ELSEVIER

J. of Ambulatory Surgery 10 (2003) 113

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Editorial

The International Association for Ambulatory Surgery (IAAS)

Some ten years since its foundation, it is perhaps time to give an update on recent changes in the IAAS and what the future holds.

The last year has not been entirely smooth sailing. Unexpectedly, at the beginning of the year, the IAAS office in Brussels became unavailable and a new office had to be found. This has now been achieved and the office will become fully functional in January, 2004. The new address is:

The International Association for Ambulatory Surgery
c/o The British Association of Day Surgery
The Royal College of Surgeons of England
35–43 Lincoln's Inn Fields
London
WC2A 3PN
United Kingdom

Details of dedicated telephone and fax numbers will be posted on the IAAS website (www.iaas-med.org) as soon as they are known. The website, itself, has become somewhat out of date over the last year. This has been due to the management upheavals.

At present, the site is being revised and expanded. On a positive note, the IAAS has developed a number of guidance notes on the following ambulatory surgery subjects:

- Universal Clinical Indicators
- Extended Recovery
- Patient Selection Criteria
- Patient Discharge Criteria
- Patient Satisfaction

These will be available on the website or from the office from January 2004.

In May 2003, the IAAS held its 5th International Congress in Boston, USA. This was a great success with an attendance of over 2,200 delegates from 24 countries. The next International Congress will be held in Seville, Spain from 24th to 27th April 2005 (see www.iaascongress2005.org). Following that, the congress will be in Amsterdam, The Netherlands in 2007, Brisbane, Australia in 2009 and in Aarhus, Denmark, 2010.

From its inception, the IAAS has had three membership categories—full member, associate organisation member and associate individual member. With these, there has been a steady increase in the number of members of the IAAS. The Executive and the General Assembly of the IAAS, however, have been disappointed by the lack of membership applications from individuals or organisations from countries of low economic status. It is these very countries that can gain so much from the cost effective treatment that day surgery can provide. Consequently, a new class of membership has been introduced—corresponding member. Details of all types of membership together with application forms are available from the IAAS office or on the website.

The IAAS enters its second decade on a firm basis but still with much to achieve if it is to meet its main objectives of promoting and developing high quality ambulatory surgery worldwide.

Professor P.E.M. Jarrett
Langleys
Queens Drive
Oxshott
Surrey, KT22 0PB
UK

0966-6532/03/$ - see front matter
doi:10.1016/j.ambsur.2003.10.001

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 114–121

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Recovery from gynaecological day surgery: are we underestimating the process

Helen Cox [a,c,*], Beverly O'Connell [b,c]

[a] Chair in Contemporary Nursing, Epworth Hospital, 89 Bridge Rd, Richmond 3121, Vic., Australia
[b] Chair in Acute Nursing, Cabrini Hospital, 183 Wattletree Rd, Malvern 3144, Vic., Australia
[c] School of Nursing, Deakin University, Melbourne, Australia

Received 23 April 2002; accepted 15 January 2003

Abstract

This paper reports a study investigating the post operative experiences of 80 women following gynaecological day surgery. Women kept a diary for the first 4 days following surgery. The diary included a recovery rating scale and a symptom management index focusing particularly on symptoms. A telephone interview conducted on post-operative day 10 further explored experiences. Results at day 4 indicated women experienced significant problems with pain, moving around and tiredness. By day 10, women were still experiencing tiredness, pain and other lingering problems. The study indicates that patients experience more problems than discharge education assumes.

Keywords: Day surgery; Laparoscopy; Symptom management

1. Introduction and literature review

The practice of conducting surgery as a day procedure is expanding at a rapid rate as it provides a practical approach to decreasing surgical waiting lists within the backdrop of cost containment. Its growth has been accelerated through advances in short acting anaesthetic drugs and the use of sophisticated technologies. Government policies and funding formulas will continue to encourage its development [1]. Day surgery relies on patients and their carers to manage patient recovery at home. Within this context, it is important to ensure sound monitoring of patient recovery at home and to evaluate the appropriateness of currently used patient education. This is particularly important because there is conflicting evidence about what constitutes appropriate discharge information in terms of addressing patients' needs [2–4].

A review of the literature on discharge information conducted by Bradshaw et al. [2] found that the information given to patients often does not address the patient's concerns. Specifically, it seemed that the development of discharge information has been informed by what nurses think the patient's knowledge needs are rather then the patient's actual needs. If patients are required to manage their recovery at home, then further work is necessary to determine patients' perspectives on their information needs.

Bradshaw et al. [2] conducted a study to identify patients' key concerns post-discharge from six common general procedures. These researchers found that all patients, regardless of type of surgery, experienced similar concerns. Patients stated that they lacked information on pain management. They also complained that the written information lacked clarity and was constructed using medical jargon that was difficult to understand. These findings support those of other researchers who have stated that post-operative pain instruction was inadequate particularly when the instruction was verbal and not accompanied by written information, and when the analgesics provided, usually paracetamol, proved ineffective [5,6].

In a study by Cox [3], women who had undergone laparoscopy for endometriosis identified pain informa-

* Corresponding author. Tel.: +61-3-9426-6565; fax: +61-3-9429-5037.
E-mail address: helencox@deakin.edu.au (H. Cox).

0966-6532/03/$ - see front matter
doi:10.1016/S0966-6532(03)00007-6

tion as an issue, but the majority also reported insufficient information in a number of other areas. They were particularly concerned about managing their wounds and felt unprepared for the length of recovery time. The issue of adequate patient information should be approached from two positions. Firstly, whether information addresses patient needs and secondly, whether information assists with recovery. It would seem that addressing information from the perspective of what patients perceive they need to assist recovery is an important goal. However, a study conducted by Young et al. [4] revealed that the use of an enhanced discharge information package that was developed based on patient's needs had no effect on patient recovery. These findings indicate that there may be other factors that influence recovery. It is important for studies to be conducted that explore and identify issues that impact on recovery.

The literature indicates that gender is one factor known to affect recovery. According to Myles et al. [7], post-operative recovery is different for women than for men. This recent quality of recovery research suggests that women are slower to return to health and are more likely to have post-operative complications. These researchers [7] postulated that the underlying physiological differences between men and women account for these variations. They further state that post-operative nausea experienced by women is linked to changes in the menstrual cycle and that women tend to have a higher incidence of headaches following surgery. The researchers conclude that the difference between men's and women's recovery from surgery is significant and may be underestimated. Given these differences, it would seem that further work is necessary to evaluate women's recovery trajectories.

A problematic post-operative symptom experienced by patients is tiredness [5]. It is clear that rest and assistance at home are important elements in recovery and should be seriously considered by consultants before scheduling someone for day surgery. Another issue worth considering that has arisen from a number of studies [4,5] is the type of support patients require in their recovery phase and whether they are able to return to their current domestic and work roles within the medically prescribed recovery time.

2. Aim

The aim of this study was to investigate women's experiences of recovering at home following gynaecological day surgery procedures. The research objectives were:

- to determine the types and intensity of symptoms that women experience when recovering from gynaecological day surgery procedures at home;
- to determine whether women are able to manage their symptoms at home;
- to identify the extent to which carers are used to assist women recover from day surgery;
- to establish whether the educational instructions given to women are adequate to enable them to manage their symptoms; and
- to determine the extent to which women who have had gynaecological day surgery access medical, community and allied health services in their recovery phase at home.

3. Patients and methods

This study used an exploratory/descriptive design and was conducted over a 6-month period in the day surgery unit at a large, private, not-for-profit hospital in inner city Melbourne.

All English-speaking patients who were to have a general anaesthetic for a gynaecological procedure in a day surgery setting and who consented were included in the study. Those who wished to participate were given a reply paid envelope and a self-administered Post-operative Symptoms Diary to complete in the first 4 days post-surgery and asked to return the diary before 10 days post-surgery. Ten days post-surgery, those patients who had returned their diary were telephoned by the researchers and asked to answer specific questions related to their recovery from days 5 to 10.

A post-operative Symptoms Diary specifically designed for day surgery patients [4] was used in this study. The diary comprised three domains: a Symptom Recovery Scale, a Management Index and two sections on discharge information and demographics. The Symptom Recovery Scale is a numerical rating scale with numbers ranging from 1 to 10 for each symptom category. Patients were asked to rate the severity of the symptom experienced. The higher the rating, the higher the severity of symptom experienced. Reliability testing revealed alpha coefficients ranging from 0.73 to 0.78 [4].

The management index contained items on tiredness, wound care, mobility, pain, eating and drinking, nausea, vomiting and elimination. Patients were asked to complete this section by indicating how they managed each symptom. The five responses for each activity/condition include the following: "not difficult", "difficult but managed", "very difficult but managed", "could not manage" or "not relevant".

The type of discharge information given to patients was evaluated using 11 questions related to recovery items. Additionally, patients were asked if the information they received was sufficient. These questions were

asked on day 4 of the diary to take into account the first 4 days of post-operative recovery. The demographics section comprised eight categorical items covering: type of operation and anaesthetic used, age, occupation, ethnicity, gender, marital status and education.

The telephone survey, which included a combination of open- and closed-ended questions, was conducted approximately 10 days post-recovery. Patients were asked questions about the types of problems experienced and the level to which they and their carer were able to manage them. Questions also focused on patients' perceptions regarding post-operative information provided by the hospital and their subsequent ability to manage convalescence. Assistance received from carers and other health care professionals was recorded. As several patients were difficult to contact, some interviews were conducted up to 15 days post-discharge.

Quantitative data were analysed descriptively using SPSS® for Windows version 10 (SPSS Inc., Chicago, IL, USA). To assist the analysis, the results of the various instruments in the diary and telephone survey closed-ended question responses were numerically coded.

4. Results

The sample consisted of 80 female patients who had undergone gynaecological procedures under a general anaesthetic in the day surgery unit. The mean age of the patients was 36.6 years (range 22–63 years). The majority (91.1%) of patients had a carer for the first 24 h after surgery. Of the sample, 82.5% of the participants were in paid employment, 10% performed home duties, 5% were students and the remaining 2.5% were unemployed. The participants were predominantly Australian-born (85%).

4.1. Four day diary analysis

The Symptom Recovery Scale comprised the following variables: tiredness, moving around, eating, drinking, elimination, pain, nausea and wound care. Figs. 1 and 2 show a decreasing trend with regard to the severity of symptoms experienced during the first 4 days post-surgery.

The highest mean scores through days 1–4 were recorded for problems with moving around, tiredness, pain and eating. Eating levels had nearly returned to normal on day 4.

Patients showed minimal discomfort with regard to wound care, drinking and nausea. Going to the toilet was a problem experienced by some patients, but these patients quickly returned to their normal bowel habits.

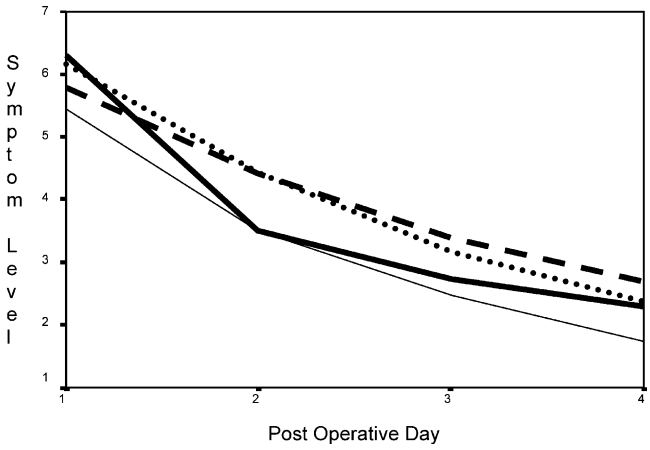


Fig. 1. Mean scores for tiredness [—], moving around [· · · · · ·], eating [— —] and pain [– ·] in the 4-day period following surgery.

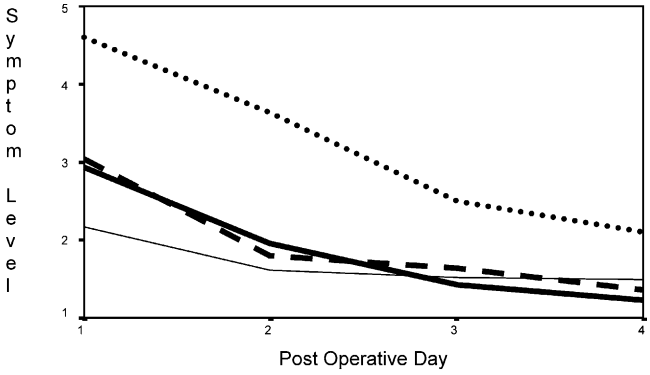


Fig. 2. Mean scores for drinking [—], elimination [· · · · · ·], wound care [— —] and nausea [– ·] in the 4-day period following surgery.

4.2. Managing symptoms

On both day 1 and 4 post-surgery, patients were asked to rate their ability to manage their symptoms. Tables 1 and 2 indicate that patients had difficulties in particular areas.

On day 1, the patients' rated moving around, tiredness, going to the toilet and pain as the most difficult factors to manage. Note that the total of 100.1% for the sum of the pain, tiredness and nausea rows is due to rounding off of these figures.

On day 4, the patients rated moving around, pain and tiredness as the most difficult factors to manage.

4.3. Discharge information

The majority (97.5%) of the patients stated that they had received discharge instructions in relation to symptom management. Most (68.8%) stated that they had received both written and verbal information. Most patients (91.3%) stated that the discharge information was sufficient for recovery and most (93.8%) also stated that they had had the opportunity to ask questions

Table 1
Problems managing symptoms day 1

Symptoms	Problems managing symptoms day 1		Not difficult (%)	Difficult but managed (%)	Very difficult but managed (%)	Could not manage (%)	Not relevant (%)
	Not difficult (%)	Difficult but managed/with carer (%)					
Moving around	26.6	73.4					
Going to the toilet	45.6	50.6					
Eating	67.1	31.7					
Wound care	67.9	12.9					
Drinking	91.2	8.8					
Pain			28.8	51.3	20.0	–	–
Tiredness			32.5	51.3	16.3	–	–
Nausea			60.0	23.8	2.5	–	13.8

Table 2
Problems managing symptoms day 4

Symptoms	Problems managing symptoms day 4		Not difficult (%)	Difficult but managed (%)	Very difficult but managed (%)	Could not manage (%)	Not relevant (%)
	Not difficult (%)	Difficult but managed/with carer (%)					
Moving around	35.4	64.6					
Going to the toilet	65.8	30.4					
Eating	86.1	13.9					
Wound care	74.4	12.8					
Drinking	93.7	6.3					
Pain			40.5	51.9	7.6	–	–
Tiredness			46.8	46.8	3.8	1.3	1.3
Nausea			77.2	19.0	–	–	3.8

Table 3
Percentage of patients stating "yes" to receiving discharge information

Type of information	Yes
Pain and how to manage it	96.1
Tiredness	92.2
Who to contact for further information	88.3
When you can take a bath/shower	81.8
Nausea and how to manage it	77.6
How to care for your wound	77.3
When to return to work	71.4
How to move around	69.3
Details of outpatients' appointments	56.0
What/when you could drink	53.9
What/when you could eat	49.4

before leaving the hospital. Patients expressed satisfaction with the discharge information from the day surgery staff in most areas of recovery. Table 3.

4.4. Day 10 telephone interview

At day 10, patients were interviewed and asked to indicate any problems they had experienced between days 5 and 10 post-recovery. A large number of patients experienced on-going problems with tiredness, pain and mobility. Table 4 lists the percentages of problems experienced. Problems with pain, mobility and tiredness were still being reported beyond day 10.

A total of 51.3% of patients reported problems with tiredness beyond day 10. Patients reported being "low on energy" and "unable to do much," "need[ing] more rest than normal" and having "problems with concentration" and "difficulties with work and exercise." 75% of patients reported that tiredness had stopped at a mean of 7.97 days, whereas 25% stated that it was still a problem on day 10. Some patients indicated that they responded to tiredness by "taking time off work", "resting", doing "nothing" or "visit[ing] a GP", while others indicated that the pain "went away by itself" or that they "just managed".

Table 4
Percentages of patients experiencing problems with symptoms between days 5 and 10

Symptoms	Yes	
	N	%
Tiredness	41	51.3
Pain	31	38.8
Moving around	22	27.5
Wound care	17	21.3
Concentration	16	20.0
Driving	16	20.0
Going to toilet	16	20.0
Going back to work	15	18.8
House cleaning	15	18.8
Shopping	11	13.8
Looking after the children	7	8.8
Preparing meals	7	8.8
Eating	5	6.3
Nausea	3	3.8
Dressing	1	1.3
Vomiting	1	1.3
Drinking	0	0
Hygiene	0	0

Those patients (38.8%) experiencing problems with pain reported being "limited in mobility", "need[ing] time off work" and being "uncomfortable", and also that "pain interfered with social life and sleep". A total of 40% of patients stated that the pain was no longer a problem at day 10, though it took a mean of 6.98 days until the pain disappeared for these patients, whereas 60% of patients stated that pain was still a problem on day 10. In terms of responding to pain, the participants reported that they "visited a GP", "used pain killers", "applied heat", "rested", did "nothing" or "let it gradually disappear by itself."

Those patients (27.5%) who had problems moving around reported that they had "trouble standing at work", "could not stretch", had "limited movement", "could not lift" or that it was "painful to move." Seventy per cent of patients stated that moving around was no longer a problem at day 10 though it took a mean 7.71 days for moving to become comfortable, whereas 30% stated it was still a problem at day 10. Patients stated that to manage moving around, they "used pain killers/antibiotics", "rested", "saw a GP", "applied heat" or "got family and friends to help".

Approximately 45% of patients accessed a health professional during their recovery. Of these, 72% contacted their GP, 28% contacted their surgeon. Some contacted others in addition to the GP and/or surgeon and of these 30% contacted a nurse. Participants indicated that they accessed health professionals for the following reasons: suture removal, general medical problems, pain relief, emotional support, and a check-up (i.e. not sure if everything is going as it should—e.g. vaginal bleeding or discharge).

Of the participants who accessed medical help/advice, 93.8% stated that seeking assistance resolved their problem. Overall, only two patients (2.5%) were readmitted to hospital. The reasons for re-admittance were medical complications.

The majority (82.5%) of patients had a carer to help with their recovery beyond the first 24 h. The mean number of days a carer was needed was 3.09, and those who had a carer rated it as being very important for their recovery. Some of the reasons for requiring a carer during recovery from day surgery included: to provide assistance with activities of daily living, to help with child care, for reassurance, and to alleviate uncertainty after anaesthetic.

Overall, 63.8% of patients suggested that their performance level was affected by day surgery, with these patients reporting an average of 6.97 days before they were able to concentrate at their usual level. These patients also reported an average period of 4.91 days before they were able to resume driving. Table 5 lists the recovery perception percentages and indicates that 66.3% of women found their experience of day surgery to be about what they expected or that they recovered faster than they had expected.

The majority of patients (88%) reported that they were "glad to have had day surgery", and 81.3% stated that they would be day surgery patients again. The patients who replied "no" when asked whether they would be a day surgery patient again (12.5%) said that they would have preferred to have had "professional monitoring", that the operation was "too major" or that they were "nauseated after anaesthetic" and would have preferred to have stayed in hospital overnight.

4.5. Additional comments

Patients were asked to provide additional comments at the end of the questionnaire or at the telephone interviews. The main areas of concern for patients included: the length of time they were required to fast and the nervousness associated with waiting for surgery, unexpected post-operative chest and shoulder tip pain (shoulder tip from the abdominal gas inserted as part of the procedure), post-operative nausea and vomiting, and a lack of information about vaginal bleeding and "what would be normal". Some patients were unable to assess their wounds to determine normal healing. Some women would have preferred an overnight stay as they found some post-operative side effects to be quite debilitating. Many voiced concern that not enough sick days were given on the medical certificate. Patients also complained about the discomfort they experienced travelling home and the pressure they felt from the car seat belt. This was further exacerbated for those patients who lived in rural settings. Patients frequently commented on the value of having a carer and the physical and emotional comfort carers provided. Assistance with physical care was particularly necessary for patients who had undergone complex procedures as a day patient. Patients who were responsible for caring for their children felt it was very important to have another person present during the recovery period.

Table 5
Day surgery recovery perception percentages

Response	*N*	%
About what expected	33	41.3
Slower than expected	25	31.3
Faster than expected	20	25.0
Do not know	2	2.5

5. Discussion

Advancements in technology and anaesthetics have accelerated the number of complex procedures being conducted as day cases. With this increase, some attention should be given to patient recovery at home; specifically, to monitoring the side effects of anaesthetics and the surgery and to how patients manage these side effects at home.

The majority of women in this study had been admitted for a laparoscopy related to the diagnosis and treatment of endometriosis, which varied in severity. The findings revealed that all post-operative symptoms reported on day 1 decreased in severity over the following 3 days. The symptoms that were reported as being the most problematic on day 4 were tiredness, moving, elimination and pain related to "shoulder tip pain" caused by carbon dioxide gas being inserted into the abdomen, which causes diaphragmatic irritation. These findings concur with those of Cox [3] and those of Young and O'Connell [8], who also reported similar symptom levels in a population of patients who had undergone laparoscopic cholecystectomy as a day procedure.

Telephone interviews conducted on day 10 post-surgery revealed that the women were still experiencing problems in terms of tiredness, pain related to moving (abdominal pain and wound-related pain), wound care, concentration, driving, returning to work, house cleaning, shopping and, to a lesser extent, looking after the children and preparing meals.

In regard to managing their symptoms at home on day 1, most women stated that although it was difficult, they were able to manage with the help of a carer. The majority of women required a carer for approximately 3 days. This finding was similar to Young and O'Connell's findings [8], where the patients required a carer for 3.8 days. Women stated that they were unsure how safe it was to perform certain tasks and were reassured by the carer's presence. They also stated that their overall performance level including their ability to concentrate was affected. This highlights the importance of having a carer both to assist the woman to recover and to assist her with household chores. Some attention needs to be given to the important role that carers play in assisting with the recovery of patients. As more complex procedures are performed in day surgery, health care professionals must continue to be cognisant of the level of responsibility placed on carers and their level of confidence and ability to deal with post-operative

problems that arise. With an ageing population in which more carers could well have medical conditions themselves, some attention should be given to addressing carer needs and adequately preparing them to manage the level of care. It may be useful to think about whether carers should be asked by the consultant whether they are willing to take on this role and responsibility as part of the process of determining whether a day surgery procedure is appropriate for patients.

Of note were the levels of impairment experienced by women performing activities of daily living such as driving. Women reported difficulties driving until about day 5. This was related to incision pain, the location of the seat belts near the incision and impaired levels of concentration.

The issue of women experiencing impaired concentration leads one to question the safety of them returning to work prior to being able to fully concentrate and function normally. More importantly, the issue of whether women who have undergone gynaecological day surgery procedures are being given adequate time off work via a medical certificate requires review. In this study, it seemed that the assigned time off work on the medical certificate was often much less than the time needed for recovery. Consequently, women experienced difficulties with their own expectation of what was an adequate recovery time and they became concerned about why they were experiencing some symptoms longer than what was apparently expected by doctors. As more complex procedures are being performed in day surgery, some attention should be given to determining the recovery time needed for the various procedures so that individuals are not further compromised by being sent back to work prior to recovery or having to consult with their GPs while they are experiencing pain from being mobile and/or driving.

There are also implications for the workplace as employers may have an expectation that women return to work within a short period, which may not occur. When the length of time needed for recovery is greater than that reflected on the medical certificate, some employers may perceive the women to be malingerers [3].

The majority of patients were satisfied with the discharge information given to them. Some voiced concerns about not knowing the types of symptoms to expect and how to manage these symptoms. Over 50% of the women accessed other health care professionals for further advice. The reasons stated by women for doing so were uncertainty as to whether particular symptoms should still be experienced for longer than they had been told to expect. This finding concurs with Bradshaw et al. [2] finding that discharge information does not always meet the needs of patients.

An important issue for many women in this study was their uncertainty about knowing what constitutes "normal" in terms of the symptoms they were experiencing. They gave examples of not knowing what was normal vaginal discharge and whether what they were experiencing was too much or going on for too long. In regard to wound care, the women were unsure whether their incisions should look red or a bit weepy on day 10. The challenge for clinicians in the day procedure unit is to have a clear understanding of the range of symptoms patients may experience and to design patient information providing practical strategies for symptom management. In instances where the patient is required to make an informed judgement about whether something is normal, it is necessary to give clear information on what is normal (e.g. the amount, time and colour of normal discharge).

Most women were satisfied with having had their surgery performed as a day procedure and would choose this mode again. Many did state that they would have liked to have stayed overnight, a finding supported by Cox [3], who reported that the majority of women in focus groups stated that where complex laparoscopic surgery is performed, day stay is inappropriate. Given the difficulties that women experienced with pain, tiredness and mobility, it would seem that their requests are well founded. The difficulties arise when women do not have health insurance and are not given the choice to stay overnight because they are having their day surgery through the public health system where such choices are less available because of pressures on beds. Privately insured patients whose surgery is conducted in the private health sector do have this choice. Women who lived in rural locations and who were in pain, which was exacerbated by seat belts and the location of their wounds, stated that it would have been helpful to know that this might occur. If they had known they would have arranged overnight accommodation close to the hospital so they would not have had to be driven long distances home on the day of the surgery.

6. Conclusion

The emerging trend of performing complex surgery as a day procedure will continue to increase due to health policy reform. While day surgery offers many advantages to patients as well as to hospitals and, within the constraints of a busy life, is appealing to consumers, its growth requires monitoring and should be accompanied by a quality assurance process. From this study, it appears that a process that reviews patient recovery up to 10 days post-discharge and assesses the adequacy of the information given to patients and carers would result in better outcomes and a higher quality of service provision.

As more complex procedures are being performed as day cases, the recovery period and the need for patients

to be given adequate time off work should not be underestimated.

If the growth in day surgery is to proceed successfully and responsibly, the quality assurance processes of reviewing patient recovery and evaluating the adequacy of information need to occur as a matter of routine.

References

[1] Callanan P. Australian (Commonwealth) government policy on day surgery (Ambulatory Surgery) with particular emphasis on the private sector. Ambulatory Surgery 2002;9:179–85.

[2] Bradshaw C, Pritchett C, Bryce C, Coleman S, Nattress H. Information needs of general day stay surgery patients. Ambulatory Surgery 1999;7:39–44.

[3] Cox H. Gynaecological procedures in day surgery: working with consumers to develop a targeted communication strategy for women with endometriosis. Report to the Commonwealth Department of Health and Ageing, Canberra, June 2002.

[4] Young JB, O'Connell BO, Mcgregor S. Day surgery patients' convalescence at home: does it make a difference. Nursing and Health Sciences 2000;2:29–39.

[5] Westman L, Legeby M, Ekblom A. A 3-day post-operative study related to pain, nausea, vomiting and tiredness in patients scheduled for day surgery. Ambulatory Surgery 1996;4:61–6.

[6] Marshall SI, Chung F. Discharge following ambulatory surgery. Ambulatory Surgery 1997;5:3–8.

[7] Myles PA, McLeod AD, Hunt JO, Fletcher H. Sex differences in speed of emergence and quality of recovery after anaesthesia: cohort study. British Medical Journal 2001;322:710–1.

[8] Young JB, O'Connell BO. Recovery following laparoscopic cholecystectomy in either a 23 or an 8 h facility. Journal of Quality in Clinical Practice 2001;21:2–7.

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 122–127

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Patient morbidity following oral day surgery—use of a post-operative telephone questionnaire

P.J. Thomson [a,*], I.R. Fletcher [b], S. Briggs [a], D. Barthram [a], G. Cato [a]

[a] *Department of Oral and MaxilloFacial Surgery, The Dental School, University of Newcastle, Framlington Place, Newcastle upon Tyne NE2 4BW, UK*
[b] *Department of Anaesthetics, Royal Victoria Infirmary, Newcastle upon Tyne NE1 4LP, UK*

Received 3 January 2003; accepted 14 February 2003

Abstract

100 patients attending for day stay surgical removal of impacted mandibular third molar teeth were telephoned at home 24 h post-operatively by their ambulatory care nurse. A structured questionnaire was completed in order to characterise patients' experiences following surgery. 92 questionnaires were analysed, confirming that over half the patients reported feeling 'not very well' after surgery, with pain and swelling the principal complaints. Prescribed analgesic medication was found to be effective, but one third of patients required additional analgesia. Sore throat, drowsiness and sleep disturbance were common post-operative complications. Nevertheless, the majority of patients described their day surgery experience as 'better than expected'. Nurse-led telephone follow up is appreciated by patients and is an effective means of determining patients' overall treatment experience and satisfaction levels following ambulatory surgery.

Keywords: Day surgery; Post-operative morbidity; Nurse-led

1. Introduction

The Oral Surgery Day Case Unit is a purpose-built facility within the Newcastle Dental Hospital which provides a wide range of surgical and dental treatment under general anaesthesia for approximately 2500 patients each year [1]. One of the commonest procedures performed in young, adult patients is the surgical removal of impacted third molar teeth [2].

Morbidity following third molar surgery is variable, but patients may experience local problems such as severe post-operative pain, facial swelling, trismus and impaired oral function as well as more generalised discomfort. Often, these symptoms and signs have resolved by the time patients attend for clinic review. Indeed, in some units post-operative appointments are not routinely arranged for uncomplicated dento-alveolar surgery, and there is little published information available on patients' experiences during the initial post-operative period.

Recent publications have emphasised the importance of patient surveys and patient satisfaction following operative intervention [3,4]. It was the aim of this study to investigate patients' experiences and post-operative morbidity in the immediate 24 h period following attendance for oral day case surgery.

2. Method

Following Local Ethical Committee approval, 100 consecutive patients attending the Day Case Unit for removal of bilateral impacted mandibular third molar teeth were asked to participate in the study. Standardised anaesthetic and surgical protocols were defined and applied by the same anaesthetist (I.R. Fletcher) and surgeon (P.J. Thomson) in each case (Table 1).

The study required the patients to be available to receive a telephone call on an agreed number at a designated time 24 h post-operatively. The call was made by the day unit nurse who had coordinated the

* Corresponding author. Tel.: +44-191-222-8290; fax: +44-191-222-6137.
E-mail address: peter.thomson@ncl.ac.uk (P.J. Thomson).

0966-6532/03/$ - see front matter
doi:10.1016/S0966-6532(03)00006-4

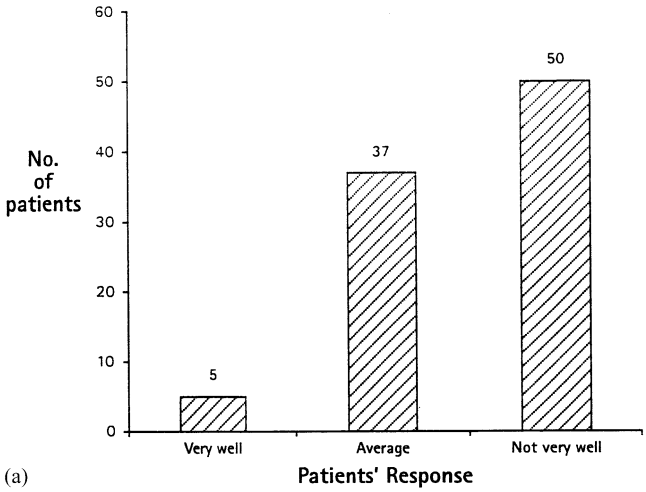
Table 1
Standardised anaesthetic and surgical protocols

Anaesthesia
- Induction with fentanyl/propofol/mivacurium
- Nasal intubation ('polar' tube size 6.0 mm female/6.5 male) plus saline-moistened throat pack
- Spontaneous respiration with a CO_2 absorber
- Maintenance with N_2O; O_2 plus Sevoflurane (1–4%)

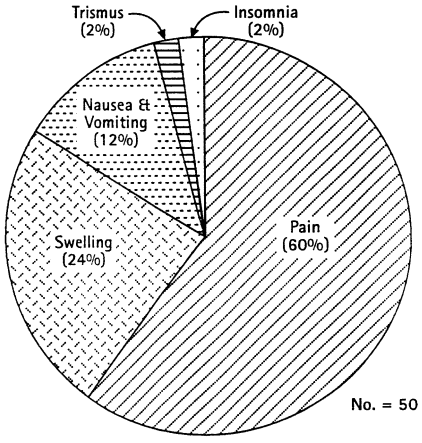
Surgery
- Bilateral impacted mandibular third molar teeth
- 'Envelope' mucoperiosteal flap reflection
- Bone removal with burs
- Vertical tooth sectioning (if required)
- Closure with resorbable sutures

patient's ambulatory care on the day of surgery, using a simple, structured questionnaire (Table 2). Ten specific questions were asked relating to the patients' general well-being, post-operative pain experience, effectiveness of discharge analgesic medication (two tablets of co-codamol six hourly; codeine phosphate 8 mg, paracetamol 500 mg per tablet) and the occurrence of any complications. Comments relating to their overall experience of day surgery were also recorded.

If there was no reply to the telephone call, the nurse would ring again later that day and once more the following day to try to ensure questionnaire completion. If it proved impossible to contact the patient, further calls were not carried out after 48 h had elapsed following surgery as it was felt that with the passage of time, patients' memories would be less reliable.



(a)



(b)

Fig. 1. (a) General health post-operatively. (b) Why are patients 'not very well' post-op?

3. Results

Ninety-two satisfactorily completed questionnaires were available for analysis; five patients proved uncontactable by telephone and three questionnaires were excluded because of inadequate data. 65 female and 27 male patients (mean age 26 years; range 17–36 years) were thus included in the study.

More than half of the patients reported feeling 'not very well' following their surgery (Fig. 1a), with pain and

Table 2
Post-operative questionnaire

1.	How have you felt in the 24 h since your operation?	Very well/Average/Not very well
2.	Have you experienced pain from the site of your operation?	Yes/No
3.	How effective was the medicine you were prescribed in controlling your pain after the operation?	Very effective/Reasonably effective/Not very effective
4.	Have you used any 'additional' pain killing medication?	Yes/No If Yes...WHAT?
5.	Have you experienced any headache?	Yes/No
6.	Have you experienced a sore throat?	Yes/No
7.	Have you experienced drowsiness or tiredness?	Yes/No
8.	How well did you sleep last night?	Very well/Average/Not very well If not very well...WHY?
9.	Have you experienced any other problems since your operation?	Yes/No If yes...WHAT?
10.	How would you describe your overall experience of oral day case surgery?	Better than expected/As expected/Worse than expected

swelling the principal causes (Fig. 1b). Almost all patients experienced pain at their site of operation (Fig. 2), but the majority found their prescribed analgesic medication effective in relieving symptoms (Fig. 3). One third of patients reported the use of analgesic medication additional to their discharge prescription (Fig. 4a). Most commonly this was ibuprofen, but alternative codeine/paracetamol formulations were also used (Fig. 4b).

Specific questions relating to other post-operative symptoms revealed that whilst headache was not a particular problem for patients (Fig. 5), sore throat (Fig. 6) and drowsiness and tiredness (Fig. 7) were extremely common.

Interference with sleep during the night following surgery was a common complaint, with over half the patients reporting they had not slept very well (Fig. 8a); pain and swelling were the principal reasons for the disturbed sleep pattern (Fig. 8b).

One third of patients reported that they had experienced 'other problems' following their day surgery (Fig. 9a). The majority of these related to swelling at the operation site, but altered sensation in the lip and tongue, bleeding and vomiting were also frequently described (Fig. 9b).

In spite of these findings the majority of patients reported their experience of day surgery as being 'better than expected', with only a small number describing things as 'worse than expected' (Fig. 10).

4. Discussion

Clinical audit and research in health service provision benefits substantially from consideration of patients' views of treatment outcome. Indeed, some authors have suggested such research is inadequate without patient involvement [3]. Patient satisfaction surveys are not new, and many previous studies have been criticised because of both methodological flaws and the resultant lack in demonstrable quality improvement [4]. Nonetheless, there is a clear need for increased patient involvement in assessing the effectiveness and quality of ambulatory

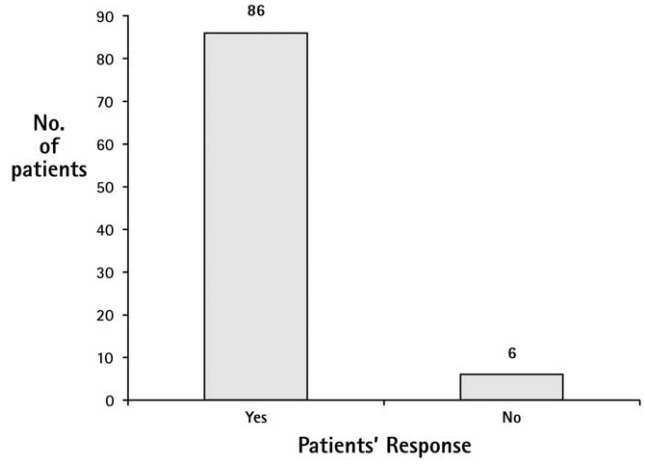


Fig. 2. Pain experienced at operation site.

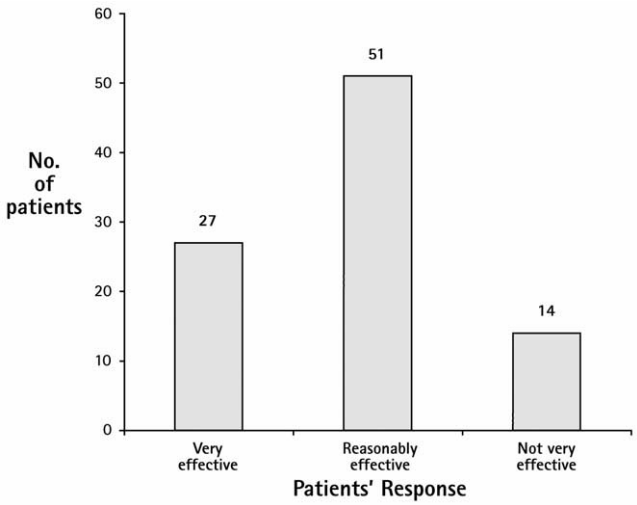
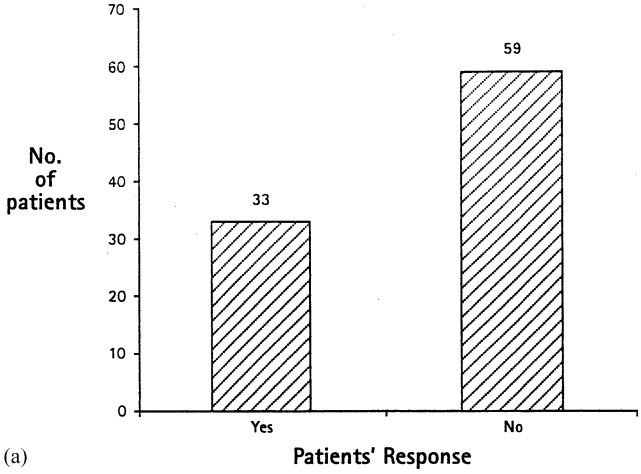
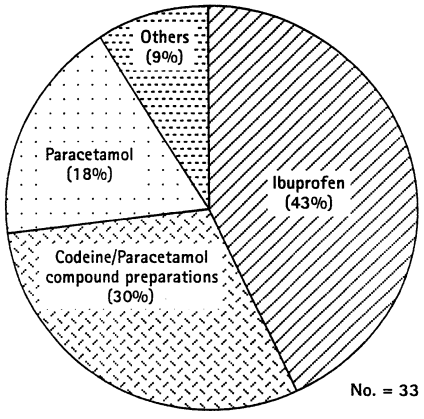


Fig. 3. Effectiveness of prescribed medication.



(a)



(b)

Fig. 4. (a) Use of 'additional' medication. (b) Types of 'additional' medication used.

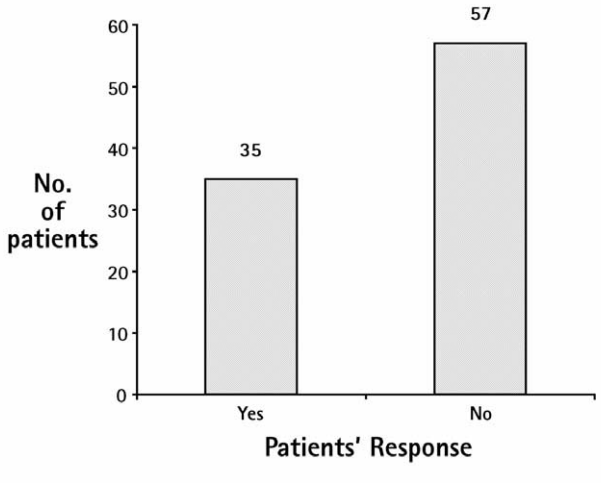


Fig. 5. Headache post-operatively.

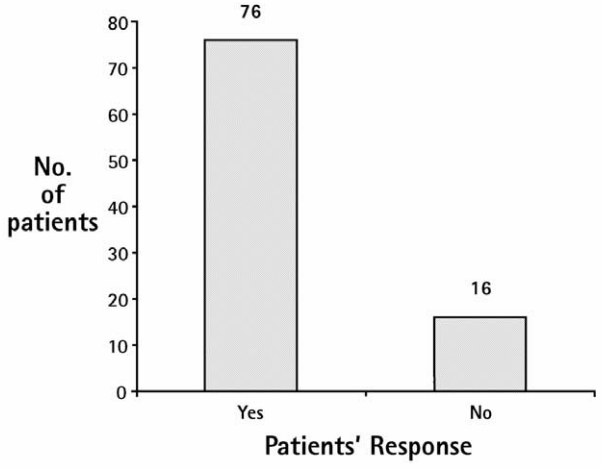


Fig. 6. Sore throat post-operatively.

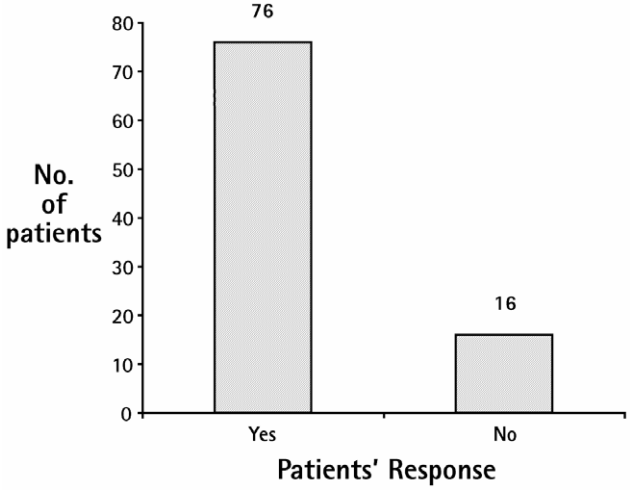
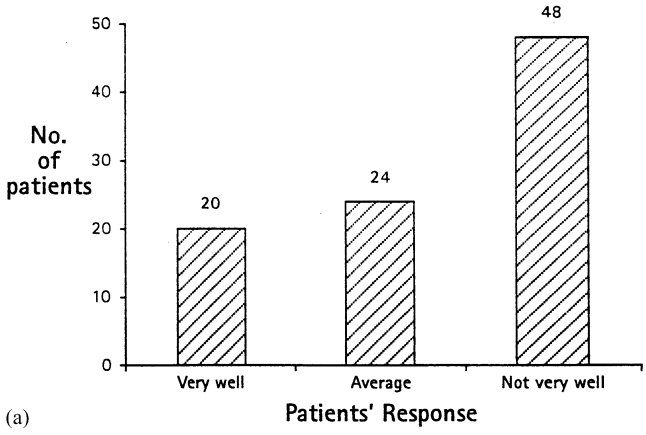
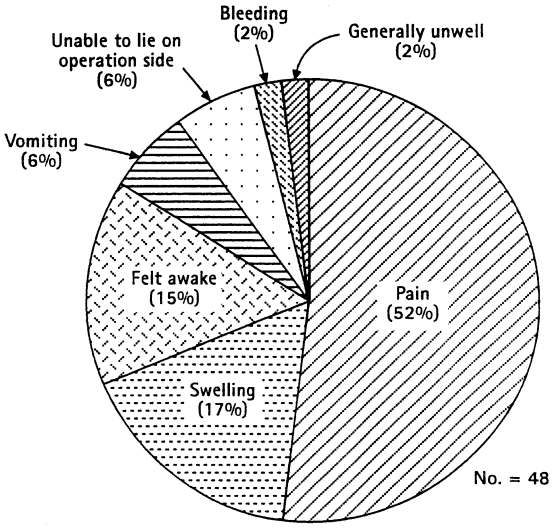


Fig. 7. Drowsiness/tiredness post-operatively.



(a)



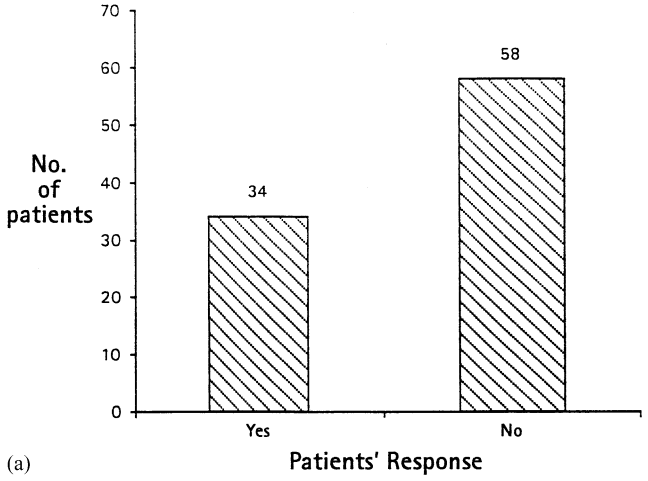
(b)

Fig. 8. How well do patients sleep (first post-operative night)? Why do patients not sleep very well?

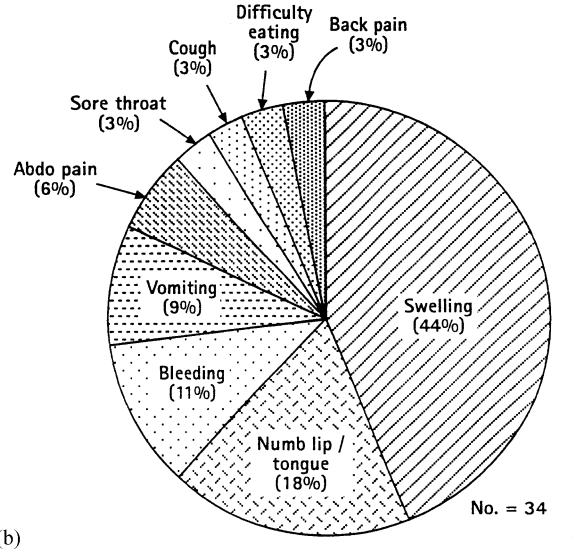
care provision. This study follows on from our previous investigation of patients' views following attendance at nurse-led pre-admission clinics prior to day unit attendance [1].

Nurse-led telephone consultations are becoming an increasingly accepted approach to patient care, both in the primary sector and also as an extension of specialist management in hospital [5–7]. We decided to use a standardised telephone questionnaire to document patients' experiences following day unit attendance for the surgical removal of impacted third molar teeth, a common procedure with recognised post-operative morbidity. All questioning was carried out by a nurse known to the patient 24 h following day surgery, and although not formally documented in this study, it was interesting to note how many patients reported their appreciation of such post-operative follow-up.

Previous studies using questionnaires have identified undesirable post-anaesthetic and post-operative sequelae affecting between 45 and 92% of oral day stay



(a)



(b)

Fig. 9. Any 'other problems' post-operatively? What 'other problems' did patients experience?

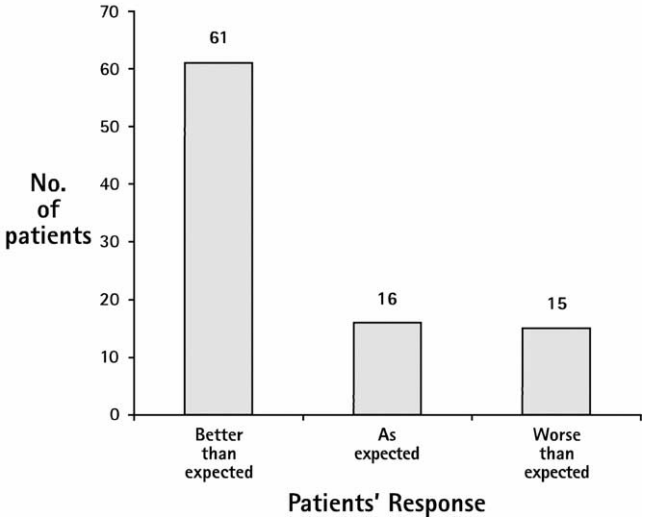


Fig. 10. Overall experience of oral day case surgery.

patients, with nausea, vomiting, headache, drowsiness and dizziness particularly prominent symptoms [8,9]. In our study 54% of patients reported feeling 'not very well' following surgery, which is similar to the figures quoted above, but the principal complaint was that of pain and swelling (Fig. 1) with 93% of patients experiencing pain at their operation site (Fig. 2). These latter complaints are, of course, common sequelae following mandibular third molar surgery.

It is encouraging that 85% of patients found their analgesic medication effective, (Fig. 3) although it is of concern that nearly one third of the 33 patients who found it necessary to use additional analgesics were consuming other codeine/paracetamol preparations; there is clearly a risk of exceeding recommended daily dosages. This is despite clear post-operative advice on the use of appropriate analgesia, and perhaps emphasises the need for further patient education.

The high incidence of sore throat observed in our patients (Fig. 6) probably resulted from the use of endotracheal intubation and saline-moistened pharyngeal pack insertion, both fundamental airway protection techniques, which inevitably lead to localised mucosal trauma. It seems unlikely that this specific aspect of post-operative discomfort could be reduced with the existing technique. The use of a laryngeal mask instead of an endotracheal tube might well reduce the incidence of sore throat, but could expose patients to a greater risk of aspiration of blood and dental debris and, by restricting oral access, may make surgery more difficult. Further possible means of reducing the incidence of sore throat would be to use proprietary shaped pharyngeal packs made of soft absorbent material, which may be less abrasive than traditional gauze packs.

It is interesting to note how many patients felt drowsy and tired post-surgery (Fig. 7) but how few (approximately 20%) actually reported sleeping well during their first post-operative night (Fig. 8). Whilst pain and swelling accounted for the majority of sleep disturbances, it is clear that day surgery significantly alters patients' sleep pattern in the 24 h following operation.

In relation to third molar surgery, it is not surprising that recorded 'other problems post-operatively' particularly emphasised oro-facial swelling, inferior dental and/or lingual nerve paraesthesia and bleeding (over 70% of the complications illustrated in Fig. 9).

It is gratifying that two-thirds of the patients participating in this study reported their overall experience of oral day surgery as 'better than expected'.

5. Conclusions

Nurse-led telephone follow-up and questionnaire completion provides an effective means of eliciting patients' views and experiences following ambulatory

surgery. The information obtained in this study provided a detailed, contemporaneous record of treatment outcome in the immediate post-operative period. These unique data have helped inform and develop our clinical and nursing practice to further improve the quality of patient care. The 24 h post-operative phone call proved not only acceptable to the majority of patients, but was also highly appreciated by many who found both practical help and reassurance. We are currently undertaking further research to examine patients' pain experience in the hours immediately following surgery and a more widespread use of nurse-led telephone consultation following day surgery.

References

[1] Clark K, Voase R, Cato G, Fletcher IR, Thomson PJ. Patients' experience of oral day case surgery: feedback from a nurse-led pre-admission clinic. Ambulatory Surg 2000;8:93–6.

[2] Briggs S, Clark K, Voase R, Barthram D, Fletcher IR, Thomson PJ. Day surgery activity and the university dental hospital. J One-Day Surg 1999;8:3–5.

[3] Lamping DL, Browne J, Smith SC. Patient-based measures to evaluate surgical outcomes: myths and realities. Ann R Coll Surg Eng (Suppl) 2001;83:78–81.

[4] Cleary PD. The increasing importance of patient surveys. Br Med J 1999;319:720–1.

[5] Pal B. Following up outpatients by telephone: pilot study. Br Med J 1998;316:1647.

[6] Lattimer V, George S, Thompson F, Thomas E, et al. Safety and effectiveness of nurse telephone consultation in out of hours primary care: randomised controlled trial. Br Med J 1998;317:1054–9.

[7] Toon PD. Using telephones in primary care. Br Med J 2002;324:1230–1.

[8] Smith BL, Young PN. Day stay anaesthesia. A follow-up of day patients undergoing dental operations under general anaesthesia with tracheal intubation. Anaesthesia 1976;31:181–9.

[9] Bridgman CM, Ashby D, Holloway PJ. An investigation of the effects on children of tooth extraction under general anaesthesia in general dental practice. BDJ 1999;186:245–7.

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 128–132

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Comparison of local and spinal anesthesia techniques in inguinal hernia repair

Ergün Erdem [a,*], Hülya Sungurtekin [b], Uğur Sungurtekin [a], Cihat Tetik [a], Akın Özden [a]

[a] *Department of Surgery, Pamukkale University School of Medicine, P.K. 66, Denizli, Turkey*
[b] *Department of Anesthesiology and Reanimation, Pamukkale University School of Medicine, Denizli, Turkey*

Abstract

The aim of this study is to evaluate the safety and effectiveness of local anesthesia in surgical treatment of inguinal hernia, compared with spinal anesthesia. Ninety-six patients who underwent hernia repair between December 1999 and April 2002 were included prospectively. The patients were assigned randomly to two groups according to their admission numbers. Group I included 47 patients undergoing surgical treatment of inguinal hernia with local anesthesia; Group II included 49 patients having inguinal hernia repair with spinal anesthesia. The early complication rates, length of the hospital stay, and costs were evaluated prospectively. Early complication rates were 14.8 and 32.6%, respectively; there was no significant difference between the two groups. The length of hospital stay and cost were significantly lower in Group I than in Group II. In conclusion, local anesthesia is a safe and cost-effective method in the treatment of inguinal hernia.

Keywords: Inguinal hernia; Hernia repair; Herniorraphy; Local anesthesia

1. Introduction

Inguinal hernia repair is a common procedure in general surgery. Surgical treatment of the hernia is elective and should be carried out under optimal conditions since most inguinal hernias in adults occur in healthy, physically active people. Modern hernia surgery should not only have a low recurrence, but also employ simple and efficient surgical and anesthetic techniques, which result in early patient mobilization. Previous studies have demonstrated the feasibility of using local anesthesia in inguinal repair, as well as achieving almost immediate patient mobilization without increasing postoperative complications. This type anesthesia can be safely done as an outpatient basis [1–3]. Spinal anesthesia may also be used for inguinal hernia repair in outpatients.The aim of this study is to compare the safety and effectiveness of local infiltration with spinal anesthesia in the surgical treatment of inguinal hernia on an outpatient basis.

2. Patients and methods

Ninety-six patients undergoing surgical treatment of inguinal hernia at Pamukkale University Hospital between December 1999 and April 2002 were assigned randomly to two groups prospectively to evaluate the effect of local infiltration and spinal anesthesia.

2.1. Patient population

The 96 patients included 92 males and had a mean age of 40.32 ± 10.54 (S.D.) years. Fourteen patients had recurrent inguinal hernia and six had bilateral inguinal hernia. If they were older than 16 years, had an inguinal skin free of infection and agreed to participate in this study comparing local or spinal anesthesia, they entered the trial. The following parameters excluded patients from the study: incarcerated hernia, hydrocele, femoral hernia, diabetes mellitus, coagulopathy, and general anesthesia.

The patients were assigned randomly to two groups according to their admission numbers. Those with even admission numbers (Group I) had local infiltration, and

* Corresponding author. Tel.: +90-532-337-9010; fax: +90-258-213-2874.
E-mail address: ergune@pamukkale.edu.tr (E. Erdem).

0966-6532/03/$ - see front matter © 2003 Elsevier B.V. All rights reserved.
doi:10.1016/S0966-6532(03)00025-8

those with odd admission numbers (Group II) had spinal anesthesia.

Patients were fasted for 8 h. A second-generation cephalosporin was injected intravenously 1 h preoperatively as routine antibiotic prophylaxis. When the patients were transferred to the operating room; a 16-gauge cannula was inserted in a peripheral vein in the ante-cubital fossa. All patients had an IV line, and hemodynamic monitoring (ECG, pulse oximetry, non-invasive measurements of arterial pressure, and heart rate). All operations were performed with standardized peroperative analgesia and sedation using midazolam and fentanyl, and no patients were given any intraoperative sedation in either group.

2.2. Local infiltration technique

The patient was placed the supine position. The inguinal area was shaved and thoroughly cleansed with povidon iodine. We used 15 ml 0.5% prilocaine and 5 ml 0.25% bupivacaine for local infiltration. After the surgical field has been prepared, a series of intracutaneous injections with the 22-gauge needle was made along the course of the incision. Approximately 10 ml of the anesthetic solution was injected into the skin. Subcutaneous infiltration was next carried out. The incision was made through the skin down to aponeurosis of the external oblique muscle. Then, infiltration was carried out along the line of the next incision with 10 ml of anesthetic solution. After 3–5 min, the aponeurosis was incised, exposing the spermatic cord and the internal oblique muscles. Two or 4 ml of the anesthetic solution was infiltrated around the ilioinguinal nerve and the inguinal branch of the iliohypogastric nerve, care being taken to avoid intraneural injection or traction. The final step was to inject 8–10 ml of solution into the region of the internal inguinal ring to block the genitofemoral nerve and edges of the peritoneal sac.

The patients in this group were administered Ringer's Lactate solution (LR) 1000–1500 ml during the operation.

2.3. Spinal anesthesia technique

Through the venous cannula, the spinal group patients received 500 ml of LR for initial fluid administration over 10–15 min.

Spinal anesthesia was induced immediately after initial fluid administration. It was performed by using 27-gauge Quincke-type spinal needle at the L2–3 or L3–4 intervertebral space with the patient in lateral decubitus position with the operative side depend. All patients received 2 ml of 0.5% hyperbaric bupivacaine. The patients were kept in lateral decubitus position for 5 min and then repositioned in the supine position. If the patients underwent bilateral herniorraphy, the patients were repositioned in the supine position immediately after the bupivacaine injection.

The surgical procedure was started when the level of sensory block was satisfactory for the operation. The patients were given LR solution 1500–2000 ml during the operation in addition to the initial 500 ml.

2.4. Surgical procedure

The tension-free hernioplasty as described by Lichtenstein was performed in all operations [4]. In order to retain 8×16 cm Polypropylene mesh graft in the right position we used continuous polypropylene 2-0 or 0 suture. In addition to the Lichtenstein repair technique, we did a purse-string suture at the base of the indirect hernia sac in order to ligate and resect it.

2.5. Postoperative care

Pain was scored with Visual Analog Scale (VAS) at the postoperative fourth hour. All patients in both group were evaluated every hour for the first 8 h after the end of surgery for early postoperative complications. If any complication was seen (such as pain at incision, transient urinary retention, headache or hematoma under the incision or in the scrotum), patients were not discharged on the same day and were kept at the hospital until they were free of the complaints. Discharge of patients after hernia repair under local or spinal anesthesia was scheduled for 8 h after the end of surgery if any complication was not seen. Enteral nutrition was started 2 h after the end of surgery. Patients came for outpatient follow-up at 7 days after surgery.

2.6. Statistical analysis

VAS pain scores, early postoperative complications, length of hospital stay, and hospital costs and were determined for each group. VAS scores, length of hospital stay, and hospital costs were analyzed by use of the Student's t-test; early postoperative complications rates were analyzed by use of Yates's χ^2 (continuity correction) test (SPSS, version 10.0).

3. Results

Ninety-six patients with inguinal hernia were enrolled. The early postoperative complication rates were 14.8 and 32.6% for Group I and II, respectively. There was no mortality in either group.

Patients in Group II (spinal) had experienced nausea and vomiting during spinal anesthesia. They were treated with metoclopramide. No patients had any of these symptoms after the operation.

There were 47 patients in Group I (local). Their length of hospital stay was 1–4 days. Group II (spinal) had 49 patients and the length of hospital stay was 1–6 days. Early postoperative complication rates mean pain scores, hospital costs and mean hospital stay for each group is shown in Table 1. There were no statistically significant differences between Group I and II in early postoperative complication rates and pain scores ($P > 0.05$).

Early postoperative complications that occurred in the first 8 h after operation are shown in Table 2. Early postoperative complications in local anesthesia group were hematomas under the incision or in the scrotum in three patients. The hematomas resolved spontaneously. These patients were kept at the hospital for follow up, and they were discharged 2–4 days after the operation. Two patients had persistent incisional pain. They were treated with analgesics and discharged 1 day after the operation. One of the patients was kept at the hospital for 1 day because of urinary retention.

Early postoperative complications in spinal anesthesia group were subcutaneous hematomas under the incision or in the scrotum in two patients. They resolved spontaneously. These patients were kept at the hospital for follow up, and they were discharged 2–6 days after the operation. Three patients had persistent incisional pain. They were treated with analgesics and discharged 1 day after the operation. Six patient had headache. They were treated with bed rest and had oral analgesic treatment and discharged 1–3 days after the operation. Four patients had urinary retention. One of them had his bladder catheterized, and the others resolved spontaneously. All patients with urinary retention were discharged 1 day after the operation.

All the patients were called at their homes daily for their possible complaints, and they were invited to come to the clinic to evaluate wound infection on the fifth day postoperatively. Two patients in both of the groups had wound infection on day 5 postoperatively. All were healed uneventfully with appropriate antibiotic therapy and wound care.

The length of hospital stay was significantly longer in Group II than in Group I ($P < 0.001$). Total hospital cost was significantly lower in Group I than in Group II ($P < 0.001$).

4. Discussion

We believe that in the patients who require repair of inguinal hernia, spinal and local anesthesia offer advantages. Both spinal and local anesthesia involve limited body areas and do not interfere with the function of other organs and ventilation. Spinal anesthesia can produce a complete sensory and motor blockade. The success of local anesthetic technique, consisting of blockade of the ilioinguinal and iliohypogastric nerves and infiltration of the surgical layers, depends on a thorough understanding of the anatomy of the nerves. Local anesthesia can reduce pain after the procedure and provide benefit by a lower incidence of postoperative narcotic analgesic requirement [5,6].

The major disadvantage of spinal anesthesia is the possibility of hypotension secondary to the production of sympathetic blockade. In this clinical research we did not any experience any hypotensive effect as the patients were administered LR solution 1500–2000 ml during the operation in addition to the initial 500 ml to lessen venodilation effect of sympathetic blockade [7]. However, it is possible that the incidence of nausea, which occurred during spinal anesthesia was related to hypovolemia.

Spinal headache may occur in 2–10% of patients [1,7]. In the literature, the frequency of postural puncture headache was 3.8% for a similar population [8]. In this study, the main reason for delay in hospital stay is care of spinal headache in six patients (12.2%). The reported headaches were postural. However, spinal headaches could be treated on an ambulatory basis.

Urinary retention in five patients had cause of increased the duration of hospital stay in five patients. In ambulatory surgery, bupivacaine may delay the recovery of motor function and cause urinary retention [9,10].

The most important complication of local infiltration is a systemic toxic reaction, which can be reduced by limiting the total dosage and avoiding intravascular injection. Local infiltration is seldom followed by major complications [11]. In this study, during the operation no more than 40 ml of our anesthetic mixture were applied to the tissues, and no complications were observed. It has been suggested that at least 70 ml of

Table 1
Results of treatment

	Early postoperative complications	Hospital stay in days (mean ± S.D.)[a]	VAS (mean ± S.D.) postoperative fourth hour	Hospital cost ($) (mean ± S.D.)[b]
Group I, number (%)	7 (14.8)	1.35 ± 0.71	5.91 ± 1.08	142.17 ± 5.40
Group II, number (%)	16 (32.6)	2.68 ± 1.18	6.44 ± 1.00	158.40 ± 5.50

S.D., standard deviation.
[a] In Group I the length of hospital stay is significantly shorter than in Group II ($P < 0.001$).
[b] In Group I the hospital cost is significantly lower than in Group II ($P < 0.001$).

Table 2
Early postoperative complications

	Hematoma	Infection	Headache	Urinary retention	Persistent incisional pain	Total
Group I, number	3	1	–	1	2	7
Group II, number	2	1	6	4	3	16

the local anesthesia mixture have to be completely resorbed to provoke cardiotoxic symptoms [12]. More abrupt onset of side effects may be produced if local anesthetic is injected whilst the tip of the needle is in vein. It is important to aspirate before injecting local anesthetic. It has been recommended to keep the needle tip moving when infiltrating large volumes of local anesthetic [13].

Outpatient inguinal herniorraphy requires an anesthetic technique that provides safety and comfort for the patient, suitable conditions for the surgeon, and allows early discharge. The anesthetic techniques used for outpatient herniorraphy play a major role in successful management of these patients. We prefer local anesthesia, which allows early return of motor and bladder function, thus avoiding prolonged immobilization. The use of local anesthetics also allows the patient to remain awake, therefore, being capable of responding to sensory stimuli, and to cooperate easily by performing a stress test, such as the Valsalva maneuver or coughing [14].

Pain is an important problem after ambulatory hernia repair. Choice of surgical technique for open repair of inguinal hernia has no influence on postoperative pain [15]. We prefer anterior tension-free repair of all inguinal hernias. The Lichtenstein repair can easily be performed under local anesthesia because of its simple technique [16]. In our series, persistent postoperative pain in five patients is among the reasons for length of stay in both groups. This data may be related to our surgical procedure. We did a purse-string suture at the base of the indirect hernia sac (peritoneum). Although pain sensation is usually blocked by the anesthetic, traction on certain tissues the particularly the peritoneum, is uncomfortable [13].

In both groups minor surgical complications increased the duration of hospital stay. However, because of the increased morbidity related to the spinal anesthesia technique from headache and urinary retention, the duration of hospital stay increased more than the local anesthesia group, the difference is significant statistically. Considering the contraindications to spinal anesthesia such us hemorrhagic diatheses, we believe that local anesthesia is a choice for the most of the patients.

We think that local infiltration is feasible in surgical treatment of all types of inguinal hernias, including bilateral, unilateral or recurrent. In our series, 14 patients had recurrent, and six had bilateral. Some authors conclude that simultaneous anterior tension free repair under local infiltration anesthesia is the treatment of choice in case of bilateral inguinal hernias [17].

Laparoscopic preperitoneal herniorraphy has the advantage of being a minimally invasive procedure with a recurrence rate comparable to open preperitoneal repair [18]. However, surgeons have been reluctant to adopt this procedure because it requires general anesthesia. Ferzli et al. concluded that the extra peritoneal laparoscopic repair of inguinal hernia is feasible under local infiltration anesthesia [19].

Local anesthesia allows a very important reduction hospital costs. The equipment consists from only a syringe and anesthetic solution. Prolonged hospitalization and the material and equipment costs are the main reason for the higher cost with the spinal anesthesia. In our series, total hospital cost was significantly lower in local infiltration group than in spinal anesthesia group.

5. Conclusions

When anesthesia related complications, hospitalization time, cost effectiveness, and applicability to all patients were take into the consideration, local anesthesia can be recommended as a safe and effective technique for inguinal hernia repair in ambulatory surgery patients.

References

[1] Zsigmond EK, Winnie AP. Anesthesia for herniorraphy. In: Nyhus LM, Condon RE, editors. Hernia, 3rd ed. Philadelphia: JB Lippincott Company, 1989:487–520.
[2] Amid PK, Shulman AG, Lichtenstein IL. Local anesthesia for inguinal hernia repair step-by-step procedure. Ann Surg 1994;220:735–7.
[3] Schumpelick V, Peiper C, Töns C, Kupzcyk-Joeris D, Busch F. Inguinal hernia repair with local anesthesia—a comparative analysis. Langenbecks Arch Chir 1993;378:329–34.
[4] Lichtenstein IL, Shulman AG, Amid PK, Montllor MM. The tension-free hernioplasty. Am J Surg 1989;157:188–93.
[5] Roberge CW, Mc Ewen M. The effects of anesthetics on postoperative pain. AORN J 1998;68:1003–12.
[6] Subramaniam P, Leslie J, Gourlay C, Clezy JK. Inguinal hernia repair: a comparison between local and general anesthesia. Aust New Zealand Surg 1998;68:799–800.

[7] Francis A, Riegler A. Spinal anesthesia. In: Longnecker ED, Tinker JH, Morgan GE, editors. Principles and Practice Anesthesiology, vol. 2. St. Louis: Mosby, 1998:1363–91.
[8] De Andres J, Valia JC, Errando C, Rigo G, Lopez-Alarcon MD. Subarachnoid anesthesia in young patients: a comparative analysis of two needle bevels. Reg Anesth Pain Med 1999;24:547–52.
[9] Vaghadia H. Spinal anesthesia for outpatients: controversies and new techniques. Can J Anaesth 1998;45:64–70.
[10] Ben-David B, Levin H, Solomon E. Spinal bupivacain in ambulatory surgery: the effect of saline dilution. Anesth Analg 1996;83:716–20.
[11] Young DV. Comparison of local, spinal, and general anesthesia for inguinal herniorraphy. Am J Surg 1987;153:560–3.
[12] Smith R, Shah S, Oerder M, Treckman J. Does postoperatively locally applied second shot analgesia improve the patients' pain perception after tension-free hernia repair? A doubleblinded study. Hernia 1999;3:125–9.
[13] Dunn JM, Day CJE. Local anesthesia for inguinal and femoral hernia repair. Update Anaesth 1994;4:1–2.
[14] Campanelli G, Cioffi U, Cavagnoli R, De Simone M, Bastazza M, Bruni P, Senni Buratti M, Ruca A, Berhane K, Pietri P. Open sutureless tension-free repair for primary inguinal hernia. Hernia 1999;3:121–4.
[15] Callesen T, Bech K, Andersen J, Nielsen R, Roikjaer O, Kehlet H. Pain after primary inguinal herniorraphy: influence of surgical technique. J Am Coll Surg 1999;188:355–9.
[16] Hetzer FH, Hotz T, Steinke W, Schumpf R, Decurtins M, Largiader F. Gold standard for inguinal hernia repair: Shouldice or Lichtenstein. Hernia 1999;3:117–20.
[17] Tocchi A, Liotta G, Mazzoni G, Lepre L, Costa G, Miccini M. Anterior approach and simultaneous tension-free repair of bilateral inguinal hernia under local anesthesia. G Chir 1999;20:429–32.
[18] Tetik C, Arregui ME, Dulucq JL, Fitzgibbons RJ, Franklin ME, Mc Kernan JB, Rosin RD. Complications and recurrences associated with laparoscopic repair of groin hernias: a multi-institutional retrospective analysis. Surg Endosc 1994;8:1316–23.
[19] Ferzli G, Sayad P, Vasisht B. The feasibility of laparoscopic extraperitoneal hernia repair under local anesthesia. Surg Endosc 1999;13:588–90.

ELSEVIER

J. of Ambulatory Surgery 133 (2003) 133–136

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Posterior approach to the sciatic nerve in the popliteal fossa for lower limb surgery☆

Jaime Fernández-Guisasola [a,*], Santiago García del Valle [a], Esther Burgos [a], Ricardo Ojea [a], Jesús López [b], Juan Gómez-Arnau [a]

[a] *Anesthesia Unit, Department of Anesthesiology and Critical Care, Fundación Hospital Alcorcón, Avda, Budapest 1, 28922 Alcorcón, Madrid, Spain*
[b] *Department of Radiology, Fundación Hospital Alcorcón, Alcorcón, Madrid, Spain*

Received 27 August 2002; accepted 27 February 2003

Abstract

Background and objectives: To evaluate success rate, acceptance and complications of sciatic nerve (SN) block at the popliteal fossa (popliteal block, PB) for ambulatory or inpatient orthopedic and vascular surgical procedures. *Methods:* A retrospective study was carried out in 312 patients who received a PB for vascular and orthopedic lower leg surgery. A single injection, posterior approach technique with 40 ml of either 0.5% ropivacaine or 1% mepivacaine was used. Data collected included demographic and clinical variables. *Results:* Observed success rate was 95.5%. Acceptance of anesthetic procedure among outpatients was high (94.1%). There were no intraoperative or postoperative complications. For ambulatory surgery patients, the postoperative stay was 130 ± 25 min. *Conclusions:* PB was a useful anesthetic technique for minor foot and ankle surgery. The single-injection, posterior approach obtained a high success rate without untoward events. It was well accepted by patients and proved to be suitable for ambulatory surgery.

Keywords: Lower limb surgery; Popliteal block

1. Introduction

Among regional anesthesia techniques for the lower limb, the sciatic nerve (SN) block is a well established procedure. Several approaches to the blockade of the SN have been proposed [1]. SN block in the popliteal fossa (popliteal block, PB) is not widely used by anesthesiologists [2] although it is a valuable technique for surgical procedures below the knee and may have advantages when compared with other anesthetic techniques [1]. Orthopedic or vascular lower leg surgery may induce severe and prolonged postoperative pain, which requires large doses of parenteral opioids [3]. For this reason, the prolonged and effective postoperative analgesia observed after a SN block is also useful.

The purpose of the present retrospective study was to evaluate success rate, acceptance and complications of PB for minor foot and ankle surgery in the setting of the clinical anesthetic practice of a general hospital.

2. Methods

The study was carried out in a medical center with 175 surgical beds serving a population of some 230 000 people. A retrospective review of an anesthetic database was done. Out of 13 852 anesthetics administered between 1 October 1999 and 31 December 2001, we identified every patient >18 years who received a PB for orthopedic or vascular lower leg surgery. If necessary, additional information was obtained from medical charts. A review of nurses' observations in the post-anesthesia care unit and in the day case unit was also done. Data collected included demographic (sex, age

☆ The work should be attributed to the Department of Anesthesiology and Critical Care, Anesthesia Unit of the Fundación Hospital Alcorcón: Alcorcón, Madrid, Spain.

* Corresponding author. Tel.: +34-91-621-9519; fax: +34-91-621-9896.

E-mail address: jfguisasola@fhalcorcon.es (J. Fernández-Guisasola).

0966-6532/03/$ - see front matter
doi:10.1016/S0966-6532(03)00008-8

and ASA physical status) and clinical variables (type and duration of surgery, inpatient versus ambulatory surgery, duration of hospital stay in day case surgery, success rate, use of intraoperative sedation, intraoperative or postoperative anesthetic complications, type of local anesthetic and patient satisfaction). Planned (inpatient or ambulatory) and urgent surgical procedures (all inpatients) were included. Exclusion criteria were patient refusal, neurologic or neuromuscular disease and infection at the injection site.

All anesthetic procedures were performed by staff anesthesiologists and all followed the same technique. Patients were premedicated with 1–2 mg IV boluses of midazolam, and intraoperative sedation or analgesia with incremental IV midazolam boluses (1 mg) and/or IV fentanil boluses (50 μg), at anesthesiologist's discretion. Our technique has been described elsewhere [4], according to Rorie et al. [5]. With the patients in the prone position, the injection site was the upper vertex of the popliteal fossa. The appropriate nerve was identified by observing motor responses in the foot using a short-beveled, Teflon-coated needle (Stimuplex, B. Braun) connected to a nerve stimulator (Stimuplex NHS 11, B. Braun) using 0.3 mA, 2 Hz current. 40 ml of either 1% mepivacaine or 0.5% ropivacaine was used. The saphenous nerve was also blocked in all patients. When the tourniquet was employed (100 mmHg > systolic arterial blood pressure), it was placed below the knee.

Once the anesthetic had been administered, sensory and motor block assessments were made every 5 min until surgical incision. If the patient presented insufficient sensory block or none whatsoever 20 min later, it was attributed to a technical failure. In this case or when persistent pain during surgery, an alternative anesthetic was considered. The incomplete blocks that were sufficient for surgery were considered successful.

All patients scheduled for outpatient surgery were interviewed by telephone by a nurse (blind to the anesthetic technique) 24 h after the operation to assess their satisfaction with the anesthetic technique by questioning: *Are you satisfied with the anesthetic procedure*? If the answer was *no*, they were asked: *what is the reason*?

3. Results

During the specified time period, 312 patients received a PB. Anesthetic procedures were performed by 19 anesthesiologists of variable experience with the technique. No patients refused this block during the study period.

Patient demographics and surgical procedures are shown in Table 1. 59 patients (18.9%) were premedicated. Intraoperative sedation was administered in 38 patients (12.2%) with anxiety or discomfort. Successful block was achieved in 298 cases (95.5%). In 14 patients (4.5%), PB was considered a technical failure; this group included two cases of failure to localize the SN.

Table 1
Demographic and surgical data

Sex (M/F)	72 (23%)/240 (67%)
Age (years)	54 ± 16
ASA physical status	
1	121 (38.8%)
2	168 (53.8%)
3	23 (7.4%)
Surgeries	
Duration (min)	34 ± 12
Orthopedic	
Bunionectomy and correction of toe deformities	259 (83%)
Orthopedic material removal	14 (4.5%)
Reduction and internal fixation	6 (1.9%)
Ankle arthroscopy	4 (1.3%)
Soft tissue surgery	3 (1%)
Others	14 (4.5%)
Vascular	
Amputation	8 (2.6%)
Others	4 (1.3%)
Surgical setting	
Urgent surgery	9 (2.9%)
Programmed procedures	
Inpatient	70 (25.3%)
Ambulatory surgery	233 (74.7%)
Local anesthetic	
Mepivacaine	160 (51.3%)
Ropivacaine	152 (48.7%)

Values expressed as n (percentage) or mean ± S.D.

No intraoperative or postoperative complications were noted. Time to initiation of sensory block was 6.6 ± 4.2 min (mean ± standard deviation (S.D.)). All the patients scheduled for outpatient surgery who received a PB ($n = 230$) could leave the hospital. The duration of their postoperative stay was 130 ± 25 min and the total hospital stay was 6.9 ± 2 h (mean ± S.D.). On the follow-up interview, 16 ambulatory patients (5.1%) considered the technique unsatisfactory: fifteen complained of the pain caused by the nerve stimulator needle insertion and one patient complained of a sensory block that lasted over 24 h (PB with ropivacaine).

4. Discussion

The results of this study showed that the single injection, posterior approach to the PB provided reliable surgical anesthesia for lower leg orthopedic and vascular procedures. In addition, there was a high acceptance of the anesthetic technique with no major intraoperative or postoperative complications. It also proved to be a suitable technique for ambulatory surgery. The retro-

spective collection of data is a limitation of our study: it may contain missing data points, it may not accurately measure the outcomes of interest and the informational content may no necessarily be useful. However, it has proved to be a useful tool in clinical research: databases reflect typical clinical practice and facilitate assessment of rare outcomes [6].

In our series, both mepivacaine and ropivacaine produced rapid, effective and safe anesthesia but postoperative analgesia was significantly more long-lasting in group ropivacaine (15.2±5.1 h) than in group mepivacaine (5.7±1.8 h) (mean±S.D.) [4]. This is a definite advantage in these kinds of surgical procedures (such as hallux valgus repair), which are usually accompanied by moderate to severe postoperative pain. After knowing the results of the quoted study, most anesthesiologists of our department now use ropivacaine. One patient was distressed by the prolonged ropivacaine block; this shows the need to inform patients about the expected duration of effect. No anesthetic causes precluded discharge of patients scheduled for ambulatory surgery who received a PB.

Among regional techniques for lower limb, the SN block is a well established procedure and several different block approaches along its pathway have been described. The classic posterior approach of Labat is the most frequently used technique by anesthesiologists in the US [1,7]. This technique and other proximal SN blocks require the identification of multiple landmarks.

Different posterior and lateral approaches to the SN at the popliteal fossa have been described [2,8,9]. In contrast to SN in pelvis, the anatomic references in PB are virtually constant. Moreover, there is usually less amount of adipose tissue in the popliteal region than in the gluteal or subgluteal regions and this could be an advantage in obese patients [10]. Saphenous nerve block was done routinely since branches of this nerve occasionally reach distal foot territory [11].

The SN is composed of independent medial and lateral divisions that are physically but not functionally joined by a common connective tissue sheath. The tibial nerve (TN) and common peroneal nerve (CPN) are bundled together with multiple layers of connective tissue, which remain as they diverge from the epineural sheath of the SN, but they do not exchange fibers [12]. These sheaths may limit the exposure to the local anesthetic when the injection is made distal to the division of the SN. That is why some investigators have suggested a double-injection technique, in which both branches are separately identified and anesthetized [13], and others have suggested injecting a large volume of local anesthetic to increase the spread within the epineural sheath to reach both the TN and the CPN [14].

The level at which the SN divides into the TN and the CPN has been suspected as a possible cause for incomplete block of the SN at the popliteal fossa [15]. In their interesting study, Vloka et al. [16] showed that the TN and the CPN divide at variable distances (60.5± 27.0 mm, range 0–115 mm) above the popliteal fossa crease. So, when performing PB, insertion of the needle 100 mm above the popliteal crease is more likely to result in placement of the needle proximal to the division of the SN than placement at 50–70 mm, according to classical teaching. In all our patients we have inserted the needle as proximal as possible (upper vertex) above the popliteal crease using a midline approach trying to avoid muscle trauma. Singelyn et al. [17] reported 625 PB with a high success rate inserting the needle 10 cm above the popliteal crease.

Incomplete sensory block of the foot after PB may be also related to the motor block that is elicited when the block is performed [15]. Thus, we have also proved in our group of patients that technical failure rate decreases when evoked motor responses corresponds to the SN branch that innervates the surgical territory. The possible evoked motor response are: eversion, inversion, plantar flexion, or dorsiflexion of the foot. A dorsiflexion or eversion identifies the CPN and a plantar flexion the TN. Inversion is caused by the action of two muscles (tibialis posterior and tibialis anterior) which are innervated, respectively, by the TN and the deep peroneal nerve, a branch of the CPN. Therefore, in the case of an elicited inversion of the foot, the needle tip is located very close to both branches of the SN or to the SN itself before it divides into TN and CPN.

Precise nerve localization using low current intensity nerve stimulation (0.3 mA) was probably essential to achieve the high success rate in our series. In fact, one of the major determinants of the success of any regional block is the distance of the needle tip to the nerve. The popliteal fossa is filled with fat so diffusion of injected local anesthetic may be impaired [1], and there are no structures that, as occurs with other regional blocks, convey or restrict local anesthetic location. Thus, the injected volume will have an erratic and unpredictable distribution (Fig. 1). Paqueron et al. [13] concluded that, using the same local anesthetic volume (20 ml), the SN block when both components were identified provided a greater success rate compared with a single-injection technique. However, the success rate they achieved with a two-stimulation technique was similar to our study and to others that used a single-injection technique injecting a higher volume [3,4,17]. The use of high volumes (40 ml) probably ensures exposure of both divisions of the SN to the local anesthetic (Fig. 2). Schirmek and Deusch [18] found an increasing percentage of patients with complete anesthesia after successive injections of local anesthetics, using a catheter introduced in the popliteal fossa. Moreover, Paqueron et al. did not report how many attempts were necessary to localize the nerve, but is very probable that with the

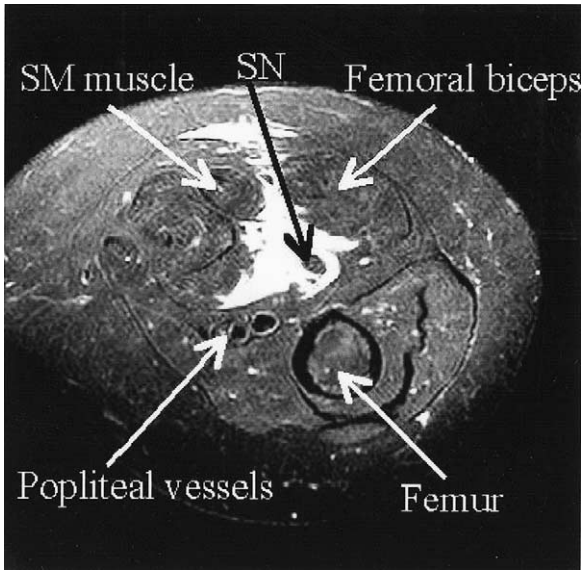


Fig. 1. Magnetic resonance imaging (MRI) at the distal level of the thigh (90 mm above popliteal crease) 5 min after injection of 40 ml of local anesthesia. The arrow indicating the SN shows the direction of the stimulation needle with the posterior approach. The white area shows the diffusion of local anesthetic in the popliteal fossa fat. SM, Semimembranous.

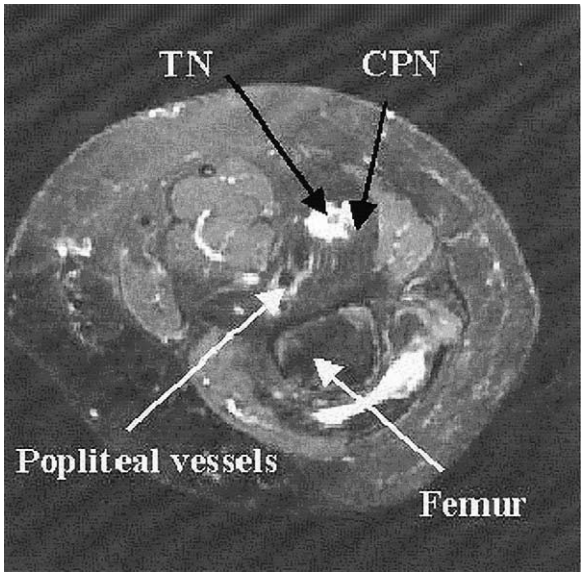


Fig. 2. MRI 63 mm distal to Fig. 1 image. The white area shows the local anesthetic surrounding the TN and the CPN. The use of high local anesthetic volume increases the probability of its impregnation and diffusion along both SN components trajectory distally to the injection site.

double-injection technique more time and attempts were necessary to perform the block and in our study, we have shown that the main complaint of the patients was the pain caused by the needle insertion.

In conclusion, single-injection, posterior approach PB was a useful anesthetic technique for minor foot and ankle surgery. We obtained a high success rate in ambulatory and inpatient surgeries without untoward events. Needle insertion as proximal as possible, high above the popliteal crease, use of low current intensity nerve stimulation, elicitation of an appropriate muscular response and, as with many other lower extremity peripheral nerve blocks, injection of high volume seemed to be the key in making the single-injection block highly successful. It was well accepted by patients and proved to be suitable for ambulatory surgery.

References

[1] Brindenbaugh PO, Wedel DJ. The lower extremity: somatic blockade. In: Cousins MJ, Brindenbaugh PO, editors. Neural blockade in clinical anesthesia and management of pain. Philadelphia: Lippincot-Raven, 1998:386–8.
[2] Hadzic A, Vloka JD, Kuroda MM, Koorn R, Birnbach DJ, Thys DM. The use of peripheral nerve blockade in anesthesia practice. A national survey. Anesth Analg 1997;84:S300.
[3] Bonica JJ. The management of pain. Philadelphia: Lea & Febiger, 1990.
[4] Fernández-Guisasola J, Andueza A, Burgos E, Plaza A, Porras M, Reboto P, Rivera JC, García del Valle S. A comparison of 0.5% ropivacaine and 1% mepivacaine for sciatic nerve block in the popliteal fossa. Acta Anaesthesiol Scand 2001;45(8):967–70.
[5] Rorie DK, Byer DE, Nelson DO, Sittipong R, Johnson KA. Assessment of block of the sciatic nerve in the popliteal fossa. Anesth Analg 1980;59:371–6.
[6] Christopher LW, Fleisher LA. Outcomes research in regional anesthesia and analgesia. Anesth Analg 2000;91:1232–42.
[7] Davies MJ, McGlade DP. One hundred sciatic nerve blocks: a comparison of localisation techniques. Anaesth Intens Care 1993;21:76–8.
[8] Collum CR, Courtney PG. Sciatic nerve blockade by a lateral approach to the popliteal fossa. Anaesth Intens Care 1993;21:236–7.
[9] Vloka JD, Hadzic A, Koorn R, Thys D. Supine approach to the sciatic nerve in the popliteal fossa. Can J Anaesth 1996;43:964–7.
[10] Fernández-Guisasola J. Popliteal block as an alternative to Labat's approach. Anesth Analg 2002;95:252.
[11] Sobotta J. Atlas der anatomie des menchen (Fig. 451). München: Urban und Schwarzenberg, 1982 (Fig. 451).
[12] Spalteholz W, editor. Atlas de anatomía humana III, 4th ed. Barcelona: Labor, 1969:850–902.
[13] Paqueron X, Bouaziz H, Macalou D, Labaille T, Merle M, Laxenaire MC, Benhamou D. The lateral approach to the sciatic nerve at the popliteal fossa: one or two injections. Anesth Analg 1999;89:1221–5.
[14] Hadzic A, Vloka J. A comparison of the posterior versus lateral approaches to the block of the sciatic nerve in the popliteal fossa. Anesthesiology 1988;88:1480–6.
[15] Benzon HT, Kim C, Benzon HP, Silverstein ME, Jerico B, Prillaman K, Buenaventura R. Correlation between evoked motor response of the sciatic nerve and sensory blockade. Anesthesiology 1997;87:548–52.
[16] Vloka J, Hadzic A, April E, Thys D. The division of the sciatic nerve in the popliteal fossa: anatomical implications for popliteal nerve blockade. Anesth Analg 2001;92(1):215–7.
[17] Singelyn FJ, Gouverneur JMA, Gibromont BF. Popliteal sciatic nerve block aided by a nerve stimulator: a reliable technique for foot and ankle surgery. Reg Anesth 1991;16:278–81.
[18] Schirmek F, Deusch H. New technique of the sciatic nerve block in the popliteal fossa. Eur J Anaesth 1995;12:163–9.

ELSEVIER

J. of Ambulatory Surgery 137 (2003) 137–141

Ambulatory Surgery

www.elsevier.com/locate/ambsur

A prospective comparison of ambulatory endoscopic totally extraperitoneal inguinal hernioplasty versus open mesh hernioplasty

Hung Lau *, Nivritti G. Patil

Day Surgery Center, Department of Surgery, University of Hong Kong Medical Center, Tung Wah Hospital, 12 Po Yan Street, Pokfulam, Sheung Wan, Hong Kong

Received 22 April 2003; accepted 27 June 2003

Abstract

Endoscopic extraperitoneal inguinal hernioplasty (TEP) has become an established technique for the repair of inguinal hernia but its application as a day case procedure remains contentious. The objective of the present study is to compare the outcomes of ambulatory TEP and open mesh hernioplasty. From 1 February 2001 to 15 January 2002, a total of 31 patients underwent ambulatory endoscopic extraperitoneal inguinal hernioplasties at our institution. The outcomes of these patients were compared with those of a cohort of 31 patients who underwent ambulatory open mesh hernioplasty during the same period. The operation time, time taken to ambulate and micturate after surgery, postoperative morbidity and unplanned admission rates were similar between the two groups. Pain scores upon coughing on postoperative days 0, 1, 4, 5 and 6 were significantly lower in patients who underwent ambulatory TEP than those who had open mesh repairs. In conclusion, ambulatory endoscopic TEP conferred a significant reduction of postoperative pain scores compared with open repair. TEP is a safe and efficacious technique for the repair of inguinal hernia in an ambulatory setting. It should be a therapeutic option for day case repair of inguinal hernia.

Keywords: Laparoscopy; Inguinal herniorrhaphy; Inguinal hernia; Analgesia

1. Introduction

Management of inguinal hernia has undergone a great evolution in the past two decades. Ambulatory surgery and endoscopic hernioplasty have been gaining in popularity in recent years [1–3]. Open mesh hernioplasty is the contemporary choice of technique for day case hernia repair in our institution. For patients who require hospitalization, endoscopic totally extraperitoneal inguinal hernioplasty (TEP) has been an alternative option for inguinal hernia repair at our institution since 1999. O'Riordain et al. [4] demonstrated the feasibility of day case TEP in the majority of patients with inguinal hernias. However, the safety and suitability of endoscopic inguinal hernioplasty in the day care setting remains contentious [5,6]. The objectives of the present study were to evaluate and compare the outcomes of ambulatory TEP and open mesh hernioplasty.

2. Patients and methods

From 1 February 2001 to 15 January 2002, a total of 31 patients underwent ambulatory TEP. The outcomes of these patients were compared with those of a cohort of 31 patients who underwent ambulatory open mesh hernioplasty during the same period.

2.1. Pre-anaesthetic assessment

All patients with inguinal hernias were assessed by a specialist surgeon at the pre-anaesthetic assessment clinic of the Day Surgery Center. Patients were given the options of either TEP or open mesh hernioplasties. A history of lower midline abdominal surgery was considered to be a contra-indication for TEP.

* Corresponding author. Tel.: +852-2589-8328; fax: +852-2548-1548.

E-mail address: lauh@hkucc.hku.hk (H. Lau).

0966-6532/03/$ - see front matter
doi:10.1016/j.ambsur.2003.06.002

2.2. Day of operation

All patients were admitted to the Day Surgery Center on the day of operation after an overnight fast. Procedures were scheduled in the morning session of the operation list. All TEPs and open mesh hernioplasties were performed under general anaesthesia. The principles of both operative techniques have been described elsewhere [7,8]. Hernia types were determined intraoperatively according to the Nyhus classification [9].

2.3. Postoperative management

After separate assessments by the operating surgeon and the anaesthetist, the patients were discharged on the same day. All patients were prescribed an oral compound analgesic, proproxyphene 50 mg and paracetamol 325 mg, four times daily and diclofenac sodium SR 100 mg daily to be used as required. A 24-h telephone hotline was available to patients in case of any problems or queries.

All patients had follow-up at the Hernia Clinic 1 week after discharge. Telephone follow-up on the patient's condition was performed by a registered nurse on postoperative days 1 and 3. The total number of analgesic tablets taken by the patients on postoperative days 1 and 3 was documented.

2.4. Statistical analysis

Statistical difference between the two groups was determined by Student's t test and chi-square test where appropriate. A P value of less than 0.05 was regarded as significant. Statistical analysis was performed with the help of computer software (SPSS/PC+ 9.0, SPSS, Chicago, IL, USA). Values were expressed as mean $\pm$ standard deviation (S.D.).

3. Results

3.1. Demographic features and operative details

The demographic features and hernia types of the two groups were comparable (Table 1). The mean operative time for ambulatory TEP and open repair was 63 ± 22 and 62 ± 18 min, respectively ($P =$ ns). All TEPs were successfully performed without the need for conversion to other approaches.

3.2. Postoperative recovery

With regard to recovery variables, the times taken to ambulation were 2.5 ± 0.6 and 2.6 ± 0.7 h for the TEP and open repair groups, respectively ($P =$ ns). The times to micturition were 3.5 ± 1.1 and 3.2 ± 1.2 h, respectively, for the ambulatory TEP and open repair groups ($P =$ ns). The time to discharge after ambulatory TEP was 5.5 ± 1.1 h, which was significantly shorter than that following ambulatory open hernioplasty, 6.0 ± 0.92 h ($P < 0.05$).

3.3. Pain scores and analgesic requirements

Postoperative pain scores at rest were significantly lower in patients after ambulatory TEPs than those who underwent open repairs on postoperative days 0, 1, 4, 5 and 6 (Fig. 1). Comparison of the daily pain scores upon coughing also showed significant differences between the two groups on postoperative days 5 and 6 (Fig. 2). Telephone survey found no significant difference in the number of analgesic tablets taken by the two groups of patients on postoperative days 1 and 3.

3.4. Postoperative morbidity

Two patients who had undergone open mesh hernioplasties were admitted overnight for acute retention of urine (n = 1) and medical observation (n = 1). Two patients who received ambulatory TEPs were also admitted because of bradycardia (n = 1) and paroxysmal atrial fibrillation (n = 1). The patient who developed bradycardia was subsequently diagnosed to have Wolff–Parkinson–White syndrome. No patient in the open repair group had to be subsequently readmitted, but one patient who had undergone TEP required hospitalization on postoperative day 2 for nausea and groin pain, both of which resolved spontaneously.

Postoperative morbidity in patients who underwent open mesh hernioplasties included superficial wound dehiscence (n = 2), wound infection (n = 1) and wound bruising (n = 1). Only one patient who had ambulatory TEP suffered from wound bruising. There was no difference in the postoperative morbidity rates between the two groups. All morbidities resolved spontaneously without the need for surgical intervention.

3.5. Convalescence

The mean time taken to resume outdoor activities was 3.9 ± 2.4 and 4.2 ± 3.2 days for patients after ambulatory TEPs and open repairs, respectively ($P =$ ns). The mean length of convalescence before returning to the work place was 9.8 ± 6.0 and 12.9 ± 15.9 days for patient who underwent ambulatory TEPs and open repairs, respectively ($P =$ ns).

Follow-up ranged from 1 week to 6 months with a mean follow-up of 2 months. No clinical recurrence was detected during follow-ups.

Table 1
Demographic features and hernia anatomy of the two groups of patients

	Ambulatory TEPs (n = 31)	Open hernioplasties (n = 31)	*P*
Age (years) (mean ± S.D.)	56 ± 10.0	55 ± 11.7	ns[b]
Male:female	30:1	28:3	ns[c]
Hernia anatomy[a]			ns[c]
II	18	23	
IIIA	7	6	
IIIB	5	2	
IVB	1	0	

[a] Nyhus classification [9].
[b] Student's *t*-test.
[c] Chi-square test; ns, no significance.

4. Discussion

The present study demonstrated that postoperative pain was significantly lower in patients who underwent ambulatory TEP than those who had open tension-free mesh hernioplasties. Meta-analyses of randomized trials also confirmed the significant difference in postoperative pain between laparoscopic and open repairs for inguinal hernia [10,11]. A recent multicenter randomized clinical trial demonstrated significant benefits in the short-term quality of life for patients who underwent laparoscopic repair, as reflected by the additional quality-adjusted life years gained [12]. Reduced postoperative pain was the chief advantage of TEP compared with the open approach.

A lower incidence of wound complications was observed in patients after TEPs. This finding was compatible with those noted in other reports [13,14]. The smaller incisions required for TEP contribute to the reduced risk of wound morbidity. Potentially serious complications were a concern in endoscopic hernioplasty but they were rarely encountered. As a high degree of skill and concentration is required during TEP, the application of this procedure in the day case setting should be adopted only by experienced surgeons.

A number of studies has reported a significantly earlier return to work and normal activities in patients who underwent laparoscopic repair compared with those after open sutured repair [15–18]. The present study also demonstrated similar findings but the difference was not statistically significant. Heikkinen et al. [19] conducted a prospective randomized study on the cost and outcome comparison between laparoscopic and Lichtenstein hernia operations. When the cost of lost working days was considered in the overall expense, the total costs for working patients were lower if the laparoscopic technique was used.

Expensive instruments have been a deterrent to the adoption of TEP [20,21]. However, with the utilization of reusable instruments and the adoption of non-stapling techniques, the cost of TEP can be substantially reduced. Another argument against TEP has been the

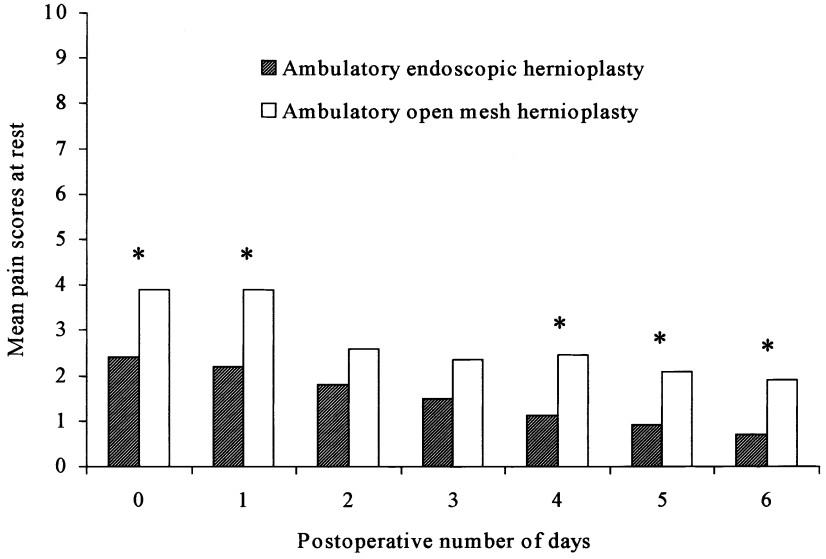


Fig. 1. Bar chart showing mean postoperative linear analogue pain scores at rest in groups I and II patients. *, Indicates $P < 0.05$ (Student's *t*-test).

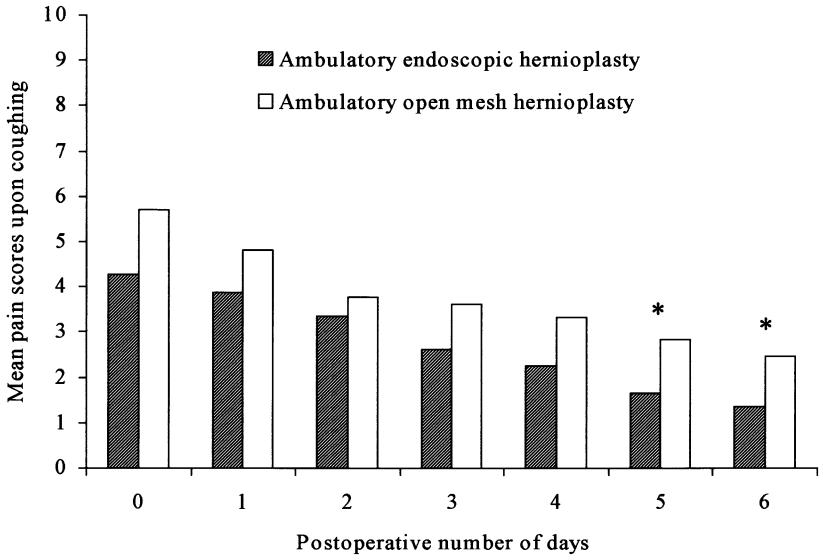


Fig. 2. Bar chart showing mean postoperative linear analogue pain scores upon coughing in groups I and II patients. *, Indicates $P < 0.05$ (Student's t-test).

requirement of general anesthesia for endoscopic repair. Rudkin et al. [5] and Subramaniam et al. [22] demonstrated that open inguinal hernia repair under local infiltration block was cost-effective for the hospital. However, acceptance of local anaesthesia and the operation preference of patients must be taken into account.

In conclusion, ambulatory TEP is superior to open mesh hernioplasty with respect to postoperative pain. A lower incidence of wound complications was also observed in patients who underwent ambulatory TEP compared with those who had open mesh hernioplasties. TEP is a safe practice for the repair of inguinal hernia in the day case setting. It should be a therapeutic option for patients who opt for day case inguinal hernia repair.

Acknowledgements

The authors wish to acknowledge the kind assistance of Dr Tze-Ching Tan in editing the manuscript.

References

[1] Willsher PC, Urbach G, Cole D, Schumacher S, Litwin DE. Outpatient laparoscopic surgery. Aust New Zealand J Surg 1998;68:769–73.
[2] Lau H, Brooks DC. Transitions in laparoscopic cholecystectomy. Surg Endosc 2002;16:323–6.
[3] Cocks JR. Laparoscopic inguinal hernioplasty: a comparison between transperitoneal and extraperitoneal techniques. Aust New Zealand J Surg 1998;68:506–9.
[4] O'Riordain DS, Kelly P, Horgan PG, Keane FB, Tanner WA. Laparoscopic extraperitoneal inguinal hernia repair in the day-care setting. Surg Endosc 1999;13:914–7.
[5] Rudkin GE, Maddern GJ. Peri-operative outcome for day-case laparoscopic and open inguinal hernia repair. Anaesthesia 1995;50:586–9.
[6] Bessell JR, Baxter P, Riddell P, Watkin S, Maddern GJ. A randomized controlled trial of laparoscopic extraperitoneal hernia repair as a day surgical procedure. Surg Endosc 1996;10:495–500.
[7] Lichtenstein IL, Shulman AG, Amid PK, Montllor MM. The tension-free hernioplasty. Am J Surg 1989;157:188–93.
[8] Lau H, Patil NG, Lee F, Yuen WK. A prospective trial of analgesia following endoscopic totally extraperitoneal inguinal hernioplasty: local wound infiltration versus extraperitoneal instillation of bupivacaine. Surg Endosc 2002;16:159–62.
[9] Nyhus LM. Individualization of hernia repair: a new era. Surgery 1993;114:1–2.
[10] Collaboration EH. Laparoscopic compared with open methods of groin hernia repair: systematic review of randomized controlled trials. Br J Surg 2000;87:860–7.
[11] Lau H, Patil NG, Lee F. Systematic review and meta-analysis of clinical trials comparing endoscopic totally extraperitoneal inguinal hernioplasty with open repair of inguinal hernia. Ann Coll Surg Hong Kong 2003;7:2–10.
[12] Medical Research Council Laparoscopic Groin Hernia Trial Group. Cost–utility analysis of open versus laparoscopic groin hernia repair: results from a multicentre randomized clinical trial. Br J Surg 2001;81:653–61.
[13] The MRC Laparoscopic Groin Hernia Trial Group. Laparoscopic versus open repair of groin hernia: a randomised comparison. Lancet 1999;354:185–90.
[14] Liem MS, van der Graaf Y, van Steensel CJ, Boelhouwer RU, Clevers GJ, Meijer WS, et al. Comparison of conventional anterior surgery and laparoscopic surgery for inguinal-hernia repair. New Engl J Med 1997;336:1541–7.
[15] Wilson MS, Deans GT, Brough WA. Prospective trial comparing Lichtenstein with laparoscopic tension-free mesh repair of inguinal hernia. Br J Surg 1995;82:274–7.
[16] Heikkinen TJ, Haukipuro K, Hulkko A. A cost and outcome comparison between laparoscopic and Lichtenstein hernia operations in a day-case unit. A randomized prospective study. Surg Endosc 1998;12:1199–203.
[17] Juul P, Christensen K. Randomized clinical trial of laparoscopic versus open inguinal hernia repair. Br J Surg 1999;86:316–9.

[18] Lau H, Lee F, Patil NG, Yuen WK. Early outcomes of laparoscopic totally extraperitoneal hernia repair versus open mesh hernioplasty. Asian J Surg 2000;23:244–8.
[19] Heikkinen TJ, Haukipuro K, Koivukangas P, Hulkko A. A prospective randomized outcome and cost comparison of totally extraperitoneal endoscopic hernioplasty versus Lichtenstein hernia operation among employed patients. Surg Laparosc Endosc 1998;8:338–44.
[20] Fielding GA. Laparoscopic inguinal hernia repair. Aust New Zealand J Surg 1995;65:304–7.
[21] Lau H, Patil NG, Lee F, Yuen WK. Two hundred endoscopic extraperitoneal inguinal hernioplasties: cost containment by reusable instruments. Chin Med J 2002;115:888–91.
[22] Subramaniam P, Leslie J, Gourlay C, Clezy JK. Inguinal hernia repair: a comparison between local and general anaesthesia. Aust New Zealand J Surg 1998;68:799–800.

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 143–146

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Groin hernia repair under local anaesthesia: effect of surgeon's training level on long-term results

Hannu Paajanen *

Department of Surgery, The Central Hospital of Mikkeli, Porrassalmenkatu 35-37, 50100 Mikkeli, Finland

Received 1 February 2003; accepted 30 June 2003

Abstract

Tension-free Lichtenstein procedure was performed as an outpatient procedure under local anaesthesia in 317 patients. One senior consultant operated on 182 hernias and 12 surgical trainees on 135 hernias during 1996–2000. After a mean follow-up of 3 years, a postal questionnaire was sent to the patients. The operative outcome (operation time, pain, bleeding, infections) and long-term results (recurrences, chronic pain) were recorded. The rate of wound infections (consultant 1.1%, residents 0.7%) and hematomas (consultant 1.1%, residents 3.0%) were low and not related to the surgeon's training level. Only five recurrences were found at follow-up: two after consultant and three after trainee repair. Although 25% of the patients reported some groin pain afterwards, over 90% were very satisfied with the operation. Open mesh repair under local anaesthesia is cost-effective, simple and a safe operation. The learning curve was relatively short and there was no difference in the long-term outcome between the trainees and their consultant.

Keywords: Hernioplasty; Inguinal; Day case surgery; Ambulatory surgery; Local infiltration anaesthesia; Surgical training

1. Introduction

Inguinal hernias occur in about 16% of adult men and herniorraphy is one of the top three surgical procedures in most western countries [1]. Approximately 12 000 inguinal herniorraphies are performed each year in Finland and over 80 000 operations in UK [1,2]. The majority of groin hernias are currently operated on in ambulatory surgery units. About 20% of groin hernia repairs are undertaken for recurrences and 4% as an emergency [3]. Therefore, the socioeconomical impact of groin hernia surgery is high on health care system.

There is strong evidence that surgeon's case volume, hospital volume and specialisation improve the outcome of major surgical procedures, such as coronary artery bypass, gastrectomy, oesophagectomy, arthroplasty and rectal cancer surgery [4,5]. The role of specialist centres in more common surgical operations, such as colon resections or inguinal herniorraphies, is not so clear [3,6]. Although inguinal herniorraphy is one of the first operations performed by surgical trainees, few studies have compared the operative results between trainees and consultants.

Lichtenstein hernioplasty is a tension-free technique, which uses polypropylene mesh to support the inguinal muscular layers [7]. Its learning curve is even shorter than traditional groin hernioplasties, and, therefore, the Lichtenstein procedure has rapidly increased as a primary operation for inguinal hernias. In some countries the rate of the Lichtenstein operation is over 50% of all inguinal hernia surgery [3]. Under local anaesthesia it can be performed as a rapid outpatient procedure with cost savings. The present study was designed as a quality control audit in the surgical training programme for this common surgical procedure. The main interest was whether young surgical trainees can perform the Lichtenstein operation with an acceptable immediate and long-term outcome compared with an experienced specialist in hernia surgery.

* Tel.: +358-15-351-2220; fax: +358-15-351-2255.
E-mail address: hannu.paajanen@esshp.fi (H. Paajanen).

0966-6532/03/$ - see front matter
doi:10.1016/j.ambsur.2003.06.001

2. Materials and methods

This was an observational study of one hospital during the years 1996–2000. Our hospital is a non-university teaching hospital with six to eight surgical trainees working at the same time. In Finland, the general surgical training consists of 2.5–3 years serving in a central provincial hospital and thereafter 3 years subspecialisation at the university hospital. The annual number of inguinal herniorraphies in our hospital has varied between 180 and 200 (population 110 000). The tension-free Lichtenstein technique was started in January 1996. In the study years 1996–2000, 317 out of 964 of inguinal hernias (33%) were operated on using the Lichtenstein procedure under local anaesthesia as an outpatient procedure. The patient selection for open mesh repair under local anaesthesia was based on the common clinical criteria of ambulatory surgery. The same senior consultant surgeon operated on 182 consecutive patients, 135 patients were operated on by 12 first- or second-year surgical trainees. The first three operations were supervised by the same consultant surgeon and thereafter the consultant was on call and advised if necessary. The trainees operated on 10–11 patients during their 3 months education period in inguinal hernia surgery. The consultant operated annually on 60–70 inguinal hernias using an open mesh technique as well as laparoscopic techniques.

The procedure was always performed under local infiltration anaesthesia as a rapid outpatient surgery using 9×13 cm polypropylene mesh (Premilene, B. Braun AG, Germany). The sac of the indirect hernia was either resected or just inverted into the abdomen [7,8]. If the hernia sac was large and direct, it was inverted with absorbable 2-0 Dexon sutures. The mesh was trimmed and placed between the conjoint tendon, inguinal ligament, pubic bone and internal oblique aponeurosis [7,8]. Bilateral hernias were present in 12/317 cases and were operated on at the same time. Local infiltration anaesthesia was a 1:1 mixture of bupivacaine (Marcain 5 mg/ml, AstraZeneca, UK) and Citanest-adrenalin (10 mg/ml + 5 μg/ml, AstraZeneca) with an average total volume of 40–50 ml [9]. After surgery the patient was followed up for 60–120 min to see possible wound haemorrhage and then discharged. No prophylactic antibiotics were used. A 0.5–1.0 mg bolus of intravenous alfentanil was given (Rapifen, AstraZeneca) if the patient felt pain during the operation. The average cost of the operation was estimated at between 380 and 420 Euros [2].

The immediate outcome was analysed from the operative reports and patient's records. The patient characteristics, type of hernia, operation time and wound complications were recorded. The long-term results (mean follow-up 3.2 years, range 1–6 years) were assessed by using a questionnaire and if necessary by clinical examination. The questions were based on the study of the Danish Hernia Database [10]. The questionnaire was sent on May 2002 (2 years after the last operation) with a covering letter and a stamped addressed envelope. If the patient responded that the hernia had recurred or that there were problems with the operated area (n = 7), the physical examination was performed by the consultant surgeon. The following questions were asked:

1	Have you noticed recurrence of your inguinal hernia?	Yes/no
2	Have you had any pain within the last month in the inguinal area?	Yes/no
3	If there has been pain, have you taken any pain-relieving pills?	Yes/no
4	Have there been any limitations in work or leisure-time activities?	Yes/no
5	Do you have any radiating pain in the testicle?	Yes/no
6	Was there any problems with wound healing?	Yes/no
7	Are you satisfied with the operation and would you come again?	Yes/no
8	Was the operation unpleasant or painful?	Yes/no

The data analysis was carried out using Statistical Package for the Social Sciences (SPSS) for WINDOWS, version 10.0 (SPSS, Chicago, IL, USA). The statistical evaluation was performed with a Student's t-test for paired values and χ^2-test with Yates correction between the groups. $P < 0.05$ was regarded as significant for both tests.

3. Results

The patient characteristics were similar in both groups (Table 1). Consultant mean operative time was shorter than the trainees. There were no differences in the number of recurrent hernias or severe wound complications between the consultant and the trainees (Table 1).

Table 1
Characteristics of the patients

	Consultant (%)	Trainee (%)
Number of patients	182 (57)	135 (43)
Male/female	176/6 (97/3)	131/4 (97/3)
Mean age ± S.D. (range)	54 ± 15 (17–83)	53 ± 12 (19–80)
Lateral/medial hernia	117/65 (64/36)	70/65 (52/48)
Right/left sided	80/92 (44/51)	61/72 (45/53)
Mean operative time ± S.D.	39 ± 13 min	62 ± 18 min***
Recurrent hernia	2 (1.1)	3 (2.2)
Wound infections[a]	2 (1.1)	1 (0.7)
Wound hematoma[b]	2 (1.1)	4 (3.0)

***$P < 0.001$.
[a] Severe enough to open the wound.
[b] Severe enough to be evacuated.

Three of the recurrences appeared in the medial border of the mesh near the pubic bone, one through too wide an external ring and one through the femoral canal.

The presence of chronic pain and the patients' assessment of the surgery were enquired after by questionnaire after a mean follow-up of 3.2 years (Table 2). One fifth of the patients announced some degree of pain in the operated area with no difference in the training level of the surgeon. Only 3–5% of the patients needed occasional pain-relieving drugs. Over 90% of patients felt that the wound healed well, and the same amount of patients were very satisfied with day-case surgery and would come again if necessary (Table 2).

4. Discussion

Inguinal hernias are so common in the population that centralisation into specific hernia centres in Europe has not been carried out. In United States, the results of such specialist clinics have been encouraging. For example, recurrences between 0 and 1% and infections between 0 and 5% have been reported [8,11,12]. The results of nonspecialist hospitals have been slightly worse reporting recurrence rates between 4 and 7% [3,13,14]. Our results indicate that the open tension-free technique is well suited for smaller community-based and regional hospitals yielding excellent immediate and long-term results. The influence of training and experience on outcome was reflected only by the shortening of operating time, but not the long-term results.

In Finland, the frequency of groin hernia repair is third after cataract and tonsil surgery. The results of the present study suggest that with appropriate supervision and training even first or second-year surgical trainees can safely perform Lichtenstein operation without compromising patient care and the long-term outcome. This is an important result for quality control and economics because the surgeon is most important variable that influences outcome [4]. Operative training of a suitable quality and quantity is essential if inter-surgeon variation is to be reduced. It seems that inguinal herniorraphies can be performed safely in general hospitals by well supervised trainees. This may indicate that the learning curve of Lichtenstein hernioplasty is relatively short and the procedure is simple enough to be part of surgical training programmes.

Table 2
Incidence of chronic pain after Lichtenstein operation

	Consultant (n = 182) (%)	Trainee (n = 135) (%)
Pain sensations in the last month?	42 (23)	33 (25)
Need pain-relieving pills?	5 (3)	6 (5)
Problems in work or leisure time activities?	15 (8)	22 (16)
No pain radiating to testicles?	152 (87)	121 (92)
Normal wound healing?	162 (89)	125 (93)
Satisfied with the operation?	167 (93)	128 (95)
Was the operation unpleasant?	30 (17)	16 (12)

Chronic pain after inguinal hernia repair was also noticed in the present study. It has been reported to occur in between 10 and 30% of patients after groin hernia repair [10,15]. The aetiological factors may include irritation or damage of inguinal nerves or mesh inguinodynia [16], inflammatory reaction against the mesh or simply scar tissue [17]. Chronic pain is reported to be neuropathic in character, related with younger age, to exist during physical activity and more often related with recurrent hernia [10,15]. Laparoscopic techniques may give some short-term advantages in terms of pain and patients' perception of health [18], but the long-term comparative follow-up studies to open techniques are still few [19]. The present study indicated that although 25% of patients reported some pain sensations afterwards in the groin, this was mild in nature since over 90% were very satisfied with the operation.

The recent cost-analysis from Finland reported that Lichtenstein hernioplasty without general anaesthesia costs between 380 and 650 Euros depending on the need for an anaesthesia nurse and equipment [2]. We estimated that our costs would be about 380 Euros, since the patient was discharged after 1 or 2 h follow-up [20]. This is clearly less than that estimated by Wellwood et al. in their randomised study comparing laparoscopic versus open mesh repair in UK [18].

In our hospital, young surgical trainees have been systematically trained in operating an inguinal hernia using the Bassini, McWay and Lichtenstein procedures, and to a lesser extent laparoscopic techniques. Our current policy is to operate on all patients suitable for day-case surgery using the Lichtenstein technique under local anaesthesia. The percentage of the Lichtenstein operation under local anaesthesia is currently over 50% of all groin hernia surgery. The only indications for the laparoscopic procedure are occasionally bilateral hernias, complicated recurrences and a suspicion of an incipient hernia. Our experience is that the open tension-free mesh technique under local anaesthesia is simple enough to be learned well in general surgical training. It should be the primary standard operation for almost all adult inguinal hernias.

References

[1] Cheek CM, Black NA, Devlin HB. Groin hernia surgery: a systematic review. Ann R Coll Surg Engl 1998;80(Suppl 1):S1–S20.

[2] Heikkinen T-J. Costs and early outcome of laparoscopic and open operation in three common surgical conditions. Doctoral Thesis, University of Oulu, 1998.
[3] Bay-Nielsen M, Kehlet H, Strand L. Quality assessment of 26 304 herniorraphies in Denmark: a prospective nation-wide study. Lancet 2001;358:1124–8.
[4] Lerut T. The surgeon as a prognostic factor. Ann Surg 2000;232:729–31.
[5] McArdle C. ABC of colorectal cancer. Primary treatment—does the surgeon matter. Br Med J 2000;321:1121–3.
[6] Singh KK, Aitken RJ. Outcome in patients with colorectal cancer managed by surgical trainees. Br J Surg 1999;86:1332–5.
[7] Lichtenstein IL, Shulman AG, Amid PK, Montllor MM. The tension-free hernioplasty. Am J Surg 1989;157:188–91.
[8] Paajanen H. Do absorbable mesh sutures cause less chronic pain than nonabsorbable sutures after Lichtenstein inguinal herniorraphy. Hernia 2002;6:26–8.
[9] Paajanen H. Lichtenstein inguinal herniorraphy under local infiltration anaesthesia as rapid outpatient procedure. Ann Chir Gyn 2001;215:51–4.
[10] Bay-Nielsen M, Perkins FM, Kehlet H. Pain and functional impairment 1 year after inguinal herniorraphy: a nation-wide questionnaire study. Ann Surg 2001;233:1–7.
[11] Rutkow IM, Robbins AW. "Tension-free" inguinal herniorraphy: a preliminary report on the "mesh plug" technique. Surgery 1993;114:3–8.
[12] Wantz GE. Experience with the tension-free hernioplasty for primary inguinal hernias in men. J Am Coll Surg 1996;183:351–6.
[13] Koukourou A, Lyon W, Rice J, Wattchow DA. Prospective randomized trial of polypropylene mesh compared with nylon darn in inguinal hernia repair. Br J Surg 2001;88:931–4.
[14] Friis E, Lindahl F. The tension-free hernioplasty in a randomized trial. Am J Surg 1996;172:315–9.
[15] Poobalan AS, Bruce J, King PM. Chronic pain and quality of life following open inguinal hernia repair. Br J Surg 2001;88:1122–6.
[16] Heise CP, Starling JR. Mesh inguinodynia: a new clinical syndrome after inguinal herniorraphy. J Am Coll Surg 1998;187:514–8.
[17] Di Vita G, Milano S, Frazzetta M. Tension-free hernia repair is associated with an increase in inflammatory response markers against the mesh. Am J Surg 2001;180:203–7.
[18] Wellwood J, Sculpher MJ, Stoker D. Randomised controlled trial of laparoscopic versus open mesh repair for inguinal hernia: outcome and cost. Br Med J 1998;317:103–10.
[19] Kumar S, Wilson RG, Nixon SJ, Macintyre IMC. Chronic pain after laparoscopic and open mesh repair of groin hernia. Br J Surg 2002;89:1476–9.
[20] Persson F, Kristensen BB, Lund C, Kehlet H. Postural stability after inguinal herniorraphy under local infiltration anaesthesia. Eur J Surg 2001;167:449–52.

ELSEVIER

J. of Ambulatory Surgery 147 (2003) 147–149

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Should scrotal operations be performed as day cases

E.O. Pearse *, M.P.J. Wright, R. Persad

Department of Urology, University of Bristol, Bristol Royal Infirmary, Upper Maudlin Street, Bristol BS2 8HW, UK

Received 1 February 2003; accepted 30 July 2003

Abstract

Day case surgery in urology and in particular scrotal surgery has been shown to have three times the admission rate recommended by the Royal College of Surgeons in England (RCSE) for day case procedures. This questions whether it is appropriate to perform such surgery as day cases. We undertook an audit of scrotal operations performed on our day case unit in order to determine our admission rate. Our admission rate of 4.5% was comparable to the 3% admission rate recommended by the RCSE. The combination of careful patient selection, an experienced anaesthetist, supervised trainee surgeons and modern anaesthesia may have contributed to the more acceptable admission rate, which we found in our study. We also identified an increase in workload for primary care.

Keywords: Scrotal surgery; Day case surgery; Primary care

1. Introduction

With increasing pressure on inpatient beds, there is an incentive to expand the number of surgical procedures which are performed as day cases. Many of the benefits of day surgery are lost if the patient is admitted and the Royal College of Surgeons of England (RCSE) guidelines [1] suggest that the admission rate should be less than 3%. We were concerned that the only publication on urological day case procedures reported an admission rate of 10.6% for scrotal and testicular operations [2].

In this study, we undertook a retrospective audit of scrotal and testicular operations performed in our day case unit in order to determine whether it is appropriate to perform such operations as day cases.

2. Patients and methods

We identified 66 patients who underwent consecutive scrotal operations on the day surgery unit at our institution between June 1997 and July 1999. Information was obtained from theatre logs, patient medical records and the hospital information system. The procedures are listed in Table 1.

We noted patient characteristics (age and ASA grade), the grade of the operating surgeon and anaesthetist and the duration of the operations. The main outcome measure was the admission rate from the day surgery unit. We also determined the number of readmissions within 2 weeks of discharge from the day surgery unit.

In order to determine whether our patients increased the burden on primary care, we contacted as many patients as possible by telephone. We asked them about any contacts with their general practitioner (GP) after their operations.

3. Results

Patients had a median age of 43 (range 17–77). Four patients were older than 70. Patients had an ASA grade of 1 or 2 and all were anaesthetised by a consultant. 59 of the 66 operations (89%) were performed by trainees supervised by a consultant.

There were three admissions from the day surgery unit (Table 2) resulting in an admission rate of 4.5%.

* Corresponding author. Present address: 28 Elm Grove Road, Barnes, London SW13 0BT, UK. Tel.: +44-7780-860-507; fax: +44-20-7405-9955.

E-mail address: yemipearse@aol.com (E.O. Pearse).

0966-6532/03/$ - see front matter
doi:10.1016/j.ambsur.2003.07.003

Table 1
Consecutive scrotal operations performed on the day surgery unit over a 2-year period

Hydrocoele plication	27
Epidydmal cyst excision	18
Orchidopexy	6
Orchidectomy	3
Insertion of testicular prosthesis	1
Hydrocoele plication and epididymal cyst excision	3
Hydrocoele plication and other (vasectomy/testicular biopsy)	3
Epididymal cyst excision and other (vasectomy/circumcision)	2
Recurrent hydrocoele plication	2
Ligation of varicocoele and closure patent processus	1
Total	66

None were for social reasons. Two patients had drains inserted after re-do surgery for recurrent hydrocoeles. The third was admitted after a lengthy orchidectomy and contralateral orchidopexy. The trainee and consultant admission rates were 3.4 and 14%, respectively. This difference was not significant ($P = 0.29$ Fisher's exact test).

Three patients were readmitted within 2 weeks of discharge from the day surgery unit. One patient had a gastrointestinal bleed caused by non-steroidal anti-inflammatories. Two patients had infected haematomas, one following plication of a hydrocoele and the other following plication of a hydrocoele and excision of epididymal cyst. Neither patient had signs of an accumulating haematoma prior to discharge.

Fifty-eight patients (88%) were contacted by telephone. The remainder had moved with no forwarding address. Twenty-four of them (41%) consulted their GPs within 2 weeks of their operations. 19 patients saw their GPs once in clinic, three patients saw their GPs twice in clinic, one required a single home visit and one required three home visits: a total of 29 GP episodes, equivalent to a contact rate of 0.50 per patient. The reasons for and the outcomes of these consultations are given in Tables 3 and 4, respectively. Of note, 13 of 58 patients (22%) had assumed infections: 11 of them received oral antibiotics on the clinical suspicion of their GPs, however, a search through their laboratory records provided no microbiological evidence of infection. Two patients did require emergency readmission and their infections were successfully treated with intravenous antibiotics.

Table 3
Reported complications following day case scrotal surgery

Infection	13
Non-infective wound problems	5
Pain	1
Swelling	3
Constipation 2° to opiate analgesia	1
GI bleed 2° to NSAIDs	1
Total	24

Table 4
Outcomes of post-operative consultations with GPs

Reassurance	5
Antibiotic prescription	11
Treatment of non-infective wound problem	4
Sent to A&E, referred to on call, admitted (infected haematoma)	1
Emergency referral to on call, admitted (GI bleed 2° to NSAIDS)	1
Emergency referral to on call, urgent follow up (infection)	1
Expedite urology follow up (patient anxiety)	1

4. Discussion

The previously reported admission rate of 10.6% for testicular and scrotal operations [2] was considerably higher than for other specialties and exceeded the 3% admission rate recommended by the RCSE. Such a high admission rate questioned the suitability of such operations for day surgery, however, we were reassured to find an admission rate of 4.5%. Several factors may account for this difference.

The first is case selection. In the previous study, 19% of the admissions involved patients over 70-years-old or with an ASA grade of 3 and over. Although four of our patients (6%) were over 70, they had an ASA grade of 2 and none of them required admission. In the previous study, 11% of the admissions were for social reasons and 15% of patients requiring admission were judged retrospectively to have been unsuitable for day surgery care. The suitability of all our patients for day surgery was

Table 2
Details of patients admitted from the day surgery unit following scrotal surgery

	Patient 1	Patient 2	Patient 3
Age	18	53	26
ASA grade	1	1	1
Surgeon	Trainee with consultant	Trainee	Consultant
Procedure	Orchidectomy and orchidopexy	Re-do hydrocoele	Re-do hydrocoele
Length of procedure (min)	65	25	45
Indication for admission	Pain	Drain inserted	Drain inserted

assessed preoperatively and none were admitted for social reasons.

A second factor may be the level of experience of the anaesthetist. In the previous study, 45% of patients admitted following non-cystoscopic procedures were admitted for anaesthetic reasons such as nausea, vomiting and drowsiness. Over half of these patients were anaesthetised by trainee anaesthetists. In our study, only one patient out of 66 (1.5%) was admitted for analgesia following a lengthy orchidectomy and contralateral ochidopexy. All our patients were anaesthetised by a consultant anaesthetist. Our results suggest that the experience of the anaesthetist may be important. The developments in general anaesthetic agents since the previous study may also be a contributing factor.

A third factor may be the level of experience of the surgeon. The previous study reported a higher admission rate for operations performed by trainees. We found no significant difference between trainee and consultant admission rates. This may be because in our series all operations performed by trainees were supervised by a consultant surgeon. It is important to note that the relationship between surgical experience and admission rate is complex. The threshold for admission may either be raised or lowered by inexperience. Furthermore there is likely to be case selection bias as more complex procedures tend to be performed by more senior surgeons.

A lower admission rate can be achieved by discharging patients inappropriately from the day surgery unit. If this were the case, one would expect that patients who were inappropriately discharged from the unit would either be readmitted soon after discharge or increase the burden on primary care physicians. None of our patients were readmitted within 48 hours of their discharge from the day surgery unit. The problems encountered by the three patients who were readmitted within 2 weeks of discharge from the day surgery unit could not have been anticipated at the time of discharge: one patient had a gastrointestinal bleed caused by non-steroidal anti-inflammatories and the two patients who had infected haematomas had no signs of an accumulating haematoma prior to discharge.

We did find that a higher percentage of patients (41%) consulted their GPs in the 2 weeks after day case scrotal surgery than the published figure of 16.7% for general surgery [3]. Our average of 0.5 contacts per patient was also higher than the average of 0.39 contacts per patient previously published [4]. Many of these consultations were for minor complaints (see Table 3): in particular six patients needed reassurance only and two patients had complications which were not related to the surgical procedures (see Table 4).

We conclude that the combination of careful patient selection, an experienced anaesthetist, supervised trainee surgeons and modern anaesthesia may have contributed to the more acceptable admission rate for day case scrotal and testicular surgery which we found in our study. Our lower admission rate was not achieved by the inappropriate discharge of patients from the day surgery unit. An increase in workload for primary care may be anticipated.

References

[1] Commission on the Provision of Surgical services. Guidelines for day case surgery. A report of the working party of The Royal College of Surgeons of England, March 1992.
[2] Crew JP, Turner KJ, Millar J, Cranston DW. Is day case surgery in urology associated with high admission rates. Ann R Coll Surg Engl 1997;79:416–9.
[3] Kong KL, Child DL, Donovan IA, Nasmyth-Miller D. Demand on primary health care after day surgery. Ann R Coll Surg Engl 1997;79:291–5.
[4] Lewis C, Bryson J. Does day case surgery generate extra workload for primary and community health service staff. Ann R Coll Surg Engl 1998;80:200–2.

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 151–154

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Adult day case hallux valgus surgery—a safe and viable option☆

Amit Bhargava [a,*], P. Rai [b,1], R.K. Shrivastava [b,2]

[a] *Reading Shoulder Unit, Wensley Road, Coley Park, Reading, Berkshire RG1 6 UZ, UK*
[b] *William Harvey Hospital, Ashford, Kent TN24 0LZ, UK*

Received 17 July 2003; accepted 30 July 2003

Abstract

The aim of this study was to assess the success of hallux valgus surgery in the day surgery setting. A patient satisfaction survey was undertaken in 65 patients who underwent surgery by one surgeon in the day surgery centre of William Harvey Hospital. The study was done on patients operated on over 4 years from March 1998 to February 2002. 92% patient satisfaction was achieved. This is comparable to 93% reported patient satisfaction in knee arthroscopy and carpal tunnel surgery done on the day care basis. 38 out of 41 patients, who replied to the questionnaire, said that if needed they would be happy to undergo similar surgery again in the same set-up and they would advocate it to their friends and relatives. Problems encountered were postoperative pain and plaster problems in two, swelling in one case and nausea and vomiting in two cases.

Keywords: Day surgery; Hallux valgus; Bunion

1. Introduction

Hallux valgus surgery is one of the most common foot procedures in orthopaedic practice. In the United Kingdom many orthopaedic procedures are done on day care basis [1]. Orthopaedic procedures such as knee arthroscopy [7], carpal tunnel decompression [8], and ganglion excision [1] are performed routinely on a day care basis in most District General Hospitals. However, because of the morbidity and complexity associated with some surgical procedures for hallux valgus, past reports have discouraged these on a day basis [10]. This study was undertaken to assess satisfaction in patients undergoing various types of day case hallux valgus surgery under the care of one consultant orthopaedic surgeon.

2. Material and methods

A satisfaction survey was undertaken in 65 patients who underwent hallux valgus surgery under the care of one consultant orthopaedic surgeon in the day surgery centre of a District General Hospital. The patients were operated on over 4 years from March 1998 to February 2002. They included 34 patients who had a Mann's 3:1 procedure, 23 had a bunionectomy and soft tissue correction and 8 patients had a Keller's procedure (Fig. 1). All these patients were given a patient satisfaction survey after their surgery. This was returned to the consultant surgeon at the time of the first follow up.

Exclusion criteria of the study included:

1) Patients unfit for day surgery due to co-morbid conditions.
2) Bilateral operations.
3) Revision surgery.

☆ This work was undertaken at the Department of Orthopaedics and Trauma, William Harvey Hospital, Ashford, Kent, UK.

* Corresponding author. Present address: 3, Baron Close, Sutton, Surrey SM2 5NJ, UK. Tel.: +44-77-1889-4089; fax: +44-20-8395-3992.

E-mail address: amitseemakartik@aol.com (A. Bhargava).

[1] Tel.: +44-1233-63-3331.

[2] Tel.: +44-1233-63-3331x86281.

0966-6532/03/$ - see front matter © 2003 Elsevier B.V. All rights reserved.
doi:10.1016/j.ambsur.2003.07.002

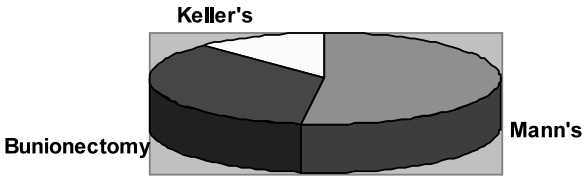


Fig. 1.

The satisfaction survey was based on a questionnaire including:

1) Preoperative fitness, assessment and the admission procedure.
2) Nursing care, anaesthetic, surgical and physiotherapy facilities on the day of operation.
3) An assessment of the postoperative pain on the day of surgery.
4) Patients were asked about their physical and emotional adjustment at home on the day of surgery and afterwards. They were also asked to comment on their mobilisation and wound healing after surgery.
5) Finally they were asked about their overall satisfaction, whether they would recommend this facility to their friends and relatives and would they be happy to undergo a similar operation in the same set up again if needed?

All patients were booked in from the out patients clinic. They were seen 2–3 weeks before the operation by a pre-assessment nurse in a day surgery unit, who explained the operation, the day surgery facility, the help line, the post-operative recovery and rehabilitation to them. All the patients were operated on under the care of one surgeon using standard operative techniques. They all received wound infiltration using 10 ml of 0.5% marcaine at the completion of surgery. Patients were prescribed co-proxamol (paracetamol 325 mg and dextropropoxyphene 32.5 mg)—two tablets six hourly for 1 week and thereafter as needed.

2.1. Standard technique for Mann's 3:1 correction [14]

It is a combination of lateral soft tissue release, bunionectomy and proximal first metatarsal dome osteotomy with internal fixation. All patients had per-operative check X-rays using an image intensifier. Plaster slabs were applied around the forefoot and midfoot. Patients were allowed heel walking for 6 weeks. Review was at 2 weeks for removal of sutures and change of plaster. Plaster was continued for a total of 6 weeks.

2.2. Bunionectomy and soft tissue correction [15]

Standard V–Y capsuloplasty and bunionectomy. Postoperatively these patients had plaster slabs around forefoot and midfoot and were allowed heel walking. Follow up was arranged at 2 weeks for removal of sutures and then full weight bearing mobilisation was allowed as tolerated.

2.3. Keller's procedure [15]

This was undertaken in relatively low demand elderly patients. It involved excision of part of the proximal phalanx of the big toe with soft tissue correction when required. No internal fixation was used. Plaster immobilisation was not used and full weight bearing was encouraged from the very beginning.

3. Results

Our cohort of 65 patients included 57 females and 8 males. Age of the patient varied from 16 to 79 with a mean of 52 years. Mean age for the Mann's procedure was 40 years, for the bunionectomy 44 years and for the Keller's procedure 66 years (Fig. 2).

Out of these 65 patients, 41 replied to our questionnaire making the response rate 63%. Out of the 41 who replied 19 had Mann's procedure, 18 bunionectomy and 4 Keller's procedure.

3.1. Preoperative fitness, assessment and admission procedure

40 out of the 41 (97%—Fig. 3) patients were satisfied with the pre-assessment explanation. 40 out of 41 had surgery on the designated date. One patient postponed the surgery due to personal reasons.

All the patients were operated on on the morning list. On the day of surgery all the patients found the day surgery centre environment clean and comfortable. 39 out of the 41 patients were happy with the information and education given at the time of admission by nursing staff, surgeon and anaesthetist. Seven out of the 41 found physiotherapy input inadequate.

3.2. Discharge

Out of the 41 patients, 36 (Fig. 3) went home the same afternoon as planned. Three patients stayed in the

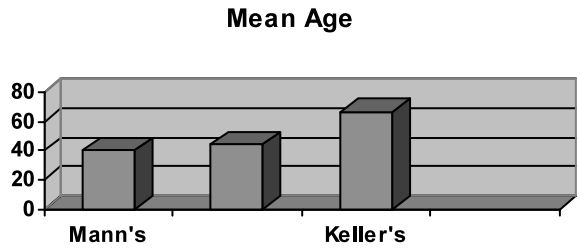


Fig. 2.

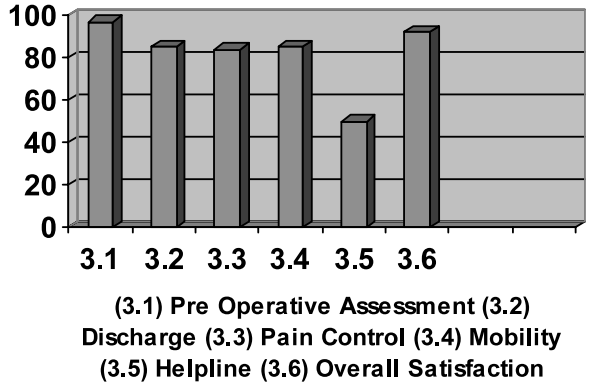


Fig. 3.

hospital hotel accommodation for one night due to poor mobility. Two patients developed sickness postoperatively and were kept as an inpatient for overnight observation. They were all discharged home the next day.

3.3. Pain control

All the patients were asked to comment on the pain after surgery while in hospital and at bedtime on the day of surgery.

They were asked to grade pain as

1) Pain adequately under control—grade 1.
2) Inadequate pain control even after taking painkillers—grade 2.

Whilst in hospital four out of 41 (10%) patients said their pain was not under control immediately after surgery. Out of these four, three had Mann's procedure and one bunionectomy.

Regarding the pain at bedtime on the night of surgery:

(84%—Fig. 3) 34 patients reported pain of grade 1 (16 Mann's, 15 bunionectomy, three Keller's);
(16%) seven patients reported pain of grade 2 (three Mann's, three bunionectomy, one Keller's).

Degree of pain was not related to the type of surgery.

3.4. Mobility

35 patients managed well (Fig. 3) but six patients had postoperative mobilisation difficulties. Out of these six patients, three were kept in hospital hotel accommodation for further physiotherapy.

3.5. Help line and readmission after discharge

In our day surgery unit there is a 24 h help line. Six patients having grade 2 pain used this facility but three (50%—Fig. 3) of them did not find the advice helpful and subsequently two of these attended the Accident and Emergency department. One of them had a tight plaster and a second had swelling and a tight bandage.

3.6. Patient satisfaction

40 out of the 41 (97%) patients found the day surgery centre facilities satisfactory. Two of this group of 40 had postoperative problems of pain and were of the opinion that they would have been better taken care of as an inpatient. 38 out of 41 (92%—Fig. 3) were satisfied with their experience in reference to the hallux valgus operation and they were happy to consider the same procedure as a day case again if needed. These patients were also happy to recommend this facility to their friends and relatives.

4. Discussion

The benefits of day surgery are well established [12,13]. Patients receive treatment that is suited to their needs and they can recover in their home environment. Cancellation of surgery due to emergency pressures is unlikely [4]. The risk of hospital-acquired infection is less [1]. Clinicians provide high quality care to appropriate patients and release hospital beds for more major cases. Hospitals improve their waiting lists and health care costs [4]. Patients want treatment that is safe, effective and the least disruptive to their lives. Day surgery provides this patient focussed care [5]. As medical technology improves and health care faces more pressure for speed and efficiency, patients regard day surgery as a very acceptable solution [2,3].

Although bunion surgery is sporadically practiced on a day care basis in the United Kingdom [9], it has not been universally accepted. Some surgeons are hesitant to take up this practice because of the high incidence of associated morbidity and the complexity of some of the procedures. Improvements in anaesthetic practice and pain management have made it possible to undertake hallux valgus surgery on a day care basis. As evident from our results patients had a very high level of satisfaction with the facilities and care provided in the day surgery centre.

The main problem in the study was inadequate postoperative pain control experienced by 18% of the patients. Pain control techniques need to be improved. In this series a physiotherapist assessed the patient before their operation and taught them mobilisation but postoperatively the patients were only supervised by nursing staff. Further physiotherapy input in the postoperative period is desirable.

A prolonged stay in hospital was necessary in only 2 (8%) patients due to sickness. 2 (8%) patients had to

attend the Accident and Emergency department after going home due to problems related to dressings and plaster. This was found comparable to the readmission rate reported after the use of the day surgery facility in all clinical specialities [11].

Overall 97% of patients were satisfied with the day care facility and services provided. Two patients who had to go to the Accident and Emergency department on the night of surgery said that they would have preferred to have this surgery as an inpatient. In all 92% patients said that they were happy to undergo similar surgery again in the same set up and they would advocate it to their friends and relatives. This is comparable to 94% reported patient satisfaction in knee arthroscopy [7], carpal tunnel decompression [8], and arthroscopic anterior cruciate ligament reconstruction surgery [6] done on a day care basis.

5. Conclusions

We strongly advocate the use of the day surgery facility in uncomplicated unilateral bunion surgery in patients who satisfy the anaesthetic fitness criteria.

References

[1] Day surgery: operational guide DOH, August 2002.
[2] Fawcett-Henesy A. All right on the day. Nurs Stand 1995;9(43):52–3.
[3] Otte DI. Patients' perspectives and experiences of day case surgery. J Adv Nurs 1996;23(6):1228–37.
[4] Coll AM, Moseley L, Torrance C. Fine tuning the day surgery process. Nurs Stand 1999;14(4):39–41.
[5] Wong LS, Kaukuntla HK, Lam FT, Fraser IA. A survey of patient satisfaction after day case surgery. Int J Clin Pract 1999;53(3):189–91.
[6] Elgafy H, Elsafty M. Day case arthroscopic anterior cruciate ligament reconstruction. J R Coll Surg Edinburgh 1998;43(5):336–8.
[7] Weale AE, Ackroyd CE, Mani GV, Winson IG. Day case or short stay admission for arthroscopic knee surgery: a randomised control trial. Ann R Coll Surg Engl 1998;80(2):146–9.
[8] Schuh A, Schuh R. Experiences with 925 outpatient operations of carpal tunnel syndrome. Zentralbl Chir 2002;127(3):224–7.
[9] Tibrewal SB, Foss MV. Is day surgery for wilson's osteotomy safe. J Bone Jt Surg Br 1991;73(2):340.
[10] May PC. Is orthopaedic day-care, kind care, J Bone Jt Surg Br 1994;76-B(Supplement 1)50.
[11] Bain J, Kelly H, Snadden D, Staines H. Day surgery in Scotland: patient satisfaction and outcomes. Qual Health Care 1999;8:86–91.
[12] The Audit Commission for England and Wales. A short cut to better services: day surgery in England and Wales. London: HMSO, 1990.
[13] Royal College of Surgeons of England. Guidelines for day case surgery, 1992.
[14] Mann RA, Coughlin MJ. Adult hallux valgus. In: Mann RA, Coughlin MJ, editors. Surgery of the foot and ankle, 6th ed. St. Louis: Mosby Yearbook, Inc., 1993.
[15] Campbell's Operative Orthopaedics, Volume 4, Edition 8, 1992, Chapter 51, 2615–92.

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 155–159

Ambulatory Surgery

www.elsevier.com/locate/ambsur

The incidence of side effects and their relation with anesthetic techniques after ambulatory surgery

Hatice Türe *, Zeynep Eti, Müge Adil, Özlem Kara F. Yılmaz Göğüş

Department of Anesthesiology, Medical Faculty of Marmara University, Istanbul, Turkey

Abstract

The aim of this study was to evaluate the incidence of side effects and their relation with anesthetic techniques in patient undergoing ambulatory surgery. 654 patients, ASA I–II, aged between 20 and 70 years scheduled for ambulatory surgery were enrolled into the study protocol. Patients were requested to record the existence of headache, sore throat, postoperative pain, nausea, vomiting, muscle weakness, lack of appetite, drowsiness, sleep disturbances, dizziness, dysuria, and lumbar pain during first week postoperatively. Postoperative pain was significantly higher after peripheral neural blockage. Muscle weakness, sore throat, lack of appetite, dysuria, sleep disturbances, headache, and dizziness were significantly higher after inhalational anesthesia ($P < 0.05$). It was concluded that total intravenous anesthesia or neural blockade should be preferred for ambulatory surgery and an effective postoperative analgesic therapy should be planned before discharge.

Keywords: Ambulatory surgery; Postoperative side effects; Anesthetic techniques

1. Introduction

Throughout the developed world there is a trend towards performing more and more surgery on an ambulatory basis [1]. The advantages of ambulatory surgery include economic savings, earlier ambulation, patient convenience, and a lessened risk of nosocomial infection. However, discharge from hospital is not the end of the process of recovery as the patient is concerned, they still have to go through the late stage, and it may be days or even weeks before they return to their preoperative physiological status. In this late recovery period, the patient may also run into complications of anesthesia and surgery, which require further contact with the hospital [2].

The aim of this study was to evaluate the incidence of postoperative side effects and their relation with anesthetic techniques prospectively in patients undergoing ambulatory surgery.

2. Methods

After institutional ethics committee approval and patients' written consent, 654 unpremedicated patients, ASA I–II, aged between 20 and 70 years scheduled for ambulatory surgery were prospectively studied. Demographic characteristics of patients, the type and duration of surgery, anesthetic techniques, and the method of airway management were recorded during surgery.

The patients were requested to record the existence and duration of postoperative pain, lumbar pain, headache, sore throat, nausea, vomiting, muscle weakness, lack of appetite, drowsiness, dizziness, dysuria, and sleep disturbances using standardized questionnaire during the first 7 days postoperative. Each side effect is defined in Table 1 [3]. The patients who did not bring their questionnaire were interviewed by the same research assistant through phone by second week postoperative.

All questionnaire and interview responses were entered into a database and analyzed. Descriptive statistics were in the form of frequencies, means $\pm$ S.D. The chi-square test was used for frequency data and the relation between anesthetic techniques and side effects. An independent t-test was used to test the differences

* Corresponding author.
E-mail address: hatciftci@hotmail.com (H. Türe).

0966-6532/03/$ - see front matter
doi:10.1016/S0966-6532(03)00027-1

Table 1
Description of postoperative side effects

Side effect	Description
Postoperative pain	You wake up moaning or writhing and need extra painkillers
Low back pain	You feel pain in the lumbar area on rest or activation
Headache	You have headache during postoperative period
Sore throat	Your throat is painful and it may hurt when you try to swallow
Nausea	You feel queasy with a strong desire to vomit
Vomiting	You are retching and bringing up liquid to solids
Muscle weakness	You feel muscle pain and loss of muscle strength
Lack of appetite	You feel aversion to food
Drowsiness	You feel very tired and do not want to get out of bed
Dizziness	You feel faintness, giddiness, and unsteadiness
Dysuria	You feel difficulty or pain in urination
Sleep disturbances	You are sleeping longer than normal or have difficulty to sleep

Taken from Ref. [3].

between groups with and without side effects. Statistical significance was assigned when $P < 0.05$.

3. Results

654 patients were studied and 403 patients (61.6%) completed the questionnaire. We did not receive the answers of 251 patients after 7 days following surgery and the telephone interviews were conducted for these patients.

The demographic characteristics of patients and type of surgery are detailed in Table 2. The mean duration of surgery was 39 ± 20 min.

Table 2
Demographics of patients, type of surgery, and anesthetic techniques

	Side effects	No side effects
Number of patients	232/654	422/654
Age (year)	43 ± 1	39 ± 3
Gender (M:F)	85:147	165:257
ASA class		
I	145/654	209/654
II	87/654	213/654
Type of surgery ($n = 654$)		
Orthopedic surgery	60	103
General surgery	46	96
Gynaecological surgery	25	80
ENT surgery	34	50
Urological surgery	67	93
Anesthetic technique ($n = 654$)		
Inhalational anesthesia	138 (44%)	177 (56%)
Total intravenous anesthesia	32 (27%)	85 (73%)
Central neural blockade	40 (30%)	93 (70%)
Peripheral neural blockade	22 (24.7%)	67 (75.3%)

The anesthetic techniques used were inhalational anesthesia (sevoflurane, nitrous oxide) in 315 patients (48%), central neural blockade (spinal, epidural, or caudal blockade) in 133 patients (20%), total intravenous anesthesia (propofol and alfentanil) in 117 patients (17%), and peripheral neural blockade (axillary, interscalene, or femoral-sciatic blockade) in 89 patients (14%). The neuromuscular relaxant drug such as succinylcholine was used in 102 patients (15.6%), rocuronium was used in 36 patients (5.5%), and atracurium was used in 24 patients (3.7%).

The method of airway management was endotracheal intubation in 141 patients (32.7%), insertion of laryngeal mask airway in 225 patients (52%), and ventilation with face mask in 66 patients (15.3%) during general anesthesia.

35% percent (232 patients) of all patients experienced one or more side effects during 7 days postoperatively. Postoperative pain was the most frequently reported side effect (9.6%) followed by muscle weakness, nausea, and sore throat (Fig. 1). The most common three side effects were muscle weakness, sore throat, and lack of appetite after inhalational anesthesia; sore throat, muscle weakness, and postoperative pain after total intravenous anesthesia; postoperative pain, lumbar pain, and vomiting after central neural blockade; and postoperative pain, nausea, and drowsiness after peripheral blockade. Postoperative pain was significantly higher after peripheral blockade than the other anesthetic techniques ($P < 0.05$). The incidences of muscle weakness, sore throat, lack of appetite, dizziness, and sleep disturbances were significantly higher after inhalational anesthesia ($P < 0.05$). Dysuria was significantly higher after inhalational anesthesia and central neural blockade, and headache was significantly higher after inhalational anesthesia and total intravenous anesthesia than the other anesthetic techniques ($P < 0.05$). No difference was observed in nausea, vomiting, drowsiness, and low back pain in relation with anesthetic technique. No correlation was found between pairs of postoperative side effects. The incidences of side effects and their comparison with anesthetic techniques were showed in Table 3.

Sore throat was significantly higher in intubated patients ($P < 0.05$) and no correlation was found between the other side effects and airway management devices.

Surgical procedures and anesthetic techniques used were shown in Table 4 and the relationship with side effects was reported in Table 5.

4. Discussion

In our study, the incidence of one or more side effects following ambulatory surgery was 35.4% and the most

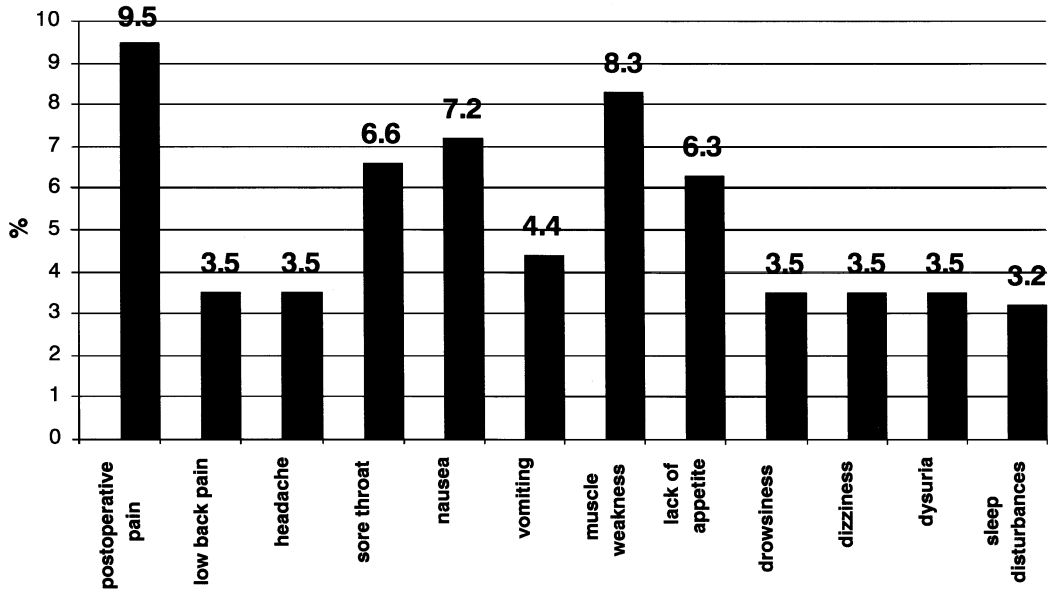


Fig. 1. Postoperative side effects (%).

common side effect was postoperative pain (9.6%). Postoperative pain is a common reason for delayed discharge and causes extreme discomfort and suffering after ambulatory surgery. Pain also precipitates several deleterious physiological effects leading to postoperative complications [4]. It was a major problem in 27.1% (63 patients) of 232 patients with side effects. The pain started after 24 h following surgery and continued until sixth day postoperative. The incidence of postoperative pain was found significantly higher after peripheral neural blockade than the other anesthetic techniques. 54% of the patients who had postoperative pain underwent orthopedic surgery and most of these patients had peripheral neural blockade. It is well-known that bone injury is more painful than soft tissue injury and orthopedic patients had the greatest incidence of severe pain postoperatively [5]. This type of surgery was found to play a role in determining the degree of postoperative pain. Puolakka et al. [6] reported that about one-third of the patients had pain in the operative area following orthopedic outpatient surgery and 5.6% continued to report this during first week.

Postoperative muscle weakness is a complex symptom consisting of a decreased ability to carry out the activities of daily living; it is often related to an element of depression. In our study, the second most common side effect was muscle weakness. The incidence of muscle weakness following inhalational anesthesia was two times higher than the total intravenous anesthesia and three times higher than the central neural blockade. The physiological causes of postoperative muscle weakness are not clear [7]. Early postoperative muscle weakness may be related to postoperative sleep disturbances, inflammatory mediators, and the use of systemic opioids [8]. In our study, succinylcholine was administered in 102 patients. 54 patients had muscle weakness and 28 (28/102 patients) of 54 patients who suffered from muscle weakness following anesthesia received succinylcholine and 11 (11/36) of the patients received rocuronium bromide. Preoperative systemic opioid–alfentanil was used in only 8 of 54 patients who suffered muscle weakness. Therefore, succinylcholine and opioid–alfentanil were not thought to be a reason of muscle weakness and predictor of postoperative myalgia [9]. However, further studies are needed to determine the relation between muscle weakness with preoperative systemic opioid and succinylcholine.

Table 3
Surgical procedures and anesthetic techniques

Surgery	IA ($n = 315$)	TIVA ($n = 117$)	CNB ($n = 133$)	PNB ($n = 89$)
Orthopedic surgery ($n = 163$)	32	–	42	89
General surgery ($n = 142$)	87	–	55	–
Gynaecological surgery ($n = 105$)	59	46	–	–
ENT surgery ($n = 84$)	53	31	–	–
Urological surgery ($n = 160$)	84	40	36	–

Table 4
The incidence of side effects and anesthetic techniques (%)

	IA ($n=315$)	TIVA ($n=117$)	CNB ($n=133$)	PNB ($n=89$)
Postoperative pain	9/315 (2.8)	7/117 (6)	13/133 (9.7)	34/89 (38.2)*
Low back pain	10/315 (3.2)	3/117 (2.6)	7/133 (5.3)	3/89 (3.4)
Headache	16/315 (5.1)**	6/117 (5.1)**	–	1/89 (1.1)
Sore throat	41/315 (13)***	8/117 (6.8)	–	–
Nausea	25/315 (7.9)	5/117 (4.3)	5/133 (5.6)	12/89 (9)
Vomiting	20/315 (6.3)	3/117 (2.6)	6/133 (4.5)	–
Muscle weakness	35/315 (11)***	8/117 (6.8)	5/133 (3.8)	–
Lack of appetite	33/315 (10.5)***	1/117 (0.9)	5/133 (3.8)	2/89 (2.2)
Drowsiness	14/315 (4.5)	4/117 (3.4)	–	5/89 (5.6)
Dizziness	18/315 (5.7)***	3/117 (2.6)	2/133 (1.5)	–
Dysuria	17/315 (4)****	1/117 (0.9)	6/133 (4.5)****	–
Sleep disturbances	18/315 (5.7)***	2/117 (1.7)	17/133 (0.8)	–

IA, inhalational anesthesia; TIVA, total intravenous anesthesia; CNB, central neural blockade; PNB, peripheral neural blockade.
* $P<0.05$: PNB vs. other anesthetic techniques.
** $P<0.05$: IA and TIVA vs. PNB, CNB.
*** $P<0.05$: IA vs. other anesthetic techniques.
**** $P<0.05$: IA and CNB vs. TIVA, PNB.

Postoperative sleep disturbances are other side effects. Rawal et al. [10] reported that sleep disturbances are very common in the postoperative period. Few studies have been performed to evaluate the influence of anesthetic techniques on postoperative sleep and they reported that regional anesthetic techniques can be used to reduce surgical stress and to provide superior analgesia with decreased opioid requirements [7]. In our study, sleep disturbances were higher after inhalational anesthesia than the other anesthetic techniques and no relation was found between opioid requirements and postoperative sleep disturbances.

Propofol and alfentanil were used for total intravenous anesthesia. Propofol provides rapid, clear-headed wake-up with a low incidence of nausea and vomiting [1]. However, Philip et al. [11] and Jellish et al. [12] reported that the incidence of postoperative nausea and vomiting was similar between propofol and sevoflurane groups. We also did not find any difference in the incidence of nausea and vomiting between inhalational and intravenous anesthesia. These side effects did not seem to be related with anesthetic techniques. Alfentanil has a short duration of action and is a popular ambulatory anesthetic, but the incidence of nausea and vomiting limits its efficacy in this setting [13]. In our study, the incidence of nausea was 4.3% and the incidence of vomiting was 2.6% after total intravenous anesthesia. The use of general anesthesia, systemic opioid's use, the surgical stress–response, and postoperative pain have all been implicated in the aetiology of PONV [7]. However, there was no relation found between systemic opioid's use, postoperative pain, inhalational anesthesia, and PONV in our study.

Table 5
The side effects and surgical procedures (%)

	Orthopedic surgery	General surgery	Gynaecological surgery	ENT surgery	Urological surgery
Postoperative pain	34/163 (20.8)*	4/142 (2.8)	5/105 (4.8)	7/84 (8.3)	13/160 (8.1)
Low back pain	5/163 (3)	3/142 (2.1)	6/105 (5.7)	–	9/160 (5.6)
Headache	5/163 (3)	6/142 (4.2)	5/105 (4.8)	2/84 (2.4)	5/160 (3.1)
Sore throat	–	–	1/105 (0.95)	32/84 (38)**	10/160 (6.2)
Nausea	13/163 (8)	8/142 (5.6)	7/105 (6.7)	8/84 (9.5)	11/160 (6.8)
Vomiting	1/163 (0.6)	4/142 (2.8)	6/105 (5.7)	8/84 (9.5)	10/160 (6.2)
Muscle weakness	1/163 (0.6)	16/142 (11.3)***	11/105 (10.5)***	8/84 (9.5)***	18/160 (11.2)***
Lack of appetite	12/163 (7.4)	2/142 (1.4)	6/105 (5.7)	7/84 (8.3)	14/160 (8.7)
Drowsiness	9/163 (5.5)	3/142 (2.1)	2/105 (1.9)	4/84 (4.8)	5/160 (3.1)
Dizziness	6/163 (3.7)	4/142 (2.8)	1/105 (0.95)	7/84 (8.3)	5/160 (3.1)
Dysuria	–	1/142 (0.7)	8/105 (7.6)	–	15/160 (9.4)
Sleep disturbances	6/163 (3.7)	1/142 (0.7)	3/105 (2.9)	8/84 (9.5)**	4/160 (2.5)

* $P<0.05$: orthopedic surgery vs. other types of surgeries.
** $P<0.05$: ENT surgery vs. other types of surgeries.
*** $P<0.05$: general, gynaecological, ENT and urological surgeries vs. orthopedic surgery.

Sore throat was significantly higher after inhalational anesthesia than the other anesthetic techniques as 99.2% of intubated patients were anesthetized with inhalational anesthesia. Endotracheal intubation causes a high incidence of postoperative airway-related complaint as sore throat. The incidence of sore throat is markedly reduced when the laryngeal mask airway is used and endotracheal intubation was a major predictor of sore throat. However, no correlation was found between the other side effects and airway management devices.

The type of anesthesia is often forced by the surgical procedure that is being performed during the study. In our study, the incidence of postoperative pain was significantly higher after orthopedic surgery as discussed, muscle weakness was significantly higher after general, urological, and gynecological surgery, and sore throat was significantly higher after ENT surgery than the other postoperative side effects. ENT surgical patients had a high incidence of sore throat (38%) and sleep disturbances (9.5%). Sore throat was found to be related with the airway management device and surgical procedure.

Chung et al. [14,15] and Jenkins et al. [3] reported that the most common side effects were pain, nausea, and vomiting after ambulatory surgery and the type of surgery did influence these symptoms. However, the type of anesthesia was not used as a predictive factor. Our study showed that the type of anesthesia, surgical procedure, and the method of airway management did influence the postoperative side effects. Postoperative muscle weakness, lack of appetite, dysuria, headache, dizziness, and sleep disturbances were related to the type of anesthesia. The incidence of muscle weakness and lack of appetite was higher after inhalational anesthesia. Therefore, the incidence of postoperative side effects may be altered depending on anesthetic techniques and drugs as these side effects played a major role in determining the degree of return to daily living functions.

We concluded that the incidence of postoperative side effects was significantly lower following central or peripheral neural blockade and total intravenous anesthesia. These anesthetic techniques should be preferred for ambulatory surgery and postoperative pain therapy should be planned before discharge. The patients must be educated for postoperative pain therapy options. However, surgical factors may determine the choice of anesthesia technique used and the side effects seen may be related to those factors. Further studies should be made to develop effective strategies for the prevention and treatment of frequently seen postoperative side effects in ambulatory surgical patients.

References

[1] Korttila K. Recovery from outpatient anaesthesia: factors affecting outcome. Anesthesiol Suppl 1995;50:22–3.
[2] Marshall SI, Chung F. Discharge following ambulatory surgery. Ambulatory Surg 1997;5:3–8.
[3] Jenkins K, Grady D, Wong J, Correa R, Armanious S, Chung F. Postoperative recovery: day surgery patients' preferences. Br J Anaesth 2001;86(2):272–4.
[4] Rowlingson J. Acute postoperative pain management. Anesth Analg 2001;92(3S):S78–85.
[5] Duc TA. Postoperative pain control. In: Conroy JM, Dorman BH, editors. Anesthesia for Orthopedic Surgery. New York: Raven, 1994:355–66.
[6] Puolakka R, Haasio J, Pitkanen MT, Kallio M, Rosenberg PH. Technical aspects and postoperative sequelae of spinal and epidural anesthesia: a prospective study of 3230 orthopedic patients. Reg Anesth Pain Med 2000;25:488–97.
[7] Nielsen KC, Steele SM. Outcome after regional anaesthesia in the ambulatory setting—is it really worth it? Best Pract Res Clin Anaesthesiol 2002;16(2):145–57.
[8] Christensen T, Kehlet H. Post-operative fatigue. World J Surg 1993;17:220–5.
[9] Fortier J, Chung F, Su J. Predictive factors of unanticipated admission in ambulatory surgery: a prospective study. Anesthesiology 1996;85:A27 (Abstract).
[10] Rawal N, Hylander J, Nydahl PA, et al. Survey of post-operative analgesia following ambulatory surgery. Acta Anaesthesiol Scand 1997;41:1017–22.
[11] Philip B, Lombard LL, Roaf ER, Drager LR, Calalang I, Philip JH. Comparison of vital capacity induction with propofol for adult ambulatory anesthesia. Anesth Analg 1999;89:623–7.
[12] Jellish WS, Lien CA, Fontenot HJ, Hall R. The comparative effects of sevoflurane versus propofol in the induction and maintenance of anesthesia in adult patients. Anesth Analg 1996;82:479–85.
[13] Nelskyla K, Korttila K, Yli-Hankala A. Comparison of sevoflurane–nitrous oxide and propofol–alfentanil–nitrous oxide anaesthesia for minor gynaecological surgery. Br J Anaesth 1999;83(4):576–9.
[14] Chung F, Un V, Su J. Postoperative symptoms 24 hours after ambulatory anaesthesia. Can J Anaesth 1996;43:1121–7.
[15] Chung F, Ritchie E, Su J. Postoperative pain in ambulatory surgery. Anesth Analg 1997;85:808–16.

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 161–162

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Brief report

Tumours of the eyelid: ambulatory surgery treatment

Elvira Elena-Sorando *, C. Vázquez-Galeano, N. Galeano-Ricaño, P. Martínez-Seijas, J. Azúa-Romeo, G. Cimorra-Moreno

Plastic Surgery Department–Histopathology Department, Hospital Universitario Miguel Servet de Zaragoza (España), C./Barcelona no. 27-2oB, 50017 Saragossa, Spain

Abstract

Purpose: To analyse the peculiar surgical features of the eyelid and the nature of those tumoural lesions located in the eyelid and its surrounding area, treated as a Day-Surgery procedure in a Plastic Surgery Department. *Methods:* A retrospective review of 107 patients with periocular lesions surgically treated in our hospital in 2002 by Ambulatory Surgery. *Conclusions:* In our hospital, the palpebral cutaneous tumours most frequently treated as Ambulatory Surgery are Basal cell carcinoma (43%), mainly involving elderly patients. Reconstruction with a small number of flaps and skin graft is an easy process, producing satisfactory results. Early implementation of Ambulatory Surgery procedures may avoid more aggressive and complex techniques.

Keywords: Eyelids; Tumours; Ambulatory surgery

1. Introduction

Skin tumours located in the eyelid are lesions, which require early and accurate management. Delay in the treatment of these conditions may lead to serious consequences, especially with malignant tumours [8], since their growth in this location can jeopardise eyelid mobility, lacrimal gland function and even sight. Ambulatory Surgery is an efficient approach to be considered for such lesions [4], as it allows the excision of small and medium size lesions with little disturbance for the patient. This makes admission to hospital unnecessary, so that the individual is spared the anxiety produced by a Hospital stay, and the Medical Centre is spared the expenses that this stay may generate.

Due to the particular anatomical and physiological characteristics of the eyelid, tumours located here become a challenge for the surgeon. Minimal thickness, relative elasticity and increased sensibility of the skin in this location have to be accounted for. Surgery in the palpebral region can be performed under local anaesthesia.

2. Objective

Our aim is to analyse the peculiar features of the eyelid as well as the nature of those tumoural lesions located in the eyelid and its surrounding area, treated as a Day-Surgery procedure in a Plastic Surgery Department.

3. Material and methods

We reviewed the charts of patients with palpebral lesions treated by Ambulatory Surgery and local anaesthesia (Lidocaina, mepivacaina or bupivacaina) in the year 2002 in our Plastic Surgery Department. Features analysed included: gender and mean age of patients, histopathology and location of the tumour and surgical procedure performed.

4. Results

We have treated 107 patients with a total number of 110 lesions (43 male and 64 female), with mean age 62 years. Topographic distribution [3] of the lesions is as follows:

* Corresponding author.
E-mail address: esorando@comz.org (E. Elena-Sorando).

0966-6532/03/$ - see front matter
doi:10.1016/S0966-6532(03)00028-3

- Medial canthus: 41 lesions.
- Lower eyelid: 34 lesions.
- Upper eyelid: 22 lesions.
- Lateral canthus: ten lesions.

From a histopathological point of view [5,6] we found: Basal cell carcinoma (43%) is the most frequent condition, followed in decreasing order by Squamous cell carcinoma, Cysts, Keratosis (actinic and seborrheic), pigmented nevi, xanthelasma-xanthoma palpebrarum, Bowen's disease, Lentigo Maligna-Melanoma (one case, in upper eyelid, close to eyebrow).

The location and size of the lesion determines the sort of closure, which is needed to cover the solution of the skin left after the excision. There must be complete resection of the lesion with an acceptable security margin, which needs to be increased in those cases with a highly suspected chance of malignancy [5].

5. Surgical procedure

Direct closure of the skin defect was performed in 40% of the cases, and 36% required reconstruction through local flaps. In 9% of the patients, palpebral free border was affected and cuneiform resection was performed followed by planar reconstruction (conjunctiva, tarsus, skin). Other therapeutic options used were electrofulguration, fullthickness grafts and carbon dioxide laser.

The different local flaps [1] utilised for closure were: glabelar–nasoglabellar flap, V–Y advancement flap, frontal flap and full-thickness skin grafts for medial canthus reconstruction [7], as well as rhomboidal or Limber flap for medial and lateral canthus, rotation and Tripier flaps, and Full-thickness skin grafts [2] for lower eyelid. Upper eyelid permits a direct closure after extirpation of the lesions, especially in elderly patients.

Immediate postoperative complications are hematoma and pain. Both of these can be reduced by following a series of simple rules such as the administration of local criotherapy, compression and prescription of adequate analgesic support. Late complications include Ectropion with lagoflalmus, reduction of the overture and insufficient resection. This later problems require specific surgical correction [3] which might not always be possible under local anaesthesia.

6. Conclusions

In our hospital, palpebral cutaneous tumours most frequently treated as Ambulatory Surgery are Basal cell carcinoma (43%), mainly involving elderly patients. Reconstruction with a small number of flaps and skin graft is an easy process, producing satisfactory results. Early implementation of Ambulatory Surgery procedures may avoid more aggressive and complex techniques.

References

[1] Jackson IT. Local flaps in head and neck reconstruction (Edición española). Barcelona: Salvat, 1990 (Edición española).
[2] McGregor IA. Fundamental techniques of plastic surgery and their surgical applications (Edición española). Barcelona: Masson, 1993:195–200 (Edición española).
[3] McCarthy JG. Plastic surgery—the face, part 1, vol. 2. Buenos Aires: Panamericana, 1992:781–856.
[4] Khalfaoui F, Gharbi N, Baccari S, Tarhouni L, Bahri H. Plastic surgery in ambulatory practice. Tunis-Med 2000;78(4):251–3.
[5] Sigurdsson H, Agnarson BA. Basal cell carcinoma of the eyelid. Risk of recurrence according to adequacy of surgical margins. Acta Ophthalmol Scand 1998;76(4):477–80.
[6] Mencia-Gutierrez E, Fernández-González MC, Gutierrez-Díaz E, García-Suarez E, Julve-San-Martín A, Gómez-Ledesma I. Squamous cell carcinomas of the eyelids: 18 cases. Arch Soc Esp Ophthalmol 2000;75(10):665–9.
[7] Reali VM, Chiarugi C, Borgognoni L. Reconstruction of a medial canthus defect with a myocutaneous flap. Ann Plast Surg 1993;30(2):159–62.
[8] Margo CE. Eyelid tumours: accuracy of clinical diagnosis. Am J Ophthalmol 1999;128(5):635–6.

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 163–166

Ambulatory Surgery

www.elsevier.com/locate/ambsur

Feasibility and problems of day-care varicose vein surgery in elderly patients

Silvestro Canonico *, Ferdinando Campitiello, Antonio Santoriello

Department of General Surgery, School of Medicine, Second University of Naples, Piazza Miraglia, 80138 Naples, Italy

Received 18 May 2003; accepted 19 August 2003

Abstract

Background: The incidence of varicose veins rises with age and over 30% of elderly people suffer from this disease. In recent years, the surgical treatment of varicose veins has moved more to day surgery (DS), but elderly patients are often excluded. *Objective:* The aim of this study was to consider retrospectively our 10-year experience of varicose disease surgery in elderly patients with reference to the feasibility of day surgeries, and to evaluate the problems that the age of patients causes to shorten hospital stay. *Material and methods:* All 2032 patients who underwent varicose vein surgery at our institution from January 1993 to December 2002 were evaluated retrospectively; of these, 312 patients (15.35%) were older than 65 years. In the group of the elderly patients, 214 (68.6%) were operated on as inpatients and 98 (31.4%) as day-care cases; in the younger group, 60.23% were treated as day cases. All patients were examined and selected depending on their general health conditions, local conditions and logistics. After their surgery, all patients were checked for at least 3 h and were discharged according to the Post-Anaesthesia Discharge Scoring System. Every patient was given written instructions for home behaviour in the postoperative period, and also phone numbers for medical advice if needed. *Results:* Among the general conditions the reasons for excluding the elderly patients from day-care surgery (DCS) were above all concurrent pathologies (43.9%) and anxiety (17.8%); with regard to local conditions, 31 patients (14.5%) with extensive bilateral varices and 27 patients (12.6%) with complex recurrent disease were excluded; 24 patients (11.2%) were excluded because of logistics. Nearly half (44.9%) of the elderly patients required multiple admissions for diagnostics before surgery. In 15 patients (15.31%), 3–5 weeks passed from the first admission to the operation in order for treatment with drugs of concurrent pathologies. In the elderly group of patients, there was a lower number of long (7.1% versus 15.9%) and below-knee (48.0% versus 56.9%) strippings of the great saphenous vein, and on the contrary a higher number of perforator veins sections (7.1% versus 1.4%), stab avulsions (10.2% versus 1.7%) and skin grafts for ulcers (8.2% versus 2.2%). No problems occurred during surgery and no patient required readmission to hospital for complications. *Conclusion:* This study supports the evidence that varicose vein disease can be safely managed in a day-care unit even in elderly patients. Preoperative restrictive selection is necessary for obtaining good results as numerous old patients are suffering from concurrent pathologies. Particular attention is to be given to anxiety of the patient and the attending persons. Postoperative overnight stay can increase the patient satisfaction and reduce the number of elderly patients excluded from day-care surgery.

Keywords: Day-care surgery; Varicose vein disease; Elderly

1. Introduction

Lower limb varicose disease shows a 15–30% incidence in the overall population of Western countries [1]. It represents a remarkable pathology, particularly in elderly people, both for its frequency and for the frequency of severe complications such as venous stasis ulcers. Epidemiological studies have shown that the incidence of varicose disease progressively rises with age. The Basilea study reported a 4% prevalence of saphenous and reticular varices in people about 30 years old, against a 35% prevalence of saphenous varices and a 25% prevalence of reticular varices at the age of 70 years [2]. Another study reported a 36.7% prevalence of lower limb varices among people older than 60 years (14.6% in males and 22.1% in women) [3]. A survey carried out on

* Corresponding author.
E-mail address: silvestro.canonico@unina2.it (S. Canonico).

0966-6532/03/$ - see front matter © 2003 Elsevier B.V. All rights reserved.
doi:10.1016/j.ambsur.2003.08.001

Italian elderly people in the Campania Region showed a 29.6% prevalence of varicose veins among people over 65 years [4].

In recent years, the surgical treatment of varicose disease, thanks to the evolution of physiopathologic knowledge and anaesthetic and surgical techniques has tended more and more to day-care surgery (DCS). Day case varicose vein surgery rates show remarkable differences in Western Countries. For example, in 1994–1995 the percentage of the lower limb varices operated on as day cases varied from very low values (2.3% in Portugal and 4.9% in Germany) to slightly higher values (11.1% in Australia and 16.1% in Ireland), intermediate values (22.2% in Belgium and 34.6% in England) and very high values (63.9% in Canada and 80.5% in the USA) [5,6]. In 1996, Bergan affirmed that in Southern California 15% of patients operated on for varices as day cases were older than 65 years and that in consequence of the progressive ageing of people phlebological DCS would include more and more elderly patients [7]. We too reported an initial experience that included in a total of 478 patients operated on for varicose veins, 14% of patients over 65 years [8].

The aim of this retrospective study was to consider our longer experience in varicose disease surgery in elderly patients, with specific reference to their treatment in a DCS regimen and to evaluate the problems that the age of the patients gives rise to.

2. Material and methods

From January 1993 to December 2002, 2032 patients underwent surgical interventions for lower limbs varicose disease in the Department of General Surgery of the Second University of Naples. Of these patients, 312 (15.35%) were ≥ 65 years old. Among the elderly patients, 214 (68.6%) were admitted to inpatient hospital stay and 98 (31.4%) were treated in the DCS regimen. Of the latter group (ranging in age from 67 to 77 years, mean age 68.5 years), 76 patients (77.6%) were females and 22 (22.4%) males. One thousand and thirty-six (60.23%) of the 1720 patients under 65 years, were treated as day cases.

All the patients were carefully examined before surgery and preoperative investigations included routine haemato-chemical tests, urine tests, ECG and chest X-ray; the lower limbs examination was always supplemented with Doppler ultrasonography and in the last 5 years with colour Doppler ultrasonography. Further preoperative diagnostic studies (echocardiography, stress ECG, etc.) were carried out as requested by the anaesthetist.

The day surgery (DS) exclusion criteria in the 214 patients who were treated as inpatients were clinical and/or logistic. The clinical criteria in line with national guidelines, included anaphylactic shock history, insulin-dependant diabetes, previous fits or convulsions, bleeding-risk, coagulopathies, myocardial infarction in the previous 6 months, haemodialysis for chronic renal insufficiency, psychiatric pathology, obesity (body weight over 100 kg for men and 80 kg for women), or an ASA 3 or 4 risk at the time of preoperative anaesthetic assessment. Over anxious patients were also admitted for surgery.

Local clinical criteria for exclusion from the DS regimen included the presence of extensive bilateral varices and complex re-operations for recurrent varices. Logistic criteria for exclusion from DS were the distance of the hospital from the patient's house (> 50 km, or the house on an island of the region) and the unavailability of a person able to attend the patient on his home-coming and during the immediate postoperative period.

All the patients signed an informed consent to DCS as well as the specifics of the proposed operation.

The operations carried out in the DCS regimen, both in the patients under 65 years and in those over 65 years, are illustrated in Table 1. The study included patients undergoing pinch grafts, made with whole thickness fragments taken from over the pubic abdominal wall for the treatment of venous stasis ulcers. The anaesthesia used in the 98 elderly patients was: monoselective intraspinal block in 17 cases (17.3%), block 3:1 according to Winnie in 24 cases (24.5%), local anaesthesia in 57 patients (58.2%). In 18 later cases, the local anaesthesia was combined with propofol e.v. drip.

All the patients were observed for a minimum of 3 h postoperatively and were discharged according to the Post-Anaesthesia Discharge Scoring System described by Chung [9]. Every patient was given written instructions about what to do in the postoperative period and phone numbers to call for medical advice if required. All the patients were asked to return on the seventh post-operative day for follow-up and redressing.

Table 1
Surgical operations for lower limbs varicose disease in day surgery regimen (1993–2002)

Operations	Patients aged ≥ 65 years, *N* (%)	Patients aged < 65 years, *N* (%)
Long Stripping of the great saphenous vein	7 (7.1)	165 (15.9)
Below-knee stripping of the G.S.V.	47 (48.0)	589 (56.9)
Crossectomy and varicectomy	11 (11.2)	134 (12.9)
Stripping of the external saphenous vein	8 (8.2)	93 (9.0)
Perforator veins section	7 (7.1)	15 (1.4)
Varices stab avulsion	10 (10.2)	18 (1.7)
Skin grafting for ulcer	8 (8.2)	22 (2.2)
Total	98 (100)	1036 (100)

3. Results

The causes of exclusion of the elderly patients from the DCS regimen are summarised in Table 2. It appears evident how general clinical reasons (61.7%), correlated overall to concurrent pathologies (43.9%) with a frequent and elevated anaesthesiological risk (ASA 3 and 4), have prevailed. However, in the 10-year period the number of the elderly patients undergoing operations for varicose disease increased constantly as well as the number of the old patients treated in DCS regimen (Fig. 1).

For patients treated as day cases, the mean waiting time for admittance was 5 weeks, with a range from 2 to 11 weeks. In 44 patients (44.9%), in addition to the first attendance for routine tests, more attendance (up to three maximum) for further diagnostic studies were required by the anaesthetist at the time of the preoperative evaluation. In 15 patients (15.31%), 3–5 weeks passed from the first attendances to the operation in order for the treatment with drugs of concurrent pathologies (seven patients with chronic bronchopneumonia; four compensations of diabetes mellitus; two patients with severe hypertension). For the elderly patients admitted for inpatient care the mean waiting time was 12 weeks and the mean stay in hospital was 6 days.

At the statistical analysis, no significant differences were found between the operations performed in the elderly and the younger patients in consequence of too high difference of the numbers (Table 1). However, in the elderly group there was a lower number of long (7.1% versus 15.9%) and below-knee (48.0% versus 56.9%) strippings of the great saphenous vein, and on the contrary a higher number of perforator vein sections (7.1% versus 1.4%), varices stab avulsions (10.2% versus 1.7%) and skin grafts for ulcers (8.2% versus 2.2%).

No complications occurred during the operations in the DCS regimen. Among the 214 patients over 65 years treated as inpatients, 12 were admitted from the day unit. In these patients, day discharge was not possible and so the hospital stay was prolonged because of faintness on attempting to stand (four patients) or the onset of serious anxiety about discharge from hospital (eight patients). All these patients were discharged after 24 h.

Table 2
Exclusion criteria from day surgery regimen in 214 patients over 65 years old undergoing operations for lower limbs varicose disease

Criteria	*N* (%)
General clinical criteria	132 (61.7)
Concurrent pathologies	94 (43.9)
Anxiety	38 (17.8)
Local clinical criteria	58 (27.1)
Extensive bilateral varices	31 (14.5)
Complex re-operation for recurrence	27 (12.6)
Logistic criteria	24 (11.2)
Unavailability of car	4 (1.9)
Unavailability of attending persons	12 (5.6)
Patient's house far from hospital	8 (3.7)

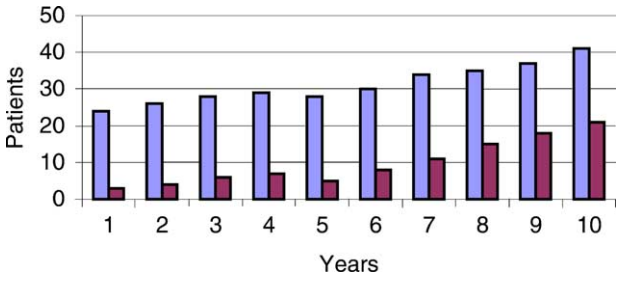


Fig. 1. Elderly patients operated on for varicose disease from January 1993 to December 2002 (first column: overall patients; second column: day cases).

Postoperative complications in the day-care patients were minimal, including only three groin wound infections (3.06%). No patients required readmission for general or local complications occurring at home during the postoperative period.

Among the 214 patients treated as inpatients, 29 patients were discharged the day after the operation, representing a further potential 13.6% for inclusion in the DCS regimen.

4. Discussion

At present, day surgery is growing exponentially in clinical practice. However, many still exclude elderly patients from this approach to treatment. Nevertheless, over the last few years, it has become clear that age itself does not represent a contraindication for DCS when good general health conditions are present [10].

Our 10-year experience seems to support the evidence that varicose veins surgery is feasible in elderly patients in the DCS regimen with excellent results. Of course, not all elderly patients are eligible for DCS. A careful evaluation of any concurrent diseases in these patients is essential prior to acceptance for day surgery. This influences the number of preoperative attendances necessary for the completion of diagnostics. In our experience, over 40% of the patients later enlisted in the DCS regimen needed, after their first attendance, further appointments before being considered operable as day cases. This affects the organisational model and implies both increased costs and the ability of patients to go to the medical facilities more than once.

Careful selection of patients permits excellent results [11]. The adoption of strict selection criteria has enabled us to have no postoperative re-admissions for general or local complications. These data confirm the results of Chung et al. that showed that in elderly patients

operated on as day cases the risks are above all intraoperative and are particularly related to cardiovascular complications and that elderly patients may have even less postoperative complications than younger patients [12].

In our experience, among the exclusion criteria for elderly patients from DCS is anxiety which had a 17.7% prevalence. The psychological condition of the older patient who has to undergo surgery is a balance between the wish of a short separation from their own family, environment and habits with a guarantee of better comfort and privacy—a wish that implies a willingness to shorten the hospital stay as much as possible—and the fear of being unwell far from hospital, particularly in case of complications. It is important that this conflict is taken into account both with the patient and with the persons who accompany the patient and attend them. The carers must be considered "reliable" for the postoperative home care of the patient and also be able to give the patient confidence [13].

Even with careful assessment, anxiety in eight patients necessitated inpatient hospital stay for the night after the operation. Wetchler affirmed that postoperative overnight stay causes a 10% increase in the patient satisfaction in any age group [14]. Mofidi et al. showed that the need of protracting hospital stay till the night following the operation for lower limb varicose disease is significantly related to the age of the patients [15]. It is therefore manifest that, in the absence of efficient home care, postoperative overnight stay (23 h surgery) could allow a reduction in the percentage of exclusions from the DS regimen particularly for elderly patients.

Continuous surgical and anaesthetic progress as well as the ever increasing knowledge about the physiopathology of elderly people have allowed and allow elderly patients to undergo operations inconceivable some years ago. This progress is evident as hospital stays become shorter and shorter and allows an increase in DCS which is both cost effective and achieves high patient satisfaction levels. Our 10-year experience has clearly pointed out not only the feasibility but also the excellent results attainable through good organisation for varicose vein surgery carried out in a day-care surgery regimen on elderly patients.

References

[1] Beaglehole R. Epidemiology of varicose veins. World J Surg 1986;10:898–902.
[2] Callam MJ. Epidemiology of varicose veins. Br J Surg 1994;81:167–73.
[3] Komsuoglu B, Goldeli O, Kulan K, Cetinarslan B, Komsuoglu SS. Prevalence and risk factors of varicose veins in an elderly population. Gerontology 1994;40:25–31.
[4] Canonico S, Gallo C, Paolisso G, Pacifico F, Signoriello G, Sciaudone G, et al. Prevalence of varicose veins in an Italian elderly population. Angiology 1998;49:129–35.
[5] De Lathouwer J, Poullier P. Ambulatory surgery in 1994–1995: the state of the art in 29 OECD countries. Ambul Surg 1998;6:43–55.
[6] Mastrobuono I. Chirurgia di giorno e chirurgia ambulatoriale. La classificazione delle attività chirurgiche. In: CeRGAS—Università Bocconi "Strategie, modelli e percorsi per l'attuazione della Day Surgery nell'ambito delle regioni", vol. I; 1998. p. 5–19.
[7] Bergan JJ. Discussion. Vasc Surg 1996;30:392–3.
[8] Canonico S, Campitiello F, Pacifico F, Sepe D, Lauletta V. Day care surgery of varicose veins in elderly patients. Vasc Surg 1996;30:387–92.
[9] Chung F. Discharge criteria—a new trend. Can J Anaesth 1995;42:1056–8.
[10] Wallin E, Lundgren P, Ulander K, von Holstein CS. Does age, gender or educational background effect patient satisfaction with short stay surgery? Ambul Surg 2000;8:79–88.
[11] Morales R, Esteve N, Casas I, Blanco C. Why are ambulatory surgical patients admitted to hospital? Prospective study. Ambul Surg 2001;9:197–205.
[12] Chung F, Mezei G, Tong D. Adverse events in ambulatory surgery. A comparison between elderly and younger patients. Can J Anaesth 1999;46:309–21.
[13] Miller KM, Wysocki T, Cassady JF, Cancel D, Izenmberg N. Validation of measures of parents' preoperative anxiety and anesthesia knowledge. Anesth Analg 1999;88:251–7.
[14] Wetchler BV. Patient focused management: cost versus value. Ambul Surg 2001;9:57–8.
[15] Mofidi R, Bello AO, Mofidi A, Khan Z, Aly S, Joyce WP. Feasibility of day case varicose veins surgery in a district general hospital. Ir J Med Sci 2000;169:37–9.

ELSEVIER

J. of Ambulatory Surgery 10 (2003) 167–170

Ambulatory Surgery

www.elsevier.com/locate/ambsur

New concepts in recovery after ambulatory surgery

Girish P. Joshi *

Department of Anesthesiology and Pain Management, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75235-9068, USA

Abstract

The recovery care after ambulatory surgery is in a state of flux. There is increasing emphasis on rapid discharge home after ambulatory surgery. Discharge after surgery should be based on clinical criteria rather than based on time. Recent studies suggest that the insistence on oral intake and voiding before discharge is unnecessary and can delay discharge. This article reviews the recent developments in the recovery process after ambulatory surgery.

Keywords: Surgery; ambulatory; Anaesthesia; recovery; Postanaesthesia care

1. Introduction

The exponential growth in surgical procedures performed on an outpatient basis has forced ambulatory surgical facilities to be more efficient with respect to rapid-turnover of patients. One of the important factors in the success of ambulatory surgery is safe and expeditious recovery and discharge home. Therefore, assessment of patient needs and time spent in the hospital is becoming an increasingly relevant issue from both a clinical and cost standpoint. Unnecessary delay in discharge reduces the effectiveness and efficiency of an outpatient setting. On the other hand, premature discharge from the hospital may increase the incidence of readmission, postoperative complications, and may have legal repercussions. Therefore, it is necessary to assure a smooth transition to the home setting.

2. Recovery process after ambulatory surgery

The time course of recovery after ambulatory surgery can be divided into early or immediate recovery (occurs in the postanaesthesia care unit [PACU]) during which patients emerge from anesthesia and recover their protective reflexes and motor function; intermediate recovery (occurs in the phase II unit) during which the patient recovers coordination and physiologic function and is considered ready for discharge home; and late recovery (occurs after discharge from the hospital) during which the patient recovers completely from both anesthesia and surgery and is ready for routine daily activities.

The recovery care after ambulatory surgery is in a state of flux. The length and the need for PACU stay are in question [1,2]. With improved anesthesia and surgical techniques it is possible to have patients who are awake, alert and comfortable in the operating room. This has resulted in a trend towards transferring these patients from the operating room directly to the phase II unit (i.e. bypassing the PACU). This concept is known fast tracking [1,2]. The process of fast tracking can be further extended to the phase II unit stay resulting in an early discharge home.

3. Discharge protocol

Traditionally, discharge from an ambulatory setting has been time-based with ambulatory facilities requiring a minimum mandatory stay in recovery. However, the value of minimum stay requirements is questioned as it may prolong the recovery process unnecessarily. The American Society of Anesthesiologists (ASA) practice guidelines for post anesthetic care state that a manda-

* Tel.: +1-214-590-7259; fax: +1-214-590-6945.
E-mail address: girish.joshi@utsouthwestern.edu (G.P. Joshi).

0966-6532/03/$ - see front matter
doi:10.1016/S0966-6532(03)00026-X

tory minimum stay is not necessary and that the length of stay should be determined on a case-by-case basis [3]. Thus, there is a move away from time-based discharge to clinical-based discharge [4].

Utilization of appropriate scoring systems allows the patients to be safely discharged from the PACU (or bypass the PACU) and to be discharged home [5–7]. The modified Aldrete criteria are commonly utilized to determine if the patient is ready for discharge from the PACU to the phase II unit [5] (Table 1). The Aldrete's criteria have been further modified to evaluate the eligibility of patients for fast tracking, which include awake and oriented patient with stable vital signs (hemodynamic and respiratory stability), minimal pain, and minimal nausea and no vomiting [6] (Table 2).

The postanaesthesia discharge scoring system (PADS) is the most commonly used tool to determine home readiness [7]. This scoring system requires that the patients have stable vital signs, can ambulate at preoperative level, and have minimal postoperative nausea and vomiting (PONV), pain, and bleeding, as well as can tolerate oral fluids and void before being allowed home. However, the need for mandatory oral intake and voiding before discharge has been challenged. Recent studies report that 10–20% of outpatients can be discharged earlier if drinking and voiding are eliminated from the discharge criteria [3,8] (Table 3).

Table 1
Modified Aldrete scoring system for determining discharge from the PACU

Activity: able to move voluntarily or on command	
4 Extremities	2
2 Extremities	1
0 Extremities	0
Respiration	
Able to deep breathe and cough freely	2
Dyspnea, shallow or limited breathing	1
Apneic	0
Circulation	
Blood pressure ±20 mmHg of preanesthetic level	2
Blood pressure ±20–50 mmHg of preanesthetic level	1
Blood pressure ±50 mmHg of preanesthetic level	0
Consciousness	
Fully awake	2
Arousable on calling	1
Not responding	0
Oxygen saturation	
Able to maintain SaO2 >92% on room air	2
Needs supplemental oxygen to maintain SaO2 >90%	1
SaO2 <90% even with supplemental oxygen	0

Score ≥9 required for discharge Ref. [5].

Table 2
Criteria for determining ability to bypass the PACU

Level of consciousness	
Awake and oriented	2
Arousable with minimal stimulation	1
Responsive only to tactile stimulation	0
Physical activity	
Able to move all extremities on command	2
Some weakness in movement of extremities	1
Unable to voluntarily move extremities	0
Hemo-dynamic stability	
Mean arterial pressure <15% of baseline value	2
Mean arterial pressure 15–30% of baseline value	1
Mean arterial pressure >30% below baseline value	0
Respiratory stability	
Able to breathe deeply	2
Tachypnea with good cough	1
Dyspneic with weak cough	0
Oxygen saturation status	
Maintains value >90% on room air	2
Requires supplemental oxygen (nasal cannula)	1
Saturation <90% with supplemental oxygen	0
Postoperative pain assessment	
None or mild discomfort	2
Moderate to severe pain controlled with IV analgesics	1
Persistent severe pain	0
Postoperative emetic symptoms	
None to mild nausea with no active vomiting	2
Transient vomiting or retching	1
Persistent moderate to severe nausea and vomiting	0

Score ≥12 required for fast tracking Ref. [6].

Table 3
Modified PADS for determining home-readiness

Vital signs	
Blood pressure and pulse within 20% of preoperative value	2
Blood pressure and pulse 20–40% of preoperative value	1
Blood pressure and pulse >40% of preoperative value	0
Activity level	
Steady gait, no dizziness, or meets preoperative level	2
Requires assistance	1
Unable to ambulate	0
Nausea and/or vomiting	
Minimal: successfully treated with oral medication	2
Moderate: successfully treated with intra-muscular medication	1
Severe: continues after repeated treatment	0
Pain	
Acceptable	2
Not acceptable	1
Surgical bleeding	
Minimal: does not require dressing change	2
Moderate: up to two dressing changes required	1
Severe: more than three dressing changes required	0

Score ≥9 required for discharge Ref. [4].

4. Oral intake before discharge

The insistence on tolerance to oral fluids before discharge is probably due to concerns of dehydration after discharge home. However, administration of oral fluids to a nauseated patient may further increase the incidence of PONV.

Schreiner et al. [9] compared the effect of mandatory drinking to voluntary drinking prior to discharge from hospital on the incidence of PONV and the time to home-readiness in 989 healthy children. In the immediate postoperative period children were randomized to one of two groups with one group requiring to drink clear fluids prior to discharge ('mandatory drinkers') whereas the other group was not required to drink ('elective drinkers'). Parents in the elective drinkers group were instructed not to offer food or drink unless the child asked for it. Except for the difference in this discharge criterion, the two groups were treated similarly. All children were allowed drink clear fluids until 2 h prior to surgery and were well hydrated intra-operatively. The results of the study showed that 78% of the elective drinkers chose to drink voluntarily before discharge [9]. In this group, there was no difference in the duration of stay between the children who chose to drink and those who were discharge without drinking. However, mandatory drinkers stayed in the PACU significantly longer than the elective drinkers (mean $\pm$ S.D., 101 ± 58 vs. 84 ± 40 min). The duration of stay in the day surgery unit was also longer in the mandatory drinkers (mean $\pm$ S.D., 98 ± 55 vs. 83 ± 39 min). In the day surgery unit, significantly fewer children in the elective drinker group vomited (14 vs. 23%). Post-discharge complication rate was similar in the two groups with no patient requiring re-admission to the hospital for dehydration or intractable vomiting. Experience with approximately 20 000 children undergoing ambulatory surgery at the Children's Hospital of Philadelphia, PA has further verified the safety of elective drinking prior to discharge [10].

Another large study ($n = 726$) evaluated the effects of withholding oral fluids from adult outpatients before discharge home [11]. These investigators also found that patients who were required to drink fluids had a longer hospital stay than those who were discharged home without drinking. In addition, patients in the mandatory drinkers group required more time to ambulation and void. However, there was no difference in the incidence of PONV between the mandatory drinkers and the non-drinkers. The investigators conclude that eliminating oral fluid intake from the discharge criteria can shorten the hospital stay without any adverse effects [11]. Of note, the patients in this study received large infusion of fluids (20 ml/kg) intra-operatively, which has been shown to reduce the incidence of postoperative nausea, thirst, dizziness and drowsiness [12].

The ASA practice guidelines recommend that the ability to tolerate oral fluids should not be part of a routine discharge protocol but may appropriate for in selected patients (e.g. likelihood of complications if fluids are not taken) [3].

5. Voiding before discharge

Another criterion, which is currently being challenged, is the need for voiding prior to discharge. Voiding has traditionally been considered a prerequisite to discharge home because of the concern that patients might develop urinary retention after discharge. Over distention of the bladder due to urinary retention can cause bladder atony and lead to significant renal complications. Furthermore, recent studies recommend liberal fluid administration in the intra-operative period because of reduced incidence of postoperative complications (e.g. nausea, dizziness, and drowsiness) [12]. However, there is concern of increased incidence of postoperative urinary retention with this practice.

There is increasing evidence suggesting that insistence on voiding before discharge in all patients is unnecessary and can delay discharge [3,8,13]. The incidence of postoperative urinary retention in outpatients is reported to be 0% after non-pelvic surgery under general or local anesthesia, 4% after gynecological surgery, 18% after hernia surgery and 25% after anorectal surgery [8]. These observations suggest that voiding before discharge may not be necessary in patients at low-risk of urinary retention (e.g. patients undergoing non-pelvic surgery).

Pavlin et al [13] designed a study to evaluate the need for voiding prior discharge after ambulatory surgery. Outpatients were stratified into risk categories for urinary retention. Patients at low-risk of urinary retention (i.e. non-pelvic or gynecologic surgery, $n = 267$) were discharged home without being required to void. Patients at high risk of urinary retention (i.e. history of prior retention, hernia or anal surgery, $n = 62$) were required to void before discharge. The patients in the low-risk group were further randomized to receive high intra-operative fluid administration (10 ml/kg bolus) or low fluid administration (2 ml/kg bolus) [13]. Bladder volumes were measured using ultrasound at various time points in the postoperative period. They investigators found that patients at low-risk of urinary retention can be safely discharged home without the prerequisite for voiding. This practice saved the recovery time by approximately 75 min in 12% of patients [13]. They also found that although liberal fluid administration increased postoperative bladder volume, the incidence of urinary retention or time to void was not increased. However, patients at high risk for retention should

receive perioperative fluids judiciously to avoid over distending the bladder before they are ready to void.

The investigators conclude that in patients at low risk of retention, voiding before discharge is unnecessary. On the other hand, patients at high risk should have their bladder evacuated if they are unable to void when otherwise ready for discharge. All patients should be cautioned to return to the medical facility if they are unable to void within 8–12 h of discharge. Patients at risk of postoperative urinary retention include those undergoing inguinal or anal surgery, patients with a prior history of urinary retention and patients receiving neuraxial anesthesia [13].

A large study of 1719 consecutive outpatients identified 30 patients who were at high risk for retention and were unable to void despite fulfillment of other discharge criteria [14]. These patients were discharged home and followed-up home healthcare nurse. They found that only three patients (10%) required catheterization at home. These patients had undergone either hernia repair or anorectal surgery under spinal anesthesia. The investigators concluded that even high-risk patients could be discharged home without voiding; however, they need appropriate follow-up by home nurses and catheterization if necessary [14]. Furthermore, the cost of providing homecare nurses must be balanced against any saving from early discharge in this patient population.

The ASA practice guidelines recommend that routine requirement for voiding before discharge should not be a part of a discharge protocol and may only be necessary in selected patients (e.g. the type of surgery performed, prior history of urinary retention and anesthetic technique used) [3].

6. Summary

The use of specific criteria, which are simple, clear, objective and reproducible provide reliable guide for safe discharge of outpatients. Each institution should modify the established criteria according to their patient population, surgical case mix, and availability of nursing care. Appropriate modifications of the current discharge criteria based upon the recent literature should allow us to discharge patients expeditiously without compromising their safety. It is important to recognize that home-readiness is not synonymous with street fitness. Therefore, patients should be given clear instructions and cautioned against performing functions that require complete recovery of cognitive ability.

References

[1] Joshi GP. Fast tracking in outpatient surgery. Curr Opin Anaesthesiol 2001;14:635–9.
[2] Joshi GP, Twersky RS. Fast tracking in ambulatory surgery. Ambulatory Surg 2000;8:185–90.
[3] Practice guidelines for postanesthesia care. A report by the American Society of Anesthesiologists Task Force on postanesthesia care. Anesthesiology 2002; 96: 742–752.
[4] Marshall SI, Chung F. Discharge criteria and complications after ambulatory surgery. Anesth Analg 1999;88:508–17.
[5] Aldrete JA. The post-anesthesia recovery score revisited. J Clin Anesth 1995;7:89–91.
[6] White PF, Song D. New criteria for fast-tracking after outpatient anesthesia: a comparison with modified Aldrete's scoring system. Anesth Analg 1999;88:1069–72.
[7] Chung F, Chen VWS, Ong D. A post-anesthetic discharge scoring system for home readiness after ambulatory surgery. J Clin Anesth 1995;7:500–6.
[8] Pavlin DJ, Rapp SE, Polissar NL, Malmgren JA, Koerchgen ME, Keyers H. Factors affecting discharge time in adult outpatients. Anesth Analg 1998;87:816–26.
[9] Schreiner MS, Triebwasser A, Keom TP. Ingestion of liquids compared with postoperative fasting in pediatric outpatients. Anesthesiology 1990;72:593–7.
[10] Schreiner MS, Nicolson SC:. Pediatric ambulatory anesthesia: NPO-before and after surgery? J Clin Anesth 1995;7:589–96.
[11] Jin F, Norris A, Chung F, Ganeshram T. Should adult patients drink fluids before discharge from ambulatory surgery? Anesth Analg 1998;87:306–11.
[12] Yogendran S, Asokumar B, Cheng DCH, Chung F. A prospective randomized double-blinded study of the effect of intravenous fluid therapy on adverse outcomes on outpatient surgery. Anesth Analg 1995;80:682–6.
[13] Pavlin DJ, Pavlin EG, Fitzgibbon DR, Koerschgen ME, Plitt TM. Management of bladder function after outpatient surgery. Anesthesiology 1999;91:42–50.
[14] Fritz WT, George L, Krull J. Utilization of a home nursing protocol allows ambulatory surgery patients to be discharged prior to voiding. Anesth Analg 1997;84:S6 (abstract).