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Ambulatory Surgery 6 (1998) 65–66

Ambulatory Surgery

Editorial

Office-based surgery: learn from experience, not from mistakes

Bernard V. Wetchler *

161 East Chicago, Avenue 29B, Chicago, IL 60611, USA

Accepted 11 February 1998

And the Lord God caused a deep sleep to fall upon Adam and he slept. And he took his rib and closed his flesh in its place.

Does the book of Genesis, in fact, report the first case of ambulatory surgery? A successful outcome: without the need for patient selection criteria—there was only Adam; without the need for physician privileges—the only physician granted himself privileges in both anesthesia and surgery.

During the 20th century, the time during which ambulatory surgery rose to its place of prominence, we learned that a successful outcome by itself is not sufficient reason to continue; we learned of the need for appropriate patient and procedure selection criteria, credentialing of physicians and facilities meeting regulatory standards of care (i.e. national society, governmental and accreditation organizations).

Ambulatory (day) surgery in the US is now the tail that wags the dog. There are three main settings where day surgery is performed: hospital, freestanding and physicians office. Initially motivated, in the mid 1960s, by a shortage of hospital beds, now driven by a need to contain costs, ambulatory surgical care through improvements in technology and anesthetic drugs and techniques is fast approaching 70% of all surgical procedures. Many other countries have been moving in a similar direction, and if it has not already occurred, will soon reach a similar percentage of surgical patient care.

Procedures once considered too complex (i.e. procedure length, invasiveness, patient physical status, etc.) to be performed without overnight hospitalization, are now scheduled in hospital or freestanding ambulatory facilities. Paralleling this growth in day surgery procedures, there has been an increasing number of less complicated surgeries performed in physicians' offices. From 1984 to 1990 office-based surgery grew from 400000 procedures to approximately 1.2 million per year. Whereas currently close to 10% of all surgeries in the US are performed in an office setting, the SMG Marketing Group (Chicago, IL) estimates an increase to 14% by the year 2001. Growth will be driven by patient convenience, physician convenience and cost. These factors are as current today as they were in 1916 when Ralph Waters (considered by many as the father of the specialty of anesthesiology in the USA) in detailing the opening of his "down-town anesthesia clinic" wrote of convenience to physicians and patients, cost-effectiveness, physician independence from the hospital and the need for careful physical examination of the patient [1].

Porterfield and Franklin in reporting 16 years of office outpatient surgery (13000 procedures under local anesthesia with or without sedation, 5038 under general anesthesia) stated, "if general anesthesia is to be used in an office facility, the service of a trained, competent and compassionate anesthesiologist should be enlisted. This person must be delegated the responsibility for final selection of patients, including a veto power over the surgeons' selection. Only in this manner can a safe and effective environment exist for the benefit of patients" [2]. Far better than veto power is having open channels of communication, establishing mutual respect among surgeons, anesthesiologists and nursing staff-an understanding that all are working toward a common goal of patient safety.

Continued growth as projected by SMG will depend upon the ability of office-based surgery to meet the following criteria [3]: deliver high quality care, establish internal peer review procedures for quality assurance

* Fax: +1 312 6643996.

PII S0966-6532(98)00011-0

and utilization, gain accreditation from a national organization and obtain adequate reimbursement for facility expenses.

In addition to consumer and payer acceptance, continued growth is further dependent upon technological advances that will allow new and more complex procedures to be performed or shifted to the office setting. Who defines 'complex' cannot be left to the eye of the beholder; there is a need to establish independent guidelines. The patient who is scheduled for an office procedure, by virtue of location of care alone, will view the procedure as 'less threatening and less risky'. It is our responsibility to see that there is no increased risk by maintaining similar standards of care, similar standards of patient safety, regardless of whether a procedure is performed in a hospital, a freestanding facility or in a physician's office.

As we move toward the 21st century, preparations are in place for the projected growth of office surgery: (1) guidelines have been established by the American College of Surgeons which match intensity of anesthesia care provided (local, local with sedation and general/major regional block) with facility equipment and drug needs; (2) the American Society of Anesthesiologists with input from the Society for Ambulatory Anesthesia (SAMBA) is in the process of establishing guidelines for anesthesiologists; (3) there are three independent national organizations which can provide accreditation; (4) three states have passed regulations governing office-based surgery; and (5) a Society for Office-Based Anesthesia (SOBA) was formed in 1996.

At its Mid-Year Meeting 1997, SAMBA, a leader in ambulatory anesthesia education, citing office-based surgery as the fastest growing segment of all surgery, presented a full day conference on office-based anesthesia. Two of the presenters at that meeting have articles in this Journal issue. Both Lydia A. Conlay's 'The history of office-based anaesthesia', and Ian Smith's, 'Office-based anaesthesia: the UK perspective' recognize the need for guidelines; the importance of patient and procedure selection; the value of collecting outcome data; and the need for a trained staff.

We should learn not from the mistakes we make, but from the experience we have gained in managing the ambulatory surgical patient. There are no short cuts; office-based surgery is but an extension of ambulatory surgery. The surgical and anesthetic care provided in a physician's office must be equal to that provided in a hospital or free-standing ambulatory facility. Surgeons, anesthesiologists and nurses must work together to provide a safe environment for all patients.

Everything has been thought of before, Goethe suggested. The challenge is to continually improve, to avoid mistakes by learning from our past experiences. So it has been with ambulatory surgery, and so it must be with office-based surgery.

References

[1] Waters RM. The down-town anesthesia clinic. Am J Surg 1919;33:33–71.
[2] Porterfield HW, Franklin LT. The use of general anesthesia in the office surgery facility. Clin Plast Surg 1983;10:292–6.
[3] Henderson JA. Ambulatory surgery: past, present and future. In: Wetchler BV, editor. Anesthesia for Ambulatory Surgery. Philadelphia: Lippincott, 1991:1–27.

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Ambulatory Surgery 6 (1998) 67–68

Ambulatory Surgery

The history of office-based anesthesia[1]

Lydia A. Conlay *

Department of Anesthesiology, Temple University School of Medicine, Broad and Ontario States, Philadelphia, PA 19140, USA

Received 6 February 1998; accepted 11 February 1998

Abstract

The history and evolution of office-based anesthesia are described, with particular emphasis on the role of the dental anesthesia community in the development of this style of practice.

Keywords: Anesthesia; Office; History

The history of 'office-based anesthesia' depends upon the definition of two terms 'office' and 'anesthesia'. In Genesis II:21, it is written "and the Lord caused a deep sleep to fall upon Adam and he slept. And He took one of his ribs and closed up the flesh instead thereof". Cro-Magnon man, living 25–45 thousand years ago, was also believed to have inhaled smoke for medicinal purposes to expunge evil spirits. Thus, 'anesthesia' has been around much longer than have 'offices'.

Since the dawn of anesthesia as we think of it today, anesthesia and dentistry have had ongoing symbiotic relationship. Extraction of a tooth without anesthesia is excruciating; so much so that in medieval times it was used as a form of torture. St. Appolonia was persecuted in this way because of her Christian faith, and has thus been named the patron saint of dentistry. So it is not surprising that dentistry and office-based anesthesia remain so closely intertwined [1]. This manuscript addresses the history of office-based anesthesia in dentistry and in medicine.

On 10 December 1844, a young Hartford dentist named Horace Wells attended a lecture by a travelling chemist, Gardner Q. Colton [2]. During the lecture, the effect of inhaling nitrous oxide (N_2O) was demonstrated. Wells noticed that after inhaling N_2O, a volunteer stumbled into a bench, seriously injuring his leg, but reported feeling no pain. On the following day, Wells underwent extraction of one of his own teeth under the influence of this strange gas. Similarly, he felt no pain. Wells then sought to share this observation with Dr John C. Warren, Surgeon-in-Chief of the Massachusetts General Hospital, Harvard Medical School, in Boston. Wells performed a similar demonstration in the presence of Warren and a number of Warren's students, but with less than an astounding success. Wells was jeered in the hall, "Humbug!" by the students. He quickly returned to Hartford, and the interest in N_2O by the medical community quickly subsided.

Colton, the chemist, manufactured N_2O for Wells. He subsequently established a number of dental institutes within the country, and by the 1880s had anesthetized over 120000 patients using 100% N_2O. Colton believed that N_2O was metabolized to form oxygen in the tissues. This belief would haunt the use of this drug for decades to come.

In 1846, another dentist, W.T.G. Morton, was to change the practice of anesthesia forever. On September 30, 1846, Morton performed a tooth extraction on patient Eben Faust under the influence of ether. This event was witnessed by Dr Henry J. Bigelow, a surgeon at the Massachusetts General Hospital. Bigelow subsequently arranged yet another demonstration of anesthe-

* Corresponding author.

[1] Based on a lecture presented at the SAMBA mid-year meeting, San Diego, CA, 17 October 1997.

0966-6532/98/$19.00
PII S0966-6532(98)00012-2

sia to be performed in the presence of Dr John Warren. A tumor of the neck was removed from a patient under the influence of ether. In contrast to the reception afforded Wells, this demonstration was an astounding success. Dr Warren announced to the audience, "Ladies and gentlemen, this is no humbug".

Nitrous oxide was first manufactured in liquid form in 1881 by the S.S. Kite Manufacturing Company of Philadelphia. The availability of N_2O in a form readily deliverable to customers and so easy to use markedly increased the use of this substance. In 1902, the forerunner of the modern day anesthesia machine was introduced by Carl K. Eter, also a dentist. It should be noted that in the early years, the use of N_2O was associated (intentionally) with cyanosis. In some instances, a patient's color was titrated to a particular shade of blue which was matched to a slip of blue color resembling a paint chip. Similarly, in the presence of excitement, it was recommended that oxygen be entirely shut off, and N_2O's flow increased in order to anesthetize the patient more quickly. "Each struggle he makes will become weaker and weaker until at the point of relaxation he will become subdued enough to give no more trouble. Then from 5 to 15% oxygen may be added, and the strap loosened to allow him plenty of room for respiration" [3].

Shortly after the turn of the century, physicians began to specialize in the practice of anesthesia. One of the earliest office-based anesthetic practices of a physician-anesthesiologist was opened in 1915 by Dr Ralph Waters [4]. In response to an occasional call from a dentist for anesthesia, Dr Waters set up "a modest office with a waiting room and a small operating room with an adjoining room containing a cot on which a patient could lie down after his anaesthetic.... In due time the place became popular and we moved".

The role which regulations would play in office-based anesthesia perhaps first became evident in 1968, at the Dudley Street facility in Providence, Rhode Island.[2] In a letter entitled 'Surgery in an Office Suite' in the Medical Economics Magazine, Charles Hill wrote: "In Rhode Island, we have come up with what we hope will be the answer: incorporating in a medical office building an operating suite complete with OR facilities and a recovery room". However, the facility was financially insolvent. It was not supported by the state government, which ruled that the suite was no more than a doctor's office, and it lacked support from Blue Cross and other third party carriers. In subsequent years, office-based anesthesia continued to blossom and to evolve. The concept of patient monitoring, a separate practitioner to administer the drugs, and the use of different types of drugs followed. A multi-center study by the National Institute of Dental Research of the National Institute of Health demonstrated that mortality following administration of anesthesia in a dentist's office was minimal, and was probably not different from the patients receiving anesthesia in a hospital.

In addition to dentists, other types of practitioners have used anesthesia in the office setting. For example, a survey of the members of the American Society for Anesthetic Plastic Surgery noted that 50% of surgeons operate in their office over half the time, and almost 25% almost never perform anesthetic plastic surgery in the hospital [5]. During office surgery, an anesthetist was not present for about a third of the cases in patients receiving sedation or anesthesia; most commonly, the circulating nurse administered the drugs. Complications were not uncommon: 13% suffered respiratory arrest, 8% unplanned intubation and 1% death. A total of 2% of respondents were the subject of malpractice claims related to adverse anesthetic outcomes in their office. This group of patients continues to represent the fastest-growing segment of office-based anesthesia market. And clearly, it provides significant opportunities for anesthesiologists.

Office-based anesthesia will no doubt continue to evolve into the next millennium. It is safe, pleasing, and convenient for the patient, and substantially lower in cost than even the free- standing surgery centers. Indeed, office-based practices may now command an increasingly larger portions of the surgery center practice, as surgery centers increasingly commanded larger portions of the in-patient practice hospital populations during the last decade. Thus, we come full circle.

Acknowledgements

The author wishes to thank Dr Andrew Herlich and the Wood Library of Anesthesiology for their invaluable input.

References

[1] Bennett CR. Anesthetic management: historical, present, future. Dent Clin North Am 1997;31:81–95.
[2] VanDam LD. A history of ambulatory anesthesia. Anesth Clin North Am (Outpatient Anesth) 1987;5:1.
[3] McMechan F, editor. The American Yearbook of Anesthesia and Analgesia. Surgery, NY, 1980:276.
[4] Waters RM. The downtown anesthesia clinic. Am J Surg (Anesth Suppl) July 1919:71.
[5] Courtiss EH, Goldwin RM, Joffe JM, Hannenberg AH. Anesthetic practices in ambulatory aesthetic surgery. Plast Reconstr Surg 1994;93:792.

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Ambulatory Surgery 6 (1998) 69–74

Ambulatory Surgery

Office-based anaesthesia: the UK perspective[1]

Ian Smith *

Directorate of Anaesthesia, Keele University, North Staffordshire Hospital, Stoke-on-Trent, Staffordshire ST4 6QG, UK

Accepted 6 November 1997

Abstract

Although office-based anaesthesia is not prevalent in the United Kingdom, anaesthesia has long been provided in community dental surgeries. Because of concerns over the safety of providing anaesthesia in hazardous remote locations, several expert working parties have examined UK dental anaesthesia and made numerous recommendations for safe practice. Concerning training, general anaesthesia, sedation, equipment, monitoring, resuscitation and building layout, these recommendations provide an excellent basis for local, regional or national guidelines for many forms of office-based anaesthesia. Putting the recommendations into practice, however, has had a fundamental impact on the provision of UK dental anaesthetic services and may have significant cost implications. These aspects should be carefully considered by anyone involved with planning or delivering office-based anaesthesia.

Keywords: Office-based anaesthesia; United Kingdom; Dental surgeries; Guidelines

1. Introduction

The current enthusiasm for office-based anaesthesia in the United States has yet to reach the United Kingdom. No doubt this latest trend will make the Atlantic crossing sooner or later, just as so many fashions have done in the past, but currently the phenomenon remains an American one. Given the pioneering status of the United States in office-based anaesthesia, can Americans really hope to learn anything from their British colleagues? I believe that they can, for although Britain does not yet conduct office-based anaesthesia for general surgery, we have a long history in the related field of community-based dental anaesthesia. For many years, patients have been receiving sedation and general anaesthesia in their dental practitioner's surgery for a variety of procedures, especially simple tooth extractions. This was once a very common procedure, although the number of general anaesthetics administered has been declining for many years. In 1967 there were approximately 2 million dental general anaesthetics administered, compared to about 370000 in 1988 [1]. This decrease is due partly to overall improvements in dental health, as well as to increased promotion of the use of local anaesthesia. Nevertheless, it is recognised that there will continue to be a public demand for general anaesthesia for dental procedures, especially amongst children, and that this is better conducted in the familiar and friendly atmosphere of the dental surgery than in a hospital unit. This desire to distance minor procedures from the hospital environment is also one of the factors which is driving the development of office-based anaesthesia in the USA. Overall, dental anaesthesia has a good safety record, with a mortality rate which compares very favourably with that for hospital-based general anaesthesia. Nevertheless, a number of deaths have occurred (Fig. 1) and while the overall number is comparatively small, any death resulting from a simple dental procedure in an otherwise healthy patient is a cause for serious concern. For this reason, several expert working parties have reviewed the practice of dental anaesthesia and have

* Tel.: +44 1782 553054; fax: +44 1782 719754.

[1] Based on a lecture presented at the SAMBA mid-year meeting, San Diego, CA, 17 October 1997.

0966-6532/98/$19.00
PII S0966-6532(98)00041-9

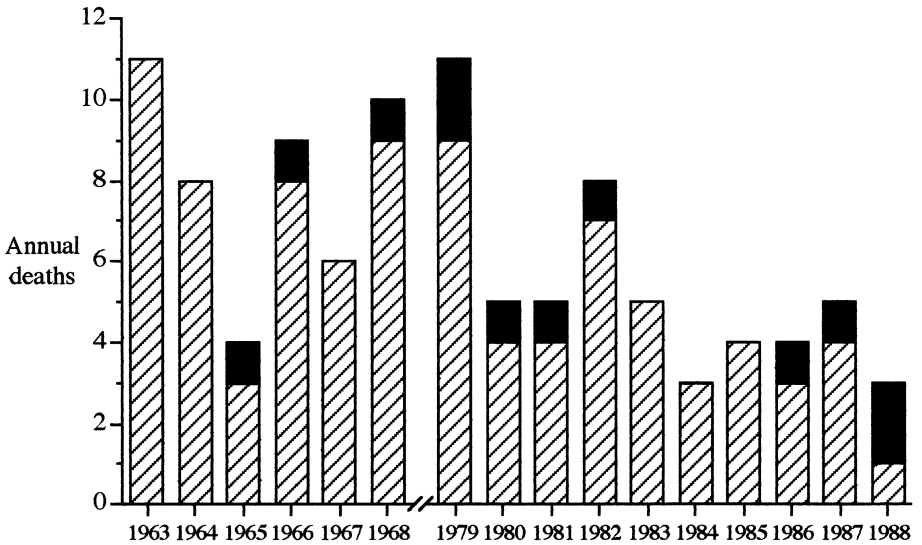

Fig. 1. Annual deaths resulting from dental practice involving general anaesthesia (hatched bars) or sedation (solid bars) in the years 1963–1968 and 1979–1988. Data from Tomlin (1974) [7] and The Poswillo report (1990) [1].

produced a number of recommendations aimed at greatly improving its safety. While some of these recommendations are specific to dental practice and the UK environment, the majority are equally applicable to other forms of office-based anaesthesia and should be considered by anyone attempting to establish local (or preferably national) guidelines for such a service.

2. General anaesthesia

Perhaps because of their pioneering role in the development of general anaesthesia, the administration of anaesthetics has always been a part of British undergraduate dental training. Previously, the majority of dental anaesthetics were administered by dentists, often working as both operator and anaesthetist. As long ago as 1967, the Joint Subcommittee of the Standing Medical and Dental Advisory Committee recommended that "all general anaesthetics should be administered by specialist anaesthetists trained in dental anaesthesia". In practice, very little changed as a result of this report and in 1978 a further working party was set up, which published its findings in 1981 [2]. Usually referred to by the name of its chairman, the Wylie report called for a register of recognised dental anaesthetists, although it allowed dentists to be included on this list, provided they had received adequate training at both undergraduate and postgraduate level. The practice of a single person acting as both operator and anaesthetist was deplored, however. The requirement for specialist training was taken a step further by a more recent working party which was set up in 1989. When published in 1990, the Poswillo report recommended that dental anaesthesia should be regarded as a postgraduate subject, that all anaesthetics should be administered by accredited anaesthetists and that anaesthetic training should include specific experience in dental anaesthesia [1]. All of these suggestions are equally applicable to office-based anaesthesia. Just as dental anaesthesia presents its own unique problems and challenges, so too does office-based anaesthesia. Office-based anaesthesia should be recognised as a subspecialty, just as ambulatory anaesthesia has been in the past, and specific training should be provided. There is also a strong safety case for insisting that general anaesthetics should only be administered in offices (and other remote locations) by accredited (or Board-certified) anaesthetists. Trainee anaesthetists, who frequently work unsupervised in British hospitals, are rarely permitted to work alone in dental practices in the United Kingdom (where Nurse anaesthetists are not recognised at all).

The Poswillo report also considered the need to continue to provide general anaesthesia in dental offices. The authors advocated the use of local anaesthesia with sedation wherever possible, but recognised a continuing need for general anaesthesia. Local anaesthesia ($\pm$ sedation) should probably be the preferred choice for all forms of office-based surgery, although with a far wider range of procedures than are encountered in dentistry, this will not always be possible. Taking the recommendations of the British expert working parties and extrapolating from them to the wider arena of office-based anaesthesia would produce the guidelines set out in Table 1.

3. Anaesthetic equipment

Traditional dental anaesthetic apparatus has adopted a different design to that used elsewhere and has involved intermittent (on-demand) gas flows and frequently incorporated the ability to administer hypoxic gas mixtures to patients. Although such equipment has not been manufactured for many years, older apparatus has often been retained for long periods, especially in infrequently used locations. It is common practice in hospitals (and elsewhere) that new equipment is sited in 'front-line' areas and older apparatus is displaced to less frequently used locations. The Wylie report recommended that equipment for the delivery of anaesthesia should conform to similar standards to those in hospital practice, in particular with regard to the inability to deliver hypoxic mixtures and the provision of oxygen failure alarms [2]. It is imperative that offices which propose to offer an anaesthetic service be equipped with modern anaesthetic equipment and are not furnished with old or 'second hand' apparatus. Not only should the equipment be inherently safe, but it should also be sufficiently similar to that which the anaesthetist is familiar with using in other locations. Arrangements must also be made for servicing such equipment and maintaining it to the accepted standard, with provision for its eventual replacement in due course. In the olden days, anaesthetists frequently carried their equipment with them as they moved from location to location. With the development of more sophisticated equipment, which was larger and heavier, it became necessary to fix apparatus at its site of use. Manufacturers are beginning to develop more transportable anaesthetic delivery equipment, but the effect of frequent movement and handling on the accuracy and safety of such apparatus needs to be considered. Offices which intend to provide an anaesthetic service should ideally have anaesthetic equipment (and scavenging apparatus) installed as part of their infrastructure.

Table 1
Recommendations concerning the use of general anaesthesia in office-based practice, modified from Poswillo (1990) [1]

(1) The use of general anaesthesia should be avoided wherever possible
(2) The same general standards in respect of personnel, premises and equipment must apply irrespective of where the general anaesthetic is administered
(3) Office-based anaesthesia must be regarded as a postgraduate subject
(4) All anaesthetics should be administered by accredited anaesthetists who must recognise their responsibility for providing office-based anaesthetic services
(5)Anaesthetic training should include specific experience in office-based anaesthesia

4. Sedation

The expert working parties on dental anaesthesia considered the use of sedation, with local anaesthesia, to be safer than general anaesthesia. 'Sedation' is a nebulous term which can describe a spectrum of consciousness ranging from almost fully alert to comatose. Ideally, the needs of the individual patient should be assessed and specific drugs should be used to treat pain, discomfort and anxiety, with each drug separately titrated to effect [3,4]. Because of their familiarity with potent sedative-hypnotic drugs and managing unconscious patients, anaesthetists are ideally suited for providing sedation and monitoring its effects. In dental and office-based practice, however, it may be impractical to have anaesthetists available whenever sedatives are used. At present, British surgeons frequently administer sedative drugs (e.g. for endoscopy) for this reason. The provision of simple sedation by non-anaesthetists may be reasonably safe, provided that there is a low risk of unconsciousness or respiratory depression. This will depend upon the technique, with certain drugs (e.g. propofol) being more likely to produce loss of consciousness [5] and some combinations (especially opioids and benzodiazepines) producing severe respiratory depression [6].

The Poswillo report [1] defined the term 'simple sedation' as "a carefully controlled technique in which a single intravenous drug (or a combination of oxygen and nitrous oxide) is used to reinforce hypnotic suggestion and reassurance…" . In addition, the technique "allows verbal contact with the patient to be maintained at all times". Furthermore, "the technique must carry a margin of safety wide enough to render unintended loss of consciousness unlikely". Any technique of sedation not coming within the above definition was considered to be general anaesthesia and therefore unsuitable for non-anaesthetists to perform. On this basis, the Poswillo report suggested that dentists could safely administer sedatives to their patients, provided that they also received training in practical aspects of sedation and were able to adequately monitor their patients and respond to any likely problems. The routine use of flumazenil was also disallowed, both because it would encourage the development of excessive sedation and because its short duration of effect permits resedation to occur after the patient is discharged. Once more, many of the recommendations concerning sedation may be adapted to office-based anaesthesia, as illustrated in Table 2. Where sedation is managed by adequately-trained anaesthetists, these guidelines need not all be applied.

Table 2
Recommendations concerning the use of sedation (by non-anaesthetists) in office-based practice, modified from Poswillo (1990) [1]

(1) Sedation be used in preference to general anaesthesia wherever possible
(2) Intravenous sedation should be restricted to the use of a single titrated dose of one drug with an end point remote from anaesthesia
(3) The use of flumazenil should be reserved for emergencies
(4) Additional caution should be exercised when administering sedation to children
(5) Practical training in office-based sedation should be provided for surgeons
(6) More emphasis should be given to (surgical) undergraduate training in sedation
(7) Surgeons wishing to administer simple sedation should complete a recognised training course
(8) All surgical undergraduates should be proficient in venepuncture and the use of indwelling cannulae
(9) Surgeons must be aware of the significance of pulse oximeter readings
(10) Patients receiving sedation should be accompanied by a responsible person

5. Facilities, monitoring and support staff

Offices which provide sedation and, especially, general anaesthesia for minor surgery will require more equipment and facilities compared to those which are used only for consultations. The additional requirements for resuscitation will be considered later. Patients who have received general anaesthesia should be allowed to recover in a separate room and be cared for by a dedicated and adequately trained member of staff. Supervision of patients recovering from sedation is also required, although it has been suggested that additional personnel may not be required because of the shorter recovery period [1]. Other recommendations concerning basic facilities are listed in Table 3.

American anaesthesiologists are familiar with minimal monitoring standards, although these have been less strictly applied in the UK. The level of monitoring suggested for dental surgeries providing general anaesthesia are listed in Table 3, and these recommendations would also be suitable for other forms of office-based anaesthesia. Capnography was only considered necessary in association with tracheal intubation because readings obtained from the alternative, a dental nasal mask, are often unhelpful. In the wider office-based setting, capnography should be used with laryngeal masks and probably also with face masks.

Skilled assistance for the anaesthetist has always been a cornerstone of UK. anaesthetic practice and hospital-based anaesthetists always work with a specifically-trained nurse or operating department assistant. In an isolated environment, where additional help may be far away, the provision of skilled assistance is even more essential. The assistant should be dedicated to helping the anaesthetist in caring for the patient and not also responsible for aiding the surgeon or performing other duties [2]. This assistant should be adequately trained in order to be capable of looking after and monitoring an unconscious patient, assisting with the anaesthetic and monitoring equipment, helping with venous access and airway management and should also be trained in resuscitation [2].

6. Resuscitation

Patients may collapse in a surgeon's office at any time. This may be due to a variety of reasons, and may not necessarily involve general anaesthesia or sedation. For this reason, resuscitation facilities should always be available and staff should be adequately trained. Where general anaesthesia and sedation are practiced, these provisions are of even greater importance. Fortunately, the need for resuscitation occurs relatively infrequently, even in quite busy units. For this reason, it is essential that all necessary equipment is regularly checked and maintained and that procedures are rehearsed frequently. Effective resuscitation cannot be provided by a single person so it is important that all members of the team are adequately trained. In order to ensure effective resuscitation, the team must work well together and training and practice should therefore be a group event. Awareness of the patient's underlying medical condition(s) and chronic medication may help in identifying the likely cause of collapse and guide successful resuscitation, and so a thorough medical history should always be obtained (and documented) prior to begin-

Table 3
Recommendations concerning facilities for office-based anaesthesia and minimal monitoring standards (for general anaesthesia), modified from Poswillo (1990) [1]

The same general standards in respect of premises must apply irrespective of where the general anaesthetic is administered
Offices delivering general anaesthesia should be registered and regularly inspected
Adequate recovery facilities (and personnel) should be available
At no time should the recovering patient be left unattended
Minimal monitoring should include the following: Pulse oximeter (also recommended for sedation) ECG Noninvasive blood pressure Capnography (whenever the trachea is intubated)
Appropriate training must be provided for those assisting the anaesthetist and surgeon

Table 4
Recommendations concerning resuscitation in office-based anaesthesia, modified from Poswillo (1990) [1]

(1) Every member of the office team should be trained in resuscitation. Training should be a team activity
(2) Every member of the office team should have their proficiency in cardiopulmonary resuscitation tested and certificated
(3) Resuscitation procedures should be regularly practiced in the office under simulated conditions
(4) A history of preexisting medical conditions and regular medications should be taken from the patient prior to starting any treatment
(5) Surgeons must be proficient in the use of airway adjuncts. Surgical students should be taught basic life support at an early stage and be proficient in airway management
(6) All anaesthetists practicing office-based anaesthesia must have advanced life support skills
(7) All surgeons must be proficient at establishing access to the circulation
(8) All surgeons should examine their offices critically with regard to their suitability for resuscitation and access for paramedics and emergency services
(9) Suitable equipment (Table 5) and drugs (Table 6) should be available for resuscitation. Equipment must be regularly serviced and maintained, while drugs must be checked regularly and out of date stock replaced

Table 5
Essential resuscitation equipment, modified from Poswillo (1990) [1]

Airway maintenance	Suction apparatus (portable) Simple airway adjunct (e.g. pocket mask) Self-inflating bag, valve and mask Portable oxygen supply and delivery system Cricothyroid puncture needle
Circulation maintenance	Syringes, needles and iv cannulae Infusion sets Defibrillator
Miscellaneous	Stethoscope Scissors and tape Tourniquet Sphygmomanometer
Additional items available where sedation is used	Suction tubing and catheters Oropharyngeal airways
Additional items available where general anaesthesia is used	Additional items as for sedation Nasopharyngeal airways Range of tracheal tubes Adult and paediatric laryngoscope Mouth gag (with offset jaws) Magill forceps Lubricant jelly

ning treatment. Many of these points were highlighted by the Poswillo report, and their recommendations concerning resuscitation are especially pertinent to other forms of office-based practice (Table 4).

In addition to training staff and providing equipment, consideration should be given to resuscitation when planning new offices (or adapting old ones) to deliver anaesthesia. The operating surface must be sufficiently firm to permit closed chest compression and the operating table should also be able to be tilted head-down quickly. There should be sufficient space around the patient to allow several people to perform the tasks which will be necessary during resuscitation, including cardiac massage, airway management and establishing additional venous access. Consideration should be given to how long it will take for an ambulance to arrive and what will be the additional journey time to the nearest hospital. Once the ambulance has arrived, it would be unfortunate for additional time to be wasted trying to gain access to the office via stairways or narrow corridors and doorways. Ideally, offices providing an anaesthetic service should be located on the ground floor with an unimpeded approach for emergency services [2]. The workload implications for a hospital supplying emergency care to patients receiving office-based anaesthesia should also be considered.

Because outside help will never be immediately available, the office should be self-sufficient in basic equipment (Table 5) and drugs (Table 6) for resuscitation and life support. Emergency equipment should be regularly inspected and serviced to ensure that it remains functional on those rare occasions when it is actually

Table 6
Drugs for emergency use, modified from Poswillo (1990) [1]

First line drugs	Oxygen Adrenaline (epinephrine) Lignocaine (lidocaine) Atropine Calcium chloride Sodium bicarbonate Glyceryl trinitrate (tablets or sublingual spray)
Second line drugs	Aminophyline Salbutamol (albuterol) inhaler Injectable antihistamine Dextrose 50% Hydrocortisone Flumazenil Naloxone Midazolam or diazepam Suxamethonium (succinylcholine) Crystalloid infusion solution Colloid infusion solution

required. Drug supplies should be stored under appropriate conditions and stock should be replaced when it approaches its expiration date. Since many of these drugs will (with luck) never be used, arrangements may be made with more frequent users to exchange supplies of older stock, rather than having to discard out of date drugs. The decision on whether or not to stock dantrolene (for treatment of malignant hyperpyrexia) is a difficult one (because of the short shelf-life and significant cost), and may depend on the rapidity with which supplies can be obtained from another source. Sharing arrangements may be possible where several offices (or office and hospital) are located nearby.

7. Summary

Office-based anaesthesia may appeal to patients because of informality and convenience and to providers because of greater efficiency and economy. However, the physician's office must be recognised as a hostile environment in which to deliver anaesthetic services and be treated accordingly. It is essential that adequate levels of equipment be provided for anaesthesia administration, patient monitoring and resuscitation and that all staff are adequately and appropriately trained. The possibility of complications must be recognised and planned for if office-based anaesthesia is not to become "a disaster waiting to happen". Many of the necessary lessons have already been learned during the long experience of outpatient dental anaesthesia in the UK and these should be considered before moving further forward. Safe practice is possible, but the UK experience has demonstrated that this standard of care is not necessarily cheap. Apart from the improvements in safety which have resulted from the British expert working parties' reports, one of the major changes to have occurred is a substantial reduction in the number of dental surgeries providing anaesthetic services. The main reason being the high cost required to equip such locations to an adequate standard. Ironically, many healthcare regions have now established fully equipped and staffed dental surgeries within the hospital, and closed community clinics! If office-based anaesthesia is to succeed in the USA, it must be for the correct reasons and not simply to save money.

References

[1] Poswillo DE. General anaesthesia, sedation and resuscitation in dentistry. Report of an expert working party. London: Standing Dental Advisory Committee, Department of Health, 1990. (The principal recommendations may be found in: the Br Dent J 1991; 170: 46–47).
[2] Wylie report. Report of the working party on training in dental anaesthesia. British Dental Journal 1981;151:385–388.
[3] Smith I, Taylor E. Monitored anesthesia care. In: White PF, editor. International Anesthesiology Clinics: Anesthesia for Ambulatory Surgery. Boston: Little, Brown & Co, 1994:99–112.
[4] Smith I. Monitored anesthesia care: how much sedation, how much analgesia? J Clin Anesth 1996;8:76S–80S.
[5] Smith I, White PF, Nathanson M, Gouldson R. Propofol: an update on its clinical use. Anesthesiology 1994;81:1005–43.
[6] Bailey PL, Pace NL, Ashburn MA, Moll JWB, East KA, Stanley TH. Frequent hypoxemia and apnea after sedation with midazolam and fentanyl. Anesthesiology 1990;73:826–30.
[7] Tomlin PJ. Death in outpatient dental anaesthetic practice. Anaesthesia 1974;29:551–70.

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Ambulatory Surgery 6 (1998) 75–78

Ambulatory Surgery

Anaesthesia for paediatric office-based surgery[1]

Ronald S. Litman *

University of Rochester School of Medicine and Dentistry, Rochester, New York, USA

Received 14 January 1998; accepted 30 January 1998

Abstract

General considerations for providing office-based anaesthesia to children are reviewed. These include monitoring and equipment, preoperative considerations, anaesthetic technique, emergence and recovery, and economic issues. Specific considerations for the haematology/oncology, gastroenterology, orthopaedic, dental and ophthalmologic clinics are also reviewed.

Keywords: Office-based anaesthesia; Paediatric anaesthesia

1. Introduction

Paediatric office-based surgery has expanded greatly within the hospital setting in recent years. It seems to have become a natural extension of the capability and willingness of anaesthesiologists to provide general anaesthesia in remote areas of the hospital, such as the radiology suite. It was then only a matter of time before children undergoing painful procedures in physicians' offices or clinics received general anaesthesia. Minor procedures that normally take place in the hospital's surgical suite or a free-standing surgi-center, are now occurring in physician's offices. Table 1 lists the clinics and offices within the hospital where we have given anaesthesia to children. In this article, a review of the general principles involved when anaesthetizing children in the office setting will be given, and will be followed with a brief description of the unique considerations for some locations.

2. General principles

2.1. Monitoring and equipment

It is essential that anaesthesiologists become familiar with our own [1] and the American Academy of Pediatrics' guidelines for monitoring patients during deep levels of sedation for painful procedures [2]. We cannot reasonably expect others to follow safety guidelines if we ourselves do not. For example, in healthy patients it is often tempting to use pulse oximetry alone during intravenous (IV) sedation for a brief procedure. However, the standard of care also requires use of electrocardiography and intermittent blood pressure measurements. Each remote location should be equipped with these capabilities as well as the provision of oxygen (via mask and positive pressure) and a suction device, unless the mobile anaesthesia team provides these themselves.

The necessity of an anaesthesia machine depends on several factors: comfort of the anaesthesiologist, induction technique, need for tracheal intubation, and often the most important, space limitations. Anaesthesiologists have different levels of comfort as far as their technique of induction of anaesthesia in children. Some are comfortable placing an IV catheter in an awake

* Present address: Box 604, Strong Memorial Hospital, 601 Elmwood Avenue Rochester, NY 14642, USA. Tel.: +1 716 2758084; fax: +1 716 2447271; e-mail: Rlitman@anes.rochester.edu

[1] This article is based upon a presentation given at the Postgraduate Assembly in New York City, December, 1997.

0966-6532/98/$19.00
PII S0966-6532(98)00010-9

Table 1

Haematology/Oncology	Gastroenterology	Orthopaedics	Dentistry and oral surgery	Ophthalmology
Lumbar puncture	Endoscopy	Removal of hardware	Removal of wisdom teeth	Exam under anaesthesia
Bone marow aspiration and biopsy	Colonoscopy	Cast change	Removal of gum lesions	Removal of sutures
		Joint aspiration	Miscellaneous minor oral surgery procedures	

child, and some prefer an inhalational induction prior to IV placement for which an anaesthesia machine is required. An alternative approach is to have an IV catheter placed by a paediatric practitioner prior to arrival. This will save time and allow for IV induction of general anaesthesia. If tracheal intubation is anticipated, capnometry is essential to confirm proper endotracheal tube placement. In this case, it is preferable to have an anaesthesia machine because of its capabilities for storing a capnometry device and the ability to provide positive pressure ventilation without having to rely on a bag-mask device.

2.2. Preoperative considerations

Fasting guidelines remain the same as for any anaesthetic, regardless of how light the sedative technique [1]. Premedication is encouraged for children >1 year old and can be administered by the office staff prior to the arrival of the anaesthesiologist. It must have a considerable margin of safety so as not to require monitoring and have a short duration of action without prolonging the time to reach discharge criteria. Midazolam best fits these requirements and can be administered as either an oral, nasal or rectal preparation [3].

Preoperative use of a local anaesthetic cream (EMLA) is recommended for painful procedures (i.e. bone marrow aspiration). Parents should receive a prescription beforehand, and apply the EMLA at home at least 1 h prior to the procedure [4]. Although data is lacking, it has been my impression that local anaesthesia of the skin allows for less general anaesthesia to be used, resulting in a more rapid recovery.

2.3. Anaesthetic technique

The choice of anaesthetic technique depends on the answers to the following questions:

2.3.1. Is the procedure painful?

If so, then ordinarily an analgesic is indicated. However, in the office setting, where rapid emergence and early discharge are priorities, opioids are usually omitted in favor of larger doses of hypnotics that will result in a faster emergence. Few surgical procedures done in remote settings produce significant postoperative pain that cannot be managed with oral analgesics alone.

2.3.2. Does the child need to be motionless?

Non-painful procedures such as echocardiography, or exams under anaesthesia require a motionless patient to obtain a high quality result. The goals are different than for painful procedures. The patient needs to tolerate only mild physical stimuli, and therefore, lighter levels of sedation are adequate.

2.3.3. What is the duration of the procedure?

The answer to this question is often the most important determinant when choosing the proper anaesthetic. Ideally, it should not last significantly longer than the procedure itself. Not only does the child with an altered mental status need to be detained in the office, but also directly supervised until their baseline mental and hemodynamic status is achieved. Experience and an honest estimate from the person performing the procedure will determine the choice of anaesthetic. The ideal agent would have a rapid onset and offset, and be easily titrated.

In recent years, IV propofol has replaced IV ketamine as the most commonly used anaesthetic outside the operating room environment. Its advantages include easy titratability, rapid onset, short duration of action, and a low incidence of postoperative nausea and vomiting [5]. The most common side effect is pain on injection that is prevented by the liberal addition of lignocaine [6]. Respiratory depression will result when high doses are administered, however clinical experience has shown that lower doses, that preserve spontaneous ventilation [7], are quite effective for most procedures [8].

2.4. Emergence and recovery

Each office or clinic where general anaesthesia is administered should have fully equipped recovery facilities with the monitoring equipment and trained personnel that parallel those in the Post-Anaesthesia Care Unit (PACU). In the office setting, it is desirable to have a rapid recovery. This enables the child to be discharged home with minimal post-anaesthesia nursing

care, and allows the anaesthesiologist to move on to the next case in an efficient and cost-effective manner.

2.5. Economics

The cost efficiency of office-based anaesthesia presents an additional challenge. The most common obstacle is delay, either because the office staff are not properly prepared to begin on time, or because of an unexpected delay during the previous case. The solutions to these problems are to develop a fluid working relationship with the staff in each location, enabling them to understand the economic pressures, and to administer anaesthesia in a cost-efficient manner with rapid induction and emergence times.

Finally, a word of caution to those considering venturing into the office setting: Flexibility is essential on the part of the anaesthesiologist but one should not expect office staff to be flexible as well. In fact, the most important ingredient for success from their standpoint is consistency. At first, these statements may seem paradoxical. However, with experience, the anaesthesiologist will become familiar with the office or clinic's surroundings and staff and will develop a consistent technique for taking care of the patients. This is especially true in the haematology/oncology department, where the patients typically require many procedures over time. Ideally, in any given institution, a small cadre of anaesthesiologists will make up the 'office-based anaesthesia team' so that differences in preferences and techniques will be minimized and a trusting relationship can develop between members of the team and non-anaesthesiology staff in those areas.

In the following section, some of the unique anaesthetic considerations for the offices and clinics where we have participated in the administration of anaesthesia will be discussed.

3. Haematology/oncology

Anaesthesia and sedation for haematology/oncology patients are one of the more challenging aspects of office-based practice. The most common procedures are bone marrow biopsy and lumbar puncture for administration of intrathecal chemotherapy. These procedures are performed with the child lying prone or in the lateral position. Children often have an indwelling central venous catheter that facilitates IV induction of anaesthesia. Up until the advent of propofol, these children were typically sedated with a combination of a benzodiazepine and an opioid. Propofol, however, has greatly improved patient and staff comfort [8,9]. Parents and children appreciate the rapid onset, brief recovery time, and complete amnesia of the procedure. An alternate method that results in a more rapid recovery time is to combine IV midazolam (0.05 mg/kg) with a continuous infusion of remifentanil to produce a state of conscious sedation. A nasal cannula or the 'blow-by' technique provides supplemental oxygen. Remifentanil is given as a bolus of 1 mcg/kg over 1 min followed by a continuous infusion of 0.2 mcg/kg per min and titrated every 5 min (the time to reach steady-state concentration) by either doubling or halving the concentration to achieve an 'analgesic state'. This method should be used with caution because the dose required to achieve analgesia frequently exceeds the dose that causes apnea! Children need to be old enough to respond to encouragements to take a deep breath. Most children and parents, however, prefer the unconscious state and the paediatric staff prefer the more rapid onset of propofol, although recovery may be prolonged. Besides, these procedures are typically of shorter duration than the time it takes to achieve an analgesic state with remifentanil.

4. Gastroenterology

The two most common procedures in the gastroenterology clinic are endoscopy of the esophagus and stomach, and lower intestinal colonoscopy. The most important consideration for anaesthesia during upper endoscopy is airway protection. Unless the child is older and a sedative technique chosen, we prefer tracheal intubation for all children undergoing this procedure. The anaesthetic technique reflects the fact that these procedures often end abruptly without advance warning. Therefore, short-acting muscle relaxants (i.e. mivacurium, succinylcholine infusion) and light levels of anaesthesia are preferred. Opioids are rarely used because pain is not a prominent concern during and following upper endoscopy, and their administration may delay awakening.

Colonoscopy, on the other hand, is more painful than it appears and opioids are often used as part of the sedative technique. These children rarely require tracheal intubation unless they are susceptible to pulmonary aspiration of gastric contents due to some pre-existing condition. We find that a combination of an opioid and a benzodiazepine is most useful for this particular procedure, but a propofol infusion technique is also effective.

5. Dentistry and oral surgery

The anaesthetic considerations during dental procedures are similar to those during upper endoscopy in that the upper airway is shared. For small children,

tracheal intubation is preferred. A light sedative technique may suffice for older, more cooperative children.

6. Orthopaedics

Various different minor surgical procedures can be performed in the orthopaedic clinic if a suitable space is available. The most common procedures are removal of hardware, joint aspiration, and cast changes in young infants. Opioids are avoided because postoperative pain is rarely a consideration. For brief procedures, an inhalational technique may be used without IV catheter placement, if space allows the presence of an anaesthesia machine.

7. Ophthalmology

We are frequently called upon by our ophthalmologic colleagues to provide a motionless child during either suture removal following eye surgery, or to enable a complete ophthalmologic exam. Titration of a short-acting hypnotic or inhalational anaesthesia will suffice. Since the procedures often involve the use of sharp instruments inside small, delicate eyes, immobility is a priority.

References

[1] ASA Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. Anesthesiology 1996;84:459–471.
[2] American Academy of Pediatrics. Guidelines for monitoring and management of pediatric patients during and after sedation for diagnostic and therapeutic procedures. Pediatrics 1992;89:1110–1115.
[3] Davis PJ, Tome JA, McGowan FX Jr, Cohen IT, Latta K, Felder H. Preanesthetic medication with intranasal midazolam for brief pediatric surgical procedures. Anesthesiology 1995;82:2–5.
[4] Garjraj NM, Pennant JH, Watcha MF. Eutectic mixture of local anesthetics (EMLA) cream. Anesth Analg 1994;78:574–83.
[5] Jobalia N, Mathieu A. A meta-analysis of published studies confirms decreased postoperative nausea/vomiting with propofol (abstract). Anesthesiology 1994;81:A33.
[6] Cameron E, Johnston G, Crofts S, Morton NS. The minimum effective dose of lignocaine to prevent injection pain due to propofol in children. Anaesthesia 1992;47:604–6.
[7] Rosa G, Conti G, Orsi P, D'Alessandro F, La Rosa I, Di Giugno G, Gasparetto A. Effects of low-dose propofol administration on central respiratory drive, gas exchanges and respiratory pattern. Acta Anaesthesiol Scand 1992;36:128–31.
[8] Powers KS, van der Jagt E, Sullivan JS, Rubenstein JS, Litman RS. Safe and effective deep sedation with propofol of children undergoing painful procedures in the outpatient setting (abstract). Pediatrics 1997;100 Suppl:458–8.
[9] McDowall RH, Scher CS, Barst SM. Total intravenous anesthesia for children undergoing brief diagnostic or therapeutic procedures. J Clin Anesth 1995;7:273–80.

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Ambulatory Surgery 6 (1998) 79–83

Ambulatory Surgery

Anaesthetic and management dilemmas in office-based surgery[1]

Rebecca S. Twersky *

Ambulatory Surgery Unit, SUNY Health Science Center at Brooklyn, Brooklyn NY, USA

Received 12 February 1998; received in revised form 18 March 1998; accepted 18 March 1998

Abstract

Given the changing patterns of healthcare delivery in the USA, it can be anticipated that office-based surgery and anaesthesia will continue to grow over the next few years. The development of newer surgical technologies and anaesthetics have facilitated the ability of the office to provide services that until recently were restricted to a hospital-based practice. Notwithstanding this shift of 'more intensive' surgical procedures to the 'less intensive' office environment, regulations need to be established to ensure patient safety. The anaesthesiologist must step forward as an advocate for patient safety and assume the leadership role in defining the practice environment, appropriate patient selection and types of anaesthetics for this site. Basic to the practice of office anaesthesia must be the tenet that the office be held to the same stringent standards that would apply in the traditional anaesthetizing locations.

Keywords: Office-based anaesthesia; Office surgery; Patient and procedure selection; Patient safety

1. Introduction

Given the changing patterns in healthcare delivery and the shifting of surgical procedures to less intensive settings, considerable growth is occurring in office-based surgery in the USA. As Fig. 1 illustrates, by the year 2001, approximately 14% of all surgeries will be performed in physicians' offices [1]. While the tradition of office-based surgery and office-based anaesthesia is well established, advances in surgical technology and the development of newer anaesthetics have contributed significantly to a continually expanding list of 'more intensive' procedures that are now performed in the office setting. Notwithstanding widespread support for the growth of this practice venue, there is growing concern regarding patient safety. The delivery of 'safe' anaesthesia in the physicians' offices has been a major focus of concern. The anaesthesiologist, assuming the role of the perioperative medical specialist, must step forward and become the advocate for patient safety and welfare in this evolving practice environment.

Is office-based anaesthesia (OBA) different from ambulatory surgery? Office anaesthesia practice, in many ways, shares similar components with ambulatory surgery. Viewed as a natural extension of ambulatory surgery, many of the lessons learned by anaesthesiologists as ambulatory surgery practice grew, can now be confidently applied in the office setting. Nonetheless, there are some components of practice that are unique to the office. A guide to safe practice in this rapidly expanding venue must be the tenet that the same degree of vigilance used by anaesthesiologists over the last 15 years in selecting the appropriate patient and anaesthetics for ambulatory surgery, must now be applied to the office setting. The objective of this article is to discuss the dilemmas anaesthesiologists face in OBA regarding the practice environment, patient selection and types of anaesthesia appropriate for this setting.

* Present address: Ambulatory Surgery Unit, Long Island College Hospital, 339 Hicks Street, Brooklyn NY 11201, USA. Tel.: +1 718 7801358; fax: +1 718 7801350; e-mail: twersky@pipeline.com

[1] This article is based upon a presentation given at the Postgraduate Assembly in New York City, December, 1997.

0966-6532/98/$19.00
PII S0966-6532(98)00034-1

2. Procedures performed in the office setting

In 1996, an estimated 3.4 million procedures were performed in physicians' offices [2]. Plastic surgery (70%), dermatology, oral surgery, gynecology, podiatry and ophthalmology procedures accounted for the majority of surgeries performed in the office. ENT, dental (other than oral surgery) and arthroscopy procedures are also being performed in increasing numbers in this setting [3]. As the growth of office-based surgery continues, the procedures will expand beyond conventional self-pay cosmetic and dental procedures. One of the challenges faced by the office-based anaesthesiologist is the limited reimbursement policies. Appropriate reimbursement fees for office-based procedures is in a state of flux. While third-party payers have started to recognize the potential cost savings offered by the office, there is no consensus regarding reimbursement fees. Healthcare providers, having gained tremendous knowledge in economic and cost-effective outpatient care, can now offer this valuable experience to the office setting in negotiations with third-party payers for reimbursement fees for office surgery and office anaesthesia.

3. Providers of office-based anaesthesia

Who are the providers of office-based anaesthesia? Office-based anaesthesia care has been administered by many different providers with varying degrees of training and experience, including nurse anaesthetists, surgeons, dental anaesthesiologists and in growing numbers, physician anaesthesiologists. A survey of plastic surgeons revealed that 35% of surgeons administered intravenous sedation themselves; while neither a nurse anaesthetist nor an anaesthesiologist was present about 1/3 of the time. In addition, in monitoring of office patients receiving IV sedation by nonanaesthesiologists, 5% did not monitor blood pressure, 7% failed to use pulse oximetry and 11% had no EKG tracing [4].

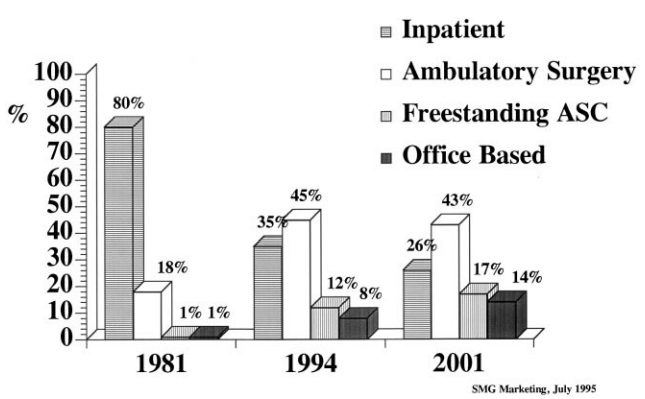

Fig. 1. Relocation in ambulatory surgery—past, present and future.

Table 1
Office based anaesthesia and surgery

Check off list	
☐	Facility design
☐	Equipment and supplies
☐	Patient flow
☐	Hospital transfer agreement
☐	Emergency set-up
☐	Credentialled and licensed MDs
☐	CQI and peer review

Does the spectrum of alternate providers of office anaesthesia care uniformly meet the same stringent standards of care as would be applied in the hospital or free-standing surgicenters? Based on these results, the answer must be a resounding 'no!' In response to reported mortalities and growing concerns about patient safety and quality of care in the office, regulatory agencies have begun to take active roles in efforts to establish guidelines and standards of care. To date, in the USA, three states (California, Florida and New Jersey), have approved legislation that regulate office surgery and anaesthesia [5–7]. It is anticipated that more states will assume an active role in introducing regulations to protect against the occurrence of unnecessary office related catastrophes. In addition, other regulatory bodies (e.g. New York State Commissioner of Health, The American Association for Accreditation of Ambulatory Surgical Facilities, Joint Commission for Accreditation of Healthcare Organizations), as well as professional societies (e.g. American Society of Anesthesiologists, Society for Ambulatory Anesthesia, American College of Surgeons), have also begun to examine the issue of safety standards and guidelines for office surgery practice.

4. Extended role of the anaesthesiologist

Beyond the responsibility to provide safe care, the office anaesthesiolgist may be obligated to assume duties that would ordinarily be delegated to other personnel in the hospital or free-standing surgicenter: (1) ensuring accreditation of the facility as an anaesthetizing site; (2) ensuring appropriate credentials and hospital privileges of the surgeon; (3) ensuring a safely equipped office; development of emergency protocols; (4) appropriate patient screening/selection; (5) supervision of patient postoperative recovery; and (6) the development of quality improvement and peer review mechanisms [8] (Table 1).

The essentials of office anaesthesiology must apply the basic standards and monitoring for anaesthesia as established by the American Society of Anesthesiologists (ASA) (Table 2). The office anaesthesiologist must

Table 2

· Make sure anaesthetizing location has:
· Functioning resuscitation equipment and defibrillator
· Appropriate sized airways
· Laryngoscope blade, masks/LMAs
· Availability of dantrolene
· Tracheostomy kit
· Drugs
· Positive pressure capable of delivering oxygen
· Suction
· Back-up power

ensure that the site is equipped to deliver positive pressure ventilation with self-inflating ambu-bag and that there is an identifiable source of oxygen. Suction may be delivered via a portable or installed system and all anaesthesia equipment should have a reliable back-up power source in the event of equipment failure. To handle any emergency following anaesthesia, functioning emergency airway equipment, drugs and a defibrillator is a must in the office. In locations where only local anaesthesia is administered, appropriate drugs, monitors and equipment for the treatment of untoward reaction should be available. While technicians and biomedical engineers are readily at hand in the hospital-based or ASCs to oversee equipment failure and up-keep, such is not the case in the office setting. Therefore, it is crucial that service checks and equipment maintenance be rigorous and strictly enforced. Furthermore, the anaesthesiologist must acquire familiarity with machine setup, as well as comfort of use. In off-site locations, the anaesthesiologist functions as both the pharmacy and pharmacist and must ensure that a full complement of medications is readily available, including those drugs necessary to resuscitate a patient in the event of cardiac or respiratory emergency(Table 3). Dantrolene must be readily available to treat malignant hyperthermia, if triggering anaesthetic agents are used [8].

Unlike the operating rooms (OR) located in hospitals or surgicentres, there is a significant variance in the set-up of off-site anaesthetizing locations. Therefore, it is important for office anaesthesia providers to check the particular site before the day of surgery to confirm

Table 3

The anaesthesiologist assumes responsibilities:
Anaesthesia equipment
Monitors
Pharmaceuticals
Resuscitation equipment/drugs
Recovery phase

Table 4
Postanaesthesia discharge scoring system (PADSS) and clinical discharge criteria used in office-based surgery setting [11]

Postanaesthesia discharge scoring system (PADSS)
1. Vital signs
2 = within 20% of preoperative value
1 = 20–40% of preoperative value
0 = >40% preoperative value
2. Ambulation
2 = Steady gait; no dizziness
1 = Ambulate with dizziness
0 = None/or ambulates and feels dizzy
3. Nausea and/or vomiting
2 = Minimal
1 = Moderate
0 = Severe
4. Pain
2 = None (pain score = 0)
2 = Minimal (pain score = 1)
1 = Moderate (pain score = 2)
0 = Severe (pain score = 3)
5. Surgical bleeding
2 = Minimal
1 = Moderate
0 = Severe
Clinical discharge criteria
1. Stable vital signs
2. Patient is alert and oriented
3. Patient is free of nausea and vomiting
4. Steady gait
5. Patient is not bleeding

Total PADSS score is 10; score ≥ 9 considered fit for discharge.

that the environment is equipped with appropriate equipment, supplies and appropriately trained personnel with the capabilty to efficiently handle emergency situations. The office anaesthesiologist may also become involved with facility design at the inception of the office set-up. Once again, the experienced anaesthesiologist can apply valuable knowledge gained in the ambulatory setting to ensure that the components necessary for safe office practice are in place (e.g. ascertaining site compliance with applicable building codes, hiring of qualified personnel and that the requirements for acquiring accreditation are satisfied).

5. Patient selection

Patient selection for office-based surgery will continue to evolve along with anaesthesia and surgical advances. In a 1997 SAMBA survey, office-based practitioners reported one of the major problems encountered in the office setting to be inappropriate patient selection [3]. Although there is high patient preference for office procedures, not all patients are suited for office anaesthesia. ASA physical status remains a key

element in patient selection [9]. However, other elements are less clear. A review of closed-claims involving anaesthesia morbidity and mortality in dental offices revealed that major morbidity involved patients with pre-existing conditions such as morbid obesity, cardiac disease, epilepsy and COPD [10]. Limiting the scope of procedures and patient selection for office surgery and anaesthesia is appropriate at this time until more extensive outcome data become available and a standardized approach to outcomes measurement is recognized. Standards for office anaesthesia and surgery in New Jersey (USA), for example, allow ASA 3 patients to receive topical, local or minor peripheral blocks and conscious sedation only, in the office setting; but only after an appropriate medical evaluation is conducted. Only ASA 1 and 2 patients may receive general anaesthesia or major regional anaesthesia in office practice in New Jersey [7].

The anaesthesiologist, asserting his role as medical specialist, is best suited to evaluate the patient risk for office-based anaesthesia. A patient medical history may be obtained via a questionnaire or a preoperative telephone call. The advent of computer technology and the sharing of information systems among physicians' offices will prove valuable. The potential for patients to transmit a health questionnaire via the Internet to the office, is already being evaluated. Regardless of method, every patient should have some contact with the anaesthesia provider prior to the day of surgery. As reliance on the surgeon provider is more than would be encountered in the hospital setting, clear communication between surgeon and the anaesthesia provider is crucial to outline what constitutes risks for the patient. Further, when indicated, the patient should be referred to the primary care physician, not for anaesthesia clearance but only to optimize the patient before surgery.

Patient selection for office-based procedure should be the same as would be for ambulatory surgery. The inappropriate office patient include the unstable ASA 3 or 4 patients, brittle diabetic, substance/alcohol abuser, the poorly controlled diabetic, the patient with seizure disorder; the malignant hyperthermia-susceptible patient, the morbidly obese, as well as the patient with no responsible adult escort.

6. Patient recovery and discharge

As with patient selection, discharge criteria for the office setting should be no different than would be applied to the patient in the ASU setting: (1) a patient who is awake and oriented; (2) with stable vital signs; (3) minimal pain or bleeding; (4) minimal nausea/vomiting; (5) ambulatory without dizziness; and (6) responsible person present for escort home (Table 4) [11]. The recovery of patients in this setting may be delegated to a qualified Post Anaesthesia Care Unit (PACU) nurse, although the anaesthesiologist is responsible for postoperative recovery and discharge.

A unique component of the office site is the absence of traditional gurneys. Patients must therefore transfer from the OR table to a chair or walk with assistance to the designated recovery area. Facilitated by the development of newer and shorter-acting anaesthetics, the office patients usually achieve sufficient anaesthesia recovery in the OR, so they can be transferred directly to 'Phase 2' recovery area and bypass the traditional 'Phase 1' recovery area. This 'fast-tracking' concept of patient recovery comes with the realization that time is not as crucial as is the requirement that recovery criteria are achieved. In the current environment of cost containment, the concept of 'fast-tracking' learned in the office setting can be brought back and applied in the hospital and ASCs.

7. Anaesthetic management

The goals of office-based anaesthesia are very similar to that for the hospital setting. The surgeon desires a quiet surgical field, almost immediate postoperative ambulation, no nausea or vomiting and rapid discharge home. The anaesthesiologist and the patient desire analgesia, amnesia for procedures, no nausea or vomiting, with feeling of well-being for rapid discharge home and high satisfaction.

Many of the anaesthetic techniques used in surgicentres and hospital facilities are suited to the office; however, there are some limitations. Intravenous sedation (propofol, barbiturates, midazolam, demerol) is the most often used anaesthetic technique in this setting. Generous use of local infiltration is strongly recommended to decrease postoperative pain; as is the use of ketorolac (Toradol®), and other non-steroidal antiinflammatory drugs to augment analgesia through the recovery period. If regional anaesthesia is administered, the site must have provisions in place in the event of toxicity or other sequelae from unanticipated anaesthesia mishaps. For general anaesthesia, some practitioners prefer to use total intravenous anaesthesia (TIVA), because of the lack of capacity to deliver inhalation agents or N_2O and the need for adequate waste scavenging system.

While all types of anaesthesia techniques are potentially appropriate for the office setting, many practitioners prefer the technique of Monitored Anaesthesia Care (MAC). Unfortunately, as reported in ASA closed-claims study, the number of closed-claims involving MAC anaesthesia-related mishaps are increasing in numbers to rival that of general

anaesthesia-related (GA) cases [12]. The administration of MAC anaesthesia in the office does not confer immunity against mishaps. Regardless of the choice of office anaesthetic technique, practitioners must exercise caution and vigilance. If the anaesthesiologist decides to administer GA with inhalation agents in the office, an adequate and reliable system for scavenging the waste gases must be in place. In addition, office-based GA requires that the anaesthesia machine used be equivalent in function to that available in the traditional OR. To date, there has been limited choice of an available anaesthesia machine for the office practice that would provide the same degree of user comfort and options as those found in traditional anaesthetizing locations. However, at least one promising mobile, very compact machine with complete anaesthesia delivery capabilty intact, will soon be available on the market.

8. Summary

The anaesthesiogist faces many challenges in the office-setting. Most importantly, however, the anaesthesiologist must recognize that safe anaesthesia practice in the office requires appropriate patient selection, uniform adherence to standards, regardless of practice setting and the establishment of quality assurance and peer review mechanisms. The experienced gained in ambulatory surgery and office surgery can be equally shared and appropriately applied.

Acknowledgements

The author acknowledges Barbara McEwan RN for her editorial assistance.

References

[1] SMG Forecast of surgical volume in hospital/ambulatory setting: 1994-2001. SMG Marketing Group, Inc. 1996, Chicago, Ill.
[2] Patterson P. Office surgery is gaining market share. OR Manager 1996:12.
[3] Society for Ambulatory Anesthesia 1997 Survey for Ambulatory Anesthesia Survey on Office-Based Practices, Park Ridge, Illinois.
[4] Courtiss EH, Goldwyn RM, Joffe JM, Hannenberg AA. Anesthetic practices in ambulatory aesthetic surgery. Plast Reconstr Surg 1994;93:792–806.
[5] California Assembly Bill AB595, Chapter 1267, Legislative Council's Digest, 1996.
[6] Florida State Medical Board: Standards of practice for medical doctors, Chapter 59r-9.009 Standard of Care for Office Surgery.
[7] Surgical and anesthesia standards in an office setting, New Jersey State Medical Board, 1997;13:35-4A.18.
[8] Twersky RS, Koch ME. Practice options: considerations in setting up an office-based practice. Am Soc Anesthesiol Newslett 1997;61:30–2.
[9] Courtiss EH, Kanter MA. The prevention and management of medical problems during office surgery. Plast Reconstr Surg 1990;85:127–36.
[10] Jastak JR, Peskin RM. Major morbidity or mortality from office anesthetic procedures: a closed-claims analysis of 13 cases. Anesth Prog 1991;38:39–44.
[11] Chung FF, Chan VWS, Ong D. A postanesthetic discharge scoring system for home readiness after ambulatory surgery. Ambul Surg 1993:189–193.
[12] Domino KB. Trends in anesthesia litigation in the 1990s: monitored anaesthesia care claims. Am Soc Anesthesiol Newslett 1997;61:15–7.

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Ambulatory Surgery 6 (1998) 85–88

Ambulatory Surgery

Re-engineering day surgery

Heather Corlett *, Lynne Maher, John Sidman

West Middlesex University Hospital, Twickenham Road, Islelworth, Middlesex TW7 6AF, UK

Received 2 August 1997; accepted 4 September 1997

Abstract

Re-engineering in day surgery to some may not seem necessary due to it relatively recent evolution. However, this is an important and rapidly changing area with a high level of patient activity, therefore, benefits can be gained by a large volume of patients. Re-engineering has been made possible at the West Middlesex University Hospital Trust through project funding gained from the European Commission. The project was entitled Technology to support Business Process Re-engineering (TBP) across Elective Surgery. We began with day surgery and the focus was to dismantle traditional thinking and establish a route for evolutionary change. This has resulted in breaking down the barriers between different hospital professions to allow the most effective and technologically advanced care.

Keywords: Day surgery; Re-engineering; IT; Change; Assessment protocol

1. The project

In 1995, the West Middlesex University Hospital NHS Trust (WMUH) combined with Irish Medical Systems and Adams Training and Advisory Business Process Re-engineering (BPR) Consultancy, successfully acquired a European Community ESPRIT project. The project, named COBRA, established funding to assist in the redesign of the Elective Surgery process, enabled and facilitated by Information Technology to support clinical practice.

The project objectives were:

- Reorganise the way the hospital conducts its business
- Treat more patients (60% more) on a day case basis over the next 3 years
- Provide a much more efficient and effective service to the patient
- Better support to the needs of health care professionals

WMUH considers its approach during the project to be unique by not separating the work of BPR from the advantages that modern and rapidly changing technology can offer. Therefore, the clinical process designs were broader in their thinking and more revolutionary in their approach.

The COBRA project is still ongoing throughout the elective surgery directorate. However, this paper concentrates on the changes initiated in day surgery and specifically the pre-operative assessment process.

2. Our unit

The day surgery unit (DSU) within the hospital is a free-standing building, comprising two general anaesthetic theatres, a local anaesthetic theatre and a 22-bedded ward. It is a busy unit that supports a local population of approximately 300000 with an annual throughput in excess of 7000 cases. The unit is relatively new, built in 1989 but designed around day surgery requirements at the time.

The opportunity to engage in a re-engineering project, supported by new computer technology integrating

* Corresponding author. Tel.: +44 181 5652508; fax: +44 181 5652509.

0966-6532/98/$19.00
PII S0966-6532(98)00035-3

administrative and clinical work, was a daunting thought to many staff and instantly created a resistance to change. This resistance was further exacerbated as limitations in the unit's design and workflow were identified as already physically restrictive, despite an eight-bed extension built in 1992.

3. Change

From the outset of the project a core group of senior and junior staff was established as the process design team. This group was facilitated by re-engineering and technology experts who together with the hospital staff developed the overall process and principles for the new elective surgery design. As part of this design day surgery figured as a key area to start the change process and evaluate the benefits and efficiencies that had been set out as the project's goals.

The new process arising from the BPR investigations highlighted the requirement for organisational change, therefore, consideration to implementation was given paramount importance. In the DSU the need for involvement and co-operation was necessary for optimal success. The change process had to be understood and adopted by staff. A 'bottom up' approach was utilised, as it is recommended within the re-engineering profession as the only way to successful change [1].

Through this approach, a COBRA Champion from within the unit was needed to promote it's success. Heather Corlett was appointed, she explained: 'I was working as a part of the day surgery nursing team and was appointed to the COBRA project team in January 1997, I found this to be a very exciting post. The opportunity to redesign the way you work and question everything you do with why? is a great challenge. Not everybody had the same enthusiasm and it has been far from plain sailing, but, the results that are starting to emerge are more than worthwhile'.

4. Old assessment process: much repetition, little rationale

Day surgery staff began this 'bottom up' approach by analysing the nursing assessment process. The assessment consisted of 14 questions with limited available responses of yes, no and remarks. There was little uniformity within the nursing staff when exploring the response from patients. The question: Have you ever had a GA before? could simply be answered with only yes. This minimal investigation resulted in the anaesthetist having to carry out an additional assessment, repeating the ground already covered by the nurse and then going into greater depth as needed all resulting in areas of duplication. For example: Have you ever had an anaesthetic before; did you have any problems with the anaesthetic; have any of your blood relatives had a reaction to anaesthetic. Another example of our duplication was the documentation of patients vital signs. Vital signs were not only entered onto the nursing document but, also on to the separate anaesthetic chart. Any result out of normal ranges would then have to be copied onto the ward theatre list and brought to the anaesthetist's attention on arrival to the unit,

These processes were obvious accidents of history and could be improved by re-engineering. Some of the guiding principles of the COBRA project are that information is only captured at the point of contact with patient, repetition is reduced and resources are optimised.

5. New assessment: challenging tradition

With these COBRA principles in mind the assessment process was reviewed. Instead of relying on our 'accidents of history' we asked the fundamental process re-engineering question: 'if we were doing this today for the first time, would we really organise the work this way? The answer, inevitably, is no' [2].

The main function of the assessment is to gather information from the patient. The nursing staff run the day surgery unit and there appeared to be great potential for further utilising their skills, including assessment. It was recognised that the information collected by the nursing staff needed to be standardised and this was agreed by the anaesthetic staff. Through discussion with the anaesthetic department it was agreed that the nursing assessment should become more detailed with structured questions to enforce uniformity and reduce repetition by anaesthetists. A protocol was devised through joint working and has enhanced the day surgery nurses' role in assessment. Information gathered by the nursing staff can be referred to and acted upon, not approached in a circumspect manner, repeated, and at worst ignored.

An anaesthetic protocol, created by a consultant anaesthetist for GP's direct booking into day surgery (also part of the COBRA project), was used as a guideline for the day surgery assessment protocol. This was further developed by the anaesthetic and nursing staff to promote ownership of the assessment process, and reduce the growing resistance to the anticipated change. The importance of recognising barriers to change has been identified, as has the importance of negotiating with all key people affected by the change [3].

This type of model for managing change has been used throughout the changes in day surgery promoting high levels of communication. A COBRA notice board within the unit keeps staff informed and provides an

opportunity for feedback. Regular updating memos are sent out to reception, nursing, Operating Department Practitioner, anaesthetic and surgical staff informing them of meetings giving examples of new paperwork and requesting personal opinions. This together with articles in 'Finger on the Pulse' our hospital paper, has created a cascading communication link to other departments such as district nurses, out patients and clinical coding. Communication is paramount to the success of any change and even with this careful planning we did still experience some resistance.

After much negotiation with members of the multidisciplinary team we have created a detailed assessment with uniform, structured questions creating a protocol. The information gathered by the nursing staff is therefore a thorough, credible, consistent and detailed anaesthetic assessment. It is currently 'in paper form' to allow teething problems to be ironed out prior to the system going 'live'.

6. IT supporting clinical work

After implementation of the computer system this autumn, the software will support the clinical work by reducing repetition—the nurse will enter the patient's vital signs into the system only once and the information will be transported to all the appropriate places. After weight and height have been entered the patient's body mass index (BMI) is automatically calculated by the system. The weight or BMI will also appear at appropriate points, on screen, with no extra work for the nursing staff.

The anaesthetic staff will be presented with an exception report for each of their patients from the information collected by the nurse. This report will include information routinely requested, such as last oral intake, as well as any details that are an exception to that patient such as allergies, dental considerations and anxiety levels. This provides the anaesthetist with a preview of each patient on which to base their assessment, and also highlights areas of concern. The nurse has, in effect, provided baseline clinical details with which the anaesthetist can continue. Initially this concept was not well accepted due to the removal of traditional boundaries, but the benefits that were realised (see Table 1) can not be denied, and these protests have begun to subside.

7. Reduced repetition but improved information collection

The new detailed assessment consists of 27 questions. It is more thorough as extra questions have been incorporated and responses are acted upon, prompting staff to carry out appropriate investigations. This more detailed assessment does consume extra time. However, time is actually saved overall through reduction of repetition, not only within the nursing profession, but, also for the anaesthetists.

The first steps towards nurse substitution within anaesthetists assessment have occurred. This substitution is 'a driver behind the development of cost effective care' [4], allowing nurses to develop into roles traditionally carried out by doctors. Such development must be supported by appropriate training as 'education is the key to the development of excellence in nursing practice' [5]. The Trust has recognised this and an in-house training strategy has begun to tackle these issues.

8. Patient's preference

It is not only the content of the assessment that has been re-engineered: we also questioned our method. The assessment was previously carried out at the bedside with the patient changed into a hospital gown and without their escort present. This method allowed many interruptions and privacy could be compromised as only curtains separated one bed from another. Moreover' the patient could be surrounded by a noisy and restless atmosphere while awaiting surgery.

Table 1
Benefits realisation

To the patient
Retain their identity
Promote privacy
Streamlined service
Reduction in question repetition
To DSU nursing staff
Greater autonomy
Increased clinical skills
Increased IT skills
Improved job satisfaction
Reduced task repetition
To DSU medical staff
Improved information on which to base clinical decision-making
Increased IT skills
Appropriate information at appropriate points
To the organisation
Efficient streamlined service
Improved quality
Enthusiastic and stable workforce
Financial gain through
Reduced recruitment
Substitution of tasks
Saving time

As part of the COBRA pilot half of our patients are currently being assessed in a separate room, In their own clothes and with their escort present if required. Interruptions are now to a minimum, and privacy is optimal. This method of assessment also allows the nurse to check home details and confirm aftercare needs with the escort. Preliminary results from a patient survey indicate that the patients prefer to remain in their own clothes and have their escorts present for as long as possible. The next step to this change would be staggered admission times, a horrific thought to some clinical staff but a welcome to patients and quality monitors.

9. Re-engineering and staff recruitment

Re-engineering has allowed us to review exactly what we do, why we do it and who does it. Research has been reviewed at each step to promote best practice. Traditional practice has been questioned, patient information details have been updated and patients views monitored. There are economic benefits to such innovation including staff recruitment and retention: innovative and progressive organisations attract and retain the best staff [6]. This would be of help to our unit which has experienced some local difficulties in recruiting staff.

10. The future

The re-engineering process has worked as a catalyst throughout the whole of day surgery activity. We are continuing to create a specialist day surgery nurse role and erase some of the boundaries between medical colleagues and end the view that nurses are a 'relatively unskilled subordinate group of doctors' helpers [7]. This promotes efficient use of resources, provides nurse development opportunities and compensates for the reduction in doctors' hours.

11. Conclusion

After several months of the COBRA re-engineering project affecting clinical practice, we are now beginning to see the fruits of our labour. The process is ongoing, and many areas have still to undergo change. Resistance to is still present, however, through quality communication a common ground is usually found.

Our re-engineering project has also identified numerous areas for review. These include the update of information leaflets to the unquestionable need for a pre-assessment service. Re-engineering has allowed us to promote an efficient and cost effective service, maximise our resources and enhanced the quality of patient care within known best practice.

Many people may view day surgery as a new development not needing re-engineering. The recent explosive increase in day surgery activity due to economic constraints and medical, technical and anaesthetic developments mean that while our workload and case type have changed, some of our practices have not. Re-engineering projects in health allow us to ensure that our working practice is up to date, appropriate and focused on patient care. With appropriate and well designed IT systems to support re-engineering, day surgery can confidently move into the 21st Century.

References

[1] Millar B. How to be ahead. Health Serv J 1997;107(5557):42-3.
[2] Greene A. Generic engineering. Nurs Manag 1994;1(1):26–7.
[3] Spiegal N, Murphy E, Kinmonth A, Ross F, Bain J, Coates R. Managing change in general practice: a step by step guide. Br Med J 1992;304:231–4.
[4] Department of Health. The challenges for nursing and midwifery into the 21st century. London: HMSO, 1993.
[5] World Health Organisation. Nursing practice. Geneva: Report WHO Expert Committee Geneva, 1996.
[6] Hunt J. Towards evidence based practice. Nurs Manag May 1997;4(2):14–7.
[7] McKee CM, Lessoff L. Nurse and doctor. Whose task is it anyway? In: Robinson J. et al, editors. Policy Issues in Nursing. London: Open University Press, 1992, p. 61-7.

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Ambulatory Surgery 6 (1998) 89–91

Ambulatory Surgery

Growth of ambulatory surgery and anaesthesia in Thailand

Thara Tritrakarn *, Jariya Lertakyamanee

Department of Anaesthesiology, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand

Received 18 September 1997; received in revised form 10 November 1997; accepted 12 November 1997

Abstract

Growth of ambulatory surgery and anaesthesia in Thailand has been much slower than in the United States due to non-encouraging government funding, the health care reimbursement system, and cultural factors. In contrast to the situation in most other countries, the growth that has taken place is the result of an inadequate number of beds in public hospitals and not of economic pressures from the health administrator. On the contrary, surgery with overnight hospitalization has steadily increased in private hospitals. However, with the financial crisis in Thailand and South-East Asia, ambulatory anaesthesia will eventually be promoted by both the government and insurance companies.

Keywords: Ambulatory surgery; Ambulatory anaesthesia; Thailand

1. Introduction

Although ambulatory surgery and anaesthesia have grown very rapidly in North America, the United Kingdom and Australia, their growth in other parts of the world have been much slower [1] and vary from country to country depending on government funding policy, health care reimbursement system, economical conditions, culture, life style and the level of ancillary home health care services. Sharing clinical experiences from various countries should help improve the understanding and promote the growth of this challenging field.

2. Historical background

The first hospital in Thailand was founded in 1888 when King Chulalongkorn founded Siriraj Hospital, providing herbal and traditional oriental medicine to his subjects [2]. Western medicine was not established until 1923 when Prince Mahidol co-operated with the Rockefeller Foundation to innovate medical teaching and practice in Thailand. Surgery in the 1950s and 1960s was done on hospitalised patients who were very sick and after failure of all other available alternatives, which resulted in a high mortality and complication rate. There was almost no ambulatory surgery except incision and drainage of abscess, close reduction of fracture, excision of a cyst or superficial tumor.

The 3-year training programs in 25 medical specialities including anaesthesia, surgery, orthopedics, obstetrics and gynecology, otolaryngology and opthalmology were started in 1969 and have played an important role in the growth of these fields. Elective surgery gained acceptance from patients and increased in number. More complicated and extensive surgeries were performed, with patients occupying the limited beds for longer periods, leaving fewer beds for simpler surgeries. In the 1980s, the government built more hospitals to serve most small communities and improve facilities in city and provincial hospitals. However, the increased facilities and beds were still not sufficient to cope with the increasing demand of health care and surgery. Major elective operations and cosmetic surgery had to wait until the more essential procedures were

* Corresponding author. Fax: +66 2 4121371.

0966-6532/98/$19.00
PII S0966-6532(97)10017-8

done. Minor cases were performed under local infiltration of local anaesthetics by surgeons on a same day discharge basis. The common procedures were circumcision, tubal sterilisation, closed reduction of fracture, eyelid surgery, excision of cyst, breast mass excision and thyroid nodule excision. Many paediatric procedures, e.g. circumcision, herniotomy, hydrocelectomy and endoscopy were done under general anaesthesia on an ambulatory basis [3].

With economic growth in the 1980s and 1990s, people were able to afford health care and surgery in private hospitals, at a cost several times greater than in public hospitals. The first for-profit private hospital was opened in Bangkok in 1972 and received a warm welcome. The number of beds in private hospitals increased rapidly to 11983 in 1978 and 28638 in 1995 [4]. Medicine has become a highly competitive health care industry. Private hospitals offer fast and convenient services and treat patients as the center of attention. They seem to provide a much better service and equally good quality of care in non-complicated surgery, but in major, complicated cases they still usually rely on government and university consultant surgeons. Many surgical procedures that are usually performed under local anaesthesia in government hospitals are done under general anaesthesia in private hospitals.

3. Outline of the problem

An anaesthesia manpower shortage has always been a problem for Thailand. With 500 M.D. anaesthesiologists for a population of 60 million, Thailand has had to rely on anaesthetic nurses to work in rural areas. They administer general anaesthesia and the surgeons decide whether the patients should be discharged or admitted after the operation. Some patients have to travel far from home to the hospital and surgeons usually prefer to have these patients stay in the hospital for observation and postoperative wound care. This system also works well for patients who feel more secure when they are in hospital.

In government hospitals less than 20% of all elective surgical procedures requiring anaesthesia in adults are performed on an ambulatory basis [5]. In contrast to the situation in other countries where the growth of ambulatory anaesthesia is the result of economic pressure from health administrators, the growth of ambulatory surgery and anaesthesia in Thailand is promoted because of an inadequate number of hospital beds and long waiting lists for many minor surgical procedures. Hospital beds are occupied by patients who need pre- and post-operative care, i.e. fluid and electrolyte replacement, intravenous antibiotics and wound care, oxygen and respiratory support, etc. Paediatric patients are the exception, as most surgeries in children are done under general anaesthesia and about 60% of them are sent home with their parents after they fully recover from anaesthesia.

The growth of ambulatory surgery and anaesthesia in Thailand has been slow for several reasons.

(1) There is no economic incentive from the government or elsewhere to hospitals and health care providers to reduce cost by decreasing the length of the patient's hospital stay or by increasing patient turn-over.

(2) The present health care reimbursment system discourages ambulatory surgery. To avoid trivial and frequent claims of treatment costs at clinics, most insurance companies only reimburse if the patient is admitted into the hospital. The patient is usually responsible for a co-payment for an ambulatory service but not for inpatient service. Patients are then happy to be admitted to hospitals after minor surgery even though the cost of care increases, because the expense can be reimbursed. Private hospitals usually have available beds to accommodate these patients.

(3) Culture plays a role in the slow growth of ambulatory surgery, as in the utilisation of any other services. Having surgery is a major concern to Thai patients and their families. Taking care of a painful, nauseated or drowsy post-operative patient is a frightening and burdensome experience. Thai people are not keen on self help after surgery and feel dependent on their doctors and nurses. They usually expect post-operative admission, if possible. Home health care facility is very limited. Traveling is difficult in the rural area and even in Bangkok. Surgeons prefer to have their patients observed overnight in the hospital and discharged the next morning rather than taking additional responsibility and any medicolegal risk associated with caring for post-surgical patients outside the hospital environment. Thus, there has been a steady increase in the percentage of cases performed on an overnight hospitalisation basis in Thailand, mostly in private hospitals.

(4) The high costs of short-acting new anaesthetic drugs (e.g. propofol, desflurane, mivacurium and alfentanil) have limited their more widespread use. Propofol and desflurane cost 10–15 times more than thiopental and halothane for the same dosage used. Low cost of nursing care because of the low salary in Thailand has reduced the potential saving associated with the use of these imported drugs. Recovery room cost is only a trivial part of the patient's bill. Propofol was compared unfavourably to ketamine for ambulatory cystoscopy in a randomised cost-benefit trial [6]. The faster recovery and shorter recovery room stay saved less than the difference between the two drugs.

4. Conclusion

In conclusion, ambulatory surgery and anaesthesia in Thailand is expanding, but at a much slower rate than in the United States. In contrast to the situation in most other countries, there is not much financial pressure from the health administrators or the health care payers to promote the growth of ambulatory surgery. Surgery with overnight hospitalisation has been steadily increasing in private hospitals which have expanded so much in the last decade that there are sufficient beds available to accommodate the patient load. The number of ambulatory surgical procedures with same-day discharge will increase in government hospitals in which beds are usually fully occupied or even over-occupied by patients who need major surgery and extensive preoperative and postoperative hospital care. However, with the financial crisis in Thailand and South-East Asia starting in 1997, the cost-containment pressure from the government and the insurance companies will eventually necessitate a change in this practice, as has occurred in the US and Europe.

References

[1] White PF. Ambulatory anaesthesia practice: an international perspective. Semin Anesth 1997;16:161–5.
[2] Bhavakul K. History of anaesthesiology at Siriraj Hospital. Siriraj Hosp Gazette 1995;47:58–67.
[3] Tritrakarn T, Lertakyamanee J. Ambulatory anaesthesia and surgery in Thailand. Semin Anesth 1997;16:247–56.
[4] Health Society of Thailand, Public Health Diary 1996. Bangkok: Health Society of Thailand, Ministry of Public Health, 1996:202.
[5] Tritrakarn T, Lertakyamanee J. International perspective: South-East Asia. In: White PF, editor. Ambulatory Anaesthesia and Surgery. London: Saunders, 1997:751–5.
[6] Lertakyamanee J. Cost effectiveness analysis comparing propofol and ketamine for cystoscopy. 10th International Clinical Epidemiology Network Meeting, Zimbabwe, 22–26 January 1996 (abstract).

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Ambulatory Surgery 6 (1998) 93–96

Ambulatory Surgery

The optimum flow of blow-by oxygen for paediatric patients in a post-anaesthesic care unit

S. Suraseranivongse [a,*], S. Maneenoy [b], C. Komoltri [b], S. Foongdej [c]

[a] *Department of Anaesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University, 2 Prannok Road, Bangkok 10700, Thailand.*
[b] *Computer center, Siriraj Hospital, Mahidol University, 2 Prannok Road, Bangkok 10700, Thailand*
[c] *Department of Nursing, Siriraj Hospital, Mahidol University, 2 Prannok Road, Bangkok 10700, Thailand*

Received 10 November 1997; accepted 12 November 1997

Abstract

A randomized cross-over study aimed to compare the efficacy of various flows of blow-by oxygen supplement in paediatric patients recovering from anaesthesia. A total of 24 infants and children of the American Society of Anesthesiologists (ASA) class I, age 10 months to 7 years, were studied. After lower abdominal or peripheral surgery on an ambulatory basis in the post-anaesthesia care unit, three flows of oxygen (3, 4 and 5 l/min) were delivered in randomized sequence, 10 min for each flow. Haemoglobin oxygen saturation (S_pO_2) was recorded before receiving oxygen (control group) and 10 min after changing the flows. The results showed that the S_pO_2 of all oxygenated groups (flow 3, 4 and 5 l/min: S_pO_2 98.7, 99.0 and 99.2%, respectively) was significantly higher than the control (95.7%). The lowest S_pO_2 obtained from the oxygenated groups of 3, 4 and 5 l/min was 95, 96 and 97%, respectively. We concluded that an oxygen flow of 3 l/min was the optimum flow to prevent post-operative hypoxaemia in paediatric patients.

Keywords: Blow-by oxygen; PACU; Paediatric; Optimum flow

1. Introduction

Hypoxaemia is commonly found in infants and children following general anaesthesia [1,2]. In a study of post-operative arterial desaturation in paediatric patients monitored by oximeter (S_pO_2), hypoxaemia ($S_pO_2 < 91\%$) occurred in 28% of patients who inspired room air during transfer to the recovery room [3]. Motoyama et al. (1986) detected significant arterial desaturation ($S_pO_2 \leq 90\%$) for 15 min [4]. Therefore, an oxygen supplement for infants and children following general anaesthesia is recommended. Amar et al. (1991) [5] introduced blow-by oxygen technique, using a corrugated tube connected to a nebulizer with the other end of corrugated tube placed 4–5 cm from the patient's mouth and nose. They compared the effect of an oxygen supplement via blow-by and face mask in paediatric patients with low risk and high risk of post-operative hypoxaemia. S_pO_2 in the blow-by group was significantly higher than in the face mask group because blow-by was better tolerated than the face mask. Fresh gas flows for blow-by in that study were 6–8 l/min for patients under 2 years and 8–10 l/min for patients aged over 2 years. Our study investigated the effect of lower fresh gas flow of 3, 4 and 5 l/min on prevention of post-operative hypoxaemia to find the optimum flow which was also the lowest flow that could provide sufficient oxygenation.

2. Methods

A prospective randomized cross-over study was carried out in 39 outpatients, ASA class I and II. They underwent lower abdominal or peripheral surgery without any limitation of anaesthetic techniques or drugs.

* Corresponding author. Fax: +66 2 4121371.

0966-6532/98/$19.00
PII S0966-6532(97)10019-1

Table 1
S_pO_2 measurement in the recovery room ($n = 24$)

	Group 1 (control)	Group 2 (3 l/min)	Group 3 (4 l/min)	Group 4 (5 l/min)
S_pO_2 (mean ± S.D.)	95.7 ± 2.3	98.7 ± 1.4*+	99.0 ± 2.2*	99.2 ± 2.0*+
S_pO_2 (range)	90–98	95–100	96–100	97–100

* Significant difference from control (group 1).
+ Significant difference between groups 2 and 4.

Exclusion criteria were: a history of cardiac or pulmonary disease, infection within 2 weeks and axillary temperature below 35.5°C. All patients were transferred from the operating theatre to the post-anaesthesia care unit (PACU) without an oxygen supplement. The oxygen was delivered to all patients by an O_2 nebulizer via the blow-by technique. All patients received three different fresh gas flows of 3, 4 and 5 l/min. The sequence of flows was randomized to prevent bias from the hypoventilating effect of residual anaesthetics or awakening. Each flow was delivered for 10 min, e.g. patient no. 1 received an O_2 flow of 3, 4 and 5 l/min, patient no. 2 received O_2 flow 5, 3 and 4 l/min, patient no. 3 received O_2 flow 3, 5 and 4 l/min etc.

S_pO_2 was continuously monitored for 30 min by Ohmeda 3700 Biox pulse oximeter. S_pO_2 was recorded before oxygen supplementation as control S_pO_2 and every 10 min after each change of flow rate. If S_pO_2 was 91% or lower at any time of continuous monitoring, hypoxaemia would be recorded and O_2 flow would be increased. If the patients woke up and refused oxygen before receiving all three flows, only S_pO_2 of the used flows were recorded.

All S_pO_2 data were analyzed by allocation into four groups: group 1, S_pO_2 of control group without O_2; group 2, S_pO_2 of O_2 flow 3 l/min; group 3, S_pO_2 of O_2 flow 4 l/min; and group 4, S_pO_2 of O_2 flow 5 l/min S_pO_2 were compared by using Friedman analysis. A P-value of less than 0.05 was considered to be statistically significant.

3. Results

A total of 39 patients aged 5 months to 7 years, weighed 4–25 kg. ASA class I were included in this study: 39 patients in group 1; 32 patients in group 2; 35 patients in group 3; and 32 patients in group 4. The total number of patients in each group was not equal because some patients woke up and refused O_2 before completing all three flows. By using Friedman analysis, only 24 patients with complete data of three flows were included. (age 10 months to 7 years, weighed 8.5–25 kg). There were no patients who had S_pO_2 lower than 97% in the excluded group.

S_pO_2 measurement in the four groups is illustrated in Table 1 and Fig. 1. Groups 2, 3 and 4 were significantly higher than group 1 ($P < 0.0001$) and group 4 was significantly higher than group 2 ($P < 0.0001$). Even though the actual sample size was less than predicted, further data was not necessary because of high statistical significance.

Blow-by oxygen was well tolerated by all patients until waking up. In control group arterial oxygen desaturation ($S_pO_2 \leq 90\%$) was found in one patient (4.2%). In oxygenated groups (groups 2, 3 and 4), no arterial oxygen desaturation ($S_pO_2 < 90\%$) was found. The lowest S_pO_2 of groups 2, 3 and 4 were 95, 96 and 97%, respectively.

4. Discussion

Hypoxaemia commonly occurred following general anaesthesia in adults and children [3,4,6]due to several causes, e.g. residual anaesthetics action on respiratory centers and altered ventilatory response to hypoxia and hypercarbia [7], inadequate neuromuscular activity, airway obstruction [2] or secretion obstruction, post-operative hypoventilation due to intraoperative hyperventilation and alkalosis. Hypothermia and shivering also increase oxygen consumption and decrease mixed venous oxygen tension. Infants and children had higher risk of post-anaesthetic arterial desaturation due

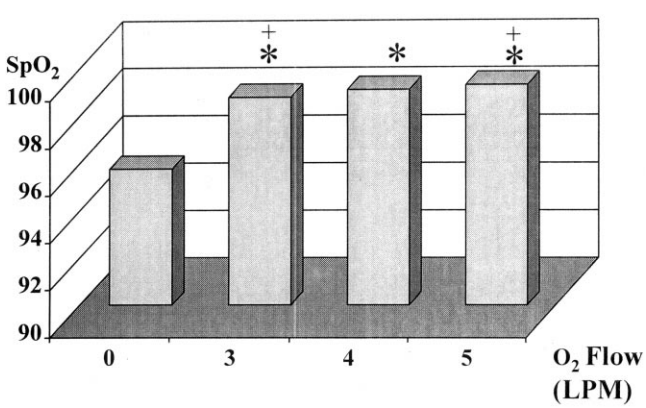

Fig. 1. S_pO_2 in recovery room. * Significant difference from control group (no O_2). + Significant difference between O_2 3 and O_2 5 l/min groups.

to higher basal metabolic rate, higher ratio of alveolar ventilation to functional residual capacity (FRC) and higher closing capacity [8].

The incidence of post-operative hypoxaemia was reported in several studies. Vijayakumar [9] found hypoxaemia ($S_pO_2 \leq 90\%$) in 26% of paediatric patients on arrival in the recovery room. Pullerits [3] detected severe arterial oxygen desaturation ($S_pO_2 \leq 85\%$) in 12.7% of children during transfer to the recovery room. Canet [10] reported hypoxaemia ($S_pO_2 \leq 90\%$) in 43% of paediatric patients, 10 min after arrival in the recovery room and severe hypoxaemia ($S_pO_2 \leq 85\%$) in 11.4% of the patients. Motoyama and Glazener [4] measured S_pO_2 in 97 children and found that the S_pO_2 on arrival in PACU was 93% and increased to 94.1%, 5–10 min later. Canet et al. [10] monitored S_pO_2 in 209 children who inspired room air. S_pO_2 in the first 10 min on arrival in PACU was 90.7%, 10 min later S_pO_2. was 92.4% and 1 h later was 93.2%. S_pO_2 increased as time passed because the effects of residual anaesthetics gradually decreased. The most critical period of post-operative hypoxaemia was the first 20 min. The incidence of post-operative hypoxaemia in our study was only 4.2%.

Amar [5] compared the efficacy of blow-by and face mask techniques delivering oxygen to 66 children in PACU. All patients in the blow-by group tolerated this method very well whereas 20% of patients in the face mask group were agitated and refused the mask (which might also cause injury to the eye). Using fresh gas flow of 6–8 l/min in patients aged under 2 years and flow 8–10 l/min in patients over 2 years, S_pO_2 increased 99–100% which was significantly higher than baseline in both low risk healthy children and high risk (heart disease, respiratory disease, haematologic disease, obesity, pre-maturity (post-conceptual age < 50 week). Blow-by oxygen might cause apnea and bradycardia from diving reflex in new-borns. Amar did not recommend blow-by in severe hypoxaemia from laryngospasm in which a closed system with a reservoir gave a better result.

This study revealed that the blow-by technique was well tolerated in paediatric patients. Lower fresh gas flows than the previous study [5] could increase S_pO_2 from 95.7% (control) to an acceptable level (98.7, 99.1 and 99.2% from flow 3, 4 and 5 l/min, respectively). F_iO_2 from each flow in the smallest patient (8 kg) and the biggest patient (25 kg) were calculated by using Shapiro's guideline [11]. The average oxygen concentration measured close to the nose of five patients by oximeter was 0.91, 0.97 and 100% from oxygen flow 3, 4 and 5 l/min, respectively.

Example. A child weighed 8 kg, RR 40/min (from Stafford: normal values of respiratory rates in children [12]), tidal volume 7 ml/kg (56 ml). Fresh gas flow, 3 l/min; *I*:*E*, 1:2; respiratory cycle, 1.5 s; total inspired gas (T_i), 0.5 s; and required inspired gas, 56 ml. T_i in 0.5 s is derived from:

(1) FGF $(3000/60) \times 0.5$ $= 25$ ml of O_2 91%
(2) Air entrained $= 31$ ml of O_2 20%
$\therefore F_iO_2 = (22.75 + 6.2)/56 = 0.52$
Fresh gas flow 4 l/min $F_iO_2 = 0.84$
Fresh gas flow 5 l/min $F_iO_2 = 1.0$

A child weighed 25 kg, RR 25/min (from Stafford: normal values for respiratory in children [12]) tidal volume 7 ml/kg (= 175 ml)

Fresh gas flow 3 l/min;
$F_iO_2 = 0.36$
Fresh gas flow 4 l/min;
$F_iO_2 = 0.43$
Fresh gas flow 5 l/min;
$F_iO_2 = 0.51$

Corresponding to the studies of Conway and Payne [13] and Canet [10], $F_iO_2 = 0.35$ was sufficient to prevent post-operative hypoxaemia. The lowest predicted F_iO_2 from O_2 flow 3 l/min was 0.36 which should be adequate and we found no arterial desaturation ($S_pO_2 \leq 90\%$) in the oxygenated group. The lowest S_pO_2 of the oxygenated group was 95% from group 2 (3 l/min). By similar calculation, the lowest predicted F_iO_2 from O_2 flow 2 l/min was 0.32 which might not be sufficient, therefore O_2 flow 3 l/min should be the optimum.

5. Conclusion

Blow-by oxygen delivery was well tolerated in post-operative paediatric patients in PACU. The optimum oxygen flow was 3 l/min.

Acknowledgements

The authors thank Associate Professor Jariya Lertakayamanee for research design and Professor Thara Trirakarn for kind suggestions.

References

[1] Nunn JF. Hypoxaemia after general anaesthesia. Lancet 1962;2:631–2.
[2] Marshall BE, Wyche MQ Jr. Hypoxemia during and after anesthesia. Anesthesiology 1972;37:178–209.
[3] Pullerits J, Burrow FA, Roy WL. Arterial desaturation in healthy children during transfer to the recovery room. Can J Anaesth 1987;34:470–3.
[4] Motoyama EK, Glazerer CH. Hypoxaemia after general anaesthesia in children. Anesth Analg 1986;65:67–72.
[5] Amar D, Broadman LE, Winikoff SA, et al. An alternative oxygen delivery for infants and children in post-anaesthetic care unit. Can J Anaesth 1991;38:49–53.

[6] Soliman LE, Patel RI, Ehrenpreis MB, et al. Recovery scores do not correlate with postoperative hypoxemia in children. Anesth Analg 1987;67:53–6.
[7] Knill RL, Gelb AW. Ventilatory responses to hypoxia and hypercapnia during halothane sedation and anaesthesia in man. Anesthesiology 1978;49:244–51.
[8] Patel R, Norden J, Hannallah R. Oxygen administration prevents hypoxaemia during post-anaesthetic transport in children. Anesthesiology 1988;69:618.
[9] Vijayakumar HR, Metriyakool K, Jeuell MR. Effect of 100% oxygen and a mixture of oxygen and air on oxygen saturation in the immediate post-operative period in children. Anesth Analg 1987;66:181–4.
[10] Canet J, Ricos M, Vidal F. Early post-operative arterial desaturation. Determining factors and responses to oxygen therapy. Anesth Analg 1989;69:207–12.
[11] Shapiro BA, Kacmarek RM, Cane RD, Perruzzi WT. In: Hauptman D, editor. Oxygen Therapy. Clinical Application of Respiratory Care, fourth. St. Louis: Mosby, 1991:128–9.
[12] Stafford MA. Cardiovascular physiology. In: Motoyama EK, Davis PJ, editors. Smith's anesthesia for infants and children. St. Louis: Mosby, 1996:69–104.
[13] Conway CM, Payne JP. Post-operative hypoxaemia and oxygen therapy. Br. Med. J. 1963;1:844–5.

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Ambulatory Surgery 6 (1998) 97–100

Ambulatory Surgery

Continuous quality improvement in ambulatory surgery The non-attending patient

B. Roche *, Ch. Robin, P.J. Deleaval, M.C. Marti

Outpatient Department, University Hospital, rue Micheli-du-Crest 24, 1211 Geneva 14, Switzerland

Received 1 February 1997; accepted 1 January 1998

Abstract

Continuous quality assessment and improvement (CQI) programmes in ambulatory surgery are geared towards maintaining high quality patient care and services, and ensuring efficiency in the use of those services and resources. From 1989 to 1993 the percentage of non-attending patients in our university hospital ambulatory department increased from 3.66 to 5.5%. The current knowledge of the process was clarified in 1993. After considering the different causes of the process variation we planned for better patient information. The initial phase of our CQI study ran for a period of 6 months. During this time, 967 patients underwent day surgery in our unit. Of these patients, 38 (3.9%) did not attend on the day of surgery. In the second phase, the number of non-attending patients decreased in 1995 to 1.1% and in 1996 to 0.9%. These results should not be considered an end point, but only a stimulus to improve them further using a CQI framework.

Keywords: Quality; Continuous quality improvement; Non-attending patient; Ambulatory surgery

1. Introduction

The principle upon which day surgery should be based is the concept of high quality care. It is unacceptable that a large number of patients can be treated efficiently and cost effectively, if the quality of the service does not match or surpass that of more formal inpatient care. Continuous quality assessment and improvement (CQI) programs in ambulatory surgery are geared towards maintaining a high quality of patient care and services and ensuring efficiency in the use of those services and resources. This concept is not exclusive to ambulatory surgery. In fact, the medical field has derived the basic tenets of quality improvement from industry: customer satisfaction, quality control of goods and services and continuous assessment of the process [1,2].

The CQI paradigm incorporates three basic components in its evaluation phase: structure, process and outcome [3]. Each area may confer specific potential benefits to both the day to day running of any day surgical facility, and to the maintenance of high standards of patient care.

2. Material and methods

A CQI programme is based on five points:

1. productive work is made through processes;
2. quality defects result in process problems;
3. quality improvement requires total employee involvement;
4. quality is customer focused;
5. CQI is undertaken by means of scientific and statistical analysis.

Different steps in the CQI process have been described. These steps are connected in two blocks.

* Corresponding author: Tel.: +41 22 3727904; fax: +41 22 3727909.

0966-6532/98/$19.00
PII S0966-6532(98)00002-X

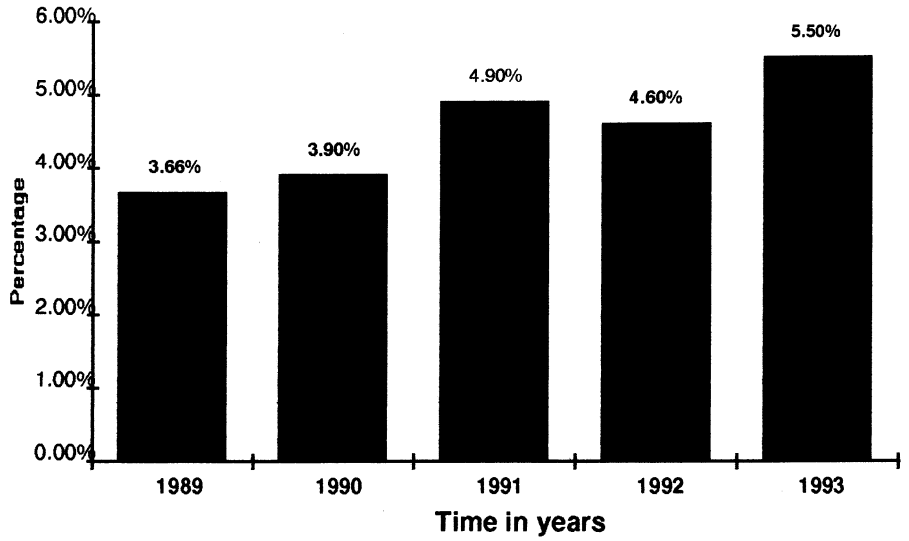

Fig. 1. Evolution of non-attending patients in ambulatory surgery.

The first block consists of analysing the actual situation:

- identify a process to improve;
- organise a team to work on the problem—this team should include physicians, (anaesthesiologists and surgeons), nurses, hospital employees and managers, and all members must be involved in the decision making process;
- clarify current knowledge of the process, identify data to be collected and collect data, including the potential contribution of the variable causes of the problem;
- understand the causes of process variation in analysing and delineating the potential causes of the problem;
- select the process improvement.

The second block is an active situation:

1. plan improvement after analysis of the most influential causes needing improvement;
2. do improvement carrying out quality action;
3. check data for process improvement;
4. act to hold gain and continue improvement. To obtain an effective CQI process, it is mandatory to continue periodic monitoring.

From 1989 to 1993, it realised that the percentage of non-attending patients in our university hospital ambulatory department had increased from 3.66 to 5.5% (Fig. 1). A team, including one operating nurse, one anaesthesiologist, one surgeon, one hospital employee, and one administrator was organised. To understand the reasons for process variation different causes were identified: these were reducible causes, i.e. misunderstanding, fear of the operation or anaesthesia; and unreducible causes, i.e. intercurrent illness, social problems and other unknown causes.

Our knowledge of the process was clarified in 1993. Out of 1898 patients who underwent an ambulatory operation in our department there were 105 (5.5%) non-attending; these consisted of 52 patients who did not attend because of illness (2.7%), 21 because of misunderstanding (generally due to language problems, i.e. foreign workers) (1.1%), 17 who were afraid of surgery or of anaesthetic (0.9%), nine who did not attend because of social problems (0.5%) and in six cases, the cause of non-attendance was unknown (0.3%).

Considering the different causes of the process variation, particularly the reducible causes, namely fear and misunderstanding, better patient information was planned. The following action was to be taken:

1. written preoperative information would be distributed;
2. all patients would meet the surgeon and anaesthesiologist preoperatively;
3. a preoperative nursing assessment would be organised;
4. patients would be required to call the operating room the day before operation for final information;
5. all the patients would be telephoned after surgery by the nurses to evaluate the immediate postoperative results.

3. Results

The initial phase of our continuous quality improvement study ran for a period of 6 months. All patients requiring surgery under anesthesiologic survey were informed. During this time, 967 patients underwent day surgery in our unit. Of these patients 38 (3.9%) did not attend on the day of surgery. The different reasons for

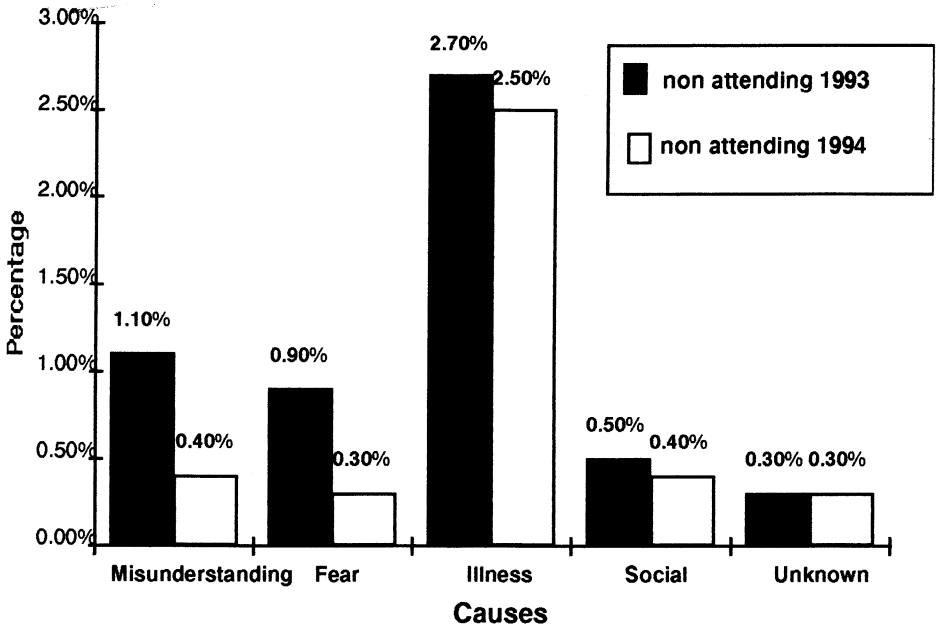

Fig. 2. Evolution of non-attending patients in ambulatory surgery causes.

non-attending were in 24 cases illness (2.5%), in four cases misunderstanding (0.4%), in three cases fear of surgery (0.3%), in four cases social problems (0.4%) and in four cases unknown (0.3%). When these results were compared with the results obtained in the preliminary study of the process in 1993, it was realised that the reducible causes had decreased drastically. In contrast, the unreducible causes were stable (Fig. 2).

In the second phase of our study all patients undergoing surgery were included in the informative procedure. The number of non-attending patients was 24 out of 2190 in 1995 (1.1%). In 1996, only 21 patients out of 2197 did not attend on the operative day (0.95%).

It is of interest to consider the time saved by the CQI procedure. If we consider that the average operative time in our unit is 78 min, we calculated that the non-attending cost in 1993 was $105 \times 78 = 8190$ min.

In 1995, the time consummated by 24 non-attending patients was $24 \times 78 = 1872$ min. The difference, 6318 min, might represent 81 operative procedures.

4. Discussion

Traditional quality assurance QA implemented in the 1980s, focused largely on the performance of individual health care providers that was below accepted standards and that lead to adverse patient care outcomes. This resulted in activities designed to focus corrective measures only at individual problems, frequently taking action only to please outside inspection [4,5]. Quality assurance has been defined as 'the bad apple' philosophy. It was inevitably viewed as a punitive approach to retrospective events.

On the contrary, CQI focuses on the performance of the organisation within its operating system [6,7]. By analysing human performance in the context of the system in which patient care is provided, global assessment and recommendations for improvement can be made. It is estimated that 80–90% of adverse outcomes result from faulty systems, while only 10–20% actually result from human errors [8]. CQI recognises that the performance improvement cycle is connected by the actions of organisational leaders, managers, physicians, trustees and support staff who design, measure, assess and improve their work processes [9,10]. For this reason, it is important to select a good team to improve quality. One member from each staff group (nurses, surgeons, anaesthesiologists, medical employees, administrators) was included in our team. It may start its improvement effort at any point. The team chosen decided to modify an existing structure process, the non-attending patient, using the different steps of CQI. Hitchcock and Ogg [11] planned that the non-attending patient number should be as small as possible: less than 1% of cases booked should not attend. In their study 4.4% of booked patients did not attend. The author described that there was no relationship between the non-attending rate and the waiting time. The visit to the unit before the day of surgery was not a determinant and did not result in a lower non-attendance rate. Our study demonstrates clearly that there are two types of causes of non-attending patients: reducible causes (fear and misunderstanding) and unreducible causes (illness, social and unknown reasons). Unknown reasons included patients who disappeared from the hospital district.

The following corrective measures were successfully undertaken:

1. the staff would give better information to the patients;
2. to avoid any misunderstanding, translation would be involved if necessary;
3. the patient would have contact with all members of the surgical team, including the anaesthesiologist, surgeon and nurse;
4. the patient would visit the outpatient facility and theatre preoperatively.

Within 6 months, a drop in the incidence of non-attendance from 5.5 to 3.9% was observed.

The set standard of 1% non-attending patients was achieved in 1996 as described by Watson et al.[12].

Poor quality is costly. It has been demonstrated in industry that quality diminishes cost. There is no example in the medical field. This study clearly shows that CQI applied to non-attending patients in ambulatory surgery is time saving. In our study the time saved equated to the potential for 80 more operative procedures.

5. Conclusion:

CQI applied to non-attending patients permitted a reduction in the incidence from 5.5 to 0.95% in 3 years. These results should not be considered as the end point, but only as a stimulus to improve them still further under the framework of CQI.

References

[1] Mayer TA. Industrial models of continuous quality improvement: implications for emergency medicine. Emerg Med Clin North Am 1992;10:523–47.
[2] Deming WE. Out of the Costs. Cambridge, MA: Massachusetts Institute of Technology, 1986.
[3] Donabedian A. The quality of care. How can it be assessed? J Am Med Assoc 1988;260:743–8.
[4] Caplan RA, Posner K, Cheney FW. Effect of outcome on physicians' judgements of appropriateness of care. J Am Med Assoc 1991;265:1957–60.
[5] Batalden PB. Building knowledge for quality improvement in health care: an introductory glossary. J. Qual Improvement 1991;13(5):8–12.
[6] Miller ST, Glanagan E. The transition from quality assurance to continuous improvement in ambulatory care. Qual Rev Bull 1993;19:62–65.
[7] Burns LR, Denton M, Goldfein S. et al. The use of continuous quality improvement methods in the development and dissemination of medical practice guidelines. Qual/Re Bull 1992;18:434–439.
[8] American Society of Anaesthesiologists Committee on Quality Improvement and Practice Management. In: Manual forAnaesthesia Department Organisation and Management. Park Ridge, IL: American Society of Anaesthesiologists 1994;89–108 and 109–121.
[9] Joint Commission on Accreditation of Healthcare Organisations: Section on Organisation. In: Accreditation Manual for Hospitals 1994, Oakbrook Terrace, IL: JCAHO 1994;51–588
[10] Roche BG, Sommer Chr. L'assurance de qualite et l'amelioration de la qualite. Nos experiences et nos intentions. Swiss Surg 1995;1:67–73.
[11] Hitchcock M, Ogg TW. Quality insurance initiative in the case of surgery: general considerations. Amb Surg 1994;2:181–92.
[12] Watson BJ, Hitchcock M, Ogg TW, Dutton KEA. Quality assurance in day case surgery: closing the audit loop. Amb Surg 1994;2:205–11.

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Ambulatory Surgery 6 (1998) 101–106

Ambulatory Surgery

Day surgery admissions and complications

T.W. Ogg *, M. Hitchcock, S. Penn

Day Surgery Unit, Addenbrooke's N.H.S. Trust, Hills Road, Cambridge CB2 2QQ, UK

Received 06 December 1997; accepted 11 January 1998

Abstract

The growth of British day surgery over the last decade has been a success story. Quality patient care should be the goal for all involved in day surgery and the number of unintended hospital admissions is now recognised as a significant clinical indicator of good day practice. This Cambridge retrospective analysis indicates that, of the 31117 day cases studied over an 8-year period, 425 admissions were recorded (1.36%). Altogether, 51 major and 386 minor complications caused these admissions. Gynaecological admissions of 203 accounted for 48% of the total. It was noted that the seniority of the surgical and anaesthetic staff was a factor in reducing the incidence of these admissions. There would appear to be a need for universally-accepted day surgical clinical indicators so that day units within different countries may make meaningful comparisons of their admission rates.

Keywords: Day surgery; Hospital admissions; Complications; Clinical indicators

1. Introduction

During the last decade in the UK there has been a dramatic switch from inpatient to day surgery. This practice has been supported by the independent Audit Commission, the National Health Service (NHS) Management Executive and the Royal Colleges of Surgeons and Anaesthetists of England. [1–4]. New surgical and anaesthetic techniques have allowed the selection of elderly patients for day surgery, many with stable chronic medical conditions. Doubts have been expressed that day patient selection may not be consistently good resulting in an increased post-discharge morbidity with subsequent primary health services involvement. However the implementation of regular quality assurance studies should assure the provision of safe day surgical practices in future [5].

Day surgery is an organisational exercise and many patients may be unsuitable for this form of treatment. Unintended hospital admission from day units has become an important quality indicator when comparing different units and published admission rates have ranged from 0.69 to 5.8% although a suitable standard of practice has yet to be determined due to case mix differences [6].

The aim of the present study was to perform a retrospective analysis of hospital admissions direct from the Addenbrooke's Day Surgery Unit (DSU) for an 8-year period from 1987–1996, excluding 1991/1992 for which precise data was unavailable. The main objectives were to assess the admission rates, the specialities contributing to these rates and the major and minor complications arising.

2. Method

This study involved the retrospective analysis of Addenbrooke's Hospital DSU admission records for 1987–1996. The source of the information was 2-fold, firstly from the operating theatre record book and secondly from a specific questionnaire completed by senior nursing staff at the time of patient hospital

* Corresponding author.

0966-6532/98/$19.00
PII S0966-6532(98)00004-3

Table 1
Direct admissions and complications during an 8-year period at Addenbrooke's day surgery unit

	Group A: 1987/1991	Group B: 1992/1996	Total
Operations (*n*)	11 952	19 165	31 117
Direct admissions	113	312	425
% Admissions	0.95	1.63	1.36
Complications			
Major	22	29	51
Minor	99	287	386

admission from the day unit. These records contained information concerning the type of surgery and anaesthesia performed, the seniority of medical staff and the causes of both major or minor complications leading to admissions. Data collection for this project was performed by one of the authors (TWO).

The data was analysed to determine the admission rates overall and for each surgical speciality. The latter were compared for two periods, 1987–1991 and 1992–1996, to estimate if changes in surgical and anaesthetic techniques had influenced admission rates. The reasons for admission were also classified according to the nature of the problem into major complications, with the potential for serious harm and minor complications, without the potential for serious harm. These complications were further sub-divided into surgical, anaesthetic and social causes.

Admissions following gynaecological surgery were analysed in more detail to determine which operations were associated with admission, the reason for admission and whether the seniority of medical staff influenced the incidence of admission.

Table 2
An overview of complications resulting in admission at Addenbrooke's day surgery unit (DSU): 1987–1996

	No. in series	% Total
DSU operations	31 117	
Major complications		
Surgical	50	0.16
Anaesthetic	1	0.003
Minor complications		
Surgical	113	0.36
Anaesthetic	238	0.76
Social	25	0.08
Total	376	1.22

Table 3
Major complications leading to hospital admissions from the Addenbrooke's DSU: 1987–96

Reason for admission	Major complications[a] (*n*)
Perforated uterus	19
Perforated bowel	10
Ectopic pregnancy	10
More extensive surgery	6
Haemorrhage (return to operating theatre)	5
Status asthmaticus	1
Total	51

[a] This represents 0.16% of the 31 117 day operations performed in the series.

3. Results

Table 1 records the admissions and complications at Addenbrooke's Day Surgery Unit for 1987–1991 (group A) and 1992–1996 (group B). Of the 31 117 day cases operated upon there were 425 direct hospital admissions (1.36%). The admissions for 1987–1991 were 113 (0.35%) and for 1992–1996, 312 (1.63%). For the two periods studied groups A and B recorded 22 and 29 major complications, respectively. The minor complications increased from 99 to 287 in the series.

Table 2 shows an overview of complications for 1987–1996. The total number of cases studied was 31 117 with major complications arising in 51 instances (0.16%). The minor complications were grouped into anaesthetic causes 238 (0.76%), surgical 113 (0.36%) and social reasons 25 (0.08%).

Table 3 details the 51 major complications leading to admissions. Of these admissions, 68.6% were due to uterine perforations (15 cases), bowel perforation (ten cases) and ectopic pregnancy diagnosis requiring emergency surgery (ten cases).

Table 4 records the minor anaesthetic complications. These amounted to 238 (0.76% of the total of 31 117

Table 4
Minor anaesthetic complications leading to admission: Addenbrooke's DSU 1987–1996

Anaesthetic complication	*n*	% Total complications
PONV	68	28.6
Postoperative pain	64	26.9
Delayed recovery	48	20.2
Fainting/vasovagal attack	32	13.4
Reaction to anaesthesia	10	4.2
Others[a]	16	6.7
Total	238	

[a] Others include hyperventilation (3), asthmatic attacks (2), gastric aspiration (2), epilepsy (2), sore throat (2), unstable heart disease (2), hyperthermia (1), laryngospasm (1) and pneumonia (1).

Table 5
Minor surgical complications resulting in admission from Addenbrooke's DSU: 1987–1996

Surgical complications	*n*	% Total complications
Haemorrhage	41	36.3
Extensive surgery	36	31.9
Late surgical finishes	14	12.4
Further investigations	12	10.6
Failed operations	5	4.4
Others[a]	5	4.4
Total	113	

[a] Others include blood transfusion required (2), drains in situ (2) and cerebrospinal fluid leak (1).

cases). A total of 68 patients (28.6%) had postoperative nausea and vomiting (PONV), 64 (26.9%) had postoperative pain and 48 (20.2%) had delayed anaesthetic recovery. These three complications accounted for 75.7% of the anaesthetic complications recorded.

Table 5 shows the minor surgical complications leading to hospital admission. These occurred in 113 cases (0.36%). A total of 41 patients (36.3%) haemorrhaged, 36 (31.9%) had undergone more extensive surgery than anticipated and in 14 cases (11.4%) there were late operative finishes.

Table 6 outlines the social complications resulting in admission. Altogether, 25 or 0.08% of the 31117 patients in the series were in this group. In 13 instances patients had no responsible person to care for them at home and on ten occasions had nobody to escort them home.

Table 7 details the reasons for gynaecological admissions. Of the 203 admissions, 46 had major surgical complications and 159 minor complications. The causes of the latter were anaesthetic (40.9%), surgical (28.7%) and social (7.8%).

Table 8 shows the procedures related to the gynaecological day operation admissions for 1987–1996. Two operations figured highly. Vaginal termination of pregnancy and diagnostic laparoscopy recorded 92 and 56 admissions, respectively, accounting for 73.9% of the admissions.

Table 6
Social complications resulting in admission from Addenbrooke's DSU: 1987–1996

Social complications	*n*	% Total complications	% Total operations
No carer at home	13	52	0.04
No escort home	10	40	0.03
Psychiatric assess.	1	4	0.003
Late operating start	1	4	0.003
Total	25		

Table 7
Reasons for gynaecological admissions from the Addenbrooke's DSU; 1987–1996, excluding 1991–1992

	n	% Total complications
Gynae. day operations	11 857	
Admissions	203	
Major complications	46	
Surgical	46	22.44
Minor complications	159	
Anaesthetic	84	40.98
Surgical	59	28.78
Social	16	7.80

Table 9 records the gynaecological day case admission rates related to surgical and anaesthetic staff seniority during 1987–1996. The admission rates expressed as a percentage of the operations performed ranged from 1.05 to 3.27%. Despite performing only 794 general anaesthetics the associate specialist and clinical assistant grades were involved with 26 admissions, an incidence of 3.27%.

Table 10 compares the incidence of unplanned admissions from six studies (1990–1997). These admissions ranged from 0.69 to 5.80%. A grand total of 108300 day cases were investigated and there were 2272 admissions (an incidence of 2.42%).

4. Discussion

This study attests to the safety of day surgery. Careful preoperative selection has been shown to be the key to success in this field. At Addenbrooke's Hospital senior nursing staff routinely perform day case preoperative screening under the supervision of a Day Unit Director (a consultant anaesthetist) The Director's decision regarding the patient's fitness for surgery and anaesthesia is final in border-line cases. Experience has

Table 8
Addenbrooke's DSU admissions related to gynaecological operative procedures: 1987–1996

Gynae. day operations	Admissions from DSU	% Total gynae. admissions
VTOP[a]	92	46.3
Diagnostic laparoscopy	56	27.6
Lap. Sterilisation	22	10.8
VTOP/ laparoscopy	16	7.9
Others[b]	17	7.4
Total	203	

[a] VTOP: vaginal termination of pregnancy.
[b] Others include D and C, hysteroscopy and excision of vulval skin lesions.

Table 9
Gynaecological day case admissions from Addenbrooke's DSU related to staff seniority: 1987–1996

	Admissions	Gynae. day operations	Admissions as % operations
Overall results	203	11857	1.71
Surgeon			
Consultant	67	4600	1.46
Senior registrar	87	4884	1.78
Registrar	49	2373	2.06
Anaesthetist			
Consultant	117	6971	1.68
Senior registrar	18	1709	1.05
Registrar	42	2383	1.76
Assoc specialists	26	794	3.27

shown that a preoperative questionnaire is a useful screening tool and that there is no need for a battery of routine investigations prior to day surgery [7]. However, in the present series it was noted that the number of unplanned admissions had increased from 113 (0.35%) in 1987–1991 to 312 (1.62%) in 1992–1996. This may be explained by the fact that more elderly patients with stable chronic medical conditions were presenting for day surgery. The Cambridge unit has no upper age limit and the risk of major morbidity and mortality after day surgery is acknowledged to be no different from a similar aged population not undergoing surgery [8]. Recently in a review of innovations for preoperative assessment and preparation the concept of an anaesthesia preoperative evaluation clinic (APEC) has been reported [9]. The benefits included less cancellations on the day of surgery and decreased surgical and anaesthetic morbidity. The results from the present Addenbrooke's study clearly indicate that such an expensive alternative need not be universally adopted.

Patient safety is the goal in day surgery and the reduction of perioperative sequelae is of the utmost importance. A low incidence of death following ambulatory surgery has been reported [10] but major complications do arise in 1/1455 patients treated [8]. Admissions arising from the 51 major complications in the present series should be viewed seriously and care ought to be taken when new day units are sited. Uterine and bowel perforations are serious complications. Before health authorities plan free-standing day surgery units, the provision of adequate preoperative screening facilities, involvement of senior medical personnel and emergency beds in a nearby hospital should be assured. The message is quite simple. Continual vigilance should be taken when surgery of any extent is performed under general anaesthesia.

The minor complications leading to hospital admission in the present series were similar to previous studies [11–15]. These side-effects may be studied by postoperative outpatient questionnaires although this method may yield a higher incidence of sequelae [16]. Disappointingly the side-effects reported by a 1993 Canadian study, e.g. headache, drowsiness and dizziness are remarkably similar to those recorded in an Aberdeen series 20 years earlier despite the advances in surgery and anaesthesia [17,18]. There is an obvious need to reduce these minor complications and extended research for 1–3 weeks into the postoperative period is now required. However, there may be an irreducible minor complication rate resulting in admissions from day units [11].

In other studies orthopaedic and urological operations have been highlighted as predictors of avoidable admissions [13,14]. Experience in the Cambridge DSU has indicated that gynaecological laparoscopy and vaginal termination of pregnancy produce high complication rates. This is in agreement with a previous study and it would appear that the occurrence of dizziness, drowsiness and postoperative nausea and vomiting (PONV) is dependent on the type of surgery performed and method of anaesthesia [19]. In future, day unit anaesthetists will have to seriously reconsider their anaesthetic techniques for gynaecological day surgery. For instance is the continued use of muscle relaxants, neostigmine, nitrous oxide and endotracheal intubation in the best interests of their day cases? Perhaps more use should be made of total intravenous anaesthetic techniques (TIVA) and the spontaneous breathing of a mixture of oxygen in air via a laryngeal mask airway [20].

Unrelieved postoperative pain and PONV were the commonest reasons for admission in this study. Pain may arise after inguinal herniorhaphy, circumcision and laparoscopic sterilisation. There is a good case for not performing either bilateral hernia repair and bilateral varicose vein stripping on the same day [11]. Management of pain in the ambulant patient requires 'balanced analgesia' in the form of short-acting opioids, non steroidal anti-inflammatory drugs, simple oral analgesics and long-acting local anaesthetic agents, e.g. bupivacaine [21]. All day units should devise suitable pain assessment and treatment protocols as it is consid-

Table 10
Unintended hospital admissions from day surgery units: published reports 1990–1997

Year	First author and Ref. No.	Patients (*n*)	Admissions	% Admissions
1990	Johnson [11]	10 348	72	0.69
1992	Biswas [12]	18 321	225	1.22
1994	Kong [13]	4310	250	5.80
1995	Twersky [14]	32 457	1042	3.20
1996	Verco [15]	11 749	258	2.25
1997	Ogg	31 117	425	1.36
Total		108 380	2272	2.42

ered poor practice to discharge day cases into the community with unrelieved postoperative pain.

PONV is a multifactorial problem and all admission studies published so far have commented on the frequency of this complication but one of the main difficulties has been the lack of uniformity when scoring PONV severity [22]. The authors would agree that prophylactic anti-emetics should be administered to known high-risk day cases and the commonest drugs used to treat PONV in the Cambridge DSU are low-dose droperidol, ephedrine, ondansetron and propofol.

Over the years there has been speculation as to whether the admission rates from day units are influenced by the seniority of the medical personnel involved. In a multicentric study involving 11749 day cases in ten hospitals no firm conclusion was reached as to whether junior anaesthetists had higher admission rates [15]. In the present series a considerable variation in admission rates was recorded, 1.05–3.27%, when the seniority of surgeons and anaesthetists was evaluated. Although these differences were not statistically significant there was a distinct trend towards higher admission rates when junior doctors were involved. If 50% of all elective surgery in the UK is to be performed on a day basis by the year 2000 then surely a large proportion of this clinical work will need to be carried out by senior surgeons and anaesthetists. Indeed junior staff will require supervision as part of their training and already the Royal College of Anaesthetists has issued suitable guidelines [4].

In conclusion this study is in agreement with other international units that day surgery is a safe procedure with benefits for health authorities, patients and hospital staff alike. Complications do arise resulting in expensive hospital admission but with suitable guidelines, preoperative selection and the involvement of senior personnel these problems may be overcome. Hopefully in the future medical and nursing staff will realise the significance of continuous quality assurance studies thereby maintaining high standards. Finally there will be a future need for programmes of education and research if day surgery is to flourish and become global practice.

References

[1] Audit Commission. A Short Cut to Better Services. Day Surgery in England and Wales. London: HMSO, 1990.
[2] NHS Management Executive: Value for Money Unit. Day Surgery: Making it Happen. London: HMSO, 1991.
[3] Royal College of Surgeons of England. Commission on the Provision of Surgical Services. Guidelines for Day Surgery, Revised Ed. London: Royal College of Surgeons of England, 1992.
[4] Royal College of Anaesthetists . Guidance for the Purchasers of Day Case Anaesthesia. London: Royal College of Anaesthetists (UK), 1994.
[5] Hitchcock M, Ogg TW. A quality assurance initiative in day case surgery: general considerations. Ambul Surg 1994;2:181–92.
[6] Chung F. Recovery pattern and home-readiness after ambulatory surgery. Anesthesiol Analg 1995;80:896–902.
[7] Goodwin APL, Ogg TW. Preoperative preparation for day surgery. Br J Hosp Med 1997;47:197–201.
[8] Warner MA, Shields SE, Chute CG. Major morbidity and mortality within 1 month of ambulatory surgery and anesthesia. J Am Med Assoc 1993;270:1437–41.
[9] Fischer SP. Preoperative assessment and preparation: new innovations. Curr Opin Anaesthesiol 1997;10:410–3.
[10] Natof HE, Gold B, Kitz DS. Complications. In: Wetchler BV, editor. Anaesthesia for Ambulatory Surgery, 2nd ed. Philadelphia: Lippincott, 1991:437–474.
[11] Johnson CD, Jarrett PEM. Admission to hospital after day case surgery. Ann R Coll Surg Engl 1990;72:225–8.
[12] Biswas TK, Leary C. Postoperative hospital admission from a day surgery unit: a seven year retrospective study. Anaesth Intensive Care 1992;20(2):147–50.
[13] Kong R, Wilson J, Kong KL. Postoperative admissions from a hospital-based day surgery unit. Ambul Surg 1994;2:43–8.
[14] Twersky RS, Abiona M, Thorne AC, Levine R, Greenberg C, McInerney E, Mingus M, Susman D. Admissions following ambulatory surgery: outcome in seven urban hospitals. Ambul Surg 1995;3(3):141–6.
[15] Verco AM, Ratne V, Robins DW. Unplanned admissions in day surgery. Ambul Surg 1996;4(2):99–102.
[16] Fahy A, Marshall M. Post anaesthetic morbidity in outpatients. Br J Anaesth 1969;41:439–41.
[17] Chung F, Un V, Michaloliakou C. Adverse outcomes after outpatient anaesthesia. 1 Description of methods, patient populations and complications. Can J Anaesth 1993;40:22.
[18] Ogg TW. An assessment of postoperative outpatient cases. Br Med J 1972;4:573–5.
[19] Lerman J. Surgical and patient factors in postoperative nausea and vomiting. Br J Anaesth 1992;69(Suppl. 1):24S–32S.

[20] Goodwin APL, Rowe WL, Ogg TW. Day case laparoscopy. A comparison of two anaesthetic techniques using the laryngeal mask during spontaneous breathing. Anaesthesia 1992;47:892–5.

[21] Hitchcock M, Ogg TW. Day surgery analgesia. J One Day Surg 1993;3:20–1.

[22] Eriksson H, Kortilla K. Prevention of postoperative pain and emesis. Curr Opin Anaesthesiol 1997;10:438–44.

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Ambulatory Surgery 6 (1998) 107

Ambulatory Surgery

Conference report

The National Congress of the German Association for Ambulatory Surgery (B.A.O.) was held in Wurzburg on 12–14 September, 1997. The venue was the Festung Marienberg, a beautifully restored castle. A total of 450 delegates attended an active medico-political conference.

As a member of the International Association for Ambulatory Surgery (IAAS) Executive, I was invited to participate in a round-table discussion on 'How much ambulatory surgery is performed world-wide?' The basis for the discussion was a joint report by the IAAS and the Organisation for Economic Co-operation and Development (OECD). Dr Claude De Lathouwer presented the results and he reported that the data would shortly be published in the journal of Ambulatory Surgery. In the first instance, 26 countries were invited to submit the percentage of day surgery performed from a list of 20 day operations. The replies from only 11 countries were valid and the results for 1994–1995 were as follows: Australia (34%), UK (43%), the Netherlands (58%) and USA (93%) with an average of 46%. Overall, the results were extremely variable. Tonsillectomy, with or without adenoidectomy, was seldom performed in the UK (2%), whereas the percentages for the Netherlands and the USA were 85 and 91%, respectively.

A brief attempt was made to quantify how much day surgery was being performed world-wide. Of course there were methodological flaws and in future the data collection should be refined. In addition, there is an obvious need for governments and health officials to correct the gaping holes in their statistical collection methods but the bottom-line is that doctors, nurses and managers should review their own practices if ambulatory surgery is to expand further.

The Wurzburg Congress indicated that, in Germany, day surgery was frequently practised in private free-standing units and that, so far, public hospitals had not followed suit. Thanks to excellent simultaneous translation I was able to sit in on a debate between a German insurance official and a doctor who was a member of a panel which formulated medical fees. There was no doubt that day surgery funding was less than satisfactory but German insurance companies had their hands tied as hospital expenses continued to escalate. Furthermore, the primary health doctors will also have to alter their practices by referring more day cases to specialists. In short, there were too many hospital beds in Germany and there was much support at Wurzburg for a phased reduction and the implementation of more day surgery. Finally, reimbursement should be along the lines of inpatient care and these measures should be agreed as a matter of some urgency.

Mrs Sarah Penn, the President of the British Association of Day Surgery (BADS) was also in Wurzburg and she addressed 100 nurses on 'Day Surgery in England'. Unfortunately, the German doctors and nurses at this conference did not meet in the same lecture theatre. The multidisciplinary approach to day surgery was ignored, which was a pity, as I firmly believe that any future success in the field depends on the collaboration between doctors, nurses and managers.

Dr Jacky Reydelet, working in Kornwestheim, Germany, should be congratulated for organising such an effective Congress. The speaker's dinner was held in Zum Stachel, a famous Wurzburg winehouse and the Congress dinner the following evening was in Palast's cellar with plenty of good Franconian wine and regional dishes.

My lasting impression of this Congress was that most European countries are ahead of their German counterparts in day surgery. Certain barriers will have to be overcome if this sub-speciality is to flourish in Germany. For instance, appropriate insurance payments will have to be devised, a multidisciplinary approach should be adopted and there is a pressing need to reduce the number of German hospital beds.

Dr Tom W Ogg

PII S0966-6532(97)10012-9

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Ambulatory Surgery 6 (1998) 111–129

Ambulatory Surgery

Literature review
Selected abstracts from the current literature[1]

Ambulatory phlebectomy of the foot: review of 75 patients

JA Olivencia

Dermatol Surg 1997;23(4):279–80

BACKGROUND: Review of 75 patients on whom ambulatory phlebectomy of the foot was performed as part of their varicose vein treatment. *Objective*. To demonstrate that ambulatory phlebectomy is an effective modality of treatment for varicosities of the foot.
METHODS: Ambulatory phlebectomies were performed on an outpatient basis under local anesthesia.
RESULTS: The overall satisfactory result of ambulatory phlebectomy of the foot employed in the 75 patients in this study revealed the procedure to be very effective with few complications resulting and with a high degree of patient satisfaction.
CONCLUSIONS: Ambulatory phlebectomy of the foot has proven to be a most satisfactory procedure for the treatment of varicose veins of the foot.

Neurolysis for ulnar nerve compression syndrome: a surgical technique for outpatients

JES Jambeiro, MAM Matos, FR Sant'Ana, AA Leite, A Barbosa, JF Jambeiro

Rev Bras Ortoped 1997;32(3):236–8

The authors present a simplified surgical technique for the treatment of ulnar compressive syndrome by using local anesthesia without ischemia in the neurolysis of the nerve. This procedure represents a new perspective as an outpatient surgery in the massive therapy of the handicapped, especially in Hansen's disease.

Reversal of tubal sterilization using laparoscopically placed titanium staples: preliminary experience

L Stadtmauer, MV Sauer

Hum Reprod 1997;12(4):647–9

We tested the feasibility of performing outpatient laparoscopic surgery to reverse tubal sterilization using titanium staples to reapproximate the oviducts. A total of 14 women underwent the procedure which involved excision of the tubal eschar, stenting of the severed remnants, and circumferential stapling of the muscularis and serosa. Reapproximation was possible in all cases, with a measured tubal length post-anastomosis of 4.5 ± 0.5 cm (range 3.0–7.0 cm). The length of operating time was 2.8 ± 0.2 h (range 2.2–3.8 h), and all patients were discharged the same day. There were no operative complications, and no readmissions were necessary. Within 6 months of surgery, there were six pregnancies including one spontaneous abortion and five ongoing pregnancies. Of those not conceiving within 8 months, seven (100%) demonstrated tubal patency on a follow-up hysterosalpingogram. We conclude the laparoscopic approach to tubal sterilization reversal is a viable alternative to open abdominal microsurgical approaches. Although preliminary, laparoscopic surgery promises to be cost effective, as it can be performed on an outpatient basis, may reduce operative time and minimizes the recuperative period of patients.

Acetaminophen or ketorolac for post myringotomy pain in children? A prospective, double-blinded comparison

JD Bean-Lijewski, JC Stinson

Paediatr Anaesth 1997;7(2):131–7

Myringotomy with tube placement (BMT) is the most frequent surgical procedure performed in children. The purpose of this prospective, double- blinded study was to determine if 15 mg. kg^{-1} of acetaminophen (paracetamol) provides analgesia similar to that provided by ketorolac, 1 mg. kg^{-1}, at a lower cost. A total of 132 children, aged 6 months to 9 years, scheduled for elective BMT were randomized to receive oral acetaminophen or ketorolac 30 min preoperatively. An Objective Pain Scale score was assessed upon arrival to the PACU and at 5, 10 and 20 min. Time of awakening, time of PACU and day surgery discharge and incidence of vomiting were recorded. Groups were comparable in demographics, side effects and time to discharge. Median pain scores were lower in the ketorolac group at five and ten min but no differences were seen at discharge nor in postdischarge analgesic requirements. Is 10 min of better analgesia worth the cost of ketorolac? We conclude that the slight analgesic benefit from ketorolac does not justify its cost in this setting.

[1] No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Because of rapid advances in the medical sciences, we recommend that independent verification of diagnoses and drug dosages should be made.

PII S0966-6532(98)00022-5

Parental perceptions, expectations and preferences for the postanaesthetic recovery of children

N Sikich, AS Carr, J Lerman

Paediatr Anaesth 1997;7(2):139–42

Improvements in anaesthesia have led to the introduction of rapid-acting agents which quicken recovery and decrease sleepiness. Whether parents believe a rapid postanaesthetic recovery is an advantage is unknown. Therefore, we evaluated the parental perceptions, expectations and preferences for the postanaesthetic recovery of children. Parents (103) of children having ambulatory surgery completed a structured questionnaire and the results of 101 are presented. Results indicate that 93% of parents expect their child to be sleepy after surgery. Of the parents, 74% indicated they would prefer their child to be sleepy or tired in the first 24 h postoperatively while 85% of parents would not be upset if their child's discharge was delayed up to 3 h because their child was too sleepy. Finally, 45.5% of parents are extremely concerned about their child experiencing postoperative pain and 68% believe that their child would be in more pain if they recovered rapidly from the anaesthetic. These results indicate that rapid recovery from anaesthesia and quick discharge from hospital are not key expectations of parents of children admitted for day surgery. Parents associate a rapid recovery with more pain. Parents need to be more fully informed of the advantages of a rapid recovery and reassured that children can recover quickly and completely but at the same time be comfortable postanaesthetic.

Pain and activity disturbance after paediatric day case adenoidectomy

H Kokki, R Ahonen

Paediatr Anaesth 1997;7(3):227–31

Over the past two decades outpatient surgery has become standard practice in paediatric surgery. Adenoidectomy is a common surgical procedure in children. In this prospective survey pain and pain-related outcomes such as sleep and activity disturbance were evaluated in 167 children aged 1–7 years who had undergone adenoidectomy as a day case in Kuopio University Hospital. The survey questionnaire consisted of 76 structured questions about pain, pain medication, adverse effects and daily activities during the first week after the operation. Of children, 83% had pain at home and 17% of them had moderate or severe pain on a four point verbal rating scale. Children (80%) used pain medication at home. Pain medication did not cause any major adverse effects. Over 90% of children were back to normal daily activities during the first three postoperative days and nearly all were able to drink during the whole postoperative period. We conclude that pain is a common problem after adenoidectomy in children but most of the children return to normal activities within 3 days.

Traumatology and day care surgery: lesional and therapeutic features at Yopougon university hospital

G Varango, I Bamba, M Kodo, Y Lambin

Urgences Med 1997;16(2):85–88

The authors report results from a retrospective study carried out over a 3-year period about 3785 patients (mean age: 41.5 ± 17.34 years) managed in a short stay basis. The procedures concerned mainly musculocutaneous (64.9%) and osteo-articular lesions (31.6%). ASA method and/or paraclinical investigations authorized general anaesthesia in 60% of cases with mean duration of 29.73 ± 13.17 min. Patients were discharged after 6.15 ± 2.23 h mean stay and follow-up complications (320 cases) were local and mechanic, inducing an immediate or secondary admission in 30.9% of these cases. As 77.5% of emergency procedures indications, ambulatory surgery, with a low morbidity level (8.45%) has permitted to obtain good results.

Neuromuscular effects, efficacy and safety of rocuronium versus atracurium in ambulatory anesthesia

DG Whalley, WG Maurer, AL Knapik, FG Estafanous

Anesth Analges 1997;84(2) (xxx)

INTRODUCTION: Rocuronium has been introduced into practice as a rapid onset nondepolarizing muscle relaxant of intermediate duration with few side effects and stable hemodynamic variables. Atracurium is used extensively in outpatient surgery because of its predictable recovery and cardiovascular stability at doses less than $2 \times$ ED95. Our objective was to compare the neuromuscular effects, safety and efficacy of $2 \times$ ED95 rocuronium and atracurium in ambulatory surgery.
METHODS: With IRB approval and informed consent, 41 patients undergoing laparoscopic gynecological outpatient surgery were enrolled in a randomized, controlled, double-blinded study. After premedication with midazolam 1–2 mg, patients were anesthetized with propofol 1.8 mg/kg and alfentanil 9 μg/kg. Rocuronium 0.6 mg/kg (group R, $n = 20$) or atracurium 0.5 mg/kg (group A, $n = 21$) were given after a control recording of the mechanomyogram had been obtained. Anesthesia was maintained with N_2O/O_2, propofol and alfentanil, and the block reversed if the train-of-four ratio was $< 70\%$ (T1/T470) at the end of surgery. Intubation was attempted 60 s after injection of the muscle relaxant and graded 1–4. If intubation was unsuccessful, another attempt was made at 90 and 120 s. Onset time was defined as the time from injection of the relaxant to peak depression of T1, and clinical duration as the time from injection to return of T1 to 25% of control. Adverse events including histamine related symptoms (erythema and bronchospasm) were noted. Data were compared using Student's t-test, Wilcoxon's test or Fisher's exact test.
RESULTS: The patients were ASA Class 1 or 2 and were demographically similar in both groups. All patients in group R were intubated in less than 90 s from injection of the relaxant, in contrast to only 14 patients in group A. Intubating conditions were rated good to excellent (grades 3 and 4) in 18 patients in group R and 20 patients in group A ($P = 0.6$). T1 was ablated in both groups, but in group R the onset time was shorter (59 vs. 99 s, $P < 0.001$), as was the clinical duration (33 vs. 45 min, $P < 0.001$). There were more patients in group A reporting adverse events than in group R (6 vs. 3, $P = 0.454$), but none of the events were severe. The most common adverse event was nausea and vomiting (group R, 1 patient; group A, 3 patients). Flushing was observed in one patient in group A. Surgery was of sufficient duration in ten patients in group R and six patients in group A for us to observe spontaneous recovery. The mean time from injection of relaxant to T1/T470 was similar in both groups (group R, 53 min; group A, 59 min; $P = 0.139$), whereas the recovery index was slightly longer in group R (10 vs. 8 min in group A, $P = 0.023$).
DISCUSSION: We have demonstrated that in patients undergoing ambulatory anesthesia for laparoscopic gynecological surgery, rocuronium was associated with a quicker onset and shorter clinical duration than an equipotent dose of atracurium. The quicker onset of rocuronium facilitates a more rapid, smoother intubation and the shorter clinical duration ensures a more predictable response to reversal drugs. The time to spontaneous recovery to T1/T470 was, however, similar for the two muscle relaxants. We observed a higher incidence of adverse events with atracurium.

A comparison of nausea and vomiting after ondansetron premedication with either propofol or desflurane following tubal ligation

G. Arndt, S Springman, M McSweeney

Anesth Analges 1997;84(2)

INTRODUCTION: Nausea and vomiting are common following tubal ligation (TL). Ondansetron is a serotonin type 3 antagonist antiemetic. This study compares the incidence of nausea and vomiting following the prophylactic administration of ondansetron using two different anesthetic techniques, intravenous (IV) propofol or desflurane anesthesia.
METHODS: Following IRB approval, 66 ASA 1 or 2 patients requiring TL were enrolled at the University of Wisconsin Outpatient Surgery Clinics. All were medicated with ondansetron, 4 mg IV, following induction. Anesthesia was randomly assigned and maintained with either IV propofol, $n = 33$ or desflurane, $n = 33$ both with nitrous oxide. All were premedicated with alfentanil 15 μg/kg IV and midazolam 0.03 mg/kg IV, paralyzed with atracurium and received ketorolac 60 mg intramuscularly. The propofol group was induced with propofol and the desflurane group with methohexital. The incisions were infiltrated with bupivacaine 0.25%. Postoperative pain was treated with hydromorphone IV. The incidence of nausea and vomiting are reported in Table 1 for the first 60 post-anesthetic min. A table is presented. Both the patients and the post-anesthesia nurses were blinded to the anesthetic. All data was analyzed using Microsoft Excel. Statistical comparisons were made using the χ^2 test with P values of < 0.05 being considered significant.
DISCUSSION: Ondansetron with propofol has a significantly lower incidence of nausea at 60 min compared to ondansetron with desflurane. The incidence of nausea following ondansetron antiemetic premedication is affected by the anesthetic technique. The incidence of vomiting is not. Intergroup hydromorphone requirements were not significant.

Cancellation of pediatric outpatient surgery: economic and emotional implications for patients and their families

AR Tait, T Voepel-Lewis, HM Munro, HB Gutstein, PI Reynolds

J Clin Anesth 1997;9(3):213–19

STUDY OBJECTIVE: To determine the cause and timing of case cancellation in a pediatric outpatient surgical population, and to examine the economic and emotional impact of such cancellations on patients and their families. *Design:* Questionnaire survey.
SETTING: Outpatient surgery unit of a large university children's hospital.
PARTICIPANTS: 127 parents of children whose elective outpatient surgery had been cancelled.
INTERVENTIONS: A total of 200 questionnaires were mailed to the parents of children who had their outpatient surgery cancelled.
MEASUREMENTS AND MAIN RESULTS: Of those children whose surgery had been cancelled, 34.6% were due to upper respiratory infectious (URIs), 30.7% for other medical reasons, and the balance for scheduling errors, because the child had not fasted, or for difficulties with transportation. The majority of surgeries (58.3%) were cancelled prior to their scheduled surgery date. However, 18.9% were cancelled on the day of surgery prior to leaving for the hospital and 22.8% were cancelled on arrival at the outpatient surgery clinic. Of those patients whose surgeries were not cancelled until they arrived at the hospital, 38.5% of mothers and 50.0% of fathers missed a day of work and, of these, 53.3% and 42.1%, respectively, went unpaid for the work day missed. The mean number of miles driven (round trip) to the hospital for a cancelled operation was 158.8 miles (range 8–1350 miles). Additional testing and new appointments were ordered in 25.2% of the cancelled cases, 45% of parents and 16% of children were disappointed by the cancellation; 16% of parents were frustrated by the cancellation and 3.3% were angry.
CONCLUSIONS: This study suggests that last-minute cancellations of surgery has an important impact on patients and their families and suggests a need to review present protocols for screening patients prior to surgery.

Intrathecal sufentanil for extracorporeal shock wave lithotripsy provides earlier discharge of the outpatient than intrathecal lidocaine

WC Lau, CR Green, GJ Faerber, AR Tait, JA Golembiewski

Anesth Analges 1997;84(6):1227–231

Many anesthetic techniques are currently used for extracorporeal shock wave lithotripsy (ESWL). This randomized, prospective, double-blind study was designed to examine postoperative recovery with two anesthetic techniques for unilateral ESWL; i.e., intrathecal sufentanil versus intrathecal 5% lidocaine. The incidence of adverse effects was also assessed. A total of 22 ASA physical status I–III patients, 18–70 years of age who were scheduled for unilateral ESWL under spinal anesthesia were studied. Patients were randomized to receive either intrathecal sufentanil 20 μg + saline ($n = 11$) or intrathecal 5%, lidocaine ($n = 11$) based on their height. Both patients and observers were blinded to the treatment groups. Patients were assessed for intraoperative and postoperative pain via a 10-cm verbal analog pain scale (VAPS) (0 = no pain, 10 = extreme pain). Stone sizes, number of shock waves, and voltages were also compared. The recovery profile time to ambulate, void, oral intake, and home discharge was documented. Antiemetic requirements in the postanesthesia care unit (PACU) and incidence of postoperative nausea and vomiting (PONV), pruritus, and sedation were also recorded. This study showed no differences in VAPS between groups at any time in the perioperative period. Patients who received intrathecal sufentanil ambulated (79 ± 16 vs. 146 ± 57 min mean $\pm$ S.D., $P < 0.05$), voided (80 ± 18 vs. 152 ± 54 min, $P < 0.05$), and were discharged home (98 ± 17 vs. 166 ± 50 min, $P < 0.005$) significantly sooner than the patients who received intrathecal lidocaine. Although 27% (3 of 11) of the patients who received sufentanil reported pruritus, respiratory depression was not found. There were no differences in PONV between the two groups. Intrathecal sufentanil provided an enhanced recovery profile with significantly earlier home discharge when compared with intrathecal lidocaine. In conclusion, intrathecal sufentanil is a safe and effective method of anesthesia for outpatient unilateral ESWL.

Surgical-cryotherapic ambulatorial treatment of anal fissure. Our experience

M Maturanza, F Maritato, A Costanzo, R Pavero, G Battistini, S Sal

Minerva Chir 1997;52(4):393–5

The authors describe their technique and their experience of ambulatorial surgical-cryotherapeutic combinated, treatment of anal fissure. The data were observed in 35 patients (medium age 37.5); in 16 cases, previous treatments gave no benefit. The surgical treatment was the lateral internal close sphyncterotomy according to Notaras, with local anesthesia (personal technique), followed by a fissure curettage with a *N*-protosside cryosound. The results confirm the well known effectiveness of lateral internal sphyncterotomy and the validity of ambulatorial treatment and of cryotherapy.

Local anesthesia in inguinal hernia surgery. Technical note

P Palumbo, M Pulcini R Turano, E Mercuri, A Fantera, AM Angelici

Minerva Chir 1997;52(4):509–12

Routine use of local anaesthesia associated with tension free hernioplasty in surgical treatment of inguinal hernia allows an immediate patient walking and prompt discharge from the hospital unit: with this technique 89 cases in 2 year were operated. The anaesthesia-related discomforts and complications are minimal. The addition of an intravenous sedative (propofol) premis to extend this approach to anxious patients too.

Day-case adenoidectomy: how popular and safe in a rural environment?

N Siddiqui, MW Yung

J Laryngol Otol 1997;111(5);444—6

In spite of previously favourable reports on day-case adenoidectomy, there are still worries amongst otolaryngologists that such practice is unsafe, especially in a rural environment. A national survey was therefore carried out which shows that only 41% of respondents perform adenoidectomy routinely as day-cases, and even fewer in rural areas. A regional audit on day-case adenoidectomy, covering five hospitals, was conducted in East Anglia. Between 1994 and 1995, 73 day-case adenoidectomies were performed and the outcome was compared to those of 183 in-patient adenoidectomies during the same period. The children in the day-case group recovered post-operatively even better than the in-patient group. None of them stayed overnight or required re-admission. There was no increased in post-operative consultation to the general practitioner. The parents in the day-case group were mostly in favour of the day-case arrangement (88%). The results suggest that day-case adenoidectomy is safe and popular with parents even in a rural environment.

Cost-effectiveness of transaxillary muscle-sparing same-day operative closure of patent ductus arteriosus

F Cetta, SY Deleon, PT Roughneen, LC Graham, RC Lichtenberg, TJ Bell, DA Vitullo, EA Fisher

Am J Cardiol 1997;79(9);1281–2

Transaxillary muscle-sparing patent ductus arteriosus closure performed as same-day surgery is described in ten patients. This approach provides a superb cosmetic result while obviating the need for thoracostomy tube placement.

The impact of regionalization on a surgery program in the Canadian Health Care System

SM Hamilton, S Letourneau, E Pekeles, D Voaklander, WC Johnston, CW Pinson

Arch Surg 1997;132(6):605–10

OBJECTIVE: To examine the impact of the regionalization of health care on the provision of surgical services in the Capital Health Region (Edmonton) of the province of Alberta.
DESIGN: A 4-year retrospective descriptive analysis using data from the Canadian Institute for Health Information and from the Capital Health Region data banks.
SETTING: To control health care costs, the provincially funded health care system in Alberta reformed its governance structure and service provision model. We studied community hospitals and an academic health sciences center.
PATIENTS: All patients undergoing surgical care in the region.
INTERVENTIONS: Regionalization of the organizational structure with the elimination of hospital boards, consolidation of services on specific sites within the regional system, and a major reduction in funding.
OUTCOME MEASURES: Inpatient and day surgery procedure volumes, average length of hospital stay, relative value units, bed use, and mortality. RESULTS: The Capital Health Region has a population of 723000 people, with five acute care institutions. In total, 18 clinical programs now provide care through two referral hospitals and three community health centers. The reduction in operating dollars for this region was $167.1 million from fiscal years 1992 to 1993 and 1996 to1997. Redistribution of surgical services occurred on July 1, 1995, resulting in an 18% inpatient bed reduction. Regionally, the number of acute care beds has declined from 2.25 to 1.47 per 1000 population ($P < 0.001$). Bed use has fallen from 637 to 442 inpatient days per 1000 population ($P < 0.001$). The surgery volume (1995–1996) was 44770 procedures (-3.1%). Redistribution of surgical services into high- and low- acuity settings has resulted in most surgeons working on two sites. Overall average length of hospital stay has decreased significantly ($P < 0.001$); however, it has increased, together with the average relative value units, in the institutions caring for patients with high-acuity surgical illnesses. Mortality remains unchanged.
CONCLUSIONS: Regionalization and funding reductions within the surgical program in the Capital Health Region have resulted in a small reduction in surgical volumes. There have been major changes in service provision and the way surgeons practice.

Endoscopically assisted plastic surgical procedures in the pediatric patient

TY Paige FF Eaves III, RJ Wood

J Craniofacial Surg 1997;(8)3:164—9

Endoscopically assisted surgery has gained wide popularity in plastic surgery. Its major uses have been in aesthetic procedures. In this article we demonstrate the safety and utility of these techniques to a pediatric population. All patients younger than 20 years who underwent an endoscopically assisted plastic surgical procedure by one of the authors were pooled and their medical records reviewed. Complications were determined. For those children having an excision of a forehead mass, the duration of the procedure, length of incision, specimen size, and length of hospital stay were determined. Additionally, parents of these children were contacted by telephone after the excisions to determine satisfaction with the procedures. The records of 16 patients' were reviewed. Patients' ages ranged from 6 months to 15 years (mean, 5.8 years). The procedures performed included removal of forehead mass ($n = 9$), placement of tissue expanders ($n = 5$), excision of gynecomastia ($n = 1$), and malar soft tissue elevation ($n = 1$). All procedures were completed with endoscopic assistance. One procedure had to be converted to an open technique. No hematomas were observed. For forehead mass excisions, the average duration of the procedure was 46.9 min. Incision length was 1.1 cm, and specimen volume was 0.5 cm^3. Parent satisfaction with the endoscopic procedures was high, with 100% responding favorably. No significant complications were observed. Many of the procedures were performed as outpatients. Parental acceptance of and satisfaction with the endoscopic techniques was high. Our experience supports the use of endoscopic techniques in the pediatric plastic surgical patient.

Subarachnoid anesthesia with minimal doses of lidocaine in arthroscopic outpatient knee surgery

M Raich-Brufau, JA Jimenez-Perez, FJ Gonzalez-Carrasco, P Martinez-Ripol, M Jornet-Ballo

Rev Espan Anestesiol Reanim 1997;(44)5:204—6

The objective is to demonstrate that subarachnoid anesthesia with 2% isobaric lidocaine at low doses (0.5 mg/kg) is safe and effective for outpatient arthroscopic surgery of the knee. This was a prospective study of 150 ASA I–III patients undergoing arthroscopic knee surgery as outpatients under subarachnoid anesthesia. With no prior vascular filling, we provided blockade by administering 2% isobaric lidocaine at a dose of 0.5 mg/kg through a Sprotte 25G needle without vasoconstrictor. We assessed effectiveness and degree of sensory-motor blockade, cardiovascular repercussions, recovery time (until reversal of blockade, ambulation, micturition and discharge) as well as side effects observed. The mean dose of lidocaine used was 33.44 ± 4.16 mg. The sensory-motor blockade achieved provided optimum conditions for prevention of ischemia and the practice of the surgical procedure in all cases. Surgery lasted a mean 38 ± 10 min. Hemodynamic changes were not clinically significant and no patients additional fluids, atropine or vasopressors. Time from start of blockade until ambulation, micturition and discharge from the recovery unit were 123 ± 8.3, 175 ± 12.4 and 194 ± 13.4 min, respectively. Micturition was spontaneous in all cases. Complications recorded were cephalea and backache. In conclusion, subarachnoid anesthesia at low doses of 2% isobaric lidocaine provides excellent conditions for practicing arthroscopic surgery of the knee on outpatients, with minimum side effects.

Outpatient orthognathic surgery: review of 205 cases

JP Lupori, JE Van Sickels, WC Holmgreen, L Jackson

J Oral Maxillofacial Surg 1997;55(6):558–63

PURPOSE: This article reviews the evolution of outpatient orthognathic surgery from 1988 to 1995 at the University of Texas Health Science Center at San Antonio.
PATIENTS AND METHODS:A total of 328 patients had orthognathic surgery from 1988 to 1995; 205 (124 females, 81 males) were treated on an outpatient basis in the surgical suite of the dental school. Procedures included bilateral sagittal split osteotomies (BSSO), Le Fort I osteotomies (LFI), horizontal mandibular osteotomies (HMO), rapid palatal expansions (RPE), and combinations of the above. Additional procedures such as submental liposuction, blepharoplasty, dorsoseptorhinoplasty, and otoplasty were performed on 22 patients. Patient age ranged from 13 to 64 years, (average age 25).
RESULTS: 94 (46%) of the patients were discharged the day of surgery, 102 (51%) were admitted for 23-h observation, and five (2.4%) were admitted for longer than the 23-h observation period. Anesthesia time over 4:28 significantly correlated with admission for observation status. There was no significant difference between LFI and BSSO in relation to admission for observation status.
CONCLUSIONS: The number and complexity of orthognathic procedures increased dramatically over the study period. The length of anesthesia time, but not the specific procedure, correlated significantly with admission to observation status. There were few unexpected complications, with considerable cost reduction and convenience for the patients.

Comparison of inguinal and laparoscopic approaches in the treatment of varicocele

V Ulker, H Garibyan, K-H Kurth

Int Urol Nephrol 1997;29(1):71–7

To determine the pros and cons of inguinal and laparoscopic varix ligation techniques, we reviewed 53 patients who underwent inguinal ($n = 35$) and laparoscopic ($n = 18$) varicocelectomy at two centers. Intraoperative complications were not observed in either of the groups. There was 1 recurrence and 1 persistence in the laparoscopically treated patients. The inguinal approach had the advantage of shorter operating time (19.1 versus 52.8 min), ability to ligate the external spermatic veins, and it could be performed as an outpatient procedure. However, the laparoscopic approach seemed superior for preserving the spermatic artery (88.8% versus 68.5%) and had lesser postoperative morbidity.

A comparison of prophylactic ondansetron and droperidol for strabismusrepair in adults

PE Jones, EA Doe, MC O'Hara, RS Brown

South Med J 1996;89(10):S10

The purpose of this study is to determine whether any differences exist between ondansetron and droperidol in the relief of nausea and vomiting in adults having strabismus surgery. Thus far, we have prospectively randomized 22 adult patients (ages 15–65) to receive either IV droperidol or ondansetron treatment intraoperatively. Nausea and sedation levels are rated by patients immediately postoperatively, in the same-day surgery unit, and at 24 h postoperatively. Other variables being measured include episodes of emesis, time to release from the PACU, time to discharge, incidence of headache, and anxiety level. To date, ten patients have received ondansetron and 12 have received droperidol. There appears to be a significant difference in the amount of time to discharge between the groups. This difference may justify the increased cost of using ondansetron.

Efficacy and financial benefit of an anesthesiologist-directed university preadmission evaluation center

MA Starsnic, DM Guarnieri, MC Norris

J Clin Anesth 1997;9(4):299–305

STUDY OBJECTIVE: To study the effectiveness of an anesthesiologist-directed preadmission evaluation center (PEC) in our institution. *Design I:* Preoperative test costs were measured on two sets of patients undergoing same-day surgery. *II:* Rate of cancellation was measured on all patients undergoing same-day surgery in a subsequent 1-year time period.
SETTING: The PEC, short procedure unit, and same-day admission unit of a university hospital. *Patients:* I: 3062 male and female patients undergoing same-day surgery between January 1, 1992, and August 31, 1992. II: 9454 male and female patients undergoing same-day surgery between July 1, 1993, and June 30, 1994.
INTERVENTIONS: Age, ASA physical status, type of surgery performed, and tests ordered were recorded in two groups of same-day surgical patients. Group S had testing primarily ordered by surgeons, augmented by the anesthesiologists in the PEC. Group A had testing primarily ordered by the anesthesiologists in the PEC, but surgeons could still order tests they felt necessary. On the day of surgery, the attending anesthesiologist recorded any additional testing that was required or would have altered intraoperative management. In a follow-up study, cancellations of same-day surgical patients were recorded for a 1-year period.

MEASUREMENTS AND MAIN RESULTS: I. With the exception of complete blood counts with differentials, significantly fewer tests were ordered in Group A than Group S. These changes produced an average cost savings of $20.89 per patient. There were no recorded cancellations or apparent alterations in intraoperative management attributable to inadequate testing. II. Of the 9,454 same-day procedures from 7/1/93 to 6/31/94, 66 were cancelled on the day of the procedure. None of the patients seen in the PEC were cancelled due to causes possibly preventable by a PEC, unlike the cases of four patients who had not been evaluated in the PEC and were cancelled.

CONCLUSION: A PEC, in which the anesthesiologist primarily orders preoperative tests and approves patients readiness for surgery, is both an efficient and cost-effective system.

Day-case cataract surgery in rural Spain

JR Villada, J Albisu

J Cataract Refractive Surg 1997;23(4):581–2

OBJECTIVE: To ascertain how many patients in a rural area of Spain would qualify for and choose to have day-case cataract surgery.
SETTING: Departmento de Oftalmologia, Hospital Comarcal, Hellin, Albacete, Spain.
METHODS: All patients intending to have cataract surgery in 1993 responded to a five-question survey. Only patients answering yes to all five questions were considered candidates for day-case surgery.
RESULTS: Of 374 patients, 33 (9.0%) answered yes to all five questions. Only 7 of the 33 (1.9%) subsequently had day-case surgery.
CONCLUSION: Establishing a day-case cataract surgery unit in rural areas requires consideration of factors not present in urban areas and may require more time for patient acceptance.

Outpatient surgical treatment of cervical radiculopathy

CR Tomaras, JB Blacklock, WD Parker

J Neurosurg 1997;87(1):41–3

A series of 200 patients who underwent outpatient surgical treatment for cervical radiculopathy is presented. The patients were selected on the basis of their willingness to undergo surgery in the outpatient setting and the absence of serious underlying medical conditions. All operations were performed using general anesthetic techniques with limited posterior dissections. A laminoforaminotomy was performed at each affected level, which had been determined by preoperative imaging and clinical examination. After being observed for several hours, the patients were discharged if they met specific criteria. No patient required subsequent hospital admission in the immediate postoperative period. Follow up review in 183 patients ranged from 3 to 43 months, with a mean of 19 months. In cases in which Workers' Compensation claims were not involved, 92.8% of patients reported an excellent or good outcome and returned to work or comparable duties at a mean of 2.9 weeks. In cases in which Workers' Compensation claims were involved, 77.8% of patients reported excellent or good outcome and returned to work at a mean of 7.6 weeks postoperatively. Two patients whose cases involved Workers' Compensation claims did not return to work. There were seven patients (3.8%) who had a poor outcome. Two of these patients underwent a second posterior procedure and reported a good outcome at the time of follow- up review. The results of this study show that outpatient surgical treatment of cervical radiculopathy can be safely provided in selected patients with outcomes similar to the inpatient surgical management of these individuals.

Morbidity and mortality with outpatient anesthesia: The experience of a residency training program

MJ Hunter, AM Molinaro, JJ Lytle

J Oral Maxillofacial Surg 1997;55(7):684–8

PURPOSE: Previous studies regarding anesthetic-related morbidity and mortality rates in the oral surgery office have usually taken the form of a survey. This retrospective investigation of outpatient anesthetic morbidity and mortality was undertaken to compare the safety record of an oral and maxillofacial surgery training program with that of private practitioners.
MATERIALS AND METHODS: Records from all outpatient general anesthesia cases performed in the Department of Oral and Maxillofacial Surgery at the Boston University Goldman School of Graduate Dentistry between August 13, 1990, and September 30, 1994, were reviewed for the incidence of nineteen separate categories of morbidity.
RESULTS: There were 1126 general anesthetics performed. There were 26 recorded incidents of morbidity (2.3%), none of which resulted in any postoperative sequelae. There were no deaths. The most common complication encountered was laryngospasm, with nine recorded incidents (0.8%). The second most common complication was cardiac dysrhythmia with eight recorded incidents (0.8%).
CONCLUSIONS: The low incidence of anesthetic-related morbidity seen in this study can most likely be attributed to proper patient selection. A carefully reviewed medical history and physical examination are the two most useful methods to prevent anesthetic emergencies. Another factor considered when selecting the proper anesthetic method includes the length and difficulty of the surgical procedure, with outpatient general anesthesia being reserved for those procedures that are predicted to be relatively short (30–45 min), and with little potential for airway difficulties.

Outpatient thyroidectomy

PS Samson, FR Reyes, WN Saludares, RP Angeles, RA Francisco, ER Tagorda, Jr.

Am J Surg 1997;173(6):499–503

In current clinical practice, the concept of outpatient surgery could apply to thyroidectomy. As the thyroid is anatomically accessible, its removal is not physiologically disabling; it makes surgery safer and precludes hospitalization. To evaluate the feasibility and solidity of outpatient thyroidectomy (OPT), the authors conducted a 12 1/2-year study (1982–1994), including an earlier 4-year randomized trial on 309 and cumulative post-trial experiences in 869 cases. The results showed the safety, practicality, and efficacy of OPT as compared with standard thyroidectomy. The study confirms the validity of OPT end is suggested for selected patients with thyroid disease.

The efficacy of tramadol hydrochloride in the treatment of postoperativepain

MD Vickers

Rev Contemp Pharmacother 1995;6(10):499–506

Tramadol is as effective as morphine given parenterally for the treatment of pain immediately following major surgery in in-patients, and is associated with significantly less desaturation of the arterial blood on air. Administration before the end of anaesthesia reduces the amount of postoperative analgesia required. It can be used for

patient controlled analgesia, but current programming regimes used for conventional opioids are inappropriate. Tramadol may be particularly appropriate as a 'take home' analgesic after day-stay surgery. As it is not a controlled drug, it will be relatively more convenient to prescribe and administer than other powerful analgesics. Tramadol is also effective by the epidural route but needs a dose equivalent to the systemic dose: however, its duration of action is very much longer by this route. Tramadol can be given to children, nursing mothers and in the presence of renal or hepatic disease, provided the dose is adjusted. Overdose leading to respiratory depression can be reversed with naloxone. Nausea (and to some extent vomiting) are the principle side effects.

Out-patient procedures in hand surgery

K Fischer

Handchir Mikrochir Plast Chir 1997;29(3):164–5

The prerequisites for out-patient surgery of the hand, from a surgeon's standpoint, as well as from a patient's standpoint are described. Compromises in quality are not to be accepted, and it is not necessary to establish a list of procedures suitable or not suitable for out-patient treatment.

A comparison of propofol-alfentanil, propofol-sufentanil, or propofol-fentanyl for total intravenous anesthesia

YF Sung, PC Moore

Pharmacologist 1997;39(1):110

Anesthesia for outpatient surgery necessitates the use of drugs that allow a rapid recovery profile. This double-blind study examined a simple method for total intravenous anesthesia using propofol in combination with a short-acting opioid for outpatient laparoscopic gynecology procdures. In 46 ASA I and II patients under general anesthesia, a visual analog assessment of alertness, nausea, and pain, was obtained pre- and postop. All patients had oral ranitidine, induction with propofol, atracurium for muscle relaxation, and maintenance with an infusion of propofol in combination with an equianalgesic concentration of either fentanyl, alfentanil, or sufentanil. The average infusion rate of 1 ml/min for all three groups was terminated immediately after abdominal CO_2 decompression. The Post Anesthesia Care Unit stay ranged from 101.23 to 132 min ($P < 0.205$). This study presents a simple intravenous anesthesia technique using the combination of propofol and short-acting opiods in one infusion pump.

Distal hypospadias repair with meatal-based flaps on an outpatient basis

O Sariyuce, DR Roth, ET Gonzales, Jr

Int Urol Nephrol 1997;29(2):241–4

We report the results of primary repairs that were performed on 52 consecutive patients with distal hypospadias as an outpatient procedure. A modified Mathieu repair with mental-based vascularized flap was performed under 2.5 optical magnification using Scottring retractors, traction sutures, micro instruments and fine suture material. A total of 3 patients had complications that required reoperation (5.8%). One of these 3 complications was a urethrocutaneous fistula (1.9%). We found that the repair of distal hypospadias was successful with meatal-based flap using contemporary freer approaches and equipment.

Grading of severity of postdural puncture headache after 27-gauge Quincke and Whitacre needles

MP Corbey, AB Bach, K Lech, AM Frorup

Acta Anaesthesiol Scand 1997;41(6):779–84

BACKGROUND: Small-gauge needles are reported to have a low incidence of complications. Pencil-point needles are associated with a lower frequency of postdural puncture headache (PDPH), but a higher failure rate than Quincke needles.
METHODS: The incidence of PDPH was investigated in 200 patients under the age of 45, undergoing day-care surgery after spinal anaesthesia with either 27-gauge Quincke or Whitacre needle. The severity of headache was graded as I (mild), II (moderate) or III (severe) using a grading system based on the visual analogue scale (VAS) associated with a functional rating (FG).
RESULTS: The frequency of PDPH following the Whitacre needle was 0 and 5.6% after the Quincke needle ($P = 0.05$). Two PDPHs were assessed as grade III, and three as grade II. All PDPHs occurred when the Quincke needle bevel was withdrawn perpendicular to the dural fibres following parallel insertion. No PDPH occurred when the bevel was inserted and removed parallel to the dural fibres ($P < 0.05$). There was no statistical difference ($P > 0.8$) in the incidence of PDPH and postdural puncture-related headaches (PDPR-H) in patients with recurrent headaches or migraine compared to patients with no previous history of headaches.
CONCLUSIONS: We conclude that the 27-gauge Whitacre needle is the 'needle of choice' in patients with normal body stature. The incidence of PDPH following Quincke needles may not only be affected by the direction of the bevel during insertion but also during removal. Statistically, there was no gender variation in PDPH in this study ($P = 0.5$). A previous history of recurrent headache or migraine does not predispose to PDPH.

Day surgery at Korle Bu Teaching Hospital: a six year review

EQ Archampong, R Darko

West Afric J Med 1996; 15(3):143–8

Day surgery is not simply a matter of economics for the health institution or the individual patient, or improved utilization of scarce and dwindling resources, or even a matter of increasing access to health care, fundamental as this is to us in the developing world. The ultimate question is to what extent does it satisfy the true needs of the patient and meet the requirements of his care as a whole. To address this day surgery in a general surgical unit has been reviewed over a 6 year period. This covered a total of 1547 cases consisting of hernias, hydroceles, excision biopsies, varicose veins etc. Infiltrative local anaesthesia using lignocaine (4 mg/kg) mostly with 1 in 200000 adrenaline added proved effective in 98% of cases; there were no deaths. For the institutions day surgery has proven cost effective, lowering cost of operative treatment and improving utilization of scarce resources. It has also proven eminently acceptable to patients and their families, enhancing access to care and significantly reducing the personal cost of treatment. To demonstrate enchanced health economics future studies should ideally show a parallel diminution of in-patient bed facilities with increasing load of day surgery.

Office hysteroscopic polypectomy

S Bettocchi, M Vicino, L Mei, R Di Venere, B Van Herendael

Ital J Gynaecol Obstet 1997;9(2):80–1

OBJECTIVE: To evaluate the safety, effectiveness and feasibility of office hysteroscopic polypectomy.

METHODS: Over a period of 4 years, 289 cervical polyps and 277 endometrial polyps were treated surgically in an office setting without the use of any pre-medication or anaesthesia. The instrument used was a 2.9 lens-based scope with a new continuous flow operative sheath with an oval profile (5.7×3.5 mm) and 5 Fr mechanical or electrical instruments.
RESULTS: The treatment generated discomfort or mild pain in 3.5% of the patients with cervical polyps and in 11.2% with endometrial polyps. Bleeding after polypectomy was absent or mild. Follow-up at 3 months showed positive results in 99% of the cases.
CONCLUSIONS: Polypectomy is effective and safe as an office procedure using newly developed instruments and techniques.

An audit of paediatric day care surgery in a District General Hospital

DM Jolliffe

Paediatr Anaesth 1997;7(4):317–23

At a 620-bed District General Hospital, questionnaires were issued to the patients of 142 consecutive paediatric day surgery cases and the nurses involved in the care of these children. Most of the children were not upset by day case surgery, although nearly a quarter were distressed by changing into a theatre gown. Postoperatively, pain was more of a problem than nausea and vomiting. Relatively minor problems occurred at home. The majority of the 93 parents who replied were happy with the overall care of their child. They valued being present for induction of anaesthesia and would have liked to be present in recovery when their child was awake, although the nurses felt this would not have been helpful. Nonclinical matters also influenced their assessment of the quality of care.

Outpatient laparoscopic cholecystectomy

O Mjaland, J Raeder, V Aasboe, E Trondsen, T Buanes

Brit J Surg 1997;84(7):958–61

INTRODUCTION: The results of laparoscopic cholecystectomy performed as an outpatient procedure were evaluated in a prospective study.
METHODS: Initially, only well motivated and healthy patients were offered outpatient laparoscopic cholecystectomy. After 50 procedures, all patients referred to the hospital, except those with American Society of Anesthesiologists (ASA) grade IV anti those living alone, were included. Some 200 procedures were studied.
RESULTS: In total, 12 patients (6%) were admitted, and 188 (94%) were discharged 4–8 h after operation. There were 15 patients (8%) who had early discharge were readmitted, nine with complications; in six no complications were documented. The frequency of minor complications was 2% and of major complications 5%. Some 173 patients who had successful outpatient laparoscopic cholecystectomy completed a questionnaire: 164 (95%) characterized their experience as excellent, five (3 per cent) as good, two (1%) as intermediate and two (1%) as unacceptable.
DISCUSSION: This high achievement of day-case treatment even in patients with ASA grade III, is explained by a new anaesthetic regimen together with good surgical technique and close follow-up.

Provision of a day case abscess service

IM Loftus, DFL Watkin

Annals of the Royal College of Surgeons of England 1997;79(4):289–90

We have established a day case service for the surgical treatment of superficial abscesses and present the results of our first 100 patients. We feel that this is an efficient and safe service with 92% treated within 6 h of arrival in hospital and no complications in this series of patients. It has important implications for the management of this common surgical problem.

Demand on primary health care after day surgery

KL Kong, DL Child, IA Donovan, D Nasmyth-Mller

Ann R Coll Surg Engl 1997;79(4):291–5

We have audited the frequency and nature of demands made on general practitioners, and the rate of surgical and anaesthetic complications within the first 7 days after day surgery. Semi-structured questionnaires were posted to the general practitioners of patients who attended the hospital's day care ward for a surgical procedure over a 6 month period. In all, 1798 questionnaires were sent, of which 1533 (85.3%) were returned. A total of 247 (16.7%) patients consulted their general practitioners after day surgery, the principal reason being pain (113 patients). Patients who underwent incisional intermediate surgery had the highest rate (31.5%) of general practitioner consultations. This audit has quantified the workload which day surgery places upon general practitioners. It also demonstrates the importance of categorising the various procedures performed on a day case basis when examining patient outcome. Patients who underwent non-incisional minor surgery consulted their general practitioner less often than those who underwent incisional minor surgery, who in turn consulted their practitioner less often than those who underwent incisional intermediate surgery. It seems likely that an increase in workload for general practitioners is inevitable if more complex procedures are performed on a day case basis.

Pediatric outpatient anesthesia and perioperative care

AM Conran, RS Hannallah

Curr Opin Anaesthesiol 1997;10(3):205–8

The goals of pediatric outpatient anesthesia include prompt emergence, fast recovery, and safe discharge with good control of postoperative pain and vomiting. Many of the newer anesthetic agents and adjuncts, such as sevoflurane, desflurane, and ondansetron, have proved instrumental in achieving these goals.

Sorbitol 2.5% mannitol 0.54% irrigation solution for hysteroscopic endometrial ablation surgery

CL Moir, H Mandin, R Brant

Can J Anaesth 1997;44(5)I:473–8

PURPOSE: To determine if systemic absorption of sorbitol 2.5%/mannitol 0.54% irrigation solution (165 mosm l^{-1}) during hysteroscopic endometrial ablation with diathermy is associated with hyponatraemia and hypoosmolality.

METHODS: In 35 day surgery patients in a university hospital we measured baseline preoperative variables: serum sodium and creatinine concentrations and osmolality, haematocrit, haemoglobin, urine osmolality and sodium concentration, and weight. Fractional excretion of sodium (FE(Na)) was calculated. The same observations were obtained postoperatively before discharge (1 h post resection). Volumes of intraoperative fluid irrigation intravasation and perioperative intravenous fluid absorption (lactated Ringer's solution) were estimated clinically (volumetric).
RESULTS: The mean ($\pm$ S.D.) serum sodium concentration preoperatively was 140.3 ± 2.4 mmol l^{-1}; and postoperatively, 139.7 ± 2.2

mmol l^{-1} (P = NS). The serum osmolality decreased from 285.4 ± 4.5 to 282.6 ± 4.1 mmol kg^{-1} ($P < 0.001$). The mean volume of intravasated irrigation fluid was 26.4 ml (range 0–300). During the same time, the FE(Na) increased from 0.57 to 0.79% ($P < 0.001$).
CONCLUSION: In these patients, closely and continuously observed for imbalance between infused and collected irrigation fluid, there was no clinical evidence for hyponatraemic hypoosmolality. However, there was a small 1 ± 1.5% (mean ± S.D.; range −3.4–3.6%) decrease in plasma osmolality despite adequate blood volumes as shown by urinary sodium indices.

Effects of anesthetic technique on side effects associated with fentanyl oralet premedication

S Malviya, T Voepel-Lewis, J Huntington, M Siewert, W Green

J Clin Anesth 1997;9(5):374–8

STUDY OBJECTIVES: To evaluate the efficacy of 5–10 μg/hg of oral transmucosal fentanyl citrate (OTFC) as an anesthetic promedication, and to determine whether propofol induction reduces postoperative nausea and vomiting (PONV) in pediatric patients premedicated with OTFC undergoing outpatient surgery.
DESIGN: Prospective, randomized, double-blinded study.
SETTINGS: University of Michigan Health Care Systems and University of Arizona.
PARTICIPANTS: 62 ASA physical status I and II children aged 4–14 years (8.9 ± 0.5 years).
INTERVENTIONS: Subjects were randomly assigned to one of four groups: (1) OTFC premedication and halothane induction; (2) OTFC premedication and propofol induction; (3) placebo premeditation and halothane induction; and (4) placebo premedication and propofol induction. OTFC or placebo was administered 30 min prior to induction, and activity (sedation), apprehension, and cooperation scores were recorded before, at 15 and 30 min after study drug, and on induction. All perioperative adverse events were recorded.
MEASUREMENTS AND MAIN RESULTS: Children who received OTFC became drowsier and had a significant change from baseline in combined activity, apprehension, and cooperation scores, whereas those who received placebo became less cooperative at induction. Patients who received OTFC experienced more adverse events overall ($P < 0.001$) than patients who received placebo. Additionally, OTFC patients experienced more vomiting ($P < 0.001$) and pruritus ($P = 0.049$) than controls. The incidence of PONV in patients who received OTFC and halothane induction was 50%, compared to 30% in patients receiving OTFC and a propofol induction (P = NS).
CONCLUSIONS: OTFC in doses of 5–10 μg/kg was effective in producing sedation and facilitating cooperation with induction; however; it was associated with significant PONV in our study. Although propofol induction did not significantly reduce PONV in our study, further study with a larger sample, and with propofol as the sole anesthetic, may be warranted.

A microlaparoscopic technique for Pomeroy tubal ligation

ML Hibbert, JL Buller, SD Seymour, SE Poore, GD Davis

Obstet Gynecol 1997;90(2):249–251

OBJECTIVE: To evaluate the efficacy of performing Pomeroy tubal ligation using microlaparoscopic techniques.
METHODS: 38 consecutive women desiring permanent sterilization underwent laparoscopic Pomeroy tubal ligation using small (2 or 5 mm) transumbilical laparoscopes and secondary midline sites (5 mm and 14 gauge). The procedures were performed under general anesthesia ($n = 20$) or local anesthesia with conscious sedation ($n = 10$).
RESULTS: The mean operative time ± standard deviation (S.D.) in minutes was 33 ± 10.3. The mean recovery time ± S.D. in minutes was 104.3 ± 41.6. There were no operative complications, and no cases required conversion from the microlaparoscopic technique to a traditional method.
CONCLUSION: The results of this study indicate that the Pomeroy tubal ligation may be performed using microlaparoscopic techniques. Furthermore, in selected cases, this technique can be performed under local anesthesia in an outpatient setting.

Randomised placebo controlled trial of mefenamic acid for premedication at outpatient hysteroscopy: a pilot study

F Nagele, G Lockwood, AL Magos

Brit J Obstet Gynaecol 1997;104(7):842–4
An increasing number of diagnostic hysteroscopies are being performed in an outpatient setting. Most women tolerate the examination well, but the single commonest reason for failure is pain. We assessed the efficacy of a nonsteroidal, anti-inflammatory analgesic as premedication before hysteroscopy in a double-blind, placebo controlled trial. Our results showed that 500 mg mefenamic acid given 1 h before hysteroscopy had no significant benefit in the discomfort experienced during the procedure but did significantly reduce pain after hysteroscopy. A larger dose or a longer interval between premedication and hysteroscopy may possibly be associated with greater benefits.

Outpatient uncomplicated inguinal hernia repair versus in-hospital procedure-Analysis of 148 cases

R Krupinski, J Narebski, L Pomorski, M Bartos

Med Sci Monit 1997;3(2):213–16

In the years 1994–1995, 148 patients were operated on for inguinal hernia, including 136 (91.9%) males and 12 (8.1%) females. The age of the patients ranged from 18 to 64 years (average 47 years). 99 (79.5%) oblique and 49 (20.5%) direct hernias were found intraoperatively. After intramuscular premedication with the use of pethidine, promethazine and atropine, the patients were operated on under local anaesthesia (0.5% lidocaine). 92 (62%) patients underwent the Bassini operation and in 56 (38%) the Shouldice herniorrhaphy was used. Out of 148 patients, in 112 (75.7%) an outpatient procedure was applied, and 36 (24.3%) were hospitalized during a few days. In the outpatients, preoperative investigations were conducted in ambulatory departments. The patients were admitted to the Clinic in the morning, operated on in the afternoon and discharged in 4–8 h (median 6 h) after the procedure. The patients were followed up in outpatient departments. Among all outpatients, 2 (1.8%) developed ecchymosis, 3 (2.8%) experienced scrotum oedema, and in one (0.9%) wound infection occurred. Over the follow-up period ranging from 6 to 24 months no hernia recurred. There were no significant differences between the incidence rates of early and late complications in both groups of the patients. 97.3% of outpatients accepted outpatient herniorrhaphy, while only 61.1% of inpatients accepted an in- hospital procedure. The costs of outpatient hernia repair were several times lower than the costs of inpatient surgery. Conclusion: Outpatient repairs of uncomplicated inguinal hernia are as safe and effective as herniorrhaphy with a several-day hospitalisation period.

Analgesia after day case laparoscopic sterilisation. A comparison of tramadol with paracetamol/dextropropoxyphene and paracetamol/codeine combinations

IM Crighton, GJ Hobbs, IJ Wrench

Anaesthesia 1997;52(7):649–52

In a prospective, double-blind trial we compared the analgesic efficacy of tramadol during the first 24 h after day case laparoscopic sterilisation

with two commonly prescribed combination analgesics. A total of 75 women were allocated randomly to receive oral paracetamol 325 mg/dextropropoxyphene hydrochloride 32.5 mg, tramadol 50 mg or paracetamol 500 mg/codeine phosphate 30 mg as required after a standardised anaesthetic technique. There were no significant differences in average or worst pain, sleep disturbance, mobility, number of tablets taken, satisfaction or preference for stronger analgesia (26.2% of all patients). The incidences of nausea and vomiting were comparable between groups. There was a trend towards a lower incidence of central nervous system side-effects (drowsiness, dizziness, headache) in the paracetamol/codeine group. Tramadol may be considered an alternative analgesic for day case surgery although analgesic regimens of greater efficacy are required for many patients. The relative incidence of side-effects for tramadol and other analgesics requires further evaluation.

Hospital and ambulatory surgery center syndications: selling interests to physicians

S Becker, Ross and Hardies
J Health Care Fin 1997;23(4):60–70

Physician ownership in hospitals and ambulatory surgery centers remains a relatively surefire method of protecting a portion of a facility's revenues. Implementation of a plan to broaden physician ownership requires compliance with legal and regulatory schemes. This article discusses the prototypical business terms of such transactions, outlines the process for completing such syndications, and analyzes the legal statutes that must be complied with in implementing the effort.

Laparoscopic cholecystectomy as an outpatient procedure

D Lam, R Miranda, SJ Hom

J Am Coll Surg 1997;185(2):152–5

BACKGROUND: Laparoscopic cholecystectomy is still done mainly on an inpatient basis at hospitals or on an outpatient basis at ambulatory care departments inside hospitals.
STUDY DESIGN: We reviewed 213 cases in which outpatient laparoscopic cholecystectomy was done at an ambulatory surgical center not associated with a hospital physically or administratively. Patients were selected solely on the basis of medical history and physical examination results. Patients received general anesthesia as is typical for outpatient procedures. Narcotic use was minimized to prevent postoperative nausea. The procedure did not include intraoperative cholangiography.
RESULTS: Laparoscopic cholecystectomy took 1–2 h in three quarters of patients. Rate of conversion to open cholecystectomy was 2.8% (6 of 213 patients). The mean recovery period was 6.6 h, and 97% of patients were discharged on the same day (i.e. were treated as outpatients). We identified no cases of retained common duct stone. Wound complications included mainly seroma, wound seepage, and wound infection; 18% of these complications were seen at trocar sites. No major complications were seen.
CONCLUSIONS: Elective outpatient laparoscopic cholecystectomy can be done safely with low morbidity, high patient acceptance, and same-day discharge in $>95\%$ of cases.

The effect of bupivacaine infiltration and single dose intravenous dexamethasone on length of stay after ambulatory tonsillectomy

MJ Shikowitz, AA Jocono

Children's Hosp Q 1996;8(1):11–16

A retrospective study was performed on 145 pediatric patients between the ages of 1 and 12 years who underwent tonsillectomy at the Schneider Children's Hospital to determine if post-tonsillectomy peritonsillar fossa infiltration with bupivacaine and intravenous dexamethasone influence the length of hospital stay in an ambulatory care setting. The patients were divided into two groups, 81 receiving bupivacaine infiltration and 64 receiving no local anesthetic. In order to study the influence of a single intraoperative dose of intravenous dexamethasone on length of hospital stay, each group of patient was further divided into two groups: those who had received intravenous dexamethasone intraoperatively and those who had not. Of the 81 patients who received bupivacaine, 11 received dexamethasone as well. Of the 64 patients who did not get bupivacaine, seven received dexamethasone. The bupivacaine group was discharged an average of 2 h and 13 min earlier than those not receiving local anesthetic (6 h and 7 min vs. 8 h and 20 min, this difference was not statistically significant, $P = 0.12$). Additionally, the bupivacaine group only had two patients requiring a hospital stay over 1000 min (representing an overnight stay) because of poor oral intake vs. seven in those not receiving local infiltration (this difference was statistically significant, $P = 0.04$). There was no difference in time until discharge whether patients received dexamethasone without bupivacaine or neither dexamethasone nor bupivacaine. However, cases receiving both dexamethasone and bupivacaine were discharged an average of 4 h and 11 min earlier than those not receiving either. This was statistically significant ($P = 0.004$). The use of intraoperative dexamethasone, post-operative analgesia, and post-operative antiemetics did not confound the differences noted between the bupivacaine and non-bupivacaine group. In this study, the complication rates for post-operative hemorrhage, severe emesis, laryngospasm, and poor oral intake compared well with the literature on short stay outpatient tonsillectomies. Additional prospective studies are underway to establish the role that post-tonsillectomy peritonsillar infiltration of bupivacaine, single intraoperative IV dose of dexamethasone, or both may have in reducing ambulatory care hospital stay for pediatric patients. For today's changing healthcare environment a reduction of hospital stay by even a few hours can translate into hundreds of dollars per patient.

Prophylactic intravenous administration of caffeine and recovery after ambulatory surgical procedures

JG Weber, JT Klindwoeth, JJ Arnold, RR Danielson, DR Ereth

Mayo Clin Proc 1997;72(7):621–6

OBJECTIVE: To determine whether prophylactic intravenous administration of caffeine, to daily caffeine users, decreases the frequency of postoperative headache and shortens recovery time.
DESIGN: The study was a prospective, randomized, double-blind investigation with predetermined sample size and statistical power.
MATERIAL AND METHODS: After Mayo Institutional Review Board approval and informed consent were obtained, 300 adult ambulatory surgical patients were enrolled in this study, which included randomization to receive either placebo or caffeine (200 mg intravenously) in the postanesthesia care unit. While recuperating, patients were allowed their choice of postoperative beverages. Before dismissal, patients completed a questionnaire providing details about intake of caffeine and tobacco, history of headache, and demographic data. Patients were considered 'at risk' for symptoms of caffeine withdrawal if they did not drink a caffeinated beverage after the surgical procedure.
RESULTS: Completed questionnaires were obtained from 234 patients. Patients at risk for symptoms of caffeine withdrawal were less likely to have a postoperative headache if they received caffeine intravenously rather than placebo—10 vs. 23% ($P < 0.05$). Time until recovery was not significantly different between caffeine and placebo study groups.
CONCLUSION: We conclude that prophylactic intravenous administration of caffeine was beneficial for those patients at risk for symptoms of caffeine withdrawal. For patients who consume caffeinated bever-

ages on a daily basis, we recommend prophylactic administration of caffeine on the day of an ambulatory surgical procedure and anesthesia.

Midazolam as a pediatric premedicant in the ambulatory setting

BM Moline, RA Marley

J Perianesth Nursing 1997;12(1):42–7

In the preoperative setting, the nurse is responsible for the comprehensive evaluation and preparation of the patient. Among these activities, the administration of various premedications to achieve a physiological (e.g. raise gastric fluid pH) or psychological (e.g. reduce apprehension) effect is commonplace. Midazolam, a benzodiazepine, is one of the more popular medications used preoperatively for its anxiolytic properties. Several studies have evaluated the variety of routes by which midazolam can effectively be administered to the pediatric patient. A review of midazolam as a premedication specific to the pediatric population in the ambulatory setting is presented.

Safety of direct laryngoscopy as an outpatient procedure

M Armstrong Jr, LJ Mark, DS Snyder, SD Parker

Laryngoscope 1997;107(8):1060–5

The safety of outpatient direct laryngoscopy has recently been challenged in the literature. We reviewed the first 589 direct laryngoscopies performed at a new outpatient surgery center. There were nine unplanned admissions to the hospital, including five airway emergencies that developed within the first 30 min after extubation. Three patients required reintubation before leaving the operating room. On postoperative telephone follow-up, 9% complained of mild to moderate sore throat. There were no major complications after discharge. We conclude that the risk of airway emergencies after direct laryngoscopy is less than 1% in carefully selected patients. The procedure can be safely performed as an outpatient procedure as long as transportation to a hospital is readily available for the few patients in whom complications arise.

The risk of postoperative haemorrhage in tonsillectomy as an outpatient procedure in children

Y Rakover, R Almog, G Rosen

Int J Pediatr Otorhinolaryngol 1997;41(1):29–36

The safety of performing tonsillectomy as an outpatient procedure is still questionable. This study determined whether there was an increased risk of postoperative bleeding by performing tonsillectomy as an outpatient procedure. A 6 years' retrospective chart review was made of 363 children who underwent tonsillectomy. Out of 363 children, 43 had been selected as an inpatient group before the operation, 264 patients were discharged home 6 h after the operation and were the outpatient group, and 56 children had to be kept overnight because of complications that had occurred. We compared the haemorrhage rate in the outpatient and the inpatient groups. We found no increase in the postoperative haemorrhage rate in the outpatient group. No statistically significant correlations were found between the children's ages, indication for surgery, type of operation or intra-operative complications and the risk of postoperative haemorrhage. Only children who had haemorrhage in the recovery room were identified as a high risk subgroup for recurrent bleeding. On the basis of our findings we believe that tonsillectomy can be performed as an outpatient procedure regardless of age, indication for surgery, or type of procedure, as long as good recovery room supervision exists for 4–6 h.

Combination laser conization: early and late complications

ES Andersen, B Pedersen

J Gynecol Surg 1997;13(2)51–6

Early and late complications of combination laser conization were evaluated in 536 patients. Results of a questionnaire sent to 350 patients specifically evaluated menstrual bleeding and menstrual pain, fertility problems, and various aspects of sex life. Combination laser conization was a safe procedure, with no significant impact on fertility, sex life, or menstrual bleeding. Postconization bleeding was a significant event, but it seems possible to reduce this risk with increased surgical experience and optimum functioning of the laser equipment. Combination laser conization is a technique suitable to 1-day surgery or outpatient treatment.

Comparison of remifentanil and propofol as adjuncts to peripheral regional anesthesia for ambulatory surgery

M Mingus, M Rosenblatt, D Gainsburg, J Waller, M Gold, W Jenkins, C Bradford, JB Eisenkraft

Anesth Analges 1996;82(2)s:(xxx)

INTRODUCTION: Placement of peripheral nerve block for ambulatory surgery may be painful for the patient. Remifentanil (R), an esterase metabolized opioid, permits rapid titration of analgesia without sedation or delayed recovery. The purpose of this study was to compare the safety and efficacy of R to propofol (P) in providing analgesia for placement of peripheral nerve blocks
METHODS: Following IRB approval and written informed consent, this multicenter, randomized, open-label, controlled study enrolled 58 ASA PS I or II adult patients scheduled for outpatient hand or foot surgery under axillary or ankle block. Patients received no premedication and were randomly assigned to receive a continuous intravenous infusion of either R (initially 0.2 mcg/kg/min from 5 min prior to block until completion of block, then 0.1 mcg/kg/min), or P (initia1ly 100 mcg/kg/min from 5 min prior to block until completion of block, then 50 mcg/kg/min). Efficacy was measured by patient and investigator assessments of discomfort, analgesia, sedation, and anxiety. Safety was assessed by hemodynamic and respiratory monitoring. Efficacy parameters were analyzed by χ^2 and $P < 0.05$ was considered significant.
RESULTS: A table is presented. We found no difference in demographic data between the groups. Respiratory depression resolved within a median of 3-4 min of decreasing or discontinuing R.
DISCUSSION: Remifentanil, compared with P. significantly decreased the pain associated with regional block placement. Although well tolerated and less sedating, R was associated with decreased respiratory rate and increased nausea and anxiety.

A comparison of oral ketorolac and hydrocodone-acetaminophen for analgesia after ambulatory surgery: arthroscopy versus laparoscopic tubal ligation

PF White, GP Joshi, RL Carpenter, RJ Fragen

Anesth Analges 1997;85(1):37–43

This multicenter study compared the analgesic efficacy and side effects of ketorolac and hydrocodoneacetaminophen when administered orally after ambulatory arthroscopic or laparoscopic tubal ligation procedures. After awakening from general anesthesia, 252 patients experiencing moderate or severe postoperative pain were randomly assigned to receive one of three analgesic treatments according to a placebocontrolled, double-blind protocol. Group 1 ($n = 83$) received

oral ketorolac 10 mg every 6 h for up to 3 days, Group 2 ($n = 82$) received hydrocodone 7.5 mg plus acetaminophen 750 mg every 6 h for up to 3 days, and Group 3 ($n = 87$) received placebo capsules followed by ketorolac 10 mg every 6 h for up to 3 days. Severity of pain was recorded using a 4-point categorical score and visual analog scale (VAS) at 0.5 h and subsequently at hourly intervals for 6 h, as well as daily for up to 3 days. Pain relief was recorded using a 5-point categorical scale at the same time points. In the patients undergoing arthroscopic surgery, both ketorolac and hydromorphone-acetaminophen provided superior pain relief compared with the placebo. Although the categorical summed pain intensity difference (SPID), VAS SPID, and total pain relief scores were higher in the ketorolac group compared with the hydrocodoneacetaminophen group, the differences were not statistically significant. In the patients undergoing laparoscopic tubal ligation surgery, the three treatment groups displayed similar responses to the study medications. However, the ketorolac group scored higher in terms of overall tolerability than the hydrocodone-acetaminophen group. In conclusion, there was no difference in the efficacy between oral ketorolac and hydrocodone-acetaminophen combination in controlling pain after outpatient arthroscopic surgery procedures. Neither oral analgesic proved to be very effective after laparoscopic tubal ligation.

Neuromuscular effects, efficacy and safety of rocuronium versus atracurium in ambulatory anesthesia

DG Whalley, WG Maurer, AL Knapik, FG Estafanous

Anesthes Analges 1997;84(2)s:(xxx)

INTRODUCTION: Rocuronium has been introduced into practice as a rapid onset nondepolarizing muscle relaxant of intermediate duration with few side effects and stable hemodynamic variables. (1) Atracurium is used extensively in outpatient surgery because of its predictable recovery and cardiovascular stability at doses less than $2 \times$ ED95. (2) Our objective was to compare the neuromuscular effects, safety and efficacy of $2 \times$ ED95 rocuronium and atracurium in ambulatory surgery.
METHODS: With IRB approval and informed consent, 41 patients undergoing laparoscopic gynecological outpatient surgery were enrolled in a randomized, controlled, double-blinded study. After premedication with midazolam 1–2 mg, patients were anesthetized with propofol 1.8 mg/kg and alfentanil 9 μg/kg. Rocuronium 0.6 mg/kg (group R, $n = 20$) or atracurium 0.5 mg/kg (group A, $n = 21$) were given after a control recording of the mechanomyogram had been obtained. Anesthesia was maintained with N_2O/O_2, propofol and alfentanil, and the block reversed if the train-of-four ratio was $< 70\%$ (T1/T470) at the end of surgery. Intubation was attempted 60 s after injection of the muscle relaxant and graded 1–4. If intubation was unsuccessful, another attempt was made at 90 and 120 s. Onset time was defined as the time from injection of the relaxant to peak depression of T1, and clinical duration as the time from injection to return of T1 to 25% of control. Adverse events including histamine related symptoms (erythema and bronchospasm) were noted. Data were compared using Student's t-test, Wilcoxon's test or Fisher's exact test.
RESULTS: The patients were ASA Class 1 or 2 and were demographically similar in both groups. All patients in group R were intubated in less than 90 s from injection of the relaxant, in contrast to only 14 patients in group A. Intubating conditions were rated good to excellent (grades 3 and 4) in 18 patients in group R and 20 patients in group A ($P = 0.6$). T1 was ablated in both groups, but in group R the onset time was shorter (59 vs. 99 s, $P < 0.001$), as was the clinical duration (33 vs. 45 min, $P < 0.001$). There were more patients in group A reporting adverse events than in group R (6 vs. 3, $P = 0.454$), but none of the events were severe. The most common adverse event was nausea and vomiting (group R, 1 patient; group A, 3 patients). Flushing was observed in one patient in group A. Surgery was of sufficient duration in ten patients in group R and six patients in group A for us to observe spontaneous recovery. The mean time from injection of relaxant to T1/T470 was similar in both groups (group R, 53 min; group A, 59 min; $P = 0.139$), whereas the recovery index was slightly longer in group R (10 vs. 8 min in group A, $P = 0.023$).
DISCUSSION: We have demonstrated that in patients undergoing ambulatory anesthesia for laparoscopic gynecological surgery, rocuronium was associated with a quicker onset and shorter clinical duration than an equipotent dose of atracurium. The quicker onset of rocuronium facilitates a more rapid, smoother intubation and the shorter clinical duration ensures a more predictable response to reversal drugs. The time to spontaneous recovery to T1/T470 was, however, similar for the two muscle relaxants. We observed a higher incidence of adverse events with atracurium.

A comparison of nausea and vomiting after ondansetron premedication with either propofol or desflurane following tubal ligation

G Arndt, S Springman, M McSweeney

Anesth Analges 1997;84(2)s (xxx)

INTRODUCTION: Nausea and vomiting are common following tubal ligation (TL). Ondansetron is a serotonin type 3 antagonist antiemetic. This study compares the incidence of nausea and vomiting following the prophylactic administration of ondansetron using two different anesthetic techniques, intravenous (IV) propofol or desflurane anesthesia.
METHODS: Following IRB approval, 66 ASA 1 or 2 patients requiring TL were enrolled at the University of Wisconsin Outpatient Surgery Clinics. All were medicated with ondansetron, 4 mg IV, following induction. Anesthesia was randomly assigned and maintained with either IV propofol, $n = 33$ or desflurane, $n = 33$ both with nitrous oxide. All were premedicated with alfentanil 15 μg/kg IV and midazolam 0.03 mg/kg IV, paralyzed with atracurium and received ketorolac 60 mg intramuscularly. The propofol group was induced with propofol and the desflurane group with methohexital. The incisions were infiltrated with bupivacaine 0.25%. Postoperative pain was treated with hydromorphone IV. The incidence of nausea and vomiting are reported in Table 1 for the first 60 post-anesthetic minutes. A table is presented. Both the patients and the post-anesthesia nurses were blinded to the anesthetic. All data was analyzed using Microsoft Excel. Statistical comparisons were made using the χ^2 test with P values of < 0.05 being considered significant.
DISCUSSION: Ondansetron with propofol has a significantly lower incidence of nausea at 60 min compared to ondansetron with desflurane. The incidence of nausea following ondansetron antiemetic premedication is affected by the anesthetic technique. The incidence of vomiting is not. Intergroup hydromorphone requirements were not significant.

Recovery and reasons for discharge delay after remifentanil vs. Alfentanil in outpatient surgery

F Chung, EP Skinner, BD Jamerson, PR Reese

Anesth Analges 1996;82(2)s:(xxx)

INTRODUCTION: Remifentanil (Remi) is an esterase metabolized, μ-specific opioid receptor agonist with a rapid elimination half life (T(1/4) $\sim = 10$ min). (1) The objective of the study was to compare the recovery of Propofol (Prop)/Remi vs. Prop/Alfentanil (Alf) TIVA in outpatients.
METHODS: IRB-approval was obtained at seven institutions, written informed consent was obtained from 200 patients adult male or

female patients, ASA I-III, scheduled for >30 min laparoscopic outpatient procedures. Patients received 1 mg midazolam premedicant and were randomized (double-blind) 2:1 to either Remi or Alf. Induction was with Prop and maintenance included Prop 75 mcg/kg/min. Remi 0.25 mcg/kg/min or Alf 1.0 mcg/kg/min. Alf was stopped 10 min before the end of surged, Prop was stopped 5 min before end of surgery and Remi was stopped at end of surgery. Protocol defined recovery criteria included Phase 1-pain, nausea, and vomiting controlled; Phase 2-Postanesthesia Discharge Score (PADS)2 $<=9$. A 24-h phone interview assessed functional status and patient satisfaction.
RESULTS: Phase 1: Remi patients qualified later than Alf patients for Phase 1 discharge primarily due to pain onset. More Remi patients (76%) required fentanyl than Alf patients (35%). Actual Phase 1 discharge times were similar. The majority of patients were delayed >15 min from Phase 1 unit discharge (50%-Remi; 73%-Alf). Reasons for delay are shown. A table is presented. Phase 2: Upon Phase 2 entry the median PADS score was similar. The majority of patients were delayed >30 min after discharge criteria was met (86%-Remi; 88%-Alf). Reasons for delay are shown. A table is presented. In those with discharge delay, nausea/vomiting was significantly higher in the Alf group compared to the Remi group. The 24-h phone interview showed more Remi patients reported no difficulties in their ability to concentrate (73%-Remi; 60%-Alf $P<0.05$). A similar number of patients in both groups reported being satisfied with their anesthetic drug experience in the surgical center.
CONCLUSIONS: In both groups transportation accounted for the majority of delay in Phase 1 and 2. The differences in nausea/vomiting incidence may have accounted for the difference in time to qualify for Phase 2 discharge and actual Phase 2 discharge between the Remi and Alf groups. Use of predictable, short acting agents like Remi may allow the hospital to reliably schedule transportation needs and discharge patients when qualified to leave the surgical center.

Development of day case cataract surgery: a literature review

JM Cooper

Brit J Nursing 1996;5(21):1327–33

There is increasing demand for day case cataract surgery. This review looks at the varying criteria for suitable patients and compares the use of local or general anaesthesia for day surgery. Preassessment clinics and the possible limitations of patient transport are discussed. Length of stay in the day unit, nurse involvement and discharge procedures are examined. Postoperative visits are reviewed. Studies show that the clinical outcome is not affected by outpatient surgery and that patients report a high level of satisfaction with their day care. Day case cataract surgery is safe and cost-effective and increased patient demand will become a significant factor favouring day case surgery in the future. Further research into patients' attitudes to the continuity of nursing care from preoperative assessment, through surgery to discharge, and whether this plays a part in their overall satisfaction, is recommended.

Dreams, images and emotions associated with propofol anaesthesia

B Brandner, M Blagrove, G McCallum, LM Bromley

Anaesthesia 1997;52(8):750–5

A total of 112 patients scheduled for day case varicose vein surgery were randomly allocated to one of three groups: total intravenous anaesthesia with propofol, propofol induction followed by inhalational anaesthesia with nitrous oxide and isoflurane or thiopentone induction followed by inhalational anaesthesia with nitrous oxide and isoflurane. Assessments were made in the recovery room of the incidence of dreaming, the content of the dreams and the emotional status of the patients. The groups differed significantly in reporting that they had been dreaming: patients who underwent total intravenous anaesthesia reported the most dreaming and patients who received thiopentone the least. However, despite the large number of case reports of sexual imagery following propofol anaesthesia and despite the two groups who had received propofol experiencing significantly greater happiness upon recovery than the thiopentone group, there were no appreciable differences in the sexual content of the dreams. Each group had only a small number of dreams even remotely related to sex.

A comparison of the nasal mask and the nasopharyngeal airway in paediatric chair dental anaesthesia

ONT Bagshaw, R Southee, K Ruiz

Anaesthesia 1997;52(8):786–9

This study compared the quality of anaesthesia and surgical access afforded by two techniques for the administration of anaesthesia during paediatric chair dental procedures. A total of 50 ASA 1 paediatric day case patients were randomly assigned to receive anaesthesia through either the traditional Goldman nasal mask or through a nasopharyngeal airway. Patients in the nasal mask group were judged to have significantly worse airway patency ($P=0.0001$) and significantly more episodes of airway obstruction (14 vs. 4; $P=0.0032$) than those in the nasopharygeal airway group. Anaesthetic, surgical and oxygen saturation data did not differ significantly between the two groups. Operating conditions were universally graded as excellent in the nasopharyngeal airway group, while those in the nasal mask group were graded as excellent/good in only 79% of cases ($P<0.0001$). These results suggest that better quality anaesthesia and operating conditions can be achieved by using a nasopharyngeal airway rather than the traditional nasal mask for the administration of anaesthesia to paediatric chair dental patients.

Five years experience with day plastic surgery

A Berg, B Palmer

Eur J Plast Surg 1997;20(4):202–4

Day surgery is increasing. This article reviews the experiences of day plastic surgery during a period of 5 years. The evaluation shows a low rate of postoperative complications and a high degree of patient satisfaction. According to the author's opinion a considerable part of elective plastic surgery is suitable for day surgery.

Prolonged surgery increases the likelihood of admission of scheduled ambulatory surgery patients

ML Mingus, CA Bodian, CN Bradford, JB Eisenkraft

J Clin Anesth 1997;9(6):446–50

STUDY OBJECTIVE: To identify variables influencing the likelihood of unanticipated admission following scheduled ambulatory surgery.
DESIGN: Retrospective case-controlled chart review study. *Setting:* A large academic tertiary care hospital.
PATIENTS: 8549 ASA physical status I, II, III, and IV patients who underwent scheduled ambulatory surgery in 1991.
MEASUREMENTS AND MAIN RESULTS: Of the 8549 patients, 216 were admitted, with complete medical record information available for 167 of the admitted patients. The most common reasons for admission among the 167 were surgical (43%), anesthetic (28%), and

medical (17%) complications. Odds for admission following long surgery (of at least 60 min) were 7.5 times ($P < 0.001$) greater than following short surgery (under 60 min). Among long cases, independent variables influencing admission were: general anesthesia (odds ratio 20.8; 95% confidence interval (CI) 4.4–45.6), and monitored anesthesia care or regional anesthesia (combined odds ratio 8.3; 95% CI 1.7–40.8). ASA physical status and patient age did not significantly influence admission rate for long cases. For short cases, patients over 65 years (odds ratio 5.6; 95% CI 2.6–12.0), ASA physical status III or IV (odds ratio 4.8; 95% CI 2.0–11.6), use of general anesthesia (odds ratio 4.7; 95% CI 1.5–14.2), and monitored anesthesia care or regional anesthesia (odds ratio 3.1; 95% CI 1.0–10.1) independently influenced the likelihood of admission. Type of surgery and gender had no detectable effect on admission.
CONCLUSIONS: Surgery duration of 60 min or longer was the most important predictor of unanticipated admission following scheduled ambulatory surgery.

Desire for perioperative information in adult patients: a cross-sectional study

ZN Kain, B Kosarussavadi, A Hernandez-Conte, MB Hofstadter, LC Mayes

J Clin Anesth 1997;9(6):467–72

STUDY OBJECTIVE: To identify which perioperative information outpatients want from their anesthesiologist.
DESIGN: Cross-sectional study.
SETTING: Outpatient center.
PATIENTS: 197 ASA physical status I and II patients undergoing outpatient surgery. Interventions: A questionnaire examining for 'desire for information.'
MEASUREMENTS AND MAIN RESULTS: Demographic data including age, ethnicity, gender, socioeconomic status, and history of previous surgery were obtained. Trait, situational anxiety, and coping strategy were assessed using a validated behavioral instrument and a questionnaire adopted from previous studies conducted in Australia, Scotland, and Canada. Each questionnaire contained 14 statements regarding specific perioperative details. An index of the overall patient desire for information (PDI) was calculated for each subject. More than 85% of subjects gave a high priority to being informed for all the 14 items. Scores on the overall index were found to be higher for females than for males (32 ± 6 vs. 30 ± 6; $P = 0.03$), and this finding persisted in a multivariable model that also included coping strategies and anxiety ($df = 1175$, $F = 4.6$, $P = 0.01$). Subjects also had higher PDI scores if a first degree relative had a history of previous surgery (33 ± 5 vs. 31 ± 6; $P = 0.007$). On analysis of individual questionnaire items, Latino Americans were significantly less likely than European Americans or African Americans to desire perioperative information ($P < 0.05$). Similarly, females had a significantly higher desire for information than males. Subjects who were divorced demonstrated a higher desire for information than did single or married subjects.
CONCLUSIONS: Ethnicity, gender, coping mechanism, marital status, and a history of previous surgery in a relative have been identified as predictors for the desire for information.

Prophylactic intravenous ondansetron in patients undergoing cataractextraction under general anesthesia

FJ Ascaso, I Ayala, P Carbonell, FJ Castro, A Palomar

Ophthalmologica 1997;211(5):292–5

During the past decade the demand for outpatient surgery has grown rapidly. Postoperative nausea and vomiting is one of the more common undesirable consequences of surgery, which may significantly delay the patient's discharge from the ambulatory surgery center. None of the currently used antiemetic drugs is considered totally effective in abolishing nausea or vomiting. The purpose of this study was to compare the efficacy of ondansetron, a highly selective 5-hydroxytryptamine subtype-3 receptor antagonist, with that of metoclopramide for the prevention of postoperative emesis in patients undergoing cataract surgery. The incidence of postoperative nausea was significantly less in the ondansetron group than that in the metoclopramide group ($P = 0.046$). Although the incidence of vomiting was clinically less frequent in the ondansetron group, there were no significant differences between both treatment groups. To our knowledge, this is the first study to demonstrate that ondansetron is effective to prevent postoperative emesis after extracapsular cataract extraction.

Ambulatory narrow excision for thin melanoma (≤ 2 mm): results of a prospective study

A Bono, C Bartoli, C Clemente, I Del Prato, P Boracchi, N Rossi, N Cascinelli

Eur J Cancer Part A 1997;33(8):1330–2

Although narrow surgical excision may be sufficient for thin melanoma, questions remain concerning how narrow the excision should be and how it should be related to tumour thickness. To address these issues, a group of 168 consecutive patients with primary invasive melanoma up to 2 mm thick underwent ambulatory surgery with excision margins of 1 cm. Of these patients, 40 (24%) had lesions thicker than 1 mm. In a median follow-up of 5 years, 11 patients relapsed and 3 developed second malignancies. The crude cumulative incidence of regional and distant metastases were, respectively, 5.6 and 1.5%. No local isolated recurrence was observed, indicating that ambulatory narrow excision is justified for melanoma up to 2 mm thick.

Treatment of enchodromas of the hand with bone substitute. Preliminary report of five cases

P Jacoulet, P Faure

J Hand Surg 1997; 22B(4):476–8

We report five patients with enchondromas of long bones in the hand. They were successfully treated by curettage and implantation of a biodegradable bone substitute (calcium phosphate). Bone regained normal X-ray appearance by 9 months. The full range of motion and normal function of the hand were restored. There were no complications and no recurrence at follow-up visits 28 months after operation. There are several advantages to this technique. The operative procedure may be performed under local anaesthesia on an out-patient basis and the operative time is shortened. Complications of a cancellous bone donor site are avoided, as are the potential infectious complications of allogenic bone implantation.

A comparison of ketorolac to other modalities for pain relief after inguinal herniorrhaphy in children

AC Poinier, LE Jacobson, J Geiduschek, HW Karl, SS Sasaki

J Invest Med 1996;44(1):150A

Ketorolac tromethamine, a non-steroidal anti-inflammatory drug, when administered intramuscularly to children intraoperatively, has been shown to reduce the requirement for post-operative narcotics

and shorten the length of a child's day surgery stay following tonsillectomy. A retrospective chart study in 1992 suggested that i.v. ketorolac administered intraoperatively was a superior modality to local anesthetic block for post-operative analgesia in children having outpatient inguinal hernia or hydrocele repair. Studying inguinal herniorrhaphy and hydrocelectomy patients aged 18 months to 12 years, we attempted to determine if i.v. ketorolac, given prior to incision, would reduce the requirement for post-operative narcotics and shorten the length of children's day surgery stay. The double-blind, randomized study included four groups: Group I: Caudal. 0.25% bupivacaine with epinephrine 1:200 k, 0.75 ml/kg, maximum 20 ml. Group II: Local block by surgeon. 0.25% bupivacaine with epinephrine 1:200 k, maximum 1 ml/kg. Group III: Ketorolac 1 mg/kg IV, prior to incision. Group IV: Ketorolac 1 mg/kg IV and local block by surgeon as described above in Group II. Following surgery, a blinded observer in the recovery room assigned pain scores and recorded other data, including analgesic requirements, length of Phase I and Phase II recovery stays, and the occurrence of nausea or vomiting. Patients having pain were given morphine 0.03 mg/kg q 5 min until comfortable. Emesis was treated with 0.15 mg/kg metaclopramide. Thus far results have shown that caudal blockade subjects have had the least post-operative morphine requirement. The subjects who have received ketorolac have had the shortest recovery room stays, which has important implications in controlling hospital costs. Parents of the subjects in the ketorolac group have also expressed the highest degree of satisfaction with their children's anesthesia care.

Administration of medroxyprogesterone acetate after endomyometrial resection

H Maia Jr, LC Calmon, D Marques, EM Coutinho

J Am Assoc Gynecol Laparoscopists 1997;4(2):195–200

STUDY OBJECTIVE: To assess the efficacy of endometrial resection for treatment of menorrhagia in women to whom no preoperative agent was given to prepare the endometrium.
DESIGN: Retrospective analysis of patients' records for all endometrial resections in which medroxyprogesterone acetate was used postoperatively. *Setting:* Hospital day surgery unit.
PATIENTS: A total of 70 patients with menorrhagia.
INTERVENTIONS: The women underwent transvaginal sonography, followed by hysteroscopy and endometrial biopsy. The endometrium was removed using the 27F resectoscope followed by coagulation with the rollerball. Medroxyprogesterone acetate was prescribed for 2 months after surgery.
MEASUREMENTS AND MAIN RESULTS: All women achieved a reduction in menstrual flow and 50% reported amenorrhea after endometrial resection. In only two was hysterectomy necessary due to recurrence of menorrhagia.
CONCLUSION: Preoperative endometrial preparation was unnecessary when endometrial resection was carried out for treatment of menorrhagia. However, the patients received medroxyprogesterone acetate postoperatively.

The current status of caudal epidural nerve block in contemporary practice

SD Waldman

Pain Dig 1997;7(4):187–93

Caudal epidural nerve block is a simple, safe, acid effective technique that is useful in a variety of surgical anesthetic applications. It is especially useful for outpatient surgery and in the pediatric population. The ability to perform caudal epidural nerve block in the presence of anticoagulation or coagulopathy is unique among the major neuroaxial regional anesthesia techniques. The utility of caudal epidural analgesia in the management of a variety of acute, chronic, and cancer-related pain syndromes-coupled with its safety and ease of performance-makes this technique an excellent addition to the armamentarium of the pain management specialist.

Symposium on ambulatory surgery: principles, practice, pitfalls

JK MacFarlane

Can J Surg 1997;40(4):259–63

Overnight-stay parathyroid surgery has proved to be safe and effective. The risk to the patient has been extremely small, the results of the surgery have been unchanged from inpatient surgery and patient compliance has been very good, with a high level of acceptance.

Establishing outpatient cholecystectomy as a hospital routine

AJ Voitk

Can J Surg 1997;40(4):284–8

OBJECTIVE: To determine the rate of outpatient cholecystectomies done voluntarily by surgeons and to identify any 'correctable' factors leading to hospital admission, also to reassess the outpatient cholecystectomy rate after correcting the identified factors.
DESIGN: A prospective analysis.
SETTING: A 256-bed non-teaching acute-care community hospital on the outskirts of a major urban centre, served by four general surgeons.
PATIENTS: All 515 patients booked for elective cholecystectomy at the hospital between April 1, 1994, and March 31, 1996, inclusive. *Intervention:* Elective outpatient cholecystectomy.
MAIN OUTCOME MEASURE: A successful procedure without compromise of safety.
RESULTS: In the preliminary study, outpatient cholecystectomy was done in 75% of the patients. Variations in individual surgical practice, preoperative patient selection and inappropriate day surgery facilities were thought to be correctable factors leading to admission. After correction of the these factors (follow-up study), the rate of outpatient cholecystectomy rose to 95% ($P < 0.001$). Variations in individual surgical practice disappeared, and no patient required processing through inappropriate day surgery facilities. No patient suffered untoward effects from outpatient management.
CONCLUSIONS: Outpatient cholecystectomy is a safe hospital routine for all elective procedures without selection. Voluntary acceptance of this routine leads to an initial 75% outpatient rate. Identifying and correcting modifiable factors led to a significant increase in the institutional outpatient rate, comparable to reported individual rates.

Ultrasonic surgical aspiration to treat genital Condyloma acuminata in children

YR Smith, C Isacson, AB Namnoum

J Pediatr Adolesc Gynecol 1997;9(3):145–7

We report on the technique of ultrasonic surgical aspiration for the treatment of genital condyloma acuminata in three prepubertal girls. All surgical procedures were done under general anesthesia, and no patient required hospitalization. Adequate samples for pathologic evaluation were obtained. This technique resulted in minimal discomfort, rapid healing, and no scarring.

Single-dose ondansetron prevents postoperative vomiting in pediatric outpatients

RI Patel, PJ Davis, RJ Orr, IR Ferrari, S Rimar, RS Hannallah, IT Cohen, K Colingo, JV Donlon, CM Haberkern, FX McGowan, BA Prillaman, TV Parasuraman, MR Creed

Anesth Analges 1997;85(3):538–45

This randomized, double-blind, parallel-group, multicenter study evaluated the safety and efficacy of ondansetron (0.1 mg/kg to 4 mg intravenously) compared with placebo in the prevention of postoperative vomiting in 429 ASA status I-III children 1–12 years old undergoing outpatient surgery under nitrous oxide- and halothane-based general anesthesia. The results show that during both the 2- and the 24-h evaluation periods after discontinuation of nitrous oxide, a significantly greater percentage of ondansetron-treated patients (2 h 89%, 24 h 68%) compared with placebo- treated patients (2 h 71%, 24 h 40%) experienced complete response (i.e., no emetic episodes, not rescued, and not withdrawn; $P < 0.001$ at both time points). Ondansetron-treated patients reached criteria for home readiness 30 min sooner than placebo-treated patients ($P < 0.05$). The age of the child, use of intraoperative opioids type of surgery, and requirement to tolerate fluids before discharge may also have affected the incidence of postoperative emesis during the 0–24-h observation period. Use of postoperative opioids did not have any effect on complete response rates in this patient population. We conclude that the prophylactic use of ondansetron reduces postoperative emesis in pediatric patients, regardless of the operant influential factors. Implications: Postoperative nausea and vomiting often occur after surgery and general anesthesia in children and are the major reason for unexpected hospital admission after ambulatory surgery. Our study demonstrates that the prophylactic use of a small dose of one ansetron reduces postoperative vomiting in pediatric patients.

Treatment of postoperative nausea and vomiting with single intravenous doses of dolasetron mesylate: a multicenter trial

AL Kovac, PE Scuderi, TF Boerner, JE Chelly, ME Goldberg, CB Hantler, WF Hahne, RA Brown

Anesth Analges 1997;85(3):546–52

This study was conducted to determine the efficacy and safety of four intravenous (IV) doses of dolasetron, an investigational 5-HT3 receptor antagonist, for the treatment of postoperative nausea and/or vomiting (PONV) after outpatient surgery under general anesthesia. This multicenter, randomized, double-blind trial compared the antiemetic efficacy of 12.5, 25, 50, or 100 mg IV dolasetron with placebo over 24 h using complete response (no emetic episodes and no rescue medication), time to first emetic episode or rescue medication, and patient nausea and satisfaction with antiemetic therapy as rated by visual analog scale (VAS). Of 1557 patients enrolled, 620 patients were eligible for treatment. Complete response rates for all dolasetron doses-12.5 mg (35%), 25 mg (28%), 50 mg (29%), and 100 mg (29%)- were significantly more effective than placebo (11%, $P < 0.05$). There was a significant gender interaction for complete response ($P < 0.01$). Of the patients in the 25- and 100-mg dose groups, 12 and 13%, respectively, experienced no nausea (VAS score < 5 mm) versus 5% in the placebo group ($P < 0.05$). There were no clinically relevant changes in vital signs or laboratory values and no trends with dose for adverse events. Dolasetron is effective for treating PONV and has an adverse event profile similar to that of placebo. The 12.5-mg dose was as effective as larger doses for complete response. Implications: Nausea and vomiting are common problems for postsurgical patients. In this study of 620 patients undergoing surgery, a 12.5-mg dose of intravenous dolasetron, a new serotonin-receptor blocker, was significantly more effective than placebo in treating established postoperative nausea and vomiting. Dolasetron 12.5 mg was as safe as placebo.

Intrathecal fentanyl with small-dose dilute bupivacaine: better anesthesia without prolonging recovery

B Ben-David, E Solomon, H Levin, H Admoni, Z Goldik

Anesth Analges 1997;85(3):560–5

Recent concern regarding lidocaine neurotoxicity has prompted efforts to find alternatives to lidocaine spinal anesthesia. Small-dose dilute bupivacaine spinal anesthesia yields a comparably rapid recovery profile but may provide insufficient anesthesia. By exploiting the synergism between intrathecal opioids and local anesthetics, it may be possible to augment the spinal anesthesia without prolonging recovery. Patients (50) undergoing ambulatory surgical arthroscopy were randomized into two groups receiving spinal anesthesia with 3 ml 0.17% bupivacaine in 2.66% dextrose without (Group I) or with (Group II) the addition of 10 μg fentanyl. Median block levels reached T7 and T8, respectively ($P =$ NS). Mean times to two-segment regression, S2 regression, time out of bed, time to urination, and time to discharge were 53 vs. 67 min ($P < 0.01$), 120 vs. 146 min ($P < 0.05$), 146 vs. 163 min ($P =$ NS), 169 vs. 177 mm ($P =$ NS, and 187 vs. 195 min ($P =$ NS) respectively. Motor blockade was similar between groups, but sensory blockade was significantly more intense in Group II ($P < 0.01$). Six of 25 blocks failed in Group I, whereas none failed in Group II. The addition of 10 μg fentanyl to spinal anesthesia with dilute small-dose bupivacaine intensifies and increases the duration of sensory blockade without increasing the intensity of motor blockade on prolonging recovery to micturition or street fitness. Implications: Concerns about the neurotoxicity of lidocaine have prompted efforts to find alternatives to lidocaine spinal anesthesia. We studied 50 patients undergoing ambulatory surgical arthroscopy and found that although small-dose bupivacaine alone is inadequate for this procedure, the addition of fentanyl makes it reliable.

Use of the laryngeal mask airway as an alternative to the tracheal tube during ambulatory anesthesia

GP Joshi, Y Inagaki, PF White, L Taylor-Kennedy, LI Wat, C Gevirtz, JM McCraney, DA McCulloch

Anesth Analges 1997;85(3):573–7

We designed a prospective, randomized, multicenter study to compare anesthetic requirements, recovery times, and postoperative side effects when a laryngeal mask airway (LMA) was used as an alternative to the tracheal tube (TT) during ambulatory anesthesia. After induction of anesthesia with midazolam 2 mg, fentanyl 1 μg/kg, and propofol 2 mg/kg, 381 patients were randomly assigned to receive either an LMA ($n = 207$) or TT ($n = 174$) for airway management. In patients assigned to the TT group, succinyl-choline 1 mg/kg or a nondepolarizing muscle relaxant was administered to facilitate tracheal intubation. Anesthesia was maintained with volatile anesthetics in combination with nitrous oxide 60% and oxygen. The average time to placement of the two airway devices (5 min) and the failure rates (1%) were similar in the two groups. Although there was a significant decrease in the intraoperative fentanyl requirement in the LMA group, the difference was of little clinical significance. Furthermore, there were no differences in the volatile anesthetic requirements. The time from end of surgery to removal of the airway device (5 min) was also similar in the two study groups. Although duration of the postanesthesia care unit stay and time to ambulation were significantly shorter in the LMA group, there were no differences in the

times to 'home readiness'. The incidence of nausea and vomiting and the need for rescue antiemetic treatments in the postoperative period were similar in the two airway management groups. However, the incidence of postoperative sore throat was significantly greater in patients receiving the TT (versus the LMA). In conclusion, this study suggests that the LMA is a useful alternative to the TT for airway management during ambulatory anesthesia. Implications: Use of the laryngeal mask airway can obviate the need for insertion of a tracheal tube for many ambulatory surgery procedures, and thereby decrease the incidence of postoperative sore throats.

A comparison of light wand and suspension laryngoscopic intubation techniques in outpatients

PG Friedman, MK Rosenberg, M Lebenbom-Mansour

Anesth Analges 1997;85(3):578–82

Endotracheal intubation can produce postoperative sore throat and hoarseness, as well as changes in cardiovascular variables. A major goal of ambulatory surgery is the prompt return of patients to their daily activities. Postoperative sore throat may impede this and may decrease patient satisfaction with their anesthetic and surgical experience. We conducted a prospective, randomized study in 40 outpatients having lower extremity arthroscopies to compare the effects of direct laryngoscopy and light wand intubation on cardiovascular changes, sore throat, hoarseness, and dysphagia. Subjects were randomly assigned to either Group A (endotracheal intubation by rigid laryngoscopy) or Group B (endotracheal intubation with a light wand). A standardized anesthetic technique was used. Heart rate and blood pressure were recorded before induction, after induction but before endotracheal intubation, and at 1-min intervals for the first 5 min after intubation. At 16–24 h postoperatively, the incidence and severity of sore throat, hoarseness, and dysphagia was assessed by a follow- up phone call. This study demonstrated no clinically significant difference in cardiovascular variables between the two techniques. Patients had a significantly lower incidence and severity of sore throat, hoarseness, and dysphagia when a light wand was used for intubation. In conclusion, this study suggests that light wand intubation may decrease the incidence and severity of postoperative sore throat, hoarseness, and dysphagia, thereby potentially increasing satisfaction in ambulatory surgical patients. Implications: This prospective, randomized study found that the incidence and severity of postoperative sore throat, hoarseness, and difficulty in swallowing among ambulatory surgical patients is more frequent when they are endotracheally intubated with a rigid laryngoscope than with a light wand. The authors, therefore, recommend more frequent use of the light wand for endotracheal intubation.

Caudal anesthesia and urinary retention in ambulatory surgery [4]

ALS Pappas, R Sukhani, D Hatch

Anesth Analges 1997;85(3):706

Reduction mammaplasty: an outcome study

PL Schnur, DP Schnur, PM Petty, TJ Hanson, AL Weaver

Plast Reconstr Surg 1997;100(4):875–83

Outcome studies of the value of reduction mammaplasties have only recently appeared in the literature. Medical directors of insurance companies and managed care plans have been reluctant to pay for reduction mammaplasties, citing the uncertainty of the medical necessity of the procedure. They have defended their position by stating that the medical literature is devoid of studies documenting that reduction mammaplasty is medically beneficial to the patient. For this reason, reduction mammaplasty is often excluded from health care benefit plans. Because of the need for outcome studies for this procedure, the charts of 363 consecutive patients who had reduction mammaplasty at the Mayo Clinic from January of 1986 to December of 1993 were reviewed. Questionnaires were sent to all these patients asking them to evaluate their outcome, and 328 responded (90.4% response rate). Of the respondents, 94.2% believed that the procedure was completely or very successful, and only 1.5% believed that it was not very successful or completely unsuccessful. The symptoms most frequently reported by patients preoperatively were as follows: uncomfortable feeling about their body, 97%: inability to find clothes that fit, 95.7 percent; pain in brastrap groove, 92.4%; shoulder pain, 86%, inability to run, 79.3%; upper back pain, 79%; inability co participate in sports, 77.4% ; neck pain, 70.7%; lower back pain, 64.0%; and intertrigo, 61%. The symptoms least frequently reported by patients preoperatively were as follows: pain or numbness in the hands, 22.6%; headaches, 30.2% arm pain 35.4%; and breast pain, 58.2%. These symptoms were either relieved or partially relieved in 88% or more of the patients. Of the 328 patients, 97.3% responded that they definitely or probably would have the procedure again, and only 1.2% definitely or probably would not have the operation again. Evaluation of medical treatment used to relieve symptoms showed a marked decrease in the need for such measures after reduction mammaplasty. Study of the charges for the procedure revealed that the setting of practice parameters for the procedure and the use of an ambulatory surgery center significantly decreased the charges for the procedure. This outcome study supports the hypothesis that reduction mammaplasty is an effective procedure and the treatment of choice for symptomatic mammary hyperplasia.

Capnography and ventilatory assessment during ambulatory dentoalveolar surgery

J Bennett, T Petersen, JA Burleson, JB Dembo

J Oral Maxillofacial Surg 1997;55(9):921–5

PURPOSE: The purpose of this study was to determine whether capnography is a more sensitive monitor than auscultation of breath sounds in detecting ventilator/changes consistent with hypoventilation, obstruction, or apnea and in detecting ventilatory changes that can be associated with oxygen desaturation.
PATIENTS AND METHODS: 55 patients received intravenous agents and supplemental oxygen to achieve a state of deep sedation or general anesthesia for removal of impacted third molars. The surgeon/anesthetist monitored respiratory status using a pretracheal stethoscope and direct observation. A blinded observer with no access to the patient or anesthetist monitored respirator/ status using capnography. A second observer monitored all respiratory parameters to allow for correlation between clinical and electronic monitors.
RESULTS: Ventilatory status was continuously represented by capnography. The Pearson correlation coefficient showed a positive correlation between increased end-tidal CO_2 ($P(ET)CO_2$) and decreased oxygen saturation that be-came stronger with greater positive changes in $P(ET)CO_2$. An additive relationship was found between $P(ET)CO_2$ and respiratory rate (RR), with increased $P(ET)CO_2$ and decreased RR contributing to decreased oxygen saturation.
CONCLUSIONS: Patients with nasal ventilatory exchange maintain this exchange throughout the anesthesia so that sampling of nasal $P(ET)CO_2$ is an effective way to monitor ventilatory status. Respiratory depression or obstructive ventilatory changes detected by capnography showed a high sensitivity and low positive predictive value in detecting oxygen desaturation. The current technology does not show a clinically satisfactory correlation between $P(ET)CO_2$ and oxygen saturation. However, a combined increase in $P(ET)CO_2$ and decrease in RR suggested a trend of decreasing oxygen saturation.

The holmium YAG laser in office based arthroscopy of the knee: comparison with standard interventional instruments in patients with arthritis

N Wei

J Rheumatol 1997;24(9)1806–1808

OBJECTIVE: To confirm the feasibility of laser assisted technology in an office based rheumatology practice and to compare selected outcome variables with those of conventional arthroscopic cutting tools.
METHODS: A prospective analysis of 70 office based arthroscopies on 70 patients with knee arthritis over an 8-month period. All patients met specific criteria for office based arthroscopy; 36 patients had interventions with conventional cutting tools and 34 patients had interventions with a 40 watt holmium YAG laser. Variables assessed included procedure time, length of recuperative period, and postprocedural pain.
RESULTS: Laser assisted arthroscopy was performed in 34 cases without side effects or complications. Patients who received laser treatment had a shorter recuperative period, less postprocedural pain, and fewer hemarthroses than patients geared with conventional methods.
CONCLUSION: While recognizing the shortcomings and possible complications associated with laser surgery, we conclude that laser use in an office setting is not only feasible but may in the future be an excellent method for office based arthroscopic treatment of the arthritic knee.

Evaluation of morphine versus fentanyl for postoperative analgesia afterambulatory surgical procedures

AR Claxton, G McGuire, F Chung, C Cruise

Anesth Analges 1997;84(3):509–14

Adequate postoperative analgesia without side effects is necessary to facilitate same-day discharge of ambulatory patients after ambulatory surgery. This study compared the use of intravenous morphine and fentanyl after painful ambulatory procedures with respect to analgesic efficacy, the incidence of side effects, and impact on the patient's readiness for discharge. Patients (58) undergoing ambulatory surgery were prospectively randomized to receive morphine or fentanyl for postoperative analgesia and studied in double-blind fashion. The drugs were administered in equipotent doses in the postanesthesia care unit (PACU) and were titrated against pain scores until a visual analog score < 40 mm was achieved and the patient was satisfied with the level of analgesia. In the ambulatory surgical unit, oral analgesia was available. Pain scores, amount of analgesia used, the incidence of side-effects (nausea and vomiting, sedation and dizziness), the times to achieve recovery milestones, and fitness for discharge were studied. Equal amounts of morphine and fentanyl were used in the PACU, but pain scores were higher in the fentanyl group in the ambulatory surgical unit. In addition, the fentanyl group required more oral analgesia than the morphine group (69 vs. 17%; $P < 0.0002$). The incidence of in-hospital side effects was similar. However, the morphine group had a more frequent incidence of postdischarge nausea and vomiting than the fentanyl group (59 vs. 24%; $P < 0.016$). There was no significant difference in the duration of stay in the PACU (morphine vs. fentanyl, 69 ± 15 min vs. 71 ± 20 min), the times to achieve recovery milestones, and fitness for discharge (morphine vs. fentanyl, 136 ± 41 min vs. 132 ± 40 min). The short duration of fentanyl was not associated with faster discharge times; most patients required additional analgesia to control pain. Morphine produced a better quality of analgesia but was associated with an increased incidence of nausea and vomiting, the majority of which occurred after discharge.

Comparison of sevoflurane and halothane for outpatient dental anaesthesia in children

ST Paris, M Cafferkey, M Tarling, P Hancock, PM Yate, PJ Flynn

Brit J Anaesth 1997;79(3):280–4
In a prospective, randomized, double-blind clinical study, we have studied 100 children, aged 2–12 years, to compare halothane and sevoflurane in outpatient dental anaesthesia. All patients were unpremedicated and received inhalation induction using nitrous oxide in oxygen supplemented with either halothane (maximum inspired concentration 5%) or sevoflurane (maximum inspired concentration 8%). Time to loss of the eyelash reflex was more rapid using sevoflurane although time to adequate anaesthesia (to allow insertion of a mouth prop) was slower in the sevoflurane group. The incidence of cardiac arrhythmia was higher during halothane (62%) than during sevoflurane anaesthesia (28%) ($P < 0.005$) and the arrhythmias were more often ventricular in origin. The two agents were comparable in terms of ease of use and quality of anaesthesia, and times to eye opening and satisfying discharge criteria were similar. We conclude that sevoflurane has qualities that have made halothane the most used inhalation agent for children, and that it is superior to halothane in dental outpatients where cardiac arrhythmias are a particular problem.

The safety of diagnostic and therapeutic ERCP as a daycase procedure with a selective admission policy

HD Duncan, IL Hodgkinson, M Deakin, JRB Green

Eur J Gastroenterol Hepatol 1997;9(9):905–8

OBJECTIVE: To assess if therapeutic endoscopic retrograde cholangiopancreatography (ERCP) as a daycase procedure with a selective admission policy is safe and cost-effective.
DESIGN: An audit of case notes of patients who attended as a daycase for either a therapeutic or diagnostic ERCP over a 20-month period.
SETTING: Stoke-on-Trent District General Hospital.
PATIENTS: Case notes of all patients who had an ERCP as a daycase were audited.
INTERVENTIONS: Therapeutic procedures performed as daycases included papillotomy, stent insertion, balloon dilatation or a combination of these procedures. Patients are discharged home 2 h after diagnostic or therapeutic ERCP.
MAIN OUTCOME MEASURES: 30-day morbidity and mortality of daycase patients.
RESULTS: During the 20-month period audited, 550 ERCPs were performed, of which 240 attended initially as daycases. There were 97 successful daycase therapeutic ERCPs. Ten patients were admitted immediately after ERCP including one who subsequently died from a myocardial infarction (known severe ischaemic heart disease); 87 patients were discharged 2 h after ERCP; none were admitted between 2 and 48 h after ERCP; 4 were admitted between 48 h and 30 days after ERCP with complications. There were 117 successful daycase diagnostic ERCPs; four patients were admitted immediately due to frailty, four were admitted between 2 and 48 h and 1 at 28 days after ERCP with complications. There were 24 failed diagnostic and 2 failed therapeutic ERCPs.
CONCLUSION: Daycase ERCP with a selective admission policy is safe and cost-effective.

Indications, techniques, results, limits, and complications of laser in situ keratomileusis

L Buratto, M Ferrari

Curr Opin Ophthalmol 1997;8(4):59–66

In this article we describe the state of the art of laser in situ keratomileusis (LASIK) through a presentation of the principles, the advantages, the disadvantages, the indications, the techniques, and the main complications. LASIK, as it is known today, involves the creation of a corneal flap using a keratome; this is followed by the in situ photoablation of the exposed stromal bed with an excimer laser. The flap thickness is about 160 mm with a circumference of about 300°, the idea being to leave a portion of tissue attached, thus creating a corneal hinge. The in situ stromal bed exposed by the lamellar cut is then photoablated and the flap is repositioned without sutures. Functional recovery and anatomical healing are rapid. The operation is painless, and it is performed under topical anesthesia in an outpatient environment.

Laser-assisted outpatient septoplasty results on 120 patients

Y.-V Kamami

J Clin Laser Med Surg 1997;15(3):123–9

OBJECTIVE: I describe a new outpatient technique of septoplasty, advocated to minimize and simplify surgery under local anesthesia with new laser instruments especially designed.
SUMMARY BACKGROUND DATA: This quick technique takes 5 min and has a specific clinical application in chronic nasal obstruction due to moderate anterior septal deviation in adults. It is less invasive that traditional septoplasty and potentially more advantageous in terms of decreased patient recovery time, less morbidity, lower medical costs, and faster return to full activity.
METHODS: I retrospectively review my experience with 120 patients, from August 1995 to November 1996, with a patient evaluation pre- and postoperatively, at first by a direct interview with clinical examination and acoustic rhinometry, then by a telephone interview with strictly standardized questioning.
RESULTS: Of the 120 patients, a surgical success rate of 96% on the nasal obstruction was achieved. Many patients experienced improvement on other symptoms like nasal discharge, frequent sneezing, frequent headaches, recurrent rhino-sinusitis, and sense of smell and sleep troubles. Observations comparing pre- and post-operative rhinometries revealed a significant increase of the size of the mean minimal cross-sectional areas (MCA) of the narrow side, at the anterior part of the nose, an increase of the mean nasal cavity volume (NCV), and a decrease of mean nasal airway resistance (NAR).
CONCLUSIONS: This new technique appears to be a safe, quick, simple, predictable, bloodless, and virtually painless in-office procedure without side effects. These encouraging good preliminary results must be confirmed by further study and long-term follow-up.