- 3 Morbid obesity complicated by haemodynamic or respiratory problems
- 4 Drug therapy
 - (a) MAOI
 - (b) Acute substance abuse
- 5 Paediatric patients
 - (a) Expremature infants (<45 weeks)
 - (b) Lower respiratory tract infections

Which procedures?

The lists of procedures acceptable for day surgery is constrained only by the need for an uncomplicated postoperative course. In recent years technological advances have revolutionized the number of operations permissible, and will continue to do so. Thus, anecdotal reports of thyroidectomies, vaginal hysterectomies, ectopic pregnancies, and cholecystectomies have been published¹ as the essential requirements of minimal physiological disturbance, little risk of haemorrhage, and postoperative pain controllable by oral analgesics, are more easily satisfied.

There remain several controversial surgical procedures, such as tonsillectomy in children or angioplasty in adults. While series of successful ambulatory management have been published it is more usual to consider such candidates for "short-stay" (8–24 hr) admissions for observation. Sepsis is also considered a relative complication, for the need for postoperative antibiotic coverage may not be met by non-intravenous techniques.

Conclusion

What is essential in considering the advisability of ambulatory surgery is a patient-orientated, not procedure-orientated, system. Those individuals providing care should be given the option of deciding whether a particular patient is a candidate for any given procedure. If the patient, and those providing the postoperative support, are properly motivated to ensure a course as expected the possibilities are unlimited. However, if the patient's health or home environment leaves any doubt the ambulatory service should not be utilized.

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Which is the best anaesthetic technique?

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A report of mortality statistics at the 1986 meeting of the Federated Ambulatory Surgery Association revealed 17 deaths in approximately 1.1 million procedures. This emphasizes that although there may be minor surgery, there is no minor anaesthetic.¹ Recurrent problems occur in two clinical situations, laparoscopy with general anaesthesia, and use of the conscious sedation technique for nasal and facial surgery.

The Federated Ambulatory Surgery Association also had some data on overall complication rates of types of anaesthesia after ambulatory surgery; combined local and sedation anaesthesia techniques (1:106), general (1:120), regional (1:277) or local anaesthesia alone (1:268).² Thus the combined local and sedation group had the highest overall complication rate, and regional or local anaesthesia groups the lowest. It is imperative for the anaesthetist to provide the best anaesthetic care for ambulatory patients to facilitate their return to daily living and work.

How long should we fast our patients?

In an effort to decrease the incidence of aspiration, patients are routinely asked to be NPO after midnight for surgery scheduled the next day. Recent clinical studies suggest that this overnight fast may not be justified in adults^{3–5} or in children.^{6–7} Pulmonary aspiration usually occurs in emergency abdominal and obstetrical procedures in which there may be such complicating factors as recent food and fluid intake, trauma, administration of narcotic analgesics and difficult intubation. These factors

do not normally apply to healthy elective ambulatory patients. When solids and liquids are tagged with different radioactive isotopes, solids require several hours for emptying while liquids take only one to two hours.⁸

Maltby used bromosulphophthalein (BSF) to measure residual gastric volume and found that patients who received 150 ml of water had a significantly lower residual gastric volume than those who did not, although pH did not vary between the groups.³

When clear fluids such as tea, coffee, fruit juice, or water were allowed until three hours before the scheduled time of surgery, there was no difference in residual gastric fluid volume or pH at induction of anaesthesia between those who drank and those who fasted from midnight.⁴ More patients who had coffee or orange juice felt less hungry and less thirsty than in the group who fasted.

Two recent editorials recommend revision of fasting guidelines.^{9,10} The universal order "NPO after midnight" should apply only to solids. Clear fluids should be allowed until three hours before the scheduled time of surgery. This will accommodate changes in surgical schedule, and a minimum two-hour emptying time.

Should outpatients receive aspiration prophylaxis?

Ong demonstrated that ambulatory patients might be at increased risk of aspiration due to their high residual gastric fluid volumes.¹¹ However, the incidence of pulmonary aspiration in ambulatory surgery is low, 1.7 in 10,000 with a very low mortality.¹² Therefore, it seems reasonable to recommend that aspiration prophylaxis should be administered to patients who are at risk of acid aspiration, e.g., patients with hiatus hernia, the morbidly obese, late midtrimester pregnancy, and anticipated difficult airway management.

Ranitidine, metoclopramide or sodium citrate can be used. It has been shown that there is no advantage in the administration of triple prophylaxis; H₂ antagonist, metoclopramide, and oral antacids or double prophylaxis over H₂ antagonist alone.¹³ In summary, sodium citrate and metoclopramide, or ranitidine can be administered to high-risk outpatients.

Preoperative anxiety

Patients who are scheduled to undergo surgery tend to be anxious. Reassurance by the anaesthetist in the preoperative holding area can reduce anxiety of patients.¹⁴ Most outpatients are not given any premedication. If anxiety persists despite reassurance, oral diazepam 5 or 10 mg can be given before anaesthesia.

General anaesthetic

Local, regional, or general anaesthesia can be administered safely to the ambulatory surgery patient. The choice

of technique should be determined by surgical requirements, anaesthetic considerations, and the patient's physical status and preference. The goal is to anaesthetize the patient for the shortest possible time with the lowest concentration of anaesthetic.

Thiopentone is the most commonly used intravenous anaesthetic induction agent in ambulatory surgery. That position is now being displaced by propofol, an alkyl phenol. Patients who were given an induction dose of propofol 1.5 to 2.5 mg·kg⁻¹ lost consciousness in one arm-brain circulation, but responded to command in three to five minutes.¹⁵

The important advantage of propofol is the ease with which patients recover from its effects. Patients reach a clear-headed state sooner and have a lower incidence of nausea and vomiting.¹⁶ Propofol induction and maintenance was compared with thiopentone, nitrous oxide, oxygen and isoflurane. Patients who had received propofol were ready to be discharged much earlier than those who had received a conventional thiopentone/isoflurane anaesthetic technique.¹⁷

The disadvantages are pain on injection, and the possibility of cardiovascular depression. In addition, the Committee on Safety of Medicines advised that care should be taken when propofol was used to anaesthetize epileptic patients. There had been 37 reports of "seizures," 16 of involuntary movements and ten of opisthotonus associated with the use of propofol.¹⁸

Should potent inhalational agents be used during termination of pregnancy? Greater blood loss has been reported with the use of potent inhalational agents than with nitrous oxide/narcotic techniques.¹⁹⁻²⁰ However, low-dose enflurane, 1% inspired, plus nitrous oxide was also compared with fentanyl plus nitrous oxide. There was no greater blood loss with the inhalational agent technique.²¹ It is possible that the length of procedure and concentration of inhalational agent affect blood loss more than the specific choice of inhalational agent.

Which inhalational agent should we use? Recovery comparisons after enflurane and halothane techniques on patients undergoing ambulatory surgical procedures suggest that recovery is faster after enflurane.²² Awakening times were reported not significantly different between isoflurane and enflurane in patients undergoing short surgical procedures.²³ Enflurane anaesthesia for longer than 90 min was associated with more rapid recovery than after shorter enflurane anaesthesia. With isoflurane, the duration of recovery did not depend on the duration of anaesthesia.²⁴ This suggests that isoflurane may be the inhalational anaesthetic of choice.

The laryngeal mask is a new design of oral airway which fits around the larynx.^{25,26} It was designed primarily as a means of offering some of the advantages of

tracheal intubation while avoiding the fundamental disadvantages of complications that may follow penetration of the larynx. The incidence of sore throat was very low. There was an absence of coughing, laryngeal irritation or spasm following removal of the laryngeal mask. It has great potential in ambulatory surgery.

Conscious sedation

Conscious sedation is defined as a minimally depressed level of consciousness produced by a pharmacological combination that retains the patient's ability to maintain an airway independently and continuously and to respond appropriately to physical stimulation and verbal commands. An alternative term is monitored anaesthesia care.²⁷ There are three components of conscious sedation: adequate sedation to maintain verbal rapport; produce amnesia and relieve anxiety; allow sedation/analgesia supplementation with local or regional block.²⁸ Propofol, midazolam, and alfentanil have the pharmacokinetic properties of smaller volumes of distribution, a high clearance rate, and a short elimination half-life.

Overdose of anaesthetic agents used for conscious sedation may lead to the induction of general anaesthesia followed by respiratory arrest, vasomotor collapse, and eventually death.¹ In patients undergoing dental procedures, the risk of death from intravenous sedation in one series was 1 in 314,000.²⁹ It is necessary to emphasize that vigilant monitoring, careful titration of drug dose, and administration of oxygen are essential.

Cognitive impairment of mental function may occur in patients undergoing cataract surgery with retrobulbar block and intravenous sedation at six hours postoperatively. Patients with a low preoperative Mini-Mental State Score were more likely to experience greater postoperative mental impairment than were patients with higher preoperative Mini-Mental State scores.³⁰ Cataract patients receiving intravenous sedation may have difficulty remembering instructions that are given during the first six postoperative hours. Perioperative instructions should be given to patients before the operation, preferably in conjunction with written instructions.³⁰

Regional anaesthesia

Regional anaesthesia has several distinct advantages over general anaesthesia for the patient scheduled for ambulatory surgery. These include: less nausea and vomiting, greater potential for postoperative analgesia, reduced risk of aspiration pneumonitis, shortened recovery time, reduced recovery nursing requirements, and enhanced ability to communicate with an alert patient intraoperatively and postoperatively.³¹

The likelihood of postoperative hospital admission is

less after regional anaesthesia. It was shown that 2.9% of patients who had general anaesthesia required admission, compared with 1.2% of those who had local or regional blockade.³² Blood loss after therapeutic abortion is reduced in patients receiving local anaesthesia. Discomfort of general anaesthesia, e.g., sore throat, muscle pain, airway trauma, and dizziness, are avoided. Also some patients have a desire to be awake, and retain some control over the situation or some may have a strong fear of general anaesthesia.³³

Patel compared regional block of the femoral, lateral femoral cutaneous, and obturator nerves with general anaesthesia using nitrous oxide and narcotics in patients having knee arthroscopy. The recovery time for the regional anaesthesia group was shorter than that of the general anaesthesia group, 56 min vs 95 min, and the incidence of postoperative pain was much less with regional anaesthesia.³⁴

A recent study compared local and general anaesthesia in patients undergoing knee arthroscopies. The local anaesthetics used were either local infiltration, or femoral nerve block. The local anaesthetic techniques were found to be successful for diagnostic arthroscopy, but it was less satisfactory for operative procedures. The patients either experienced some discomfort, or the surgeon had some difficulty during the procedure due to restricted access owing to poor muscle relaxation.³⁵

For regional anaesthesia to be successful for the ambulatory surgery patient, the anaesthetists must be technically skilled, the surgeons must support the concept, and the patients should be educated in a preoperative visit. Thus regional anaesthesia is applied in a limited fashion in the outpatient setting because the time constraint and rapid case turnover are overwhelming limiting factors.

Should spinal anaesthesia be used in outpatients?

Flatten and Raeder showed an incidence of 37.2% of postdural puncture headache in 51 young male outpatients given spinal anaesthesia with a 25-gauge needle.³⁶ Those who developed headache were off work for a longer time than those who did not. The incidence of postdural puncture headache can be reduced by using spinal needles such as conical Greene points which spread dural fibres vs Quincke point which cut dural fibres.³⁷ In addition, a paramedian approach instead of a median approach and adequate hydration will reduce the incidence of headache. Neal and co-workers evaluated 366 patients undergoing spinal anaesthesia for a variety of surgical procedures. The incidence of postdural puncture headache was 6.6% in outpatients.³⁷ Headache is a serious deterrent for using spinal anaesthesia in the outpatient setting. There are

certain advantages in combining general and local anaesthesia. It can produce less postoperative pain and more rapid recovery.^{38,39}

New horizons

A few drugs are recently under investigation, and will likely be suitable for use in ambulatory surgery. Desflurane is a fluorinated methyl-ethyl ether identical to isoflurane except for the substitution of a fluorine for the chlorine on the alpha ethyl carbon. The blood:gas partition coefficient is 0.42.⁴⁰ Thus it is less soluble than sevoflurane or even nitrous oxide. Induction of anaesthesia with desflurane appears to be more rapid than with enflurane or isoflurane.⁴¹ The rate of recovery from anaesthesia with desflurane is three to five times more rapid than from isoflurane in rats.⁴² Taylor and Lerman investigated induction and recovery characteristics of desflurane in children, and found the gas to be mildly irritant, with a rapid onset and brief excitement period.⁴³ Thus this agent has the potential to be valuable in ambulatory anaesthesia.

The pharmacological properties of sevoflurane suggest that it may be well suited to use in ambulatory anaesthesia but it undergoes degradation to formaldehyde, hydrochloric acid, methanol and olefin at elevated temperatures in the presence of soda lime.⁴⁴

Mivacurium

Mivacurium is a short-acting, non-depolarizing, bis-benzylisoquinolinium muscle relaxant. It undergoes rapid hydrolysis by plasma cholinesterase. Intubating dose of 0.2 to 0.25 mg · kg⁻¹ required two minutes for maximum blockade to occur.⁴⁵ It has approximately twice the duration of action of equipotent doses of succinylcholine, and approximately half those of atracurium or vecuronium. Thus its short duration of action will be ideal for ambulatory surgery.

Flumazenil is a receptor-specific benzodiazine antagonist. It competitively displaces benzodiazepines at the central nervous system receptor site. Reversal of benzodiazine can be titrated to achieve the desired degree by titrating 0.1 to 0.2 mg increments until awakening occurs. However, the elimination half-life of flumazenil is only one hour and benzodiazine resedation may occur.⁴⁶

Summary

With vigilance of the anaesthetists, and careful monitoring, general, local, regional or conscious sedation techniques can all be best techniques tailored to the needs of the ambulatory patients.

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