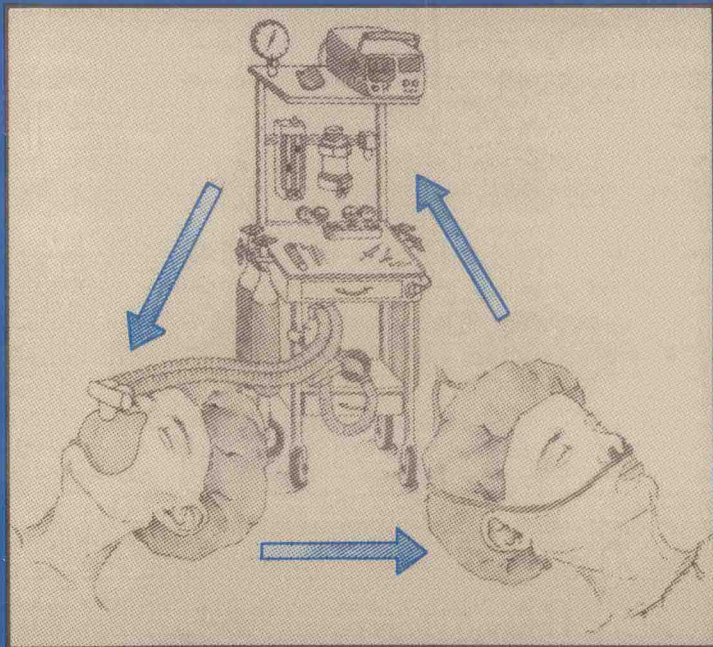


Anaesthesia and Patient Care

T C K Brown



Blackwell Scientific Publications

Anaesthesia and Patient Care

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With a chapter on Electrical Hazards by

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FOREWORD

This book has been needed for a long time. It gives nurses a better understanding of their role in relation to anaesthesia and also provides useful information for anaesthetic assistants and medical students having their initial exposure to anaesthesia. The subject of the care of the patient undergoing anaesthesia has rarely been accorded the detailed attention it deserves and requires; even more rarely has the subject been presented in the simple style that Kester Brown displays in the pages ahead.

Beyond the theory that we associate with the study of anaesthesia — physiology, drugs, equipment and safety, for example — we need to know more about the patient committed for surgery, the responsibility of the nurse and the roles of others involved in the care of the patient.

It is precisely because aspects of this nature are clearly addressed and explained that this is an important book and it is these dimensions of the book which, taken together, make it an extraordinary contribution to nursing students and nurse educators alike, and a valuable introduction for medical students and anaesthetic technicians to whom it is also addressed.

Sydney, 1982

Clifford C. Buchanan

PREFACE

This book has been written to provide a concise, practical introduction to anaesthesia and to outline the care of surgical patients, particularly in relation to anaesthesia and postanaesthetic recovery. It also provides information about anaesthetic equipment and how it is cleaned and sterilized. Basic principles of physiology, pharmacology, resuscitation and electrical safety are presented so that their application in the care of the patient having an anaesthetic can be appreciated. The specialized care of patients undergoing open heart surgery is beyond the scope of this book although most of the general principles outlined will apply to these patients.

It is hoped that this introduction to anaesthesia and the emphasis placed on the care of the patient undergoing anaesthesia will be easy to understand and will be of practical value to medical students, nurses and anaesthetic technicians.

Melbourne, 1982

Kester Brown

ACKNOWLEDGEMENTS

Many people have played a part in producing this book. My sister, who is a nurse, encouraged me during the first difficult stages of writing the first draft and Malcolm Dodd and Martin Schabet, as medical students, encouraged me to expand the text for medical students. Many nurses, medical students and anaesthetists have read and made useful comments on the text as it has developed. In particular, I would like to thank Pam Atkinson, who also contributed to the appendix on handling infected patients, Dr Geoff Tauro, Director of the Royal Children's Hospital Haematology Laboratory and Blood Bank, who gave me valuable assistance in preparing the section on blood transfusion, Heather Telfer, Noel Cass, Rod Westhorpe, Barbara Main, Mary Dwyer, Alan Duncan, John Paull and Ted Sumner for their ideas and constructive criticism.

Glen Johnston, recently retired head of the Hospital Electronics Department, contributed the chapter on Electrical Hazards. His lucid style which has helped so many nurses, doctors and technical staff in the past to understand electrical equipment and its applications will continue to do so through his chapter on the subject.

'A picture is worth a thousand words' — our Department of Medical Illustration is to be thanked for the fine set of illustrations they have prepared for the book as is Robyn Jones who drew the illustration on the cover. Figure 6.17 was produced at The Royal Women's Hospital specially for this book.

I am also grateful to my wife and family for their support during the time I spent writing the manuscript.

Finally but most importantly, I owe much gratitude to my secretary, Pamela Corden, for typing the manuscript and all the help she has given me during the preparation of this book.

CONTENTS

FOREWORD by Clifford C. Buchanan	vi	
PREFACE	vii	
ACKNOWLEDGEMENTS	viii	
CHAPTER 1	The patient	1
CHAPTER 2	Preoperative preparation	3
CHAPTER 3	Equipment and its cleaning	12
CHAPTER 4	Physiology in relation to anaesthesia and monitoring	38
CHAPTER 5	Drugs used in anaesthesia	56
CHAPTER 6	The conduct of anaesthesia including the role of the anaesthetist's assistant	73
CHAPTER 7	Intravenous fluids and blood transfusion	99
CHAPTER 8	Recovery room	107
CHAPTER 9	Electrical hazards and safety in the operating theatre	121
APPENDIX 1	Cardiac and respiratory arrest	134
APPENDIX 2	Procedures in relation to anaesthesia for handling infected patients	143
APPENDIX 3	The application of Ohms law to physiology and flow of fluids	146
APPENDIX 4	Has this book achieved its aims?	147
BIBLIOGRAPHY		149
INDEX		151

CHAPTER 1

The patient

Surgery is a major event in the lives of most people. They may remember some events related to the operative period for the rest of their lives unless they are very young or so ill that they are unaware of the situation.

It is important to realize that most people are worried preoperatively. This may be because they fear that the operative findings may spell doom (e.g. cancer). They may fear disfigurement, pain, being sick post-operatively or even that they will let out some secret as they go under the anaesthetic (this is a very rare happening but is a real concern to some people). A bad experience with a previous anaesthetic is an aggravating factor. Patients should be encouraged to express these fears. Sometimes they find it difficult to discuss them with the surgeon either because they feel that he is too busy, lacking in sympathy or that they would be embarrassed. Sometimes the anaesthetist helps to allay these fears by asking questions and giving the person the chance to say what he or she is feeling, but there are some anaesthetists who find it difficult to communicate easily with their patients or whose visit is too brief to allow the patient much opportunity for discussion.

The nurse can have a very important supportive role to play because he or she will usually spend more time with the patient. A nurse who provides a listening ear, is understanding and shows compassion can provide reassurance to any patient about to undergo surgery and thereby reduce his anxiety. It must be remembered that even those patients who put on an apparently brave front may be apprehensive. Sweaty skin or collapsed peripheral veins due to high levels of circulating catecholamines (adrenaline and noradrenaline) may be found in frightened people as well as those who have suffered loss of blood.

Children pose particular problems. Neonates are unaware of what is going to happen. As infants grow older and their maternal attachment grows stronger separation becomes more traumatic to the child and often to the mother who sometimes conveys her anxiety to the infant or small child, making it more difficult for her offspring. Children up to 3

or 4 years old suffer most from this separation. Older children tend to cope better, especially if procedures are explained to them beforehand in a way that they understand. A group which often hides its apprehension until the time of induction is boys of about 10 years.

Most parents do not like to see their children unhappy and crying. Racial and cultural differences may lead one parent to leave the child in hospital, not having told him or her about the operation and not return until the child is ready to go home, while another may wish to be with the child every minute of the hospitalization except during the actual surgery. The reasons for their behaviour may be similar but their actions are very different. Most parents fall between these extremes but both types of parent may be encountered.

Racial factors influence the way people react when they are going to have an operation. These must be recognized and accepted by the staff. Some races express their emotions verbally and physically much more than others who may show no apparent emotion, and yet both may have similar feelings. The difference often lies in the way people are brought up to react to situations and because a patient reacts differently to the way one feels he or she should behave, it is not reasonable to be critical or intolerant of the patient for doing so.

An awareness of the many factors influencing a patient's behaviour can help the staff to realize that each patient has to be dealt with as an individual. All require some caring attention and reassurance before an operation. Talking to the patient, especially if addressed by name, conveys a feeling that the staff are interested in him or her. Too much small talk with other staff while ignoring the presence of the patient will very quickly make the patient feel of secondary importance at a time when he or she needs the greatest support. Staff should be careful what they say within earshot of patients because inappropriate comments may be misconstrued and cause alarm.

CHAPTER 2

Preoperative preparation

The purpose of the anaesthetist's preoperative visit. Preoperative assessment. Preoperative resuscitation. Requirements before transfer to the operating theatre. Preoperative fasting. Premedication. Antibiotic cover. Steroid cover. Other drug therapy. Transportation to theatre. Arrival and waiting in theatre.

The purpose of the anaesthetist's preoperative visit

The purpose of the anaesthetist's visit is to make the acquaintance of the patient, to review the medical history and undertake a physical examination to ensure the patient is fit to have an anaesthetic. The anaesthetist also needs to know what drugs the patient is taking so that dangerous interactions with anaesthetic drugs can be avoided. Preparation for the anaesthetic includes giving an explanation about what will happen, especially if the patient has not had a previous anaesthetic, and generally giving reassurance. To avoid alarming patients when recovering from anaesthesia it is wise to tell them before surgery if you expect them to awaken with any of the following — intravenous lines, pressure monitoring lines, a nasogastric tube, a catheter, chest drains or nasal packs. If the patient is to be electively ventilated postoperatively this should be explained and he or she should be told that a tracheal tube or tracheostomy will be necessary.

When the patient's physical condition and temperament have been assessed appropriate premedication can be ordered. This may vary depending on whether the surgery is major or minor, elective or emergency.

The anaesthetist should also check that blood is cross matched where necessary and that any special investigations have been done.

Preoperative assessment

The assessment of fitness for an anaesthetic is simple when a healthy, young person is presenting for elective surgery. When someone has heart or respiratory disease, is on treatment with several drugs and especially if he or she is old there is a greater chance of complications occurring during anaesthesia (i.e. the risk is greater).

Review of the medical history and the physical examination may indicate to the anaesthetist that some modification of the anaesthetic may be necessary. For instance patients with heart disease, particularly fixed cardiac output conditions such as aortic stenosis, should be given myocardial depressant drugs with great care otherwise a disastrous decrease in cardiac output may occur. Patients with asthma should be adequately treated so that they are not wheezing preoperatively, and drugs which cause histamine release and bronchospasm such as morphine and D-tubocurarine should be avoided in the premedication and during anaesthesia. Patients with diabetes should be well controlled, the insulin dose reduced in proportion to the reduction in calorie intake and the timing of surgery should be arranged so that hypoglycaemia does not occur during anaesthesia. Arrangements can also be made to check blood sugar intraoperatively.

If the operation is not urgent and the patient's condition can be improved (e.g. by physiotherapy, antibiotics and stopping smoking in patients with respiratory disease) the operation should be postponed. Patients for elective surgery with an upper respiratory tract infection who have a temperature or a cough should usually be postponed to avoid causing more serious respiratory complications.

If there is some urgency to proceed with surgery then greater risks may be taken although as much should be done to improve the patient's condition as time will permit.

Some people think that anaesthetists are not particularly interested in people as most of their contact is with unconscious patients. This should not be the case as they have to be able to gain rapport with their patients, elucidate any significant medical problems and provide appropriate counselling and reassurance within the space of a relatively short preoperative visit.

The conduct of the preoperative visit with a child will vary with the age of the child. The anaesthetist has to gain rapport and the confidence of the child, and the parents like to be reassured that their child will be cared for sympathetically and competently. Sometimes anxious parents need as much or more reassurance than the child. Relief of this anxiety

is important as anxious parents often convey their anxiety to their child.

The anaesthetist will often tell the patient, especially if he is a child, that he is going to put him to sleep for the operation so that he will not feel anything while it is being done. It is always important to tell a child that he will be woken up at the end of the operation, otherwise he may think that he is like a dog or cat being taken away to be put to sleep for ever. Depending on how much the child understands he may be told something about how he will be put to sleep and how he will feel afterwards, and that a short time will be spent in the recovery room before returning to the ward. He should also be told the people working in the theatre will be dressed differently, and may not be recognized easily because they will be wearing masks and caps. Many anaesthetists remove their masks so that the patient can see their face.

Children may be prepared before admission by reading books about hospital, by showing a film or a tape-slide programme about the procedure which occurs when they are admitted and the places they will be taken to in the ward and theatre areas.

Preoperative resuscitation

Patients may have been ill for some time and, particularly before emergency surgery, may need resuscitation. They may be hypovolaemic due to haemorrhage or dehydration, the latter from vomiting, diarrhoea, loss of fluid into the gut or peritoneal cavity or lack of fluid intake. Any deficiency should be corrected before anaesthesia if possible, otherwise the depressant effect of anaesthetic drugs on the heart and brain may be exaggerated and the dose used for a healthy person becomes an overdose.

The fluids used in resuscitation will depend on the type of loss. Patients who have been vomiting will have lost hydrochloric acid from the stomach, as well as some potassium, so will require isotonic saline (0.9%) with potassium chloride supplements.

Losses into the peritoneal cavity may contain much protein. If the i.v. solution does not contain protein or an osmotically active substance such as dextran, much will be lost from the circulation due to a lack of osmotically active particles which hold the fluid in the circulation (Fig. 2.1). Blood loss can be treated initially with a plasma volume expander (stable plasma protein solution, dextran or Haemaccel) or a balanced electrolyte solution such as Hartmann's solution. When blood loss

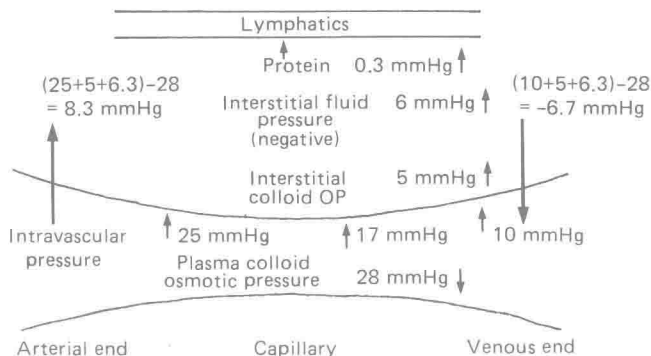


Fig. 2.1 The opposing pressures which determine fluid shifts between capillaries and the surrounding tissues.

exceeds 15–20% of the blood volume, blood is usually transfused. Normal blood volume is about 70 ml/kg and is slightly more in infants, 80 ml/kg.

The anaesthetist will not usually accept a patient for anaesthesia until resuscitation is complete unless there is an acute surgical reason to proceed, such as major uncontrolled bleeding where blood is being lost faster than the transfusion is running in. It is worth remembering that hypovolaemic, dehydrated or uraemic patients may be confused and irrational, and that their language and behaviour may not be characteristic of their normal personality. They call for extra understanding and compassionate care.

Preoperative investigations

Usually some basic information such as temperature, pulse, blood pressure and respiratory rate as well as haemoglobin and urinalysis is obtained before anaesthesia. Other laboratory information such as electrolytes, acid base measurements, blood examination and X-rays may also be requested. These are usually done to confirm the diagnosis and to ensure that the patient is in a satisfactory condition to undergo anaesthesia and surgery. Blood should be cross matched if significant losses at surgery are expected.

Preoperative fasting

Normally patients are fasted for several hours before a general anaesthetic. The reason for this is to allow the stomach to empty so that during induction of anaesthesia vomiting followed by aspiration of stomach contents will not occur. This may result in airway obstruction or, if very acid, acute pulmonary oedema may occur (Mendelson's syndrome). The time taken for the stomach to empty varies but usually 4-6 hours is sufficient. Patients who have been injured or who are very apprehensive may have delayed emptying due to the stress response stimulating the sympathetic nervous system. This inhibits peristalsis. Gastric emptying is also delayed following the administration of narcotic analgesics such as morphine.

At least 6 hours fasting is desirable after solid food and 4 hours after liquids. Most people easily tolerate a fast of this length or longer but infants who have a high metabolic rate and less metabolic reserve should be starved for the shorter period — usually 4 hours after milk and 2-3 hours after clear fluids.

When the operation is urgent then the added risk of a full stomach has to be accepted and the necessary precautions taken (e.g. cricoid pressure, see Chapter 7). Antacids may be given, especially in obstetrics where they reduce the acidity and thereby decrease the chance of potentially lethal acid aspiration which is a particular hazard of anaesthesia in these patients.

Premedication

Premedication is usually ordered. If the patient is very anxious a tranquillizer or hypnotic may be ordered for the night before to help the patient to have a good night's sleep.

The timing of the premedication will depend on the drugs used and the route by which they are given. A drug given orally or rectally is usually administered at least 2 hours before, while intramuscular injections are usually given 1-1.25 hours before.

The drugs are used as follows:

- 1 To allay anxiety (tranquillizers such as diazepam or promethazine).
- 2 Sometimes to provide analgesia to relieve preoperative pain or to provide some of the analgesia during the operation (morphine, papaveretum (omnupon), pethidine).

3 To dry secretions in the mouth and respiratory tract and to block vagal reflexes (atropine and hyoscine).

Some of these drugs have more than one use. For instance, morphine and papaveretum also produce some euphoria which reduces apprehension, while hyoscine acts centrally on the brain to produce some sedation and amnesia and suppress vomiting. Thus the combination of intramuscular papaveretum and hyoscine provides a well sedated, tranquil patient who may not remember much of the visit to the operating theatre afterwards. The combination of pethidine, promethazine and atropine is often used for asthmatics because morphine and papaveretum cause histamine release which can precipitate bronchospasm. The problem with the former combination is that it requires two injections which most patients do not relish.

Many anaesthetists prefer to avoid premedication which requires an injection in children. In some places no premedication is used, the reassurance of the child being dependent on experienced and sympathetic staff who stay with the child during the preoperative period. Oral premedication, usually a tranquillizer such as promethazine (Phenergan), trimeprazine (Vallergan), diazepam (valium), lorazepam or chlorpromazine (Largactil) can be given as a suspension. These are well absorbed if given 2 hours before operation and usually provide a reasonably tranquil patient without the need for an injection but recovery following anaesthesia may be delayed especially with trimeprazine. Small infants are often not premedicated and narcotics are not usually used under 6 months of age.

Care must be taken to ensure that the patient receives the correct dose of drug. Doses are more often related to weight in children. The commonest sources of error are (a) the incorrect weight being recorded on the chart so that the calculated dose is too large or too small, (b) an incorrect dose is ordered and (c) an error in the calculation of how much of an ampoule is to be given. The calculation and amount of drug drawn up in the syringe is always checked by a registered nurse to avoid the latter source of error. The hazard is greatest when an excessive dose of a respiratory depressant drug is given (e.g. morphine, pethidine).

When intramuscular premedication is given the nurse's attitude and technique are important, especially after the injection when the nurse should settle the patient comfortably. A firm but kindly approach is desirable.

It must be stressed again that the sympathetic and considerate handling of the patient plays a very important part in the preoperative preparation of the patient. This cannot be replaced by drugs alone.

Antibiotic cover

Patients who have valvular or congenital heart disease or have had cardiac surgery usually have an antibiotic cover which may be given with the premedication, especially when dental or other oral procedures are to be performed which may result in a bacteraemia. Subacute bacterial endocarditis may follow if an antibiotic cover is not given.

Steroid cover

Hydrocortisone may be given with the premedication to patients on steroid treatment. Long term steroid treatment, especially when high doses are used, suppresses the adrenal cortex so that the secretion of cortisol in response to stress is reduced. This can result in hypotension when anaesthesia is induced. Extra preoperative steroids help to prevent this complication.

Other drug therapy

Some patients are on long term treatment for conditions such as depression, hypertension, asthma, epilepsy or diabetes. The anaesthetist will have to decide how soon before the operation the last dose of these other drugs should be given. The decisions will depend on the likelihood of complications occurring if they are stopped too soon or on the possibility of adverse interactions occurring between the drug and drugs used during anaesthesia.

Preparation for transfer to the operating theatre

Patients are usually washed or have a bath prior to surgery. A hospital gown is usually worn because it can be easily undone and so that the patient's clothes are not soiled.

Jewellery, hair pins and make-up, including nail polish, should be removed. If patients are allowed to keep their dentures in (especially full dentures) they are less embarrassed, the airway is more easily maintained with a mask and they can still be removed prior to intubation if necessary. The anaesthetist should always enquire about dentures. If dentures are left in a labelled denture container they should accompany the patient to

theatre. The patient should empty his or her bladder. Identification bands with the patient's name and unit number are checked. The correct history (with recent temperature, pulse and respiratory rate recordings), drug and fluid order sheets, fluid balance chart and any other relevant papers including a signed consent form for anaesthesia and surgery should accompany the patient. In some hospitals the check list from theatre specifies which of these are required. The rules for the transfer of the patient's X-rays and blood, if ordered, vary in different hospitals but the appropriate arrangements should be made.

Transportation to theatre

The patient should be helped on to the trolley and must be made to feel secure. The trolley sides should be raised or, in their absence, patients should be strapped on to the trolley. In the case of small children, cot sides should be raised to prevent them from rolling off. The patient should be made as comfortable as possible with pillows and adequately covered with blankets for warmth and privacy. (Theatre gowns can be revealing!)

It is advantageous if a nurse who has been looking after the patient accompanies him or her to theatre because of the reassurance gained from a familiar face. This is particularly true in the case of children, the elderly or anyone who is very apprehensive.

The management of children requires special consideration. The personality and attitude of the porters and staff taking patients to theatre can make a difference. Someone who takes an interest in the patient can have a reassuring influence. The timing of separation of children from their parents is worthy of consideration. It is often easiest for the parent and the child if this occurs when the child settles following the onset of the effect of the premedication. Separation at the theatre entrance is undesirable as many children handle one upsetting circumstance at a time but not the combined effect of parental separation and entry to a strange environment.

In some places a parent is allowed to accompany the child to the induction room and remains until the child falls asleep. This has some advantages with small children or where a child has complex congenital anomalies and has had many operations or procedures and is frightened of more, but there are also some problems. It will not be in the child's interest if the anaesthetist does not feel completely at ease having the particular parent present. To succeed the parent must be able to cope