Symposium Report

Critical incidents in anaesthesia: medico-legal and other aspects

Overview

The title of the Tenth Annual Anaesthetic Symposium of the Department of Anaesthesia, Foothills Hospital at the University of Calgary was "Critical incidents in anaesthesia: medico-legal and other aspects." The purpose of the symposium was to review the latest in the field of human factors implicated in the genesis of critical incidents. Similarities to accidents in aviation were identified and the medico-legal consequences were explored.

Dr. Rob Lee began by describing the success of the aviation industry in developing a high standard of safety. He emphasized the importance of investigation of accidents, the development of a computerized data-base, and the relevance of the study of human factors in both aviation and anaesthesia. Dr. Jeffery Cooper followed with a description of methods of measuring untoward outcome in anaesthesia. He indicated the need to examine various types of adverse events but indicated that the subject studied would depend on the particular anaesthetic "culture." Dr. Jan Davies reviewed the theory of risk-management policies as applied to unanticipated adverse events, comparing American and Canadian aspects. She then described the particular system used at Foothills Hospital and emphasized the importance of a process for "emotional debriefing." Dr. J. N. Armstrong outlined the system for investigation of anaesthetic accidents which he and Doctors Davies and Lee have developed. He drew the analogy between the study of accidents in aviation and anaesthesia and indicated the trend to examine factors

other than just the equipment, such as personnel. Finally, Dr. Rory McIntyre described the decline in the rate of suits after adverse events and detailed reasons for this. He then reviewed ongoing problems in anaesthesia and the medico-legal consequences of anaesthetic accidents. In conclusion, each speaker emphasized the safety of current anaesthetic practice and the importance of maintaining high standards.

Le titre du dixième Symposium Anesthésique Annuel du département d'anesthésie du Foothills Hospital de l'Université de Calgary était « Incidents Critiques en Anesthésie: aspects médicaux-légaux et autres ». Le but de ce Symposium était de revoir les plus récents facteurs humains impliqués dans la genèse des incidents critiques. Des similarités avec les accidents dans l'aviation furent identifiées et les conséquences médico-légales furent explorées.

Le docteur Rob Lee a commencé par décrire le succès de l'industrie de l'aviation en développant des normes de sécurité élevées. Il a mis l'accent sur l'importance de l'investigation des accidents, le développement d'une base de données informatisée, et l'importance de l'étude des facteurs humains tant dans l'aviation qu'en anesthésie. Le docteur Jeffery Cooper a enchaîné avec une description des méthodes de mesure des complications en anesthésie. Il a indiqué la nécessité d'examiner les différents types d'événements adverses tout en sachant que le sujet étudié dépendrait sur la « culture anesthésique particulière ». Le docteur Jan Davies a revu les politiques des conduites à tenir lors de la survenue d'un événement adverse non anticipé, comparent les aspects canadiens et américains. Elle a ensuite décrit le système particulier utilisé au Foothills Hospital et a mis l'accent sur l'importance du processus du « mise à nu émotionnel ». Le docteur J. N. Armstrong a revu le système d'investigation des accidents anesthésiques que lui et les docteurs Davies et Lee ont développé. Il a souligné l'analogie entre l'étude des accidents dans l'aviation et l'anesthésie et a indiqué la tendance d'examiner les

Key words

ANAESTHESIA: critical incidents, medico-legal aspects, safety.

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facteurs autres que l'équipement tels que le personnel. Enfin, le docteur Rory McIntyre a décrit la diminution du taux de poursuite après des incidents néfastes et a détaillé les raisons de ce déclin. Il a ensuite revu les problèmes anesthésiques courants et les conséquences médico-légales des accidents anesthésiques. En conclusion, chaque conférencier a mis l'emphasis sur la sécurité de la pratique anesthésique actuelle et l'importance de maintenir des normes de pratique à un niveau élevé.

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On-site risk management

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Complications of anaesthesia and surgery may change intraoperative management and/or postoperative recovery. They may result from the anaesthetic, in which case the cause is most likely human error.¹ However, complications may not be due to the anaesthetic alone; few patients undergo anaesthesia without attendant surgery. Indeed surgery more often than anaesthesia causes serious complications, as has been shown in several studies. In 1954, Beecher and Todd reported that errors in surgical technique were a primary cause of death three times more often than anaesthesia and were a contributory cause of death five times more often.² In 1987, the CEPOD study showed that the incidence of death was 1 in 2600 when due to surgery alone in comparison with 1 in 185,000 when due solely to the anaesthetic.³

When anaesthesia and surgery result in a serious complication, a process of risk management should be undertaken. Risk management is a confusing term. It was developed by the insurance industry in 1963 in relation to funding and control of predictable losses in business.⁴ When used with respect to health care, it has been described as a technique to restrain "the public's growing fascination with litigation."⁵ In the United States of America (where the term originated), risk management is now the process of preventing anaesthetic accidents and their consequences ("injury, litigation, financial loss"⁶). In effect, in a country where patients (and/or their relatives) tend to sue for monetary recompense for perceived injury, risk management is a policy to reduce the risk and cost of legal suit to the health care system.

In Canada, risk management does not appear to be so fiscally oriented. Firstly, risk management is considered only a part of Quality Assurance. (If one defines Quality Assurance as Structure/Process/Outcome, then risk management is at the end of the Outcome list, after mortality, morbidity, and patient satisfaction.) Secondly, Canadian patients are, at present, neither so litigious nor so financially demanding (although the "American" attitude is increasing). At the Foothills Hospital at the University of Calgary, experience with a risk management policy over the past six years suggests that the patients and/or their families who have suffered serious complications want to prevent similar injury to other patients. Thus, although this policy may have helped to avert some lawsuits, this is not the aim of the Foothill's risk management policy.

The aims of the policy are four-fold. First, if the patient is still alive, then all efforts should be made to ensure that he or she is receiving appropriate medical attention. If possible, another physician should be assigned to take over direct care of the patient. This is important not only because of the extra help provided, but because the incoming physician has a "fresh eye" for the problem and emotionally may be better able to cope with a traumatic situation. In addition, if appropriate, another surgical team should be assigned to complete the operating list, preferably in another operating room to allow complete examination, if necessary, of all the room's equipment, drugs, and agents.

Second, an attempt should be made to establish the sequence of events. This should encompass a systematic investigation to determine contributory causal factors, which may include the patient, the anaesthetist, the surgeon, other personnel, equipment, the environment, and the health care system. However, it must be noted that this process does not include the "attribution of blame." Then, an Ad Hoc Risk Management Committee, a subcommittee of the hospital's Patient Care Committee,

should be struck. The committee is chaired by the Director of the Department of Anaesthesia, or deputy, and members include the anaesthetists, the surgeon (if appropriate), the physician in charge of the patient's continuing care (if applicable), and any residents involved. Other resources to the committee include nurses, respiratory therapists, a senior representative of the hospital administration, and the chairman of the Patient Care Committee. (This latter individual plays a key role in the third aim of the risk management policy.) The committee has two functions: (1) to ensure that the aims of the risk management policy are fulfilled and (2) to ensure that all documentation is complete. Accounts of the *facts* of the events should be written by all involved. Specially important is completion of the anaesthetic record (the "currency of the trade"), which should be done as soon as possible but with a notation as to when this was done. (The difficulty in producing a contemporaneous record during anaesthetic and surgical crisis is well-recognized and underscores the importance of automated anaesthetic records.) Once completed, all documents should be copied.

Third, the patient and/or relatives are kept fully informed of all events. This should be carried out by a single physician, for example, the chairman of the Patient Care Committee, and who was not involved in the incident. This physician acts as a liaison between the hospital and the patient/relatives, with 24 hour/day availability, if necessary. Full disclosure of *facts* is provided, e.g., sequence of events, planned treatments, test results, etc. Having one physician responsible for this task minimizes potential confusion and misunderstanding which may be produced when separate attempts at communication are made by anaesthetist and surgeon.

Fourth, repetition of the incident should be prevented by the correction of perceived problems or deficiencies and the recommendation of new procedures. These, in turn, should be communicated to the patient and/or relatives.

Ideally, the risk management policy should be activated as soon as possible, to allow "capture" of the maximum amount of information possible, so as to aid in investigation and identification of causal factors. Furthermore, early discussion of the event is important for the psychological well-being of all concerned.^{7,8}

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Why accidents happen

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Aviation has achieved probably the highest level of operational safety of any complex man/machine/environment system, certainly of any mass transportation system. The primary reason is that the very visible consequences of system failure, with their attendant costs (private, commercial, military, political), have resulted in the continuing dedication of considerable resources towards the maintenance and enhancement of air safety. Australia, for example, has not had a major airline accident for over 22 years, showing the success of this ongoing endeavour on the part of both industry and government.

There are many outcomes of this effort which have application to other complex systems, such as anaesthetics. Yet, aviation has the advantage that safety is supported and facilitated worldwide through the International Civil Aviation Organization (ICAO). The investigation of aviation mishaps plays a vital role in aviation safety, and agencies such as the Australian Bureau of Air Safety Investigation (BASI) exist because of the ICAO agreements. The objective of BASI is to promote safer aviation by disseminating information and recommendations based on the investigation and analysis of selected hazards, incidents and accidents, and on the results of research. The International Air Transport Association (IATA), the commercial equivalent of ICAO, also plays a major part in coordinating safety programs. However,

TABLE Categories of human factors identified in aviation accidents

Communications
Pre-flight planning/preparation
Psychosocial
Psychological
Physiological
Training/experience/supervision

BASI is completely independent of aviation regulatory authorities and has no role in attributing blame or liability.

Over 80% of aviation accidents are attributed to human factors, as is the case in anaesthesia.¹ The human factors identified in these mishaps can be broadly categorized (Table). However, it must be remembered that these groups of factors are not mutually exclusive, i.e., more than one factor may contribute to the genesis of an accident. Similarly, the same categories of human factors have been identified in anaesthetic accidents. This is not surprising because, like the pilot in the cockpit and the air traffic controller in the tower, the anaesthetist in the operating theatre is a component of a complex man/machine/environment system.

The effectiveness of such systems is dependent on the performance of each individual component. One of the lessons learned by the aviation industry over many years, and at great expense, is that, just like the other system components (hardware and software), man has finite capabilities and limitations (i.e., a "performance envelope"). The physical, physiological, and psychological characteristics, and boundaries of this performance envelope have been well researched, particularly since World War II.² The resulting discipline of Human Factors has become firmly established in aviation.³

Human performance is an outcome of the interaction between intrinsic factors (e.g., arousal) and extrinsic factors (e.g., equipment design). In aviation, the various hardware (aircraft, avionics, engines) and software (flight management computer programs) components of systems have become extremely reliable. This leaves the human element as the final challenge in aviation safety. Another hard-learned lesson from aviation is that to be effective, accident investigations must properly address specific human factors. "Pilot error" may describe what happened in an accident: it does not explain it.

The aviation industry has also recognized that mishaps are mostly multifactorial. BASI therefore does not attempt to allocate a single "probable cause" to any occurrence. Instead, the investigation aims to identify all relevant factors and, where appropriate, to address safety recommendations to each one.

Air safety investigation aims to determine what happened, how "it" happened, why "it" happened, and to

make recommendations to prevent "it" happening again. A critical element in the success of the investigation process has been the development of comprehensive national and international accident/incident data bases. These provide essential frames of reference for investigations. In addition, data base analyses may identify hazards before they result in accidents. The aviation industry is fortunate in now possessing a vast store of safety information, readily accessible by computer. For example, each year BASI adds to its data base information on some 5000 incidents and some 200–250 accidents.

Nearly all safely recommendations fall into the following categories:⁴

- (i) elimination of hazards and risks (i.e., the Environment)
- (ii) incorporation of new safety features/warning devices (i.e., the Machine)
- (iii) established of new or modified procedures (i.e., Man).

Of these, the third category is usually the most cost-effective to implement.

In conclusion, the aviation industry has shown, through careful air safety investigation, application of research, and the continuing development of sophisticated accident/incident data bases, that human factors are the major causes of accidents. These specific factors have been identified. In addition, aviation has shown how, using this knowledge, that the probability of human error and the consequences of such error may be effectively minimized in complex man/machine/environment systems. While the aviation industry's efforts to enhance safety continue, and new data are always being obtained, the existing hard-won experience and information can be readily transferred to anaesthesia to help improve safety in the operating theatre.

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How to measure what happens

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A major theme in anaesthesia has been the prevention of untoward outcomes, the most serious of which are death or severe neurological injury due in some way to the administration of an anaesthetic. Typically, such outcomes are believed to result from several events. These, in combination with other factors that may provoke the events initially, aid in their propagation or act to prevent prompt discovery or correction.¹ To design strategies to prevent such accidents it is necessary to study the undesirable outcomes and to identify causal and connecting elements. This can be done in numerous ways.²

A spectrum exists of adverse outcomes and undesirable events related to the administration of anaesthesia, ranging from death (or the most serious, costly type of injury, severe hypoxic brain damage) to seemingly minor mistakes or equipment failures which require correction, but alone are unlikely to cause harm. Each type of outcome or event can serve to identify elements of practice needing improvement. Each offers a different perspective and requires different resources and approaches for collecting and studying the information generated. One way of categorizing outcomes and events recognizes that there are four major types: death and/or serious outcomes, complications, impact events and critical incidents.

Death and/or serious outcomes

These are the easiest to identify and define, but happen so rarely that they cannot be used to monitor acute changes in a hospital's or region's quality of care unless there is some glaring problem. Such events can be studied in depth by using the approach of an "accident" investigation, if the event is unexpected. The goal of investigation is to identify systematic problems that can be corrected directly or to identify a previously unknown aetiology of untoward outcome, e.g., the "next" malignant hyperthermia.

Complications

These are adverse outcomes (including the above) that actually affect the patient beyond the anticipated perioperative period. They occur more frequently than deaths or the most serious injuries, and may be the result of

correctable deficiencies. Intuitively, amelioration of the factors leading to complications will reduce the likelihood of the more serious outcomes. Identifying complications requires more resources, e.g., tracking patients postoperatively, and the relationship to anaesthesia may be more difficult to define. However, the size of the population studied may be large enough to be a better indicator of trends in quality of care than when examining mortality.

Impact events³

These include undesirable changes that do not necessarily last beyond the perioperative period, e.g., intraoperative hypotension or hypovolaemia. Because they occur frequently, perhaps as often as in 80% of all procedures,⁴⁻⁵ a change in their incidence can be seen in small populations. However, there are legitimate questions as to whether or not these events have a meaningful relationship with true adverse outcomes or if they are merely expected elements of anaesthetic care. Furthermore, the cost of investigating these events must be borne in mind.

Critical incidents⁶

This is a still broader category of events, including all which could contribute to a preventable adverse outcome. The potential relationship to preventability of the outcome is clearer than with "impact events" but improvements cannot usually be shown to improve the quality of care. Intuitively, remediation of critical incidents should reduce the likelihood of the "accident cascade". Establishing a cost/benefit ratio for such incidents and their prevention is guesswork at best. Although critical incidents are now often studied, the true critical incident method⁷ is not typically applied. It has a special purpose for identifying general patterns of human performance which are not likely to vary too much among different anaesthetic centres.

In conclusion, application of any of these approaches to studying the quality of anaesthetic care requires attention to detail, careful definition of events, thoughtful sorting of data and provision of feedback to all those involved, to be effective. Above all, the subject of study must be well defined, i.e., "what are you looking for?" These are all tactics that can be used to encourage cooperation and minimize wasted efforts in defining and preventing problems in anaesthesia.

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A systematic method for the investigation of anaesthetic incidents

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When an adverse perioperative event occurs, either in the operative room, recovery room or ward, careful investigation may help to determine contributory causes. This is particularly important for incidents believed to be related to the anaesthetic, in contrast to those thought to be related directly to the patient's disease or the surgical technique. In those cases, pathological findings at autopsy may prove helpful (although care must be taken to distinguish injuries due to underlying pathology from those engendered by such therapeutic manoeuvres as external cardiac massage^{1,2}). With respect to anaesthetic-related incidents, the "positive value of autopsy in the assessment of the contributory role" of anaesthesia is "disappointing."³ Indeed, in 1861, the Boston Society of Medical Improvement stated the "no conclusive light can be thrown on the subject by post-mortem examination. It can only demonstrate a cause exculpating the anaesthetic, there being no pathognomonic signs of death from these agents."⁴ Thus, systematic investigation of all contributory factors should prove helpful.

This is not a new concept. Through international agreement, aviation has long operated under a policy requiring breaches of air safety to be rigorously investigated. The purpose of this activity is not to determine

TABLE I The five basic elements of the protocol

Patient
Operation
Incident
Equipment and environment
Personnel

TABLE II Patient

<i>History</i>
presenting problems
recent and remote medical conditions
medications
allergies
previous anaesthetics
family history

<i>Physical examination</i>
airway (mouth and nose)
respiratory system
cardiovascular system
neurological system
other pathology

<i>Laboratory examination</i>
blood
urine
radiology
electrocardiography

<i>Autopsy</i>
consider the need for special techniques

blame or liability but to determine causal factors, with the sole purpose of preventing future problems. One feature of aviation's approach is to conduct the investigation from a "systems" perspective.⁵ That is, the performance of the pilot cannot be considered in isolation from other components of the system of which he/she is a part. Many factors may influence pilot behaviour directly. Aviation investigation recognizes and takes into account the fact that the performance of the human part of the "system" has fundamental characteristics, capabilities and limitations.

In developing a protocol to investigate anaesthetic incidents, we adapted one used by the Medical Branch of the Royal Australian Air Force for investigation of aircraft accidents.⁶ The anaesthetic protocol provides a structured framework for investigation of five separate elements of the total systems.* These are the Patient, the Operation (Anaesthetic, Surgery, and Recovery), the Incident, Equipment and Environment, and Personnel (Table I). Each of these areas is subdivided. Patient

*Copies of the complete protocol may be obtained from the authors.

TABLE III Operation

<i>Anaesthetic</i>
preoperative assessment
preoperative equipment check
preoperative drug preparation
monitors
intravenous access
pre-oxygenation
induction
airway control and ventilation
position
maintenance
fluid loss
fluid administration
emergence
unanticipated anaesthetic problems
<i>Surgery</i>
operative/diagnostic procedure
skin preparation
incision
procedure
skin closure
unanticipated surgical problems
<i>Recovery</i>
recovery room score
monitors
orders
medications
fluid loss
fluid administration
unanticipated problems
<i>Transport</i>
mode
position
monitors
personnel
unanticipated problems

details include history, physical examination, laboratory examination, and (if applicable) autopsy details (Table II). Operation details include the timing and events of the anaesthetic, surgery, and recovery (in the recovery room, during transport, and on the ward) (Table III). Incident details include the problem and resuscitation (Table IV). Equipment and Environment details include the presence and proper operation of the monitors and machines required for the safe execution of the case, as well as aspects of the operating room (or other) environment such as access light and heat (Table V). Personnel details include recent work history, antecedent significant incidents, and professional, physiological, supervisory, personal, and psychological factors (Table VI). This section applies to both the anaesthetist and the surgeon (or any other members of the operating room team), if appropriate.

One of the most important steps in investigation involves the construction of a "time line," in which all

TABLE IV Incident

<i>The problem</i>
time of occurrence
nature of the problem
sequence of events
<i>Resuscitation</i>
time initiated
condition at time of start
method(s)
medications
defibrillation
other treatment
equipment used
condition at termination

TABLE V Equipment and environment

<i>Equipment</i>
available
– anaesthetic machine
– monitors
– drugs
not available or failed during
– anaesthesia
– surgery
– recovery
– transport
– resuscitation
<i>Environment</i>
access to patient
lighting
temperature
noise
availability of ancillary personnel

events are listed in chronological order. This not only helps to "sort out" events, but may lead to identification of "missing" data, such as lack of charting during critical events. The absence of materials, either drugs or equipment, as well as lack of necessary personnel, e.g., technical help, should also be noted. In addition, throughout the investigation, attempts should be made to identify which, if any, of these factors are causal and contributory.

This protocol surpasses traditional coronial investigations which have looked primarily at the patient and any equipment involved. Now included are examination of other factors recognized to be of importance by the aviation industry, for example, the possible contribution by fatigue and task saturation. Since human error is the major cause of anaesthetic incidents,⁷ inclusion of personnel details helps identification of the contribution of this factor. Following an established protocol insures that all important areas are covered systematically, yielding an "organized framework for data analysis,"⁸ and eases the difficulties in gathering information about what may be emotionally charged details. The protocol also provides

TABLE VI Personnel factors

Professional
Recent work history
Supervisory
Personnel
Physiological
Psychological
Psychosocial
Previous significant incident history

the foundation for development of a standardized data base of anaesthetic incidents. This would facilitate statistical analysis and identification of common factors underlying a wide range of anaesthetic mishaps. (This concept is not novel. Aviation has made use of data base information in development of strategies to prevent future accidents. In anaesthesia, in 1945 Ruth recommended the institution of "anesthetic study commissions" to examine both "fatalities and complications occurring during or subsequent to anesthesia."⁹ He suggested that a report "based on ten years' activities of the commission" would be "informative to the medical profession in general on the problems involved in and the results of the application of anesthesia."⁹)

In addition, the anaesthetic protocol has the potential for widespread application at all levels of medical care. Investigation of anaesthetic mishaps can be carried out by family practitioner anaesthetists in small general hospitals or by specialists and residents in training in tertiary care hospitals. The protocol may also be used by those agencies specifically charged with investigation of peri-operative mishaps, such as provincial coroners, with investigation carried out by nurses, or provincial medical examiners, with investigations carried out by physicians. Use of the protocol as a checklist will also assist other individuals or bodies similarly charged, but unfamiliar with anaesthesia, to collect comprehensive and accurate data on anaesthetic mishaps. Finally, the protocol can be used to examine incidents which result in either mortality or morbidity.

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Medico-legal consequences

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In the past decade, considerable medico-legal changes have occurred affecting physicians, especially those who practice in the traditionally "high-risk" specialities. Membership fees in the Canadian Medical Protective Association (CMPA) increased dramatically in the mid-1980's and continue to rise. Of all member groups, anaesthetists are unique in that their fees have not risen for the past four years and have decreased slightly for 1991. This stabilization of fees has occurred despite many factors which have tended to increase the number of actions and the size of awards and settlements in general. Similar changes have occurred in parts of the United States of America where anaesthetists no longer pay the highest malpractice insurance premiums.

Attempts have been made to relate reductions in anaesthetic malpractice to reported declines in anaesthetic morbidity and mortality.¹ Better training, continuing medical education, higher standards of practice, quality assurance programs, better monitoring, equipment, and new drugs have all been suggested as reasons for these declines. The threat of litigation may also have been a potent reason.²

The CMPA membership fees are related to both the frequency and severity of claims that result in successful litigation. While the frequency of anaesthetic-related claims is low, the severity of injury can be very high, especially when there is circulatory collapse or hypoxia,

with resultant brain damage or death. Successful liability claims can be enormously expensive and any increase in their frequency could have a profound effect on fees paid for malpractice protection in the future.³

Common anaesthetic problems

Many common and well-documented problems recur repeatedly and are mentioned below. Some old problems (e.g., those associated with poorly designed equipment) appear to have been resolved.⁴ Unfortunately, new problems sometimes appear with the introduction of new techniques (e.g., cardiac tamponade associated with incorrectly placed central venous pressure catheters).

Damage to teeth continues to occur, as a result of laryngoscopy and the presence of an oral airway.⁵ Some of this damage may be unavoidable. However, fewer legal actions will be started and more will be defended successfully if there is better preoperative assessment of teeth at risk of damage because of pre-existing pathology and subsequent discussion with patients of these risks. In addition, offering the patient an alternate but appropriate anaesthetic technique (e.g., epidural anaesthesia rather than general anaesthesia with tracheal intubation) may decrease problems.

Unrecognized oesophageal intubation remains one of the most common causes of brain damage or death, despite the publicity this problem has received. Anaesthetists must always remember that intubation is a three-step process: inspection, intubation, and confirmation. Visual confirmation of correct tube placement in the trachea remains the simplest and best method,⁶ while the only other sure method is confirmation of the presence of carbon dioxide in the exhaled gas. The Guidelines to Practice of the Canadian Anaesthetists' Society (CAS) now consider capnography to be a basic monitor for intubated patients in the operating room.⁷

Obstetric analgesia/anaesthesia is associated with special risks since it is frequently "non-elective" and involves two patients. High clinical standards are expected and any lapses which result in a poor outcome may be open to criticism. A significant number of legal actions are started because of complications of regional analgesia but very few cases relate to nerve damage. One of the major problems with general anaesthesia continues to be the risk of failed intubation and resultant complications.⁸⁻¹⁰

Patient positioning during anaesthesia still causes problems. Perioperative ulnar neuropathy is the most common reported nerve injury,¹¹ but may occur without any demonstrable negligence on the part of the anaesthetist. The CMPA feels strongly about the defense of such cases. Delayed recognition of tube displacement, pressure on the eyes, or cardiovascular depression appear to occur more often when patients are placed in the prone position.

Pulse oximetry is now a CAS basic monitor for all patients receiving a general anaesthetic.¹² This should allow the more ready detection of hypoxia and, providing the cause is identified and corrected in time, injury due to this cause should be reduced. However, Cheney, in the ongoing ASA Closed Claims Study,¹³ reported a small number of cases in which a pulse oximeter was in use and showed no desaturation at the time of unexpected cardiovascular events or collapse. He postulated the occurrence of vagus nerve-related events or anaphylaxis which, without the evidence of the oximeter, may have been incorrectly considered to be due to hypoxia and with resultant blame assigned to the anaesthetist. This intriguing finding deserves further investigation.

In conclusion, Canadian anaesthetists should be congratulated on their high standards of care. However, at the same time they should be aware of the many potential complications of anaesthesia and the medico-legal consequences of these.

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