

# One-week recovery profiles after spinal, propofol, isoflurane and desflurane anaesthesia in ambulatory knee arthroscopy

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## Abstract

There are comprehensive findings on the immediate recovery of patients from different types of anaesthesia, but more information is needed on how patients manage at home after ambulatory surgery. One hundred and seventy-three elective knee arthroscopy patients were randomised into four different anaesthesia groups to receive either spinal anaesthesia (SA) with 5% lidocaine or general anaesthesia (GA) with propofol infusion, isoflurane inhalation or desflurane inhalation. The patients were interviewed over the phone on the next day and asked to complete a questionnaire after 1 week. One hundred and sixty-eight patients (97%) were reached by phone. The questionnaire was returned by 163 patients (94%). After 24 h, all the patients were satisfied with the type of anaesthesia they had received, but 2% of the SA patients would have chosen GA and 4.3% of the GA patients would have chosen SA for the next operation. Based on the questionnaires returned after 1 week, 8.3% of the SA patients would have wanted to have GA, and 4.7% of the GA patients would have wanted to have SA in the future. The incidence of nausea (4.2%) and vomiting (1.8%) was very low in the whole series, with no differences between the anaesthesia groups. Headache after 24 h was experienced by 15.7% of the SA and 10.3% of the GA patients. After 1 week, SA patients reported headache upon standing in 13.5% of the cases, backache in 36.5% and lower leg pain in 59.6%. The corresponding figures for GA patients were 4.5, 9.9 and 39.6% ( $P < 0.05$ ). In spite of the good immediate recovery profile in the all anaesthesia groups, the fact that SA patients reported a higher incidence of headache, backache and lower leg pain after 1 week may be signs of post spinal headache and transient neurologic symptoms (TNS). For overall patient comfort, GA might be a better anaesthetic choice in ambulatory surgery. © 2000 Elsevier Science B.V. All rights reserved.

*Keywords:* Ambulatory anaesthesia; Desflurane; Home readiness; Isoflurane; Knee arthroscopy; Propofol; Recovery; Spinal

## 1. Introduction

Knee arthroscopy is one of the most common ambulatory orthopaedic procedures. In Finland, there is a long and established tradition of doing lower leg operations under regional anaesthesia. This practice has also been adopted for ambulatory surgery. Spinal anaesthesia (SA) has been marketed to patients as a pleasant technique that avoids the discomforts of general anaesthesia (GA) — such as being sleepy after the operation, having nausea and vomiting or waking up with pain. The time spent in the recovery unit before discharge has been found to be over three times longer with SA

compared with GA [1]. This will have a major impact on the patient turnover in busy post anaesthesia care units. This fact suggested to us the need to study patient well being at home after different types of anaesthesia, mainly to find justification for giving up the tradition of regional anaesthesia and switching to GA with new short-acting agents.

## 2. Methods

### 2.1. Patients and methods of anaesthesia

One hundred and seventy-three elective patients (ASA I or ASA II, age between 18 and 65 years) were randomised into four different anaesthesia groups, SA ( $n = 55$ ) with 5% lidocaine or GA with propofol induc-

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tion followed by propofol infusion (PA,  $n = 32$ ), isoflurane inhalation (IA,  $n = 38$ ) or desflurane inhalation anaesthesia (DA,  $n = 48$ ). Informed consent was obtained from each participant, and the protocol was approved by the Ethics Committee of the Medical Faculty, University of Oulu.

SA was given with lidocaine 50 mg/ml in 7.5% glucose 1.5–2.0 ml through a sharp-point 27-gauge needle. The block was performed laterally through the lumbar III/IV space with the patient lying on the side to be operated. The PA patients were anaesthetised with propofol, starting with a bolus 2 mg/kg i.v. followed by continuous infusion of 12 mg/kg per h for the first 15 min, 9 mg/kg per h for the next 15 min and, when necessary, 6 mg/kg per h until the end of surgery. The IA patients were anaesthetised with isoflurane after a propofol bolus of 2 mg/kg. Isoflurane was given in rising concentrations up to 1 MAC before the skin incision. After that, the anaesthesia was maintained with isoflurane at the 1 MAC level. The DA patients were anaesthetised with desflurane after the same induction dose of propofol as above.

Desflurane inhalation was started at doses of 6% for patients aged over 30 and 7.25% for those less than 30-years-old. The goal was to reach 1 MAC before the skin incision and to continue at that level during the operation. All the GA patients were relaxed with a single bolus of mivacurine 0.3 mg/kg and intubated. The patients were normoventilated with 30% oxygen in air. The fresh gas flow was constantly 2 l/min in all the GA groups. Alfentanil 0.5 mg was given to all groups before starting the anaesthesia. During the anaesthesia, alfentanil 0.5 mg was given for pain when needed (systolic blood pressure or heart rate rise of 20% over the baseline value). Ketoprofen (100 mg) diluted in 20 ml of 0.9% NaCl was given to all groups before the beginning of the operation. Postoperatively, all patients received 100 mg of ketoprofen i.v. or p.o. three times per 24 h and 0.05 mg of fentanyl i.v., when necessary, for postoperative pain relief. The following criteria for discharge were applied in all groups, alert; stable vital signs; able to ambulate; able to take oral fluids; no nausea; and pain controllable by oral medication [2].

Table 1  
Demographic characteristics<sup>a</sup>

	Spinal	Propofol	Isoflurane	Desflurane
Number of patients ( $n$ )	55	32	38	48
Age (years)	41 (16–63)	37 (17–65)	41.5 (17–61)	37.5 (16–64)
Men/women (%)	46/54	38/62	62/38	63/37
Height (cm)	170 (153–187)	170 (153–183)	173 (153–184)	175.5 (155–186)
Weight (kg)	75 (46–95)	72 (51–95)	75.5 (52–95)	75 (54–95)

<sup>a</sup> Values are presented as medians and range (minimum–maximum).

## 2.2. Recovery profile (after 24 h and after 1 week)

On the following day, the patients were asked to ascertain their nausea after leaving the unit on an 11-point rating scale (0, no nausea; 10, worst possible nausea). The intensity of pain was evaluated as an average during the 24-h period on an 11-point rating scale (0, no pain, 10 worst pain imaginable). The patients were also asked whether they had headache (in a supine or upright position), difficulties in micturation or abnormal sleepiness after their discharge. The patient's overall satisfaction with their general condition during the first 24 h after surgery, the timing of discharge, the anaesthesia and the postoperative pain treatment as well as their satisfaction with the staff (surgeon, anaesthesiologist and nurses) were all evaluated on an 11-point rating scale. The patients were also asked if they would have a similar procedure done in the future in the ambulatory setting and if they would have the same type of anaesthesia.

After 1 week, the patients were asked to complete a questionnaire. They were asked about their general condition on the way home (good, moderate, bad), pain on the way home (severe, moderate, mild, none), discomfort during the first week (headache, backache, leg pain) and preferences for possible future anaesthesia.

## 2.3. Statistics

Tests of normality (Kolmogorov–Smirnov and Shapiro–Wilk) were used. The Kruskal–Wallis test was used for the non-parametric variables and analysis of variation (ANOVA) for the parametric variables (posthoc Scheffé test).  $P < 0.05$  was considered to be significant.

## 3. Results

Of the 173 patients 168 (97%) were reached by phone and 163 (94%) returned the questionnaire. The demographic data of the groups are shown in Table 1. The study groups were comparable with regard to age and weight. In all groups, most of the patients had only minimal or no pain on the way home and during the

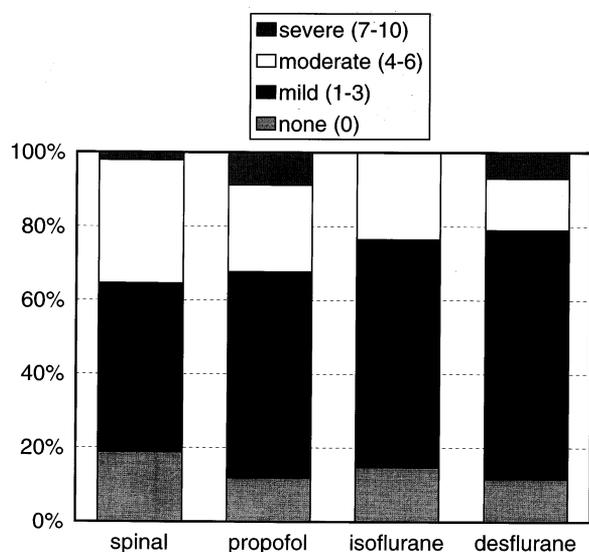


Fig. 1. Pain at home. Severity in visual analogue scale (VAS) during the first 24 h.

Table 2

The incidence of headache during the first 24 h after surgery (24 h) and the incidence of postural headache during the first week after surgery (first week)

	Spinal (%)	Propofol (%)	Isoflurane (%)	Desflurane (%)
24 h	15.7	3.1	8.1	16.7
First week	13.5	3.2	8.8	2.2

first 24 h postoperatively (Fig. 1). All the patients found their condition moderate or good on the way to home even though the distance travelled ranged up to 270 km. The level of pain was similar between the groups during the first 24 h after the operation. Headache after 24 h was experienced by 15.7% of the SA and 10.3% of the GA patients. After 1 week, SA patients had experienced headache when standing in 13.5% of the cases, backache in 36.5% and lower leg pain in 59.6%. The corresponding figures for GA patients were 4.5, 9.9 and

Table 3

The patient's satisfaction with the timing of discharge, the anaesthesia, the postoperative pain treatment and the staff (11-point rating scale; 0, dissatisfied; 10, satisfied)<sup>a</sup>

Rating scale	SA		PA		IA		DA	
	5–9	10	5–9	10	5–9	10	5–9	10
Satisfied with the timing of discharge (%)	21.6	78.4	16.7	83.3	21.6	78.4	25.5	74.5
Satisfied with the anaesthesia (%)	29.4	70.6	3.1	96.9	13.5	86.5	4.2	95.8
Satisfied with the postoperative pain treatment (%)	22.0	78.0	15.6	84.4	27.8	72.2	10.4	89.6
Satisfied with the anaesthesiologist (%)	11.8	88.2	9.4	90.6	18.9	81.1	14.6	85.4
Satisfied with the nurses (%)	11.8	88.2	9.4	90.6	21.6	78.4	12.5	87.5
Satisfied with the surgeon (%)	30.0	70.0	18.7	81.3	32.4	67.6	31.2	68.8

<sup>a</sup> There were no rating scale values 0–4 in any of groups.

39.6% ( $P < 0.05$ ). The incidence of headache during the first 24 h after surgery and the incidence of postural headache during the first week after surgery are shown in Table 2.

After 24 h, all the patients were satisfied with the type of anaesthesia they had received, but 2% of the SA patients would have chosen GA and 4.3% of the GA patients would have chosen SA for the next operation. The patient's satisfaction with the timing of discharge, the anaesthesia, the postoperative pain treatment and the staff are shown in Table 3. There were two common reasons for the dissatisfaction of the patients, the patients had not seen the surgeon postoperatively; and missed information given by the surgeon. Based on the questionnaires returned after 1 week, 8.3% of the SA patients wanted to have GA and 4.7% of the GA patients wanted to have SA next time in similar procedure. SA patients (98.0%) and 95.7% of the GA patients would have ambulatory surgery in the future. The incidence of nausea (4.2%) and vomiting (1.8%) were very low in the whole series, with no differences between the anaesthesia groups. The SA patients (17.6%) and 14.8% of the GA patients needed medical consultations by phone or by visiting a general practitioner during the first week at home. None of the patients were rehospitalised. Two patients from the SA group and two patients from the IA group had difficulties with micturition during the first 24 h.

#### 4. Discussion

The principal result of the study was that, after ambulatory knee surgery, the patients did well and were highly satisfied with both SA and the types of GA studied here. There was a tendency for lower satisfaction with the surgeon than other members in the ambulatory surgery unit. Patients felt that they got insufficient information from the busy surgeon. The surgeon seldom visited patients postoperatively. The incidence of readmissions after discharge from an am-

bulatory surgery unit is reported to be 3% [3]. None of the present patients were rehospitalised, but the need for medical consultation was obvious. A prospective monitoring programme should include patient follow-up for at least 1 week postoperatively and special attention should be paid into the recovery period that patients get enough information from the surgeon.

The general level of pain was low after the first few hours postoperatively [1], and the pain level continued to be low in all groups during the first week. The spinal patients had a higher incidence of headache, backache and lower leg pain after 1 week, and these may be signs of post spinal headache and transient neurologic symptoms (TNS) [4–6]. The tendency in the DA group to have headache during the first 24 h may be due the fact that desflurane is a cerebral arteriolar dilatator and may result in intracranial pressure changes in vulnerable patients [7]. We used 75–100 mg of lidocain in the SA group and there are studies recommending lower doses of lidocain [8]. The incidence of leg pain was relatively high in the GA groups, suggesting that TNS does not alone explain the leg pain. One cause for the leg pain may be the effect of the patient's position [9] and the blood-free limb due to external pressure.

The total frequency and severity of nausea in this study were lower compared with the earlier studies [10–12]. One reason for the low incidence of nausea may be the limited need for parenteral opioids for postoperative pain relief in ambulatory knee arthroscopy [13].

## 5. Conclusions

Morbidity after outpatient knee arthroscopy is low. The patients do well and are highly satisfied with both SA and GA. The lower incidence of headache, backache and leg pain favours the use of GA.

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