All nurse-delegates have important role to play when viewing exhibits

Nurse-delegates attending the ORNAO conference have an important role to play when they view the exhibits. If it is accepted that the quality of pari-operative patient care is affected by the products used in the O.R., then the degree with which operating room staff understand the products that are used also affects the quality of patient care.

Even if one is not involved in the purchasing of the products on display, it is important that all delegates use the viewing time to familiarize themselves with the operating room technology and instrumentation they will be using or maintainingr.

Delegates to the First Provincial Conference of the Operating Room Nurses Association of Ontario will be provided the opportunity to learn about the latest in surgical techniques, instrumentation and operating room equipment. In turn, this opportunity, if taken full advantage of, translates into better patient care.

The representatives of the various companies who will be exhibiting are eager to demonstrate their products. Even if you are not part of the purchasing decisions, company representatives want to talk with you. A product exhibition is as much a learning experience for the reps as it is for the nurse-delegates.

The companies that manufacture and supply the products to your hospital are eager to exchange information and ideas with the users. They are as concerned about the complaints you may have as they are with the accolades you want to pass on.

Feedback on the exhibit floor is essential. It is possible, for example, that a particular item or device will be seen that could improve the care that your facility provides. If such is the case, this is the time to pass on to the rep the name of the person at your hospital that should be contacted. Thus, you don't have to be directly involved in purchasing decisions to play a prominent role for your hospital's surgical department.

Over 80 exhibitors

Donna Kaufmann, co-ordinator of the exhibitors committee for the ORNAO Conference, expects more than 80 companies to exhibit at the three-day conference. As of March 1, over 100 exhibit booths have been allocated, with the few remaining spaces expected to go prior to the conference opening.
Exhibit hours are:

Monday & Tuesday, April 24/25 - 1130 - 1500
Wednesday, April 26 - 1130 -1400

First Biennial Conference

Operating Room Nurses Association of Ontario

Exhibitors as of March 1, 1989

- Abbott Laboratories
- AMD-Ritmed - Div. of Pharmascience Inc.
- Allergan Inc.
- American Sterilizer
- Angelica-Whitewear
- Aurora Biomedical Systems
- Auto Suture Canada
- Bard Canada
- Baxter Corporation
- Becton Dickinson Canada Inc.
- BEEJAY Medical Ltd.
- Canada Microsurgical
- Beltec
- Canadian Anaesthetic & Respiratory
- Canadian Hospital Specialties Ltd.
- Carl Zeiss Canada
- Carsen Medical & Scientific Co. Ltd.
- Cleanwear Products
- Deknatel
- DeRoyal Industries Inc.
- Codman
- Cook(Canda) Ltd.
- Davis & Geck Sutures
- Dittmar
- Dow Corning Canada
- Dumex Medical
- Epic
- Ethicon Ltd.
- Getinge Canada
- Graphic Controls Canada Ltd.
- Haessler Deway Health Care Products
- Hennco Medical
- Heco Medical
- Howmedica, Div. of Pfizer
- Huntington Labs
- Immuno Canada Ltd.
- Imperial Surgical Co.
- Incare Medical (Div. of Hollister)
- Ingram & Bell
- Instrumentarium
- International Surgical Products Inc.
- Intra-Optics Canada
- J. Stevens & Son Co.
- Johnson & Johnson
- Kendall Canada
- Lac-Mac Ltd.
- Mallimer Laboratories
- McDavis Sales & Service Ltd.
- MDT Canada Ltd.
- Medical Mart Supplies
- Medigas
- Medilogic Ltd.
- Meditron
- Medtronic of Canada
- Pharmacia Canada Inc.
- Pilling Canada
- Puritan-Bennett Canada
- R. Laborie Surgical
- Richards Medical Co.
- Serving Software Inc.
- Siemens Electric Ltd.
- Sigmacon Medical Devices (Canada) Ltd.
- Sims Canada Ltd.
- Smith & Nephew
- Storz Instrument Co. of Canada Inc.
- Stryker International
- Surgikos Canada Inc.
- Synthes (Canada) Ltd.
- Tecnol International
- Techlem Medical
- 3M Canada
- Trudell Medical
- Users Choice (Data Management Technology Inc.)
- Valleylab Canada
- Weck Div. of Squibb Canada Inc.
- Wild Leitz Canada Ltd.
- Xomed/Surgitek, Div. of Zimmer
- Zimmer Canada

Demystifying general anaesthesia

By Melissa N. Marshall, R.N., B.N.

- Are you an operating room nurse who must occasionally help in the recovery room during busy times or after hours?
- Do you care for patients on a busy surgical floor?
- Are you a staff nurse working in the post-anaesthetic care unit or recovery room?
- Do you float to every patient unit in your hospital and possibly find yourself alone in the recovery room at 3 a.m. with no resources and a patient emerging from anaesthesia?

Unravelling the mysteries

If you answered "yes" to any of the above questions, then you have probably been faced with the uncomfortable situation of looking after patients whose surgery you understand, but whose anaesthetic has you baffled!

In this submission, we'll attempt to unravel some of the mystery surrounding general anaesthesia and help you form a basis for your care of the post-anaesthetic patient.

General anaesthesia

Goodman and Gilman (1980) define general anaesthesia as a "reversible state of unconsciousness produced by drugs, with sufficient depression of reflexes to allow a surgical procedure to be performed."

These drugs or anaesthetic agents work by interrupting the normal process whereby brain cells obtain their energy from oxygen or glucose for the generation of nerve impulses. If you've ever wondered why the patients seem to go to sleep so quickly and can awaken from an apparent deep sleep equally as rapidly, consider the brain for a moment:

1. The brain receives a very high proportion of the cardiac output because of its high metabolic demand.

2. Most general anaesthetic agents have a great affinity for lipids or fats; and the brain contains a very large amount of these substances.

3. The nerve cells responsible for the conscious state in the reticular activating system (the alerting system of the brain) are the smallest and most sensitive in the body and are the first to be affected by anaesthetics.

One can see that the brain will be exquisitely sensitive to these anaesthetic agents - with every patient reacting to them uniquely. The definition provided above of a general anaesthetic implies that there is more to a general anaesthetic than merely being put to sleep. If we examine the objectives of a general anaesthetic, it will be seen that the underlying principles of any general anaesthetic are similar...it is simply the agents and the technique being used by each practitioner which may vary.

Objectives of a general anaesthetic

An anaesthetic must meet a number of objectives so that the patient experiences a comfortable surgical experience, and the surgeon is able to perform the surgery. These objectives include the following:

1. Analgesia

The patient must be kept pain-free both during and following the surgical procedure. Remember that someone can be asleep, but still be in pain. Unconsciousness is not necessarily a measurement of analgesia. Agents used most commonly to achieve analgesia include our old friends Meperidine (demerol) and Morphine Sulphate, and the newer narcotics fentanyl, Alfentanil and Sufentanil. The choice of narcotic agent used depends upon many factors such as drug availability, cost, the anaesthetist's preference, type of surgery, length of surgery, the patient's condition, and the patient's history of narcotic use (i.e., allergies, etc.).

2. Unconsciousness

It is hoped that the patient will remain asleep and hopefully unaware of his or her environment during the surgical procedure. The drugs which provide the analgesia required, will not necessarily provide unconsciousness. You'll likely see two distinct groups of anaesthetic agents used here:

- those which will put the patient to sleep quickly (induction agents such as Pentothal), and
- those which will keep the patient asleep (maintenance agents such as halothane, isoflurane, nitrous oxide and narcotics) for the remainder of the surgery.

3. Muscle relaxation

From the surgeon's perspective, muscle relaxation is perhaps the most critical objective. Surgical access to the site is facilitated by the use of drugs which cause profound skeletal muscle relaxation. This permits less anaesthetic to be used, thereby causing less systematic cardiovascular compromise. This technique facilitates the patient's recovery, and may actually cause less post-op pain as a result of less surgical manipulation against tight muscles.

4. Control of autonomic reflexes

It is this factor (control of the autonomic reflex) which has led to the increasing sophistication of anaesthesia in recent times. In the early days of general anaesthesia, mortality rates were high, due in part to the reflex side effects caused by the agents being used. For example, most of the inhalational anaesthetic agents have a depressant effect on the cardiovascular system, related to their effect on various components of the autonomic nervous system. When it was recognized that this was occurring, other agents were brought into clinical practice to combat these side effects. The result has been the development of a more controlled peri-operative environment with fewer potentially lethal side effects.

The components of a general anaesthesia

If you've ever taken the time to glance at your patients' anaesthetic records, you may have concluded that it was a muddled potpourri of drugs and treatments that appeared to make little sense. There is, however, a pattern to all general anaesthetics and despite apparent differences, they are basically very similar. They must all meet the objectives we outlined earlier and they must do so in an orderly, sequential fashion. The pattern to be followed is:

1. ***Premedication***
2. ***Induction***
3. ***Maintenance***
   - unconsciousness
   - analgesia
   - muscle relaxation
4. ***Reversal***

I. Premedication

Most readers will be aware that this component of the general anaesthetic has changed dramatically over the past few years. What was once a standard narcotic and antisialogue (an agent that lessens or prevents the flow of saliva) combination has become a choice of numerous drug combinations or, indeed, nothing at all. The goals of the pre-medication are to obtain the effects of:

a) allaying anxiety
b) analgesia
c) amnesia
d) reducing nausea and vomiting
e) increasing gastric pH
f) reducing oral and mucosal secretions

Medications such as benzodiazepines H1, and H2 antagonists, droperidol, the opiates, the barbiturates and the anti-cholinergic preparations may be used together or in combination to achieve these effects.

For your own interest, try conducting a little survey within your hospital, and note the different types of pre-medications being used. It might be interesting to then compare the post-operative courses of the patient, based on the pre-medication given.

II. Induction of anaesthesia

The process of induction involves putting the patient to sleep and ensuring maintenance of a patient airway and ventilation while doing so.

The agents used most commonly to achieve this rapid unconsciousness are short acting barbiturates such as sodium pentothal (Thiopentone) or sodium brietal (methohexital sodium). Injected intravenously, the drug will circulate very quickly to the brain, where the reticular activitating system will respond to it, and sleep will ensue within 3 to 5 seconds. Many patients will experience a characteristic 'garlic' taste because it reaches the taste buds before the medulla. The barbiturates may also be given rectally, a route commonly preferred for children in whom an IV is difficult to establish.

The duration of the barbiturate will vary according to its uptake from body cells and re-release to the brain. Because of its affinity for fat cells, one can see that the barbiturates could cause prolonged recovery in the morbidly obese patient population.

In patients presenting with any form of cardiovascular compromise such as shock, tamponade, heart failure or trauma, the intravenous barbiturates with their cardiovascular depressant effect, would be a poor choice of induction agent. In these instances, Ketamine may be used as an alternative. It has a slight cardiovascular stimulating effect which may be beneficial for these individuals.

You may frequently see the anaesthetist administer a dose of non-depolarizing muscle relaxant such as pancuronium bromide (Pavulon), or vecuronium bromide (Norcuron), prior to the barbiturate. This is done to facilitate the process of intubation, and prevent the muscle spasm caused by the depolarizing muscle relaxant, succinylcholine (Anectine). The succinylcholine is a very short-acting neuro-muscular blocker which causes profound muscular relaxation, particularly of the jaw musculature and laryngeal muscles. This allows the anaesthetist to open the jaw, insert a laryngoscope and pass an endotracheal tube down through the vocal cords. Airway maintenance is thus established and ventilation maintained either by manual ventilation with the ambu-bag or with the mechanical ventilator.

III. Maintenance of anaesthesia

Maintenance agents include a combination of any of the following:

a) intravenous barbiturates
b) intravenous tranquilizers - such as droperidol
c) intravenous analgesics - usually opioids

(Cont'd on page 22)

Indications for a general anaesthetic

What factors determine an anaesthetist's decision to choose a general over a regional anaesthetic? Many of us remember some of the myths that used to circulate: "old people have spinals because they can't tolerate general anaesthesia," or, "someone with lung disease couldn't possibly have a general anaesthetic because of innate respiratory compromise."
These and many other such myths have been quashed with the advent of the newer, more sophisticated techniques of general anaesthesia. Today, the decision regarding anaesthesia is based on more specific, discrete and individualized data. Factors to consider include:

Age
The age of the patient is less of a factor than it used to be in terms of the elderly. The older patient with severe hemodynamic compromise may do better with a light general anaesthetic than with the massive hemodynamic insult caused by the sympathetic blockade of a spinal anaesthetic. Children will not usually tolerate regional anaesthesia well. A light general anaesthetic is most often administered for pediatric cases.

Patient preference
The preference of the patient should be a factor in the decision-making

Type of surgery
The proposed surgery may dictate the type of anaesthesia to be administered. Procedures requiring deep muscular relaxation such as abdominal surgery, will be better performed under general anaesthesia. Conversely, many surgeries such as cataract extractions and diagnostic arthroscopies may be readily performed with regional techniques.

Length of surgery
Length of surgery is an important factor. Regional blocks have a limited effectiveness such that longer procedures may require general anaesthesia.

History of toxicity
A prior toxic reaction to a local anaesthetic drug will necessitate an alternate choice for any given patient.

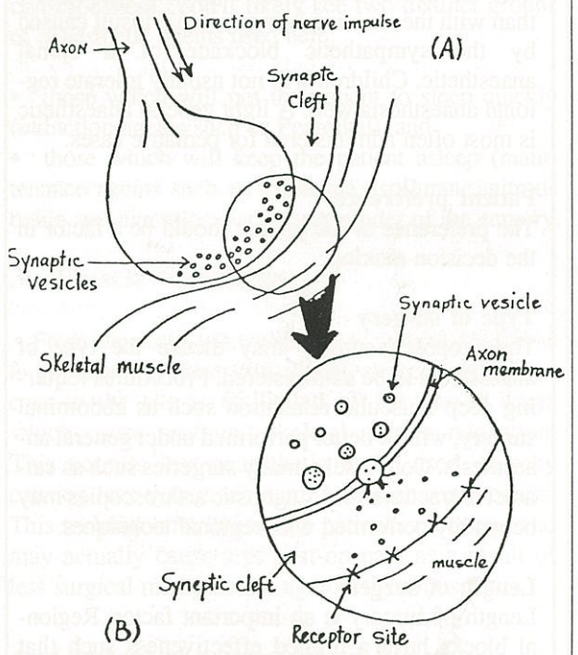
Preferences
The skill or preference of the anaesthetist may also influence anaesthetic choice. ■

d) muscle relaxants - the non-depolarizing neuro-muscular blockers
e) gaseous agents - such as nitrous oxide
f) inhalational agents, i.e., halothane, isoflurane

We mentioned the use of barbiturates, tranquilizers and analgesics earlier. Let's look specifically at the agents used to maintain muscular relaxation and unconsciousness.

Muscle relaxants

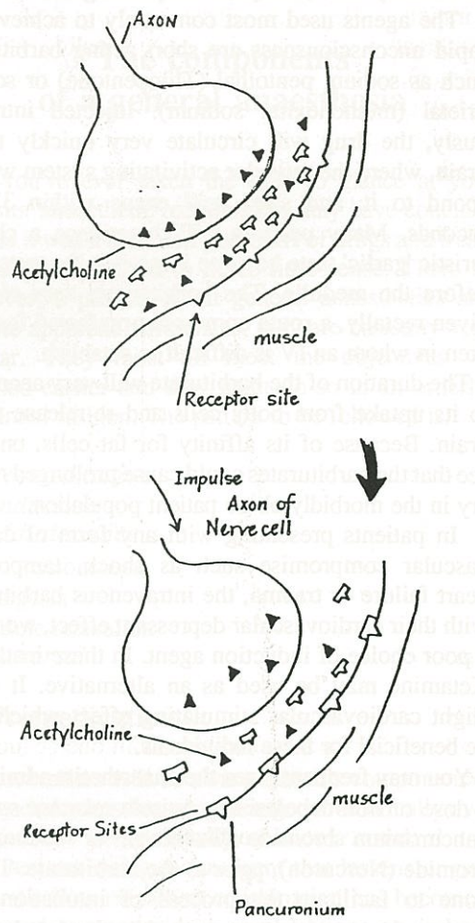
The agents most frequently used to achieve the deep skeletal muscular relaxation necessary for the surgeon to obtain surgical access are the non-depolarizing muscle relaxants (sometimes called "competitive blockers"). They work by "competing" with the normal neurotransmitter, acetylcholine, for access to the receptor sites on the muscle membrane. In order to understand how this works, let's take a look at the normal neuro-muscular junction.



The neuro-muscular junction

(A) The nerve impulse reaches the synaptic knob at the end of the axon, where the nerve meets muscle.
(B) The neurotransmitter substance crosses the cleft to depolarize the muscle cell on the other side. The crosses represent receptor sites on the muscle. Once depolarized, the muscle will contract.

So, how does the pancuronium or vecuronium work on this process? Let's look at another diagram of how the blocking agent molecules can "compete" for space on the receptor site.



Legend: ▲ = Acetylcholine/ ▽ = Pancuronium

There are 10 molecules of pancuronium in the top diagram and only 5 of acetylcholine. So, pancuronium wins the competition and slides into the receptor sites causing a competitive blockade with resultant paralysis.
In the lower diagram, the pancuronium has blocked the receptor sites, causing paralysis, and the acetylcholine is left waiting in the cleft unable to get into the sites and trigger a contraction.

The various types of non-depolarizing muscular relaxants vary in their potency and length of neuromuscular blockage they provide. Although pancuronium bromide has been a sort of gold standard for many years, we are seeing increasing use of the more intermediate duration agents such as vecuronium and atracurium.

As the nurse looking after a patient post-operatively, you should be aware of what type, what

dose and the last administration of muscle relaxant your patient received. You can see that these drugs may have prolonged effect in the post-op phase, particularly with respect to the patient's ability to maintain an airway and breathe adequately.

We must also maintain unconsciousness for the duration of the surgery. This is usually done with a combination of inhaled gases (usually N_20 and oxygen), and/or one of the inhalational agents such as halothane, isoflurane, enflurane, etc. These are administered to the patient via the endotracheal tube or mask, from the cylinders on the anaesthetic machine. The narcotics will also be used for routine patient maintenance.

Nitrous oxide

The only true gaseous agents used today are nitrous oxide and oxygen. N_2O is considered the least toxic of all agents and one of the most frequently administered. A relatively weak anaesthetic, its many advantages include:

1. rapid induction and emergence
2. intense analgesic properties
3. antiemetic capabilities
4. relative lack of toxicity or effect on cardiovascular system

Because it is a relatively weak anaesthetic, nitrous oxide is often given in tandem with one or more of the other agents.

It is important to recognize that N_2O must always be given together with oxygen. The oxygen molecule in N_2O is not available for use by the body, so the patient would become asphyxiated if not given adequate supplemental oxygen. Recovery from nitrous oxide simply involves washaing it out of the lungs by delivering increased concentrations of O_2 and less N_2O.

Inhalational agents

Although we tend to think of these agents as gases because they are delivered to the patient through the endotracheal tube, these drugs are actually highly volatile liquids at room temperature. When added to the vaporizers which you often see attached to the anaesthetic machine, they vaporize and join the stream of gases (e.g. N_2O and O_2) being delivered to the patient via the airway. The depth of anaesthesia may be varied according to the delivered percentage of these agents.

Agents included in this category are halothane, enflurane, methoxyflurane, and isoflurane. You may see one or two of these used routinely in your institution. Each agent differs slightly in its effects and side effects, but generally you will note that they all act as potent cardiovascular depressants. This has relevance when it comes to caring for a patient post-operatively who may still be suffering from the residual effects of anaesthetic

Intravenous agents

Often because of this cardiovascular compromise, or in an effort to prevent it, the anaesthetist may choose not to administer the inhalational agents. Instead, maintenance may be achieved by the use of nitrous oxide and oxygen and high doses of narcotic, such as fentanyl. Although used primarily as an analgesic agent, the narcotics may achieve the objectives of a general anaesthetic when given in large enough doses. This technique, referred to as "balance anaesthesia." is used frequently for patients undergoing open heart surgery. Often their left ventricular function is so poor that the side effects of the agents such as isoflurane and halothane could be devastating. The narcotics will achieve the desired effect with less CVS depression, and, as a bonus, may provide some degree of post-op pain relief.

You should be aware, however, that there are also disadvantages to every technique. With the narcotics there have been increased reports of intra-operative awareness, inadequate depth of anaesthesia and a diminished respiratory drive and cough reflex post-operatively. Knowing that your patient received primarily narcotics as anaesthetic agents will help you determine your plan for care for him/her post-operatively. What would you suspect could be a major post-operative problem for these patients?

IV. Reversal

The patient has been pre-medicated, induced, and maintained throughout the surgical procedure. Surgery is almost complete and it's time to think about waking this person up. How do we do that?

Reversal of anaesthesia is the final, and perhaps most crucial, step of the process. Timing is critical and post-operative recovery will depend greatly on the skill of the anaesthetist.

The process involves discontinuance of the maintenance agents such as the neuro-muscular blockers, inhalation agents, and narcotics, approximately 30-60 minutes before the anticipated end of surgery.

If the patient received a non-depolarizing muscle relaxant, the anaesthetist may reverse this drug with a preparation that promotes build-up of the neuro-

transmiter in conjunction with atropine or glycopyrolate. Neostigmine alone will cause a severe drop in heart rate, which the atropine will combat. Together these drugs will reverse the effect of the neuromuscular blocker and allow the patient to move (and breathe!) spontaneously.

Gradually the concentrations of nitrous oxide are lowered while the delivered oxygen is increased. The patient normally shows signs of regaining consciousness and reflexes before being transferred from the O.R. to the post-anaesthetic recovery room. Sophisticated monitoring techniques and the practice of maintaining anaesthesia at the lowest possible level, have now made post-operative emergence predictable and safe for the patient.

Can you see now that despite the apparent differences in a patient's general anaesthetic records, there are also many similarities? Each anaesthetic must achieve similar objectives of:

1. Analgesia
2. Unconsciousness
3. Muscle relaxation
4. Control of autonomic reflexes

You may find it helpful to recall these objectives the next time you see a general anaesthetic which really puzzles you. Ask yourself what objective each of these drugs is attempting to achieve and you may be surprised how easy it is to determine the answer.

Your post-operative care patients receiving general anaesthesia may depend on an understanding of all these agents and their effects and side effects. It is, therefore, worth your while to "demystify general anaesthesia." ■

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