ELSEVIER

Ambulatory Surgery 6 (1998) 1

Ambulatory Surgery

Editorial

What's in a name?

Day	(n)	i	The time between the rising and setting of the sun.
		ii	The time of one revolution of the earth (24 h).
Ambulatory	(n)		Part of a building to walk in.
	(adj)		Movable.

Do any of the above definitions of 'day' or 'ambulatory' qualify the word 'surgery' in such a way as to convey clearly the concept of surgery we wish to promote? Some will say yes, some no. Overall there will be no agreement. If those with a particular interest in this field of surgery have no clear consensual agreement on the terms that are used, how can we communicate in a meaningful way our ideas and the results of our research with others? We cannot. It is thus not for semantic reasons that we need to tightly define our terms: it is essential on both practical and scientific grounds.

The IAAS executive decided at its last meeting that ambulatory and day surgery, together with associated terminology, need to be defined on an internationally agreed basis.

This is a big task. But the process has been started by Mr L. Roberts and Dr J. Warden, two of IAAS's Australian delegates. Their initial proposals follow this editorial. Readers comments on these definitions and suggestions for other terms that need defining would be welcome.

The present imprecise usage of terminology is confusing. Clarification is essential if national and international comparisons are to be made and progress occur in what we term Ambulatory or Day Surgery.

P.E.M. Jarrett

PII S0966-6532(98)00003-1

ELSEVIER

Ambulatory Surgery 6 (1998) 3

Ambulatory Surgery

Suggested International terminology and definitions

L. Roberts, J. Worden

TERMINOLOGY

Ambulatory: Synonyms: Day. Same day. Day only. Time frame - up to 8 h - no overnight stay.

Extended Recovery: Synonyms: 23 h. Overnight stay.

Time frame - over 8 h - under 24 h.

Short Stay:

Time frame - 24–72 h.

DEFINITIONS - GENERAL

Surgery/Office: A medical practitioner's professional premises.

Outpatient Department: Section(s) of a hospital, public or private, for the treatment of outpatients.

Outpatient: A patient treated solely in the outpatient department of a hospital, public or private.

Inpatient: A patient admitted into a hospital, public or private, for a stay of 24 h or more.

DEFINITIONS - SURGERY/OFFICE OR OUTPATIENT

Surgery/Office Procedure: An operation or procedure carried out in a medical practitioner's professional premises which provides an appropriately designed, equipped and serviced room(s) for its safe performance.

Outpatient Procedure: An operation or procedure carried out in the outpatient department of a hospital, public or private, which does not require inpatient, or ambulatory surgery unit services or supervision.

DEFINITIONS - AMBULATORY SURGERY

Ambulatory Surgery/Procedure: An operation/procedure, excluding an office/surgery or outpatient operation/procedure, where the patient would normally be discharged on the same working day.

Ambulatory Surgery/Procedure Patient: A patient having an operation/procedure excluding an office/surgery or outpatient operation/procedure, who is admitted and discharged on the same working day.

Ambulatory Surgery Centre (Facility): A centre (facility) designed for the optimum management of an ambulatory surgery/procedure patient.

Ambulatory Surgery Procedure - Extended Recovery Patient: A patient treated in ambulatory surgery/procedure centre/unit, free standing or hospital based, who requires extended recovery including overnight stay, before discharge the following day.

Ambulatory Surgery/Procedure Extended Recovery Centre/Unit: Purpose constructed/modified patient accommodation, free standing or within an ambulatory surgery centre or hospital, specifically designed for the extended recovery of ambulatory surgery/procedure patients.

Limited Care Accommodation: Hotel/hostel accommodation for ambulatory surgery/procedure patients where professional health care is available on an on call basis.

Hotel/Hostel Accommodation: Accommodation without professional health care for ambulatory surgery/procedure patients when required for domestic, social or travel reasons.

L. Roberts and J. Warden

Australian Day Surgery Council,
Sydney, Australia.

*Please send comments, criticism or suggested additions to Professor P.E.M. Jarrett, Editor-in-Chief, Ambulatory Surgery.

ELSEVIER

Ambulatory Surgery 6 (1998) 5–11

Ambulatory Surgery

Current issues in ambulatory anaesthesia[1]

Sujit K. Pandit

Department of Anesthesiology, University of Michigan Medical Center, 1500 East Medical Center Drive, IG323 UH, Box 0048, Ann Arbor, MI 48109-0048, USA

Received 7 July 1997; received in revised form 7 August 1997; accepted 14 August 1997

1. Introduction

Current Issues in Ambulatory Anaesthesia was the theme of a Breakfast Panel during the 54th Annual Meeting of the Canadian Society of Anaesthetists in Vancouver, BC, Canada, 6–10 June, 1997. Frances F. Chung, from Toronto, Canada moderated the session and Sujit K. Pandit, from Ann Arbor, MI, made the presentation. A large audience enthusiastically joined in the discussion.

2. Preoperative fasting

Three editorials published in the 90s in three different international journals, one each from Canada, USA, and the UK [1–3], recommended a change in our traditional guidelines for preoperative fasting time. Why are we suddenly challenging the time honored tradition of NPO (nothing by mouth) after midnight?, and why did we have the traditional policy of NPO after midnight in the first place?

Much has to do with a paper by Mendelson published in 1946 [4]. It was a very enlightening paper but was also very disturbing. It told us that the incidence of death after general anaesthesia due to pulmonary acid aspiration in obstetrics is very high, 1:700. At about that time, we made two assumptions: (1) if a patient does not consume any food or drink 6–8 h before surgery, then the stomach will remain empty and thus, there will be no or minimum risk of pulmonary aspiration; and (2) if the patient consumes any food or drink 6–8 h before surgery, then it will remain in the stomach for many hours increasing the chance of acid aspiration. As we now know, neither of these two assumptions is entirely correct. Nevertheless, with those assumptions, the tradition of NPO after midnight for both solid food and drinks was firmly established.

In doing so, surgeons and anaesthesiologists conveniently ignored the work by Beaumont published 150 years ago [5]. He showed that solids and liquids behave quite differently after ingestion. While solids take 6–8 h to clear from the stomach, liquids pass into the duodenum quite fast, in 2 h or less. This fact was confirmed by other investigators using sophisticated and modern techniques of study [6].

Then came the surge for outpatient surgery in the 1970s and the 1980s. With its increasing popularity, and changed logistics, some brave anaesthesiologists, mostly from Canada, UK, and Australia, and of course patients themselves started to ask this important question: 'is a 5-h fast before surgery really justified'? [7]. We recognized that long fasting is not merely an inconvenience to the patient, it is stressful, and it may have physiological consequences. Long fasting causes hunger, thirst, headache, noncompliance, and in children may cause dehydration and hypoglycemia [8,9].

In the 80s, a large number of research on this topic were published. Many studies showed that ingestion of clear liquids before elective operations may in fact reduce the residual gastric volume and may even increase the gastric pH [10–13]. This is because of the dilutional effect of the clear liquid on the stomach acid and the stimulation of peristaltic activities by ingestion.

The serious question of pulmonary aspiration must also be considered. How common is pulmonary aspiration during elective surgery today? In 1946, Mendelson reported a high death rate of 1:700 due to pulmonary acid aspiration during general anaesthesia in obstetrics [4]. How has that changed, especially for outpatient surgery? Olsson et al. [14] from Sweden did a large

[1] Based on Presentation at the 54th Annual Meeting, Canadian Anaesthesia Society, 6–10 June, 1997, Vancouver, BC, Canada.

PII S0966-6532(97)10003-8

retrospective study of 185 000 cases published in 1986, they concluded that the aspiration rate in all comers, elective and emergency surgery, was 4.3:10 000, with a death rate of 1:35 000. A vast majority of the aspirations took place during emergency operations and in young children, especially at night. Nevertheless, this was a significantly better result than what Mendelson had reported earlier.

The Federated Ambulatory Surgery Association (FASA) after a prospective study of 87 000 cases, reported [15] that the incidence of aspiration during ambulatory surgery was 0.3:10 000. More recently Warner from Mayo Clinic has reported [16] an incidence of aspiration, 1:9000 in ASA 1 and 2 patients with no death.

What is the reason for this tremendous improvement in the incidence of pulmonary aspiration since the days of Mendelson? Undoubtedly, this is because of better identification of patients who are at risk of aspiration, namely: emergency surgery, pregnancy, obesity, etc.; use of appropriate prophylactic measures in 'at risk' patients; and especially, wide-spread use of rapid sequence induction and cricoid pressure with endotracheal intubation in these patients. Although Mendelson did not mention one way or the other, it is very likely that none of the 44 000 patients that he studied had an endotracheal tube placed during general anaesthesia.

Recognition that clear liquids behave differently in the stomach than solids, and that the risk of pulmonary aspiration during elective surgery in healthy patients with physical status ASA 1 or 2 is extremely rare, are reasons for the three editorial pleas in the early 1990s to allow clear liquids before elective operations. Have we actually changed our practice regarding the traditional NPO guidelines? A group of investigators from the University of Michigan Medical Center addressed this issue with a national survey [17]. The results of that survey showed that by 1993, 70% of the anaesthesiologists in the USA have changed their practice and liberalized fasting guidelines in children while about 40% of them did it for adults.

3. Current guidelines for preoperative fasting

At the University of Michigan, the current recommendations for preoperative fasting in elective surgery are: in adults and children above three months of age, no solid food on the day of surgery, water in unlimited amounts up to 3 h before induction of anaesthesia. Infants who are more than three months, in addition, may take breast milk or infant formula up to 4 h before induction of anaesthesia. Infants three months or younger may have clear liquids (sugar water) up to 2 h before induction of anaesthesia, and breast milk up to 3 h before induction. In children they have liberalized the definition of clear liquid to include clear fruit juice (e.g. apple juice) [18].

The American Society of Anesthesiologists (ASA) has recently appointed a task force, with Mark Warner, as its Chair to develop its own guidelines for preoperative fasting. The Committees report is not published yet, but it is expected that the Committee will suggest a simple guideline that will be same for all ages: clear liquids up to 2 h before induction of anaesthesia, breast milk up to 4 h, and solids up to 8 h before induction of anaesthesia.

A lively discussion followed Dr Pandit's presentation. The majority of the audience agreed with the ASA's expected recommendations. However, others suggested 3 h fasting for clear liquids may be more realistic.

4. Postoperative fasting

Schreiner et al. from Philadelphia published, in 1992 which asked this question: should children drink before discharge [19]? Ability to drink, or oral intake has been a prerequisite for discharge after outpatient surgery. Is it a good practice? Schreiner studied a large number of children undergoing outpatient surgery. One group, called mandatory drinkers, had to have a drink before discharge. The other group was offered a drink only if they asked for one, this group was called elective drinkers. There was a higher incidence of vomiting in the Post Anaesthesia Care Unit (PACU) and increased PACU time in the mandatory drinker group compared to the elective drinkers. There was no difference in vomiting after discharge. The authors recommended that children should not be required to drink before discharge.

On the basis of this paper, many anaesthesiologists have changed their discharge criteria and do not require the patients to show the ability to drink before discharge. Chung, who devised the well accepted PADSS discharge criteria, has in her latest version omitted this criteria for discharge [20].

The audience in general, agreed that the ability to drink should not be a part of discharge criteria, although the state of hydration should be carefully evaluated before discharge.

5. Is postoperative nausea and vomiting (PONV) still a problem?

When Gold published her paper in 1989 [21], it immediately became a classic. She reported an incidence of unanticipated admission after outpatient surgery of 2% which became a gold standard for ambulatory surgery practice at the time. The incidence is much lower now, close to 0.2–0.5% level. Her second

observation was that the most important anaesthesia related cause for unexpected hospital admission was nausea and vomiting.

A year earlier Patel and Hannallah had also showed that PONV was the most important anaesthesia related complication after outpatient surgery in children [22].

Is this still true today? Green from Scandinavia published a report in 1993 confirming many earlier published papers that nausea and vomiting are the most important reasons for delayed discharge after outpatient surgery [23]. This year, 1997, Splinter et al., presented the results of their study which showed an incidence of unanticipated admission of 1.1%, with PONV as the reason for admission in 18% of them [24]. Further, Carroll showed us that PONV after discharge is more common than PONV in the PACU [25].

Therefore, it seems that PONV is still a problem, but as we learn to identify the patients who are at higher risk for PONV [26], we may be able to take steps to remedy the situation. Who is at risk?

Table 1 lists the conditions that put patients at risk for PONV. Though it is not usually mentioned, the person who actually administers the anaesthetic and where the surgery is performed make a big difference in PONV. Cohen, an epidemiologist from Toronto, did a multicenter study on PONV at various hospitals in Canada [27]. She reported a huge difference in the incidence of nausea and vomiting among the hospitals, a range from 39 to 75%. Some anaesthesiologists are better than others in preventing PONV; they must be doing something right. The audience agreed that PONV is still a problem after outpatient surgery.

6. Is propofol an antiemetic?

Innumerable studies have shown that propofol anaesthesia is associated with less PONV than enflurane, isoflurane, halothane, desflurane or sevoflurane anaesthesia [28,29]. In a very instructive study, Hannallah compared halothane anaesthesia against propofol induction followed by halothane, and propofol induction followed by propofol infusion anaesthesia for strabismus surgery. The incidence of PONV after halothane was 58%, propofol–halothane 22%, but with propofol–propofol only 11% [30], a remarkable result. Even with ondansetron prophylaxis desflurane causes more PONV than propofol [31]. Thus, propofol anaesthesia is clearly associated with less PONV.

Is propofol an antiemetic for treatment of PONV? Borgeat from Switzerland suggested that it is [32]. She injected 10 mg propofol or equal volume of intralipid in the PACU for postoperative nausea, success rate after propofol was 81 vs. 31%. However, the effect was short lived. Ostman confirmed that the antiemetic effect of propofol is not due to intralipid solvent [33]. However, when Scuderi gave a small dose of propofol by infusion in the PACU, he found no antiemetic effect of either propofol or intralipid [34].

Apparently contradictory results on the efficacy of propofol as an antiemetic were obtained by a group of investigators from Dallas, Texas. At the last International Anesthesia Research Society (IARS) meeting, this group presented a study in which they either gave propofol 0.5 mg/kg or droperidol 0.625 mg at the end of a tubal ligation operation and both treatments were better than placebo in preventing PONV [35]. However, the same group presented another paper at the Society for Ambulatory Anesthesia (SAMBA) Annual Meeting this year, with exactly the same protocol for laparoscopic cholecystectomy but this time they reported propofol was equal to placebo [36]. Zestos also found propofol 0.2 mg/kg ineffective to treat vomiting in PACU [37].

A case report of intractable nausea and vomiting after cancer chemotherapy gives an interesting insight to the problem [38]. When all usual antiemetics, including ondansetron, droperidol and metoclopramide failed, the authors started a propofol infusion and measured propofol blood levels continually. Nausea and vomiting disappeared when blood level of propofol reached 197 ng/ml.

The same group (Gan et al.) recently published a comprehensive study on propofol and its antiemetic properties [39]. Their conclusions were: propofol used to induce and maintain anaesthesia is more effective than ondansetron (with thiopental–isoflurane anaesthesia) in preventing postoperative vomiting, and propofol anaesthesia is associated with fewer requests for rescue antiemetic and sedation in the early phase of recovery. Propofol anaesthetic for maintenance is equally effective as ondansetron 4 mg in preventing nausea in the first 6 h after the operation. Furthermore, propofol used only as the induction agent, or when given both for induction as well as at the end of surgery, 50–150 μg/kg per min for 30 min, is not as protective against

Table 1
Factors that increase the risk for PONV

Patient:
Female young, obese, preovulatory stage of menstrual cycle, history of PONV, motion sickness, pregnancy
Operation:
Eye, ENT, suction D&C, laparoscopy, orchidopexy
Anaesthetic/analgesics:
Opiates, nitrous oxide, volatile anaesthetic agents, muscle relaxant antagonist
Longer operation:
Hospital/anaesthesiologist:

postoperative nausea and vomiting The majority in the audience said they use propofol anaesthesia to reduce the incidence of PONV.

7. Nitrous oxide and PONV

Fisher in a recent editorial asked this question: does nitrous oxide cause vomiting [40]? There is no question that it does. When Hornbein gave nitrous oxide and oxygen anaesthesia to seven volunteers for an unrelated study [41], each of the subjects were nauseated after the anaesthetic. Therefore, nitrous oxide like all other inhaled anaesthetics, e.g. ether, cyclopropane, halothane, isoflurane, desflurane, sevoflurane does cause nausea to a greater or lesser extent. The real question is, does it increase the nausea and vomiting caused by other anaesthetics?

Alexander was the first to report (abstract) that nitrous oxide increases PONV, especially when fentanyl is added to the anaesthetic [42]. However, many other papers followed with conflicting results. For example Hovorka and Korttila claimed nitrous oxide does not increase PONV [43], a paper from the University of Michigan also supported that conclusion in children [44]. Most of the papers showed a slight but statistically insignificant increase in PONV after nitrous oxide anaesthesia.

As one would expect, recently we have started to get several papers describing meta analysis on this topic [45–47]. As we know, in meta analysis you pool all the available published papers, do some statistical manipulations and figure out if there is a statistical significance. All papers doing meta analysis on this topic agreed: nitrous oxide does increase PONV. To quote Hurtung [45], the question probably is not whether nitrous oxide causes vomiting, but when, why, in whom, and under what circumstances does nitrous oxide cause vomiting? Answers to these questions are not clear yet.

However, before we rush to remove nitrous oxide from our machine we need to consider a couple of points. The results of meta analysis must be considered carefully [40]. Typically meta analysis rarely have access to the original data because it depends on published summaries. Thus, flaws in the methodology of original studies can not be taken into account. Secondly, there may be publication bias, negative results are less likely to be published.

In addition, the well known beneficial effects of adding nitrous oxide to other anaesthetic agents often greatly outweighs any slight increase in PONV by nitrous oxide. Nitrous oxide decreases the requirement of other anaesthetic agents and narcotics which may translate into quicker recovery and reduced cost of expensive anaesthetic agents and narcotics. Inclusion of nitrous oxide may also reduce the incidence of awareness during general anaesthesia [48,49].

During the discussion, a majority in the audience said they use nitrous oxide when ever it is indicated, however, a few said they do not use nitrous oxide.

8. Reversal agents, intravenous fluids and PONV

Do the neuromuscular blocker antagonists, like neostigmine increase the incidence of PONV? This was first suggested by King [50].

There are three other papers, all from Dallas, TX, and the results are conflicting. The first one, published in 1994, claimed neostigmine does increase PONV [51]. The next paper published in 1995, claimed the same result in children [52]. However, a more recent paper from the same group published in 1996 [53] gives a different result. There was no difference in the rate of PONV whether or not the patient had received a reversal agent. Therefore, it seems that this question is still not settled. During discussion, the majority in the audience opined that they do not believe that reversal agents increase PONV.

Can we reduce the incidence of PONV by giving large amounts of preoperative intravenous fluids? Yogendran and Chung think so [54]. The group of patients that received 20 ml/kg i.v. fluid preoperatively before outpatient surgery, had less nausea and vomiting and over all less postoperative complications. Unfortunately, this is the only paper on this topic, this result needs confirmation.

There was a good discussion about the use of large quantities of intravenous fluids during outpatient operations, but no consensus developed.

9. Prophylactic antiemetics: droperidol versus ondansetron

As it appears, PONV is still a problem, but we can now identify the at-risk patients better. We know something about what drugs increase and which ones decrease PONV. However, there are occasions when a prophylactic antiemetic is the best way to deal with the situation. If we decide to use a prophylactic antiemetic, which agent should we use? Anaesthesiologists use many different agents for this purpose. To keep the discussion manageable, only droperidol and ondansetron were discussed.

Fortney et al. conducted a large prospective placebo controlled study comparing ondansetron 4 mg with droperidol 0.625 and 1.25 mg as prophylactic antiemetics given intravenously at the time of induction of anaesthesia in patients who are at high risk for PONV [55]. More than 2000 cases were enrolled. The results show that ondansetron 4 mg is superior to placebo, equal to droperidol 0.625 mg, and inferior to droperi-

dol 1.25 mg for antiemetic prophylaxis. The other important result was that there were no significant difference in the postoperative side effects among the three groups. There was no increase in dysphoria, agitation, or sedation after droperidol 0.625 or 1.25 mg. In a study with a very similar protocol, Tong et al., came out with virtually the same results [56]. Their results show that the incidence of vomiting following placebo is 65%, droperidol 0.625 mg is 37%, droperidol 1.25 mg is 20%, and ondansetron 4 mg is 30%.

What are the appropriate doses of droperidol and ondansetron for prophylaxis against PONV? The two papers quoted earlier [55,56] showed a dose response for droperidol, a dose of 1.25 mg was better than 0.625 mg. This confirmed the results of an earlier study by Pandit et al. [57] who showed that although a dose of 10 μg/kg ($\sim$6.25 mg for an average adult) was better than placebo or metoclopramide, droperidol 20 μg/kg ($\sim$1.25 mg for an adult) was superior. Watcha has shown that the optimal dose of ondansetron in paediatric patients is 50 μg/kg [58].

Since droperidol and ondansetron work in two different pathways, some people like to use a combination of the two for better results. It would appear that a combination might actually work better than either one [59,60].

What is the best time to give the prophylactic antiemetic? It does make a difference. Sun et al. showed that ondansetron is more effective when given at the end of the operation [61]. We know from analysis of previous studies [57] that droperidol is best given at the time of induction of anaesthesia. When given a short time before the end of operation or for very short operations, droperidol is not as effective [62]. For best results, droperidol should be given at least 30–45 min before the patient reaches the recovery room.

In today's cost-conscious environment, cost-effectiveness of any medication has become an important consideration. Watcha and Smith analyzed the cost-effectiveness of droperidol and ondansetron [63] and concluded that prophylactic antiemetic therapy is cost-effective for operations with a high frequency of emesis, whereas treatment of symptoms is more cost-effective when frequency was lower. For ondansetron, prophylactic use is cost-effective when the frequency of emesis exceed 33%, whereas prophylactic droperidol is cost-effective even if the frequency is 10%.

In a more elaborate and meticulous study, the same group of investigators have worked out a cost-effectiveness comparison of droperidol and ondansetron [56]. They looked at all aspects of cost, both direct and indirect. Their results show: droperidol 0.625 mg is the most cost-effective antiemetic. Weighted cost of antiemetics were as follows: Placebo, $8.65; droperidol 0.625 mg, $3.37; droperidol 1.25 mg, $5.17; and ondansetron 4 mg, $17.97.

10. Spinal anaesthesia for outpatient surgery

With the recent introduction of non-cutting pencil point spinal needles (Whitacre, Sprotte) postdural puncture headache has become a rarity even in young patients. Spinal anaesthesia has become a very acceptable form of anaesthesia for patients undergoing ambulatory surgery. However, controversy exists about the choice of local anaesthetic agent. The controversy has been heightened with publication of several papers implicating hyperbaric 5% lidocaine for causing transient neurological toxicity (cauda equina syndrome) and severe pain (transient radicular irritation) after single subarachnoid injection of hyperbaric 5% lidocaine with 7.5% dextrose [64–66]. Neither the hyperosmolarity of 7.5% dextrose nor the higher concentration of lidocaine could be implicated for the problem [67,68]. However, bupivacaine seems to be devoid of these side effects [69,70]. Vagadia has recently demonstrated that fentanyl 25 μg or sufentanil 10 μg when added to a small dose of hypobaric lidocaine, gives adequate and safe spinal anaesthesia with rapid recovery [71,72]. A more recent paper from the University of Michigan demonstrated that intrathecal sufentanil 20 μg in saline provides good analgesia for extracorporeal shock wave lithotripsy (ESWL) and allows early discharge [73]. Ben-David demonstrated efficacy and safety of saline dilution of bupivacaine with dextrose for ambulatory anaesthesia [74].

It was clear from the discussion that the vast majority in the audience uses spinal anaesthesia regularly for outpatient surgery using either lidocaine or bupivacaine with or without fentanyl.

References

[1] Goresky CV, Maltby JR. Fasting guidelines for elective surgery patients (editorial). Can J Anaesth 1990;34:493–5.
[2] Cote CJ. NPO after midnight for children—a reappraisal. Anesthesiology 1990;72:589–92.
[3] Strunin L. How long should patients fast before surgery? Time for new guideline (editorial). Br J Anaesth 1993;72:589–92.
[4] Mendelson CL. Aspiration of stomach contents into lungs during obstetric anesthesia. Am J Obstet Gynecol 1946;52:91–205.
[5] Beaumont W. Gastric Juice and Physiology of Digestion. Plattsburg, NY: Allen, 1833:159–60.
[6] Minami H, McCallum RW. The physiology and pathology of gastric emptying in humans. Gastroenterology 1984;86:1592–610.
[7] Maltby JR, Sutherland AP, Sale JP, et al. Preoperative oral fluid: is a five hour fast justified? Anesth Analg 1986;65:1112–6.
[8] Agarwal A, Chari P, Singh H. Fluid deprivation before operation. Anaesthesia 1989;44:632–4.
[9] Splinter WM, Stewart JA, Muir JG. The effect of preoperative apple juice on gastric contents, thirst, and hunger in children. Can J Anaesth 1989;36:55–8.
[10] Splinter WM, Schaefer JD. Ingestion of clear fluids is safe for adolescents up to 3 h before anaesthesia. Br J Anaesth 1991;66:48–52.

[11] Scarr M, Maltby JR, Jani K, et al. Volume and acidity of residual gastric fluid after oral fluid ingestion before elective ambulatory surgery. Can Med Assoc J 1989;141:1151–4.
[12] Maltby JR, Lewis P, Martin A, et al. Gastric volume and pH in elective patients following unrestricted oral fluids until 3 h before surgery. Can J Anaesth 1991;38:425–9.
[13] Phillips SD, Hutchinson S, Davidson T. Preoperative drinking does not affect gastric contents. Br J Anaesth 1993;70:6–9.
[14] Olsson GL, Hallen B, Hambracus-Jonzon K. Aspiration during Anesthesia. A computer-aided study of 185 358 anaesthetics. Acta Anaesth Scand 1986;30:84–92.
[15] Federated Ambulatory Surgery Association (FASA). Special Study. I Alexandria, VA, 1987.
[16] Warner MA, Warner ME, Weber JC. Clinical significance of pulmonary aspiration during perioperative period. Anesthesiology 1993;78:56–72.
[17] Green CR, Pandit SK, Schork MA. Preoperative fasting time: is traditional policy changing? Results of a national survey. Anesth Analg 1996;83:123–6.
[18] Pandit UA, Pandit SK. Fasting before and after ambulatory surgery. J Peri-Anesth Nurs 1997;12:181–7.
[19] Schriener MS, Nicolson SC, Martin T, et al. Should children drink before from day surgery? Anesthesiology 1992;76:528–33.
[20] Chung F. Are discharge criteria changing? J Clin Anesth 1993;5(suppl 1):6S–8S.
[21] Gold BS, Kitz SD, Lecky JH, et al. Unanticipated admission to the hospital following ambulatory surgery. J Am Med Assoc 1989;262:3008–10.
[22] Patel RI, Hannallah RS. Anesthetic complications following pediatric ambulatory surgery: a 3-year study. Anesthesiology 1988;69:1009–12.
[23] Green G, Janssen L. Nausea: the most important factor determining length of stay after ambulatory anesthesia. A comparative study of isoflurane and/or propofol techniques. Acta Anaesth Scand 1993;37:742–6.
[24] Splinter WM, Paradis RN. Unexpected admissions after pediatric ambulatory surgery—a 4 year review. Anesth Analg 1997;84:S26.
[25] Carrol NV, Miederhoff P, Cox FM, et al. Postoperative nausea and vomiting after discharge from outpatient surgery centers. Anesth Analg 1995;80:903–9.
[26] Larman J. Surgical and patient factors involved in postoperative nausea and vomiting. Br J Anaesth 1992;69(suppl):24S–32S.
[27] Cohen MM, Duncan PG, DeBoer DP, et al. The postoperative interview: assessing risk for nausea and vomiting. Anesth Analg 1994;78:7–16.
[28] Randel GI, Levy L, Kothary SP, Pandit SK. Propofol versus thiamylal–enflurane anesthesia for outpatient laparoscopy. J Clin Anesth 1992;4:185–9.
[29] Lebenbom-Mansour MH, Pandit SK, Kothary SP, et al. Desflurane versus propofol anesthesia: a comparative analysis in outpatients. Anesth Analg 1993;76:936–41.
[30] Hannallah RS, Briton J, Schafer P, et al. Effect of propofol anesthesia on the incidence of vomiting after strabismus surgery in children. Anesth Analg 1992;74:S131.
[31] Amdt G, Springman MD, McSweeny M. A comparison of nausea and vomiting after ondansetron premedication with either propofol or desflurane following tubal ligation. Anesth Analg 1997;84:A1.
[32] Borgeat A, Wilder-Smith OH, Saiah M, et al. Subhypnotic doses of propofol possess direct antiemetic properties. Anesth Analg 1992;74:529–41.
[33] Ostman PL, Faure E, Glosten B, et al. Is the antiemetic effect of emulsion formulation of propofol due to the lipid emulsion? Anesth Analg 1990;71:36–40.
[34] Scuderi PE, D'Angelo R, Harris L, et al. Small-dose propofol by continuous infusion does not prevent postoperative vomiting in females undergoing outpatient laparoscopy. Anesth Analg 1997;84:71–5.
[35] Song D, White PF. Use of propofol versus droperidol for preventing PONV after desflurane anesthesia in outpatients. Anesth Analg 1997;84:S25.
[36] Zarate E, Song D, White PF. Comparison of a subhypnotic dose of propofol with low-dose droperidol for preventing PONV after desflurane anesthesia. 12th Annual Meeting SAMBA, Orlando, FL, 1–4 MAY, 1997.
[37] Zestos MM, Carr AS, McAuliffe G, et al. Subhypnotic propofol does not treat postoperative vomiting in children after tonsillectomy. Can J Anaesth 1997;44:401–4.
[38] Schulman SR, Rockett CB, Canada AT, Glass PSA. Long-term propofol infusion for refractory postoperative nausea: a case report with quantitative propofol analysis. Anesth Analg 1995;80:636–7.
[39] Gan TJ, Ginsberg B, Grant AP, Glass PSA. Double blind, randomized comparison of ondansetron and intraoperative propofol to prevent postoperative nausea and vomiting. Anesthesiology 1996;85:1036–42.
[40] Fisher DM. Does nitrous oxide cause vomiting? (editorial). Anesth Analg 1996;83:4–5.
[41] Hornbein TF, Eger EI II, Winter PM, et al. The minimum alveolar concentration of nitrous oxide in man. Anesth Analg 1982;61:553–6.
[42] Alexander GD, Skupski JN, Brown EM. The role of nitrous oxide in postoperative nausea and vomiting. Anesth Analg (abstract) 1984;63:175.
[43] Hovorka J, Korttila K, Erkola O. Nitrous oxide does not increase nausea and vomiting following gynecological laparoscopy. Can J Anaesth 1989;36:145–8.
[44] Pandit UA, Malviya S, Lewis IH, et al. Vomiting after outpatient tonsillectomy and adenoidectomy in children: the role of nitrous oxide. Anesth Analg 1995;80:230–3.
[45] Hartung J. Twenty four of twenty seven studies show a greater incidence of emesis associated with nitrous oxide than with alternate anesthetics. Anesth Analg 1996;83:114–6.
[46] Divatia JV, Vaidya JS, Badwe R, et al. Omission of nitrous oxide during anesthesia reduces the incidence of postoperative nausea and vomiting. A meta analysis. Anesthesiology 1996;85:1055–62.
[47] Tramer M, Moore A, McQuay H. Meta analysis of prophylactic antiemetic efficacy for postoperative nausea and vomiting: propofol anaesthesia vs. omitting nitrous oxide vs. total i.v. anaesthesia with propofol. Br J Anaesth 1997;78:256–9.
[48] Sukhani R, Lurie J, Jabamoni R. Propofol for ambulatory gynecologic laparoscopy: does omission of nitrous oxide alter postoperative emetic sequela and recovery? Anesth Analg 1994;78:831–5.
[49] Moore TM, McQuay A. Omitting nitrous oxide in general anesthesia: meta analysis of intraoperative awareness and postoperative emesis in randomized controlled trials. Br J Anaesth 1996;76:186–93.
[50] King ML, Milaziewicz R, Peacock AR. Influence of neostigmine on postoperative vomiting. Br J Anaesth 1988;61:403–6.
[51] Ding Y, Fredman B, White PF. Use of mivacurium during laparoscopic surgery: effect of reversal drugs on postoperative recovery. Anesth Analg 1994;78:450–4.
[52] Watcha MF, Safavi FZ, McCulloch DA, et al. Effect of antagonism of mivacurium-induced neuromuscular block on postoperative emesis in children. Anesth Analg 1995;80:713–7.
[53] Tang J, Joshi GP, White WF. Comparison of rocuronium and mivacurium to succinylcholine during outpatient laparoscopic surgery. Anesth Analg 1996;82:994–8.
[54] Yogendran S, Ashokumar B, Cheng DCH, et al. A prospective randomized double-blinded study of the effects of intravenous fluid therapy on adverse outcomes on outpatient surgery. Anesth Analg 1995;80:682–6.

[55] Fortney J, Graczyk S, Creed M, et al. A comparison of ondansetron and droperidol as prophylactic antiemetic therapy for elective surgical procedures. Anesthesiology 1997;87:A21.
[56] Tang J, Watcha M, White PF. A comparison of costs and efficacy of ondansetron and droperidol as prophylactic antiemetic therapy for elective outpatient gynecologic procedures. Anesth Analgesia 1996;83:304–13.
[57] Pandit SK, Kothary SP, Pandit UA, et al. Dose-response study of droperidol and metoclopramide as antiemetics for outpatient anesthesia. Anesth Analg 1989;68:798–802.
[58] Watcha MF, Bras PJ, Cieslak GD, et al. The dose-response relationship of ondansetron in preventing postoperative emesis in pediatric patients undergoing ambulatory surgery. Anesthesiology 1995;82:47–52.
[59] Pueyo FJ, Carrascosa F, Lopez L, et al. Combination of ondansetron and droperidol in the prophylaxis of postoperative nausea and vomiting. Anesth Analg 1996;83:117–22.
[60] McKenzie R, Lim NT, Riley TJ, et al. Droperidol/ondansetron combination controls nausea and vomiting after tubal ligation. Anesth Analg 1996;83:1218–22.
[61] Sun R, Klien KW, White PF. The effect of timing of ondansetron in outpatients undergoing otolaryngologic surgery. Anesth Analg 1997;84:331–6.
[62] Paxton LD, McKay AC, Mirakhur RK. Prevention of nausea and vomiting after day case gynecological laparoscopy. A comparison of ondansetron, droperidol, metoclopramide and placebo. Anaesthesia 1995;50:403–6.
[63] Watcha MF, Smith I. Cost-effective analysis of antiemetic therapy for ambulatory surgery. J Clin Anesth 1994;6:370.
[64] Schneider M, Ettlin T, Kaufman M, et al. Transient neurological toxicity after hyperbaric subarachnoid anesthesia with 5% lidocaine. Anesth Analg 1993;76:1154–7.
[65] Sjostrom S, Blass J. Severe pain in both legs after spinal anesthesia with hyperbaric 5% lidocaine solution. Anaesthesia 1994;49:700–2.
[66] deJong R. Last round for a 'heavy weight'? (editorial). Anesth Analg 1994;78:3–4.
[67] Hampl KF, Schneider MC, Thorin D. Hyperosmolarity does not contribute to transient radicular irritation after spinal anesthesia with hyperbaric 5% lidocaine. Reg Anesth 1995;20:363–8.
[68] Hampl KF, Schneider MC, Pragger H, et al. A similar incidence of transient neurologic symptoms after spinal anesthesia with 2 and 5% lidocaine. Anesth Analg 1996;83:1051–4.
[69] Pollock JE, Neal JM, Stephenson CA. Prospective study of the incidence of transient radicular irritation in patients undergoing spinal anesthesia. Anesthesiology 1996;84:1361–7.
[70] Freedman J, Li D, Jaskela M, et al. Risk factors for transient neurologic symptoms after spinal anesthesia. Anesthesiology 1996;85:A741.
[71] Vaghadia H, McLeod DH, Mitchell GWE, et al. Small-dose lidocaine–fentanyl spinal anesthesia for short duration laparoscopy. A randomized comparison with conventional dose hyperbaric lidocaine. Anesth Analg 1997;84:59–64.
[72] Vaghadia H, Berrill A, Viskari D, et al. Walk-in walk-out spinal anaesthesia for outpatient laparoscopy. 12th Annual Meeting of SAMBA, Orlando, FL, 1–4 May, 1997.
[73] Lau WC, Green CR, Faerber GJ, et al. Intrathecal sufentanil for extracorporeal shockwave lithotripsy provides earlier discharge of the outpatient than intrathecal lidocaine. Anesth Analg 1997;84:1227–31.
[74] Ben-David B, Levin H, Solomon E, et al. Spinal bupivacaine in ambulatory surgery: the effect of saline dilution. Anesth Analg 1996;83:716–20.

ELSEVIER

Ambulatory Surgery 6 (1998) 13–15

Ambulatory Surgery

A comparison of the analgesic effects of femoral nerve block and intra-articular bupivicaine in day case operative knee arthroscopy

C.E.R. Gibbons [a,*], N. Nandakumar [a], G. Samsoon [a], H. Olearnik [b], M.J. Curtis [a]

[a] *Department of Orthopaedics and Anaesthesia, Kingston Hospital, Galsworthy Road, Kingston upon Thames, Surrey, KT2 7QB, UK*
[b] *National Institute of Epidemiology, University of Surrey, Surrey Research Park, Guildford, Surrey, GU2 SYD, UK*

Accepted 3 September 1997

Abstract

A double blind prospective study of 50 patients undergoing operative day case knee arthroscopy was performed. Each patient received either intra-articular bupivicaine or a femoral nerve block (FNB) after the operative procedure. Pain scores were recorded pre- and post-operatively at rest and found to be reduced in the FNB group. Time to first dose of analgesia was also prolonged in the FNB group. No major complications were recorded and no patient required overnight stay.

Keywords: Day surgery; Knee arthroscopy; Femoral nerve block

1. Introduction

Knee arthroscopy is an accepted day case procedure. The success of day case surgery is partly dependent on the control of post-operative pain. Intra-articular local anaesthetic with or without an opioid is frequently used to reduce post-operative pain [1,2]. However, a recent study by Laurent et al. showed no increased analgesic effect by the addition of morphine to intra-articular bupivicaine [3].

In this study the analgesic effects of intra-articular bupivicaine are compared with a femoral nerve block (FNB). Only patients undergoing operative knee arthroscopy were included. All operations were performed by one consultant surgeon or one of his team. The same consultant anaesthetist was involved throughout the study and performed all the FNB's.

2. Method

A double blind, randomised study was performed on 50 patients undergoing operative day case knee arthroscopy at Kingston Day Case Unit. Written informed consent was obtained from each patient.

All patients had a general anaesthetic and either received intra-articular bupivicaine (20 mls of 0.5%) or a FNB (20 mls of 0.5%) at the end of the operative procedure. Neither the patient or operating surgeon were aware of the type of analgesia used.

Twenty five patients were randomised to receive a FNB. This was administered by the same consultant anaesthetist with the aid of a nerve stimulator. Twenty five patients received intra-articular bupivicaine.

Pain scores were recorded pre and post-operatively at rest using a visual analogue scale (0 to 100 mm). Pain scores were recorded at 1 and 4 h after operation in the day unit, and at 12 and 24 h at home. Co-dydramol was prescribed to each patient to take home and use as required.

* Corresponding author. Present address: 55B Mill street, Kingston upon Thames, Surrey KT1 2RG, UK.

0966-6532/98/$19.00
PII S0966-6532(97)10005-1

Figure 1 - Patient Data

	FNB	Intra-Articular Bupivicaine
Meniscectomy	20	17
Debridement	5	7
Synovial Biopsy	-	1
Age (Mean)	38	41
Sex (M : F)	19 : 6	17 : 8

Fig. 1. Patient data.

The patients were phoned the next day to record pain scores, time to first dose of oral analgesia, and to ascertain patient satisfaction and the presence of numbness or heaviness in the leg.

3. Results

3.1. Patient data

Fifty patients were included in the study, with an equal number either receiving intra-articular bupivicaine or FNB. The mean age and sex difference were similar in both groups (Fig. 1).

3.2. Pain scores

Mean pain scores using the visual analogue scale were compared between the two groups (Fig. 2).

Mean pain scores were less in the FNB group, with statistical significance at 4 and 12 h post-operatively using the paired t-test ($P < 0.05$). There was no statistical difference at 1 and 24 h.

3.3. Time to first dose of oral analgesia

The mean time to first dose of oral analgesia was prolonged in the FNB group (10 h) compared to the other group (6 h).

3.4. Patient satisfaction

In both groups the majority of patients were satisfied with post-operative analgesia (92% in FNB group and 88% with intra-articular bupivicaine). A total of 92% after direct questioning had numbness and heaviness in the operated leg in the FNB group, consistent with femoral nerve blockade.

3.5. Post-operative complications

No post-operative complications were recorded in either group.

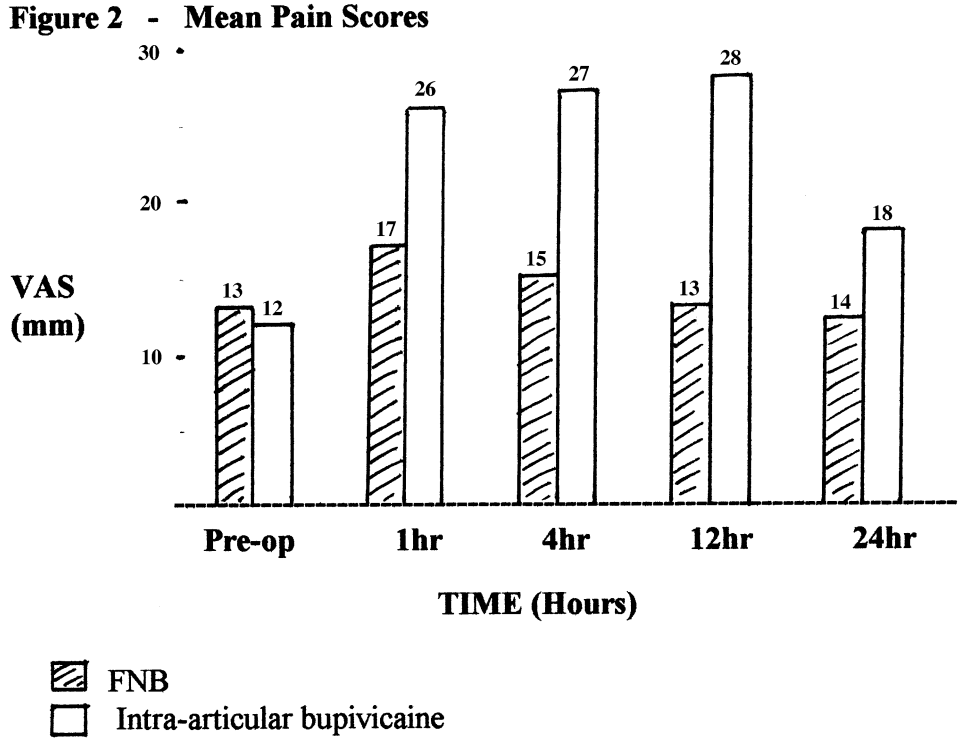

Fig. 2. Mean pain scores.

4. Discussion

Intra-articular bupivicaine is frequently used for post-operative analgesia in day case knee arthroscopy [1,2]. To our knowledge the use of a FNB in day case arthroscopy has not been compared with intra-articular local anaesthetic in patients undergoing general anaesthesia.

Mean pain scores were shown to be lower in the FNB group, and statistical significance shown at 4 and 12 h post-operatively. The time to first dose of oral analgesia was also prolonged in this group, which may possibly be a more sensitive indicator of post-operative analgesia [4].

In both groups a large number of patients were satisfied with post-operative analgesia. A total of 92% of patients with an FNB recorded heaviness and numbness in the operated leg after direct questioning. This corresponded to a successful FNB with quadriceps paralysis and numbness in the sensory distribution of the femoral nerve.

Prolonged motor weakness for up to 36 h has been recorded by Madej et al. [5], after femoral nerve blockade, but there were no cases of prolonged block in our series. A possible cause for this is intra-neural injection of local anaesthetic.

5. Conclusion

Both groups in our study recorded satisfaction with post-operative analgesia after day case knee arthroscopy procedures. Advantages in the FNB group included lower mean pain scores and prolonged time to oral dose of analgesia. Disadvantages included symptoms of heaviness and numbness in the operated leg. All patients in the FNB group were able to mobilise and were discharged within a few hours of operation.

With the increasing use of our day case unit for lower limb operative procedures, the use of femoral nerve blockade may have potential in more invasive knee procedures, including arthroscopic anterior cruciate ligament reconstruction.

References

[1] Hughes DG. Intra-articular bupivicaine for pain relief in arthroscopic surgery. Anaesthesia 1985;40:821.
[2] Keading CC, Hill JA, Katz J, Benson L. Bupivicaine use after knee arthroscopy: pharmacokinetics and pain control study. Arthroscopy 1990;6:33–9.
[3] Laurent SC, Nolan JP, Pozo JL, Jones CJ. Addition of morphine to intra-articular bapivicaine does not increase analgesia after day case knee arthroscopy. Br J Anaesth 1994; 72:170–3.
[4] White AP, Laurent SC, Wilkinson DJ. Intra-articular and subcutaneous prilocaine with adrenaline for pain relief in day case arthroscopy of the knee joint. Ann R Coll Surg Eng 1990;72(1):300–52.
[5] Madej TH, Ellis FR, Halsall PJ. Prolonged femoral nerve block with 0.5% bapivicaine. Anaesthesia 1988;43:607–8.

ELSEVIER

Ambulatory Surgery 6 (1998) 17–20

Ambulatory Surgery

Day surgery—the future

Lindsay Roberts

Internatonal Association for Ambulatory Surgery, Suite 1, 2A Mona Road, Darling Point NSW 2027, Australia

Received 31 July 1997; accepted 6 September 1997

Abstract

Day surgery in Australia continues to expand but has not reached its potential of 60% of procedures. The concept of extended recovery for appropriate day surgery patients, involving overnight stay, was recently unanimously supported by the Australian Day Surgery Council. This should provide a significant stimulus for the further expansion of day surgery. There has been no formal undergraduate or postgraduate teaching of day surgery and this needs to be addressed. © 1998 Elsevier Science B.V. All rights reserved.

Keywords: Ambulatory (day) surgery; Extended recovery; Education

The concept of day surgery as a high quality, safe procedural service is now well established in Australia and there has been rapid expansion in the past 5 years.

Day surgery services are provided in hospital based units, private and public, as well as in free-standing centres. Some hospitals have constructed separate free-functioning day surgery units. However in many hospitals this ideal situation does not exist and day surgery patients are mixed with overnight stay patients.

The cost advantage of day surgery is best achieved in free-standing centres or totally free-functioning units within acute bed hospitals. The number of free-standing day surgery/procedure centres has almost doubled since 1993. As indicated in Table 1, there were 83 free-standing day surgery/procedure centres registered with the Commonweath Government in January 1993 and this increased to 139 by January 1996. The greatest number of these centres are of multi-disciplinary type, but there has been a notable increase in the number of day eye surgery centres.

In Australia at the present time approximately 40% of operations are carried out as day surgery, although it is generally accepted that 60%, and possibly more, of surgical operations can be treated this way.

In 1992, the Australian Day Surgery Council identified 18 commonly performed operations which, at that time, were mostly carried out as overnight(s) stay surgery in acute bed hospitals. There has been an increase in the proportion of day surgery for these procedures from 1993 to 1996, as indicated in Table 2

Table 1
Free-standing day procedures centres in Australia

Population 18 million	January 1993	January 1996
Day surgery centres	36	67
Endoscopy centres	23	29
Day plastic surgery	10	7
Day eye surgery	3	18
Day ENT Surgery	—	1
Day medical centres	11	17
In vitro fertilization	2	3
Oncology	1	1
Cardiac clinic	1	1
Sleep disorders	1	2
Sports medicine	1	1
Rehabilitation	1	—
Dental	—	1
Medical/diagnostic	4	8
Total	83	139

PII S0966-6532(97)10004-X

Table 2
Selected procedures for transfer to day surgery

Description	% Day only	
	1993	1996
Breast excision of cyst or fibroadenoma or other local lesion	37.2	66.3
Breast excision of cyst, fibroadenoma or other lesion where frozen section is performed	38.6	68.4
Femoral or inguinal hernia or infantile hydrocoele repair of…	13.2	13.0
Umbilical epigastric or linea alba hernia repair < 10 years of age	44.9	86.9
Pilonidal sinus or cyst or sacral sinus or cyst excision <10 years of age	10.7	11.5
Varicose veins, multiple ligation; one leg	30.7	30.8
Varicose veins high ligation and complete stripping; one leg	5.6	10.9
Cystoscopy with urethroscopy; not associated with any other urological endoscopic procedure	47.2	83.8
Cystoscopy with ureteric catheterisation	43.8	70.0
Cystoscopy with one or more ureteric dilation, insertion or ureteric stent, biopsy	29.0	38.5
Cystoscopy, with ureteric catheterisation, unilateral or bilateral	38.2	69.3
Cystoscopy, with biopsy of bladder	44.6	77.5
Hysteroscopy with dilation of cervix under GA	48.9	91.0
Hysteroscopy with endometrial biopsy or suction curettage or both	61.4	91.1
Hysteroscopy with uterine adhesiolysis or polypectomy or tubal catheterisation or R/O IUD	66.3	88.9
Lens extraction and artificial insertion	30.5	50.0
Squint operation for one or both eyes involving one or two muscles	37.8	63.8
Lop ear, bat ear or similar deformity correction of	27.3	40.8

Data provided by Medibank Private.

(this data applies to private insured patents and was provided by Medibank Private). Nevertheless, the levels of day surgery for some of these procedures is unacceptably low.

It is frequently stated by surgeons that many patients having intermediate type operations have not sufficiently recovered or are not comfortable enough to be discharged on the same day as the operation. These patients require an extended period of recovery involving overnight stay, e.g. many laparascopic abdominal operations, anorectal operations, cataract/lens replacement operations and tonsils.

The Australian Day Surgery Council, at a meeting on the 12th October 1996, unanimously supported the concept of extended recovery for day surgery and this will include overnight stay. Very importantly, it will be necessary to provide specifically constructed/modified recovery units for such patients and these can be attached to free-standing centres or hospital based units. These extended recovery units would be of 'hotel type' and not the typical highly sophisticated and serviced acute hospital bed accommodation.

In view of this important decision, Council considered it was essential to define all facets of day surgery, and at a subsequent meeting on 28 February 1997, the following definitions applying to day surgery were identified.

Office or outpatient surgery/procedure: An operation/procedure carried out in a medical practitioner's office or outpatient department other than a service normally included in an attendance (consultation), which does not require treatment or observation in a day surgery/procedure centre (facility) or unit, or as a hospital patient.

Day surgery/procedure: An operation/procedure, excluding an office or outpatient operation/procedure, where the patient would normally be discharged on the same day.

Day surgery/procedure patient: A patient having an operation/procedure excluding an office or outpatient operation/procedure who is admitted and discharged on the same day.

Day surgery centre (facility): A registered[1] centre (facility) designed for the optimum management of day surgery/procedure patient.

Day surgery/procedure—extended recovery patient: A patient treated in a registered day surgery/procedure centre (facility) or unit, free-standing or hospital based, who requires extended recovery including overnight stay before discharge.

Extended day surgery/procedure recovery centre/unit: Purpose constructed/modified patient accommodation, free-standing or within a registered day surgery centre (facility) or hospital, specifically designed for the extended recovery of day surgery/procedure patients, and registered with Commonwealth/State Governments for this purpose.

Limited care accommodation: Hotel/hostel accommodation for day surgery/procedure patients where professional health care is available on a call basis.

Hotel/hostel accommodation: Accommodation for day surgery/procedure patients without proffesional health care, when required for domestic, social or travel reasons.

1. Office-based procedures

A number of minor operations/procedures carried out under local anaesthetic, minor oral sedation or without anaesthetic, are suitable to be carried out as office-based procedures.

Until the present time, there has been a major disincentive for medical practitioners to carry out office-based surgery as there is no health insurance facility

[1] Registered with Commonwealth/State Governments.

rebate for these procedures with the costs of providing this service carried by either the patient or the medical practitioner. The recent more acute awareness of anti-infection standards necessitating the use of autoclaves, together with the steady increase in overall costs, has increased this disincentive.

Legislation in the Australian Capital Territory (The Skin Penetration Procedures Act 1994) came into force in mid 1995. This Act provides for minimal anti-infection standards and applies to any procedure or operation where the skin is penetrated. In summary, under the Act it will be compulsory to have a certificate of accreditation where these office-based procedures/operations are carried out and the Act applies to medical practitioners (general and specialist), dentists and other practitioners, such as acupuncturists and tattooists.

It is understood that other States are considering the introduction of legislation and accreditation processes for office-based surgery similar to that which has been introduced into the ACT.

As a result of these influences, it is now imperative that an office-based facility rebate be introduced into the Medicare Schedule of Rebates. It would be inappropriate for such a rebate to be paid by private health insurance funds, as they now only cover about one third of the population. Furthermore, private health insurance funds may only pay facility rebates for services provided at hospitals or registered free-standing day surgery centres.

2. Extended recovery units for day surgery

Many patients having intermediate type operations are not being treated in day surgery at the present time because they are considered to be insufficiently recovered to be discharged on the day of operation. Some elderly patients, with inadequate social back-up, may also be unsuitable for discharge on the day of surgery. Such patients require an extended period of recovery and this would involve overnight stay.

The standard recovery rooms of operating complexes, be they free-standing centres or hospital-based day surgery units, do not provide appropriate accommodation for an extended period of recovery.

Specifically designed and constructed/modified extended recovery units with hotel type facilities are required for these patients. At existing free-standing day surgery centres these would mostly be additions to the existing structures as most centres do not have enough space to construct them within the centre. New free-standing centres could design and construct the extended recovery unit as an integral part of the day surgery centre. It would be much easier in hospitals to reallocate and modify existing sections of the hospital as day surgery extended recovery units.

It is emphasised that these extended recovery units should be of hotel type and do not require the sophisticated and expensive acute hospital wards/rooms, with inbuilt resuscitation and related equipment. The capital and running costs of these units would therefore be considerably less than acute bed hospital accommodation.

Patients in these units would be supervised by appropriately trained nurses.

A further option is the development of unsupervised hotel/hostel aocommodation for day surgery/procedure patients, with or without on call professional health care.

In respect of these day surgery options, the paramount principle is reiterated, that the choice of procedure and the operation venue must remain the responsibility of the surgeon and/or anaesthetist.

3. Education

There has been very little formal education of medical practitioners up to the present time on the subject of day surgery, neither undergraduate nor postgraduate, and this needs to be addressed. Specific anaesthetic and surgical techniques are necessary if patients are to make a rapid recovery from operations so that they are fit for discharge either on the same day, or the following day for extended recovery patients.

It is suggested that a segment on day surgery practice be introduced into the final year undergraduate medical course. Free-standing day surgery centres, with their high daily number of patients, have a wealth of clinical material which, at the present time, is not utilised in either undergraduate or postgraduate teaching. Secondment of undergraduate medical students and resident medical officers in their early postgraduate years to selected day surgery centres deserves serious consideration.

The inclusion of day surgery in postgraduate specialist courses for surgeons and anaesthetists should also be considered.

4. Recommendations

On the basis of the above comments, the following recommendations are made:

- The introduction of a Medicare facility rebate for office-based operations/procedures.
- Commonwealth and State Government support for the development of extended recovery day surgery units.

- The inclusion of day surgery in undergraduate and postgraduate medical education.

5. Conclusion

Introduction of the abovementioned recommendations would provide a major stimulus for the expansion of day surgery to achieve its potential of 60%, if not more, of all surgical operations/procedures, and eliminate the serious disincentive that currently exists for office-based operations/procedures.

Acknowledgements

The author gratefully acknowledges the Commonwealth Department of Health and Community Services and Medibank Private for providing the data in Tables 1 and 2.

ELSEVIER

Ambulatory Surgery 6 (1998) 21–23

Ambulatory Surgery

Quality control in outpatient surgery: what data are useful?

M.-C. Marti *, B. Roche

Outpatient Clinic for Surgery, University Hospital of Geneva, 1211 Geneva 14, Switzerland

Received 29 August 1997; accepted 16 September 1997

Abstract

Quality control is mandatory, not only for inpatients but also for ambulatory surgery. We propose a list of indices which respond to the key properties of health care that have been defined by Donabedian. These indices should be part of a computerized quality control program which allows comparative evaluation between different centers.

Keywords: Quality control; Outpatient surgery; Donabedian

1. Introduction

Quality assessment and measuring quality care have gained importance in most Western societies for several different reasons. Quality control (QC) is not new; every surgeon, every clinic or department and every hospital has for centuries published their results in the form of statistics of mortality and morbidity as well as their success rates. Today, due to the rising costs of health care, politicians, health organizations, insurance companies, patients' associations and any money provider involved in the field of medicine want to have exact data and indicators about the quality of care and the state of the art. These indicators should allow comparisons, better control and follow-up of the status and performance of any single physician or of any medical institution. We can no more say 'we did our best…' but we must be able to prove that 'we did the best today achievable and if not, why?'.

This concept gives rise to accreditation systems, to guidelines and to the definition of standards. This concept also allows political authorities to reorientate the health care system, to adapt their funding and to organize hospital-wide surveillance activities.

Quality assessment begins with measuring the patient's access to the health care system and proceeds to involve their experience within the system until discharge.

Quality control means continuous evaluation of structure, process and outcome.

2. Key properties of health care

Donabedian [1] defined the key properties of health care that have to be monitored to ensure quality:

Effectiveness: the ability to attain the greatest improvements in health now achievable by the best care.

Efficiency: the ability to lower the cost of care without diminishing attainable improvements in health.

Optimality: the balancing of costs against the effects of care on health (or on the benefits of health care, meaning the monetary value of improvements in health) so as to attain the most advantageous balance.

Acceptability: conformity to the wishes, desires and expectations of patients and responsible members of their families.

* Corresponding author.

0966-6532/98/$19.00
PII S0966-6532(97)10006-3

Legitimacy: conformity to social preferences as expressed in ethical principles, values, norms, mores, laws and regulations.

Equity: conformity to a principle that determines what is just or fair in the distribution of health care and of its benefits among the members of a population.

Most of the published data concerns hospital inpatients and hospital stays. There does not appear to be any information concerning only surgical outpatients. We therefore tried, according to these definitions of key properties, to develop some index which may be routinely calculated to control the quality of an outpatient surgical facility. These indices are outlined below.

3. To prove the effectiveness of ambulatory surgery in an outpatient facility

Number of preoperative and postoperative complications: these complications should be listed in the anaesthetists' records and in the clinical notes after any surgical procedure. Improvement and QC should help in reducing the incidence of complications to a minimum, ideally nil.

Number of secondary and unplanned hospitalizations and their reasons: if a surgical procedure has been planned as an outpatient procedure, every secondary hospitalization means a failure in the selection system or occurrence of a complication. A reduction of the numbers of secondary hospitalizations means improvement in the selection system.

Time off work and the comparison between inpatients and outpatients operated on for an identical lesion: we should be able to demonstrate that ambulatory surgery results in a reduced time off work, not only because hospitalization is avoided but also because patient's fears are diminished. Comparison should be established in one institution between all patients, inpatients and outpatients, treated for the same condition.

Number of postoperative appointments until complete healing: for one type of surgical procedure, any reduction in the number of postoperative appointments means an increase in security and a better control and prevention of complications.

Number of postoperative emergency calls: a reduced number of postoperative emergency calls means that patients were well selected and prepared to undergo surgery as an outpatient.

4. To prove the efficiency of ambulatory surgery in an outpatient facility

Theatre occupation rate: a theatre devoted exclusively to outpatient surgery should demonstrate a high occupation rate. Time between two procedures should be as low as possible. Occupation rate, therefore, gives precise information about the quality of management.

Cancellation rate: if patients are well selected and well informed about the procedure they will undergo, the cancellation rate will be low.

Evaluation of the number of inpatients and outpatients operated on for an identical lesion: one of the aims of ambulatory surgery is to reduce the number of inpatient hospital stays. It is therefore necessary to analyze precisely the number of patients treated for the same condition as inpatients and as outpatients. Any rise in the proportion of outpatients tends to prove the efficiency of such an approach.

Evolution of a comparative ratio between expenses and billed incomes: the efficiency of management can be estimated by any reduction in this ratio and also for a given ratio larger than the number of patients treated.

Number of hospital days saved because of ambulatory surgery: one of the justifications of ambulatory surgery is that the number of days of hospital stay may be saved. For one surgical procedure, mean hospital stay multiplied by the number of outpatients treated for the same condition gives the number of days of hospitalization which are saved. These numbers may be criticized as patients treated as inpatients are probably in worse condition, frailer and older than the outpatients.

5. To prove the optimality of ambulatory surgery in an outpatient facility

Comparative costs of ambulatory and inpatient surgery linked to various surgical procedures: only real costs should be considered and not lump amounts payed by insurances or fees for 1-day-stay. To be exhaustive, the cost for one given procedure should also include the cost of postoperative treatment for outpatients as well as posthospital costs for inpatients and costs resulting from time off work. Optimality of outpatient treatment can be demonstrated if costs are reduced per case as well as for a given case-mix.

6. To prove the acceptability of ambulatory surgery in an outpatient facility

Number and percentage of non-attending patients: the number and percentage of patients planned for an outpatient procedure who don't attend the facility should be as low as possible in order to keep the theatre occupation rate as high as possible and to avoid any last minute change in the operative pro-

gram. Patients don't attend for involuntary reasons (intercurrent disease, death, familiar problems, transportation failure, etc.) which are unavoidable and for reasons like patient's fear or incorrect psychological preparation which can be controlled and reduced by better preoperative evaluation and information.

Adequacy of postoperative analgesia: postoperative analgesia is one of the most difficult problems we have to deal with in outpatient surgery as it is very patient related. Could pain be controlled? Was pain bearable? If 'yes' treatment is adequate.

Patient satisfaction index: patient satisfaction may be estimated in different ways. Patient satisfaction does not always equal surgeon satisfaction but is an important component of any quality control program. Telephone follow-up surveys or patient satisfaction questionnaires may be developed to analyze all the different phases of the organization. These should be undertaken continually in order to identify precisely what can be done to improve patient satisfaction.

7. To prove the legitimacy of ambulatory surgery in an outpatient facility

Family satisfaction index: is the patient's family satisfied by the outcome following outpatient surgery? Was the family able to take care of the patient? Would things be easier for them if the patient had stayed in the hospital? Family satisfaction should be as high as possible and efforts continually made to improve it.

8. To prove the equity of ambulatory surgery in an outpatient facility

Comparative index of in/outpatient with or without private insurance treated for the same condition: to prove that everybody has easy access to outpatient surgery and that no bias results from the insurance system, we should determine for each condition how many patients with and without private insurance were treated as inpatients and as outpatients. The proportion of patients with or without private insurance should be the same in both groups of inpatients and outpatients if there is no financial bias.

9. Conclusions

The indices we propose will be part of a permanent computerized quality control program we are developing for our outpatient surgical center. We think that each outpatient surgical center should develop and use some quality control indices in order to compare their own results with those of other centers. It is also important that reliable data and indices help not only the management but also the physicians, nurses and all personnel involved in an outpatient facility to improve outpatient care.

References

[1] Donabedian A. Defining and measuring the quality of health care. In: Wenzel RP, editor. Assessing Quality Health Care. Baltimore: Williams and Wilkins, 1992:41–64.

ELSEVIER

Ambulatory Surgery 6 (1998) 25–28

Ambulatory Surgery

Outpatient proctological surgery

M.-C. Marti *, B. Roche

Outpatient Clinic for Surgery, University Hospital of Geneva, Geneva, Switzerland

Received 29 August 1997; accepted 16 September 1997

Abstract

Outpatient proctological surgery is feasible if patients are carefully selected, if surgery is meticulous, if postoperative wound care is optimal, if postoperative analgesia is adequate and if patients confidence is established. An 18 year experience has proven to us that 70% of anal canal surgery can be done on an outpatient basis using local or posterior perineal block anesthesia with a low complication rate of 0.5%. Proctological surgery can be done on an outpatient basis with the same success rate as any other day case procedure.

Keywords: Outpatient; Proctological surgery; Postoperative

1. Introduction

Today, many surgical procedures are performed on an outpatient basis or ambulatory basis. There are several reasons for this (Table 1).

Patients are usually anxious about proctological surgery, as they fear postoperative pain.

Can the good results observed after outpatient surgery in many other surgical specialities be expected after surgical proctology?

To give an answer to this question we will present our own experience at the Outpatient Clinic for Surgery at the University Hospital of Geneva.

We have been running an outpatient clinic for proctology since 1976. With increasing experience and confidence more surgical procedures have been performed on an outpatient basis.

The development of posterior perineal block anesthesia has allowed us to operate on more patients of any age, with a reduced risk of complication.

Table 1
Advantages of outpatient surgery

Patients life is only minimally disturbed
Patient anxiety is lessened
Reduced rate of nosocomial infections
Better administrative management of operative programme
Earlier return by the patient to normal activities
Time off work is reduced
Costs of outpatient surgery are less than for inpatient surgery
Overall health expenditure is reduced
Hospital beds can be occupied by more severe cases

2. Selection criteria

As for any ambulatory procedure, patients are selected according to precise and well established social and medical criteria (Table 2)

Any patient fulfilling these criteria may be considered for ambulatory surgery.

Laboratory investigations are not routinely performed before local anesthesia, posterior perineal block or caudal block. In special cases, blood samples are analyzed according to the patients medical conditions.

* Corresponding author.

0966-6532/98/$19.00
PII S0966-6532(97)10010-5

Table 2
Selection criteria

Age <60 years (relative contraindication)
ASA I and ASA II
Any severe concommitant medical condition should be well controlled (diabetes, hypertension, angina, etc.).
Patient should not take any anticoagulant medication
Patients should have a positive attitude towards outpatient surgery
Patient should not be at home alone during the first 24 h postoperatively
Family should be willing to participate in the postoperative treatment
Social circumstances should be adequate
Patient should have easy access to a bathroom and toilet
Telephone should be accessible
Patient should not drive postoperatively
Distance from home to hospital should not be >60–100 km
Transportation facilities should be available in case of emergency or complications
Hospital or medical facilities should be accessible 24 h a day

3. What procedures?

Many proctological surgical procedures can be considered. They concern the anal margin, anal canal and lower rectum. They should not require complicated and time consuming postoperative care, special dietetic measures or result in any risk of major secondary bleeding. Table 3 give a list of possible procedures:

The patient should be completely informed about the procedure and possible complications.

Strict recommendations should be given to the patient about postoperative care, local hygienic measures, dressings, consumption of alcoholic beverages, painkiller medication, physical exercise and driving.

According to national regulations, a consent form should be filled and signed by the patient.

4. Anesthesia and preoperative measures

Most of our cases are performed under local anesthesia or a posterior perineal block. Caudal block is used in cases of extensive septic lesions but in the absence of any pilonidal sinus.

We do not routinely use any premedication. Only in very anxious patients we give 5–10 mg diazepam orally, 30 min before surgery. The patient should not be fasting. The patient is asked to pass stool and urine before the operation. Neither enema nor preoperative laxative is used.

In the case of a caudal block, intravenous access is obtained.

A resuscitation emergency kit and monitoring facilities are always available.

5. Practical organisation

The patient comes to the proctologic clinic minutes before the planned time for surgery. He takes his clothes off and is put on the operating table in the lithotomy position. The operative field is not shaved. After disinfection, the anesthetic is given. The surgical procedure is carried out. After surgery, we show to the patient, by means of a video camera and a monitor, how the wounds are and how he should treat them and apply an adequate dressing. The patient immediately leaves the theater, dresses and is allowed to go to the hospital cafeteria. A total of 40–60 min later he is called back and the wound is checked by the nurse. The dressing is renewed, if necessary, by the nurse to insure that there is no bleeding. The patient receives a leaflet about postoperative care after proctological surgery and a detailed prescription for sitting baths or showers, dressings, local ointments, pain killers and a bulk forming laxative. An appointment is planned for the fifth postoperative day. Altogether, the patient leaves the hospital within 60–90 min. In case of a complication, a phone number is communicated to the patient, which he may call 24 h a day.

6. Postoperative care

The patient is instructed to take, 3–4 times a day, a shower or a sitting bath to keep the wounds clean. Contact with faeces increases postoperative pain. The application of some wound healing ointment may be useful. Systemic antibiotics are administered preoperatively in case of extensive cellulitis, in patients suffering from heart valve insufficiency or those who have undergone prosthetic valvular replacement.

Table 3
Possible outpatient surgical procedures

Excision of thrombosed perianal hemorrhoids
Semi-closed and closed hemorroidectomy
Sphincterotomy
Fissurectomy
Skin tag excision
Abscess drainage
Seton drainage
Fistulotomy
Fistulectomy
Slinding flaps
Anoplasty
Perianal skin flaps
Correction of anal stenosis
Correction of Whitehead deformity
Anal warts excision
Polypectomies
Excision of low villous adenomas
Transanal excision of small rectal tumours
Pilonidal sinus surgery
Endoscopy with polypectomy

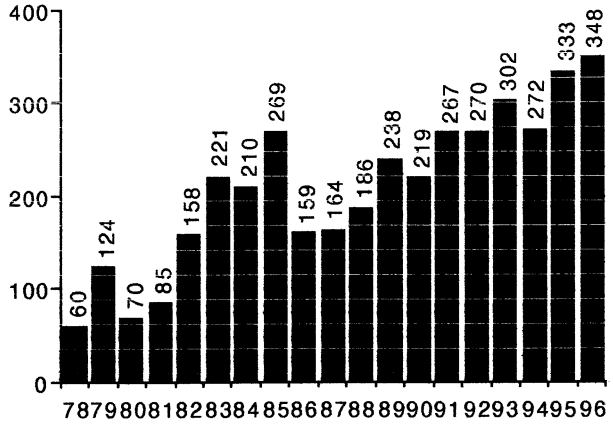

Fig. 1. Number of proctological outpatients procedure per year between 1978 and 1996.

To avoid straining at stools and to achieve daily anal stretching, we order bulk forming laxatives and taking paraffin oil.

The most complex postoperative problem is the control of pain. We routinely advise the patient to take, three times a day, some non steroidal anti-inflammatory drug (NSAID) and paracetamol. Tramadol is prescribed if patients are very sensitive and anxious and if the procedure may result in severe pain (e.g. extensive excision of fistulous tracts).

7. Our experience and results

We have run an outpatient clinic for proctology since 1976. From 1978 to 1996, an increasing number of patients were operated on yearly. Altogether 3955 procedures were performed (Fig. 1). These figures do not include:

1. Minor procedures performed during consultation such as endoscopy, haemorrhoidal sclerosis by injection or infrared coagulation, rubber band ligation and thrombectomies.
2. Procedures performed in the emergency station during the night when the proctological clinic is closed.
3. Major procedures requiring in every case, a hospital stay such as extensive rectal surgery, rectopexy, sphincter repair and colpomyoraphy.

During the last 10 years, 3996 procedures involving anal canal, with exclusion of minor cases mentioned above were performed. A total of 30% (1238) were inpatients and 70% (2758) were outpatients. The conditions are listed in Table 4.

Surgery was performed without mortality and without any infection. Complications (Table 5) were observed in 14 cases (0.5%). Thirteen patients had secondary bleeding on the day of surgery and 11 cases could be treated on an outpatient basis. Two patients required an overnight short stay in hospital (one after hemorroidectomy and one after fistulectomy). No bladder retention was recorded as a result of local anesthesia and there was no use of intravenous infusion.

One patient developed a fecaloma which required manual elimination and enemas.

Table 4
Conditions treated between 1986 and 1996

	Inpatients	Outpatients
Haemorrhoids	777	750
Fissure	46	450
Fistual in ano	292	515
Pilonidal sinus	16	602
Condyloma acuminata	35	222
Tumour, polyp	44	135
Anoplasty	15	16
Others	13	68
Total	1238	2758

8. Remaining problems

Our experience during the last 18 years has shown, that thanks to precise selection, proctological outpatient surgery is possible, safe and has a low complication rate. Furthermore, patient satisfaction is very high as they appreciate avoiding a hospital stay.

The biggest problem we are still facing is the postoperative pain control. We cannot determine preoperatively, if and how a patient will tolerate postoperative pain and if they are a very sensitive person. The intake of a NSAID just before surgery and for 3 days postoperatively seems to be very effective. NSAID should be use with paracetamol three to six times a day.

In case of more extensive and painful surgery, if patients are very sensitive, tramadol (Tramal R) is ordered as drops: 15–20 drops four to six times per day. The patient should take these drugs routinely and not wait until pain occurs or is unbearable. The complications resulting from these medications are very low. They do not result in acute constipation as would opiate analgesics, such as codeine.

Table 5
Complications after 2758 proctological outpatients procedures

Bleeding	13
	4 after fistulectomy
	6 after pilonidal sinus
	2 after hemorrhoidectomy
	1 after sphincterotomy
Infection	0
Fecaloma	1
Bladder retention	0
Hospital admission	2

Topical anesthetic ointments may be useful as an additive measure.

We still need more powerful painkillers with low side effects: no nausea and dizziness, no constipation, no blood pressure drop.

9. Conclusions

Careful patient selection, meticulous surgery, optimal postoperative wound care, adequate postoperative analgesia and patients confidence are mandatory to achieve successful proctological outpatient surgery. In our experience, 70% of anal surgery can be done on an outpatient basis using local or posterior perineal block anesthesia, with a low complication rate of 0.5%. Proctological surgery can be done on an outpatient basis with the same success as other day case procedure.

ELSEVIER

Ambulatory Surgery 6 (1998) 29–34

Ambulatory Surgery

The problem of pain after day-surgery haemorrhoidectomy

Francesco Gabrielli *, Marco Chiarelli, Angelo Guttadauro, Luca Poggi

University of Milan, I.R.C.C.S. Ospedale Maggiore Policlinico, Institute of General and Thoracic Surgery, I-20122 Milano, Italy

Received 18 September 1997; accepted 13 October 1997

Abstract

A total of 185 patients underwent day surgery haemorrhoidectomy with postoperative discharge after 24 h. An open technique (Milligan-Morgan) was adopted in 177 cases (97.8%) and a closed technique (Ferguson) in 8 cases (2.2%). In all cases, anaesthesia was achieved by the posterior perineal block: effective analgesia was obtained in 52.4% of the cases (very good and good analgesia) and postoperative analgesic effectiveness reached 5–10 h in most patients (49.2%), while in 9.2% of the cases analgesia was effective for up to 15 h or over. Innervation complexity and early wound stimulation make a painless haemorrhoidectomy impossible. It was not found that any particular surgical technique was superior to another. No evident advantages could be found in closed haemorrhoidectomies or laser/diathermic dissection nor was routine internal sphincterotomy found useful. Pain control was mainly entrusted to the action of pharmaceutical agents. In the operating theatre, the posterior perineal block can be followed by long term local anaesthetic or NSAIDs infiltration of muco-cutaneous wounds. During the postoperative period, lasting 30 days, pain assessment is not an easy task but this can be performed by Graphic Rating Scale. Pain at rest was moderate to acute during week 1 in 64.3% of the cases, while being light or absent in 35.7%. By week 2, pain had become moderate to acute in 29.2% of the patients, being light or absent in 70.8%. Finally, by week 3, only 10.8% of the patients reported moderate to acute pain (and this was due to complications ensuing such as haemorrhage or stenosis). Pain intensity increased at defecation, with 86% of the patients reporting acute moderate pain in week 1. A more gradual reduction of pain at evacuation was noted in later weeks compared to that at rest. Only in 2.7% of the cases did we have to resort to major analgesia during the first 24 h. In all other cases, NSAIDs (Ketorolac) sufficed with i.m. injections of 30 mg up to three times a day before discharge and 10 mg orally up to three times a day once the patient had returned home. Effective anaesthesia, competent surgery, a close follow up and regularly administered minor analgesics provide effective postoperative pain control after day surgery haemorrhoidectomy. As a result, the operation is no longer feared, as next to normal physical activity was reported towards the end of week 1 in 94.1% of the cases. Most patients expressed full satisfaction with their treatment 30 days after surgery.

Keywords: Haemorrhoidectomy; Surgery

1. Introduction

Haemorrhoidectomy pain assessment and control are of great importance, not only because of the frequency of the procedure, but also because patients are becoming increasingly aware of difficulties arising from a more autonomous and personally responsible management of the postoperative period. This growing awareness is due to the feasibility of day or short stay surgery. Immediate discharge or only a single night's hospitalisation means that the patient must cooperate more in dealing with postoperative problems [1].

The type of pathology, ano-perianal innervation complexity and open surgical wounds (nowadays, early bowel motion is commonly preferred) make painless haemorrhoidectomy almost impossible.

* Corresponding author. Tel.: +39 2 861097.

0966-6532/98/$19.00
PII S0966-6532(97)10008-7

2. Patients and methods

From March 1994 to February 1997, 185 patients were submitted to day surgery haemorrhoidectomy for 3rd and 4th degree haemorrhoids: 84 Milligan-Morgan haemorrhoidectomies, 41 Milligan-Morgan with posterior anoplasty, 34 Milligan-Morgan with skin bridge reconstruction, 18 Milligan-Morgan with lateral internal sphyncterotomy (coexistence of anal fissure) and 8 Ferguson haemorrhoidectomies.

The anaesthetic technique was the posterior perineal block (P.P.B.) described by Marti [1] and modified by us [2]. This consists of deep infiltration of the ischiorectal fossae and the retrorectal space (block of the pudendal nerves, the inferior haemorrhoidals and the anococcygeals) and perianal surface infiltration of superficial perineal branches (including the minor ischiatic). The anaesthetic mix used up to March 1996 (143 haemorrhoidectomies) was lidocaine (0.5–1%), sodium bicarbonate 1M and adrenaline (1:200 000). The last 42 haemorrhoidectomies were performed with a mix of mepivacaine (1%), sodium bicarbonate 1M and adrenaline (1:200 000).

So as to better assess intraoperative P.P.B. analgesic effectiveness, four levels were used: (A) very good, (B) good, (C) poor (an i.v. administration of 1–2 cc of fentanyl was necessary) and (D) conversion to general anaethesia.

Postoperative pain was assessed by a Graphic Rating Scale (0–10), containing a colour scale so as to provide the patient with a visual image in addition to the normal verbal indications set for each level: it was thought that such a method could at least partly solve the problem of obtaining more exact quantification of pain. To obtain yet more precision, a third parameter overlapping verbal and visual indications was included, using a numerical: 0, absence of pain; 1–3, light pain; 4–6, relatively moderate pain; 7–9, acute pain; 10, unbearable pain. At complete recovery (30 days postoperative), the patient was asked to define the pain he had suffered according to the three parameters adopted, verbal, visual and numerical. Pain was evaluated at different stages of the postoperative recovery period: during the first 24 h, during weeks 1, 2 and 3 of recovery, and distinguishing the pain suffered at rest during the day from that suffered at the act of defecation. Bowel motion was considered an important parameter and so as to reach early regular evacuation during the postoperative period, 15 ml of lactulose laxative were administered every day. When non-evacuation exceeded the 3rd day of the postoperative period, a stronger sennoside base catharthic was additionally administered. All patients were administered a routine analgesic dose of 30 mg i.m. of Ketorolac up to three times daily while in hospital and 10 mg b.m. up to three times daily on their homecoming. During the initial 24 h, only particularly worried or still suffering patients were administered a sublingual dose of 0.2 mg of buprenorphine.

3. Results

Of the 185 patients, 91 (49.2%) underwent surgery with optimum analgesic results, 80 (43.2%) with good analgesia, 14 (7.6%) requested administration of fentanyl e.v., while there were no cases requiring general anaesthesia. During the immediate postoperative period, analgesic effectiveness was <5 h in 60 cases (32.4%), 5–10 h in 91 cases (49.2%), 10–15 h in 17 cases (9.2%) and >15 h in 17 cases (9 2%).

A total of 143 (77.3%) patients were discharged on the 1st day, 34 (18.4%) were hospitalised for 2 days and 8 (4.3%) remained for 3 days.

During the first 24 h, 13 cases (7%) suffered from urinary retention and a Foley catheter was inserted, to be removed after 1 day in 12 cases and after 5 days in the case of a young woman. In 4 patients (2.1%) mild postoperative bleeding occurred from cutaneous wounds.

A total of 74 patients (40%) achieved spontaneous postoperative evacuation on the 1st day, 54 (29.2%) on the 2nd and 37 (20%) on the 3rd day. A total of 21 patients (11.3%) had to resort to a cathartic on the 4th day.

During the 1st week, only 37 (20%) reported acute daytime pain, while 82 patients (44.3%) found the pain relatively moderate; 55 (29.7%) reported light but tolerable pain and 11 (6%) absolutely no pain. By the 2nd week, only 13 (7%) still complained of strong pain, 41 (22.2%) moderate, 103 (55.7%) light and 28 (15.1%) did not report any pain whatsoever. By the 3rd week, only 3 (1.6%) of the patients (who had undergone further surgery for severe haemorrhage and this on the 8–9th day) reported acute pain, while 17 (9.2%) (using dilators for evidence of anal stenosis) reported moderate pain, 66 (35.7%) had light pain, and the majority 99 (53.5%), had no pain at all (Table 1).

On evacuation, 115 (62.2%) of the patients in week 1 complained of acute pain, 44 (23.8%) reported moderate pain and 26 (14%) reported little pain. During week 2, 51 (27.6%) reported acute pain, 79 (42.7%) moderate

Table 1
Postoperative pain assessment at rest

	Week 1 (%)	Week 2 (%)	Week 3 (%)
Acute	37 (20)	13 (7)	3 (1.6)
Moderate	82 (44.3)	41 (22.2)	17 (9.2)
Light	55 (29.7)	103 (55.7)	66 (35.7)
No pain	11 (6)	28 (15.1)	99 (53.5)

Table 2
Postoperative pain assessment on evacuation

	Week 1 (%)	Week 2 (%)	Week 3 (%)
Acute	115 (62.2)	51 (27.6)	15 (8.1)
Moderate	44 (23.8)	79 (42.7)	49 (26.5)
Light	26 (14)	47 (25.4)	81 (43.8)
No pain	0 (0)	8 (4.3%)	40 (21.6)

pain, and 47 (25.4%) little pain, while 8 (4.3%) reported no pain. Finally, in week 3, only 15 (8.1%) had acute pain, 49 (26.5%) moderate pain, 81 (43.8%) little pain, and 40 (21.6%) reported no pain at all (Table 2).

A total of 5 patients (2.7%) needed to be given a sublingual dose of buprenorphine (0.2 mg) during the first 12 h postoperatively. Besides these, there was no need for further administration of major analgesics. Ketorolac was administered in doses defined above for 3 days in 34 cases (18.4%), for 1 week in 71 cases (38.4%), for 2 weeks in 45 cases (24.3%) and for 3 weeks in 30 cases (16.2%). A total of 5 cases (2.7%) needed no analgesics at all (Table 3).

To assess pain control effectiveness, patients were asked to define the limits imposed on their living habits by symptoms in their postoperative recovery period. Most patients replied they could already lead more or less normal lives in week 1, some answered they had made long journeys home only 2 days after undergoing surgery or that they had gone out or resumed their normal working lives (136 patients, i.e. 73.5%). A total of 38 patients (20.6%) reported difficulties when seated, when walking and or when performing normal activities. Only 11 patients (5.9%) said they had stayed at home in bed but these had also been particularly nervous and anxious prior to surgery. Only 15 patients (8%) could not lead a normal life by week 2, while the remaining 170 (91.9%) had resumed normal working activities. By week 3, only three (1.6%) still complained of some pain, but these were cases which had undergone a longer period of recovery because of additional surgery for haemorrhage (Table 4).

Table 3
Analgesic (NSAIDs) administered in the postoperative period

	Patients	%
3 Days	34	18.4
1 Week	71	38.4
2 Weeks	45	24.3
3 Weeks	30	16.2
No analgesics	5	2.7

Table 4
Daily activity limitation

	Week 1 (%)	Week 2 (%)	Week 3 (%)
No limitation	136 (73.5)	170 (91.1)	182 (98.4)
Moderate	38 (20.6)	15 (8)	3 (1.6)
Severe	11 (5.9)	0 (0)	0 (0)

4. Discussion

Even today, haemorrhoid surgery is still an object of fear for patients, not so much for the postoperative complications that could arise but more as result of the pain inherent in defecation. The problem is not surgical as this is technically simple. It is the long lasting postoperative discomfort that creates the problem. Surgery is commonly only resorted to when the pathology reaches its advanced stage (3rd or 4th degree). It is with this background that attempts have been made to improve operating techniques and to provide postoperative pharmaceutical relief from ensuing pain.

The Milligan-Morgan haemorrhoidectomy [3] proposed in 1937 involved haemorrhoidal pedicle excision and low tying at the level of or below the dentate line (‘5 min job’), an operation causing intense postoperative pain. This led to high tying above the dentate line, thus obtaining haemorrhoid pedicle excision at the insensitive rectal mucosa level [4]. In 1956, Parks [5], focusing on postoperative pain pathophysiology, stressed the pathogenetic importance of three elements: mistaken involvement of sensitive mucosa and internal sphincter fibres in pedicle tying, the presence of extensive wounds, the positioning of an ano-rectal tampon. The tampon set aside, the attempt to eliminate the algogenic stimulus from muco-cutaneous wounds led to growing interest in closed techniques proposed by Parks in Great Britain [5] and Ferguson in the USA [6]. Goligher [16], however, showed that, as far as postoperative pain is concerned, closed haemorrrhoidectomies had no edge on their open counterparts. Nor do any trials exist that provide an objective and valid comparison of Milligan-Morgan and Ferguson type haemorrhoidectomies in terms of postoperative pain. Furthermore, Ferguson haemorrhoidectomy is more likely to cause swelling, hematoma and subsequent suture dehiscence, thus transforming a closed haemorrhoidectomy into an open one.

Sphincter spasm can become an important factor. Eisenhammer [8] in the 50’s proposed haemorrhoidectomy combined first with anal stretching and then with internal sphincterotomy. No significant reduction of postoperative pain however has been brought about by the application of this method, though it produces worse results as far as continence [7].

With the introduction of new technology (high frequency diathermy [9] and lasers [10]), pain control has turned to haemorrhoidal pedicle dissection. Coagulation or vaporization of blood vessels and nerve fibres reputedly causes less tissue oedema, specifically at cutaneous skin bridges and therefore less painful stimulation. These advantages have generally been considered more theoretical than realistic by us and others [11].

Pain control by drugs seems more feasible. In the operating theatre, even under general anaesthesia, the muco-cutaneous dissection of the pedicles with the St. Mark's technique tends to be performed no longer with saline plus adrenaline 1:200 000, but with a local anaesthetic plus adrenaline. The anaesthetics most widely used in proctology are lidocaine (L), mepivacaine (M) and bupivacaine (B), plus other new anaesthetics now appearing in clinical practice. L and M possess similar properties, namely limited latency and intermediate effective action (70'–90'), while B possesses greater latency and a prolonged effect. After haemorrhoidectomy, wound infiltration with preferably protracted action local anaesthetic can be performed [12]. A limited dose of ethanol is sometimes used to obtain alcoholic neurolysis. NSAIDs, because of their antiflogistic and analgesic properties are widely adopted to provide infiltration of surgical wounds and underlying external sphincter fibres [13]. Furthermore, intrasphincteric injection of these drugs causes a drop in pain transmission to the perianal trigone, diminishing prostaglandin release, thus avoiding the risk of urinary retention [14].

Other anaestheic techniques can replace conventional general anaesthesia. However, epidural, spinal and caudal blocks each involve their own particular problems. The epidural technique requires a competent anaesthestist, due to rachis pathologies (arthrosis), and often causes urinary retention, cephalea and serious peripheral vasodilation. Selective spinal technique must always involve an anaesthetist specialised in this sector. Caudal block, on the other hand, is marked by a high failure incidence due to the difficulty of the needle insertion into the sacral hiatus, the latter being blocked by anatomic malformation or because of age linked calcification. In our opinion, loco-regional anaesthesia with the posterior perineal block (P.P.B.) is of great practical interest [1,2]. Above all, it can be effected by the surgeon himself and is easy to execute. Intraoperative analgesia is so good that we have not had to resort to i.v. administration of other analgesics in $>7.6\%$ of our patients. Sphincter relaxation is comparable to that obtained under general anaesthesia. P.P.B. eliminates vagal reflex risks inherent in sphincter stimulation and anal stretching manoeuvres. Postoperative analgesia is long-lasting, 5–10 h in most cases (49.2%), and in some patients up to >15 h (9.2%). It drastically reduces the risk of urinary retention. Unlike general anaesthesia, there is no danger from induction (although slight) and it allows immediate postoperative mobility and earlier discharge. On the other hand, surgery on a conscious patients requires more careful manoeuvring. The vasoconstrictor added to the anaesthetic means that extremely accurate and meticulous hemostasis must be achieved because of the patient's impending early discharge. Finally, P.P.B. execution time and latency waiting time (10 min) makes the total operation time longer than that needed for a conventional operation under general anaesthesia [2].

With regards to postoperative recovery, Goligher [16] greatly stressed differing pain reports from patient to patient. The evaluation is highly subjective due to physiological variables (individual pain thresholds, sex and age), psychological factors (anxiety, depression), socioeconomic and ethnocultural differences that condition assessment of pain. Some operated patients did not remember any great pain, while others reported a very painful recovery period and saw defaecation as an atrocious experience, comparable to a hot iron bar in the anus or fragments of broken glass, needing morphine. In fact, more recently, even morphine administration has been proposed through a subcutaneous pump [17], but this seems, in our opinion, extremist. Some authors [18,19] have reported in a randomised study, that fentanyl transdermal administration improves haemorrhoidectomy pain for day care patients returning home. However, this is not available in all countries.

Only very few of our patients (5, i.e. 2.7%) needed major analgesics and this was only during the first 24 h. Buprenorphine was chosen for its high effectiveness on the central nervous system and for its partial agonistic/antagonistic features. It possesses long lasting action and a low risk addiction factor. Administered sublingually (0.2 mg), it takes effect after 20 min and lasts 6–8 h. Short term administration moderates the potential side effects found in all opiates (including constipation) [15].

In all other cases, even in those patients reporting acute pain, the situation seems well controlled with non-steroidal analgesics (NSAIDs) i.m. for 24 h and then b.m. Patients were advised regular and staged taking of the drug so as to maintain effective plasma concentration and to avoid taking it only when maximum pain was felt. In this way, stable and effective pain control can be obtained [20]. From the NSAIDs we chose Ketorolac, the action of which causes prostaglandin synthesis inhibition (specifically PGE 2/PGF 2 α), causing peripheral stimulus pain relief and preventing receptor sensitivity of physical or chemical agents in inflamed tissues. It is generally known that NSAIDs should be used with care as a result of their possible serious side effects. More specifically, the fact that Ketorolac alters platelet function and prolongs

bleeding time could theoretically lead to postoperative haemorrhaging. Its constipative action must also be taken into account, even if this is not as intense as that of the opiates. However, at the advised dosage, we or others for that matter have not encountered any significant clinical problem [15].

Constant pain decreasing as time goes on seems to mark the progressive stages of wound healing. In fact, analysis of Table 1 reveals that moderate-acute pain in most cases (82 patients, i.e. 44.3%) during week 1 progressively dropped in intensity in the following week, so much so that the patients who complained about moderate-acute pain by week 3 were only 44.9% of the total. These were cases which underwent further surgery due to significant complications on the 8–9th day for haemorrhage (4 patients, i.e. 2.1%) and others (26 patients, i.e. 14%) who used a dilator due to the development of stenosis. It is of interest that 11% of patients did not report any pain whatsoever during the week 1 and received no analgesics, thus confirming the wide range of subjective pain thresholds.

In our experience, in most cases (162 patients, i.e. 89.2%), the first bowel motion was spontaneously achieved by the 3rd postoperative day. Only in few cases (20 patients, i.e. 10.8%) did we have to resort to a mild aperient. Early evacuation prevents stenotic granulation tissue when the skin bridges are too thin or necrotic. On the other hand, pain does indeed reach higher intensities at defecation, as a result of the wounds being stimulated by faeces. The patients suffering acute pain at evacuation (62.2%) were more than double those at rest (20%). Results showed the pain relief rate slowing down at defecation over the following 2 weeks because of the still incomplete healing of wounds. In all cases, Ketorolac provided effective pain control. A total of 105 patients (56.8%)were administered the above at full dosage during week 1. It was then reduced up to discontinuation over the following weeks (45 patients (24.3%) over week 2, 30 patients (16.2%) over week 3).

Further proof that orally taken minor analgesics provide effective pain control, regardless of intensity, lies in the high percentage of cases (73.5%) which reported no significant alterations in daily life and habits during week 1 and no modification of sleeping or mood patterns. Finally, at the end of the postoperative period, over 149 (92%) of the patients expressed their full satisfaction regarding surgical treatment.

Flavonoids have also been proposed for use, early in the postoperative periods. Their antagonising action on phlogosis mediators produces positive microcircle effects, protecting basal membrane and media tunic of the vessels from degeneration. Furthermore, catecholamine activity on the smooth muscle fibres of the venule wall is prolonged, thus diminishing stasis and oedema [21]. Blood vessels become less vulnerable to bacterial attack (fibrinolysis) and trauma (defecation). Therefore, anti-inflammatory action greatly reduces algogenic stimulus and postoperative haemorrhage risks.

The role played in pain control by early wound infection with eventual microabscesses would suggest intraoperative and postoperative antibiotic use (full dosage of metronidazole for 7 days) [22]. Nevertheless, antibiotic prophylaxis is generally not adopted in minor proctological surgery.

Finally, the use of anaesthetic creams (i.e. a mix of prilocaine and lidocaine) to reduce postoperative perianal pain on injection of local anaesthetics is not found suitable for pain relief subsequent to defecation trauma. Further, cream application on recent ano-perianal wounds seems to question one of the axioms of proctology, namely whether surgical wounds should be frequently washed out and disinfected. Vegetable extract creams with antiinflammatory action in early use should also be seen just as negatively, but these could be useful later at complete healing.

5. Conclusions

To conclude, it must be admitted that though painless surgery is out of the question, effective anaesthesia, operating dexterity and a thorough follow-up by the surgeon (and the end of out of date management concerning rectal tampons and protracted constipation) have endowed routine hemorrhoidectomy with a new reputation. Gone are negative connotations that transformed a simple surgical operation into a dreaded one that was even sometimes repudiated by patients who needed to undergo it.

References

[1] Marti MC, Laverriere C. Proctological outpatient surgery. Int J Colorectal Dis 1992;7:223–6.
[2] Gabrielli F, Di Sibio T, Chiarelli M, et al. The posterior perineal block in proctological day surgery. Coloproctology 1996;3:133–9.
[3] Milligan ETC, Morgan C, Naughton Jones LF, Office RR. Surgical anatomy of the anal canal and the operative treatment of haemorrhoids. Lancet 1937;ii:1119–23.
[4] Keighley MRB, Williams NS. Haemorrhoidal Disease. In Surgery of the Anus, Rectum and Colon. London: Saunders, 1993:295–363.
[5] Parks AG. The surgical treatment of haemorrhoids. Br J Surg 1956;43:337–51.
[6] Ferguson JA, Heaton JR. Closed haemorrhoidectomy. Dis Colon Rectum 1959;2:176.
[7] Watts JM, Bennett RC, Duthie HL, Goligher JC. Pain after haemorrhoidectomy. Surg Gynecol Obstet 1965;120:1037–42.
[8] Eisenhammer S. Internal anal sphincterotomy plus free dilatation versus anal stretch with special criticism of the anal stretch procedure for haemorrhoids: The recommended modern approach to haemorrhoid treatment. Dis Colon Rectum 1974;17:493.

[9] Lentini J. Las hemorroides. Barcelona: Hemeka, 1990:123–30.
[10] Tesauro B, Persico G. Laser in chirurgia: Applicazioni cliniche. Arch Atti Soc It Chir 1983:47–54
[11] Senagore AJ, Mazier WP, Luchtefeld MA, Mac Keigan JM, Wengert T. The treatment of advanced haemorrhoidal disease: A prospective randomized comparison of cold scalpel vs. contact Nd:YAG laser. Dis Colon Rectum 1993;36:1045–52.
[12] Chester JF, Stanford BJ, Gazet JC. Analgesic benefit of locally injected Bupivacaine after haemorrhoidectomy. Dis Colon Rectum 1990;33:487–9.
[13] Milito G, Cortese F, Brancaleone C, Casciani CU. Effect of Ketorolac in the management of posthaemorrhoidectomy pain. Tech Coloproctol 1996;1:14–6.
[14] O'Donovan S, Ferrera A, Larach S, Williamson P. Intraoperative use of Toradol facilitates outpatient haemorrhoidectomy. Dis Colon Rectum 1994;37:793–9.
[15] Nolli M, Albani A, Nicosia F. Il Dolore Postoperatorio: Valutazione e Trattamento. Milano: Mosby Doyma Italia, 1996:1996.
[16] Goligher JC. Haemorrhoids. In Surgery of the Anus Colon and Rectum. London: Bailliére and Tindall, 1984:98–149.
[17] Goldstein ET, Williamson PR, Larach SW. Subcutaneous morphine pump for postoperative haemorrhoidectomy pain management. Dis Colon Rectum 1993;36:439–46.
[18] Kilbride M, Morse M, Senagore A. Transdermal fentanyl improves management of postoperative haemorrhoidectomy pain. Dis Colon Rectum 1994;37:1070–2.
[19] Caplan RA, Ready LB, Oden RV, Masten FA, Nessly ML, Olsson GL. Transdermal fentanyl for postoperative pain management. J Am Med Assoc 1989;260:1036–9.
[20] Goodman LS, Gilman A. The Pharmacological Basis of Therapeutics, 8th. New York: Pergamon, 1990:1990.
[21] Ho YH, Foo CL, Seow-Choen F, Goh HS. Prospective randomized controlled trial of a micronized flavonidic fraction to reduce bleeding after haemorrhoidectomy. Br J Surg 1995;82:1034–5.
[22] Milito G, Cortese F, Brancaleone C, Casciani CU. Role of prophylactic metronidazole in the management of postoperative pain after haemorrhoidectomy. Tech Coloproctol 1996;4:84–6.

ELSEVIER

Ambulatory Surgery 6 (1998) 35–37

Ambulatory Surgery

The effects of pre-operative blockade with 4% prilocaine on the post-operative pain experienced by patients undergoing removal of impacted mandibular third molars

S. Namjo Nik, D. Drake, J.P. Rood *

Oral Surgery Day Case Unit, University of Manchester, Manchester Royal Infirmary, Oxford Road, Manchester M13 9WL, UK

Received 30 September 1997; accepted 13 October 1997

Abstract

Local anaesthetic nerve blockade had been suggested as being useful in controlling per-operative afferent stimulation and sensitisation of the central nervous system. This measure should contribute to pre-emptive analgesic regimes and reduce the awareness of pain post-operatively. A double-blind placebo-controlled, randomised study was undertaken to assess the effectiveness of a moderate-duration local anaesthetic (prilocaine 4% plain solution) in controlling pain after the surgical removal of impacted mandibular third molar (wisdom) teeth. The local anaesthetic reduced patients' pain scores during the first 45 min post-operatively, whilst the block was effective. No prolonged effect on post-operative analgesia was noted, suggesting that per-operative blockade alone was an ineffective method of providing pre-emptive analgesia.

Keywords: Pre-operative blockade; Post operative; Prilocaine

1. Introduction

Adequate post-operative pain control remains an essential, but often inadequate [1], component of surgical management. Pain after surgery is believed to arise during the procedure and post-operatively from the damaged tissues where the local inflammatory response sensitises receptors and may additionally be enhanced by sensitisation of the central nervous system [2].

Pre-emptive analgesic regimes seek to modify the pain response by interfering with the mechanisms responsible for the generation of pain. Per-operative local anaesthetic blockade should prevent impulses being transmitted to the central nervous system during surgery [3], preventing central sensitisation and thereby, reducing the level of pain experienced throughout the post-operative period [4].

In this study, a short acting local anaesthetic block was used, which was effective for the duration of surgery. Pain was recorded post-operatively as the effects of the local anaesthetic resolved and normal sensation returned.

2. Method

The study was conducted as a double blind parallel comparison of local anaesthetic blockade and placebo injections. The study was approved by the local ethical committee and forty patients gave written consent to participate. Patients requiring the surgical removal of impacted mandibular third molar teeth (with or without the non-surgical extraction of upper third molars) under general anaesthesia, were recruited. Pre-operatively, each patient was instructed in the use of a visual analogue scale (VAS) to record their pain.

* Corresponding author.

0966-6532/98/$19.00
PII S0966-6532(97)10009-9

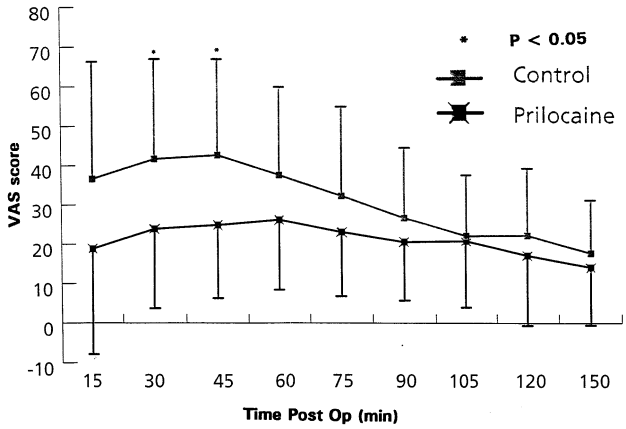

Fig. 1. Post-operative pain scores.

A standardised general anaesthetic regime was adopted, excluding the use of per-operative analgesics. The patients were randomly allocated to receive either the active local anaesthetic or placebo injection, using a 'minimisation' method to ensure equal distribution to each group of male and female subjects and patients requiring bilateral or unilateral surgery. After intubation, each patient was given injections of either 4% prilocaine solution (Citanest plain–Astra) or placebo (normal saline) delivered from identical coded syringes. For each impacted lower tooth, an inferior alveolar nerve block was administered using 2.0 ml of solution; in addition 1.0 ml of the same solution was administered as a buccal infiltration. Where the ipsilateral upper third molar was to be extracted, appropriate infiltrations of the same solution were administered. A total of 5 min was allowed for the injections to become effective before surgery commenced. The impacted third molar teeth were removed using standard techniques, bone removal being achieved primarily using chisels and a drill, when necessary.

Each patient recorded their pain using a VAS during the immediate post-operative period at 15 min intervals after the end of surgery for 1.5 h; then at 2 and 2.5 h.

3. Results

There were no differences between the groups with respect to sex, age and duration of surgery (mean 25 min).

For each time point, the mean VAS (and S.D.) was calculated. The differences between the means of the two groups were then compared, applying the t-test for equality of means. The results were tabulated and displayed graphically.

In the control group, the maximum pain was experienced at 45 min, whereas the patients who received the local anaesthetic injections reported lower pain scores, with the greatest pain at 60 min.

The reported pain scores differed significantly between the groups only at 30 and 45 min post-operatively ($P < 0.05$).

4. Discussion

Prilocaine is a local anaesthetic agent with moderate duration [5] and in 4% concentration (without vasoconstrictor) has a duration of dental analgesia of ~ 30 min [6], although soft tissue symptoms may persist for up to 2 h [7] in some cases. The nerve block would have been effective throughout the period of surgery, sometimes extending into the post-operative period. Reduced pain scores were evident 1 h and 1 h 15 min after the injection (30 and 45 min post-operatively) Fig. 1, but thereafter, there was no effective benefit. The apparent lack of effect at the first 15 min post-operative reading was considered most likely to be due to inaccurate recording, whilst many patients were still affected by the general anaesthetic.

An effective nerve blockade during the operation did not induce long lasting reduction of post-operative pain. The effects appear to have been limited to the immediate post-operative period. Effective pre-emptive analgesia with local anaesthetics has only been demonstrated previously when long acting drugs have been used and a reduction of pain scores was noted many hours later [8].

An effective nerve block which terminates at the end of surgery does not induce prolonged reduction in the post-operative pain experience. Pre-emptive analgesia from local anaesthesia probably requires effective nerve block during surgery and also during the post-operative period, whilst pain is generated from the site of tissue damage [9].

References

[1] Woolf CJ. Evidence for a central component of post-injury pain hypersensitivity. Nature 1983;308:386–8.
[2] Woolf CJ, Chong M-S. Pre-emptive analgesia-treating post-operative pain by preventing the establishment of central sensitisation. Anaesth Analg 1993;77:362–79.
[3] Jebeles JA, Reilly SJ, Gutierrez JF, Bradley EL, Kissin I. The effect of pre-incisional infiltration of tonsils with bupivacaine on pain following tonsillectomy and general anesthesia. Pain 1991;47:305–8.
[4] Sabanathan S. Has post-operative pain been eradicated? Ann R Coll Surg Engl 1995;77:202–9.
[5] McQuay HJ, Caroll D, Moore RA. Post-operative orthopaedic pain-the effect of opiate premedication and local anaesthetic blocks. Pain 1988;33:291–5.
[6] Bach S, Noreng MF, Tjellden NU. Phantom limb pain in amputees during the first 12 months following limb amputation after pre-operative lumbar epidural blockade. Pain 1988;33:297–301.

[7] Ejlersen E, Andersen HB, Eliasen K, Mogensen T. A comparison between preincisional and postincisional lignocaine infiltration and postoperative pain. Anaesth Analg 1992;74:495–8.
[8] Tuffin JR, Cunliffe DR, Begg R, Shaw SR. Do local analgesics injected at the time of third molar removal under general anaesthesia reduce significantly post-operative analgesic requirements? A double-blind controlled trial. Br J Oral Maxillofac Surg 1989;27:27–32.
[9] Alton, T.A. Impact of surgery length on post-operative pain and production of inflammatory mediators. J Oral Maxillofac Surg 1995;53(8) Supp 4:102.

ELSEVIER

Ambulatory Surgery 6 (1998) 39–42

Ambulatory Surgery

Patient satisfaction after laparoscopic and conventional day case inguinal hernia repair

J.M.A. Biemans [a], R.F. Schmitz [a,*], E.G.J.M. Pierik [b], P.M.N.Y.H. Go [a]

[a] *Department of Surgery, St. Antonius Hospital, PO Box 2500, 3430 EM Nieuwegein, Netherlands*
[b] *Department of Surgery, De Weezenlanden Hospital, Zwolle, Netherlands*

Received 1 October 1997; accepted 22 October 1997

Abstract

Comparison of patient satisfaction after laparoscopic and conventional day case inguinal hernia repair. The post-operative course of 60 patients subjected to laparoscopic hernia repair (TAPP) and conventional anterior hernia repair (Griffith) under general anaesthesia as day case procedures was analysed. Both groups (TAPP, $n = 30$; Griffith, $n = 30$) were comparable for age and gender. The operating time, success rate of ambulatory surgery, readmissions and complications were assessed. After 6 months (range 3–10) post-operative pain and nausea, consumption of analgesics/anti-emetics, convalescence and adequacy of the patient information were recorded by a telephonic questionnaire. The patients were asked also if they would choose again a day case procedure for hernia repair. In the TAPP group, 28 out of 30 operations succeeded in ambulatory surgery; one patient was admitted because of nausea and another because of the late time of operation. In the Griffith group all operations succeeded as a day case procedure. In the TAPP group patients experienced less pain ($P = 0.05$), but more nausea ($P < 0.05$), they also needed fewer days bedrest ($P < 0.05$) and felt fully recovered sooner. A total of 90% of both groups would choose a day case procedure again. In conclusion, laparoscopic inguinal hernia repair under general anaesthesia can very well be performed as a day case procedure. After laparoscopic hernia repair patients experienced less pain (statistically non significant) and had an earlier recovery, but they had more nausea than after conventional repair.

Keywords: Inguinal hernia; Day case procedure; Patient satisfaction; Laparoscopy

1. Introduction

In 1987 the Dutch government defined day care as a form of care in a hospital lasting a couple of hours, related to an investigation or treatment on that same day [1]. One of the most frequently performed surgical operations as a day case procedure is inguinal hernia repair. In 1994 a total of 22% of all inguinal hernias were repaired as day cases [2]. Almost 90% of the hernias were corrected by a conventional anterior approach: Bassini (62%), Shouldice (20%) and Griffith (7%) [3,4]. In 1994, 5.7% of all inguinal hernia surgery was done laparoscopically. We think that this figure will increase because recently some sound prospective randomised studies have claimed superiority of the laparoscopic technique in terms of recurrence [5,6]. Since January 1994 hospital laparoscopic inguinal hernia repair has been carried out as a day case procedure.

The aim of this study is to compare patient satisfaction with laparoscopic and conventional hernia repair in ambulatory surgery.

2. Patients and methods

Between January and October 1996, 190 patients underwent inguinal hernia repair at St. Antonius Hospital, Nieuwegein. A total of 84 adults (53%) were operated upon as day cases. A total of 30 patients

* Corresponding author. Tel.: +31 30 6092052; fax: +31 30 6036578; e-mail: rschmitz@knmg.nl

0966-6532/98/$19.00
PII S0966-6532(97)10011-7

underwent their repair laparoscopically. The conventional group consisted of 30 patients who were comparable where it concerned ages and gender. The surgeon made the choice for a laparoscopic or anterior approach, according to his own preference. Patients were accepted for ambulatory surgery by the anaesthetist if no or only minor comorbidity was found according to the American Society of Anaesthesiologists score (ASA 1 or 2) and if there was a guarantee of sufficient help at home during the first 24 h after operation [7]. A brochure regarding the procedures on the day surgery unit was handed out. All patients received anaesthesia according to a standard protocol (induction with propofol and fentanyl and maintainence with isoflurane and nitrous oxide in oxygen; the laparoscopic group also received atracurium). The laparoscopic correction was done by a transabdominal preperitoneal approach (TAPP) by which a 10×15 cm polypropylene mesh (Prolene®, Ethicon, Somerville, NJ) with rounded edges was positioned over the inguinofemoral area, widely overlapping the edges of the hernial defect. The conventional operation was done as originally described by Griffith by which the transversalis aponeurosis is sutured to the iliopubic tract [8]. The operations are carried out in the morning and the patients were discharged between 16:00 and 17:00 h with a supply of paracetamol tablets. 500 mg three times a day. After 7–10 days the patient returned to the surgical outpatient clinic.

Operating time (defined as the period between time of arrival at the operating room and departure), the success rate of operation as a day case procedure, readmissions and the number and type of complications were assessed. Post-operative pain and nausea, consumption of analgesics/anti-emetics, convalescence and adequateness of the patient information were assessed by telephone using a standardised questionnaire 6 months (range 3–10) after the operation. Post-operative pain and nausea were measured by the verbal rating score (VRS) with four response possibilities (no, mild, moderate and severe pain or nausea). The convalescence was measured by the number of days bedrest and was also determined by time to feeling 100% fit and by the time elapsed until the patient resumed work. Finally the patients were asked if it were necessary if they would choose ambulatory surgery again.

Where appropriate the χ^2-test was used to compare proportions. $P < 0.05$ was taken as significant.

3. Results

The characteristics of the patient groups and types of hernia are depicted in Table 1. The mean operating time in the TAPP group was 80 (50–120) min and in the Griffith group 60 (20–80) min. In the TAPP group no operation was converted to an open approach. Two patients could not be discharged the same day: one because of nausea and vomiting and the other because of the late time of the operation resulting in an insufficient recovery time for discharge on the same day. In the Griffith group all the patients were discharged the same day. There were no serious complications or readmissions in either group.

Table 1
Characteristics and types of hernia of patients groups

Characteristics	TAPP ($n = 30$)	Griffith ($n = 30$)
Mean age (year)	43 (34–68)	47 (17–72)
Male:female	28:2	29:1
Indirect	16	15
Direct	13	10
Pantaloon	1	5
Primary	26	28
Recurrence	4	2
Min operating time (range)	80 (50–120)	60 (20–80)

Results are given as the number of hernias unless otherwise stated.

The telephone survey was performed after an average post-operative time of 6 months (range 3–10). All patients were satisfied with the preoperative information. The VRS-scores concerning post-operative pain and nausea are depicted in Table 2. Patients of the TAPP group experienced less pain ($P = 0.05$) but more nausea ($P < 0.05$) than the patients in the Griffith group. The convalescence in the TAPP group was swifter than in the Griffith group. Nine patients in the TAPP group felt it necessary to take bedrest at home. After two days their number was decreased to three. In the Griffith group 14 patients took bedrest and after 2 days this number was still ten ($P < 0.05$). Fig. 1 shows that the patients in the TAPP group felt fully recovered earlier. In the TAPP group 3 of the 28 successful day case procedures (11%) would not choose ambulatory surgery again for their treatment, in the Griffith group this number was three out of 30 (10%). They mentioned nausea and pain as reasons for inpatient treatment.

Table 2
Number of patients with pain and nausea after TAPP and Griffith

Characteristics	Pain		Nausea	
	TAPP	Griffith	TAPP	Griffith
Much	2	4	6	2
Moderate	4	9	4	0
Mild	16	11	1	1
No	8	6	19	27
Medication	10	19	5	1

The number of patients who took analgesics/anti–emetics at home is also depicted.

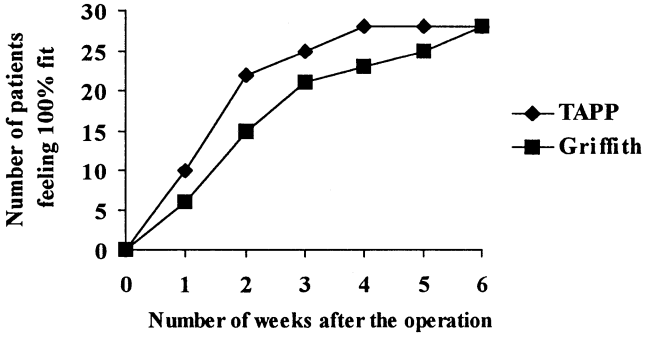

Fig. 1. Post-operative time to patients feeling 100% fit.

4. Discussion

The number of ambulatory surgery procedures is increasing. In the Netherlands there has been a nationwide register since 1991. In the period between 1991 and 1994 day care surgery was recorded as increasing from 18.4 to 35% of all surgical procedures. This is not only accounted for by simple procedures but also by operations like inguinal hernia repair and varicose vein surgery.

For successful day surgery one needs good patient selection, experience with the surgical procedures and an adequate hospital infrastructure. In our hospital there is a preoperative preassessment at the anaesthesiologists outpatients clinic immediately after the surgeon's consultation. As Wilson advises, it's wise to perform these operations before noon so that there is sufficient time to recover [9]. In the TAPP group one patient was operated on late so he had to be admitted. Inadequate control of post-operative pain and nausea can also lead to hospital admission as happened with one patient [10]. In our study all patients were operated on under general anaesthesia. For the conventional repair it's also possible to use regional anaesthesia while for the laparoscopic approach general anaesthesia is required. This might be an argument against day care laparoscopic hernia correction. Maddern and Bessell recorded in randomised trials no difference in post-operative pain and resumption to daily activities between the conventional anterior hernia repair performed under regional anaesthesia and laparoscopic repair done under general anaesthesia [11,12]. Remarkable is the number of patients in the TAPP group with post-operative nausea compared to the Griffith group ($P < 0.05$). Because the anesthetic technique in our study is the same in both groups, nausea may very well be related to the transabdominal approach in the TAPP group. Larsson [13] and Andrews [14] believe that post-operative nausea is related to the manipulation of the intestines. A longer duration of operation is also thought to cause an increase of post-operative nausea [13]. Insufficient desufflation after laparoscopy aggravates abdominal discomfort [14]. They [13,14], advised to start the administration of anti-emetics during the operation. Avoiding hypercarbia during anaesthesia is also important [15,16]. Less post-operative pain, quicker recovery and earlier resumption of work after laparoscopic hernia repair corresponds very well with the results of most randomised trials [11,12,17–20]. The probably smaller surgical trauma of laparoscopy supports the suitability of laparoscopic inguinal hernia repair for ambulatory surgery. The patients' appreciation in terms of choosing day care surgery again for an inguinal hernia repair is 90% for both groups and corresponds with Theus' trial in another Dutch hospital [10].

We conclude that laparoscopic hernia repair, as well as the conventional method, can very well be performed as a day case. We feel that adequate administration of anti-emetics is mandatory to reduce post-operative nausea, which occurs more often after a laparoscopic than after a conventional hernia repair.

References

[1] College van Ziekenhuisvoorzieningen: Advies inzake dagverpleging in algemene ziekenhuizen. College van Ziekenhuisvoor-Zieningen, Utrecht, S.I.G., Utrecht, 1987.
[2] S.I.G. zorginformatie. Jaarboek voor de ziekenhuizen (1994), 1995.
[3] Simons MP, Vos PM, Geldere van D, Hoitsma HFW, Obertop H. Meer recidieven na liesbreukchirurgie dan verwacht. Ned Tijdschr Geneeskd 1996;140(50):2506–9.
[4] Griffith CA. Inguinal hernia and anatomic correction. Surg Clin North Am 1959;39:531.
[5] Liem MSL, Graaf van der Y, Steensel van CJ, et al. Comparison of conventional anterior surgery and laparoscopic surgery for inguinal hernia repair. New Engl J Med 1997;336(22):1541–7.
[6] Dirksen CD, Beets GL, Go PMNYH, Geisler FEA, Baeten CGMI, Kootstra G. Bassini repair versus laparoscopic repair for primary inguinal hernia: a randomized controlled trial. In: Beets GL, editor. On the Repair of Inguinal Hernia (Thesis). Datawyse/Universitaire PERS, Maastricht, 1997.
[7] Dripps RD, Lamont A, Eckenhof JE. The role of anesthesia in surgical mortality. J Am Med Assoc 1961;178:261–6.
[8] Griffith CA. Inguinal hernia and anatomic correction. Surg Clin North Am 1959;39:531.
[9] Wilson MS, Deans GT, Brough DA. Prospective trial comparing Lichtenstein with laparoscopic tension free mesh repair of inguinal hernia. Br J Surg 1995;82:274–7.
[10] Theus RJ, Go PMNYH, Wijmen van F. Quality assessment in day surgery unit. Ambul Surg 1995;10:495–500.
[11] Maddern GJ, Rudkin G, Bessell JR, Devitt P, Ponte L. A comparison of laparoscopic and open hernia repair as a day surgical procedure. Surg Endosc 1994;8:1404–8.
[12] Bessell JR, Baxter P, Riddell P, Watkin S, Maddern GJ. A randomized controlled trial of laparoscopic extra peritoneal hernia repair as a day surgical procedure. Surg Endosc 1996;10:495–500.
[13] Larsson S, Lundberg D. A prospective survey of post-operative nausea and vomiting with special regard to incidents and relations to patient characteristics, anesthetic routines and surgical procedures. Acta Anesthesiol Scand 1995;39:539–45.

[14] Andrews PLR. Physiolgy of nausea and vomiting. Br J Anaesth 1992;69:2S–19.
[15] Erikson H, Kortilla K. Recovery profile after desflurane with or without ordansetron compared with propofol in patients under going gynaecological laparoscopy. Anesth Analg 1996;82:533–8.
[16] Cunningham AJ, Brull SJ. Laparoscopic cholecystectomy: anesthetic complications. Anesth Analg 1993;76:1120–30.
[17] Stoker DL, Spiegelhalter DJ, Singh R, Wellwood JM. Laparoscopic versus open inguinal hernia repair: randomized prospective trial. Lancet 1994;343:1243–5.
[18] Vogt DM, Curet MJ, Pitcher DE, Martin DT, Zucker KA. Prelimenary results of a prospective randomized trial of laparoscopic onlay versus conventional inguinal herniorrhaphy. Am J Surg 1995;169:84–9.
[19] Payne JH, Grininger LM, Izawa MT, Podoll EF, Lindahl PJ, Balfour J. Laparoscopic or open herniorrhaphy. Arch Surg 1994;129:973–9.
[20] Lawrence K, McWhinny D, Goodwin A, et al. Randomized controlled trial of laparoscopic versus open repair of inguinal hernia repair: early results. Br Med J 1995;311:981–5.

ELSEVIER

Ambulatory Surgery 6 (1998) 43–55

Ambulatory Surgery

Ambulatory surgery in 1994–1995: The state of the art in 29 OECD countries

C. De Lathouwer [a,*], J.-P. Poullier [b]

[a] *International Association for Ambulatory Surgery, Avenue du Duc Jean 71–73, 1083 Brussels, Belgium*
[b] *Organization for Economic Cooperation and Development, 2 rue André Pascal, 75775 Paris, France*

Received 3 October 1997; accepted 8 November 1997

1. Introduction

Few health professionals or governments dispute the fact that, for many procedures, ambulatory surgery is an alternative to traditional hospitalisation and is likely to radically change hospital practice. It responds positively to the expectations of both patients and health care personnel and provides an opportunity to improve quality. Finally, it permits a better use of available resources. However, it is necessary for governments to put into play useful and equitable policies and to this end they require a factual base.

Little data has been released. Its reliability has been found to be highly questionable, even whimsical and none has led to valid inter-country comparisons. The sources of that information, when not based on a single individual's sample, are typically not cited. The data encountered are either fragmentary or relate to global ratios or percentages that cannot be validated.

2. Scope and methods

To answer the question on the current volume of ambulatory surgery and to compare prevalence levels and trends throughout the world, the International Association for Ambulatory Surgery (IAAS) and the Organization for Economic Cooperation and Development (OECD) launched a joint survey among their members and correspondents. The results are presented in this article.

Important methodological difficulties surrounded this attempt, affecting the conduct of the survey and the homogeneity of the findings. These included:

1. The estimation of the total surgical market and the share performed on an ambulatory basis;
2. The identification of the procedures selected according to national or international coding systems so as to assure a high degree of homogeneity.

To circumvent these inherent difficulties, the survey selected significant and representative groups of procedures that would allow a valid measure of the performance levels of the countries to be analysed and compared. The survey focused on two types of intervention. Firstly, a list of 18 reference groups of procedures frequently performed in conventional in-patient settings, but also currently practised in a day setting as well. The second category of procedures, much less numerous, related to two groups of procedures which are seldom undertaken in a day setting at present, but which appear likely to join the first list shortly.

The method of identification of the selected procedures was determined. Numerous classifications, some international, some national, are used in the countries surveyed. A generic name was given to the 20 reference groups of procedures just described. Each heading may include a variable number of procedures, each with its own description and code number, depending on each country's recording methods. To circumvent this hurdle as best as possible, the survey offered a choice between three types of coding: the Diagnostic Related Group (DRG) 10th version and the International Classification of Diseases—Clinical Modification (ICD9CM) 4th version (both commonly used internationally), as well as a free classification for respondents from countries using a national coding system. The codes of DRG and

* Corresponding author. Tel.: +32 2 4224271; fax: +32 2 4257076; e-mail: c.delathouwer@club.innet.be

PII S0966-6532(97)10016-6

Table 1
The 20 reference procedures: coding systems used

No.	Group	ICD9CM (V4)	DRG (V10)	Free classification
1	Knee arthroscopy	8026 806	232 222	
2	Extraction of impacted teeth	2319	187	
3	Cataract surgery	1319 1341 1359 1370 1371	39	
4	Inguinal and femoral hernia	5300 5310 5321 5329 5331 5339 5341 5349 539	162 163	
5	Dilatation and curettage uterus	6909 6816	364	
6	Vein legation and stripping	3859	119	
7	Tonsillectomy w. or w/o adenoïdectomy	282 283	59	
	Adenoïdectomy	286	60	
8	Myringotomy	2001	61 62	
9	Laparoscopic sterilization	662*	361	
10	Squint surgery	154	40 41	
11	Submucous resection	215	55	
12	Excision of breast lump	8521 8535	262	
13	Anal procedures	9623 4911 4912 4944 4945 4946 495 4973	158	
14	Circumcision	640	342 343	
15	Dupuytren	8235	229	
16	Carpal tunnel decompression	443	006	
17	Orchidopexy–varicocoele	625 631	339 340	
18	Removal of implanted devices from bone	786*	230 231	
19	Cholecystectomy laparoscopic	5123	787 788	
20	Vaginal hysterectomy	685	355 357	

Table 2
General table of responses

No answer	Response data		
	Not presently available	Insufficient	Included
Austria	Czech Republic	Italy	Australia
France	Greece	Mexico	Belgium
Japan	Hungary	Norway	Canada
Korea	Iceland		Denmark
Sweden	Poland	Spain	Finland
	Switzerland		Germany
	Turkey		Ireland
			Luxembourg
			Netherlands
			New Zealand
			Portugal
			United Kingdom
			United States

ICD9CM procedures entering the 20 groups selected were supplied. Respondents using the free classification were invited to specify the contents of the 20 groups listed (Table 1). The overall purpose was to ensure that each number, entered at group level, would comprise a similar range of procedures, thus giving statistically meaningful and comparable numbers.

To reduce interpretation problems, ambulatory surgery was defined as elective surgery performed under general or local anaesthesia, previously or still widely conducted in an in-patient setting with overnight stay, that can be safely carried out in a day setting, requiring no overnight stay but sophisticated technical support and specific organisational procedures, including post-operative surveillance.

3. Results

The national administrations and learned societies or professional associations of 29 OECD countries were contacted (Table 2). Among these, responses were received from 24 countries. Of these countries, seven (Czech Republic, Greece, Hungary, Iceland, Poland, Switzerland and Turkey) indicated that they were unable to provide any data on ambulatory surgery at the present time. Five countries did not respond (Austria, France, Japan, Korea and Sweden).

Despite receiving a sizeable amount of information, the data for four countries (Italy, Mexico, Norway and Spain) was judged too fragmented or difficult to interpret to allow its inclusion with other countries with quantified information in a comparative international study (Table 3). Thirteen countries (Australia, Belgium, Canada, Denmark, Finland, Germany, Ireland, Luxembourg, the Netherlands, New Zealand, Portugal, the United Kingdom and the United States) provided complete or reasonably comprehensive and precise information. The data from these countries related to the year 1994 or 1995.

The thirteen countries included have between them, five distinct coding systems, with well over half using the ICD9CM coding system. Six countries used the DRG classification alone (Denmark and Finland) or in addition to the ICD9CM coding system.

Tables 4–16 show the percentage of surgical procedures in ambulatory surgery in each country analysed and for each group of operations.

There are significant disparities among often relatively homogenous countries, with sometimes surprising reversals.

Care is required with respect to the reliability and comprehensiveness of these findings, as in all 'first of its kind' surveys. Assuming the accuracy and thoroughness of the facts sent back by the best sources available in these 13 countries, the United States exhibits the highest rates. It is followed by Canada, the Netherlands and New Zealand.

Recent articles in the medical literature claim the possibility of conducting certain operations, such as laparoscopic cholecystectomy, on an ambulatory basis. This was found to be the case only in the United States.

Table 3
Countries excluded: reasons

Country	Comment
Spain	Statistics provided resulted from a survey to which 37% of public and private hospitals questioned responded. Only percentages were supplied. Several reference groups of procedures were not documented. The data reported in the sample concern only those hospitals performing ambulatory surgery, thus, a non random sample not useful for international comparisons, of 21% of Spanish hospitals.
Italy	National data but not allowing any distinction between cases of ambulatory surgery and patients hospitalized for a day.
Mexico	Data concerning 20% of hospitals. The distinction between ambulatory surgery and short stay was not clearly established. Also, the total number of procedures given for the 20 groups of procedures appeared statistically insufficient (at 70 000) for a population of more than 90 million inhabitants.
Norway	The data provided dealt only with an extremely limited number of procedures.

Table 4
Statistics for Australia 1995–1996

		Australia 1995–1996			
	Classification	ICD9CM			
	Group	A	I	Total	%
1	Knee arthroscopy	29 920	45 833	75 753	39
2	Extraction of teeth	39 190	55 439	94 629	41
3	Cataract surgery	44 957	82 745	127 702	35
4	Inguinal and femoral hernia	8474	49 690	58 164	15
5	Dilatation and curetage uterus	37 094	44 338	81 432	46
6	Vein legation and stripping	2415	19407	21822	11
7	Tonsillectomy w. or w/o adenoïdectomy	530	33 253	33 783	2
	Adenoïdectomy	2922	5585	8507	34
8	Myringotomy	27 202	30 117	57 319	47
9	Laparoscopic sterilization	12 163	15 208	27 371	44
10	Squint surgery	162	304	466	35
11	Submucous resection (ENT)	193	3495	3688	5
12	Excision of breast lump	12 690	20 784	33 474	38
13	Anal procedures	8847	23 926	32 773	27
14	Circumcision	12 107	15 198	27 305	44
15	Dupuytren	1247	3929	5176	24
16	Carpal tunnel decompression	13 416	19 819	33 235	40
17	Orchidopexy–Varicocoele	3607	7017	10624	34
18	Removal of implanted devices from bone	10 741	20 370	31 111	35
	Total 1–18	267 877	496 457	764 334	35
19	Cholecystectomy laparoscopic	197	31 537	31 734	1
20	Vaginal hysterectomy	8	14 128	14 136	0
	Total 19–20	205	45 665	45 870	0
		268 082	542 122	810 204	33

Complete data concerning public and private hospitals; Source: Australian Institute of Health and Welfare (Hospital Morbidity Database).

Table 5
Statistics for Belgium 1995

		Belgium (1995)			
	Classification	ICD9CM			
	Group	A	I	Total	%
1	Knee arthroscopy	19 618	44 590	64 208	31
2	Extraction of teeth	18 197	11 885	30 082	60
3	Cataract surgery	18 913	47 996	66 909	28
4	Inguinal and femoral hernia	1366	17 786	19 152	7
5	Dilatation and curetage uterus	9874	13 227	23 101	43
6	Vein legation and stripping	4600	16 127	20 727	22
7	Tonsillectomy w. or w/o adenoïdectomy	8549	17 802	26 351	32
	Adenoïdectomy	17 409	6212	23 621	74
8	Myringotomy	20 867	7480	28 347	74
9	Laparoscopic sterilization	2989	5883	8872	34
10	Squint surgery	102	824	926	11
11	Submucous resection (ENT)	234	5197	5431	4
12	Excision of breast lump	977	5389	6366	15
13	Anal procedures	1755	8887	10 642	16
14	Circumcision	8442	5300	13 742	61
15	Dupuytren	628	1133	1761	36
16	Carpal tunnel decompression	8284	3947	12 231	68
17	Orchidopexy–Varicocoele	1463	4509	5972	24
18	Removal of implanted devices from bone	8970	13 766	22 736	39
	Total 1–18	153 237	237 940	391 177	39
19	Cholecystectomy laparoscopic	36	11 493	11 529	0
20	Vaginal hysterectomy	1	7141	7142	0
	Total 19–20	37	18 634	18 671	0
		153 274	256 574	409 848	37

Complete data concerning public and private hospitals. Other classifications are available: INAMI (national) and DRG; Source: Ministère des Affaires Sociales, de la Santé Publique et de I'Environment (Commission RCM).

Table 6
Statistics for Canada 1995–1996

	Classification	Canada (1995–1996) CCP (*1) and DRG (*2)			
	Group	A	I	Total	%
1	Knee arthroscopy	35 881	3402	39 283	91
2	Extraction of teeth	29 726	1690	31 416	95
3	Cataract surgery	201 017	11 607	212 624	95
4	Inguinal and femoral hernia	28 430	35 788	64 218	44
5	Dilatation and curetage uterus	11 196	1204	12 400	90
6	Vein legation and stripping	8955	5066	14 021	64
7	Tonsillectomy w. or w/o adenoïdectomy	19 163	18 863	38 026	50
	Adenoïdectomy	15 112	1798	16 910	89
8	Myringotomy	37 340	560	37 900	99
9	Laparoscopic sterilization	21 439	3696	25 135	85
10	Squint surgery	7962	1214	9176	87
11	Submucous resection (ENT)	12 084	4406	16 490	73
12	Excision of breast lump	23 833	3197	27 030	88
13	Anal procedures	12 718	9391	22 109	58
14	Circumcision	14 548	29 654	44 202	33
15	Dupuytren	10 161	1439	11 600	88
16	Carpal tunnel decompression	26 161	728	26 889	97
17	Orchidopexy–Varicocoele	5266	2216	7482	70
18	Removal of implanted devices from bone	15 508	4793	20 301	76
	Total 1–18	536 500	140 712	677 212	79
19	Cholecystectomy laparoscopic	8066	69 214	77 280	10
20	Vaginal hysterectomy	27	19 213	19 240	0
	Total 19–20	8093	88 427	96 520	8
		544 593	229 139	773 732	70

(*1) Canadian Classification of Procedures issued (CCP). Complete data from 4 of 10 provinces: Alberta, British Columbia, New Brunswick and Ontario (60% of the Canadian population). Hospital categories are not indicated. Source: Canadian Institute for Health Information (C.I.H.I.).
(*2) Complete data concerning public hospitals. Of Quebec (26% of the Canadian population) DRG classification is used. Source: Québec, Ministère de la Santé et des Services Sociaux, Direction de la recherche et de I'évaluation.

Table 7
Statistics for Denmark 1995

	Classification	Denmark (1995) DRG			
	Group	A	I	Total	%
1	Knee arthroscopy	7611	9334	16 945	45
2	Extraction of teeth	1876	521	2397	78
3	Cataract surgery	14 379	5409	19 788	73
4	Inguinal and femoral hernia	1693	6636	8329	20
5	Dilatation and curetage uterus	5072	6131	11 203	45
6	Vein legation and stripping	1375	2982	4357	32
7	Tonsillectomy w. or w/o adenoïdectomy	115	4925	5040	2
	Adenoïdectomy				
8	Myringotomy	206	367	573	36
9	Laparoscopic sterilization	117	2012	2129	5
10	Squint surgery	2034	1399	3433	59
11	Submucous resection (ENT)	726	3106	3832	19
12	Excision of breast lump	939	1550	2489	38
13	Anal procedures	1214	4594	5808	21
14	Circumcision	839	1030	1869	45
15	Dupuytren	2051	3521	5572	37
16	Carpal tunnel decompression				
17	Orchidopexy–Varicocoele	627	2722	3349	19
18	Removal of implanted devices from bone	3250	6526	9776	33
	Total 1–18	44 124	62 765	106 889	41
19	Cholecystectomy laparoscopic				
20	Vaginal hysterectomy	17	888	905	2
	Total 19–20	17	888	905	2
		44 141	63 653	107 794	41

Data refer to public hospitals. Data for groups 16 and 19 are missing. Source: Ministry of Health.

Table 8
Statistics for Finland 1995

		Finland (1995)			
	Classification	FinDRG			
	Group	A	I	Total	%
1	Knee arthroscopy	163	2518	2681	6
2	Extraction of teeth				
3	Cataract surgery	7808	15 612	23 420	33
4	Inguinal and femoral hernia	1324	6998	8322	16
5	Dilatation and curetage uterus	4331	4056	8387	52
6	Vein legation and stripping	2549	6807	9356	27
7	Tonsillectomy w. or w/o adenoïdectomy	120	3936	4056	3
	Adenoïdectomy	3049	4900	7949	38
8	Myringotomy	121	21	142	85
9	Laparoscopic sterilization	3363	2626	5989	56
10	Squint surgery	1026	1407	2433	42
11	Submucous resection (ENT)				
12	Excision of breast lump	43	297	340	13
13	Anal procedures	779	3620	4399	18
14	Circumcision	589	410	999	59
15	Dupuytren	493	632	1125	44
16	Carpal tunnel decompression				
17	Orchidopexy–Varicocoele	111	594	705	16
18	Removal of implanted devices from bone				
	Total 1–18	25 869	54 434	80 303	32
19	Cholecystectomy laparoscopic				
20	Vaginal hysterectomy				
	Total 19–20				
		25 869	54 434	80 303	32

Finnish classification for DRG (FinDRG) and Finnish classification of surgical procedures. Data concerning public and private hospitals. Data for groups 2, 11, 16, 18, 19 and 20 are missing. Group 1: includes all arthroscopy. Group 4: includes only inguinal hernia procedures for patients age >17. Group 10: includes all extra ocular procedures, not only squint surgery. Source: National Research and Development Centre for Welfare and Health (Health Statistics and Registers Unit).

Table 9
Statistics for Germany 1994

		Germany (1994)			
	Classification	EBM	ICD9		
	Group	A	I	Total	%
1	Knee arthroscopy	172 192	206 600	378 792	45
2	Extraction of teeth				
3	Cataract surgery	66 320	205 000	271 320	24
4	Inguinal and femoral hernia	13 316	243 800	257 116	5
5	Dilatation and curetage uterus	112 840	290 800	403 640	28
6	Vein legation and stripping	63 124	65 800	128 924	49
7	Tonsillectomy w. or w/o adenoïdectomy				
	Adenoïdectomy				
8	Myringotomy				
9	Laparoscopic sterilization				
10	Squint surgery				
11	Submucous resection (ENT)				
12	Excision of breast lump	9140	71 200	80 340	11
13	Anal procedures				
14	Circumcision	45 688	40 600	86 288	53
15	Dupuytren	8524	12 000	20 524	42
16	Carpal tunnel decompression				
17	Orchidopexy–Varicocoele				
18	Removal of implanted devices from bone	15 080	100 600	115 680	13
	Total 1–18				
19	Cholecystectomy laparoscopic				
20	Vaginal hysterectomy				
	Total 19–20				

Public and private German hospitals perform very little ambulatory surgery (which has been authorized there only since January 1, 1993). Ambulatory surgery is practiced in private free standing clinics not equipped for hospital stays. Hospitals (ICD9 modified) and private clinics (EBM) use two different coding systems. Groups 2, 7, 8, 9, 10, 11, 13, 16, 17, 19 and 20 are missing. Source: Zentral Institute des Kassenarztliche Bundesvereininung, Statistisches Bundesamt.

Table 10
Statistics for Ireland 1994

	Classification	Ireland (1994) ICD9CM (V.12)			
	Group	A	I	Total	%
1	Knee arthroscopy	1629	1582	3211	51
2	Extraction of teeth	1546	828	2374	65
3	Cataract surgery	292	2328	2620	11
4	Inguinal and femoral hernia	26	987	1013	3
5	Dilatation and curetage uterus	2616	3937	6553	40
6	Vein legation and stripping	577	3014	3591	16
7	Tonsillectomy w. or w/o adenoïdectomy	22	5875	5897	0
	Adenoïdectomy	27	1072	1099	2
8	Myringotomy	3562	993	4555	78
9	Laparoscopic sterilization	873	640	1513	58
10	Squint surgery	1	5	6	17
11	Submucous resection (ENT)	19	297	316	6
12	Excision of breast lump	1682	1078	2760	61
13	Anal procedures	408	423	831	49
14	Circumcision	1287	1039	2326	55
15	Dupuytren	16	272	288	6
16	Carpal tunnel decompression	196	404	600	33
17	Orchidopexy–Varicocoele	469	1095	1564	30
18	Removal of implanted devices from bone	1379	1701	3080	45
	Total 1–18	16 627	27 570	44 197	38
19	Cholecystectomy laparoscopic	4	2272	2276	0
20	Vaginal hysterectomy	1	1060	1061	0
	Total 19–20	5	3332	3337	0
		16 632	30 902	47 534	35

Complete data concerning public hospitals. DRG classification is also available. Source: Department of Health (Irish Health Statistics).

Table 11
Statistics for Luxembourg 1995

	Classification	Luxembourg (1995) ICD9CM			
	Group	A	I	Total	%
1	Knee arthroscopy	120	2114	2234	5
2	Extraction of teeth	910	94	1004	91
3	Cataract surgery	2	12	14	14
4	Inguinal and femoral hernia	50	1496	1546	3
5	Dilatation and curetage uterus	112	943	1055	11
6	Vein legation and stripping	22	875	897	2
7	Tonsillectomy w. or w/o adenoïdectomy	12	1794	1806	1
	Adenoïdectomy	277	1224	1501	18
8	Myringotomy	519	1335	1854	28
9	Laparoscopic sterilization	2	294	296	1
10	Squint surgery	2	42	44	5
11	Submucous resection (ENT)	2	26	28	7
12	Excision of breast lump	7	101	108	6
13	Anal procedures	320	413	733	44
14	Circumcision	207	646	853	24
15	Dupuytren	2	93	95	2
16	Carpal tunnel decompression	81	559	640	13
17	Orchidopexy–Varicocoele	14	290	304	5
18	Removal of implanted devices from bone	434	578	1012	43
	Total 1–18	3095	12 929	16 024	19
19	Cholecystectomy laparoscopic	0	529	529	0
20	Vaginal hysterectomy	0	731	731	0
	Total 19–20	0	1260	1260	0
		3095	14 189	17 284	18

Complete data concerning public and private hospitals. Other classification is available: DRG (version 10). Source: Inspection Générale de la Sécurité Sociale.

Table 12
Statistics for The Netherlands 1995

		Netherlands (1995)			
	Classification	ICD9CM			
	Group	A	I	Total	%
1	Knee arthroscopy	21 093	6072	27 165	78
2	Extraction of teeth	126	78	204	62
3	Cataract surgery	34 378	82 954	117 332	29
4	Inguinal and femoral hernia	7460	25 223	32 683	23
5	Dilatation and curetage uterus	428	506	934	46
6	Vein legation and stripping	4514	8308	12 822	35
7	Tonsillectomy w. or w/o adenoïdectomy	28 275	4979	33 254	85
	Adenoïdectomy	28 074	921	28 995	97
8	Myringotomy	46 454	741	47 195	98
9	Laparoscopic sterilization	13 597	1356	14 953	91
10	Squint surgery				
11	Submucous resection (ENT)	1050	9530	10 580	10
12	Excision of breast lump	4152	5683	9835	42
13	Anal procedures	2114	5270	7384	29
14	Circumcision	13 557	1134	14 691	92
15	Dupuytren	2997	1773	4770	63
16	Carpal tunnel decompression	10 662	2707	13 369	80
17	Orchidopexy–Varicocoele	2817	2331	5148	55
18	Removal of implanted devices from bone	8720	8488	17208	51
	Total 1–18	230 468	168 054	398 522	58
19	Cholecystectomy laparoscopic	3	10 553	10 556	0
20	Vaginal hysterectomy				
	Total 19–20	3	10 553	10 556	0
		230 471	178 607	409 078	56

Hospital categories are not detailed. Data for groups 10 and 20 are missing. Source: Dutch Centre for Health Care Information (S.I.G.).

Table 13
Statistics for New Zealand 1995

		New Zealand (1995)			
	Classification	ICD9CMA			
	Group	A	I	Total	%
1	Knee arthroscopy	1547	1073	2620	59
2	Extraction of teeth	3676	1017	4693	78
3	Cataract surgery	2634	3469	6103	43
4	Inguinal and femoral hernia	1522	2621	4143	37
5	Dilatation and curetage uterus	5975	4439	10 414	57
6	Vein legation and stripping	410	610	1020	40
7	Tonsillectomy w. or w/o adenoïdectomy	1059	3415	4474	24
	Adenoïdectomy	1222	201	1423	86
8	Myringotomy	8601	1308	9918	87
9	Laparoscopic sterilization	2388	539	2927	82
10	Squint surgery	642	228	870	74
11	Submucous resection (ENT)	6	186	192	3
12	Excision of breast lump	1139	930	2069	55
13	Anal procedures	688	2142	2830	24
14	Circumcision	552	240	792	70
15	Dupuytren	179	288	467	38
16	Carpal tunnel decompression	1255	415	1670	75
17	Orchidopexy–Varicocoele	377	593	970	39
18	Removal of implanted devices from bone	1290	1511	2801	46
	Total 1–18	35 171	25 225	60 396	58
19	Cholecystectomy laparoscopic	5	1159	1164	0
20	Vaginal hysterectomy	3	1116	1119	0
	Total 19–20	8	2275	2283	0
		35 179	27 500	62 679	56

Classification ICD9CM Australian version. Complete data concerning public hospitals. Source: Ministry of Health (Sector Analysis).

Table 14

	Country	Portugal				Comments
	Year	1995				Complete data refering to public hospitals
	Classification	ICD9CM				Other classification is available: DRG
	Group	A	I	Total	%	
1	Knee arthroscopy	54	2118	2171	2	
2	Extraction of teeth	190	257	447	43	
3	Cataract surgery	46	15 015	15 061	0	
4	Inguinal and femoral hernia	877	13 918	14 795	6	
5	Dilatation and curetage uterus	2675	5257	7932	34	
6	Vein legation and stripping	69	2912	2981	2	
7	Tonsillectomy w. or w/o adenoïdectomy	76	3689	3765	2	
	Adenoïdectomy	145	3269	3414	4	
8	Myringotomy	66	1695	1761	4	
9	Laparoscopic sterilization	322	1035	1357	24	
10	Squint surgery	7	167	174	4	
11	Submucous resection (ENT)	11	166	177	6	
12	Excision of breast lump	338	2011	2349	14	
13	Anal procedures	160	1646	1806	9	
14	Circumcision	1083	2182	3265	33	
15	Dupuytren	122	375	497	25	
16	Carpal tunnel decompression	399	1281	1680	24	
17	Orchidopexy–Varicocoele	314	1501	1815	17	
18	Removal of implanted devices from bone	267	3996	4263	6	
	Total 1–18	7221	62 490	69 711	10	Source
19	Cholecystectomy laparoscopic	5	2601	2606	0	Ministry of health
20	Vaginal hysterectomy	4	1270	1274	0	Instituto de Gestao Information and Financeira de Saude (IGIF)
	Total 19–20	9	3871	3880	0	
		7230	66 361	73 591	10	

Table 15
Statistics for United Kingdom 1994–1995

	Classification	United Kingdom (1994–1995) OPCS (1)			
	Group	A	I	Total	%
1	Knee arthroscopy	45 193	30 395	75 588	60
2	Extraction of teeth	92 771	44 862	137 633	67
3	Cataract surgery	60 435	102 396	162 831	37
4	Inguinal and femoral hernia	23 003	68 000	91 003	25
5	Dilatation and curetage uterus	50 207	37 003	87 210	58
6	Vein legation and stripping	16 023	30 344	46 367	35
7	Tonsillectomy w. or w/o adenoïdectomy	1940	78 059	79 999	2
	Adenoïdectomy	3641	13 653	17 294	21
8	Myringotomy	42 698	13 836	56 534	76
9	Laparoscopic sterilization	37 061	14 404	51 465	72
10	Squint surgery	6090	9025	15 115	40
11	Submucous resection (ENT)	512	12 427	12 939	4
12	Excision of breast lump	15 251	16 815	32 066	48
13	Anal procedures	21 592	30 360	51 952	42
14	Circumcision	20 145	10 376	30 521	66
15	Dupuytren	2525	7693	10 218	25
16	Carpal tunnel decompression	22 404	7220	29 624	76
17	Orchidopexy–Varicocoele	6555	6225	12 780	51
18	Removal of implanted devices from bone	9047	20 541	29 588	31
	Total 1–18	477 093	553 634	103 0727	46
19	Cholecystectomy laparoscopic	101	21 207	213 08	0
20	Vaginal hysterectomy	68	15 460	15 528	0
	Total 19–20	169	36 667	36 836	0
		477 262	590 301	1067 563	45

Complete data referring to public hospitals only in England. Activity in private hospitals is relatively limited as compared to public hospitals. It should be noted that these concentrate on elective surgery that is likely done as ambulatory surgery. Source: Department of Health.

Table 16
Statistics for United States 1994

		United States (1994)			
	Classification	ICD9CM			
	Group	A	I	Total	%
1	Knee arthroscopy	546 000	38 000	584 000	93
2	Extraction of teeth	28 000	*	28 000	100
3	Cataract surgery	1650 000	52 000	1702 000	97
4	Inguinal and femoral hernia	542 000	1000 000	642 000	84
5	Dilatation and curetage uterus	347 000	28 000	375 000	93
6	Vein legation and stripping	33 000	8000	41 000	80
7	Tonsillectomy w. or w/o adenoïdectomy	334 000	40 000	374 000	89
	Adenoïdectomy	81 000	*	81 000	100
8	Myringotomy	471 000	17 000	488 000	97
9	Laparoscopic sterilization	205 000	9000	214 000	96
10	Squint surgery				
11	Submucous resection (ENT)	54 000	*	54 000	100
12	Excision of breast lump	326 000	21 000	347 000	94
13	Anal procedures	77 000	21 000	98 000	79
14	Circumcision	103 000	19 000	122 000	84
15	Dupuytren	18 000	*	18 000	100
16	Carpal tunnel decompression	338 000	7000	345 000	98
17	Orchidopexy–Varicocoele	70 000	*	70 000	100
18	Removal of implanted devices from bone	146 000	30 000	176 000	83
	Total 1–18	5369 000	390 000	5759 000	93
19	Cholecystectomy laparoscopic	170 000	304 000	474 000	36
20	Vaginal hysterectomy	5000	170 000	175 000	3
	Total 19–20	175 000	474 000	649 000	27
		5544 000	864 000	6408 000	87

Data are provided by the National Hospital Discharge Survey (NHDS) and the National Survey of Ambulatory Surgery (NSAS). They are national probability samples and as such, are subject to sampling error. Combining the NHDS and the NSAS, the spectrum of hospitals covered by the samples includes all non-Federal hospitals and free standing units that are licensed specifically for ambulatory surgery. An asterisk indicates that they were some sampled cases, but fewer than 30, hence very low reliability. Data for group 10 is missing. Source: National Center for Health Statistics (N.C.S.H.).

4. Discussion

A striking and notable observation from the survey is the lack of statistics or useful facts available in 11 of 24 countries responding to the questionnaire. This shortcoming is not restricted to ambulatory surgery activity but also, frequently extends to activity levels in conventional in-patient settings.

The 'penetration rate' of ambulatory surgery differs from one country to another. Some explanatory variables include: national medical culture and practice, the network of hospitals, the number of available beds, length of waiting lists, the regulatory systems and financing policies of public authorities and private health insurers, the training received by medical/paramedical personnel and the level of public awareness. The impact of these factors should be looked at separately.

It is tempting to establish a ranking of performance according to an overall index of all the operations

Table 18
Population: Thousand persons (1995)

Country	Persons	Males	Female
Australia	17.886	8.920	8.947
Belgium	10.127	4.961	5.167
Canada (*1)	25.523	12.653	12.870
Denmark	5.223	2.583	2.640
Finland	5.107	2.486	2.620
Germany	81.594	39.800	41.793
Ireland	3.546	1.771	1.775
Luxembourg	407	201	206
New Zealand	3.561	1.760	1.802
The Netherlands	15.482	7.665	7.818
Portugal	9.815	4.728	5.087
United Kingdom (*2)	48.903	23.996	24.907
United States	271.300	131.600	135.515

(*1) Provinces of Alberta, British Colombia, New Brunswick, Ontario and Quebec (representing 86% of the Canadian population).
(*2) England only.
Source: OECD.

Table 17
Ratios of ambulatory surgery

	Group	AUS	B	CDN	DK (*1)	SF (*1)	D (*1)	IRL	L	NL (*1)	NZ	P	UK	US (*1)
	Year	1996	1995	1995–6	1995	1995	1994	1995	1995	1995	1995	1995	1995	1994
1	Knee arthroscopy	39.5	30.6	91.3	44.9	6.1	45.5	50.7	5.4	77.6	57.4	2.5	59.8	93.5
2	Extraction of teeth	41.4	60.5	94.6	78.3			65.1	90.6	61.8	78.3	42.5	67.4	100.0
3	Cataract surgery	35.2	28.3	94.5	72.7	33.3	24.4	11.1	14.3	29.3	43.2	0.3	37.1	96.9
4	Inguinal and femoral hernia	14.6	7.1	44.3	20.3	15.9	5.2	2.6	3.2	22.8	36.7	5.9	25.3	84.4
5	Dilatation and curetage uterus	45.6	42.7	90.3	45.3	51.6	28.0	39.9	10.6	45.8	57.4	33.7	57.6	92.5
6	Vein legation and stripping	11.1	22.2	63.9	31.6	27.2	49.0	16.1	2.5	35.2	40.2	2.3	34.6	80.5
7	Tonsillectomy w. or w/o adenoïdectomy	1.6	32.4	50.4	2.3	3.0		0.4	0.7	85.0	23.7	2.0	2.4	89.3
	Adenoïdectomy	34.3	73.7	89.4		38.4		2.5	18.5	96.8	85.9	4.2	21.1	100.0
8	Myringotomy	47.5	73.6	98.5	36.0	85.2		78.2	28.0	98.4	86.8	3.7	75.5	96.5
9	Laparoscopic sterilization	44.4	33.7	85.3	5.5	56.2		57.7	0.7	90.9	81.6	23.7	72.0	95.8
10	Squint surgery	34.8	11.0	86.8	59.2	42.2		16.7	4.5		73.8	4.0	40.3	
11	Submucous resection (ENT)	5.2	4.3	73.3	18.9			6.0	7.1	9.9	3.1	6.2	4.0	100.0
12	Excision of breast lump	37.9	15.3	88.2	37.7	12.6	11.4	60.9	6.5	42.2	55.1	14.4	47.6	93.9
13	Anal procedures	27.0	16.5	57.5	20.9	17.7		49.1	43.7	28.6	24.3	8.9	41.6	78.6
14	Circumcision	44.3	61.4	32.9	44.9	59.0	52.9	55.3	24.3	92.3	69.7	33.2	66.0	84.4
15	Dupuytren	24.1	35.7	87.6	36.8	43.8	41.5	5.6	2.1	62.8	38.3	24.5	24.7	100.0
16	Carpal tunnel decompression	40.4	67.7	97.3				32.7	12.7	79.8	75.1	23.8	75.6	98.0
17	Orchidopexy–Varicocoele	34.0	24.5	70.4	18.7	15.7		30.0	4.6	54.7	38.9	17.3	51.3	100.0
18	Implanted devices	34.5	39.5	76.4	33.2		13.0	44.8	42.9	50.7	46.1	6.3	30.6	83.0
	Total 1–18	35.0	39.2	79.2	41.3	32.2		37.6	19.3	57.8	58.2	10.4	46.3	93.2
19	Cholecystectomy laparoscopic	0.6	0.0	10.4				0.2	0.0	0.0	0.4	0.2	0.5	35.9
20	Vaginal hysterectomy	0.1	0.0	0.1	1.9			0.1	0.0		0.3	0.3	0.4	2.9
	Total 19–20	0.4	0.2		1.9			0.1	0.0	0.0	0.4	0.2	0.5	27.0

Values are expressed as a percentage.
(*1) One or several groups missing.

Table 19
Number of procedures/1000 persons

	Group	AUS	B	CDN	DK(*1)	SF(*1)	D(*1)	IRL	L	NL (*1)	NZ	P	UK	US(*1)
1	Knee arthroscopy	4.2	6.3	1.5	3.2	0.5	4.6	0.9	5.5	1.8	0.5	0.2	1.5	2.2
2	Extraction of teeth	5.3	3.0	1.2	0.5			0.7	2.5	0.0	1.3	0.0	2.8	0.1
3	Cataract surgery	7.1	6.6	8.3	3.8	4.6	3.3	0.7	0.0	7.6	1.7	1.5	3.3	6.3
4	Inguinal and femoral hernia	3.3	1.9	2.5	1.6	1.6	3.2	0.3	3.8	2.1	1.2	1.5	1.9	2.4
5	Dilatation and curetage uterus (*2)	9.1	4.5	1.0	4.2	3.2	9.7	3.7	5.1	0.1	5.8	1.6	3.5	2.8
6	Vein legation and stripping	1.2	2.0	0.5	0.8	1.8	1.6	1.0	2.2	0.8	0.3	0.3	0.9	0.2
7	Tonsillectomy w. or w/o adenoïdectomy	1.9	2.6	1.5	1.0	0.8		1.7	4.4	2.1	1.3	0.4	1.6	1.4
	Adenoïdectomy	0.5	2.3	0.7		1.6		0.3	3.7	1.9	0.4	0.3	0.4	0.3
8	Myringotomy	3.2	2.8	1.5	0.1	0.0		1.3	4.6	3.0	2.8	0.2	1.2	1.8
9	Laparoscopic sterilization	1.5	0.9	1.0	0.4	1.2		0.4	0.7	1.0	0.8	0.1	1.1	0.8
10	Squint surgery	0.0	0.1	0.4	0.7	0.5		0.0	0.1		0.2	0.0	0.3	
11	Submucous resection (ENT)	0.2	0.5	0.6	0.7			0.1	0.1	0.7	0.1	0.0	0.3	0.2
12	Excision of breast lump	1.9	0.6	1.1	0.5	0.1	1.0	0.8	0.3	0.6	0.6	0.2	0.7	1.3
13	Anal procedures	1.8	1.1	0.9	1.1	0.9		0.2	1.8	0.5	0.8	0.2	1.1	0.4
14	Circumcision (*3)	3.1	2.8	3.5	0.7	0.4	2.2	1.3	4.2	1.9	0.5	0.7	1.3	0.9
15	Dupuytren	0.3	0.2	0.5	1.1	0.2	0.3	0.1	0.2	0.3	0.1	0.1	0.2	0.1
16	Carpal tunnel decompression	1.9	1.2	1.1				0.2	1.6	0.9	0.5	0.2	0.6	1.3
17	Orchidopexy–Varicocoele (*3)	1.2	1.2	0.6	1.3	0.3		0.9	1.5	0.7	0.6	0.4	0.5	0.5
18	Implanted devices	1.7	2.2	0.8	1.9		1.4	0.9	2.5	1.1	0.8	0.4	0.6	0.6
	Total 1–18	49.5	42.8	29.1	23.6	17.6	27.2	15.4	44.8	27.1	20.1	8.4	23.7	23.4
19	Cholecystectomy laparoscopic	1.8	1.1	3.0				0.6	1.3	0.7	0.3	0.3	0.4	1.7
20	Vaginal hysterectomy (*2)	1.6	1.4	0.8	0.3			0.6	3.5		0.6	0.1	0.6	1.3
		3.4	2.5	3.8	0.3			1.2	4.8	0.7	0.9	0.4	1.1	3.0

(*1) One or several groups missing.
(*2) Only female population.
(*3) Only male population.

concerned (Table 17). In the authors opinion, the operations selected constitute a representative sample of the general activity in ambulatory surgery in a country, but it is a sample from which are excluded numerous operations which can be conducted on an ambulatory basis. Moreover, data concerning certain groups is missing for certain countries. Performance activity in certain categories of health institutions (private hospitals, health centres or medical offices) has not always been recorded. Coding omissions, questions of medical culture and the plethora of medical specialists and regulatory or financial incentives or obstacles could have an influence. Furthermore, it is not clear whether some numbers cited, mainly from the US, do not include a significant number of patients who spent well over a 'working day' in an ambulatory setting, with post-operative transfer for 23 h or more to medicalised recovery structures found next to some ambulatory surgical centres. Finally, additional investigations sometimes show very large variations in ratios of number of procedures per 1000 inhabitants from country to country (Tables 18 and 19). These diverse factors, as well as the greater or lesser feasibility of the ambulatory surgery approach in each group of procedures, could significantly influence the overall national scores.

5. Conclusions

In our view, despite flaws in the method and the difficulties already mentioned, the results of this survey nonetheless make a significant contribution to understanding the impact of ambulatory surgery at the international level, by comparing practices from one country to another and in providing an information base that allows further study.

This instrument must of course be refined: the apparent anomalies must be investigated, the field of investigation must be further defined and enlarged and new countries should be included when data is available.

Nonetheless, there is the matter of a question which must be answered by governments and health professionals. Governments and professional associations should rise to the challenges made evident in this survey. Public authorities must fill a glaring lack of reliable statistics. The surgical profession, reflecting on this data, should be rethinking its practice options.

Acknowledgements

The authors gratefully thank the respondents who sent the figures used in this report, as well as the administrations and professional associations making up the data base: Australia (M. de Looper, L. Roberts), Belgium (F. Praet, M. Breda), Canada (G. Fortin, C. Proietti), Canada Québec (M. Alberton, P. Bégin-Brosseau), Czech Republic (J. Holub), Denmark (M. Kruse), Finland (M. Nenonen, O. Nikiforov), Germany (J. Reydelet, G. Brenner), Ireland (M. Higgins), Italy (U. Baccaglini, C. Castoro), Luxembourg (R. Wagener), Mexico (M.A. Lezana Fernandez), Netherlands (P. Go), New Zealand (E. Bray, A. Devlin), Norway (L. Korbol, J.C. Raeder), Portugal (M. Bentes, J. Giria), Spain (E. Gil Lopez), United Kingdom (E. Bramley-Harker, N. Huda), United States (R. Pokras, E. Wood, E. Bacon).

ELSEVIER

Ambulatory Surgery 6 (1928) 57–60

Ambulatory Surgery

Clinical challenges in paediatric ambulatory patients

J. Lance Lichtor *

The University of Chicago, Department of Anaesthesia and Critical Care, MC4028, 5841 South Maryland Avenue, Illinois, Chicago 60637, USA

Received 30 April 1997; received in revised form 9 July 1997; accepted 14 July 1997

Clinical challenges for the child undergoing ambulatory surgery was the topic discussed on the morning of Friday, May 2, 1997, at the Society for Ambulatory Anaesthesia Annual Meeting. The first talk, entitled 'Managing the Child with Congenital Heart Disease' was presented by Ronald S. Litman, DO, Assistant Professor of Anaesthesiology and Paediatrics and Chief of Paediatric Anaesthesia at the University of Rochester Medical Center, Rochester, New York. Congenital heart disease affects between two and eight children per 1000 at birth. When a child with congenital heart disease comes for ambulatory surgery, the lesion is either uncorrected, palliated, or corrected. Children with uncorrected lesions either have a lesion that will not cause hemodynamic compromise or may be awaiting surgery for correction. An example of a child who has undergone palliative surgery is a child who has had a Blalock–Taussig shunt for tetralogy of Fallot. Children with corrected lesions may present no cardiac concerns although other non-cardiac anomalies may affect anaesthetic management. Some cardiac lesions, for example, are associated with shorter tracheas so that after intubation, it is especially important that breath sounds be auscultated to ensure that both sides of the lung are being ventilated. Concerning preoperative laboratory tests, no specific laboratory test is indicated in children with heart disease. In these children, as with most children undergoing ambulatory surgery, the most commonly ordered blood test is hematocrit. Preoperative hematocrits $>65\%$ are problematic and should be discussed with the patient's cardiologist.

Information that can be gleaned from the preoperative interview includes a determination of exercise intolerance. In an infant, strength of feeding may be a means to determine exercise intolerance. The child's cardiologist or even parent can provide important clinical information about the nature of the child's complex lesion. A mild upper respiratory tract infection may cause greater cardiac stress, so surgery is usually cancelled when the child has such an infection. It is important to ask parents about the child's previous anaesthetics and their management and to check the patient's chart for this information.

Dehydration must be avoided. With chronic hypoxia, patients may have polycythemia, and dehydration with polycythemia may be problematic. For perioperative fasting, normal NPO rules should apply.

If the child is sedated preoperatively, there is less crying. Because sedation decreases oxygen consumption, it may be important if oxygen consumption is a concern. An excessive amount of sedation should be avoided though, because of possible hypotension or respiratory depression. Oral midazolam seems to be particularly advantageous in children with congenital heart disease, but oxygen saturation should be measured to avoid desaturation.

Intraoperative monitors may not be accurate in patients with congenital heart disease, particularly in patients with a right to left shunt in whom ventilation and perfusion are mismatched. The difference between end-tidal and arterial carbon dioxide is greater in patients who are cyanotic. Such a difference is present even in normal patients, although the difference is greater in patients with congenital heart disease. The practitioner should use the end-tidal CO_2 as a means to detect a trend and should not rely on absolute numbers.

Pulse oximeters may also be problematic in patients with congenital heart disease, particularly when the oxygen saturation is less than 70%. When saturation decreases further in patients with chronically low oxygen saturation, the pulse oximeter may not reflect the decrease. A precordial stethoscope may then be useful for monitoring.

* Tel.: +1 312 7026582; fax: +1 312 7025447.

PII S0966-6532(97)10002-6

Concerning anaesthetic agents, there is no good proof that one agent is better than another. In patients with right to left shunts, inhalation agents may cause a greater shunt fraction cyanosis. Ketamine has been thought to be particularly useful in patients with right to left shunts because it preserves systemic vascular resistance. Propofol has recently been used and seems to be a better drug because of its shorter duration of action.

Regional anaesthesia is generally safe for children with congenital heart disease. Patients with coarctation of the aorta may have tortuous arteries, so that regional anaesthesia is probably not optimal because the needle used to insert the local anaesthetic may hit such an artery. In patients with right to left shunts the action of local anaesthetics may be prolonged: local anaesthetics are metabolized in the lungs and because of the shunt, anaesthetics may take longer to reach the lungs. In patients with high hematocrits ($>60\%$) coagulopathy may be present. If regional anaesthesia is anticipated, the practitioner should make sure that clotting function is normal.

Postoperatively, hypoventilation of the child should be avoided. Oxygen is recommended on transport of the patient to postoperative care. These patients may be more prone to develop post extubation croup. The clinician should be prepared for that problem in the post anaesthesia care unit.

Concerning specific lesions, an atrial septal defect may be associated with postoperative arrhythmias. Patients with ventricular septal defects may have pulmonary hypertension. After repair, a right bundle branch block is common and patients may also have myocardial dysfunction; arrhythmias; tricuspid and mitral and/or pulmonary insufficiency. Patients who have undergone a patent ductus arteriosus repair usually have no permanent sequelae. For all of these lesions, prophylactic antibiotics should be considered to prevent sub acute bacterial endocarditis, particularly in surgical procedures that are likely to result in bacteremia. Patients who have a Blalock shunt should be kept well hydrated so that the shunt does not clot.

Pain management for the child was the next topic of discussion given by Hernando DeSoto, MD, Chief of Paediatric Anaesthesia and Clinical Associate Professor of Anaesthesia at the University of Florida College of Medicine, Jacksonville, Florida.

The tendency in the management of postoperative pain in children is to undermedicate patients. The primary reason for undermedication is that a fixed dose is given based on weight. Another reason is that pain medications are ordered 'as needed'. PRN (as needed) may be acceptable for adult pain medication, but it is difficult for a 6 month old to state that he or she is in pain. Older children hate intramuscular injections and so may avoid asking for pain medication. There is also an exaggerated concern about side effects. For children, as is the case frequently for adults, determination of the presence of pain is delegated to inexperienced personnel. Finally, there is the mistaken belief that children do not experience pain.

Pain assessment in children is not necessarily more difficult than in adults, but it is different. For neonates behavioral cues for pain are facial grimacing (eyebrows furrowed and eyes tightly closed), crying and an increase in motor activity. A cry of pain is higher in pitch and more urgent in character than normal crying. Motor activity in the presence of pain consists of arching of the back and withdrawing. The physiologic parameters associated with pain are non-specific. If a procedure is painful for an adult or older child, the procedure will also be painful for a young child. Sometimes when scales for pain are used, the child will point to what he likes to feel rather than what he is actually feeling. Many tools are available to help children qualify the amount of their pain. These include facial expressions, the oucher scale, color scales, and various linear analog scales.

Acetaminophen is the most common drug used for mild analgesia. In the past, children have been undermedicated with this drug. Doses of 10 mg/kg are too conservative. Doses rectally of 35 and up to 45 mg/kg have been reported without adverse effects. Orally, the dose of 15–20 mg/kg every 4 h is useful. The drug takes approximately 3 h before a maximal effect is seen. Therefore, it is best given even preoperatively rather than at the end of a surgical procedure.

Ketoralac is a useful, non-steroidal, anti-inflammatory drug for the control of pain. It can be given both intravenously and orally. When given in combination with opiates, opiate requirement is less. Non-steroidal anti-inflammatory drugs and acetaminophen work together and act at different sites. The toxicity of the two drugs is not additive. The main concern with the use of non-steroidal anti-inflammatory drugs is their effect on platelet function. In patients undergoing tonsillectomy, for example, the drugs may be problematic. Ketorolac should be avoided in patients with a coagulopathy, neuropathy, gastropathy, or hypovolemia or in those undergoing high-risk surgery.

Clonidine, which reduces postoperative pain, is a drug that has had limited use in adults and even less use in children. There is the potential for bradycardia when clonidine is used.

Narcotics, which may be necessary to control intense pain, can contribute to postoperative drowsiness, respiratory depression, and nausea and vomiting. Remifentanil has recently been introduced into anaesthesia practice, and it may be useful for children. Because of its rapid offset though, it may not be therapeutic in patients who will have pain postoperatively. In addition, because delivery by infusion is nec-

essary, it should not be used for short cases where the complexity and expense associated with its delivery are not warranted.

Regional anaesthesia is a method to help control pain, and one that should not be ignored in patients undergoing ambulatory surgery. The caudal block is probably the most popular form of regional anaesthesia in children but is most useful for operations below the umbilicus. Bupivacaine is the local anaesthetic most commonly used. For lower extremity surgery, a dose of 0.5–0.75 ml/kg of a 0.125% bupivacaine solution is satisfactory. For operations in the inguinal region, a higher dose, i.e. 0.75–1 ml/kg, is necessary. Penile blocks are very effective for circumcision or hypospadias repair. A ring block around the base of the penis or a dorsal nerve block at the 10:30 and 13:30 h positions at the base of the penis can be performed. Another type of penile block involves the application of a local anaesthetic cream at the incision site after surgical closure. In neonates, an epinephrine-free solution of local anaesthesia (either 0.25% bupivacaine 1–3 ml or lidocaine 1%) should be used.

Bier blocks are effective in the emergency room for closed reductions. A 3 ml/kg of 0.5% lidocaine solution may be used.

Although anaesthesiologists who care for children, in general, tend to undermedicate them for control of pain, our colleagues who care for them outside of the operating room probably undermedicate them even more. Procedures such as veni-puncture, lumbar puncture, or bone marrow aspiration may be particularly painful and feared by children. Pain control with some of the techniques described or with EMLA cream is advisable.

The next lecture entitled 'Management of the Ambulatory Patient with Sleep Apnea or Bronchospastic Disease' was given by Raafat S. Hannnallah, MD, Professor of Anaesthesiology and Paediatrics at the Children's Hospital National Medical Center, Washington, DC. The current trend in management of ambulatory surgery patients is to take care of patients who are sicker. These include patients with sleep apnea or bronchospastic disease.

Patients with sleep apnea may have obstructive central or a mixed type of apnea. In central apnea, there is decreased CNS output to the inspiratory muscles. With obstructive apnea, although respiratory efforts continue, the upper airway is closed, resulting in no airflow. Despite the cause for apnea, the end result is desaturation. The usual causes for this syndrome in children include adenotonsillar hypertrophy, craniofacial anomalies, obesity, or neuromuscular disease. Frequently patients with adenotonsillar hypertrophy require tonsillectomy and adenectomy. A patient with craniofacial anomalies may have sleep apnea because of the decreased area of his airway. Obstructive sleep apnea should always be suspected in a child scheduled for tonsillectomy and adenoidectomy surgery. These patients may have an elevated hematocrit because of chronic hypoxemia. Patients with coexisting pulmonary disease, e.g. bronchopulmonary dysplasia or asthma, may have a predilection for pulmonary hypertension. Severe forms of the disease may be accompanied by cardiomegaly and some element of cardiac dysfunction.

Intraoperatively, apneic patients may demonstrate complete airway obstruction after induction of anaesthesia. They usually do not have an anatomic obstruction that would interfere with direct visualization of the vocal cords during laryngoscopy. These children probably should not be extubated until they are awake. Patients who are considered high risk have craniofacial anomalies affecting the pharyngeal airways, failure to thrive, hypotonia, corpulmonale, morbid obesity, previous upper airway trauma and are less than 2 or 3 years of age. Postoperatively, these patients may require oxygen, continuous positive airway pressure, or some form of afterload reduction. Extubation may be delayed until surgical swelling subsides and normal pharyngeal muscle tone is restored. Patients such as these obviously are not appropriate for ambulatory surgery. Some physicians think that any apneic child with more than minimal symptoms is not an appropriate candidate for ambulatory surgery.

Patients with bronchospastic disease are noisy breathers. They may have reactive airway disease or asthma. Asthma is probably the most common disease of childhood, and a disease whose incidence is increasing. Although more prevalent among Caucasians, the disease tends to be more intense in African American individuals. Asthma may be classified according to its intensity, from mild asthma by history to active wheezing. Patients with active wheezing either have moderate asthma that is under poor control or are never wheeze free and have severe asthma. Patients with active wheezing because their moderate asthma is poorly controlled should not undergo surgery. Patients with severe asthma are difficult to manage and probably should not, under any circumstance, undergo ambulatory surgery. Patients with upper respiratory tract infections are at an increased risk for wheezing and should probably wait for 1 month before they undergo ambulatory surgery.

Patients with mild asthma are excellent candidates for ambulatory surgery. Patients with moderate asthma who are taking daily medications to control their symptoms should be instructed to continue their medications up to and including the morning of surgery. A beta agonist should be administered in the holding area.

In the management of patients intraoperatively with asthma, endotracheal tubes should be avoided if possible because they are associated with an increased incidence of bronchospasm. If a patient is intubated, the

anaesthesiologist should make sure that there is an adequate depth of anaesthesia. An LMA is preferable to an endotracheal tube.

There is probably no advantage to using one type of anaesthetic over another. If a patient does experience intraoperative bronchospasm, a beta agonist is useful. The criteria for discharge home should be no different than that for other patients. Adequate hydration is important and the patient should not be wheezing.