

HKCA Bulletin



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The Bulletin is an official publication of the Hong Kong College of Anaesthesiologists (HKCA). Acceptance of manuscripts submitted to *Bull HK Coll Anaesthesiol* is based on significance, originality, and validity of the material presented. Types of submissions accepted include reviews, clinical and laboratory investigations, case reports, technical communications, letter to the editor and other special articles describing the historic, social and current trends in anesthesia, intensive care and pain medicine.

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Name of department(s) and institution(s) to which the work should be attributed. Disclaimers, if applicable; Name, address, telephone and Fax number, and email address of author responsible for correspondence about the manuscript.

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The second page should have an abstract. All articles (except editorials) must include unstructured abstracts consisting of one complete paragraph. Summary should be no more than 300 words for all articles including case reports and reviews.

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Abbreviations and Units of Measurement

Units of measurement: Measurements of distance/length and weight must be expressed in metric units only. Clinical laboratory and hematologic data must be expressed in SI units with, if desired, present conventional metric units in parentheses. Continue using abbreviations consistently; do not revert to the spelled-out term.

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All references must be available to all readers. Cite only references to books and articles or abstracts published in peer-reviewed journals. Number references consecutively in the order in which they are first mentioned in the text. Double-space between all lines of each reference and between references when typing the reference page. Identify references in text, tables, and legends by Arabic numerals. References must be verified by the author(s) against the original documents, and the entire list must be checked for nonduplication. Use the style of the examples below:

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Type each table double-spaced on a separate sheet. Number tables consecutively and supply a brief title for each. Give each column a short or abbreviated heading. Place explanatory matter in footnotes, not in the heading. In footnotes, define all abbreviations that are used in each table. Repeat definition if the abbreviation is used in a subsequent table. For footnotes, use lower-case italicized letters in alphabetical order. Cite each table in the text in consecutive order.

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Medical Insurance: Is it helping or stifling our practice?

Bull HK Coll Anaesthesiol 2006; 15:181-3

Keynote lecture delivered by Professor Grace Tang, President of the Hong Kong Academy of Medicine, at the 21st congregation of the Hong Kong College of Anaesthesiologists, 18th November 2006.

President Gin, Council Members of the College of Anaesthesiologists, Presidents and Representatives of Constituent Colleges of the Academy, Fellows, Trainees and Trainers, Distinguished Guest, Ladies and Gentlemen,

It is my privilege and honor to attend this Congregation as President of the Academy of Medicine. I would like to send my heartiest congratulations to all the trainees who have successfully completed their training, and will be moving onto another phase of their career in the specialty of anesthesiology. You will no doubt practice independently as specialists joining the 308 Fellows in your College, the Academy, and 3991 Specialists on the Specialist Register of the Medical Council. Congratulations.

In my career as an Obstetrician-Gynecologist, I have worked very closely with anesthesiologists from general anesthesia to regional anesthesia, and from surgical procedures to pain control in interventions such as uterine artery embolization for uterine fibroid. We are indeed great partners. Hence, I would like to share with you my thoughts about "Medical Insurance: Is it helping or stifling our practice?".

The need for insurance

We buy insurance because we think something may go wrong and we need to be prepared for compensation and for assistance during accidents. We think we need a third party to help us in crisis. This way of thinking applies to motor vehicle insurance, life insurance, fire insurance, just to mention some examples.

In medical practice, why do we need medical insurance if our practice is evidence-based and of standard? What can go wrong so that we need third party assistance and such assistance is primarily a legal one followed by compensation?

Before the question is discussed, let me tell you some statistics. In 2000, the number of complaint cases received by the Hong Kong Medical Council was 227. Up to November 2006, the number has gone up to 381, representing a 68% increase of cases. Doctors who are complained against will mostly have legal input when they respond to the Council. And, when the complaint cases go for Inquiry, there is almost always legal representation by solicitors and barristers and the cost is substantial. Without insurance, the defending doctor either goes to the Inquiry without legal representation, or he has to pay heavily.

I recall my Professor in Obstetrics and Gynecology starting all briefing sessions by saying "You do not work here unless you have subscribed for medical practice insurance". Being a veteran professor, she was obviously well informed about the risks faced by doctors in medical practice.

Subscription rates based on experience and rank

Of the 10,704 doctors currently in the resident list of the Medical Council, some 80% have subscribed medical practice insurance with the Medical Protection Society (MPS). Those working in the public sector enjoy a lower premium. An intern pays HK\$ 2,200/year, a medical officer/medical officer trainee

pays HK\$ 4,500/year, a senior medical officer/specialist pays HK\$ 7,285/year, and a consultant / professor / director pays HK\$ 12,800/year.

Pegging the amount of premium with the rank seems reasonable, as higher ranks come with heavier responsibilities, and better pay. But does it mean that more junior doctors are less susceptible to complaints, legal actions and compensation? The answer is "no". In fact, junior doctors, being less experienced in medical care as well as in interaction with patients, may be more susceptible to medical adversity.

A lower premium hopefully will entice them to buy the insurance and be protected, but in my mind, they must be guided and protected by their seniors as well. The latter is not only a sure way of learning, but a proactive way to avoid medical adversity.

Subscription based on risks of the specialty practice

In the private setting, insurance premium is set according to specialty and risks. Obstetrics is above "Super High Risk" and the current premium is HK\$ 209,500 per annum.

The Super High Risk (cosmetic / aesthetic surgery, neurosurgery, plastic and reconstructive surgery, spinal surgery) premium is HK\$ 174,500, the Very High Risk (Gynecology, trauma and orthopedics surgery) premium is HK\$ 162,015, the High Risk (cardiothoracic surgery, general surgery, ophthalmology, ENT, pediatric surgery, urology, vascular surgery) premium is HK\$ 94,600, the Medium Risk (A&E, anesthetics, cardiology, oral & maxillofacial surgery, radiology, radiotherapy) premium is HK\$ 39,640, and the Low Risk premium is HK\$ 20,865. For general practice with no Obstetrics or cosmetics, the premium is HK\$ 24,770, but if Obstetrics or cosmetics is included, the premium goes to HK\$ 54,810.

Who wants to do Obstetrics?

The risk assessment for Obstetrics is very obvious. Legal action and claim can last for 21 years after delivery when the child becomes an adult. The overall premium therefore must cover 21 years. But why should gynecology be of higher risk than general surgery when gynecologists only managed the pelvic organs?

Insurance premium goes up because there have been increasing claims and compensation. A point can be reached when the specialty is so highly risky that nobody will be prepared to practice it, and nobody can afford its premium. For Obstetrics, it is possible that one day it may be only practiced in the public sector, or it may be ultra-expensive for a delivery, or there may be no Obstetricians but only midwives conducting deliveries. The specialty can be stifled by medical insurance and the Public will be left with no choice in Obstetrics care.

Obstetrics aside, can we be certain that the insurance premium will not go up for other specialties, e.g., anesthesia when the scope of practice is being expanded?

Can we curb the insurance premium?

Insurance premium goes up primarily because of the increasing compensation needed to be paid. I was given to understand by the MPS that capping compensation is not done by law (e.g. in Singapore), but rather by an "instruction not to go beyond a certain sum". I was also given to understand that in the Common Law system, compensation cannot be capped.

I believe we need to help ourselves. We should help ourselves by maintaining the standard of medical practice, by building up the trust between ourselves and our patients, and by clear communication.

In maintaining the standard of medical practice, we have to be up to date with knowledge, practice and skills – the much discussed continuous professional development. We need peer review and audit so that we can help each other and do better. These activities are not punitive nor negative. They must be regarded as positive measures for continuous quality improvement so that we can all avoid litigation and compensation.

After all, the Bolein Test is based on what most medical practitioners will do in a particular circumstance.

Much has been said about trust and communication between doctors and patients. We need to practice what we preach, and genuinely believe that it is conducive to doctor-patient

relationship. It is only with such belief that we can effectively generate trust and good communication.

I sincerely hope that we ourselves will do something effective to curb the rising insurance premium, and with our concerted effort, I am certain we can do it.

Insurance is for accidents, and accidents should be the exception rather than the rule.

Before I end, I wish to congratulate the new Fellows, and to call on them to help curb the insurance premium.

*Professor Grace Tang
President
The Hong Kong Academy of Medicine*



Magnetic Resonance Imaging of the Airway *Implications on the Design of Laryngeal Mask Airway for the Chinese*

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SUMMARY

Difficulties are commonly encountered during laryngeal mask airway (LMA) insertion among the local Chinese population. I have reviewed 100 magnetic resonance images of the head and neck region. I observed that the angulations between the oropharynx and laryngeal inlet were significantly wider in the Chinese compared with the Caucasians. This may explain the problem of placing the LMA to the pharynx. I suggested that the wedged cuff of the LMA and the shaft itself can be further modified to facilitate LMA insertion in Chinese.

Keywords: Upper Airway; Anatomy; Magnetic Resonance Imaging; Laryngeal Mask Airway

Bull HK Coll Anaesthesiol 2006; 15:184-8

Since its invention in 1981, the laryngeal mask airway (LMA) has proved itself an invaluable device to anesthesiologists.^{1,2} The LMA is easy to insert, with less tissue trauma and minimal somatic or autonomic responses. It is reusable and hence provides cost-effective tool in the airway management for both the elective cases and the unexpected difficult airway.^{2,3}

LMA has a very high successful rate of placement. In an earlier study, correct positioning of LMA is achieved in 88% to 90% of patients during the first attempt. It increased to 95% to 98% after two attempts.⁴ However, the high success rate does require optimal patient

positioning and modifications of the original technique. Nevertheless, difficulty in placing the LMA is still encountered in a significant proportion of Chinese.

This observation has led to the speculation that the design of LMA requires modification for the local population. In this two-part study, I evaluated the anatomy of the upper airway in the local Chinese using the magnetic resonance imaging (MRI) technique. The results were compared to those of published data in the Caucasians.⁵ In the second part of this study; a geometric model of the upper airway was created. I also compared the various LMA parameters and placement methods with the geometric model.

Materials and Methods

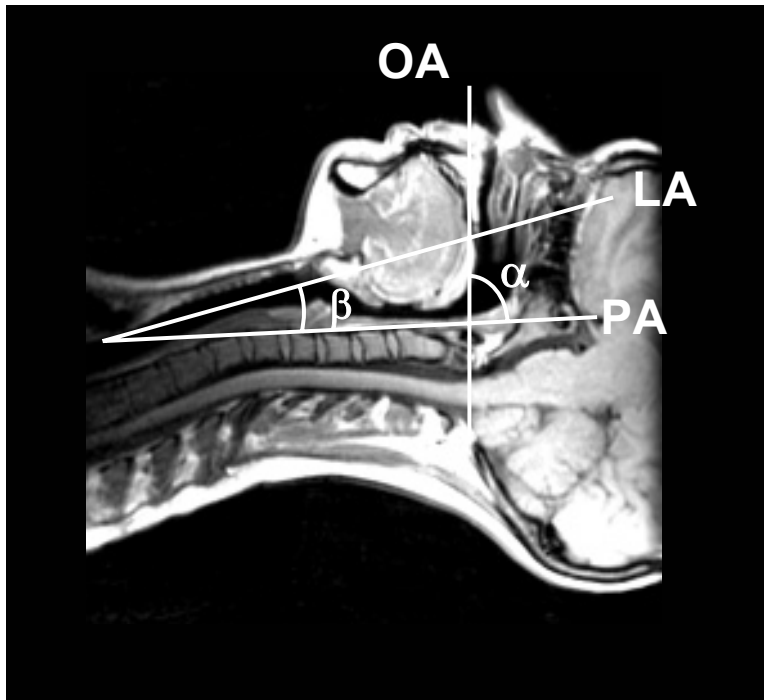
Part A:

One hundred adult Chinese patients (> 18 years) undergoing MRI scans of head and neck region in neutral position were recruited. I chose to review the sagittal sections showing the skull base down to cricoid cartilage. Demographic

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Figure. 1 A MRI image showing the head and neck in neutral position. OA = oral axis. PA = pharyngeal axis. LA = laryngeal axis. $\angle\alpha$ is the angle between OA and PA. $\angle\beta$ is the angle between PA and LA.



data were also recorded. We excluded patients who have their trachea intubated or who gave a history of cervical spine disease. Ethics committee approval was not sought as the images were taken for clinical reasons unrelated to the present study. Confidentiality was however, maintained at all time.

The midline sagittal image was selected for measurement. I drew the following lines (Figure 1):

1. Oral axis (OA) (defined as a straight line drawn parallel to the hard palate),
2. Pharyngeal axis (PA) (a straight line passing through the anterior margins of C1 and C2), and
3. Laryngeal axis (LA) (a line passing through the centers of the cricoid cartilage and glottic opening).

The angles between OA and PA as well as between PA and LA were labeled as $\angle\alpha$ and $\angle\beta$,

Figure 2. A deflated classic LMA ready for insertion. $\angle\gamma$ = angle of the bow to the tube. $\angle\epsilon$ = wedge angle of the deflated tip

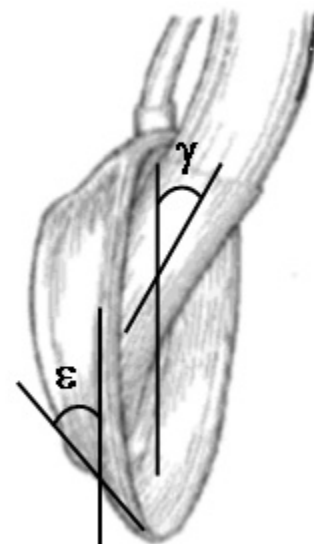
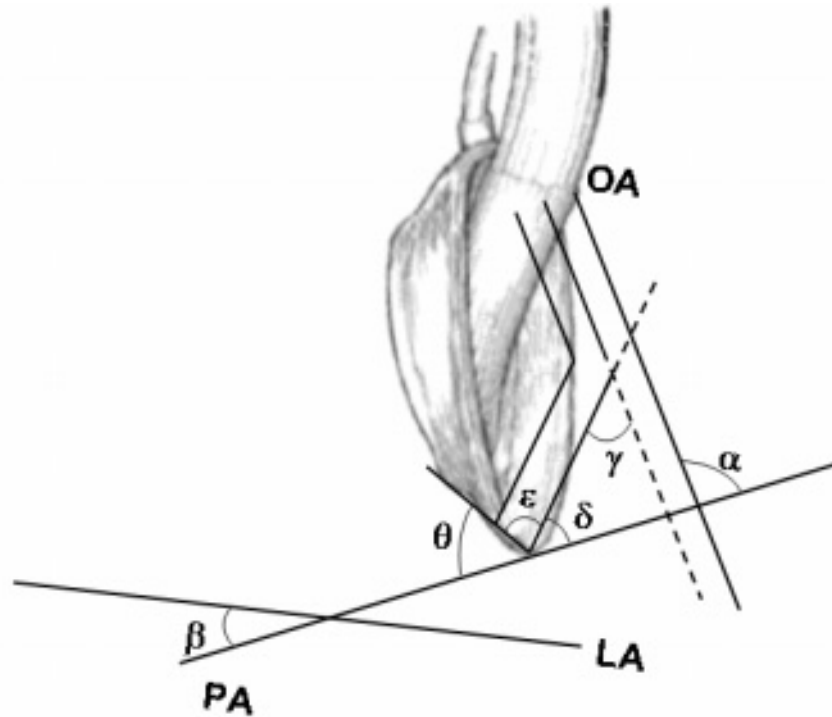


Figure 3. The upper airway geometric model with a LMA in the pharynx. $\angle\gamma$ = angle of the bow to the tube = 28° , $\angle\epsilon$ = wedge angle of the tip when deflated = 36.5°



respectively. During insertion, the LMA needs to negotiate through these two angles, $\angle\alpha$ and $\angle\beta$, in order to sit properly over the laryngeal inlet. The pharyngeal $\angle\alpha$ is the most obtuse angle, and is responsible for most of the difficulty encountered in LMA placement. The $\angle\beta$, however correlates the position of the laryngeal structure with the oropharynx. A large $\angle\beta$ indicates that the larynx is more anterior to the pharynx and may contribute to the difficulty in the advancement of LMA.

Part B:

In this part of the study, I defined the geometry of the classic LMA. In 20 deflated (wedged-shape) LMAs (size 3, $n = 10$; size 4, $n = 10$), I measured the following parameters:

- (1) angle of the bow to the LMA shaft ($\angle\gamma$) and
- (2) angle of the tip when deflated ($\angle\epsilon$) were measured.

These measurements defined the ease of passing a classic LMA through the angles of the patient's upper airway.

I then constructed a geometric model to describe the obstacles during LMA insertion. Figure 3 shows the combined changes in angulations during LMA insertion.

The relationship of the angles can be summarized as follows:

$$\angle\alpha = \angle\gamma + \angle\delta, \text{ and} \quad (\text{Equation 1})$$

$$\angle\delta + \angle\epsilon + \angle\theta = 180^\circ \quad (\text{Equation 2})$$

If $\angle\theta$, the angle between the pharyngeal axis and the wedged LMA mask is $\geq 90^\circ$, then the LMA can be advanced downward to its destined position. However, if $\angle\theta$ is less than 90° , the LMA will then be jammed in the pharynx with the tip flipping backward. In fact, more downward pressure would not advance the

LMA further. In the extreme case, it will be forced into the nasopharynx. Therefore in order to facilitate LMA placement, equation 2 should be rewritten as $\angle\delta + \angle\epsilon < 90^\circ$ or $\angle\delta < 90^\circ - \angle\epsilon$, substituting this expression with that of equation (1), then

$$\angle\alpha < 90^\circ + \angle\gamma - \angle\epsilon \quad (\text{Equation 3})$$

Statistics

The angulations in the upper airway of the local Chinese were compared with those in Caucasians as reported in the literature using the using the Z test. Based on the distribution of the $\angle\alpha$ (result of Part A), and the measured $\angle\gamma$ and $\angle\epsilon$ (results of Part B), I have then calculated the proportion of patients that were predicted to have difficult LMA insertion.

Results

Part A

A total of 100 MRI sagittal images of the upper airway were studied. The median (range) age of the patients were 45 (18 – 60) years. About half were males (male:female = 46:54). The mean (\pm standard deviation, SD) $\angle\alpha$ was $90.7 \pm 5.4^\circ$ (median value was 91° and the range was $80 - 103^\circ$). Similarly, the mean $\angle\beta$ was $20.1 \pm 5.5^\circ$ (median value was 15° and the range was $4 - 23^\circ$). Table 1 shows the changes in $\angle\alpha$ and $\angle\beta$ between Chinese and Caucasians.⁵ The $\angle\alpha$ was similar between Chinese and Caucasians ($t_{2,98} = 1.7$, $P = 0.08$). However, $\angle\beta$ was larger in the Chinese compared with the Caucasians ($t_{2,98} =$

3.1 , $P = 0.003$).

Part B

The mean (\pm SD) $\angle\gamma$ was $28 \pm 2.3^\circ$ and that for $\angle\epsilon$ was $36.5 \pm 2.1^\circ$. Accordingly, $\angle\alpha$ is less than 81.5° (from Equation 3). Therefore, in patients with the head and neck in the neutral position, difficulties will be expected in LMA insertion in about 96% of the population, assuming $\angle\alpha \geq 90^\circ$ is associated with easy LMA placement. In contrast, if the extended position from the Caucasian data were used (i.e. $\angle\alpha = 69 \pm 13^\circ$), then 17% of the population has $\angle\alpha \geq 90^\circ$.

Discussion

The LMA was invented by Dr Archie Brain in an effort to develop a simple airway in 1980's when MRI was not widely available in United Kingdom. Much of the development was based on laryngeal cast models obtained from cadavers.¹ The emphasis was put around the glottic aperture so that once the LMA is inserted and the cuff inflated, it can provide an oval seal around the laryngeal inlet.^{1,2} On the other hand, the airway upstream to the glottis had not received much attention. In the classic LMA, it is just a slightly curved tube fused at to the distal elliptical spoon-shaped mask with an inflatable rim in an angle of about 30° .

During its insertion, the LMA needs to negotiate two angles, $\angle\alpha$ and $\angle\beta$, in order to sit properly over the laryngeal inlet. Based on my data, it can be observed that if $\angle\epsilon$ can be decreased to a smaller value, the proportion of population with difficult LMA placement will be greatly reduced as seen from the standard normal distribution transformation. In neutral position, a 5° decrease in $\angle\epsilon$ will decrease the proportion of patient with difficult LMA placement by 17%. Similarly, a 10° decrease in $\angle\epsilon$ reduces difficult intubation by another 35%. Alternatively, one can make the LMA straighter, so that $\angle\gamma$ will increase and this should improve the success of LMA placement. These two angles can be modified easily during the manufacturing process. In the regard, a large

Table 1. The calculated mean (\pm standard deviation) $\angle\alpha$ and $\angle\beta$. Data of the Caucasians were derived from reference 5.

Ethnicity	Position	$\angle\alpha$	$\angle\beta$
Chinese	Neutral	90.7 ± 5.4	20.1 ± 5.5
Caucasian	Neutral	87 ± 10	7 ± 6
	Extension	69 ± 13	15 ± 3

wedge $\angle \varepsilon$ is not necessary for the overall structural strength. Additional strengthening material can be blended to the posterior aspect of the bow to achieve the same purpose.

Various maneuvers have been used to facilitate the LMA placement.^{1,3,4} Our data suggested positioning of the head could greatly increase the ease of LMA insertion. Other modifications, including pulling of the tongue forward and the use of direct laryngoscopy, widen the pharyngeal space, this should increase $\angle \theta$ as the tip of the wedge can get further down into the pharynx.

It should be clear that $\angle \alpha$ provides the necessary condition for successful LMA placement. However, for a smooth insertion, the $\angle \theta$ must be substantially larger than 90° . This is important because for $\angle \theta$ just slightly more than 90° , most of the insertion force is therefore transmitted to the soft tissue at point of contact, and very little force is present to move the LMA forward. This would result in tissue trauma and subsequent adverse effects. With the current LMA design, in the extended neck position, 83% of patients will have $\angle \alpha$ less than 81.5° . However, the actual incidence of "smooth" placement is lowered than 83%. From the LMA design point of view, it is clear that a small change in the $\angle \varepsilon$ and $\angle \gamma$ by a mere 5 or 10° could decrease difficult LMA placement substantially.

The geometric model may be an oversimplification of the real life situation. The LMA is made of elastic material and hence it can conform to some extent in the upper airway. Therefore, the placement process may not be adequately represented by modeling with linear model.

The soft tissues in the upper airway were neglected in this study. It may be argued that this would also introduce errors as it is the soft tissue that the LMA encounters instead of the cervical spine.^{7,8}

In conclusion, I have created a geometric model to explain the difficulty during LMA placement. Much of the difficulty can be resolved if the wedged cuff ($\angle \varepsilon$) can be made smaller and the shaft of the LMA is straightened.

Acknowledgements

The author is in debt to the Department of Neurosurgery and Department of Radiology of Tuen Mun Hospital for their kind help in supplying the MRI films for review.

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Evaluation of the i-STAT (point-of care) Analyzer in the Intensive Care Unit: *the Effect of Time Delay on Blood Gases Analysis*

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SUMMARY

The i-STAT point-of-care analyzer (i-STAT Corporation, Princeton) was evaluated in an Intensive Care Unit setting. The EG7+ cartridge was used to provide measurements of sodium, potassium, pH, arterial oxygen (PO₂), carbon dioxide (PCO₂) and hematocrit. Measurements of these parameters were compared between the i-STAT device and corresponding standard laboratory apparatuses. The effect on blood gases due to the delay in transportation of blood samples was also examined. Employing the Bland and Altman's plot, it was found that the discrepancies between i-STAT and the laboratory methods on sodium, potassium and PCO₂ were clinically acceptable and comply with manufacturer's recommendation. For PO₂ and the hematocrit, the differences were larger than the recommended limits. There was no difference in PCO₂ and pH measurements due to delay in transportation (median time = 17 minutes). However, PO₂ was significantly affected. We recommended the use of i-STAT for rapid measurement of sodium, potassium, pH and PCO₂, but caution the interpretation of hematocrit and PO₂ analyses.

Keywords: Measurement techniques; Point-of-care test, i-STAT analyzer, blood gas analysis

Bull HK Coll Anaesthesiol 2006; 15:189-95

The i-STAT Portable Clinical Analyzer (i-STAT Corporation, Princeton, USA) is a hand-held device which allows clinicians and nurses, whom generally are not laboratory-trained, to analyze essential blood chemistry and hematocrit at the point of care. A blood sample volume of 65 to 95 µL is required to fill a

specific single-use cartridge. The cartridge is then inserted into the i-STAT analyzer. The analysis takes about 2 minutes and the results are displayed on the liquid crystal display panel. A hard copy of the results can also be obtained by transmitting the information to a portable printer through the infrared light diode on the analyzer. A variety of cartridges are available to measure different combinations of parameters such as, blood gases, electrolytes, urea, glucose and hematocrit. Self-calibration is done automatically every time the cartridge is inserted into the device. An electronic check by inserting a simulator into the cartridge slot of the i-STAT device is the only routine daily maintenance. Two levels of electrical signals are simulated to stress the analyzer's signal detection function both below and above measurement ranges.¹

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The analyzer measures sodium and potassium by ion-selective electrode potentiometry using the direct (undiluted) electrochemical methods. In the calculation of results, the concentration of the respective ion is related to the potential through the Nernst's equation. After correction for the electrolyte concentration, hematocrit can be determined by measuring the blood conductivity which is inversely proportional to the hematocrit. pH and PCO₂ are measured by direct potentiometry, while PO₂ is measured by an oxygen sensor similar to the Clarke electrode. Bicarbonate, total CO₂ and base excess are calculated using the results of pH and PCO₂.¹

In this study we aimed to compare the biochemical measurements between the i-STAT analyzer and the conventional laboratory methods. We also investigated the effect of time delay in analysis on blood gas measurements.

Methods

Following approval from our hospital Research Ethics Committee, informed consent was obtained from every second patient or their relative at the time of admission to our intensive care unit (ICU). Thirty patients were recruited into the study. Arterial cannulation was performed in all patients as part of the medical care in ICU.

For the purpose of this study, the same i-STAT device was used for all i-STAT measurements, and the daily maintenance of the device was performed according to the manufacturer. With the EG7+ cartridge, sodium, potassium, hematocrit, pH, PO₂ and PCO₂ were measured and compared to the corresponding laboratory values. Though ionized calcium could be measured by the EG7+ cartridge, it was not evaluated as our laboratory did not routinely measure this parameter. After discarding 10 ml of dead space blood, 5 ml of blood was aspirated from the arterial line with a heparinized syringe. The syringe was heparinized by rinsing with 1 ml of sodium

heparin solution which was then squeezed out completely before sampling of blood. An unheparinized syringe was then used to withdraw another 10 ml of blood. A small amount of blood from the heparinized syringe was analyzed by i-STAT immediately at the bedside. The rest of the blood in the heparinized syringe was kept on crushed ice for laboratory blood gas analysis. Blood from the unheparinized syringe was used to fill up a lithium heparin bottle and an EDTA bottle (Becton-Dickinson Vacutainer system). The former was for analysis of sodium and potassium while the latter for measurement of haemoglobin concentration and haematocrit. All the blood specimens were then sent down by hospital porter service to the laboratory for analysis. All blood sampling and i-STAT measurements were done by one of the investigators (CC) to ensure proper sampling technique.

When the blood samples reached the laboratory, blood gas analyses were immediately and simultaneously performed by the Chiron Diagnostic 860 (Chiron Diagnostic, USA) and the i-STAT analyzer using the heparinized blood sample. The i-STAT measurements were repeated by the same investigator (CC). Electrolytes and hematocrit were measured by the Hitachi 917 (Hitachi, Japan) and the Cell Dyn 1600 (Abbott Diagnostic, USA) respectively. The Hitachi 917 uses serum for its analysis whereas whole blood is used in the Cell Dyn 1600.

For sodium (Na), potassium (K) and hematocrit, the i-STAT results obtained at the bedside were used to compare with that from the laboratory devices. For blood gases, results from the simultaneous measurements by i-STAT and Chiron Diagnostic 860 were compared. To examine the effect of time delay in blood gas analysis due to transportation of the specimen, the i-STAT measurements obtained at the bedside were compared with the i-STAT measurements duplicated later in the laboratory from the same heparinized blood sample.

Table 1. Mean differences and the limits of agreement.

	Range Tested	Mean difference ± 2 SD	Range between limits of agreement	Manufacturer's acceptable differences
Sodium (mmol)	120-153	0.13 ± 4.6	-4.51 - 4.77*	± 4
Potassium (mmol)	2.5-5.3	0.03 ± 0.4	-0.36 - 0.42*	± 0.5
Arterial oxygen (kPa)	8.2-23.5	0.002 ± 1.06	-1.06 - 1.07†	± 0.67
Arterial carbon dioxide (kPa)	2.1-8.7	-0.23 ± 0.53	-0.76 - 0.3*	± 0.67
pH	6.93-7.50	0.01 ± 0.05	-0.04 - 0.05*	± 0.04
Hematocrit	0.13-0.49	-0.002 ± 0.05	-0.05 - 0.04†	± 0.024

* The differences between i-STAT and laboratory methods in measurements of sodium, potassium, arterial carbon dioxide and pH are clinically acceptable

† The differences between i-STAT and laboratory methods in measurements of arterial oxygen and hematocrit are unacceptably large. SD = Standard deviation

The reproducibility of i-STAT was studied by repeating measurements on a single blood sample from an ICU patient selected randomly in addition. The blood sample was kept on crushed ice during the period of measurement. Five consecutive measurements were completed within 12 minutes to yield the coefficients of variation (CV) for the various parameters. The CVs of the laboratory apparatuses during the study period were also obtained from the pathology laboratory.

Statistics

The differences between each parameter measured by the i-STAT and the corresponding laboratory apparatuses were analyzed by Bland and Altman's plot.² The limits of agreement denoted by the ± 2 standard deviations (SD) about the mean difference were used to evaluate the comparability between the i-STAT and the

corresponding laboratory apparatuses. Two-tailed paired *t*-test was applied to compare the differences in measurements of blood gases due to time delay; a *P* value < 0.05 was considered significant.

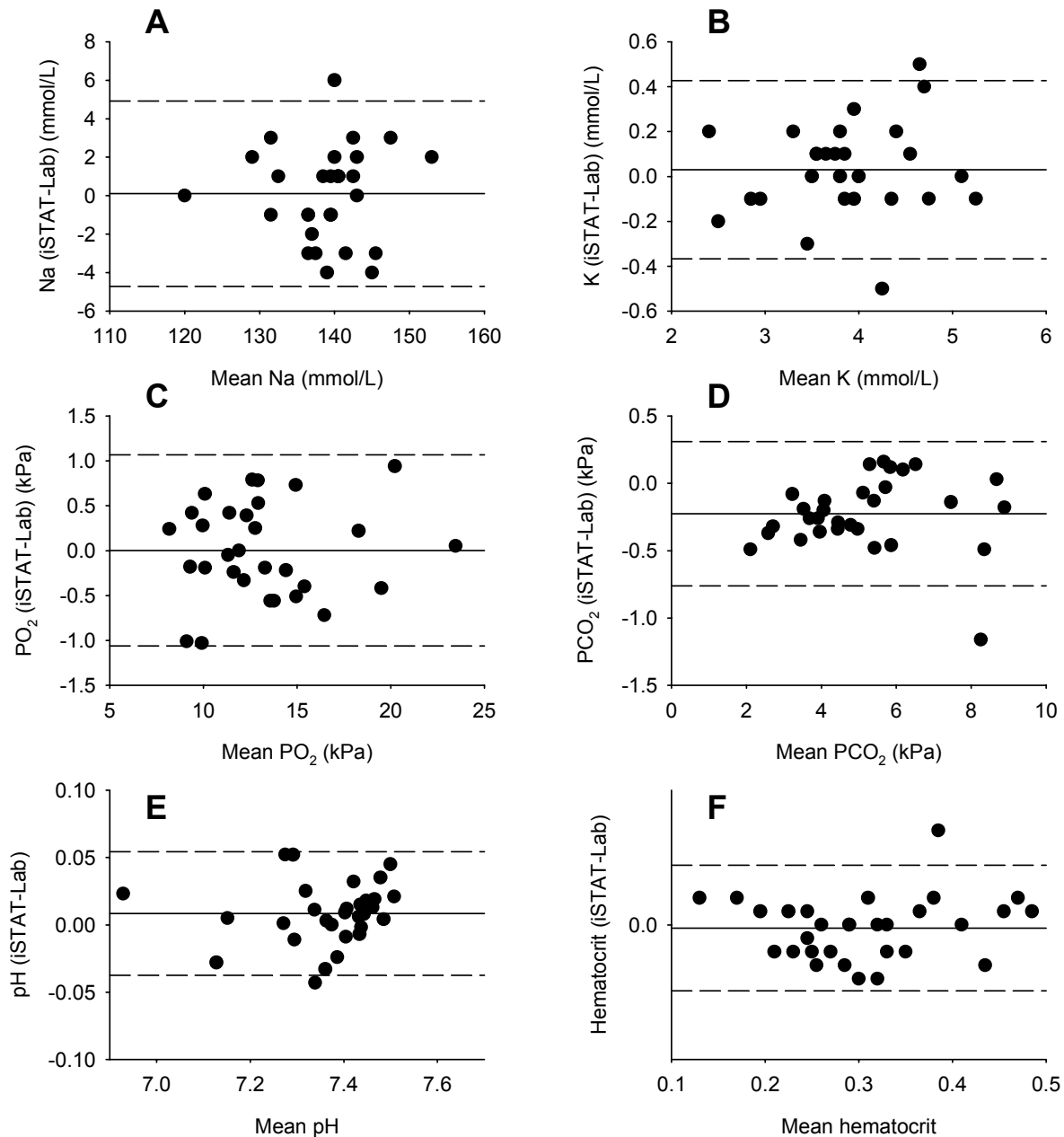
Results

Thirty patients aged between 36 and 85 years were studied. Using Bland and Altman's method, the results of Na, K, pH, PO₂, PCO₂, and hematocrit measured by both the i-STAT and laboratory machines are analysed and presented graphically shown in Figure 1. It was noted that apart from that of PO₂ and hematocrit (Figure 1, panels E and F), the limits of agreement of other parameters were reasonably narrow indicating that the differences between i-STAT and the corresponding laboratory methods were small. The manufacturer's

Table 2. Coefficients of variation for i-STAT and laboratory apparatuses.

	Range Tested	i-STAT, %CV	Laboratory apparatus, %CV
Sodium (mmol)	120-153	0.77	0.96
Potassium (mmol)	2.5-5.3	1.1	1.2
Arterial oxygen (kPa)	7.6-37.2	1.9	2.9
Arterial carbon dioxide (kPa)	3.5-12.6	1.8	2.2
pH	6.81-7.65	0.21	0.09
Hematocrit	0.13-0.49	4.4	1.8

Figure 1. Bland and Altman's plot showing the difference between the i-STAT and the laboratory measurements of A: sodium (Na), B: potassium (K), C: arterial oxygen (PO_2), D: arterial carbon dioxide (PCO_2), E: pH and F: hematocrit against their mean values. The solid line indicates the mean difference and the dotted lines denote 95% confidence limits ($\pm 2\text{SD}$).



recommendations on the acceptable between i-STAT and other laboratory methods are also shown in Table 1.

The median time delay in transportation was 17 minutes (range: 11-50 min). For PCO₂ and pH, no significant differences ($P > 0.05$) were found between the results of the analyses done at the bedside and in the laboratory. However, for PO₂ there was a significant difference ($P = 0.0007$). Further analysis revealed that for the subgroup (9 blood samples) in which PO₂ measurements were performed within 15 minutes, there was no significant difference ($P > 0.05$).

The reproducibility of the i-STAT analyser and the laboratory devices on all parameters measured were satisfactory. The CVs are shown in table 2.

Discussion

Differences are expected when comparing any two different apparatuses. Therefore in evaluating a new apparatus for its ability to replace the one currently used, the differences in measurements between the two apparatuses should be small enough to be acceptable. Although several studies have shown the usefulness and accuracy of i-STAT, most of these studies have interpreted their results with correlation coefficients as the indicator of comparability.³⁻⁹ A statistical method developed by Bland and Altman is more suitable in assessing the agreement between two methods of measurement.² However, to determine whether the two methods are comparable, such decision is a clinical decision rather than a statistical decision.² In this study, we found that the discrepancies between our laboratory and the i-STAT measurements for hematocrit and PO₂ were larger than manufacturer's recommendations. Similar discrepancies in hematocrit and PO₂ were also noted by Bingham *et al* in the Bland and Altman's plot of hematocrit (Fig. 6),¹⁰ there was no particular skewing to account for any inaccuracy when

measuring a particular range of hematocrit. The discrepancy could be due to different methods of determining the hematocrit between the two devices. The hematocrit was measured according to the conductivity of the blood by the i-STAT, whereas the Cell Dyn 1600 utilized the photospectrometry method to measure the hemoglobin concentration with the hematocrit calculated. Conductivity could be affected by several factors, such as albumin level and abnormally high white cell count. In an ICU setting, patients have an abnormality in albumin level which may account for the large discrepancy. An algorithm supplied by the manufacturer can be used to adjust the hematocrit according to the total protein level.¹ Using a different algorithm, Connelly *et al* adjusted their i-STAT hematocrit measurements for cardiopulmonary-bypass patients and found the adjusted results agreed well with the laboratory measurements.¹¹ However, for most circumstances the current protein level may not be readily available and the need for such an algorithm will defeat the purpose of a point-of-care device in providing a quick and reliable result.

The range of the limits of agreement for PO₂ was also wide (-1.062 to 1.066 kPa). This could be ascribed to the fact that much of the deviation from the mean difference occurred within the range between 10-20 kPa (Figure. 3). One may argue that a variation of about 1 kPa (the limits of agreement) in this range will not affect clinical management, but such an amount of discrepancy at the low range (≤ 10 kPa) can be crucial. Furthermore, it should be noted that of the eight points at the low range of PO₂ (≤ 10 kPa), only two were outside the manufacturer's recommended limits (± 0.67 kPa). We suggest that further study is required for a more representative evaluation of the i-STAT at the low range of PO₂.

The i-STAT measurements for pH, PCO₂, sodium and potassium were found to agree reasonably well with our laboratory apparatuses; the differences were clinically acceptable.

Despite the fact that the discrepancy in sodium was small in our study, the i-STAT results could be affected by the presence of minute quantity of sodium ions from the sodium heparin, even though care had been taken to squeeze out all the heparin solution before sampling of blood. Although the manufacturer stated that heparinization of blood was not required, we had heparinized the blood specimen because of the delay in analysis at the laboratory. There were other limitations that could have affected the study. Faulty sampling technique can lead to errors. A larger number of patients may reduce the error due to sampling.

Analysis of arterial blood gases may be affected by time delay.¹² It is a common practice to send the blood sample on crushed ice to the laboratory for analysis. In this study the effect of time delay on blood gases components was investigated. As the study took place in a clinical setting, the time delay was not standardized. It appeared that the measurements of PCO₂ and pH were not affected significantly due to delay in transportation (median time = 17 min). However, PO₂ measurements were affected significantly, except for those performed within 15 minutes. Air bubbles inside the syringe could lead to such differences.¹²⁻¹⁴

Conclusions

In this study the i-STAT analyser has demonstrated an acceptable comparability in measurements of sodium, potassium, PCO₂, and pH with our laboratory apparatuses. The ranges for these parameters were reasonably wide and therefore it would be clinically useful for the management of critically ill patients, especially in the setting of ICU and anaesthesia where quick results are invaluable in decision making. However, the discrepancies in PO₂ and haematocrit measurements were found to be larger than expected. Clinicians should beware of the differences and interpret the results with caution. Double-checking with the laboratory method is recommended if in doubt. The transportation time should be as short as possible because a long delay

might lead to erroneous measurement in PO₂ for blood gas analysis.

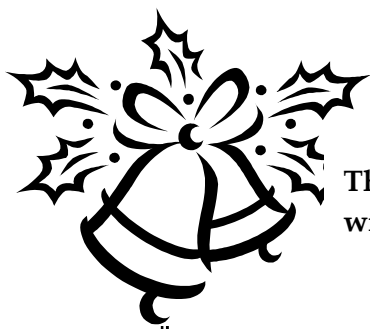
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The Hong Kong College of Anaesthesiologists
wishes you a

*Merry Christmas
& Happy New Year*



Intraoperative Warming to Prevent Shivering After Cesarean Section with Spinal Anesthesia

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SUMMARY

Fifty obstetric patients undergoing spinal anesthesia for lower segment Cesarean section were randomly assigned to receive warm air mattress (temperature set at 38°C) placed over the upper body or unwarmed mattress intraoperatively. Occurrence of shivering, rectal temperature changes and ratings for thermal comfort were taken during the operation. This method of intraoperative warming failed to reduce the incidence of shivering, though it significantly delayed the onset. It did not reduce the degree of hypothermia and made no difference to patients' thermal comfort.

Keywords: Hypothermia; Force air warming; Cesarean section, Pregnancy

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The incidence of shivering after neuraxial anesthesia has been reported to be as high as 56.7%.¹ This has been largely attributed to core hypothermia as a result of vasodilatation after sympathetic blockade, and its consequent heat loss to peripheral tissues by redistribution.^{1,2} There is also inhibition of central thermoregulatory control and reduction of shivering threshold after regional anesthesia.^{3,4} These factors together worsen hypothermia. Nonetheless, some of the shivering has been attributed to non-thermogenic in origin.⁵

As shivering is unpleasant and interferes with monitoring, efforts have been made to prevent it. Use of pharmacological agents like opioids are best avoided in parturients because of the possibility of maternal transfer of drugs to the fetus. Active external pre-warming using warm air mattress has been shown to be useful to prevent shivering and decrease hypothermia in a recent study.⁶ This is due to a decrease in the temperature difference between skin and core, so that less heat is lost by redistribution after regional anesthesia. However, the application of external pre-warming is greatly limited by the high turnover rate of patients in a busy clinical setting. In addition, most of the studies have been done on subjects undergoing epidural anesthesia. Given that spinal anesthesia is currently a common choice for Cesarean section,^{7,8} it is unclear whether external pre-warming is also useful in this setting. This study was designed to determine the efficacy of intraoperative external pre-warming will reduce the incidence of shivering and hypothermia in obstetric patients undergoing spinal anesthesia for Cesarean section.

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Methods

The study was approved by the local institutional ethics committee and written informed consent was obtained from all patients. We studied 50 pregnant women undergoing spinal anesthesia for either elective or emergency Cesarean section in a regional hospital. Indications for Cesarean delivery included non-reassuring fetal signs, previous Cesarean section, fetal malposition and strong patient preference. The incidence of shivering after regional anesthesia was around 50% in our local audit. We have therefore calculated that 25 patients per group will achieve 80% power for detecting an expected reduction in the incidence of shivering from 50% to 25% after spinal anesthesia ($\alpha = 0.05$).

Patients were eligible for the study if they have singleton pregnancy, were American Society of Anesthesiologists physical status class I-II, aged between 18 and 45 years and weighing between 55 and 85 kg. We excluded parturients with puerperal fever ($> 38^{\circ}\text{C}$), overt sepsis that required antibiotic therapy, known thyroid dysfunction or who have received opioids within 4 hours of operation. Women with complicated pregnancy (pre-eclampsia, placenta praevia/abruptio) and any contraindication to SA were also excluded from the study.

In the evening before operation, all women were instructed on the use of a visual analogue scale to assess their thermal comfort intraoperatively (1=very cold, 2=cold, 3=comfortable, 4=hot, 5=very hot). Immediately before transfer to the operating room, all parturients received antacid prophylaxis of 30 ml 0.3M sodium citrate orally and famotidine 20 mg.

In the operating room, all patients received prewarmed (37°C) normal saline 500 ml IVI as preload. The operation theatre temperature was controlled with electronic air conditioning and kept at a constant 22°C and 65% relative humidity throughout the operation. All patients

were covered with a single layer of hospital clothing and a blanket at room temperature during transfer to theatre. Intra-aural temperature was taken by infrared thermometer (Braun, Germany) upon arrival at the operation theatre.

In the operation theatre, standard monitoring including electrocardiogram, non-invasive blood pressure, and pulse oximetry were applied.

Spinal anesthesia was performed under aseptic conditions using a 25G Whitacre spinal needle (Becton-Dickinson, UK) at the L3-5 level with the patient lying in the lateral position. Three milliliter of hyperbaric bupivacaine 0.5% was given to achieve a sensory blockade of up to T4-6 in all patients. The patient was immediately positioned in the supine position with a left lateral wedge and a rectal temperature probe was inserted, its position fixed by tapes on the thigh. Temperature was then continuously monitored and recorded. Arterial pressure was kept within 20% of the usual values to maintain uteroplacental perfusion. Use of phenylephrine, ephedrine and the amount of pre-warmed fluid were documented.

Patients were randomly assigned to the "warmed" and "unwarmed" groups using sealed opaque envelopes. Parturients allocated to the "warmed" group had a forced air blanket (Bair Hugger®, Model 522 Upper Body Blanket, Arizant Healthcare Inc., USA) with a Bair Hugger® Temperature Management Unit (Model 505) set at 38°C , placed over upper body immediately after spinal anesthesia was performed.

The unwarmed group had the same Bair Hugger® mattress placed exactly the standard fashion but the warming unit was not switched on. Rescue treatments were available for shivering and/or cold sensation. These included increasing temperature setting from 38 to 43°C in the warmed group, or cross-over treatment with force air warming in the unwarmed group.

Table 1. Patient characteristics and operative details.

	Warmed	Unwarmed	<i>P</i> values
No. of patients	25	25	
Age (year)	31.8 ± 4.9	31.8 ± 5.4	0.96
Weight (kg)	67.5 ± 8.2	70.0 ± 8.2	0.29
Height (cm)	156.4 ± 5.9	157.5 ± 4.9	0.48
Body mass index (kg/m ²)	27.6 ± 2.8	28.2 ± 3.1	0.44
Paraity			0.63
0	6	9	
1	15	12	
2	3	4	
3	1	0	
Indication for LSCS			0.32
Patient's preference	5	6	
Previous Cesarean section	12	9	
Fetal distress	2	0	
Fetal malpositioning	6	10	
Operative details			
No. of patients	22	24	
Initial body temperature (°C)	36.9 ± 0.3	36.9 ± 0.4	0.97
Surgery duration (min)	30	28	0.17
Anesthesia duration (min)	51	47.5	0.16
Blood loss (ml)	350	400	0.11
Level of sensory block achieved			0.79
T4	27.3% (6)	12.5% (3)	
T5	45.5% (10)	29.2% (7)	
T6	27.3% (6)	54.2% (13)	
T7	0% (0)	4.2% (1)	
No. of patients receiving supplementary medications	36.4% (8)	37.5% (9)	0.94
Fentanyl	4	5	-
Midazolam	3	4	-
Others (antiemetic)	1	1	-

The use of adjuncts to improve patient comfort (e.g. fentanyl, midazolam) was also recorded. Thermal comfort was assessed at the start of spinal anesthesia and at the end of surgery, with additional readings taken when the patient shivered or felt cold.

Statistics

All statistic tests were performed using the SAS System for Windows (Release 8.02, SAS

Institute Inc., Cary, NC). Demographic data were summarized and were tested between groups using unpaired *t* test or Fisher exact test, as appropriate. The incidences of shivering and cold sensation were compared between groups using Fisher's exact test. Thermal comfort scores were compared between groups with Mantel-Haenszel test. The changes of body temperature were analyzed by analysis of variance with repeated measures.

Results

A total of 46 patients completed the study. Four patients were excluded after randomization because of failed spinal anesthesia ($n = 3$) and one required conversion to general anesthesia due to hemorrhagic shock. Patient characteristics were similar between groups (Table 1). The height of block, amount of fluids, or additional drugs given did not differ between groups.

The number of patients with shivering was similar between groups. Results did not change when patients who only shivered in the operating theatre were excluded. There was significant delay in the onset of shivering in patients receiving pre-warming, 22 min, compared with those in the unwarmed groups, 3 min, $P = 0.04$.

Figure 1 shows the changes in core temperature after spinal anesthesia. Core temperature decreased gradually and was significantly lower than baseline 18 min after spinal anesthesia. The changes were similar between groups. There was no difference in thermal comfort scores between groups throughout the surgery (Table 2). Interestingly,

one parturient in the unwarmed group reported an improved thermal comfort score. There was also one parturient in each group complained of excessive heat and requested the warming unit to be switched off. None of these two patients had shivering.

Discussion

Shivering after regional anesthesia can be either due to hypothermia^{1,2} or non-thermogenic in origin.⁵ Previous studies have shown that pre-warming decrease shivering and hypothermia significantly.⁶ This may be explained by increasing skin temperature and heat content before regional anesthesia, thus decreasing heat loss by redistribution. In our study, intra-operative warming (at 38°C) failed to reduce the incidence of shivering after spinal anesthesia, although it delayed the onset. The results did not change after excluding parturients who only shivered in the recovery area, at a time when all the monitoring and warming devices were removed. This may contribute to the inability to reduce the initial drop in core temperature. Alternatively, shivering may not be related to hypothermia at all.⁵ Emergency Cesarean section tended to shiver more than elective cases (60 *vs* 38.7%, $P = 0.17$), but the difference did not reach

Figure 1. Changes in body temperature after spinal anesthesia.

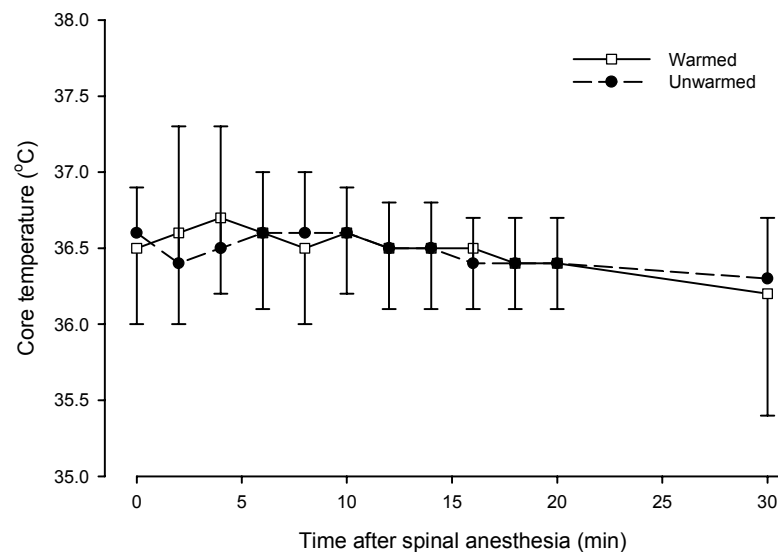


Table 2. Efficacy of intraoperative warming.

	Warmed	Unwarmed	P values
No. of patients	22	24	
Incidence of shivering	11	10	0.58
Shivering in recovery room	4	1	
Core temperature during shivering (°C)	36.2 ± 0.9	36.3 ± 0.8	0.88
Time to first shivering episode after spinal anesthesia (min)	22	3	0.04
Thermal comfort scores at start of spinal anesthesia			
1 = very cold	1	0	0.17
2 = slightly cold	2	2	
3 = comfortable	8	5	
4 = slightly hot	0	3	
5 = very hot	0	0	
No. of patients receiving rescue treatment	4	8	0.05
Thermal comfort scale at end of surgery			
1 = very cold	0	1	0.45
2 = slightly cold	1	1	
3 = comfortable	10	8	

statistical significance.

Few patients required intravenous fentanyl and midazolam for intraoperative discomfort during surgical manipulation. Intravenous fentanyl (1.7 µg/kg) has been shown to prevent shivering in patients undergoing general anesthesia. Nevertheless, pethidine has been commonly prescribed because it is more effective and the effect is much longer lasting.¹⁰ Midazolam has little effect on thermoregulatory control.¹¹ As few patients were given the adjuncts, and half of the patients had already reported shivering before midazolam was given. We believe the effect of these adjuncts on the overall incidence of shivering, if any, should be minimal.

The delay in onset of shivering with intraoperative warming may be beneficial to obstetric patients since they were already stressed and anxious about childbirth, pain and surgery. Therefore, additional psychological burden may worsen shivering. If shivering should occur later after delivery, its negative emotional effect might be reduced by of the mother to the newborn. A significant delay to 22 min should

provide adequate time required for delivering the baby in most uncomplicated Cesarean sections.

The warm air mattress (at 38°C) was unable to reduce the decrease in core temperature, although this was not serious. We believe it was probably due to inadequate body coverage and lack of prewarming to prevent redistribution heat loss. The rate of heat transfer by intraoperative external warming at 38°C could not compensate for the rapid heat loss by redistribution after spinal anesthesia and surgical exposure. Intraoperative warming itself was inadequate to reduce the drop in core temperature, although it has been proven effective in maintaining perioperative normothermia.¹⁴ Warming at 43°C may increase heat transfer, though its effectiveness to reduce core hypothermia may still be restricted by the limited body coverage. Thus pre-warming is likely to have a much more important role in maintaining body temperature in regional anesthesia than would be expected.

Interestingly, intraoperative warming did not change subjective thermal comfort in patients with or without shivering. Although

there was a tendency towards the need for rescue intervention in unwarmed parturients (60% vs 36.4%, $P = 0.05$), the resultant thermal comfort scores were similar. One patient in the unwarmed group reported improved thermal comfort although the warming unit has not been used. without switching on the warm air mattress. Another in the warmed group had improved thermal comfort despite the same temperature target was maintained.

Thermal comfort has been shown to be dependent on mean skin temperature¹² and that active external warming improves patient satisfaction.¹³ Other possible explanations included inadequate change in mean core temperature by warming of the upper body alone, although previous study has demonstrated effectiveness of such warming device.¹⁴ Warming both the lower limbs and the upper part of the body, may be more useful in raising core temperature. This may improve thermal comfort. The utility of the warm air mattress has been challenged by a previous report of maximum thermal comfort at the lowest core temperature in similar group of patients.² Altered thermal perception after spinal anesthesia may occur as their patients did not feel cold despite hypothermia. Although the warm air mattress could not reduce shivering and hypothermia and it failed to improve thermal comfort in our patients, it can still be used to delay the onset of shivering after spinal anesthesia.

We measured intraoperative temperature using a rectal probe despite it may induce patient discomfort. However, it provides continuous recordings. In a recent study, rectal temperature was found to be more accurate and precise than other sites of measurement.¹⁵ In pilot studies we tried intra-aural infrared temperature measurements but abandoned this technique because of the large variability in readings¹⁶ and intolerance by most of our patients.

In conclusion, intraoperative warming using warm air mattress (targeted at 38°C) failed to prevent shivering after spinal anesthesia. It did not reduce the decrease in core temperature, and did not improve subjective thermal comfort. Nonetheless, there was a delay in the onset of shivering after prewarming.

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Obstetric Outcomes After Epidural Analgesia

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SUMMARY

Epidural analgesia (EDA) provides superior analgesia compared with conventional analgesic modality. However, there are concerns regarding its effects on labor outcome. Early administrations of EDA on induced-labor patients have not been reported. The aim of this observational study is to evaluate the effect of early administration of EDA on induced-labor in nulliparous patients in a Level III regional hospital in Hong Kong.

A total of 971 (10% of all deliveries) nulliparous patients admitted for induction of labor were studied. 227 (23.4%) patients received EDA. There were no difference in maternal age, gestational age, fetal weight and Apgar score. The indications for induction of labor were distributed unevenly. The incidence of premature rupture of membrane was significantly higher in the conventional group compared with the epidural group (21.4% vs 12.2%, $P < 0.001$). Logistic regression shows that EDA was an independent risk factor for operative vaginal delivery (odds ratio, 95% confidence intervals: 1.5, 1.1-2.1) but not for Cesarean section (odds ratio, 95%CI: 1.3, 0.9-1.8).

Even though parturients with EDA are more prone to operative vaginal delivery, the association does not simply indicate causal relationship. The decision to perform operative vaginal or Cesarean delivery is often subjective and many factors have been shown to influence clinical decision. Our data suggest that EDA is a risk factor for operative vaginal delivery and its impact is likely to be modified by other obstetric practices and interventions.

Keywords Epidural analgesia; Labor pain; Opioids, Pethidine; Cesarean section; Vaginal delivery

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Epidural analgesia (EDA) during labor is widely accepted since its introduction three decades ago. It provides better analgesia compared with other conventional

methods such as systemic opioids and inhalation analgesia. However, there are still concerns regarding its effects on the course and outcome of labor. Several studies investigating the association between EDA and Cesarean section have not resolved the issue.¹⁻⁵ Two previous reports found EDA prolonged the course of labor and increased the incidence of operative delivery for dystocia.^{1,2} However, other studies failed to confirm the side effects.³⁻⁵ All of these studies involved patients with spontaneous onset of labor and the effect of early administration of EDA on induced-labor

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patients have not been reported. The aim of the present study was to evaluate the effect of early EDA administration on drug induced-labor in nulliparous patients. We compared the obstetric outcome, including the incidence of Cesarean section and operative vaginal delivery in nulliparous parturient receiving EDA with that of parturient receiving entonox or intramuscular pethidine.

Materials and Methods

This observational study was approved by the Hospital Clinical Research Ethics Committee. Nulliparous parturients receiving induced-labor over a 24 months period were eligible for the study. Patients who were medically unfit for EDA or pregnancy complications that require immediate Cesarean section were excluded.

Induction of labor

Induction of labor was defined as artificial or spontaneous rupture of membrane before spontaneous onset of labor. It was commenced initially with prostaglandin E₂ vaginal suppository the night before induction. Labor was augmented according to the active management of labor protocol until adequate uterine contraction and progressive change of the cervix were achieved or maximal dose of syntocinon was used.⁶ Patients were monitored by continuous cardiotocogram (CTG) and intrauterine pressure monitoring was also applied in all parturients with previous Cesarean section.

Analgesic Management

All parturients were offered with the various methods of analgesia. This included EDA, entonox or intramuscular pethidine. The choice of analgesia was not interfered by obstetric, anesthetic or administrative reasons. For parturients requesting EDA, it was performed when labor was still in the latent phase in a standard fashion. All patients received oral ranitidine 150 mg and sodium citrate 0.3M 20 ml. A bolus of fluid 15 ml/kg of

Hartmann's solution (Baxter Healthcare, Deerfield, IL) was infused over 20 minutes as preload. EDA was performed in the left lateral decubitus position. Epidural space was identified by either loss of resistance to air or saline at the L_{2/3} or L_{3/4} intervertebral space. An 18G epidural catheter was introduced through a 16G Tuohy needle (Braun, Melsungen, Germany). We inserted a catheter with a length of 3-4 cm left inside the epidural space. The position was tested with 3 ml of lignocaine 2%. EDA was commenced with a bolus dose of bupivacaine 0.25%, 5-10 ml after a negative test. EDA was maintained with bupivacaine 0.0625% and fentanyl 2.5 µg/ml mixture running at 8-15 ml/h. Additional bolus of bupivacaine 0.25%, 5-10 ml, was given so that sensory block at T₁₀ bilaterally was achieved or at request by the parturient. When EDA was not considered, entonox (50% nitrous oxide and 50% oxygen) inhalation analgesia and/or pethidine 1.5 mg/kg intramuscularly were given according to the preference of the parturient. The subsequent obstetric course was managed according to protocol.⁶

Obstetric outcomes including operative vaginal delivery and Cesarean section were recorded. Operative vaginal delivery using vacuum ventouse was performed when the second stage was longer than one hour. Cesarean section was undertaken when there were persistent CTG abnormalities suggestive of fetal distress or failure to progress despite adequate augmentation with syntocinon infusion.

Statistical analysis

Maternal and fetal characteristics were compared between groups using unpaired *t* test. Indications for induction of labor, operative vaginal delivery and Cesarean section were compared between groups using Fisher exact test. Logistic regression with backward stepwise elimination was used to model the relation between risk factors for operative or Cesarean delivery and the final obstetric outcome. We reported the odds ratio (95% confidence intervals, CI) for the risk of Cesarean delivery

and operative delivery for each indication of induction of labor. Probability values less than 0.05 were considered significant.

Results

During the 24 months, 971 (10.1%) deliveries were induced. Of these, 227 (23.4%) received EDA (epidural group), 736 parturients (76.4%) received conventional analgesia (conventional group) with entonox and/or pethidine intramuscularly. Maternal and fetal characteristics are summarized in Table 1. Maternal age, birth weight and Apgar score at 1 and 5 minutes were similar between the two groups. The indications for induction of labor were listed in Table 2. The incidence of premature rupture of membrane was significantly higher in the conventional group, 21.4%, compared with the epidural group, 12.2%, $P < 0.001$. However, the incidence of intrauterine growth retardation was higher in the epidural group (11.8% *vs* 6.9%, $P < 0.05$). Logistic regression showed that EDA is an independent risk factor for operative vaginal delivery but did not increase the incidence of Cesarean section. However, intrauterine growth retardation appeared to reduce both incidences of operative vaginal and Cesarean delivery. Therefore, EDA increases the risk of operative delivery by 1.54 times and pregnancy with intrauterine growth retardation reduces the incidence of operative

delivery by 55%.

All EDA were placed successfully. There was no major complication during EDA. Three parturients had dural puncture during EDA placement, but none developed post-dural puncture headache. Catheters were replaced at a more cephalad level. There was no unilateral block and all parturients were satisfied with the method of analgesia. The mean (\pm standard deviation, SD) total dose of bupivacaine and fentanyl used were 176.5 ± 40 mg and 99.2 ± 45 mg, respectively. The dose of epidural agents did not correlate with obstetric outcome. Two patients had transient obturator neuropathy and another patient developed femoral neuritis. Patients who had parathesia over the appropriate dermatomal distribution and were carefully managed by experienced neurologists. Symptoms subsided within two weeks in all parturients and no sequel was documented.

Discussion

This observational study was carried out in a major regional hospital with over 5,000 deliveries per year. The incidence of Cesarean section was 20.3% and that for operative vaginal delivery was 11.7%. These incidences were comparable to the other major obstetric units in Hong Kong. The nulliparas as a group had a

Table 1. Maternal and fetal characteristics.

Variables	Epidural group (n=227)	Conventional group (n=744)
No. of patients	227	744
Age (year)	28 (17-24)	27(15-44)
Maturity (weeks)	40 (34-42)	40 (24-44)
Birth weight (kg)	3.2 (2.1-4.7)	3.2 (0.5-4.6)
Apgar score at 1 minute	7.9 (5-9)	7.6 (0-10)
Apgar score at 5 minute	8.9 (6-10)	8.7 (0-10)

Values are median (range)

Table 2. Indications for induction of labors.

Indications	Epidural group	Conventional group
No. of parturients	227	736
Post-term	65 (26.5)	202 (24.3)
APH	37 (15.0)	116 (13.9)
Hypertension	31 (12.7)	82 (9.9)
PROM	30 (12.2)	178 (21.4)**
IUGR	29 (11.8)	57 (6.9)*
Others	45 (18.4)	156 (18.8)

Values are *n*, (%); APH = antepartum hemorrhage; PROM = premature rupture of membrane; IUGR = intrauterine growth retardation.

P* < 0.05, *P* < 0.001 compared with epidural group

higher incidence of operative vaginal delivery (20.7%) but a lower incidence of Cesarean section (14.7%). In this study we evaluated the effect of EDA as an independent risk factor for operative vaginal delivery or Cesarean section. Our data suggested that EDA with bupivacaine 0.0625% and fentanyl 2 µg/ml, when administered to patients undergoing induction significantly increase the incidence of operative vaginal delivery but not Cesarean section. Previous studies have examined parturients with uncomplicated pregnancy with spontaneous onset of labor. But there are few data on nulliparas with induced labor. Rojansky *et al* examined the effect of EDA on the outcome of induced labor with all parity.⁷ In a retrospective database of 210 parturients, they showed that EDA prolonged the duration of labor and

increased the incidence of operative vaginal delivery. However, Cesarean section was not common and intrapartum complications were reduced. Traditionally, nulliparous parturients are associated with higher risk of operative delivery. Furthermore, retrospective data have shown that Cesarean delivery were more common in nulliparous patients who had elective induction of labor compared with spontaneous labor.^{8,9} Thus, it would be important to separate the various risk factors for operative delivery in the nullipara. Our data confirmed that EDA increases operative vaginal delivery in the nullipara as in the multipara.

Early reports suggest possible adverse effects of EDA on uterus contraction.¹⁰ It is thought that pelvic parasymphathetic block slows

Table 3. Adjusted relative odds (95% confidence intervals, CI) of risk factors for Cesarean section and operative delivery

Risk factors	Cesarean section		Operative delivery	
	Odd ratio	95%CI	Odd ratio	95%CI
Post-date	1.1	0.8-1.4	1.3	0.9-1.8
Hypertension	1.2	0.8-1.8	1.0	0.7-1.6
DM	1.1	0.5-1.8	1.0	0.6-2.0
APH	0.9	0.6-1.3	0.8	0.5-1.1
IUGR	0.5	0.3-0.8	0.4	0.3-0.7
EDA	1.3	0.9-1.8	1.5	1.1-2.1

DM = diabetes mellitus; APH = antepartum hemorrhage; IUGR intrauterine growth retardation; EDA epidural analgesia

down uterine contraction and cervical dilation through a decrease secretion in endogenous oxytocin, known as the Ferguson reflex.¹¹ Large crystalloid preload may also adversely affect labor.¹² Motor block and loss of the bearing-down reflex are important for the second stage and may lead to operative delivery.¹³ In a recent retrospective study, Liebermann *et al* showed that in term nulliparas with spontaneous labor, Cesarean section was more common in the epidural group (168 of 991, 17%) compared with that in the non-epidural group (30 of 142, 4%). Using logistic regression analysis, they were able to show that parturients receiving EDA were 3.7 times more likely requiring Cesarean section (95%CI: 2.4-57). Risk is higher when EDA was administered earlier in labor, but there was still a twofold increase in the incidence of Cesarean delivery regardless of the dilation and station of cervix at the time of administration of EDA.¹⁴

Retrospective studies of this kind were known to be biased from intrinsic selection problem. Another way of looking at the problem is by impact study. A number of impact studies examining the incidence of operative deliveries before and after the introduction of an epidural service found no increase in the total dystocia, although Cesarean delivery for dystocia were more common in patients with EDA.¹⁵⁻¹⁸ It has been postulated that women who request EDA often have abnormal painful labor and this may be more prone to Cesarean delivery (26% *vs* 0-7%, $P = 0.01$).¹⁹ The reason that dystocia is likely an association rather than a result of the use of EDA remains unclear and its impact on Cesarean delivery is more likely altered by obstetric practices and intervention.¹⁸

Apart from the retrospective studies, six randomized controlled trials have been conducted in the States. All the trials involve women with spontaneous onset of labor. There are more studies refuting the association between EDA and Cesarean delivery^{3-5,20} than supporting it.^{1,2} Definitive conclusions are difficult to draw because there are major

differences in the population studied, the epidural technique and the obstetric management protocol used. Non-compliant and crossover rate are common problems. Self-selection bias may exist in those patients who initially agree to enter into the randomization process. Thus, patients who have rapid progression of labor on admission may not want to be admitted into the study.²¹ This may increase the number of parturients with potentially more difficult labor into the study. Crossover and non-compliant from the opioid to the EDA can be as high as 30% to 50%.²⁴ These patients are usually more painful with protracted labor,²² and hence are at high risk of operative delivery.¹⁹ The use of "protocol compliant" analysis may not valid as a significant portion of patients with potentially difficult labor from the opioid group is omitted. The use of "intention to treat" analysis probably represents the other extreme in examining this problem. It provides a more valid estimation of treatment effect as deviations from protocols often happen in routine clinical practices.²³ If both the "intention-to-treat" and "protocol compliant" analysis come to the same conclusion, the strength of the conclusion is very much increased.²⁴

The use of active management protocol in labor has decreased the overall incidence of Cesarean delivery for dystocia in a controlled clinical trial.²⁵ The protocol described by O'Driscoll *et al* consists of early amniotomy, frequent cervical examinations and early initiation of syntocinon infusion once dystocia is suspected.²⁵ This frequently associates with a higher demand of EDA. In nulliparous women at term, when the incidence of operative delivery is adjusted for the amount of syntocinon use, the difference has become insignificant.²⁷ Another controversial obstetric factor is the criteria for diagnosing dystocia. Physicians' preference to operate for dystocia depends on a number of factor.²⁸ Institution of strict guidelines for the diagnosis of dystocia in community hospitals has been shown to be associated with a lower frequency of Cesarean

delivery for dystocia in nulliparous.²⁹ In a multivariate analysis, duration of labor of more than 20 hours, birth weight more than 4 kg, and higher dose of local anesthetic are more predictive of dystocia.³⁰ Altering epidural technique with less use of local anesthetic may be helpful in lowering the incidence of Cesarean and operative vaginal delivery.³¹ In a large prospective randomized trial, bupivacaine 0.125% with sufentanil 10 µg was associated with a lower incidence of operative vaginal delivery and Cesarean section compared with bupivacaine 0.25% with adrenaline using intermittent bolus technique.³² A meta-analysis also suggested EDA with low dose bupivacaine may increase the risk of syntocinon augmentation but not of Cesarean section.³³

In the current study, all the epidural catheters were placed early in the latent phase of labor. Early reports in spontaneous labor suggests that placement of epidural catheter should be delayed until the active phase has began.^{1,34} There are reports suggesting the contrary.³⁵ Chestnut *et al* using vigorous inclusion criteria and randomization process, had shown that early administration of epidural analgesia (cervix is at least 3 but less than 5 cm) did not prolong labor, increase the incidence of syntocinon augmentation, or increase the incidence of operative delivery, when compared with intravenous nalbuphine followed by late administration of epidural analgesia, in nulliparous women who were in spontaneous labor at term.³⁶ Similar findings were shown in women receiving syntocinon.³⁷ Among women in spontaneous labor, it seems reasonable to delay administration of epidural analgesia until labor is established. However, it is unnecessary to await for an arbitrary cervical dilatation of 5 cm.³⁸ There are no data for induced labor.

The practice guideline in our hospital defined prolonged second stage as more than one hour disregard of the type of labor analgesia and parity. Delayed pushing as advocated by the American College of Obstetricians and Gynecologists is not practiced, and two small

studies failed to show a significant improvement in the operative delivery rate after adopting the policy of delayed pushing in their hospitals.^{39,40}

Most literature supports an association between EDA and increased incidence of Cesarean section. The question has been whether the increase in operative delivery is related to the effects of EDA itself or to the characteristics of women who elect to receive epidural analgesia. In evaluating whether abnormal or difficult labor may be responsible for both the request for EDA and Cesarean delivery, one must consider what proportion of the population should be categorized as having difficult labor. There are the parturients with "slow progress". In these cases, Cesarean section are deemed necessary no matter what induction methods was used or whether EDA is administered. Thus, it remains important to consider the role of labor characteristics as potential cofounders. There are many limitations in our study. Even if it were shown that the contemporary use of EDA results in a small increase in the Cesarean rate, it is unclear how many women, who now choose FDA would voluntarily change for nothing or intravenous opioid. The decision to perform a Cesarean delivery is often subjective. Many factors have been shown to influence clinical decision to proceed with Cesarean delivery,⁴¹ Physician convenience,⁴² reimbursement practices,⁴³⁻⁴⁵ perception of medico-legal risk,⁴³ and the differences in labor management practices alters Cesarean delivery rates.⁴⁷ The decision to intervene in induced labor is more complicated and the incidence of operative delivery is found to be higher than in spontaneous onset of labor.⁸⁻⁹ The results in previous studies and our data suggest that EDA is an independent risk factor for operative delivery, and its impact is likely to be modified by other obstetric practices and interventions.¹⁸ Although the causal nature of this association remains unclear and should be examined in more vigorous randomized trial, prenatal care providers should discuss the risks and benefits of EDA with their patients during pregnancy to assist parturients in making

informed decisions about the use of pain relief during labor.

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Congratulations!

Dr Jacobus Kwok Fu NG was awarded the *Sir Patrick Manson Gold Medal* by the University of Hong Kong, 2005/06 for his outstanding MD thesis entitled "Perioperative Haemostatic Monitoring with Thromboelastography".

Drs Polly Lai Mei CHAN and Chun Yin WAT were awarded the *Merit Certificates* by the Australian and New Zealand College of Anaesthetists for their outstanding performances in the Primary Examination, July/September 2006.

Efficacy of Adding Morphine to Bupivacaine in Dorsal Penile Nerve Block for Post-Circumcision Analgesia

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SUMMARY

In this randomized double-blind study, we evaluated the analgesic efficacy of adding a small dose of morphine to bupivacaine during dorsal penile nerve block (DPNB) in children undergoing day stay circumcision. After induction with general anesthesia, 90 healthy boys between 4 to 12 years of age were randomly allocated to one of the three groups. Group I received DPNB with 0.25% bupivacaine and morphine 0.05 mg/kg. An intramuscular injection of normal saline 0.5 ml was also given; Group II received DPNB with 0.25% bupivacaine and saline 0.5 ml, an intramuscular injection of morphine 0.05 mg/kg was administered; Group III received DPNB with 0.25% bupivacaine and saline 0.5 ml, with intramuscular injection of saline 0.5 ml. Adequacy of analgesia was assessed at 10 min intervals in recovery room, hourly in ward and then 12-hourly at home for 24 hours, using a facial affective scale. We also recorded the consumption of supplemental analgesic and the time of first request for analgesic. Patient characteristics and duration of surgery were similar in all three groups. There were no significant difference in pain score and the total dose of analgesics required between the groups. The time of first request for analgesic was longer in penile morphine group compared to patients receiving intramuscular morphine, but was similar to placebo group. Time of first voiding (3.9 hours) was significantly longer in the penile morphine group and the incidence of nausea and vomiting (44.7%) was however higher in the intramuscular morphine group. This study did not demonstrate any additional efficacy in the control of post-circumcision pain with perineuronal morphine.

Keywords Analgesic: Morphine; Anesthetic: Local bupivacaine; Analgesic technique: Dorsal penile nerve block

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Central analgesic effect of opioids is well documented.¹ Recently, the existence of peripheral opioid receptors has been

demonstrated morphologically and functionally.²⁻⁵ However, the role of these receptors is still unclear. Although intra-articular morphine for knee arthroscopy and local morphine for the control of chronic pain has been shown useful in some studies,⁸⁻¹⁰ results from direct perineuronal morphine injection in other reports for post-operative pain control had been rather disappointing.¹¹⁻¹²

We conducted a randomized, double-blind investigation to evaluate the efficacy of perineuronal opioid administration as an alternative method of acute pain management. We added a small dose of morphine to

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Figure 1. Oucher's facial affective scale for pain assessment.¹⁸

bupivacaine during dorsal penile nerve block (DPNB) for post-operative pain relief after circumcision.

Patients and Methods

The study was approved by local Ethics Committee. Written informed parental consent was obtained. Ninety children of American Society Anesthesiologists physical status class 1, aged between 4 to 12 years, undergoing circumcision as day case surgery were recruited into the study. All children received EMLA cream (Astra Pharmaceuticals, Sodertalje, Sweden) over the dorsum of both hands 90 minutes before operation. No other premedication was prescribed. Standardized anesthetic technique consisted of inhalational induction using halothane in nitrous oxide and oxygen was administrated to all patients. Patients were allowed to breathe spontaneously and anesthesia was maintained with halothane 1-1.5% in nitrous oxide and oxygen. The inspired oxygen concentration was set as 30%.

After induction, DPNB was performed using the paramedian approach with a 23 gauge sharp needle by one of the authors. Two separate injections at 10:30 and 1:30 o'clock position of the penis were given.¹³ All children received 2 ml of bupivacaine 0.25% every three years of age,¹⁴ together with an intramuscular injection of either preservative free morphine or saline at deltoid region. The children were randomly allocated to one of the three groups. In group I, preservative free morphine 0.05

mg/kg was added to bupivacaine and 0.5 ml normal saline was given intramuscularly.¹⁵ In group II, the child received similar volume of 0.25% bupivacaine and intramuscular morphine injection of 0.05 mg/kg diluted to 0.5 ml with saline. In group III, the child received 0.25% bupivacaine as well as an intramuscular injection of 0.5 ml normal saline. The attending anesthetist was blinded to the nature of the solution given.

Upon completion of surgery, the children were observed in the recovery room for at least 30 minutes before discharge to the ward. Upon arrival, they were allowed to eat and drink as soon as they wished. Apart from the routine observations, pain assessment was made at 10 min intervals in the recovery room and then hourly in the ward by a trained nurse observer who was unaware of the drugs given to the children. All children were asked to report any sensation or pain after surgery. Intensity of pain was graded¹⁶⁻¹⁷ by the Oucher's affective scale.¹⁸ Six faces were presented in an ordered sequence from the least to the most distressed (Figure 1). This pain scale was then converted to a numerical scale from 0 to 10. The affective scale was shown to all patients pre-operatively. Any pain score of 4 or above in the recovery room was defined as a failure of the block. Intravenous fentanyl 2 µg/kg or paracetamol suppository 20 mg/kg was given as rescue analgesic. The time from end of surgery to time of first request for analgesic and the time of first micturation were also recorded. Side effects like nausea and vomiting, and respiratory depress-

Table 1. Patient characteristics and duration of surgery.

	Penile Morphine	IM Morphine	Placebo
No. of patients	27	30	29
Age(year)	5.93 ± 1.8	6.5 ± 2.2	6.21 ± 1.8
Body Weight (kg)	21.5 ± 6.3	23.5 ± 7.9)	24.3 ± 10.4
Duration of surgery (min)	18.3 ± 6.7	17.3 ± 5.4	17.2 ± 3.4

Values are mean ± SD

ion were noted and was treated accordingly. Nausea and vomiting was treated by prochlorperazine 5 µg/kg while respiration depression was initially managed with supplemental oxygen. Respiratory depression was defined as respiratory rate less than 8 in child over 10 years of age and less than 14 in child below 10 years old.¹⁹

Before discharge from the hospital, every child was given a paper ruler with the same facial affective scale for pain assessment at home. Follow-up over telephone was conducted at 12 and 24 hours after operation to assess the subsequent post-operative pain. Syrup paracetamol (10 mg/kg) was prescribed for analgesia at home. Frequency and the total dose of paracetamol taken were recorded at follow-up.

Statistics

Patient characteristics, vital signs and analgesic efficacy were compared among groups using analysis of variance. Post-hoc comparison

was performed by Tukey's multiple comparison test. Pain scores were compared among groups by Kruskal-Wallis test. The incidence of adverse effects was compared using χ^2 statistic. The time to receive the first rescue analgesic was calculated by Kaplan-Meier model and was compared among groups using log-rank test. Data were presented as mean ± standard deviation (SD) or median (range), as appropriate. A two-tail *P* value of less than 0.05 was considered significant.

Results

A total of 30 children were studied in each group. Age, body weight, duration of surgery and dose of bupivacaine given were similar among groups (Table 1). There were four children failed blocks (failure rate = 4.4%; penile morphine, *n* = 3 in and placebo group, *n* = 1). The mean pain score in each group from recovery up to 24 hours after operation is shown in Figure 2. The mean pain score at rest was less

Table 2. Analgesic Efficacy.

	Penile Morphine	Intramuscular morphine	Placebo	<i>P</i> value
No. of patients	27	30	29	
Time to first request of analgesic (hour)*	24 (3-24)	9.5 (4-24)	10.5 (3-24)	
Children requiring supplemental analgesic				
At ward (number (%))	2 (7.5%)	6 (20%)	6 (21%)	0.32
At home (number (%))	13 (48%)	22 (73%)	15 (52%)	0.10
Paracetamol dose:				
Total (mg)	215 ± 263	273 ± 200	243 ± 278	0.68
At ward (mg)	18.5 ± 67	45 ± 95	45 ± 90	0.42
At Home (mg)	198 ± 247	227 ± 168	198 ± 253	0.84
Pain score at First urination	4.0 ± 2.7	2.9 ± 2.8	3.3 ± 2.7	0.32

Values are mean ± standard deviation and *median (range)

Table 3. Side Effects.

	Penile morphine	Intramuscular morphine	Placebo	<i>P</i> value
No. of patients	27	30	29	
Incidence of nausea and vomiting	12 (44%)	20 (67%)	9 (31%)	0.02*
Time to void (hour)	3.85 ± 2.0	2.8 ± 1.3	3.2 ± 1.6	0.05 [#]

Values are mean ± SD or number (%)

*Comparison between intramuscular morphine and placebo.

[#]Comparison between penile morphine and placebo.

than 4 throughout the entire 24 hours after the surgery in all children. The pain score in the recovery and during the micturation was higher in the penile morphine group (Table 2). Thereafter, the analgesic effect of penile morphine improved and was better than those receiving intramuscular morphine or placebo at the third and fourth postoperative hour. Nonetheless, the difference did not reach statistical significance.

Two out of 27 children (7.4%) in penile morphine group requested rescue analgesic in ward, whereas 6 out of 30 (20%) in the intramuscular morphine group and 6 out of 29 (21%) in the placebo group required supplemental analgesic. The number of children who remain free from requesting supplemental analgesics decreased with time (Figure 3). At the end of the 24 hour period, 14 out of 27 (51.9%) in

the penile morphine group, 9 out of 30 (30%) in the intramuscular morphine group and 13 out of 29 (44.8%) in the placebo group did not require any analgesic throughout the study period. The median time from end of operation to time of first request of analgesic was more than 24 hours for penile morphine group, and was longer than intramuscular morphine group, 9.5 hours and the placebo group, 10.5 hours (log rank test, $P = 0.02$) but not between the intramuscular and placebo groups (Figure 2). The total dose of paracetamol needed and the duration of analgesia were similar among groups (Table 2). Overall, 41 children had nausea and vomiting (47.7%), 12 in the penile morphine group (44%): 20 in the intramuscular morphine group (66.7%) and 9 in the placebo group (31%, $P < 0.05$). The total amount of droperidol and ondansetron used to treat the symptoms were similar among groups. There was no respiratory depression

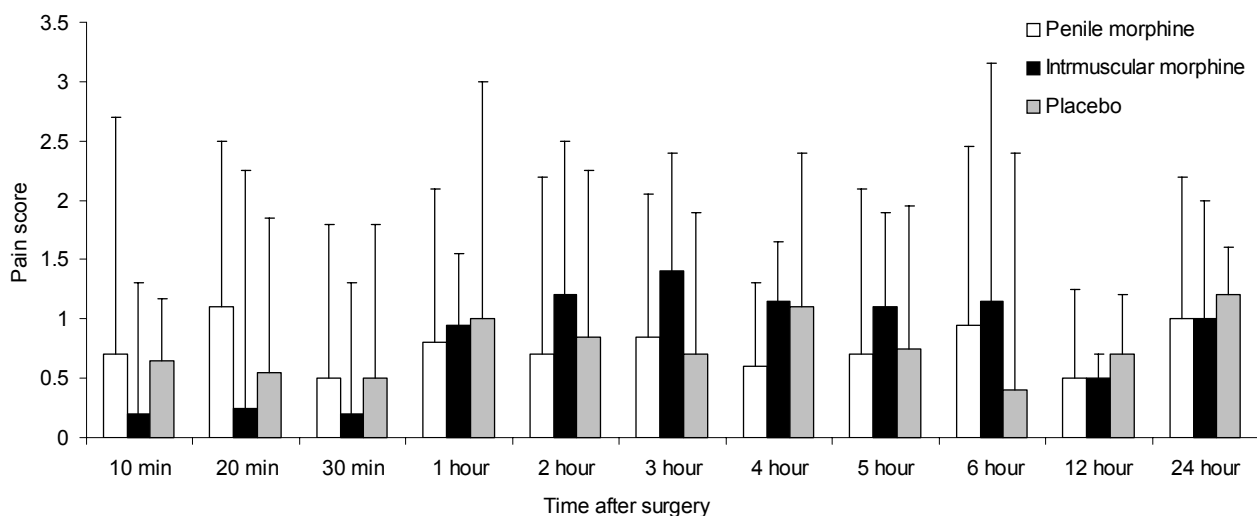
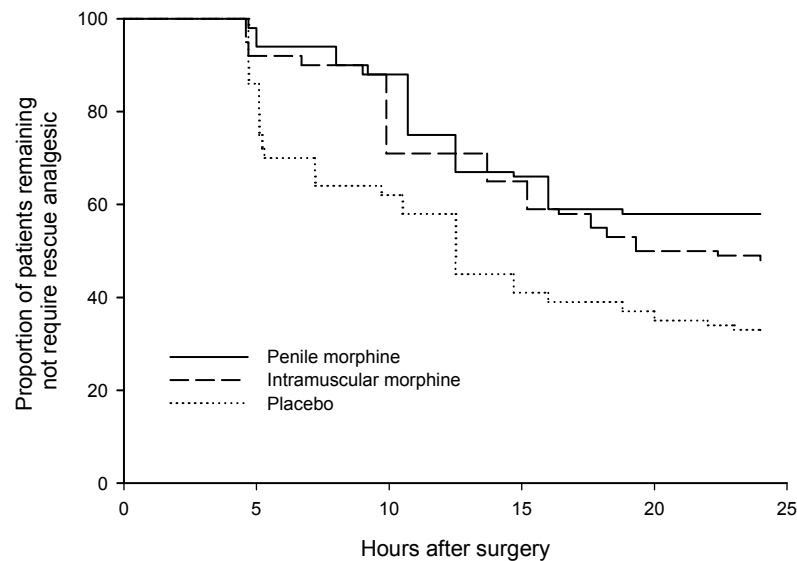
Figure 2. Pain score at rest at surgery.

Figure 3. Kaplan Meier Estimates of patients remained pain free (not requiring analgesic) after surgery.

associated with DPNB.

Discussion

Circumcision is associated with significant postoperative pain (91.7%).²⁰ Various techniques for pain relief have been used, each with its own limitations.²⁰⁻²² Drug of long analgesic duration would be beneficial for this group of patients. From studies involving the use of perineuronal morphine,²³⁻²⁴ long duration of analgesia had been reported. The most promising result were observed in intra-articular morphine injection.^{6,7} Our study was designed to evaluate the analgesic effect of intramuscular morphine as an active control for penile morphine. Penile morphine has to demonstrate significant analgesic effect when compared with both the placebo and intramuscular morphine groups in order to establish evidence for peripheral analgesia. An alternative control using penile morphine without penile bupivacaine was not included for obvious ethical reasons.

DPNB is one of the effective methods for providing post-circumcision analgesia which can last for 6 to 24 hours.²² In our study, the median duration of analgesia for the children receiving DPNB with bupivacaine alone was

10.5 hours (range 3-24) and 44.8% of these children did not require any supplemental analgesic for up to 24 hours. The failure rate of DPNB in our study was 4.4% which is comparable to previous reports (4-8%).²¹⁻²² The addition of morphine, either systemically or perineuronally did not affect the pain score nor total analgesic consumption. The absence of statistically demonstrable analgesic effect with intramuscular morphine can be explained from the small dose of intramuscular morphine (0.05 mg/kg). The usual intramuscular dose of morphine is 0.1-0.2 mg/kg. We believe a dose of 0.05 mg/kg can be regarded as systemically inactive and inadequate to provide analgesia to all children.²⁵ The analgesic effect of such a low dose may also be masked by the very effective DPNB since the median duration to first request for supplemental analgesic was 10.3 hours in the placebo group. The high incidence of nausea and vomiting among children receiving intramuscular morphine (66.7%) compared with the placebo group might contribute to the lack of analgesic efficacy of intramuscular morphine.¹⁶

Nausea and vomiting could exaggerate the pain score and increase the perception and physiological response to pain.¹⁶

Interestingly, children receiving penile morphine had the highest pain score among the three groups initially in the recovery room. Incidentally, penile morphine group also carried a higher incidence of failed block (10%). We have therefore evaluated, the possibility of a pharmacokinetic drug interaction between morphine and bupivacaine causing a delay in onset of action of bupivacaine. As predicted by the Henderson-Hasselbalch equation, changes in pH would affect the degree of ionization and hence the speed of onset of action. Factors that create local acidosis retards the rate of diffusion of local anesthetic to the nerve by decreasing the amount of unionized form.²⁶ In order to substantiate this hypothesis, the pH of 0.25% bupivacaine with or without addition of preservative free morphine was measured using a pH meter. When 0.1 ml of preservative free morphine (pH = 3.3) was mixed with 0.25% bupivacaine 2 ml, the resultant pH decreases from 5.39 to 5.06 causing the unionized fraction to change from 0.2% to 0.09%. Since only the unionized fraction can diffuse through nerve membrane, the decrease in unionized fraction to 0.09% might have an effect on onset of action. It is likely that the normal buffering capacity of the tissues could handle such a minute change, but the short operative procedure may unmask any effect of delay in onset. There are few reports in the literature to address this issue. Indeed, many experiments or clinical trials only focus on how alkalinization of local anesthetic to hasten the onset and duration of action.⁷⁻²⁸ Further studies in this area are needed.

Perineuronal injection of penile morphine in this study failed to demonstrate significant analgesic effect. However, as the dose of morphine administered in this study was small, it is plausible that by increasing morphine dose may enhance the analgesic effect.

Finally, the role of the inflammation may be important. Inflammation stimulates *de novo* synthesis and axonal transport of opioid receptors to the periphery.^{5,29-33} However, the time needed for this axonal transport is in term

of days; which outlasts the duration of action of a single dose of perineuronal morphine given preoperatively. The delay in upregulation might partly explain for the difference in efficacy to perineuronal morphine between acute and chronic pain syndrome. As axonal transport could not explain the immediate anti-nociceptive effect occurring within minutes to hours after the start of inflammation, it is possible that the early analgesic effect is mediated through disruption of perineurium and subsequent facilitated transport of opioid receptors. In the close proximity to the inflamed tissue, intra-articular morphine injection could facilitate the access of drug to the opioid receptors and result in prolonged analgesic effect. On the contrary, perineuronal opioid deposition along the nerve trunk, which is at a distance from the site of inflammation would show little efficacy.

In conclusion, the addition of morphine to bupivacaine in DPNB has no additional benefit in the control of post-operative pain after circumcision.

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Abstracts presented at the Combined Scientific Meeting 2006

From the Heart and Beyond

Hong Kong Convention and Exhibition Centre, 18-19 November, 2006

F001

COX-3: Biochemistry, Pharmacology, Relevance to Paracetamol and Future Prospects

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Objective: There are two commonly known cyclooxygenase – COX-1 and COX-2. For years researchers have postulated on the existence of COX-3 and the mediated actions of paracetamol. Recently evidence of a new cyclooxygenase, in the form of RNA, is discovered in canine brain cells. It is a splice variant of COX-1 and is called cyclooxygenase-3 (COX-3). This presentation is a review on the recent developments of this new enzyme and its relevance to paracetamol.

Methods: Sources for this review include Medline 1980-2005 (searched under the following Medical Subject Headings: Cyclooxygenase, COX-3, Paracetamol, acetaminophen, splice variants) and PubMed (<http://www.ncbi.nlm.nih.gov/entrez>) 1980-2004. The bibliographies of the included studies were also scanned for additional references (reference dredging).

Results and Conclusion: Canine COX-3 is more sensitive to paracetamol than COX-1 and COX-2 even at low concentrations of substrate. Nonetheless, its exact pathophysiological role is still unknown. There is little data on human COX-3, especially on the enzyme product. Currently the only evidence of COX-3 comes from Simmons' laboratory. There is a lack of confirmation and extension of these results in other labs. A functional COX-3 in human is yet to be isolated. The identification of additional functional cyclooxygenases in the generation of bioactive autacoids can lead to the development of more selective drugs. Further studies on the characterisation of COX-3 in humans and its function are required. The discovery of COX-3 warrants the search for further COX variants and other paracetamol sensitive antipyretic proteins.

F003

The Analgesic Effect of Dexmedetomidine in Open Abdominal Liver Surgery

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Objective: Open abdominal liver surgery is associated with much pain and morbidity. The α -2 agonist dexmedetomidine may have beneficial hemodynamic and anesthetic sparing effects and this study aimed to determine whether its use in this setting results in opioid sparing and/or pre-emptive analgesia.

Methods: 30 adult patients undergoing elective liver surgery were randomly allocated to receive either dexmedetomidine (D group; n=15, loading dose 1 mcg/kg over 10 minutes and maintenance infusion at 0.4 mcg/kg/hr) or placebo (P group; n=15, normal saline) administration commenced before skin incision. Induction and maintenance with isoflurane were standardized. A remifentanyl infusion was used for intra-operative analgesia and morphine (0.1mg/kg) for initial postoperative analgesia. Patient-controlled intravenous morphine (PCA) was used post-operatively. Primary endpoints were sedation score, morphine consumption, pain numerical rating score (NRS), and the time to first request of morphine in the recovery room. Our secondary endpoints were total morphine consumption and NRS at regular intervals in the first 48 hours after surgery. Other data recorded included intra-operative hemodynamics, remifentanyl consumption, opioid side effects, analgesic rescue and anti-emetic administration.

Results: Group D required significantly less morphine [(median) 8 mg] in the recovery room than group P [13 mg]. Time to first dose of morphine was also significantly shorter in group D (77 vs 35 hours). Pain scores were not different in the recovery room. In the first 48 hours, there was no significant difference in total morphine consumption and pain scores among the two groups. There was no observed difference in the use of anti-emetics and rescue. The incidence of opioid side effects was the same.

Conclusion: Intra-operative use of dexmedetomidine in open liver surgery prolongs the time to first request of analgesia but does not have a prolonged opioid sparing effect.

F004**Cerebral State Index to Predict Patient Responsiveness During Sevoflurane Anesthesia. A Comparison With Bispectral Index**

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Introduction: The cerebral state index (CSI) is a novel indicator of anesthetic drug effect. It combines several electroencephalographic (EEG) parameters using the adaptive neuro-fuzzy inference system.¹ The purpose of this study is to compare the accuracy of CSI with bispectral index (BIS) to predict patient response during sevoflurane anesthesia.

Methods: This study was approved by ethics committee. Twenty patients (12 F: 8 M), ASA 1-2, aged 20-47 years, scheduled for general surgery gave written informed consents. Patients received increasing concentrations of sevoflurane via a tight fitting face mask, until they lost response to verbal command. CSI was measured by a cerebral state monitor (Danmeter, Odense A/S, Denmark), using Fpz-A1 montage. BIS (version 3.4) was recorded by a right frontal BIS-XP sensor, and was computed online by an A-2000 monitor (Aspect Medical, Newtown, MA). Ten minutes was allowed for equilibration before each step change (0.1%) in sevoflurane concentration. End-tidal CO₂ concentration was maintained at 3.5-4.0 vol%. Patient response was assessed by an blinded observer using the modified Observer's Assessment of Alertness/Sedation (OAA/S) scale.² Loss of response was defined as OAA/S score ≤ 2 . Patient responses vs CSI or BIS were analyzed by logistic regression and sevoflurane concentration vs CSI or BIS was tested by nonlinear regression. The ability of CSI or BIS to detect OAA/S level was evaluated by prediction probability (PK, ranging from 0-1), PK of 1 indicates perfect prediction. Differences between indices were tested by Mann-Whitney test.

Results: Both CSI and BIS decreased with increasing concentration of sevoflurane. The correlation coefficients were -0.83 and -0.79 for CSI and BIS, respectively. The values at which 50% (95% CI) of patients failed to respond to verbal command were 72 (69-75) for CSI and 69 (66-73) for BIS. The PK (\pm SE) values indicates similar accuracy of CSI (0.89 ± 0.04) and BIS (0.87 ± 0.03) to predict OAA/S scale.

Discussion: During steady state conditions, we found that both CSI and BIS accurately detect the level of consciousness after sevoflurane anesthesia.

Reference:

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F005**Title of Presentation: Evaluation of the new Viewmax laryngoscope in a simulated difficult airway.**

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Background: We evaluated the learning curve and performance of the Viewmax laryngoscope during simulated difficult laryngoscopy in an intubation manikin (Laerdal Airway Management Trainer).

Methods: To determine learning curve, 25 anaesthesiologists without previous experience with Viewmax laryngoscope performed 10 successive intubations in an intubation manikin with normal airway. Time to intubation and failed intubation attempts were recorded. Another manikin was modified to enable comparison of Viewmax laryngoscope with Macintosh and McCoy laryngoscopes. Time to intubation, number of failed intubation attempts, modified Cormack and Lehane (MCL) laryngeal view grading, percentage of glottic opening (POGO score), use of gum elastic bougie and subjective rating of degree of difficulty were recorded.

Results: The learning curve for Viewmax laryngoscope showed progressive decrease in time to successful intubation and reached plateau at the sixth attempt. In simulated difficult laryngoscopy, Viewmax laryngoscope demonstrated significantly better laryngeal view than Macintosh and McCoy laryngoscopes in terms of MCL grading (Macintosh, $P = 0.01$; McCoy, $P < 0.01$) and POGO score (Macintosh, $P < 0.01$; McCoy, $P < 0.01$). Time required for intubation in simulated difficult laryngoscopy for Viewmax Laryngoscope was significantly longer than that for Macintosh ($P = 0.02$) and McCoy ($P < 0.01$) laryngoscopes. There was no significant difference in degree of difficulty, number of failed intubations and use of gum elastic bougie.

Conclusion: When compared with the Macintosh and McCoy laryngoscopes in a manikin, the Viewmax laryngoscope appears to improve the view of the larynx but requires a longer time for tracheal intubation.

F006**Intranasal Ketamine Premedication in Children***Assad Hussain**Department of Anaesthesiology, Queen Mary Hospital, Pokfulam, Hong Kong**Email: drassad@gmail.com*

Objectives: To study the efficacy, safety and appropriate dose of intranasal ketamine for premedication in paediatric patients.

Methodology: A double blind, placebo-controlled trial. 75 children were randomly allocated to receive intranasal ketamine 2 mg/kg (Group K2), ketamine 3 mg/kg (Group K3) or sterile saline solution (Group P) 30 minutes before operation (0.5 ml study solution in each nostril). Sedation and anxiolysis were evaluated at several time points using a sedation and cooperation scale, as were total analgesic requirements and adverse effects.

Results: Demographic data, discharge times and analgesia requirements were similar among the three groups. Compared to baseline values, children in the two ketamine groups became more acceptably sedated 10 minutes after premedication ($P < 0.01$), there was a trend towards improved conditions in group K3 from 20 minutes until prior to induction, and in group P conditions got significantly worse prior to and at induction ($P < 0.01$). On intergroup comparison, sedation conditions for group K2 were not better at any time. In group K3, however, children presented for anaesthesia with significantly better sedation prior to induction as compared with placebo. There was less resistance in group K3 to parental separation than in groups P and K2 ($P < 0.05$) and to monitor application than in group P ($P < 0.05$). Blood pressure and heart rate increased slightly throughout most of the study period in group K3, whereas in group P and K2 they were only elevated prior to, and at induction. A few children in both ketamine groups became heavily sedated.

Conclusion: Intranasal ketamine 3 mg/kg is better than 2 mg/kg or placebo for premedication in children and has minimal side effects.

F007**Low Dose Ketamine has No Preemptive Analgesic Effect in Patient Undergoing Thoracic and/or Lumbar Spinal Fusion Surgery***Frances Lui**Department of Anaesthesiology, Queen Mary Hospital, Hong Kong**Email: Lui_frances@hotmail.com*

Objective: A double-blind randomised controlled trial to evaluate the analgesic effect of low dose ketamine administered before and after skin incision in patients scheduled for elective thoracic +/- lumbar spinal surgery under general anaesthesia.

Methods: 60 patients scheduled for elective spinal surgery were randomly assigned to receive one of the three analgesia regimes. In group 1 (preoperative), Ketamine 0.2 mg/kg was administered before induction of anaesthesia. In group 2 (postoperative), Ketamine was administered after closure of surgical wound. In group 3 (control), normal saline was substituted both pre- and post-operatively. Wake up profile, duration for awakening and extubation were noted. Visual analogue score (VAS) during recovery and early postop days, duration for patient controlled analgesia (PCA) use, daily and total morphine consumption and side effects were recorded until PCA removed.

Statistical Methods: Demographic data were analysed by ANOVA and Chi-square test. Morphine consumption were analysed by Kruskal-Wallis test. Pain scores and side effects data were compared by Chi-square test.

Results: No significant result was found between groups with respect to total morphine consumption postoperatively (48.5 [29.5-63.8] vs 50.6 [30.4-65.5] vs 43.6 [32-66.1] mg for control, pre- and postoperative groups respectively), or duration of PCA use (48 [40.5-59.5] vs 43.5 [40-57] vs 43.5 [41-56.5] hours). Moreover no significant difference was observed in the median VAS in recovery (0-30min) or postop (24 and 48 hours).

Conclusion: Low dose Ketamine has no preemptive analgesic effect when given preincision or post wound closure in elective patients scheduled for thoracic and/or lumbar spinal surgery in early postoperative periods.

F008**Tracheal Tube Advancement During Fiberoptic Intubation: A Randomized Comparison of Three Techniques**

Yee Kwan Tang, *Matthew Chan, *PT Chui, *Tony Gin
Department of Anaesthesia, Grantham Hospital and *Department of Anaesthesia and Intensive Care, The Chinese University of Hong Kong
Email: yeekwan@graduate.hku.hk

Objectives: To compare the ease of advancement of a Parker Flex-Tip tube (PFT, Parker Medical, Englewood, CO) over a fibroscope with a standard tracheal tube at neutral position (0°) and rotated 90° counterclockwise (-90°) during orotracheal intubation in anaesthetized, paralyzed patients.

Methodology: We conducted a randomized controlled trial recruiting 120 patients scheduled for elective surgery requiring orotracheal intubation. Orotracheal intubation was performed using a fibroscope (outer diameter 3.8 mm) following induction of anesthesia. The fibroscope was randomly mounted with either a PFT or standard tracheal tube at 0° or -90° and was covered with a surgical drape. A blinded investigator recorded the difficulty in advancing the tracheal tube into the trachea. Ease of passage of the tracheal tube was compared among and between groups using Chi squared test and Fisher exact test respectively.

Results: Considerable difficulties were encountered in over two thirds of patients during the initial attempt of passing a standard tracheal tube in 0°. Success in tube advancement increased significantly when PFT was used or when the standard tracheal tube was turned -90° ($P < 0.001$). There was no difference in success rate between the PFT and the pre-rotated ETT tube ($P = 0.69$). Patients in the standard tracheal tube 0° group reported more severe hoarseness and sore throat ($P < 0.001$).

Conclusions: Both PFT and pre-rotation of standard tracheal tube by -90° improved tracheal tube advancement during fiberoptic-assisted orotracheal intubation. Considering the cost and availability of PFT, the simple technique of rotating the standard tracheal tube by -90° should be the standard practice.

F010**Combination Antiemetics: Combining Effects or Side-effects?**

Zoe YT Fu, Matthew Chan, Emily GY Koo, *KC Choi, Tony Gin
Department of Anaesthesia and Intensive Care, and Center of Biostatistics, The Chinese University of Hong Kong
Email: Zoe_fu2003@yahoo.com.hk

Introduction: Combining antiemetics has been popular for preventing postoperative nausea and vomiting (PONV) after general anesthesia. A number of studies have shown that the combination therapy produced better response. However, it is uncertain how the drugs interact when they are combined together. We performed a systematic review of the literature to determine the interaction between antiemetics from different classes.

Methods: From a search of the MEDLINE, EMBASE, the Cochrane Library and other relevant database, nineteen studies involving a total of 6,734 patients were identified that compared the antiemetic efficacy of a combination of two commonly prescribed antiemetics (including serotonin antagonists, antihistamines, metoclopramide, droperidol and dexamethasone) with either agent alone and placebo. We compared the observed incidence of PONV after drug combination with that predicted from additivity. This is calculated as the product of the individual drug response, normalized to that of the controls.

Results: Overall, the interaction between antiemetic agents was additive in nature. A separate analysis of adult and pediatric data did not demonstrate differences in the interaction effect. There were few studies reporting adverse events after drug combinations. The interaction for side effects was also additive.

Conclusions: In this meta-analysis, we demonstrated that a combination of two commonly administered antiemetics produced an additive effect for preventing PONV. At these dosages, there was no change in the side effect profile.

F012

Health-Related Outcomes of Patients Treated in A Multidisciplinary Pain Centre in Hong Kong

Cheryl Yeung

Department of Anaesthesiology and Operating Services, North District Hospital

Email: clsyeung@hotmail.com

Objective: To evaluate health-related outcomes and healthcare utilization of chronic non-malignant pain patients after a one-year management period at a multidisciplinary pain centre.

Methodology: Patients who attended the pain centre from April 2003 to December 2004 completed a questionnaire on pain and health-related instruments measuring quality of life (SF36), mood disturbance (HADS), pain catastrophizing (PCS) and self efficacy (PSEQ) at first attendance and again after one year of treatment. Treatment was multidisciplinary with a biopsychosocial approach. Health care utilization was evaluated by attendances at A&E, specialist clinics, allied health clinics, in-patient hospitalization and analgesic use. Wilcoxon signed ranks test was used for analysis with $P < 0.05$ considered significant. Results are reported as mean (SD).

Results: 259 patients completed the questionnaires. Average pain score decreased from 6.12 (1.78) to 5.68 (1.90), $P = 0.002$. SF36 domains that improved significantly were role physical ($P = 0.002$), bodily pain ($P < 0.0005$), vitality ($P = 0.008$) and social functioning ($P = 0.002$). Physical functioning, general health, role emotional and mental health did not show significant change. PCS score decreased 2.66 ($P = 0.008$). No significant change was shown in PSEQ or HADS. A&E attendance decreased 44% ($p < 0.0005$), hospital admission decreased 50% ($P < 0.0005$), and total out-patient clinic (specialist and allied health) attendance decreased 36% ($P < 0.0005$). Analgesic use decreased 27% ($P < 0.0005$).

Conclusions: Treatment at the multidisciplinary pain centre showed slight improvement in pain score, PCS, and some SF36 domains. In contrast, significant decreased healthcare utilization implies potential cost saving on the healthcare system.

F013

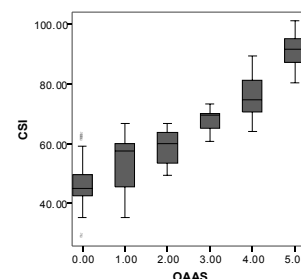
Validation of The Cerebral State Index During Cardiac Anaesthesia¹C Jordening, ²EW Jensen, ¹HLitvan¹Department of Anaesthesia and Intensive Care, Odense University Hospital, Denmark ²Cardiac Anesthesia Research Unit, Hospital Santa Creu i Sant Pau, Barcelona, Spain

Email: jordening@galnet.com

Background and Goal of Study. The aim of this study was to show that the Cerebral State Index (Danmeter A/S, Odense, Denmark), could reliably assess the level of consciousness in anaesthetised patients during cardiac surgery. The CSI is defined using 4 spectral ratios of the EEG as inputs to an adaptive neuro-fuzzy inference system (ANFIS). The advantage of ANFIS is that it does not assume an underlying mathematical function governing the causal relationship between the EEG values and the clinical state of the patient, rather it is a data driven approach. A part of this study has previously been presented ¹.

Materials and Methods. After Ethics Committee approval, informed consent was obtained from 24 ASA III-IV patients (50-78 years), scheduled for cardiac bypass surgery. Propofol infusion was initiated until the patient had no response to noxious stimuli, according to the Observer's Assessment of Alertness and Sedation scale (OAAS) had reached level 0 (OAAS 5= awake, OAAS 0=deep anesthesia). The OAAS level was estimated every 2 min. The anaesthetic procedure was identical for all patients, using a TCI-Diprifuor pump which calculated the propofol plasma concentration. Subsequently remifentanyl was administered as well. Four EEG sub-parameters, derived from the EEG power spectrum and Burst Suppression, were used to define the inputs to the fuzzy system. The output of the fuzzy system is the CSI.

Results and Discussions. The prediction probability (Pk) between the CSI and OAAS was 0.91. The figure shows the box plot of the CSI versus the OAAS for the data set. An almost linear relationship exists between the clinical signs of the OAAS scale and the CSI.



Conclusion. The results show that during cardiac surgery, the depth of anaesthesia can be measured reliably by using the Cerebral State Index.

References. 1 Validation of the Cerebral State Index (CSI) during cardiac surgery.

EW Jensen, BE Rodriguez, H. Litvan, abstract IARS 2006 Orlando.

Future Meetings:

**Kathmandu
NEPAL**

22 - 24 February, 2007

**7TH CONGRESS OF THE SOUTH ASIAN CONFEDERATION OF
ANAESTHESIOLOGISTS**

Contact: Clinic-Health Care Centre (Pvt.) Ltd. Naya Bazar - Balaju, Ring Road
Crossing, P.O. Box 4602, Kathmandu, Nepal. Tel: 977 1 4351627 Fax: 977 1 4351654
Email: info@7thsacacongress2007.com Website: 7thsacacongress2007.com

HONG KONG

14-18 March, 2007

**5TH INTERNATIONAL CONFERENCE ON PAIN CONTROL AND REGIONAL
ANAESTHESIA**

Venue: Sheraton Hotel and Towers TST
Contact: OPTIONS Fax: 44 (0)870 0132940; www.optionsglobal.com

**Melbourne
AUSTRALIA**

26 - 29 May, 2007

2007 ANZCA ASM

Theme: "Perioperative Medicine - Evidence and Practice".
Contact: Ms Juliette Mullumby. ANZCA, 630 St Kilda Road, Melbourne 3004.
Tel: 03 9510 6299 Fax: 03 9510 6786 Email: jmullumby@anzca.edu.au
Website: www.anzca2007asm.com

**Queenstown
NEW ZEALAND**

23 - 26 August, 2007

**NEUROANAESTHESIA SPECIAL INTEREST GROUP CONTINUING
EDUCATION MEETING**

Theme: Hypothermia
Venue: Millennium Hotel
Contact: Ms Juliette Mullumby, ANZCA, 630 St Kilda Road, Melbourne VIC 3004
Tel: 03 9510 6299; Fax: 03 9510 6786
Email: jmullumby@anzca.edu.au; Website: <http://www.neurosigs.com>

**Perth
AUSTRALIA**

14 - 18 Sept., 2007

**ASA 66TH NATIONAL SCIENTIFIC CONGRESS AND AOSRA-PM 9TH
BIENNIAL CONGRESS**

Theme: A Regional Focus.
Venue: Burswood Entertainment Complex
Contact: NSC Secretariat: Congress West, PO Box 1248 West Perth WA 6872.
Tel: 08 9322 6662; Fax: 08 9322 1734
Website: <http://www.asa2007.org.au>

**San Francisco
USA**

13 - 17 October, 2007

AMERICAN SOCIETY OF ANESTHESIOLOGISTS ANNUAL MEETING

Venue: San Francisco
Contact: ASA, 520 N. Northwest Highway, Park Ridge, IL 60068-2573.
Tel: 1 847 825 5586; Fax: 1 847 825 1692
Email: mail@ASAhq.org; Website: www.asahq.org

**Perth
AUSTRALIA**

November, 2007

**9TH ANNUAL SCIENTIFIC MEETING OF THE SOCIETY FOR PAEDIATRIC
ANAESTHESIA IN NEW ZEALAND AND AUSTRALIA**

Contact: Dr Craig Sims, Paediatric Anaesthetist, Princess Margaret Hospital for
Children
Roberts Road, Subiaco, WA 9340 8778.

Fellowship Examinations 2007

Intermediate Fellowship Examinations

Examination Fee: \$ 6,000

February / April	Date
Written	23 February 2007 (Fri)
Oral	13/14 April 2007 (Fri/Sat)
Closing Date	12 Jan 2007 (Fri)

June / August	Date
Written	22 June 2007 (Fri)
Oral	10/11 Aug 2007 (Fri/Sat)
Closing Date	11 May 2007 (Fri)

Final Fellowship Examination in Anaesthesiology

Examination Fee: \$ 9,500

March / May	Date
Written	23 March 2007 (Fri)
Oral/OSCE	11-13 May 2007 (Fri-Sun)
Closing Date	9 February 2007 (Fri)

July / September	Date
Written	20 July 2007 (Fri)
Oral/OSCE	7-9 Sept 2007 (Fri-Sun)
Closing Date	8 June 2007 (Fri)

Application forms are available from Supervisors of Training and HKCA Office.

Examiner's workshop 2007

The College inaugural examiner's workshop (for intermediate, final, OSCE, Pain diploma and ICM examiners) has been scheduled on 9-10 March, 2007 (tentatively). Our guest speaker is Professor Russell Jones, Director of Education, Australian and New Zealand College of Anaesthetists. Details of the program will be available from the College office.

Board of Pain Medicine

Congratulations to Drs Wong Kwong Sun (QMH), Peggy Pang Chi Kwan (NDH), Michele Cheung Ning (PWH) and Sunny Lee Yuk Ming (UCH) for passing the Diploma of Pain Management Examination in November 2006. Four out of six candidates passed the examination. Our external examiner for this examination was Dr Beverly Collette who was also a speaker at the HKCA/SAHK Annual Scientific Meeting 2006.

I wish to remind all Diploma of Pain Management trainees and SOTs that the examination in 2007 will be the last examination under the current format. In 2008, the Diploma of Pain Management examination will include compulsory questions in the written papers and there will be an oral examination. Details have been published in previous issue of the Bulletin, and updated information can be obtained from the HKCA website.

Several Diploma of Pain Management training centres will be due for re-inspection this year. With the revised training programme commencing in January 2008, special attention will be given to the availability of multidisciplinary training and teaching at the respective centres.

On Friday, 26th January 2007, a scientific meeting on pain management is being planned jointly with the Society of Anaesthetists Hong Kong. Details will be available soon and will be posted on the College website, www.hkca.edu.hk. For fellows and members interested in pain management, on the same weekend, 28 January 2007, the Hong Kong Pain Society has also organized a workshop on *Problem-based pain management*. Details are available at www.hkpainsociety.org.

PP Chen
Chairman, BoPM



The Hong Kong College of
Anaesthesiologists



& The Society of Anaesthetists of
Hong Kong

Jointly Present
A CME Lecture By

Dr Mary Cardosa, FANZCA, FFPMANZCA

Consultant Anaesthetist & Director of Pain Management
Selayang Hospital, Malaysia
Secretary, Malaysian Association for Study of Pain
President-elect, Malaysian Society of Anaesthesiologists

Topic: *Preventing Chronic Pain after Surgery*
Chairman: *Dr. Steven Wong,*
President, The Society of Anaesthetists of Hong Kong
Date: Friday, 26th January 2007
Programme: 6:30 P.M. Refreshment
7:00 P.M. Lecture
Venue: *Lecture Theatre, G/F, Block M, Queen Elizabeth Hospital*

(Credit with 1 point for HKAM/HKCA CME, 3 points for ANZCA MOPS)

ALL ARE WELCOME
RSVP Ms Elsie Cheung
Tel: 29586176

New Members, 2006

CHAN, Ka Man Carmen	LEUNG, Kin Nin Kenneth
CHENG, Ho Yi	LIANG, Ka Wan Sharon
HUI, Ying Kei	SO, Mang Sze Alpha
JENKINS, Caroline Ruth	TANG, Pui Yan
KU, Ying Wai	TSE, Yee Wah
KWOK, Vansie	WAN, Chalk Ming Alex
LAI, Lo Man	WAN, Tsz Pan Winnie
LAM, Yung	WONG, Tak Yee
LAU, Shiu Kwan Candice	YAU, Wing Sze
LEUNG, Ka Mei Amy	YIP, Hing Wah
LEUNG, Ka Ming	YU, Clara Kam Ying

Admission to Fellowship, FHKCA

CHAN, Choi Hung	NG, Yuen Chong Denise
CHANG, Hang Kwok	SIN, Wai-leung Leonard
FONG, Siu Yan	TAN, Kee Soon
HUSSAIN, Assad	TANG, Yee Kwan
LAM, Kar Yee Katherine	TONG, Ka-fai Henry
LAM, Wylie Vuu Luong	WONG, Ian Yee Yan
LEUNG, Ka Ki	WU, Wai San Janet
LEUNG, Kam Kin	YIP, Kim Ho
NG, Wing Kwong Vincent	YU, Lin Yau Andrea

Admission to Fellowship, *an eundem*, FHKCA

WONG, Gordon Tin Chun

Admission to the Diploma of Pain Management (HKCA) by Examination, Dip Pain Mgt (HKCA)

Li, Ching Fan Carina	Yuen, Man-kwong
Man, Kwan Yin	

Admission to Fellowship, FHKCA(IC)

Lee, Hon Ming Wilson

Admission to Fellowship *ad eundem*, FHKCA(IC)

Li, Sing Tao Thomas

Board of Education

ITA of HKCA trainees

Please remember to submit your ITA form to HKCA by end of January 2007 for the period July-December 2006.

CME/CPD

The Academy has passed the notion that starting from 1st January 2008, no more than 75 points can be awarded for passive participation in a cycle. It is also proposed that from 1 January 2011, the limit for passive participation will be 60. Fellow consultation letters have already been sent from the College. Forum communication

focused to private hospitals by HKAM Education Committee will be planned in due course for further consultation.

The Board of Education will explore various ways to facilitate the fellows to achieve the CME/CPD accreditation. Please let the college understand your needs and feedback.

YF Chow
Chairman, BoEd

Current list of accredited CPD activities by HKCA:

Self-study (Remarks: College approved self study program and or self assessment program)

Chairing/Presenting at Formally College Approved Activity

Publications (Remarks: in peer reviewed journals approved by the College)

Research (Remarks: with publication in peer reviewed journals approved by the College)

Development of New Technologies or Services

Postgraduate/Undergraduate Teaching (Undergraduate and postgraduate teaching may not be accepted as a form of CME/CPD. Consideration can be given to development of teaching materials.)

Conducting Examinations

Quality Assurance and Medical Audits

Mortality & Morbidity Meetings (Participation in mortality & morbidity meetings is accepted as a form of CME/CPD)

Quality assurance activities (such as clinical/surgical review and audit, clinical governance, peer review of operative practice, activities that examine and evaluate the clinical care of patients, are accepted as a form of CME/CPD)

Postgraduate Courses (Attending a course leading to postgraduate qualification can be accepted as a form of CME/CPD)

Development of CME/CPD Materials

Activities for Improvement of Patient Care

- ☐ Information technology training
- ☐ Interpersonal and communication skill training
- ☐ Skills laboratory learning
- ☐ Virtual reality learning

Grand Rounds in Training Units

Reviewers of Hong Kong Medical Journal and other

Indexed Journals (e.g. Participation in reviewing articles submitted to HKMJ and other indexed journals is accepted as a form of CME/CPD)

Approved Formal Projects, 2006

CHAN, CH Stanley	Reliability Using Finger Palpation of Pilot Balloon in Estimating Endotracheal Tube Cuff Pressure: Comparison Between Portex® Soft-Seal And Curity®
CHANG, HK	Case Report: Anaesthetic Management of A Child with Spinal Muscular Atrophy, Obstructive Sleep Apnoea Syndrome and Asthma
FONG, Siu Yan	A Randomized Study In Comparing Levobupivacaine <i>vs.</i> Racemic Bupivacaine in Epidural Analgesia For Labor Pain
FUNG Nga Yin	A Comparison Between Sevoflurane/Remifentanil and Propofol/Remifentanil Anaesthesia in Providing Conditions for Somatosensory Evoked Potential Monitoring During Scoliosis Corrective Surgery
HUSSAIN, Assad	Intranasal Ketamine Premedication in Children
LAM, Wylie	Cuffed or Uncuffed Endotracheal Tubes for Intubation in Paediatric Patients (Below 8 Years of Age) - A Postal Survey of Attitudes and Practice Among Anaesthesiologists In Hong Kong
LEE, Yee Chi Sandy	A Survey of Attitude Towards Day-Case Surgery in Hong Kong Chinese Patients
LEUNG, Ka Ki	Evaluation of Patients' Perception Against the Modified Postanaesthetic Discharge Scoring System for Home Readiness After Ambulatory Surgery
LEUNG, Kam Kin	Comparison of Forced-Air Warming and Electric Heating Pad for Maintenance of Body Temperature During Laparotomy
LEUNG, Wing Yan	Adjuvant Tramadol/Acetaminophen Combination for Down Stepping Patient-Controlled Morphine Consumption and Related Side Effects after Open Colorectal Surgery
LUI, Frances	A Study of Preemptive Analgesic Effect of Low Dose Ketamine In Patient Undergoing Thoracic and/or Lumbar Spinal Fusion Surgery
MA, Elina	Report And Mini Review Of Management of A Case of Placenta Increta in A Patient With Placenta Praevia Type IV
NG, Vincent	Comparison of Forced Air-Warming And Electric Warming Blanket for Maintenance Of Body Temperature In Total Knee Replacement
SO, Mang Sze Alpha	COX-3: Biochemistry, Pharmacology, Relevance to Paracetamol and Future Prospects
TAN, Kee Soon	Audit of In-Hospital Adult Cardiopulmonary Resuscitation (CPR) in a Tertiary Hospital in Hong Kong
TANG, Yee Kwan	Passage of Tracheal Tube During Oral Fibreoptic Intubation: A Randomised Comparison Of Three Technique
TONG, Kam Chiu	Revision of Right Total Hip Arthroplasty (THA) in A Case Of Ankylosing Spondylitis
TONG, K F Henry	A Case Report of A Patient With Becker's Muscular Dystrophy Undergoing Elective Caesarean Section
TSE, Kin Chung	Survey on Anaesthetists' Effort Towards Prevention of Air Pollution in Operating Theatres in Hong Kong
WONG, Grace	A Comparison of USCOM Ultrasound Monitor and Pulmonary Artery Catheter Thermodilution for Assessing Cardiac Output in Patients Undergoing Liver Transplantation
WONG, Y Y Ian	Effect of Prophylactic Subcutaneous Single Injection of Naloxone on Prevention of Intrathecal Morphine-Induced Pruritus in Post Caesarean Patients
YEUNG, Cheryl	Health-Related Outcomes of Patients Treated in A Multidisciplinary Pain Centre in Hong Kong
YIP, Kim Ho	Local Anaesthetic Effect of Amethocaine Gel, a Comparison with EMLA

The College would like to thank the following fellows for contributing their time and efforts in reviewing the formal projects:

Drs Jacobus KF Ng(*Formal Project Officer*), Matthew Chan, Anne Chan, PT Chui, Lester Critchley, Edward Ho, C.T. Hung, KK Lam, Michael Irwin, JC Lawmin, Warwick NganKee, B.H. Yong

Trainee Project Prize 2006

The prize was awarded to Dr Frances Lui for the best presented paper in the Annual Scientific Meeting 2006. Her paper was entitled: "Low Dose Ketamine has No Preemptive Analgesic Effect in Patient Undergoing Thoracic and/or Lumbar Spinal Fusion Surgery in Early Postoperative Periods"

Revision Tutorial Course in Basic Sciences in Anaesthesiology 2006

The Course was held from 20 November to 1 December 2006 at the Queen Elizabeth Hospital. It was aimed to help candidates preparing for the Intermediate Fellowship Examination. This year there are 14 participants. Professor Peter C A Kam from the Department of Anaesthetics, Royal Prince Alfred Hospital in Sydney, Australia was again invited to be the tutor. All the participants commented that it was very useful, well organized and Professor Kam was very knowledgeable and experience in teaching.

Dr CH Koo
Course Coordinator

Revision Tutorial Course in Clinical Anaesthesiology 2006

Professor Peter Kam has a very busy schedule in Hong Kong this year after his arrival in the evening of 17th November. He was one of the invited overseas speakers at the ASM in Anaesthesiology 2006 (18-19th November), this was followed immediately by 2 weeks of Revision Tutorial Course for our primary candidates; without any break, he led on the Revision Tutorial Course for our final candidates in his third and final week (2 – 9 December 2006). We had 19 trainees from 10 hospitals applied the course and their attendance was very high for the whole week. I would like to express my gratitude to all the departments for their support in releasing their trainees for the week.

Incidentally, in its 5th year of running, Peter breaks his record of not coming down with flu during the 3 weeks!

Dr Douglas Fok
Course Coordinator





香港麻醉科醫學院 The Hong Kong College of Anaesthesiologists





Management of Anaesthetic Crisis (EMAC) course

(Censored by the Australian and New Zealand College of Anaesthetists)

EMAC is a simulator-based course catered to management of anaesthetic crises developed by Australian and New Zealand College of Anaesthetists. It is comprised of 5 half-day modules, namely Human Performance, Cardiovascular Emergencies, Airway, Anaesthetic Emergencies and Trauma.

Venue: Institute of Clinical Simulation
North District Hospital
9 Po Kin Road, Sheung Shui

Date: 9-11 June 2007 Course A
3-5 November, 2007 Course B
(Tentative date only, please visit the college website for possible changes)

CME points: HKCA 20 points

Max participants: 8

Fee: HK\$4,000 per head

Format: Each registrant will participate in:

- (1) Lectures
- (2) Skills stations
- (3) An introduction on the METI Simulator, the anesthetic machine for use in the workshop and the theories of crisis management
- (4) Allocated time for hands-on crisis scenario management on the METI Simulator, rotating through different roles and handling different scenarios

Trainees starting training program on or after 1st January 2005 are required to complete the EMAC course or its equivalent.





Problem Based Workshop in Pain Management 2007

28 January 2007, Sunday, 09:00-16:00
Grand Ballroom I-II, 6/F, Royal Plaza Hotel,

Target Audiences – Doctors, Nurses, Physiotherapists, Occupational Therapists, Clinical Psychologists, Health Administrators... ..

Objective – To provide an opportunity for experts from different disciplines to share and demonstrate an evidence-based pain management using a problem-based approach. Audiences from different specialties are encouraged to actively participate in the discussion.

Cases to be discussed:

Orofacial Pain, Whiplash Injury, Cancer Pain and Pelvic Pain.

Faculty

Dr Mary Cardoso	Consultant (Anaesthesia), Malaysia	Dr Theresa Li	SMO (Anaesthesia)
Dr Anne Chan	SMO (Anaesthesia)	Ms Priscilla Poon	Physiotherapist
Dr P P Chen	Consultant (Anaesthesia)	Dr Michael Sham	Consultant (Palliative Medicine)
Prof Raymond Cheung	Professor (Neurology), HKU	Dr S L Tsui	Consultant (Anaesthesia)
Dr P H Chin	Consultant (Orthopaedics & Traumatology)	Prof Y K Wing	Professor (Psychiatry), CUHK
Dr Ken W K Chiu	Assistant Professor (Oral & Maxillofacial Surgery), HKU	Dr Steven Wong	Consultant (Anaesthesia)
Dr T Y Chui	Consultant (Rehabilitative Medicine)	Ms Emma Wong	Clinical Psychologist
Dr K N Hung	Consultant (Neurosurgery)	Dr Yvonne Yau	AC (Clinical Oncology)
Ms Mary Lee	Clinical Psychologist	Prof Alex S K Yip	Professor (Obstetric & Gynaecology), CUHK

Academic Accreditations

CME/CNE/CPE applied and pending. CE (DCP) 6 points.

Secretariat & Registration

The Hong Kong Pain Society, Department of Anaesthesiology, Alice Ho Miu Ling Nethersole Hospital, 11 Chuen On Road, Tai Po, New Territories, Hong Kong, Tel: 2689 2730, Fax: 2666 6773, Website: <http://www.hkpainsociety.org>, Email: painsec@hkpainsociety.org

Registration Fee: \$100 for Hong Kong Pain Society Member
(non-refundable) \$400 for non Hong Kong Pain Society Member
(Hong Kong Pain Society Membership Fee: \$200)

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Registration Deadline – 20 January 2007

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Programme

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5TH INTERNATIONAL CONFERENCE
on Pain Control and Regional Anaesthesia

Abstract submission deadline : 22nd December 2006

Annual Scientific Meeting **in** **Anaesthesiology**

17 – 18 November 2007

Programme Outline*

16 November (Pre-meeting Workshop)

- Off-site Workshop on Transthoracic Echocardiography

17 November

- Off-site Simulator Workshop
- Advanced Airway Workshop
- Refresher Courses
- Plenary Lectures
- Symposia in Anaesthesia
- Nursing Seminar - Updates in Recovery Room Care
- HKCA Trainee Project Presentations
- HKCA Congregation and Dinner

18 November

- Plenary Lectures
- Symposia in Anaesthesia
- Symposia in Pain Management
- Symposia in Intensive Care
- Debate Session
- Medico-legal Session
- Free Paper Presentations

* Programme and invited faculty are indicative only and are subject to change

International Faculty*

▪ Professor Simon Finfer

Senior Staff Specialist in Intensive Care at Royal North Shore Hospital, Clinical Associate Professor in Intensive Care at University of Sydney and Director of the Critical Care & Trauma Division at The George Institute for International Health, Australia

▪ Professor Pamela Flood

Associate Professor of Anesthesiology, Department of Anesthesiology, Columbia University, USA

▪ Professor Peter Kam

Nuffield Professor of Anaesthetics, Royal Prince Alfred Hospital, Australia

▪ Professor Kate Leslie

Associate Professor, Department of Anaesthesia & Pain Management, Royal Melbourne Hospital, Australia

▪ Professor Alan Merry

Head of Department, Department of Anaesthesiology, University of Auckland, New Zealand

▪ Professor Stephan Schug

Chair of Anaesthesiology & Director of Pain Medicine, University of Western Australia, Royal Perth Hospital, Australia

▪ Dr. Tim Semple

Senior Consultant Anaesthetist, Department of Anaesthesia and Intensive Care, The University of Adelaide, Royal Adelaide Hospital, Australia

▪ Professor Steven Shafer

Professor of Anaesthesiology, Department of Anaesthesia, Stanford School of Medicine, USA

▪ Professor Martin Tobin

Professor of Medicine, Pulmonary and Critical Care Medicine, Department of Medicine, Loyola University Hospital, USA

Venue

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Expanding the Boundaries



Organizers

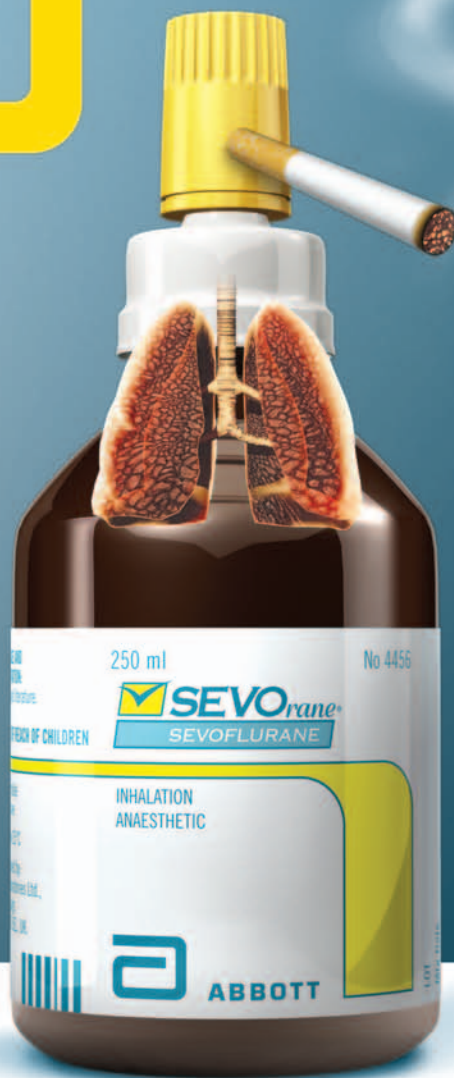


The Hong Kong College of Anaesthesiologists



The Society of Anaesthetists of Hong Kong

Smell the difference?



Bottle 1

- Sevoflurane causes moderate bronchodilation that is not observed with desflurane¹
- The broncho-constriction produced by desflurane was primarily noted in patients who currently smoked¹
- In patients with bronchial asthma undergoing general anesthesia, the goal is to avoid bronchoconstriction²

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References: 1. Mitchell J. Goff, et al. Absence of Bronchodilation during Desflurane Anesthesia. A Comparison to Sevoflurane and Thiopental. *Anesthesiology* 93 (2), 404-8, 2000 2. M. F. TerRiet, et al. Which is the most pungent: isoflurane, sevoflurane or desflurane? *British Journal of Anesthesia* 85(2): 305-7, 2000

SEVOrane Quiz 1 (Tick the correct answer and fax to 2219 8066)

Which specific patient group does Bottle 1 represent?

- ☐ Smokers and asthma patients ☐ Elderly patients ☐ Paediatric patients ☐ Patients with cardiac disease

Doctor's name: _____ Tel: _____

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The first ten respondents who return the Quiz with correct answer will be entitled to a HK\$200 medical bookshop voucher. Abbott Laboratories Limited reserves the right to make final decision in relation to the SEVOrane Quiz.

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