429	38.31%
Obstetrics and gynecology	259	23.13%
Neurosurgery	38	3.39%
Orthopedics	234	20.89%
<i>Note: Only specialties with more than 30 patients in the study period are presented</i>		
Magnitude of operations		
Minor	190	
Intermediate	283	
Major	647	
Duration of operation		
0-30 min	215	
31-60 min	262	
61-120 min	373	
121-180 min	137	
>180 min	133	
Anesthetic technique	Number	%
General anesthesia	827	73.8%
General + epidural anesthesia	59	5.3%
General anesthesia + nerve block	37	3.3%
Epidural anesthesia	10	0.9%
Spinal anesthesia	135	12%
Combined spinal and epidural anesthesia	44	3.9%
Nerve blocks (including plexus block) only	8	0.7%
General anesthesia induction technique		
Intravenous	833	
Inhalational	71	
Intravenous induction agent for general anesthesia		
Thiopentone	336	
Propofol	381	
High dose fentanyl	8	
Etomidate	55	
Ketamine	7	
Volatile agents used during GA		
Enflurane	16	
Halothane	7	
Isoflurane	792	
Sevoflurane	43	
Combination	43	
Use of suxamethonium at induction of GA		
Elective operation	134	
Emergency operation	191	
Airway Management		
Endotracheal tube (single lumen)	596	
Laryngeal mask	203	
Face mask	71	
Double lumen endobronchial tube	37	
Tracheostomy	10	
Tubeless technique	7	

Table 4. Incidence and severity of minor complications in the first 3 postoperative days

	None	Mild	Moderate	Severe	mean (SD)
Day 1					
Sore Throat	598 (73.3%)	154 (18.9%)	44 (5.4%)	20 (2.4%)	0.89 (1.76)
Nausea	688 (84.2%)	83 (10.2%)	29 (3.6%)	16 (2%)	0.55 (1.48)
Vomiting	655 (80.2%)	105 (12.9%)	38 (4.7%)	18 (2.2%)	0.52 (1.47)
Wound Pain	265 (32.5%)	316 (38.8%)	165 (20.3%)	68 (8.4%)	2.61 (2.44)
Muscle Pain	749 (91.7%)	39 (4.8%)	21 (2.6%)	7 (0.9%)	0.3 (1.12)
Dizziness	697 (85.4%)	80 (9.8%)	29 (3.6%)	10 (1.2%)	0.49 (1.39)
Pruritus	741 (90.8%)	44 (5.4%)	23 (2.8%)	8 (1%)	0.33 (1.21)
Headache	743 (91%)	56 (6.9%)	12 (1.5%)	5 (0.6%)	0.28 (1.04)
Day 2					
Sore Throat	569 (83.6%)	99 (14.5%)	12 (1.8%)	1 (0.1%)	0.37 (0.97)
Nausea	631 (92.7%)	36 (5.3%)	13 (1.9%)	1 (0.1%)	0.21 (0.86)
Vomiting	651 (95.6%)	23 (3.4%)	5 (0.7%)	2 (0.3%)	0.08 (0.47)
Wound Pain	226 (33.5%)	297 (43.9%)	121 (17.9%)	32 (4.7%)	2.23 (2.18)
Muscle Pain	636 (93.35%)	32 (4.7%)	12 (1.8%)	1 (0.15%)	0.21 (0.88)
Dizziness	609 (89.45%)	51 (7.5%)	20 (2.9%)	1 (0.15%)	0.3 (1.02)
Pruritus	644 (94.55%)	26 (3.8%)	10 (1.5%)	1 (0.15%)	0.17 (0.78)
Headache	640 (94%)	31 (4.6%)	7 (1%)	3 (0.4%)	0.18 (0.85)
Day 3					
Sore Throat	538 (92%)	46 (7.8%)	1 (0.2%)	0 (0%)	0.16 (0.59)
Nausea	556 (95.1%)	26 (4.4%)	2 (0.3%)	1 (0.2%)	0.12 (0.62)
Vomiting	569 (97.3%)	13 (2.2%)	2 (0.3%)	1 (0.2%)	0.05 (0.43)
Wound Pain	227 (40%)	259 (45.7%)	64 (11.3%)	17 (3%)	1.77 (1.95)
Muscle Pain	565 (96.6%)	16 (2.7%)	4 (0.7%)	0 (0%)	0.09 (0.52)
Dizziness	533 (91.1%)	40 (6.8%)	12 (2.1%)	0 (0%)	0.25 (0.87)
Pruritus	563 (96.23%)	13 (2.2%)	8 (1.4%)	1 (0.17%)	0.13 (0.72)
Headache	556 (95.1%)	24 (4.1%)	3 (0.5%)	2 (0.3%)	0.14 (0.72)

The reasons for patients with prolonged mechanical ventilation were major operation, poor premorbid conditions, massive intraoperative bleeding and hemodynamic instability.

Of all patients who received major regional block, one patient required blood patch for post-dural puncture headache. A total of 10 patients were diagnosed to have neurological complications after anesthesia. Five of these were anesthetic related such as numbness or paraesthesia. All of them recovered spontaneously during subsequent follow up. The rest were surgically related complications.

The number of patients who required unexpected intensive care unit admission during the first 3 postoperative days was 29, 0 and 1, respectively. The reasons for their admission included severe intraoperative hemorrhage requiring massive blood products transfusion and postoperative respiratory failure.

The outcome of patients is shown in Table 6. Eleven patients (1%) died in our survey. The causes of death were myocardial infarction, severe sepsis and multi-organ failure. There was no postoperative mortality related to anesthesia.

Table 5. Incidence of major complications during the first three postoperative days

	Day 1	Day 2	Day 3
Cardiovascular complications			
Hypotension	34	21	11
Hypertension	25	17	11
New cardiac arrhythmia	10	9	6
Congestive heart failure	4	4	3
Acute myocardial infarction	4	7	7
Cardiac arrest	3	4	5
Thrombembolism	0	0	0
Respiratory complications			
Respiratory failure	6	2	3
Still on ventilator	61	38	30
Pulmonary aspiration	3	3	2
Neurological complications			
Post dural puncture headache	2	1	1
Nerve injuries	5	4	6
Awareness	0	0	0
Stroke	0	0	0
Confusion	9	11	11
Renal complications			
Urinary retention	25	22	14
Catheter in-situ	340	168	112
Acute renal failure	13	6	3
Hematological complications			
Coagulopathy	34	22	13

Table 6. Outcome of the patients

	Discharged		Died
	Home	Other hospital	
Day 1	162	18	3
Day 2	186	16	3
Day 3	90	17	5
Total	438	51	11

Table 7. Patient's assessment for their experiences with anesthesia

	Number	%
Excellent	60	9.1%
Good	429	64.9%
Acceptable	122	18.5%
Fair	34	5.1%
Poor	1	0.15%
Don't know	15	2.3%
Total	661	100%

Patient's assessment of anesthetic service is shown in Table 7. Although 912 follow-ups were done, only 661 responses (72.5%) were obtained. One patient rated her anesthetic as poor because she had dizziness, nausea and headache.

Statistical associations

The occurrence of adverse postoperative events were associated with American Society of Anesthesiologists (ASA) physical status, increasing age, emergency surgery, pre-existing medical problems, long operating time, major surgery, high GCRI score, increased blood loss, blood transfusion and presence of intraoperative cardiovascular problems (Table 8).

Discussion

Shortcomings

In this survey, patients were followed for 3 days as opposed to other studies which are

usually up to 28 days. Some of the postoperative complications (such as respiratory, cardiovascular, thromboembolism or neurological complications) may be missed since they may present late.

It is assumed that patients who were discharged within 24 hours do not have any anesthetic related complications. This may be true for category 2 and 3 complications but it is incorrect for category 1 complications.

The method of detecting postoperative myocardial ischemia by daily ECG and cardiac enzymes in high risk patients may be too crude to reveal the true incidence of silent ischemia.

An interesting observation during the study period was that the number of critical incidents reported to the departmental quality assurance committee in the form of anonymous reports was fewer than what had happened. It was estimated that less than half of the critical incidents were reported. This is similar to what was found by Findlay's study.¹⁰

Table 8. Univariate predictors of postoperative complications.

	Postoperative complication		
	Category 1	Category 2	Category 3
American Society Anesthesiologists physical status	<0.001	<0.01	<0.01
Age	0.003	<0.01	0.001
Emergency	0.29	<0.01	<0.01
Pre-existing conditions			
Preexisting neurologic diseases	0.13	<0.01	0.30
Preexisting cardiac diseases	<0.01	<0.01	<0.01
History of ischemic heart disease	0.006	<0.01	0.05
History of hypertension	0.73	<0.01	0.01
History of congestive heart failure	0.046	<0.01	0.001
History of myocardial infarction	0.29	0.001	0.025
Preoperative shock	0.31	0.02	<0.01
Preexisting respiratory diseases	0.007	<0.01	<0.01
History of obstructive airway disease	0.86	0.03	0.26
History of difficult airway	0.20	0.004	0.15
Abnormal preoperative electrolytes	<0.01	<0.01	<0.01
Preexisting endocrine diseases	0.34	<0.01	0.68
History of diabetes mellitus	0.13	<0.01	0.84
History of thyroid disease	0.56	0.85	0.58
Obesity	0.82	0.06	0.05
Preexisting renal diseases	0.01	<0.01	<0.01
Preexisting hematological abnormalities	0.90	<0.01	<0.01
Preoperative anemia	0.79	<0.01	<0.01
Preoperative coagulopathy	0.002	<0.01	<0.01
Preoperative thrombocytopaenia	0.31	<0.01	<0.01
Pregnancy	0.002	<0.01	0.13
Trauma	0.54	0.73	0.39
Preoperative Infection	0.15	<0.01	<0.01
Previous anesthetic problems	0.69	0.005	<0.01
Presence of any preoperative problems	0.001	<0.01	<0.01
Goldman cardiac risk index	0.093	<0.01	<0.01
Operation category	0.007	<0.01	<0.01
Major operation	0.002	<0.01	0.02
General Anesthesia	0.48	0.87	0.02
Induction method	0.02	<0.01	<0.01
Induction agent	0.06	<0.01	<0.01
Propofol	0.22	<0.01	<0.01
Use of opioids	0.27	0.04	0.001
Volatile agents	0.05	0.86	0.10
Use of suxamethonium	0.33	0.001	0.006
Airway type	0.16	<0.01	<0.01
Use of endotracheal tube	0.04	<0.01	<0.01
Use of laryngeal mask	0.09	0.19	0.003
Presence of Intraoperative problems	0.005	<0.01	<0.01
Intraoperative bronchospasm	0.40	0.37	0.06
Difficult intubation on induction	0.15	0.12	0.20
Intraoperative hypotension	0.15	<0.01	<0.01
Intraoperative hypertension	0.83	0.006	0.01
Intraoperative arrhythmia	0.004	0.0062	<0.01
Intraoperative/recovery room hypoxaemia	0.13	<0.01	<0.01
Accidental dural puncture	0.46	0.23	0.69
Use of acute pain service	<0.01	0.55	0.04
Type of acute pain service	0.18	0.03	0.63
Intraoperative blood transfusion	0.60	<0.01	<0.01
Blood loss	0.02	<0.01	<0.01
Colloid use	0.09	<0.01	<0.01
Operation time	0.12	<0.01	<0.01
Duration of recovery room stay	0.05	0.49	0.01

Compare with other studies

Tiret *et al* found that 4 preoperative factors (ASA physical status, age, magnitude and type of surgery) were significantly associated with the occurrence of complications. We observed similar findings.²³

Do we need to follow up all the patients after general anesthesia?

From this study, it is still difficult to answer this question. Although most minor complications (e.g. sore throat and dizziness as well as nausea and vomiting) resolved with time, it is these minor complications that patients disliked most. However, for patients who have undergone intermediate or major procedures with pre-existing medical problems or with intraoperative or recovery room problems, they had a high risk of developing major complications.

It is important for the anesthesiologists to know which co-existing medical problems or intraoperative adverse events predict the development of postoperative complications so that patient can be informed of the risk and optimized before operation. It is also possible to prevent the occurrence of those adverse events in the postoperative period with appropriate prophylactic measures.

Conclusion

Pre-existing medical problems is associated increased risk of development of postoperative medical and anesthetic complications. Most local and international anesthetic colleges recommend their fellows and trainees to follow up patients who had anesthesia at least once in the postoperative period. Our study found that high risk patients should be followed up in order to detect early and late complications.

Acknowledgement

We thank all the staff of the Department of Anaesthesiology, Queen Elizabeth Hospital for their invaluable support in helping me to collect the data.

References

1. Hong Kong Government GAZETTE No.44/1996 pp.D5473-95

2. Lawrence VA, Dhanda R, Hilsenbeck SG, Page CP. Risk of pulmonary complications after elective abdominal surgery. *Chest* 1996;110:744-50.
3. Larsen SF, Zaric D, Boysen G. Postoperative cerebrovascular accidents in general surgery. *Acta Anaesthesiol Scand* 1988;32:698-701
4. Sinclair DR, Chung F, Mezei G. Can postoperative nausea and vomiting be predicted? *Anesthesiology* 1999; 91:109-18
5. Ballantyne JC, Loach AB, Carr DB. Itching after epidural and spinal opiates. *Pain* 1988;33:149-60.
6. Moller JT, Cluitmans P, Rasmussen LS, *et al*. Long-term postoperative cognitive dysfunction in the elderly: ISPOCDI study. *Lancet* 1998;351:851-61.
7. Howell SJ, Sear YM, Yeates D, Goldacre M, Sear JW, Foex P. Risk factors for cardiovascular death after elective surgery under general anaesthesia. *Br J Anaesth* 1998;80:14-9.
8. Carson JL, Duff A, Berlin JA, *et al*. Perioperative blood transfusion and postoperative mortality. *JAMA* 1998;279: 199-205.
9. Seppo O-VR, Laurila R, Saario J, Melkkila T, Hynynen M. Awareness with recall during general anaesthesia: incidence and risk factors. *Anesth Analg* 1998;86: 1084-9.
10. Findlay GP, Spittal MJ, Radcliffe JJ. The recognition of critical incidents: quantification of monitor effectiveness. *Anaesthesia* 1998; 53: 589-603.
11. Chung F, Mezei G. Adverse outcomes in ambulatory anesthesia. *Can J Anesth* 1999; 46:R18-26.
12. Marshall S, Chung F. Discharge criteria and complications after ambulatory surgery. *Anesth Analg* 1999;88:508-17.
13. Chung F., Mezei G., Tong D. Pre-existing medical conditions as predictors of adverse events in day-case surgery. *Br J Anaesth* 1999;83:262-70.
14. Dodds C., Allison J., Postoperative cognitive deficit in the elderly surgical patient. *Br J Anaesth* 1998;81:449-62.
15. Goldman L., Caldera DL, Nussbaum SR, *et al*. Multifactorial index of cardiac risk in

- noncardiac surgical procedures. *N Engl J Med* 1977;297:845-50.
16. Pedersen T. Complications and death following anaesthesia: A prospective study with special reference to the influence of patient, anaesthesia, and surgery-related risk factors. *Dan Med Bull* 1994;41:319-30.
 17. Detsky AS, Abrams HB, Forbath N, *et al.* Cardiac assessment for patients undergoing noncardiac surgery: a multifactorial clinical risk index. *Arch Intern Med* 1986;146:2131-4.
 18. Pedersen T, Eliassen K, Henriksen E. A prospective study of mortality associated with anaesthesia and surgery: risk indicators of mortality in hospital. *Acta Anaesthesiol Scand* 1990, 34(3):176-82
 19. Pedersen T, Eliassen K, Henriksen E. A prospective study of risk factors and cardiopulmonary complications associated with anaesthesia and surgery: risk indicators of cardiopulmonary morbidity. *Acta Anaesthesiol Scand* 1990;34:144-55.
 20. Guidelines on Quality Assurance. Hong Kong College of Anaesthesiologists
 21. Quality Assurance (Policy Document E9). Australian and New Zealand College of Anaesthetists.
 22. Chan JCN. Heterogeneity of Diabetes Mellitus in the Hong Kong Chinese Population. *HKMJ* 2000;6:77-84.
 23. Tired L, Hatton F, Desmonts JM, Vourc'h G. Prediction of outcome of anaesthesia in patients over 40 years: A Multifactorial Risk Index. *Stat Med* 1988;7:947-54.
 24. Tired L, Hatton F, Desmonts JM, Vourc'h G. Complications associated with anaesthesia: a prospective survey in France. *Can Anaesth Soc J* 1986;33:336-4.
 25. Cohen MM, Duncan PG. Physical status score and trends in anaesthetic complications. *J Clin Epidemiol* 1988;41:83-9.
 26. Cohen MM, Duncan PG, Tate RB. Does anaesthesia contribute to operative mortality? *JAMA* 1988;160:2859-63.
 27. Farrow SC, Fowkes FG, Lunn JN, Robertson IB, Sweetnam P. Epidemiology in anaesthesia: a method for predicting hospital mortality. *European Journal of Anaesthesiology* 1984;1:77-84.
 28. Mangano DT. Perioperative Cardiac Morbidity. *Anesthesiology* 1990;72:153-184
 29. Cohen MM, Duncan PG, Tweed WA, Biehl DB, Pope WDB, Perry M, Merchant RN. The Canadian four-centre study of anaesthetic outcomes: I. Description of methods and populations. *Can J Anaesth* 1992;39:420-9
 30. Duncan PG, Cohen MM, Tweed WA, Biehl DB, Pope WDB, Merchant RN, DeBoer D. The Canadian four-centre study of anaesthetic outcomes: III. Are anaesthetic complications predictable in day surgical practice? *Can J Anaesth* 1992;39:440-8
 31. Forrest JB, Rehder K, Cahalan MK, Goldsmith CH. Multicenter study of general anesthesia. III. predictors of severe perioperative adverse outcomes. *Anesthesiology* 1992;76:3-11.
 32. Bromage PR. Neurological complications of subarachnoid and epidural anaesthesia. *Acta Anaesthesiol Scand* 1997;41:439-44.
 33. Lybecker H, Djernes M, Schmidt JF. Postdural puncture headache: Onset, duration, severity, and associated symptoms. An analysis of 75 consecutive patients with PDPH. *Acta Anaesthesiol Scand* 1995;39:605-12.
 34. Prause G, Comenda R, Pierer G, Smolle-Juttner F, Glanzer H, Smolle J. Can ASA grade or Goldman's cardiac risk index predict peri-operative mortality? *Anaesthesia* 1997;52:203-6.
 35. Charlson ME, MacKenzie CR, Ales K, Gold JP, Fairclough G, Shires GT. Surveillance for postoperative myocardial infarction after noncardiac operations. *Surg Gynecol Obstet* 1988;167:407-14.

Randomized, double-blind comparison of fentanyl, morphine or placebo for laryngeal mask airway insertion

¹Ming Chi CHU, ²Vivian YN CHEUNG and ³Eddy WS CHEAM

Department of Anaesthesia and Intensive Care, The Chinese University of Hong Kong, Prince of Wales Hospital, Hong Kong Special Administrative Region

Abstract

Introduction: The objective of this study was to determine whether the addition of either fentanyl or morphine to propofol improved conditions for laryngeal mask airway insertion during induction of anesthesia.

Methods: Ninety patients received, in a randomized double-blind fashion, either, fentanyl 1 µg/kg, morphine 0.1 mg/kg or sodium chloride 0.9%, followed by propofol 2.5 mg/kg. A laryngeal mask airway was inserted 90 s after administration of the study drug.

Results: The laryngeal mask airway was successfully inserted and correctly positioned in 93%, 90% and 80% of patients in the fentanyl, morphine and placebo groups, respectively (non-significant). Fentanyl significantly reduces swallowing and head or limb movements during laryngeal mask airway insertion but the duration of apnea (mean ± SD) in the fentanyl group (78 ± 62)s was greater than that in the morphine (34 ± 26)s or placebo (37 ± 27)s groups ($P=0.001$). The incidence of postoperative sore throat, hoarseness or earache was similar in all three groups.

Conclusions: We conclude that the addition of fentanyl 1 µg/kg during induction of anesthesia improves conditions for laryngeal mask airway insertion but also increases the duration of apnea. We were unable to show that the addition of morphine 0.1 mg/kg to propofol improved conditions for laryngeal mask airway insertion.

Keywords Equipment, laryngeal mask airway; Analgesics, fentanyl, morphine

Introduction

The laryngeal mask airway (LMA) provides a clear airway in spontaneously breathing patients under anesthesia. Insertion of the LMA requires sufficient depth of anesthesia to avoid complications such as gagging, coughing or laryngospasm. Propofol 2.5-3 mg/kg is the induction agent of choice for LMA insertion.¹

Opioids are frequently given with intravenous anesthetics during induction of anesthesia. Their central depressant effects reduce the gag, cough and airway protective reflexes. It is our clinical impression that the addition of an opioid, such as fentanyl, to propofol during induction of anesthesia improved conditions for LMA insertion although published data is lacking. Morphine is another opioid frequently used at induction of anesthesia. It has a slower onset of action²⁻⁵ but provides a longer duration of analgesia in commonly recommended dosages compared with fentanyl.^{2,3,5} The longer duration of action of morphine may be desirable for extending analgesia into the postoperative period. We postulate that the addition of morphine to propofol during induction may also improve conditions for LMA insertion. In this randomized double-blind study, we compared the use of fentanyl, morphine or placebo for LMA insertion following induction of anesthesia with propofol.

Methods

This study was approved by the University Clinical Research Ethics Committee. Written informed consent was obtained from all patients. We recruited patients, aged 18 to 65 and of American Society of Anesthesiologists

¹HKCA, FANZCA, Dip Pain Mgt (HKCA) Associate Consultant; ²FRCA, Private Practice; ³FRCA, Private Practice.

Address correspondence to: Dr MC Chu, Department of Anaesthesia and Intensive Care, Prince of Wales Hospital, Shatin, Hong Kong SAR, Peoples Republic of China. Email: chu0079@cuhk.edu.hk

(ASA) physical status I and II, undergoing surgery in which spontaneous ventilation using a LMA is the most appropriate technique. Patients with anticipated difficult airways were excluded from the study. Patients were randomly allocated, in a double-blind fashion using sealed envelopes, to receive either fentanyl 1 µg/kg, morphine 0.1 mg/kg or 10 ml sodium chloride 0.9%. The study drugs were also diluted with saline to 10 ml. Patients were not given pre-medication.

Following pre-oxygenation for 3 minutes, patients were given the study drugs intravenously over 10 s. This was immediately followed by propofol 2.5 mg/kg intravenously over another 10 s. Ninety seconds after the study drug was administered; a LMA was inserted by a blinded investigator using the technique recommended by Brain.¹

Conditions during insertion of the LMA, which included degree of mouth opening (full, partial or nil), swallowing (nil, slight or gross), gagging or coughing (nil, slight or gross), laryngospasm (nil, partial or total) and head or limb movements (nil, slight or gross) were assessed by the investigator during LMA insertion. The overall ease of LMA insertion (easy, difficult or impossible) was also noted.

Correct positioning of the LMA was checked by observing respiratory movement and the capnogram in spontaneously breathing patients or by inspection of chest expansion and the capnogram during manual ventilation if patients were apneic. Any malpositioned LMA was removed. Patients in whom insertion of the LMA was unsuccessful or the LMA was removed due to malposition will be given another dose of propofol 1 mg/kg bolus. Sixty seconds later, another attempt of LMA insertion was made. This cycle was repeated until the LMA was successfully inserted and positioned correctly. The number of attempts of LMA insertion was recorded. However, conditions during LMA insertion and the overall ease of LMA insertion (vide supra) were only graded during the first LMA insertion.

After successful LMA insertion, anesthesia was maintained with 1.5% isoflurane and 70% nitrous oxide in oxygen. Apneic patients, defined as the absence of respiratory

movement for more than 30 seconds, were ventilated manually via the LMA to maintain arterial oxygen saturation above 95% and end-tidal carbon dioxide concentration between 5.3-6.6 kPa. The duration of apnea was also timed and recorded.

All patients were monitored with electrocardiography, non-invasive arterial pressure, pulse oximetry and capnography throughout the duration of anesthesia. Heart rate, arterial pressure and arterial oxygen saturation were measured and recorded before induction of anesthesia and every minute thereafter until the LMA was successfully inserted. The duration of surgery was also noted. All patients were seen the morning after surgery. They were asked to grade any sore throat, hoarseness or earache on a three-point scale (nil, mild or severe).

Categorical data was analyzed with χ^2 test. Numerical data were tested for normality and were analyzed with one-way analysis of variance or Kruskal-Wallis test as appropriate. *P* values less than 0.05 were taken as statistically significant.

Results

Altogether 90 patients were studied. Demographic data including age, sex, body weight and ASA grades were similar in all 3 groups (Table 1).

Table 1. Demographic data

	Placebo	Fentanyl	Morphine	<i>P</i> values
Sex (male/female)	12/18	9/21	11/19	0.71
Age (years) median (range)	34 (18-52)	36.5 (19-63)	32.5 (20-65)	0.82
Weight (kg) (mean $\pm$ SD)	57.8 (9 $\pm$ 36)	59.1 (10 $\pm$ 29)	59.2 (11 $\pm$ 77)	0.85
ASA grade (I/II)	26/4	27/3	28/2	0.69

ASA = American Society of Anesthesiologists

LMA insertion was successful and correct on first attempt in 93%, 90% and 80% in the fentanyl, morphine and placebo groups respectively (Table 2). Overall there was less

Table 2. Conditions for laryngeal mask insertion.

	Placebo	Fentanyl	Morphine	<i>P</i> value	<i>P'</i> value
Mouth opening (full / partial / nil)	20/10/0	20/9/1	18/12/0	0.824	
Swallowing (nil / slight / gross)	14/14/1	25/5/0	19/9/2	0.012*	0.003
Gagging / coughing (nil / slight / gross)	22/7/1	27/2/1	16/10/4	0.186	
Head / limb movement (nil / slight / gross)	11/11/7	23/6/1	16/10/4	0.021*	0.004
Laryngospasm (nil / partial)	26/4	28/2	29/1	0.338	
Overall ease (easy / difficult / impossible)	26/3/1	23/7/0	24/5/1	0.602	

P' intergroup comparison with χ^2 test for fentanyl and placebo

swallowing ($P < 0.05$) and less head or limb movements ($P < 0.05$) in the fentanyl group (Table 2). Swallowing ($P < 0.05$) and head or limb movements ($P < 0.005$) were less in the fentanyl group when compared with the placebo group, but there was no difference when comparing the fentanyl group with the morphine group or when comparing the morphine group with the placebo group.

The overall ease of LMA insertion and other conditions during LMA insertion, such as degree of mouth opening, gagging or coughing and laryngospasm were similar in all three groups (Table 2). Insertion of the LMA was graded as easy in 77%, 80% and 87% in the fentanyl, morphine and placebo groups respectively.

The duration of apnea was longer in the fentanyl group compared to the morphine group and the placebo group ($P = 0.001$) (Table 3). Postoperative sore throat, hoarseness and earache were similar in all three groups (Table 3). Hemodynamic parameters are shown in Table 4.

Discussion

The insertion of the LMA can lead to undesirable and potentially serious sequelae. The common problems are swallowing, gagging, coughing, involuntary movements and laryngospasm. Postoperative complications associated with LMA insertion like sore

Table 3. Side effects of laryngeal mask airway insertion.

	Placebo	Fentanyl	Morphine	<i>P</i> value
Apnea time (s) (mean $\pm$ SD)	36.5 $\pm$ 27.4	77.8 $\pm$ 62.2	34 $\pm$ 25.7	0.001*
Sore throat (nil / mild / severe)	14/13/3	16/12/2	21/9/0	0.278
Hoarseness (nil / mild / severe)	22/8/0	24/5/1	25/5/0	0.627
Earache (nil / mild / severe)	27/3/0	25/5/0	30/0/0	0.074

throat, hoarseness or earache can also be troublesome. Adequate depth of anesthesia will depress airway protective reflexes and improve conditions for LMA insertion.⁶ Propofol has been shown to be superior to thiopentone for LMA insertion due to its greater depression of airway reflexes.⁷⁻¹⁰ Other drugs have been used with propofol to facilitate or improve conditions for LMA insertion, including lignocaine,¹¹ midazolam,¹² midazolam-alfentanil¹³ and mivacurium.¹⁴ Although successful, the addition of these drugs lead to polypharmacy while some of the drugs may have undesirable side effects.

The use of opioid is an integral part of many anesthesia techniques for providing peri-operative analgesia. Fentanyl or morphine are opioids frequently administered together with an intravenous anesthetic during induction of anaesthesia. Published data on the addition of

Table 4. Haemodynamic parameters (mean $\pm$ standard deviation)

		Placebo	Fentanyl	Morphine	<i>P</i> value
Systolic pressure (mmHg)	Baseline	126 $\pm$ 14	128 $\pm$ 21	124 $\pm$ 18	0.88
	Post-induction	103 $\pm$ 11	105 $\pm$ 16	106 $\pm$ 13	0.69
	Post-LMA insertion	118 $\pm$ 18	109 $\pm$ 18	112 $\pm$ 17	0.13
Diastolic pressure (mmHg)	Baseline	73 $\pm$ 12	71 $\pm$ 13	71 $\pm$ 11	0.73
	Post-induction	56 $\pm$ 9	57 $\pm$ 9	59 $\pm$ 11	0.45
	Post-LMA insertion	64 $\pm$ 12	59 $\pm$ 13	61 $\pm$ 12	0.27
Heart rate (beats/min)	Baseline	75 $\pm$ 11	75 $\pm$ 11	75 $\pm$ 12	0.87
	Post-induction	79 $\pm$ 10	73 $\pm$ 12	79 $\pm$ 13	0.05
	Post-LMA insertion	83 $\pm$ 11	75 $\pm$ 12	82 $\pm$ 12	0.01

opioids to supplement propofol for LMA insertion is lacking. The role of fentanyl in obtunding airway reflexes during propofol anesthesia have been investigated,¹⁵ but its effect on LMA insertion remain unexplored. In our study, the addition of equipotent doses¹⁶ of fentanyl or morphine to propofol 2.5 mg/kg increased success in insertion and positioning of a LMA at first attempt but this did not reach statistical significance (Table 2). However, our study showed that fentanyl reduces swallowing and head or limb movements during LMA insertion and resulted in a smaller increase in heart rate after LMA insertion although the latter probably has little clinical significance.

Whilst propofol is regarded as the induction agent of choice for LMA insertion,¹ the dose of propofol required in non-premedicated patients frequently exceeded 2.5 mg/kg to ensure good conditions for LMA insertion. The addition of fentanyl improved conditions during LMA insertion, as shown in this study. Further studies are needed to determine whether the addition of fentanyl will allow for a reduction in the dose of propofol needed for LMA insertion. The use of less propofol will reduce adverse hemodynamic

effects such as hypotension following induction of anesthesia.

Intravenous fentanyl has a rapid onset of action, reflecting its high lipid solubility. Following a single intravenous injection, fentanyl effects were evident within 10 s in rats.² This may coincide with the peak effects of a bolus of propofol and produce synergistic central neurological depression, including depression of airway protective reflexes, resulting in improved conditions for LMA insertion. In the same way, the duration of apnea is increased with the addition of fentanyl, as shown in our study, although this is of little clinical significance. This is in accordance to results from another study,¹⁵ which showed that fentanyl depressed cough and expiration reflexes and spasmodic panting, but is less effective in obtunding laryngospasm.

The relatively short duration of action of low dose fentanyl, again primarily a result of its high lipid solubility leading to rapid redistribution from its site of action in the brain to the site of storage and biotransformation,² is another 'disadvantage' of using fentanyl at induction of anesthesia especially when analgesia is required well into the post-operative period. The use of another longer acting opioid to supplement fentanyl analgesia

perioperatively will lead to 'polypharmacy'. Higher doses of fentanyl may be used at induction of anesthesia to extend the duration of analgesia at the expense of prolonged apnea and respiratory depression. The high affinity of tissues for the highly lipid soluble fentanyl limits the rate of ultimate elimination from the body by biotransformation, and leads to accumulation of the drug when administered in very large or repeated doses.¹⁷ The resultant prolonged respiratory depression with high dose fentanyl will not be desirable when using a spontaneously breathing technique.

Morphine is another frequently used opioid during anesthesia. Arguably, its longer duration of action^{3,5} and its common use as a postoperative analgesic may render it a more 'suitable' opioid than fentanyl for use during induction of anesthesia, especially in cases where a long duration of analgesia is required. In this study, using equipotent doses, we were unable to show any difference in conditions during LMA insertion when comparing fentanyl with morphine. Although swallowing and head or limb movements were less in the fentanyl group when compared with the morphine group (Table 2), it did not reach statistical significance ($P = 0.09$ and 0.12 respectively).

We were also unable to show a difference when comparing morphine with placebo ($P = 0.27$ and 0.31 for swallowing and head or limb movements respectively). The onset of effects of morphine, which is slower compared with fentanyl,^{2,5} may have occurred well after the ninety seconds we took between the administration of the study drug and LMA insertion and well after the peak effect of a bolus dose of propofol. Following a bolus intravenous injection in dogs, morphine was detectable in the cerebrospinal fluid only after 2-5 min and peak concentrations observed after 15-30 min.⁴ To ensure the double-blind nature of our study, the LMA was inserted at the same period of time, i.e. 90 seconds, after the administration of the study drug. We could have used a 'double-dummy' design for our study so that morphine was given ample time for full onset of action before LMA insertion. It was decided that we standardize the drug administration because this is usually the

time frame for induction of anesthesia using a combination of intravenous anesthetic drugs and LMA insertion in common clinical practice. Besides, if a 'double-dummy' design was used, patients in the morphine group may experience some of the unpleasant side effects of morphine such as nausea and dizziness before anesthesia and hence 'unblind' the study. It is interesting to note again that we were unable to demonstrate any difference in conditions during LMA insertion when comparing fentanyl with morphine. Therefore we postulate that the use of morphine is 'somewhere in between' the use of fentanyl or placebo for improving conditions during LMA insertion. It is likely that if a longer duration was allowed between the administration of morphine and insertion of the LMA, conditions during LMA insertion would be improved.

The duration of apnea was similar between the morphine and placebo group but they were shorter than the fentanyl group (Table 3). Again, this could be attributed to the differences in the pharmacokinetic properties of fentanyl and morphine as outlined above. The addition of fentanyl or morphine to propofol did not reduce the occurrence of post-operative complications associated with the use of the LMA, such as sore throat, hoarseness or earache.

In conclusion, the addition of fentanyl $1 \mu\text{g/kg}$ to propofol improved conditions during LMA insertion but causes a longer duration of apnoea when compared to the addition of morphine 0.1 mg/kg or placebo. We were unable to show that the addition of morphine 0.1 mg/kg to propofol improved conditions for LMA insertion.

References

1. Brain AIJ. The Laryngeal Mask Airway Instruction Manual. Intravent Research Ltd. Henley 1995.
2. Hug CC, Murphy MR. Tissue redistribution of fentanyl and termination of its effects in rats. *Anesthesiology* 1981;55:369-75.
3. Murphy MR, Hug CC. Pharmacokinetics of intravenous morphine in patients anesthetized with enflurane-nitrous oxide. *Anesthesiology* 1981; 54: 187-92.

4. Hug CC, Murphy MR, Rigel EP, Olson WA. Pharmacokinetics of morphine injected intravenously into the anesthetized dog. *Anesthesiology* 1981;54:38-47.
5. Yang JC, Clark WC, Ngai SH, Berkowitz BA, Spectr S. Analgesic action and pharmacokinetics of morphine and diazepam in man: An evaluation by sensory decision theory. *Anesthesiology* 1979;51:495-502.
6. Fisher JA, Ananthanarayan C, Edelist G. Role of the laryngeal mask in airway management. *Can J Anaesth* 1992;39:1-3.
7. Scanlon P, Carey M, Power M, Kirby F. Patient response to laryngeal mask insertion after induction of anaesthesia with propofol or thiopentone. *Can J Anaesth* 1993;40:816-818.
8. Brown GW, Patel N, Ellis FR. Comparison of propofol and thiopentone for laryngeal mask insertion. *Anaesthesia* 1991;46:771-772.
9. Brown GW, Ellis FR. Comparison of propofol and increased doses of thiopentone for laryngeal mask insertion. *Acta Anaesthesiol Scand* 1995;39:1103-1104.
10. McKeating K, Bali IM, Dundee JQ. The effects of thiopentone and propofol on upper airway integrity. *Anaesthesia* 1988;43:638-640.
11. Stoneham MD, Bree SE, Sneyd JR. Facilitation of laryngeal mask insertion: effects of lignocaine given intravenously before induction with propofol. *Anaesthesia* 1995;50:464-466.
12. Godsiff L, Magee L, Park GR. Propofol versus propofol with midazolam for laryngeal mask insertion. *Eur J Anaesth* 1995;12:35-40.
13. Driver IK, Wiltshire S, Mills P, Lillywhite N, Howard-Griffin R. Midazolam co-induction and laryngeal mask insertion. *Anaesthesia* 1996; 51:782-784.
14. Chui PT, Cheam EWS.: The use of low dose mivacurium to facilitate insertion of the laryngeal mask airway. *Anaesthesia* 1998;53:491-5.
15. Tagaito Y, Isono S, Nishino T. Upper Airway Reflexes during a Combination of Propofol and Fentanyl Anesthesia. *Anesthesiology* 1998;88:1459-1466
16. Wood M. Opioid Agonists and Antagonists. In: Wood M, Wood AJJ (ed.): *Drugs and Anesthesia: Pharmacology for Anesthesiologists*. Baltimore: Williams & Wilkins, 1990; 129-178.
17. Murphy MR, Olson WA, Hug CC. Pharmacokinetics of ³H-fentanyl in the dog anesthetized with enflurane. *Anesthesiology* 1979;50:13-19.

ERRATUM

The September issue of the newsletter contains a number of errors:

1. The first name for Dr HUSSAIN should have read "Assaid" (HKCA Newsletter 2004;13(3):12)
2. In the **GUIDELINES ON PAIN MANAGEMENT TRAINING** (HKCA Newsletter 2004;13(3):17-18), the degree awarded for training in pain management should have read "Diploma of Pain Management (HKCA) or in short *Dip Pain Mgt (HKCA)*". A revised version of the guideline is available in this issue of the newsletter

The editors apologize for these errors.

Case Report

An Unanticipated Difficult Extubation

Irene CW LUK

Department of Anaesthesia, Princess Margaret Hospital, New Territories, Hong Kong

We reported a 77-year-old lady presented with bilateral vocal cord palsies after a two-hour elective surgery for removal of a benign gastric tumor. Despite an uneventful intubation on induction, difficulty was encountered during removal of the tracheal tube. Subsequent fiberoptic laryngoscopy confirmed bilateral vocal cord palsies. The patient required tracheostomy subsequently. Careful choice of airway devices, regular checks of cuff pressure, cautions during position of the head and the tubes may prevent similar events in the future.

Key Words: AIRWAY: difficult extubation, bilateral vocal cord palsy, recurrent laryngeal nerve

Anaesthesiologists are constantly facing with challenges in securing patient's airway. Although we are most concern with tracheal intubation, extubation of the trachea can be challenging.

We reported a case of an unanticipated difficult extubation after an uneventful partial gastrectomy.

Case History

The patient was a 77-year-old lady with past history of hypertension, diet control diabetes mellitus and lumbar spondylosis. She was admitted because of passing tarry stool for a few days. Her vital signs were stable after admission except the hemoglobin (Hb)

concentration was noted to be 65 g/L and blood transfusion was given.

She was fast and a nasogastric tube was inserted uneventfully. Subsequent oesophago-gastroduodenoscopy (OGD) revealed a gastric leiomyoma and an elective surgery was scheduled for tumor excision. She never had an anesthesia or experienced any difficulty in breathing during normal daily activities. She weighed 51.6 kg and was 1.52 m tall. Examination showed a Mallampati class I airway with adequate thyromental distance and atlanto-occipital movement. Preoperative condition was satisfactory and the post-transfusion Hb was 105 g/L.

On arrival to the operation theater, her arterial pressure was 192/91, pulse 78 /min. Anesthesia was induced with IV fentanyl and propofol. Atracurium was administered to facilitate tracheal intubation. The trachea was intubated with a size 8 mm I.D. polyvinyl chloride high-volume low-pressure cuffed tracheal tube with the aid of a gum elastic bougie. The tracheal tube was fixed 20 cm at the angle of mouth. Anesthesia was maintained with isoflurane and the lungs were ventilated with an oxygen / nitrous oxide mixture. Intermittent boluses of IV atracurium and morphine were given.

The operation was completed in two hours. Systolic arterial pressure was maintained above 100 mmHg. Blood loss was estimated to be 1,200 ml. Intraoperative Hb was 71 g/L and one unit of packed cells was given.

At the conclusion of surgery, extubation was prepared after the patient had regained consciousness and adequate muscle power. However, despite the tracheal cuff was fully

MBBS, FHKCA, Medical officer

Address correspondence to: Dr Irene Luk, Department of Anaesthesia, Princess Margaret Hospital, Lai King Hill Road, Kwai Chung. Email: ireneluk917@hotmail.com

deflated, much resistance was encountered during withdrawal of the tube. It was described as a "gritty sensation" when the attending anaesthesiologist attempted to pull onto the tracheal tube. It appeared that the tracheal tube was "locked" at a level with the tube marking of 18 cm at the angle of mouth.

The tracheal tube was therefore advanced back to the 21 cm marking. The patient was sedated and mechanical ventilation was recommenced. The tracheal cuff remained deflated. Patient was then transferred to intensive care unit. No air leak was noted around the tracheal tube. A preliminary diagnosis of suglottic oedema was made.

Patient was nursed at a position of 30° head-up. Flexible laryngoscopy on post-operative day 1 showed no supraglottic oedema but the tracheal tube was tightly surrounded by the vocal cords. Dexamethasone 4 mg IV was given every 4 hours. An urgent computed tomogram of the neck was performed and showed mild laryngeal oedema. The tracheal lumen was found to be adequate and patent.

A trial of extubation was made in the operation theatre with the use of Cook's Airway Tube Exchanger (Cook Inc., Bloomington, IN) 8 days after surgery. A fiberoptic bronchoscopy was performed revealing a gap between the tracheal tube and the vocal cords. The tube was then carefully removed without much resistance. However, the patient developed arterial desaturation and a 6.5 mm tracheal tube was inserted. Another fiberoptic laryngoscopy was performed by specialist otolaryngologist showed bilateral vocal cord palsies. The epiglottis, tongue and arytenoids were normal. The patient finally required temporary tracheostomy.

Discussion

Reports and reviews of difficult tracheal intubation are numerous but only a few describe difficult tracheal extubation which may lead to morbidities and mortalities.

Aetiologies of difficult extubation at the early postoperative period are diverse and can largely be attributed to factors due to the

tracheal tube or pathological constriction of the larynx.

Tracheal tube problem

Blanc and Tremblay reported that difficult extubation was related to failure of tracheal tube cuff deflation.¹ The large cuffs caught onto the vocal cords, or glued to the tracheal wall because of inadequate lubricant. Failure of cuff deflation may also be due to clamping of the pilot balloon by artery forceps,² or bandages attached to the tracheal tube.^{3,4}

Use of inappropriately large tracheal tubes may produce sleeves as the deflated cuff fold onto itself. This increases the external diameter of the cuffs and will make tracheal extubation difficult.⁵⁻⁷ During this situation, it is recommended to reinsert, rotate and apply gentle traction on the tracheal tube. Otherwise, reinsertion and reinflation of the cuff might smooth out the sleeves, and allow possible extubation after subsequent deflation.

There are other surgical causes of difficult tracheal extubation. Two reports described the tracheal tube being transfixated to the facial bone by a Kirschner wire or a broken drill bit.^{8,9} Another report described the Kirschner wire passed between the tracheal tube and the pilot tube thus catching it during withdrawal.¹⁰ The pilot tube had also been reported to entangle with the nasogastric tube.¹¹ Other interesting situations included the tracheal tube being partially cut by the osteotome. The "barb" caught onto the posterior aspect of the hard palate and prevented extubation.¹² In another report during pneumonectomy, the Carlens double lumen tube was fixed by a suture that was used to ligate the pulmonary artery. The artery was torn when traction force was applied during tracheal extubation. The patient died as a result of massive hemorrhage.¹³

Vocal cord pathology

Alternatively, damage to the recurrent laryngeal nerves (RLN) may lead to difficult tracheal extubation because of vocal cord palsies. RLN may be traumatized due to surgical procedures such as neck exploration, craniotomy and thoracotomy.¹⁴ Bilateral RLN palsies could occur unexpectedly after surgery

remote from the head and neck region.¹⁵ In a review of 880 patients suffered from RLN palsy, Faabrog-Anderson found that 90 cases could not be ascribed to any reason even after thorough history and examination.¹⁶ Nevertheless, the position of the tracheal cuff may result in peripheral nerve damage leading to vocal cord palsy.¹⁷ In a cadveric study, Ellis and Pallister dissected the intralaryngeal course of the recurrent laryngeal nerve. They described 30 patients with true vocal cord paralysis and found that tracheal intubation appeared to be the only explanation for the peripheral nerve damage.^{18,19}

The recurrent laryngeal nerves leave the thorax and travel into the oesophagotracheal groove towards the larynx, they divide into the anterior and posterior branches. The RLN is susceptible to pressure neuropraxia by the inflated tracheal cuff compressing on the lamina of the thyroid cartilage.

Friedman and Sofferman reported three cases of bilateral vocal cord palsies secondary to the presence of nasogastric tube.^{20,21} This is probably due to the mechanical irritation of the posterior lamina of the cricoid cartilage. This results in ulceration, infection, secondary paresis of the cricoarytenoid and finally bilateral vocal cord palsy. To and Tsang reported a similar case except that vocal cord oedema and palsy promptly resolved after removal of the nasogastric tube.²² In this case however, only the left vocal cord was involved due to the site of the nasogastric tube impingement.

Other causes of vagal paralysis were related to intrathoracic neoplasms, cervical or mediastinal lymphadenopathy, neuritis secondary to acute (e.g. influenza, infectious mononucleosis) or chronic inflammation (e.g. tuberculosis, syphilis), collagen vascular disorders (e.g. rheumatoid arthritis, systemic lupus erythematosus, polyarteritis nodosa) or thyromegaly.²³

Peripheral neuropathy, a well established complication of diabetes mellitus, is found mainly to involve the upper cranial nerves, especially the ocular and facial nerves.²³ Paralysis of the lower cranial nerve in isolation is much less common. Kabadi reported a rare

case of an insulin-dependent diabetic patient who complained of sudden hoarseness of voice for four days. Direct laryngoscopy revealed left vocal cord paralysis. This was completely resolved as glucose control was normalized. A remittent nature of neural ischemia was assumed.

The arytenoids may be dislocated resulting in an acute upper airway obstruction.^{24,25} Quick and Merwin found that arytenoid dislocation was related to the position of the tracheal tube and its point of contact with the larynx.²⁶ If insertion of the tracheal tube was made from the right side of the mouth, the convex curvature of the tube and the blade of the laryngoscope would exert a force onto the left arytenoid and this may explain why left arytenoid dislocation is more common. Furthermore, abrupt changes in patients' head and neck position during surgery could contribute to the dislocation by changing the forces exerted by the tracheal tube onto the larynx.

Arytenoid dislocation was found to be the cause of some of the difficult extubation which was previously misdiagnosed as "glottic oedema".²⁷ Management should include early arytenoid relocation by applying gentle pressure to the cartilage. Alternatively, early tracheostomy to prevent arytenoids movement will facilitate recovery of the dislocated joint.¹⁸

Glottic oedema

Glottic oedema is another important cause of difficult extubation. Supraglottic oedema occurs on the anterior surface of the epiglottis and the aryepiglottic folds. The epiglottis may be displaced posteriorly, blocking the glottic aperture. Retroarytenoidal oedema occurs just below the vocal cords and behind the arytenoid cartilages. Vocal cord movement is restricted because of tense swelling and cord during inspiration. Subglottic oedema is encircled by the non-expandable cricoid cartilage which is the narrowest part of airway in children. This can be traumatized because of the fragile epithelium.

Koka found that factors with significant positive correlations to the development of laryngeal oedema were the use of tight-fitting

tracheal tube, trauma at tracheal intubation, duration of intubation > 1 hour, coughing on the tracheal tube or a change in position in head and neck during surgery.²⁸ However, Darmon found that laryngeal oedema was only significantly in patients with long duration > 36 hours of intubation.²⁹

Probert and Hardman commented that the material of endotracheal tube used was important.³⁰ The less compliant and rough surface of the red rubber Robertshaw double-lumen tube might become more firmly stuck to the subglottic mucosa.

We believe the mechanism of bilateral vocal cord palsies in our patient was related to a combination of anesthetic factors: a tightly fitted tracheal tube (8 mm) in relation to the glottic size. The over inflated cuff may lead to RLN neupraxia. A nasogastric tube syndrome might also be one of the contributing causes of vocal cord palsy and oedema.

To manage an unanticipated difficult extubation, the approach was to maintain the patient's oxygenation and ventilation while eliciting and treating possible causes. The patient was sedated and ventilation was assisted with the cuff of the tracheal tube deflated to observe for presence of leak.

Measures that release the tracheal tube should aim to reduce glottic swelling by head elevation, administration of dexamethasone IV and topical vasoconstrictors (e.g. 0.5% phenylephrine) around the tube. Introducing water-based lubricant from above to decrease the friction of the tracheal tube may be beneficial.^{29,30}

In summary, failure of tracheal extubation is a very rare but serious post-operative complication. Understanding of the possible causes is important.

References

1. Blanc VF, Tremblay NAG. The complications of tracheal intubation; a new classification with review of literature. *Anesth Analg* 1974;53:202-213.
2. Harmer M. Complications of tracheal intubation. Difficulties in tracheal intubation. Eastbourne: Bailliere-Tindall. 1985;36-47.
3. Tanski J, James RH. Difficult extubation due to a kinked pilot tube. *Anaesthesia* 1986;41:1060.
4. Brock-Utne JG, Jaffe RA, Robins B, Ratner E. Difficulty in extubation. A cause of concern. *Anaesthesia* 1992;47:229-230.
5. Tashayod M, Oskoui B. A case of difficult extubation. *Anesthesiology* 1973;39:337
6. Grover VK. Difficulty in extubation. *Anaesthesia* 1985;40:198-199.
7. Khan RM, Khan TZ. Difficult extubation. *Anaesthesia* 1988;43:515
8. Lee C, Schwartz S, Mok MS. Difficult extubation due to transfixation of a nasotracheal tube by a Kirschner wire. *Anesthesiology* 1977;46:427.
9. Lang S, Johnson DH, Lanigan DT, Ha H. Difficult tracheal extubation. *Can J Anesth* 1989;36:340-2.
10. Hilley MD, Henderson RB, Giesecke AH. Difficult extubation of the trachea. *Anesthesiology* 1983;59:149-50.
11. Fagraeus L. Difficult extubation following nasotracheal intubation. *Anesthesiology* 1978;49:43-44.
12. Schwartz LB, Sordill WC, Liebers RM, Schwab W. Difficult in removal of accidentally cut endotracheal tube. *J Oral Maxillofac Surg* 1982;40:518-519.
13. Dryden GE. Circulatory collapse after pneumonectomy (an unusual complication from the use of a catheter): case report. *Anesth Analg* 1977;46:427.
14. Wason R, Gupta P, Gogia AR. Bilateral adductor vocal cord paresis following endotracheal intubation for general anaesthesia. *Anaesth Intensive Care* 2004;32:417-8.
15. Gibbin KP, Egginton MJ. Bilateral vocal cord paralysis following endotracheal intubation. *Br J Anaesth* 1981;53:1091-1092
16. Faaborg AF. Recurrent laryngeal paralysis of unknown etiology. *Acta Otol* 1954; 118(suppl):68-75.
17. Cavo JW. True vocal cord paralysis following intubation. *Laryngoscope* 1985; 95:1352-9.

18. Hartley M, Vaughan RS. Problems associated with tracheal extubation. *Br J Anaesth* 1993;71:561-8.
19. Ellis PDM, Pallister WK. Recurrent laryngeal nerve palsy and endotracheal intubation. *J Laryngol Otol* 1975;89:823-6.
20. Friedman M, Baim H, Shelton V. Laryngeal injuries secondary to nasogastric tubes. *Ann Otol Rhinol Laryngol* 1981;90:469-74.
21. Sofferman RA, Haisch CE, Kirchner JA, Hardin NJ. The nasogastric tube syndrome. *Laryngoscope* 1990;100:962-8.
22. To EWH, Tsang WM, Pang PCW, Cheng JHH, Lai ECH. Nasogastric-tube-induced unilateral vocal cord palsy. *Anaesthesia* 2001;56:690-713.
23. Kabadi UM. Unilateral vocal cord palsy in a diabetic patient. *Postgraduate Medicine* 1988;84:53-5.
24. Edward JF, Bradley D. Posterior arytenoid dislocation following uneventful endotracheal intubation and anaesthesia. *Anaesthesiology* 1989;70:358-60.
25. Prasertwanitch Y, Schwarz JYH, Vandam LD. Aryenoid cartilage dislocation following prolonged endotracheal intubation. *Anaesthesiology* 1974;41:516-8.
26. Quick CA, Merwin GE. Arytenoid dislocation. *Arch Otolaryngol* 1978;104:267-70.
27. Castella X, Gilabert J, Perez C. Arytenoid dislocation after tracheal intubation: an unusual cause of acute respiratory failure? *Anaesthesiology* 1991;74:613-5.
28. Koka BV, Jeon IS, Andre JM, MacKay I, Smith RM. Postintubation croup in children. *Anesth Analg* 1977;56:501-5.
29. Darmon JY, Rauss A, Dreyfuss D. Evaluation of risk factors for laryngeal edema after tracheal extubation in adults & its prevention by dexamethasone. *Anaesthesiology* 1992;77:245-51.
30. Probert DJ, Hardman JG. Failed extubation of a double-lumen tube requiring a cricoid split. *Anaesth Intensive Care* 2003;31:584-7.

Board of Education...

I am much honored to be appointed as the Chairman of the Board of Education from 2005. It is a great challenge to convene a Board that directly shapes the training of our profession. I am indebted to former chairmen Drs Ronald Lo, TW Lee and CT Hung who have laid down the strong foundation of our training program. Although their footpath of success is difficult to follow, I hope, with the concerted efforts of our fellows and trainees, guidance from our previous brain heads, and examples of international counterparts; we will be closer to an ideal training system.

Coming focus of the Board of Education will be related to the implementation of new VTG that includes eLogbook, ITA, and EMAC. All these will surely require further fine-tuning and adjustment. The College will continuously monitor the progress of the achievement of the new system. In the coming year, feedback from Supervisors of Training (SOTs) and trainees will be collected and reviewed. Transitional arrangements for the existing trainees have been worked out and needs to be streamlined.

New Training Officer

The College has appointed Dr CH Koo to be the new Training Officer. Dr Koo is the Organizer for the Basic Science Course for the past 4 years and he is also one of the College webmasters. He is currently a Senior Medical Officer in the Department of Anaesthesiology, Queen Elizabeth Hospital. The Training Officer works closely with SOTs and trainees. He oversees the anaesthesia training of our registered trainees, currently there are more than 100 of them. The Training Officer will review every trainee's training profile before the exit assessment.

Highlights of the Changes of the New Vocational Training Guide

eLogBook

Every trainee should be aware that starting from 1st July 2004, they are required to record their training exposure via the eLogBook online (www.aic.cuhk.edu.hk/hkcalog/hkca.htm). As for introduction of every new system, there will be teething problems. The College will continuously look into and sort out the various feedbacks and comments by the trainees and SOTs. eLogBook is a tool to facilitate the trainees, SOTs and the College to keep track of the progress of training. We all understand that case number alone cannot reflect our training exposure truly. However, we also realize that assessment of experience is a complex and sophisticated issue and is difficult to delineate.

In-Training Assessment (ITA)

From 1st July 2004, SOTs will have to complete an In-training Assessment (ITA) form for all trainees every 6 months. As the first half-year have just passed, SOTs are reminded to hand in the ITA forms to the College before the end of January, 2005. ITA complements formal College Examinations and is intended to focus primarily on the attainment of clinical skills, attitudes and behavior for competent professional practice. The objectives of these assessments are to assist trainees to develop professional competence. ITA also provides an opportunity for the trainee to feedback their achievements and helps their ongoing development. The College appreciates the tremendous efforts of all SOTs for implementing ITA. This is in line with various international Colleges or Boards.

EMAC

The College incorporated EMAC as one of the training requirement in the new VTG. Dr TW Lee, Chairman of the Simulation Committee, has been vigorously involved in the preparation for launching EMAC courses in HK from our Australian and New Zealand counterpart. The College has already nurtured a group of EMAC instructors. Please look out for the coming EMAC courses during the year.

Besides wishing everybody a happy and prosperous New Year, we hope that we will never see another major natural disaster.

Dr YF Chow
Chairman, Board of Education

WORKSHOPS ORGANISED BY THE INSTITUTE OF CLINICAL SIMULATION
A Collaboration between the Hong Kong College of Anaesthesiologists and the North District Hospital

Anaesthetic Crisis Resource Management (ACRM)

Date:	First Saturday of each month - slots available from March 2005 (5 March, 2 April, 7 May, 4 June, 2 July, 6 August, 3 September, 5 November and 3 December, 2005)
Time:	08:00 – 18:00
Venue:	The Institute of Clinical Simulation
CME points:	HKCA 10 points
Max participants:	4
Fee:	HK\$2000 per head
Format:	Each registrant will participate in (1) An introduction on the METI Simulator, the anesthetic machine for use in the workshop and the theories of crisis management (2) Allocated time for hands-on crisis scenario management on the METI Simulator, rotating through different roles and handling different scenarios (3) A group debriefing session at completion of each scenario

“Group” registration welcome if you can find your own partners to form a group of four. Mutually agreed dates may be arranged. Sessions will be videotaped. All participants in the workshop will be required to sign a confidentiality statement.

(Application form can be downloaded from the College website: www.hkca.edu.hk)

Effective Management of Anaesthetic Crisis (EMAC) course, coming in February, 2005...



EMAC instructors, The College is grateful to Drs Brendan Flanagan, Jennifer Weller and Tim Gray for their assistance in the EMAC instructor course.

Board of Accreditation

As the Lunar New Year approaches, it is fitting for me to update members on the progress of our board's activities so far in 2004. Last year was a particularly testing year for our board when we reviewed the accreditation status of training hospitals and updated our training/accreditation guidelines as the plan for the new training system was being rolled out.

We have been working very closely with the Board of Education as the policy and guidelines they set will impact directly on our criteria of accreditation. The two boards collaborate to improvise on the new system and inform Supervisors of Training about the spirit of the change. Drs CT Hung and YF Chow were pivotal in gathering the data and information necessary for the implementation of the new training system.

The stage was set in late 2004 for our board to begin the challenging task of inspecting the many training hospitals in Hong Kong. With a little planning and co-operation among our board members we inspected the seven clusters within a week of the Australasian College's visit. The panels of our inspection teams are as follows:

1. HK West/HK East clusters: Drs John Liu, YF Chow, Anne Kwan and Prof. Gavin Joynt
2. NTE cluster (include NDH and AHNH): Drs John Liu, CT Hung and Tom Buckley
3. KW cluster (KWH, CMC, PMH, YCH): Drs O'Regan, Lilian Lau, TS Sze and PW Cheung
4. KC cluster/KE cluster: Prof. Tony Gin, Wallace Chiu, Rodrigo and Tom Buckley
5. NTW cluster: Drs Joseph Lui, Amy Cho, PP Chen and HY So

With their co-operation and team effort, utilizing valuable personal time outside clinical hours in many cases, the inspection was carried out successfully. We have been busily assembling our reports for all clusters and hope to finalize the reports early this year.

I wish to thank all members of the Board of Accreditation for their hard work and patience.

I look forward to working closely with them in the future.

John Liu

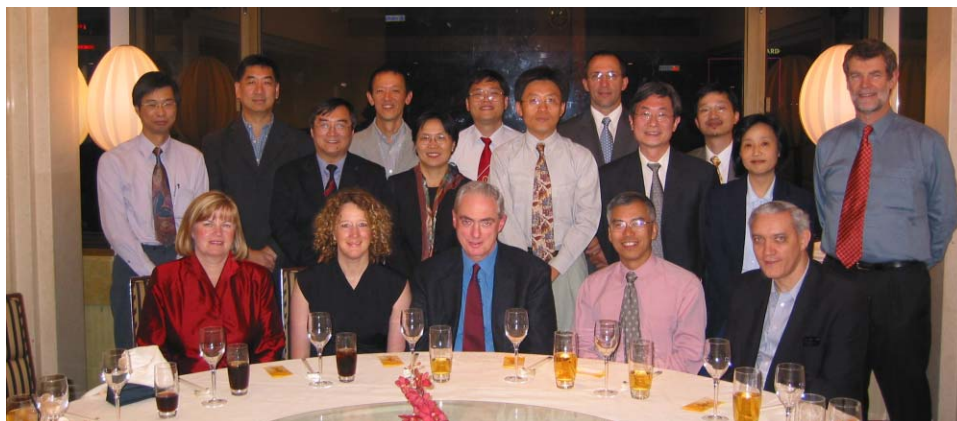
Chairman, Board of Accreditation

The ANZCA Hospital Accreditation Committee (HAC) recently inspected the hospitals in Hong Kong from 11-15 October 2004. The inspection ran smoothly without any major problems. During the course of the visit, the inspectors met with representatives from the Hospital Authority to discuss about issues significant to the specialty of anesthesia in Hong Kong. In the recent Bulletin (November 2004), the inspectors commented that "...they were impressed by the physical facilities ...and the manner in which the health profession coped with the dreadful challenge of SARS". This inspection certainly provided an opportunity for the exchange of experiences and goodwill between the anesthesia community in Hong Kong and Australia.

Dr Jackie Yap

Secretary, RTCHK, ANZCA

The ANZCA team of inspectors:
Front row (left to right): Leona Wilson (Chair of Education and Training Committee); Kate Leslie (Treasurer); Steuart Henderson (Retired Councilor); and Wally Thomson (Vice President)
Back row (left to right): Tony Weeks (Assessor) and Dick Willis (Immediate Past President)



Board of Examination

2004 has been a particularly busy year for the Board of Examination. In the March/April 2004 Final Fellowship Examination in Anaesthesiology, we had 27 candidates, being the largest number so far. We were still nervous whether the examination might be interrupted by SARS again. I am grateful to all the examiners who have contributed so much time and energy. I am particularly thankful to Drs KK Lam, Peggy Tan, TW Lee, Theresa Hui, Steven Wong, SK Ng, and Prof KF Ng and Matthew Chan for co-ordinating various parts of the examinations in Anaesthesiology, Intensive Care and Pain Medicine. At the end of each examination, I usually had opportunities to talk to the successful candidates. I generally could feel and share their happiness. However, I missed the opportunities of also talking to the unsuccessful candidates. I would want to hear their feedback about the examination. I liked also the candidates to realize the benefits of studying and preparing for the examinations. The times might be stressful and exhausting, but these would all be worthwhile in the long term personally and interpersonally.

The Intermediate Fellowship Examination Format

We introduce a new Intermediate Fellowship examination format in Jul/Aug 2004. Candidates are invited to the oral examination only if they have achieved acceptable standards in the written papers. They are also given longer vivas to allow more extensive coverage of topics in physiology and pharmacology. The new format was implemented successfully in the last examination. Three (17%) out of eighteen candidates were not eligible for the oral examination. The external examiners commented that a similar system existed in their examinations in RCA and ANZCA. They also felt that inadequately prepared candidates benefited little from going through the oral examinations. In fact, the adverse experience might impact negatively on their future examination performance. We have allowed a margin in the criteria for eligibility for the oral examination. We like to encourage potential candidates to aim to finalize their examination preparation before the written papers.

Examiners for College Examinations

The College began its Fellowship examinations in 1994. After serving the maximum terms of 12 years, our first batch of examiners will retire by the end of 2005. The Board will like to send the retiring examiners a special note of thanks. Their devotion to College affairs has allowed the development of a strong foundation in the College examination system. Many of the candidates in the earlier examinations have now become examiners. I like also to take this opportunity to remind Fellows that the Board of Examination needs new examiners from time to time. Interested Fellows can obtain the application form and information on duties of examiners, and criteria for appointment of examiners from the College office or website (<http://www.hkca.edu.hk/zip/Examinership.pdf>).

Dr PT Chui
Chairman, Board of Examination

Examination Prize

The HKCA Final Fellowship Examination Prize for March/ May, 2004 examination was awarded to Dr TAN Kee Soon of Prince of Wales Hospital.



Successful candidates

Final Fellowship Examination in Anaesthesiology July/August 2004

CHANG Hang Kwok	KWH
FONG Cheuk Ying	UCH
FONG Siu Yan	QEH
EUNG Che Hoe	PMH
NG Tse Choi	YCH
SIN Wai Leung Leonard	QMH
SO Chi Long, Frankie	KWH
TONG Gerald Sze Ho	PMH
WONG Kan Nam	PMH

Nine out of 15 candidates passed the examination.

The College is grateful to Dr. Maire Shelly of RCA, and Dr. Tony Weeks of ANZCA for their assistance as External Examiners during the examination.



Examination Dates, 2005

Intermediate Fellowship Examinations 2005

Examination Fee: \$6,500

February / April	Date
Written	18 February 2005 (Fri)
Oral	1-2 April 2005 (Fri-Sat)
Closing Date	18 January 2005 (Tue)

June / August	Date
Written	24 June 2005 (Fri)
Oral	12-13 August 2005 (Fri-Sat)
Closing Date	24 May 2005 (Wed)

Final Fellowship Examinations in Anaesthesiology 2005

Examination Fee: \$10,000

March / May	Date
Written	18 March 2005 (Fri)
Oral/OSCE	29-30 April ± 1 May 2005*(Fri-Sun)
Closing Date	18 February 2005 (Fri)

July / August	Date
Written	15 July 2005 (Fri)
Oral/OSCE	2-3 September ± 4 September 2005*(Fri-Sun)
Closing Date	15 June 2004 (Wed)

Exit Assessment Date for Year 2004

Examination Fee: \$5,000 for Fellow *ad eundem*

13 January 2005 (Thur)
 14 April 2005 (Thur)
 14 July 2005 (Thur)
 16 June 2005 (Thur)
 13 October 2005 (Thur)

*Trainees who are qualified to apply for fellowship are recommended to have their respectively applications received at the HKCA office **at least 21 days before** the scheduled Exit Assessment dates, to allow ample time for processing.*

Board of Pain Medicine

The Board of Pain Medicine is glad to announce that all three candidates who sat for the October 2004's *Dip Pain Mgt* examination passed. They were Dr Edmond Chung (NDH), Dr Alice Man Kwan Yin (PWH) and Dr Lina Chan (CMC). We are grateful for our external examiner, Dr Roger Goucke from Perth, Australia for setting and marking the examination papers.

Approved Formal Projects

Over the last six months the following projects were approved for the Dip Pain Mgt:

Timothy BRAKE	Patient controlled epidural analgesia with ropivacaine and fentanyl: an audit of different ropivacaine concentrations
Huey Sing LIM	Validation of the Chinese (Hong Kong) Version of the Pain Self-Efficacy Questionnaire (PSEQ-HK)
Teik Guan TAY	A prospective longitudinal study of quality of life and mood in cancer pain patients after referral to pain management centre
Aaron Kin Wah LAI	Phantom limb pain and phantom sensation: a pilot study
Man Shun LAW	Pain and quality of life in patients with osteonecrosis after SARS infection: a cross-sectional survey
Jacqueline Claire YAP	Validation of the Chinese Pain Catastrophizing Scale (HK-PCS) in chronic pain patients

Scientific Events

On 18 October the Board hosted a Pain SIG meeting on the "*Assessment of pain in the elderly*" (Speaker: Dr Roger Goucke) that included an interesting discussion on how to assess pain in patients with dementia. Another Pain SIG meeting was hosted by the Pain Management Unit, Department Anaesthesiology, United Christian Hospital on 1 December 2004. The topic was "Cancer pain: its mechanisms and quality of life".

The HKCA also conducted a cadaver-workshop on "*Implantable pain therapy*" at the Institute of Clinical Simulation and Mortuary at the North District Hospital on 16 October 2004. Over thirty participants including anaesthesiologists, neurosurgeons and orthopedic surgeons, and facilitators attended the full-day workshop that received much favorable feedback. The Board of Pain Medicine would like to acknowledge its appreciation to the assistance provided by Dr R Goucke, Dr MC Chu, Dr TS Sze, Dr T Yuen, Dr JMK Lam, Dr E Chung, Dr J Yap, Dr TW Lee, Dr LY Wu (Beijing), Ms Celia Wong (Medtronic) and Ms May Kwong (Medtronic).

Dr PP Chen
Chairman, Board of Pain Medicine

"Implantable pain therapy" A cadaver workshop



Participants concentrating on the lecture at the start of the workshop.



A participant practicing his SCS electrodes placement technique while Dr R Goucke is seen explaining the finer details of the technique to other participants in the group.



Participants practiced epidural electrodes and catheter insertion at one station while another group practiced pocketing and insertion of IPG and IT infusion pump at another station. Two other stations were conducted at the ICS simultaneously.



Dr T Yuen giving hands-on advice on the epidural technique.

GUIDELINES ON PAIN MANAGEMENT TRAINING (PM1V3, August, 2004)

INTRODUCTION

The Hong Kong College of Anaesthesiologists (HKCA) conducts organised training programmes in pain medicine for anaesthesiologists. Two categories of training programme are provided in accredited training centres.

- A. Training in pain medicine leading to a post-fellowship Diploma of Pain Management (HKCA) (Dip Pain Mgt (HKCA)).
- B. Pre-fellowship pain medicine training that is a component module of the vocational anaesthesiology training programme of the HKCA.

1. Diploma in Pain Management TRAINING PROGRAMME

1.1. Entry requirements:

- 1.1.1 In possession of FHKCA, OR
- 1.1.2 Having completed at least 5 years of anaesthesiology vocational training recognised by the HKCA, AND
- 1.1.3 Trainees must be registered with and approved by the HKCA before any training is accredited for the Diploma of Pain Management (HKCA). Retrospective approval of up to three months may be granted, but approval is not automatic.

1.2 Duration of training:

- 1.2.1. The training programme shall consist of not less than twelve months of full time training in a post approved by the College for Diploma of Pain Management (HKCA) training. It will normally commence during and some part may be concurrent with the vocational anaesthesiology training programme.
- 1.2.2. At least six months of training shall be completed after obtaining FHKCA.
- 1.2.3. In the event of interrupted training,
 - 1.2.3.1 training shall be conducted in blocks of not less than three months.
 - 1.2.3.2. the whole training programme shall be completed in not more than two years for the training experience to be accredited.

1.3 The number of patients managed by the trainee under supervision should be not less than:

- 1.3.1. One hundred new patients with chronic or cancer pain, and
- 1.3.2. Two hundred new patients with acute or postoperative pain.

1.4 A log book shall be kept for documentation of training. The log book has to be endorsed by the Director of Pain Management / Supervisor of Training upon completion of training.

1.5 The trainee is required to carry out and submit a project related to acute, chronic or cancer pain, and of such a standard that is acceptable to the College. The project must be completed and approved by the College within three years of completion of training. Otherwise, these candidates have to rejoin the entire training programme again.

1.6 Trainees must complete a training progress report with their Supervisor of Training every six months as long as they remain in the training programme. These reports shall be submitted to the College. A final report on the trainee's performance from the Supervisor of Training shall be submitted to the College upon completion of the one year training period.

1.7 Diploma in Pain Management Examination:

- 1.7.1. Trainees must satisfy the examiners in a Diploma of Pain Management (HKCA) examination conducted by the College. The format of the examination shall be determined by the Council of HKCA on recommendation of the Board of Examinations.

- 1.7.2. Only trainees who are registered with the College for training in Diploma in Pain Management, have submitted all required documentation, have paid the appropriate fee and have completed at least six months of approved training requirement including a satisfactory Supervisor of Training Report are eligible to present for the examination.
- 1.7.3. The examination must be passed within three years of completion of training. Otherwise, these candidates have to rejoin the entire training programme again.
- 1.8. The accredited training time, examination passed and the approved project will lapse 3 years after completion of the approved training period in pain medicine. Doctors failing to obtain the diploma within 3 years of completion of the training will have to rejoin the entire training programme again and re-sit the examination.

2. Pre-Fellowship Pain Medicine TRAINING PROGRAMME

- 2.1 Entry requirements:
 - 2.1.1. Registered HKCA Vocational Trainees in anaesthesiology AND
 - 2.1.2. Having completed at least 12 months of accredited training in clinical anaesthesia.
- 2.2. Anaesthesiology trainees may take up pre-fellowship pain medicine training either as a non-core anaesthesiology module or as an elective option in the new anaesthesia training programme starting on 1st January 2005
- 2.3. Trainees doing the pre-fellowship pain medicine training programme do not have to occupy a training post in pain medicine but the training must be conducted in training units approved by College for pain medicine training.
- 2.4. Training programme shall be conducted in blocks of not less than three months, during which the trainee must be rostered to the module full time (normally equivalent to seven sessions or more per week).
- 2.5. Pre-fellowship pain medicine training may be accredited for the Diploma of Pain Management (HKCA) only if the trainee occupies a post approved for Diploma of Pain Management (HKCA) during the period of training and satisfied all other requirement of training for Diploma of Pain Management (HKCA).
- 2.6. Documentation of pain management experience should be recorded in a log book as required for documentation of training towards the Diploma for the FHKCA (Anaesthesiology).
- 2.7. Trainees are expected to manage a minimum of 40 acute pain and 20 chronic or cancer pain patients during a three months block or pro rata.

Board of Intensive Care Medicine

Highlights from the Board:

- (1) The New Vocational Training Guideline is now available in the College Website
www.hkca.edu.hk/intcare.htm
- (2) Please be reminded that the policy regarding "Fellow *ad eundem*" for the Hong Kong College of Anaesthesiologists also applies to the sub-speciality, Intensive Care Medicine, of the College.

Gavin Joynt

Chairman, Board of Intensive Care Medicine

New Policy on "Fellow *ad eundem*"

A. Introduction:

The regulations regarding **admission of Fellow *ad eundem*** as governed by the By-laws of the Hong Kong College of Anaesthesiologists stipulates that:

- "2.3.5 Election of candidates as Fellow *ad eundem* shall be by the Council.
- 2.3.6 Such election shall be held at the meeting of the Council prior to the Annual General Meeting in each year but so that the number of Fellows *ad eundem* so admitted in each year shall not exceed a number to be determined each year by the Council;
Such election shall be by ballot and to be admitted a candidate shall receive the favorable vote of three quarters of the number of the members of the Council present"

HKCA recognizes the importance and contribution of anaesthesiologists possessing overseas anaesthesia qualifications who have decided to come and work in Hong Kong. On the other hand, HKCA has to address the issue of supply and demand of specialist anaesthesiologists. At the present moment, HKCA is able to produce enough specialist anaesthesiologists to satisfy the needs of Hong Kong people. It would be reasonable to set a quota for the number of "Fellows *ad eundem*" to be admitted each year.

B. **After the Annual General Meeting of 2005, the procedure for election of "Fellow *ad eundem*" will follow strictly by-law 2.3.6 and**

- B.1 Not more than 5 will be admitted at such occasion.
- B.2 Each application will be vetted according to the spirit laid down in By-law 2.3.2.7, which stipulates that the applicant should have demonstrated a contribution to the advancement of the pursuits of the College in practice, education or research.
- B.3 If there are more than 5 applications, the most deserving ones, according to By-law 2.3.2.7 will be admitted. The total number of admissions may be less than 5.
- B.4 Unsuccessful applicants may appeal to the Appeals Committee against the decision of the Board of Censors, or they may apply again in future when their contributions may have increased over time.

C. Procedures for application

- C.1 The deadline for the annual application for admission as "Fellow *ad eundem*" will be announced 6 months in advance.
- C.2 Applicants should complete the Fellowship Application Form and send it to the College secretariat together with supporting documents before the prescribed deadline.
- C.3 All applications will be considered together.
- C.4 Short listed applicants will be invited to attend an "Exit Assessment".
- C.5 Successful applicants will be informed in due course.

Board of Censor

Admission to Fellowship by Examination, FHKCA

CHAN Lina
FONG Cheuk Ying Cherry
SIT Yiu Kwong
CHONG David Yew Chuan

CHEANG Si Ngai
LI Yin Fai
UNG Sze Man Eric

Admission to Fellowship *ad eundem*, FHKCA

LEE Kam Suen, Anna

Admission to Fellowship by Examination, FHKCA(IC)

KWOK Keen Man

New Members

CHAN Lai Mei
CHAN On Yi
CHENG King Lik
CHENG Pik Lam Agnes
CHEUNG Lap Kei
CHIANG Chi Sum James
CHOY Chung Ming Eric
CHU Ka Lai
FAN Chun Yin
IP Ka Ho
JOENG Kin Ying Alice

LAU King Yin
LEUNG King Hei
LI Hok Nam
NG Kwun Tung
NG Lai Ming
SHUM Ho Cheung
TAI Man Ting Florence
TAM Tak King Dhugal
WAT Chun Yin
WONG Sze Ming
YU Pak Chung
WONG, Tsz Kin

Michael Irwin
Chairman, Board of Censor

Intermediate Examination Mock Viva 2005

Dear trainees,

It is my pleasure to announce the dates of the Intermediate Examination Mock viva for 2005. It will be held on 19th March and 23rd July, 2005.

The Mock Viva will be held at Queen Elizabeth Hospital. Each mock viva will last for 20 minutes including 2 minutes of feedback from the tutor. Depending on the number of participants, each participant will have at least 5 mock viva on each day.

Intermediate Examination Mock Viva 2005 will be opened for registration in January 2005. Trainees who are interested please complete an application form (available from your SOT or HKCA web site) and return it to me together with a cheque of HK\$ 500 payable to "The Hong Kong College of Anaesthesiologists" **before 6th March, 2005** for the 19th March Mock Viva or before 9th July for the 23rd July Mock Viva. The applicant can attend one or both of the Mock Viva organised by the HKCA for the year 2005 with this application.

If you have any queries concerning the mock viva, please feel free to contact me at 2958 7410 during office hours or by Email at kooch@hutchcity.com.

Your Help is Highly Appreciated!!

Recruitment of Intermediate Examination Mock Viva Examiners

In order to help our candidates to pass their Viva exam, the Hong Kong College of Anaesthesiologists organizes mock viva for the trainees every year. Approximately 12 examiners will be required on each mock viva day.

We would appreciate if you can volunteer or nominate your colleagues to be examiners for the mock viva. You are free to ask physiology, pharmacology or statistics questions related to the examination. Each mock viva session lasts about 20 minutes including feedback time. Mock Examiner Nomination Form is available from SOT of your department. I shall contact you later regarding the time and venue of the mock viva. CME points will be awarded by the Hong Kong College of Anaesthesiologists.

If you have any queries concerning the application, please feel free to contact me at 2958 7410 during office hours or by Email at kooch@hutchcity.com.

REVISION TUTORIAL COURSE IN BASIC SCIENCES IN ANAESTHESIOLOGY 2004

This year the College has again invited Professor Peter Kam from Australia to host the Revision Tutorial Course. 19 participants from 9 different hospitals have attended. It is a full day 2-week course held at the Queen Elizabeth Hospital from 29th November to 10th December, 2004. Besides tutorials on various topics of physiology, pharmacology and statistics, participants also have the chance to practice answering short answer questions and viva voce.

Professor Kam is a patient, kind and knowledgeable teacher.

The knowledge I gain from this course is useful not only for the examination but also helps me to gain a deeper insight and understanding of anaesthesia.

...a participant

Dr CH Koo
Training officer, Basic Sciences Course Organizer
Hong Kong College of Anaesthesiologists

Congratulations....

1. Dr CT Hung has been elected as the Vice-President (Education & Examinations), the Hong Kong Academy of Medicine.
2. Dr KM Ho has been appointed as Consultant in the Department of Anaesthesiology and Operating Services, North District Hospital.
3. Dr Tom Buckley has been awarded the Bronze Bauhinia Star by the Government, in recognition of his contribution during the SARS crisis.

An Anaesthetic Odyssey to Intensive Care

Annual Scientific Meeting in Anaesthesiology 2004

Thank you... Our Annual Scientific Meeting in Anesthesiology 2004, jointly organized by Hong Kong College of Anesthesiologists, Society of Anesthetists of Hong Kong and Hong Kong Society of Critical Care Medicine, was held from 12th to 14th November. This year we have nearly 100 attendants for the CME lectures and more than 300 attendants for the whole ASM program. We are impressed by such high attendance rate. The new format of CME lectures was welcomed by most of us. I do hope you all feel it has been a successful and interesting meeting too.

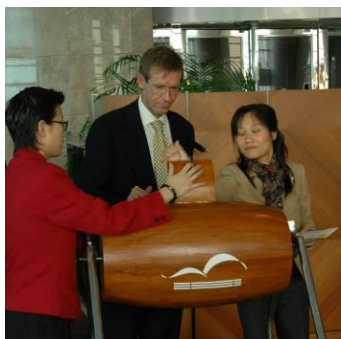


We feel that a good-sized panel of experts and outstanding speakers is very vital for the success of ASM. Hence we would like to feedback to the college to invite more overseas experts in future. Your valuable opinions are very important to us to keep on improving our future ASMs. Please forward your comments on ASM 2004 to me.

Finally, on the behalf of the Organizing Committee of ASM 2005, I wish you will continue to support our ASM in August 2005. Looking forward to seeing you all in the coming ASM next year.

PW Cheung, FHKCA, FHKCA(IC)

The biggest turnout ever in our ASMs...Congratulation PW!



Abstracts presented at the Annual Scientific Meeting in Anaesthesiology 2004, *An Anaesthetic Odyssey to Intensive Care*

Hong Kong Convention and Exhibition Centre, 12-14 November, 2004

Ab 01

Remifentanyl Preconditioning Confers Cardioprotection via Cardiac δ - and κ -opioid Receptors

Ye Zhang, Michael G Irwin, Tak Ming Wong
Department of Anaesthesiology, The University of Hong Kong

Background: Administration of remifentanyl reduced the infarct size of heart in anesthetized rats, which cardioprotective effect of remifentanyl preconditioning (RPC) was mediated by all three types of opioid receptor(OR)s. However, there was evidence that δ - and κ -, but not μ -ORs in the rat heart. So, we hypothesis that RPC confer cardioprotection via cardiac δ - and κ -ORs as well as via extra-cardiac μ -OR agonism. We also determined the involvement of signaling mechanisms, namely protein kinase C (PKC) and mitochondrial K_{ATP} (mito- K_{ATP}) channels.

Method: Male Sprague-Dawley rats weighing 200-250g, which heart was removed and perfused retrogradely at 100cmH₂O with Krebs-Ringer solution (Langendorff). The study consisted three series of experiments and OR antagonists or PKC K_{ATP} channel blockers had been used according to every group. RPC was produced by three cycles of 5 min perfusion of remifentanyl in Krebs-Ringer solution interspersed with a 5 min reperfusion with Krebs solution only. Infarct size (IS), as a percentage of the area at risk (AAR), was determined by 2,3,5-triphenyltetrazolium staining.

Results: IS/AAR in RPC (10-100ng/ml) group were significantly reduced concentration-dependently, which were abolished by naltrindol (a selective δ -OR antagonist) or nor-binaltorphimine(a κ -OR selective antagonist) but CTOP (a μ -OR selective antagonist). Chelerythrine and GF109203X, both PKC inhibitors, abolished the effects of RPC or IPC on IS/AAR. 5-Hydroxydecanoate (a selective mito- K_{ATP} channel blocker) but HMR-1098(a selective inhibitor of the

sarcolemmal K_{ATP} channel) also abolished the cardioprotection of RPC or IPC.

Conclusion: Cardiac δ - and κ - but not μ -ORs mediate the cardioprotection produced by RPC. Both PKC and mito- K_{ATP} channel were involved in the effect.

Ab02

The effect of adding fentanyl to levobupivacaine in spinal anaesthesia: a randomized study

K Muchhal, YY Lee, CK Chan

Department of Anaesthesiology, Kwong Wah Hospital

Objectives: Fentanyl is commonly added to local anaesthetics in spinal anaesthesia. No double-blind, randomized study has been done on the effect of adding fentanyl to levobupivacaine. The objective of this study was to investigate whether the addition of fentanyl to levobupivacaine in spinal anaesthesia, would affect the level of sensory block, the degree of motor block and the haemodynamic parameters.

Methodology: Forty patients scheduled for elective urological surgery under spinal anaesthesia were recruited after obtaining written informed consent. The patients were randomly assigned into one of two groups for spinal anaesthesia: Group L had 2.3 ml of 0.5% levobupivacaine with 0.3 ml of normal saline and Group LF had 2.3 ml of 0.5% levobupivacaine with 15 μ g (0.3 ml) of fentanyl. A 25G Quincke needle was inserted at L_{3/4} level with the patient in left lateral position. The following parameters were monitored: (i) continuous electrocardiogram, heart rate, non-invasive blood pressure; (ii) sensory block was assessed using loss of sensation to coldness; (iii) motor block was assessed according to modified Bromage scale.

Results: There were no case of failure and patient's satisfaction was good in all cases. There were no statistical differences in the highest level of sensory

block, the incidence of complete motor block and haemodynamic parameters between the two groups.

Conclusion: Levobupivacaine with or without fentanyl is effective for spinal anaesthesia in urological surgery which required a sensory block to at least T₁₀. The addition of fentanyl does not affect the characteristics of the sensory and motor block as well as haemodynamic parameters.

Ab03

A survey of the cuff pressure of endotracheal tube in patients undergoing general anaesthesia.

Katherine Lam, Manoj Karmakar, Cindy Aun, Anna Lee

Department of Anaesthesia and Intensive Care, Prince of Wales Hospital, Hong Kong

Objectives: Overinflation of the endotracheal tube cuff can cause tracheal mucosal injury. In this survey, we measured the cuff pressure of anaesthetized patients undergoing elective surgery to get an overview of our current practice. We also attempted to identify factors associated with the development of high cuff pressure.

Methodology: 100 patients older than 12 year undergoing general anesthesia for elective surgery who required tracheal intubation using a standard endotracheal tube with a high volume low pressure cuff were selected randomly for this survey. Cuff pressure was measured at the end of the operation using an aneuroid pressure gauge. No attempt was made to influence the anaesthetic technique, the choice of endotracheal tubes or the method or adjustment of cuff inflation. Post-operative follow-up was carried out the next day to assess for the presence and severity of sore throat.

Results: The median [range] cuff pressure was 28 [6–110] cm H₂O. In 46% of patients, the measured cuff pressure was higher than the recommended upper limit of 30 cmH₂O. Logistic regression analysis showed that the use of nitrous oxide was the only factor predictive of high cuff pressure (odds ratio 15.50, 95% C.I.3.02-19.68). There were no significant differences in the incidence of sore throat between groups in which the cuff pressure was higher or lower than 30cmH₂O.

Conclusion: High endotracheal tube cuff pressure is still prevalent in anaesthetic practice. Routine monitoring of cuff pressure using a pressure gauge is recommended especially when nitrous oxide is used.

Ab04

Medical Graduates Perceptions of a Problem based Learning Curriculum and How it has Equipped them for their Clinical Career

Natalie Caves

Department of Anaesthesiology, The University of Hong Kong

Objective: To examine the attitudes and perceptions of medical graduates regarding their undergraduate experiences and learning environment and how prepared they feel for their role as doctors, following the introduction of a problem based learning (PBL) curriculum.

Methodology: A postal questionnaire was used to survey pre-registration house officers who graduated from the University of Hong Kong in 2001 (traditional course) and in 2002 (PBL course). The survey was conducted at a point two months following the commencement of each group's first house officer placement, and was designed to explore attitudes and behaviours in four main areas: 1) learning environment; 2) learning behaviour; 3) professional capability; and 4) future outlook.

Results: In comparison with traditional graduates, PBL graduates 1) perceived their tutors to be more accessible and inspiring, felt more autonomous, and were more satisfied with their medical training, although there was no difference in their mean stress levels, 2) showed no alteration of learning behaviour or perceived knowledge retention, yet perceived their study time to be less wasteful, 3) had a higher perception of their interpersonal skills and clinical application of knowledge, 4) would be more likely to again choose medicine as their career. Both groups worried about similar deficiencies in professional competence. Neither group felt that their medical curriculum was a true reflection of the requirements needed as a professional.

Conclusion: Adopting a PBL curriculum has improved some aspects of the learning environment and has produced graduates who are more confident in their interpersonal and clinical skills and more satisfied with their medical education. However it has not changed student perceptions regarding capability for professional practice.

Ab06

Effect of General Anaesthesia vs Regional Anaesthesia on Cognitive Function in Postoperative Elderly Patients. A Pilot Study.

Lim Hsien Jer ^a, Lee Shu Ying ^a, Quek How Yow Kelvin ^a, Lim Tiek Whai ^a, Ng Li-Ling ^b, Sahadevan Suresh ^c

^aDepartment of Anaesthesia, Changi General Hospital,

^bDivision of Psychological Medicine, Changi General Hospital, ^c Department of Geriatric Medicine, Tan Tock Seng Hospital

Aim: To compare the effect of general anaesthesia (GA) vs regional anaesthesia (RA) on cognitive function in elderly patients undergoing orthopaedic surgery.

Methodology: In this prospective randomised controlled trial, 30 patients aged 60 years and above undergoing lower limb orthopaedic surgery were recruited. Patients were first assessed by an independent anaesthetist to be medically fit for both GA and RA. After giving informed consent, patients were then randomly allocated to either GA or RA. Cognitive function was assessed using the Chinese Mini-Mental Status Examination (MMSE) and a 10-word verbal recall list. Both of these have been validated for the local population. The tests were done pre-operatively, as well as at the point of discharge to reflect the patient's cognitive function just before returning to the community.

Results: The mean difference in MMSE scores between pre and post-op in the GA group was 0.9 (95% CI: -0.29–2.09), while that in the RA group was 0.62 (95% CI: 0.11–1.13). The mean difference in 10-word list scores between pre and post-op in the GA group was 1.09 (95% CI: 0.40–1.70), while that in the RA group was 1.05 (95% CI: 0.60–1.50). This increase in scores seen post-operatively is likely to be due to learning effect. The mean difference between the increase in MMSE scores for the GA group vs the RA group is 0.29 (95% CI: -0.75–1.31)($p=0.51$). The mean difference between the increase in 10-word list scores for the GA group vs the RA group is 0.04 (95% CI: -0.69–0.78) ($p=0.97$).

Conclusion: We have found no statistical difference between the effects of GA vs RA on cognitive function in elderly patients who have undergone orthopaedic lower limb surgery.

Ab07

The Optimal Dose of Alfentanil Co-administered with Propofol for LMA Insertion

LY Yu, A Lee, LA Critchley

Department of Anaesthesia and Intensive Care, Prince of Wales Hospital, Hong Kong

Objective: To determine the most appropriate dose of alfentanil co-administered with propofol to facilitate the insertion of a Laryngeal Mask Airway (LMA).

Methods: Seventy-five ASA I or II patients, age 18 to 59 years, were randomized into 5 groups of 15 patients. Each received either alfentanil nil, 5, 10, 15 or 20 μ g/kg with propofol 2.5mg/kg given 90 seconds prior to LMA insertion. Insertion conditions were assessed using a six-variable (mouth opening, ease of insertion, swallowing, gagging and coughing, movement and laryngospasm) 3-category (nil, slight and gross) score. Mean arterial pressure (MAP) and heart rate pre-induction, post-induction and post-LMA insertion and duration of apnea were recorded. Probit analysis was used to determine the ED90 dose for each insertion variable.

Results: Co-administration of alfentanil reduced the incidence of swallowing, gagging and coughing, movement and laryngospasm ($P<0.05$), but did not reduce the incidence of difficult mouth opening and difficult LMA insertion. Probit analysis provided ED90 (95%CI) for alfentanil to prevent swallowing, gagging, movement and laryngospasm of 8.6 (6.4 to 14.4), 4.9 (3.3 to 10.8), 8.1 (5.8 to 14.9) and 7.2 (4.3 to 19.1) μ g/kg, respectively. The mean duration of apnea following drug injection increased from 22 seconds to over 5 minutes as alfentanil dose increased from nil to above 15 μ g/kg ($P<0.001$). MAP decreased by 20-27% after drug injection in the five groups. MAP increased after LMA insertion in the nil-alfentanil group but decreased in the other alfentanil groups ($P<0.001$).

Conclusion:

Alfentanil 10 μ g/kg when co-administered with propofol 2.5mg/kg provides optimal LMA insertion in over 90% of patients with minimal hemodynamic disturbances. With this dose post-insertion apnea lasts 140(94-189) [mean (95%CI)] seconds.

Ab08

Attitudes to cardiopulmonary resuscitation among medical students following the 2003 SARS outbreak in Hong Kong.

ND Caves

Department of Anaesthesiology, University of Hong Kong

Purpose: In 2003 Severe Acute Respiratory Syndrome (SARS) affected 1755 people in Hong Kong, including 386 health care professionals and medical students, some of whom were infected during resuscitation attempts of affected patients. This study seeks to explore whether the 2003 SARS epidemic has altered the willingness of Hong Kong medical students to perform basic life support and mouth-to-mouth ventilation during an out-of-hospital cardiac arrest.

Methods: A questionnaire was used to survey Year 4 medical students at the end of their undergraduate

anaesthesia attachment, during which basic life support skills were taught. The survey was conducted during July and August 2003, approximately two months after Hong Kong was removed from the World Health Organisation SARS Infected Areas list, and was designed to examine student confidence in their basic life support skills, their perceptions of the risks associated with performing basic life support and their willingness to perform basic life support in varying situations.

Results: The response rate was 64.8% (35 from a possible 54). Students were positive regarding the adequacy of their basic life support training (3.49 ± 0.95). They were concerned about disease transmission during resuscitation (3.83 ± 0.71) but were less positive regarding whether the risks had increased due to SARS (3.14 ± 1.17). In all situations they were significantly more likely to perform mouth-to-mouth ventilation for a family member compared with a stranger ($p < 0.001$) and they were more likely to withhold mouth-to-mouth ventilation if either vomitus ($p < 0.001$) or blood ($p < 0.001$) were present in the victim's mouth, rather than due to the fear of contracting SARS.

Conclusions: Hong Kong medical students feel able to perform basic life support if required. They are concerned about the risk of transmission of disease, including SARS, during resuscitation, but would be more likely to withhold mouth-to-mouth resuscitation in the presence of vomitus or blood than due to a fear of contracting SARS.

Ab09

Protecting staff against airborne viral particles – the in-vivo efficiency of the laser mask

Peggy TY Li, JL Derrick, C Gomersall

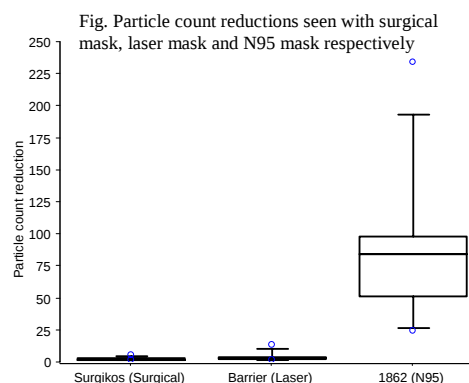
Department of Anaesthesia and Intensive Care, Prince of Wales Hospital, Hong Kong

Objective: Laser masks are used to protect staff from potentially infectious airborne viral particles during laser surgery. They have also been used for tuberculosis prevention. Some studies examining prevention of tuberculosis have considered laser masks to provide equivalent protection to N95 respirators^{1, 2}. Although these masks theoretically have better filtration characteristics than surgical masks, there are no in-vivo data to support their use. This was a prospective un-blinded crossover study comparing the in-vivo ability of a laser mask, a surgical mask and an N95 respirator to filter submicron particles.

Methodology: Eight healthy volunteers underwent a performance test on a laser mask, a surgical mask and an

N95 respirator using a differential particle counter. The particle counter calculated the ratio of submicron particles between the inside and the outside of the protective devices.

Result: The median reduction in particle count using a surgical mask, laser mask and N95 respirator was 2.3, 3.8 and 85.1 respectively. There was a significant difference between the groups ($p = 0.001$) and intergroup testing showed that N95 respirator was better than surgical and laser masks ($p = 0.012$). The laser mask may be marginally better than the surgical mask ($p = 0.062$).



Conclusion: The N95 respirator was over 20 times better at filtering submicron particles than the laser mask. There was little difference between a laser mask and a surgical mask. To prevent airborne infection, a fitted N95 respirator should be more appropriate protection than a laser mask. Studies grouping laser masks with N95 masks for analysis of TB prevention are probably flawed.

References

1. Sinkowitz RL, Fridkin SK, Manangan L, Wenger PN, Jarvis WR. Status of tuberculosis infection control programs at United States hospitals, 1989-1992. *AJIC* 1996;**24**:226-234.
2. Fridkin SK, Manangan L, Bolyard E, Jarvis WR. SHEA-CDC TB survey, Part II: Efficacy of TB infection control programs at member hospitals 1992. *Infect Control Hosp Epidemiol* 1995;**16**:135-40.

Ab10

Percentage of shunt after the aortic cross-clamp is released in Coronary Artery Bypass Graft Surgery: Is it necessary to ventilate the lungs before separation from Bypass?

Eric SM Ung

Department of Anaesthesia & Intensive Care, Grantham Hospital, Hong Kong

Objectives: In Coronary Artery Bypass Graft Surgery, after the aortic cross-clamp is released, the classical teaching is to resume ventilation of the patient's lungs. The rationale is to minimize the potential intrapulmonary shunt once the patient's heart re-contributes to the forward blood flow.

However, the degree of shunt may be minimal and has not been investigated. The ventilation of the lungs may disturb the surgical field and make proximal graft anastomoses difficult. As a result, ventilatory practices after the release of the aortic cross-clamp differ between anesthesiologists.

In this study, instead of resuming ventilation of the patient's lungs on release of the aortic cross-clamp, we withheld lung ventilation until suturing of the final proximal anastomosis was completed. We seek to demonstrate the safety and efficacy of this practice by calculating the percent shunt.

Methods: 16 patients scheduled for coronary artery bypass graft surgery requiring cardiopulmonary bypass were recruited. Lung ventilation was stopped after commencement of cardiopulmonary bypass and was resumed following suturing of the final proximal graft anastomosis. Serial blood gases were measured from the patients and Heart lung machine as follows: (1) before aortic cross-clamp release as baseline, (2) 10

minutes after aortic cross-clamp release, and (3) during suturing of the final proximal anastomosis. Oxygen content of the blood sample was calculated from the oxygen carrying capacity equation and percentage shunt at the different sampling times was then calculated from the Shunt equation.

Results: Oxygen saturation and oxygen tension measured from patients' systemic blood and Heart Lung machine arterial circuits were almost identical and very close respectively. The lowest oxygen saturation and oxygen tension measured from the patient's systemic blood were above 98% and 180mmHg respectively. Percentage shunt calculated at all sampling times was less than 5% and there was no clinical or statistical significant difference ($p = 0.91$).

Conclusion: The degree of shunt after release of the aortic cross-clamp without lung ventilation is minimal and there is no clinical or statistical significant difference from the baseline.

Combined
Scientific Meeting in
Anaesthesiology 2005
CSM2005
27-28 August 2005
Hong Kong Convention and Exhibition Centre

**East Meets West
in Pain Medicine**
*Official Satellite Meeting
of the 11th World Congress on Pain*

**New Horizons in
Anaesthesia**

Jointly organized by:



The Hong Kong College of
Anaesthesiologists



The Society of Anaesthetists
of Hong Kong



VENUE
Hong Kong Convention and Exhibition Centre
1 Expo Drive, Wanchai, Hong Kong

The CSM 2005 will take place at the Hong Kong Convention and Exhibition Centre, on the shoreline of splendid Victoria Harbour. The Centre is the largest and most impressive exhibition and meeting facility in Hong Kong. Many hotels are located within an easy walking distance from the Centre. Subway transport is only minutes away and it serves Hong Kong's major urban areas. The airport can readily be reached by road or express rail link in 30 minutes.

SECRETARIAT

CSM 2005 Secretariat
c/o International Conference Consultants, Limited
Unit 301, 3/F, The Centre Mark
287-299 Queen's Road Central, Hong Kong
TEL: (852) 2559 9973
FAX: (852) 2547 9528
EMAIL: csm2005@icc.com.hk
WEBSITE: www.hkca.edu.hk/csm2005.htm

19th Congregation for the Conferment of Fellowships, Diplomas and Admission to Memberships

13th November 2004, Hong Kong Convention and Exhibition Centre



The Council
2004-2006

The College would like to encourage more fellows, members and their family to attend the annual congregation. It is a time to share your achievements and successes with your friends and colleagues. If you have any comments regarding the program, please contact the College Administrative Executive, Mr Daniel TSO (office@hkca.edu.hk)

Recent Meetings: Anaesthesia, Intensive Care & Pain management

Local meetings 2005

- 14-16 January 2005 **HONG KONG SURGICAL FORUM - WINTER 2005**
Venue: 5th Floor Lecture Theatre, Professorial Block, Queen Mary Hospital
Contact: Forum Secretary, Department of Surgery, University of Hong Kong Medical Centre, Queen Mary Hospital
Phone: 2855 4885; Fax: 2819 3416; Email: hksf@hkucc.hku.hk
- 24 February, 2005 **SCIENTIFIC MEETING**
"Role of non-opioid analgesics in the prevention of postoperative pain"
"Preoperative evaluation of the airway - why bother?"
Speakers: Professor Paul White, and Dr Steve Yentis
Venue: Ballroom, Miramar Hotel TST
Time: 18:00-20:30
Contact: Phone 2811 9711; Fax 2963 5572;
Email: Hiu-Wan.Yvonne.Yan@Pfizer.com
- 26 February, 2005 **HA COMMISSIONED TRAINING IN ANAESTHESIOLOGY: OBSTETRIC ANAESTHESIA**
Venue: To be announced
Time: 08:30 -12:00
Speakers: Steve Yentis, Imperial College, UK
Contact: Karen Lee, Email: leesk@ho.ha.org.hk
- 18-21 March, 2005 **HA COMMISSIONED TRAINING IN NEUROSURGERY: "MANAGEMENT OF AVM" AND "RADIOSURGERY"**
Speakers: Professors Shokei Yamada, William L Young, Anton Valavanis, Peter Nakaji, Jean Régis, Antonio AF. De Salles and David Hung-Chi Pan
Venue: Postgraduate Education Center, The Chinese University of Hong Kong
Contact: Brunnhilde Kwan Email: kwanyl@ha.org.hk
- 19-20 March, 2005 **ADVANCES IN CARDIAC IMAGING 2005**
Venue: Postgraduate Education Centre, Prince of Wales Hospital.
Contact: Conference Secretariat: Department of Medicine & Therapeutics, 9/F Clinical Sciences Building, Prince of Wales Hospital, Shatin, N.T., Hong Kong;
Phone: (852) 2632 3194; Fax: (852) 2637 3852; E-mail: cardiology@cuhk.edu.hk;
Website: www.mect.cuhk.edu.hk/cardiology/
- 27-28 August, 2005 **COMBINED SCIENTIFIC MEETING IN ANAESTHESIOLOGY 2005 (Official satellite meeting of the 11th World Congress on Pain)**
Theme: "East meets West in Pain Medicine". Venue: Hong Kong Convention Centre. Contact: CSM 2005 Secretariat, c/- International conference Consultants, Ltd, Unit 301, 3/F, The Centre Mark, 299 Queen's Road Central, Hong Kong. Phone: 852 2559 9973; Fax: 852 2547 9528 Email: csm2005@icc.com.hk; Website: www.hkca.edu.hk/csm2005.htm

Overseas Meetings 2005

Colombo, SRI LANKA
24-27 February, 2005

6th CONGRESS OF THE SOUTH ASIAN CONFEDERATION OF ANAESTHESIOLOGISTS

Theme: "Reaching out for excellence across the region"

Venue: Bandaranaike Memorial International Conference Hall (BMICH),

Contact: Secretariat (John Keells Conventions Ltd) 130, Glennie Street, Colombo 02, Sri Lanka, Phone: 94-11-2306434 / 2439052 Fax: 94-11-2439026 / 2447087 E-mail: jkconventions@walkerstours.com or

info@jkconventions.com

Honolulu, Hawaii, USA
11-15 March, 2005

79TH CLINICAL AND SCIENTIFIC CONGRESS OF THE INTERNATIONAL ANESTHESIA RESEARCH SOCIETY

Venue: Hilton Hawaiian Village, Honolulu, Hawaii. Contact: International Anesthesia Research Society 2 Summit Park Drive, Suite 140, Cleveland, OH 44131-2571. Tel: 216 642 1124 Fax: 216 642 1127 Email: iarshq@iars.org

Website: www.iars.org

Tunis, Tunisia
21-25 May, 2005

3RD ALL AFRICA ANAESTHESIA CONGRESS

Venue: Tunis. Contact: Professor Mohamed Salah Ben Ammar, Chairman of the Congress. Email: contacts@aaac-tunis2005.org Website: www.aaac-tunis2005.org

Vienna, AUSTRIA
27-31 May, 2005

EUROANAESTHESIA 2005

Venue: Austrian Centre Vienna Contact: European Society of Anaesthesiologists, 24 rue des Comiens ,Brussels, Brussels 1000 , Belgium.

Tel: 11 2743 3290 Fax: 11 2743 3298 Email: secretariat.esa@euronet.be

Website: www.euroanesthesia.org

Sydney, AUSTRALIA
10-12 June, 2005

JOINT FACULTY OF INTENSIVE CARE MEDICINE IN ASSOCIATION WITH ANZICS NSW REGIONAL COMMITTEE INAUGURAL ANNUAL SCIENTIFIC MEETING

Theme: "Neurointensive Care: The Road Ahead". Venue: Sofitel Wentworth Sydney. Contact: Carol Cunningham-Browne, Executive Officer, Joint Faculty of Intensive Care Medicine, 630 St Kilda Road, Melbourne VIC 3004.

Tel: 03 9510 6299 Fax: 03 9510 6786 Email: jficm@anzca.edu.au

Sydney, AUSTRALIA
21-26 August, 2005

11th WORLD CONGRESS ON PAIN, INTERNATIONAL ASSOCIATION FOR THE STUDY OF PAIN

Contact: International Association for the Study of Pain, 909 NE 43rd Street, Suite 306, Seattle, WA 98105, USA. Tel: 206 547 6409 Fax: 206 547 1703 Email:

IASP@locke.hs.washington.edu

Formal Project Committee

Approved Formal Projects

Andrea LY YU	The optimal dose of alfentanil co-administered with propofol for LMA insertion
Katherine LAM	A survey of the cuff pressure of endotracheal tube in patients undergoing general anaesthesia.
Jason SW CHUI	Nitrite induced methaemoglobinaemia - aetiology, diagnosis and treatment"
Irene CW LUK	Case report of an unanticipated difficult extubation
Peggy TY LI	Protecting staff against airborne viral particles: the in-vivo efficiency of the laser mask
Joyce CP WONG	Tracheal Intubation under target controlled remifentanil Infusions
CW CHEUNG	Pre-operative surgical waiting time: survey of patient's preference in two Hong Kong district general hospitals

Formal Project Prize 2004

The 2004 Formal Project Prize was awarded to Dr Andrea Yu.

(The formal project prize was established by the College Council in 1998. The prestigious prize is awarded to the best paper presented at the Annual Scientific Meeting)



ESMERON®
ROCURONIUM BROMIDE

The *versatile* NMBA

It's dose can be easily adapted^{1,2}
to provide relaxation of various clinical duration



Short
to



Long

Esmeron® gives you the flexibility^{1,2}

Esmeron® Abbreviated prescribing information

Therapeutic indications: Esmeron is indicated as an adjunct to general anesthesia to facilitate tracheal intubation during routine and rapid sequence induction, and to provide skeletal muscle relaxation during surgery. Esmeron is also indicated as an adjunct in the intensive care unit (ICU) to facilitate intubation and mechanical ventilation. Contra-indications: Former anaphylactic reactions to rocuronium or to the bromide ion. Special warnings and precautions for use: Since Esmeron causes paralysis of the respiratory muscles, ventilatory support is mandatory for patients treated with this drug until adequate spontaneous respiration is restored. As with all neuromuscular blocking agents, it is important to anticipate intubation difficulties, particularly when used as part of a rapid sequence induction technique. Anaphylactic reactions can occur following the administration of neuromuscular blocking agents. Precautions for treating such reactions should always be taken. Particularly in the case of previous anaphylactic reactions to neuromuscular blocking agents, special precautions should be taken since allergic cross-reactivity to neuromuscular blocking agents has been reported. Dose levels greater than 0.9 mg rocuronium bromide per kg body weight may increase the heart rate; this effect could counteract the bradycardia produced by other anesthetic agents or by vagal stimulation. In general, following long term use of muscle relaxants in the ICU, prolonged paralysis and/or skeletal muscle weakness has been noted. In order to help preclude possible prolongation of neuromuscular block and/or overdose it is strongly recommended that neuromuscular transmission is monitored throughout the use of muscle relaxants. In addition, patients should receive adequate analgesia and sedation. Furthermore, muscle relaxants should be titrated to effect in the individual patients by or under supervision of experienced clinicians who are familiar with their actions and with appropriate neuromuscular monitoring techniques. Because Esmeron is always used with other agents and because the occurrence of malignant hyperthermia during anesthesia is possible, even in the absence of known triggering agents, clinicians should be familiar with the early signs, confirmatory diagnosis and treatment of malignant hyperthermia prior to the start of any anesthesia. In animal studies, Esmeron was shown not to be a triggering factor for malignant hyperthermia. The following conditions may influence the pharmacokinetics and/or pharmacodynamics of Esmeron: Hepatic and/or biliary tract disease and renal failure. Because rocuronium is excreted in urine and bile, Esmeron should be used with caution in patients with clinically significant hepatic and/or biliary diseases and/or renal failure. In these patient groups, prolongation of action has been observed with doses of 0.6 mg rocuronium bromide per kg body weight. Prolonged circulation time: Conditions associated with prolonged circulation time such as cardiovascular disease, old age and oedematous state resulting in an increased volume of distribution, may contribute to a slower onset of action. Neuromuscular disease. Like other neuromuscular blocking agents, Esmeron should be used with extreme caution in patients with a neuromuscular disease or after poliomyelitis since the response to neuromuscular blocking agents may be considerably altered in these cases. The magnitude and direction of this alteration may vary widely. In patients with myasthenia gravis or with the myasthenic (Eaton-Lambert) syndrome, small doses of Esmeron may have profound effects and Esmeron should be titrated to the response. Hypothermia: In surgery under hypothermic conditions, the neuromuscular blocking effect of Esmeron is increased and the duration prolonged. Obesity: Like other neuromuscular blocking agents, Esmeron may exhibit a prolonged duration and a prolonged spontaneous recovery in obese patients, when the administered doses are calculated on actual body weight. Burns: Patients with burns are known to develop resistance to non-depolarizing neuromuscular blocking agents. It is recommended that the dose is titrated to response. Conditions which may increase the effect of Esmeron: Hypokalaemia (e.g. after severe vomiting, diarrhoea and diuretic therapy), hypermagnesaemia, hypocalcaemia (after massive transfusions), hypoproteinaemia, dehydration, acidosis, hypercapnia, cachexia. Severe electrolyte disturbances, altered blood pH or dehydration should therefore be corrected when possible. For full prescribing information see your local package insert.

References:

1. Chetty M et al: Rocuronium bromide in dental day case anaesthesia-A comparison with atracurium and vecuronium. *Anaesth Intens care* 1996;24:37-41.
2. J.C. De mey et al: Evaluation of the onset and intubation conditions of rocuronium bromide. *European Journal of Anaesthesiology* 1994; 37-40.



For further information, please contact:

Organon (HK) Ltd.

Tel: 2833 6380 Fax: 2574 9151

Using

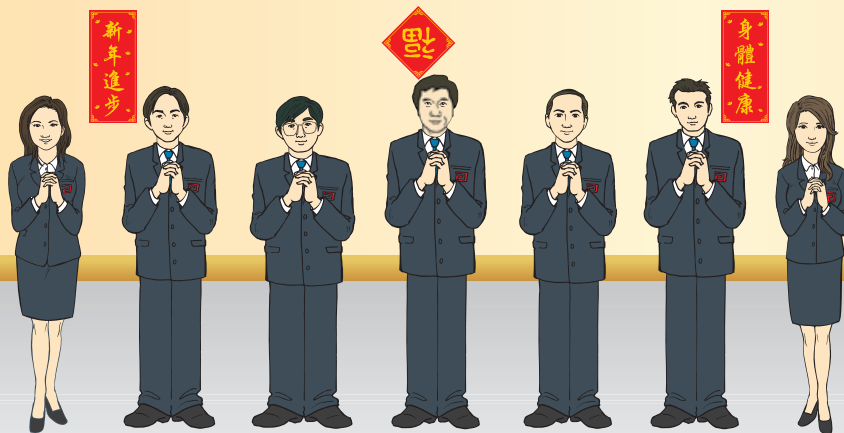


Precedex[®]
dexmedetomidine HCl
Comfortable sedation, stable respiration

To its fullest potential
開枝散葉



Abbott Anesthesia
Today. Tomorrow. Together.



With compliment from
ABBOTT LABORATORIES
Hospital Products Division

美國雅培
醫院產品部 全人鞠躬

Chinese New Year Greetings

好夢成真

心調氣順

苦盡甘來

Good dream come true

Healthy heart, easy breathe

Stop feeling pain, start feeling good



Precedex[®]
dexmedetomidine HCl
Comfortable sedation, stable respiration

May produce natural sleep[†]



Precedex[®]
dexmedetomidine HCl
Comfortable sedation, stable respiration

**↓ Stress, ↓ Cardiac complications*
Excellent respiratory stability****



Precedex[®]
dexmedetomidine HCl
Comfortable sedation, stable respiration

Clinically important analgesic effects[#]

[†]Reference : Laura E Nelson, Jun Lu, Tianzhi Guo, Clifford B Saper, Nicholas P Franks, Mervyn Maze, The α_2 -Adrenoceptor Agonist Dexmedetomidine Converges on an Endogenous Sleep-promoting Pathway to Exert its Sedative Effects, *Anesthesiology* 2003;98:428-36.

^{*}Reference : Duminda N. Wijesundera, Jennifer S Naik, W Scott Beattie, Alpha-2 Adrenergic Agonists to Prevent Peri-operative Cardiovascular Complications: A Meta-analysis, *Am J Med*, 2000;114:742-750.
^{**}Reference : Richard M Venn, John Hill, R Michael Grounds, Respiratory effects of Dexmedetomidine in the surgical patient requiring intensive care, *Crit Care* 2000, 4:302-308.

[#]Reference : Elke Martin, Graham Ramsay, Jean Mantz, S.T. John Sum-Ping, The Role of the α_2 -Adrenoceptor Agonist Dexmedetomidine in Postsurgical Sedation in the Intensive Care Unit, *J Intensive Care Med* 2003;18:29-41.



The Hong Kong College of Anaesthesiologists

Room 807, Hong Kong Academy of Medicine Building, 99 Wong Chuk Hang Road, Aberdeen, Hong Kong
Phone: (852) 2871 8833. Fax: (852) 2814 1029, Email: office@hkca.edu.hk, website: www.hkca.edu.hk

Office Bearers and Council (2003-2005)

President	Tony GIN
Vice Presidents	Po Tong CHUI Theresa HUI
Honorary Secretary	Yu Fat CHOW
Honorary Treasurer	Joseph LUI
Assistant Secretary	Matthew CHAN
Assistant Treasurer	Simon CHAN
Immediate Past President	Tsun Woon LEE
Council Members	John LIU Tsz Yeung CHAN Po Wah CHEUNG Phoon Ping CHEN Edward HO Chi Tim HUNG Anne KWAN Gavin JOYNT

Staff

Administrative Executive	Daniel TSO
Assistant	Cherry WONG

Board of Censor

Mike Irwin (Chairman)	YF Chow (Deputy Chair)
Tony Gin	Tom Buckley
DA Sudhaman	Lilian Lau
TW Lee	PT Chui
John Liu	KC Li
CT Hung	

Board of Intensive Care Medicine

Gavin Joynt (Chair)	Peggy Tan (Examination)
HY So (Secretary)	Anne Leung (Training officer)
Karl Young	
YF Chow	KW Au Yeung
Edward Ho	PW Cheung
Tony Gin	

Guidelines Committee

Anne Kwan (Chair)	PP Chen
Joseph Lui	Theresa Hui
Agnes Cheng	

Board of Examination

PT Chui (Chairman)	KK Lam (Deputy Chair)
Andrea O'Regan	Cindy Aun
SL Tsui	CT Hung
Mike Irwin	Tony Gin
YF Chow	Peggy Tan

Board of Accreditation

John Liu (Chairman)	Mike Irwin
Amy Cho	Joseph Lui
Andrea O'Regan	Anne Kwan
CT Hung	HY So
Lilian Lau	Tom Buckley
Wallace Chiu	Clement Yuan
PP Chen	Chandra Rodrigo
Tony Gin	YF Chow

Board of Education

YF Chow (Chairman)	CH Koo (Training officer)
Tom Buckley	PW Cheung
Andrew Chan	Mike Irwin
Andrea O'Regan	TW Lee
TY Chan	Tony Gin
PT Chui	CK Koo
KK Lam	

Formal Project Officer: KF Ng

Matthew Chan (Deputy officer)

Board of Pain Medicine

PP Chen (Chairman and Training officer)	
Steven Wong (Secretary)	Anne Kwan (Accreditation)
TW Lee (Examination)	YF Chow
S Onsiong	CT Hung
SL Tsui	KO Sun
TS Sze	Tony Gin

Manpower Committee

John Low (Chairman)	CT Hung
---------------------	---------

Resuscitation Committee

HY So	KM Ho
Chandra Rodrigo	TY Chan

Organizer, Basic Science Course: CH Koo

Organizers, Clinical Anaesthesiology Course: Douglas Fok and Eric So

Coordinator, Difficult Airway Management Workshop: KM Ho