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Recovery time and patient satisfaction in ambulatory knee arthroscopy Prospective study comparing three anaesthetic methods

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Abstract

The aim of this study was to compare recovery time and satisfaction of patients operated under two anaesthetic techniques. A randomised-controlled trial that enrolled ASA I–II patients submitted to ambulatory knee arthroscopy was designed. Patients included were randomly assigned to one of the three study groups: general intravenous anaesthesia (TIVA), spinal anaesthesia with lidocaine (LIDO), and spinal anaesthesia with prilocaine (PRILO). Spinal groups did not receive supplementary sedation. Major outcome measures considered were both the time to discharge from the post-anaesthesia care unit (PACU) and from the day-case surgical unit (DSU), the incidence of adverse events, postoperative need for analgesics and patients satisfaction. One hundred and twenty patients were enrolled. Mean time from the patients comes into operating room to discharge from PACU was 125 ± 27 min for the PRILO group, 109 ± 24 min for the LIDO group and 106 ± 34 min for the TIVA group ($P < 0.01$). Time to discharge from the ASU was 279 ± 37 min for the PRILO group, 261 ± 53 min for the TIVA group and 241 ± 36 min for the LIDO group ($P < 0.001$). No significant differences were observed in the appearance of adverse events, the need for postoperative analgesics and the degree of patient satisfaction among the study groups. A shorter recuperation time was observed in the LIDO group, but more TIVA patients preferred to have the same anesthetic again. All three anaesthetic methods are useful for ambulatory knee arthroscopy.

Keywords: General anaesthesia; Spinal anaesthesia; Safety; Efficacy; Satisfaction; Ambulatory surgery

1. Introduction

The growing importance of day-case surgery (DCS) over the last 10 years has encouraged research into new tools or techniques to improve quality of care [1,2] to reduce length of stay and complications that arise from the techniques employed [3,4] and to maintain patient satisfaction as an overall measure of procedure success [5–8]. There are several techniques of ambulatory anaesthesia, no single technique being considered ideal. In the surgery of the lower limbs or abdomen, including knee arthroscopy, general or loco regional anaesthesia can be used. Despite being very different techniques, there are minor differences between them [9–11]. This is due to the advances made in anaesthesiology in recent years, such as new anaesthetic drugs that are degraded by plasmatic esterases more quickly [12], improvements in air management techniques that are now safer and less invasive [13], or the development of needles that are less damaging to the dura mater and nerve tissue [14]. The current debate over the ideal technique for DCS and the large number of articles that refer to transient radicular irritation caused by intradural lidocaine [15–17], has led us to compare two anesthetic techniques and also two different local anaesthetics used in intradural anaesthesia, testing alternatives to lidocaine, such as prilocaine which is used in similar doses [18]. Several factors can affect the choice of one technique or another, including preferences of the anaesthetist or the patient, fear of complications derived from its application,

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legal implications of these complications, and reduction in the duration or cost of procedures [19–21]. The aim of this study was to examine the efficacy of intradural anaesthesia compared with general anaesthesia in terms of recovery times and times to discharge from the ASU in DCS patients undergoing knee arthroscopy and to compare adverse events, rates of hospitalization and degree of patient satisfaction between the anaesthetic techniques.

2. Materials and methods

A randomised-controlled trial was designed with three parallel groups and was approved by the Hospital Ethics Committee. All ASA I–II patients between the ages of 20 and 65, with no history of duodenal ulcer and with a body mass index of less than 35 kg/m^2 who were scheduled to undergo outpatient knee arthroscopy in the year 2002 were invited to participate. Patients who agreed to participate in the study and gave written informed consent were randomly assigned to one of the three study groups by means of a sealed, numbered envelope which contained the group they had been assigned to, taken from a table of random numbers. TIVA group patients were given general anaesthesia using intravenous propofol at a dose of 2 mg/kg/h and remifentanil a 0.2–0.4 μg/kg/h, both by continuous infusion, the airway maintained by controlled ventilation and laryngeal mask. LIDO group patients were administered spinal anaesthesia using 3 ml lidocaine at 1.5% and PRILO group patients were given spinal anaesthesia using 3 ml prilocaine at 1.5%. The spinal anaesthesia was injected into the intervertebral space level L2–L3 using a 25-gauge Whitacre pencil-point spinal needle. Spinal group did not received supplementary sedation.

All patients were premedicated the night before with 10 mg oral diazepam obtained in the preanesthetic visit. In the preanesthesia room, patients were given an intravenous bolus of 1.5 mg midazolam and an infusion of 100 ml saline solution with 75 mg diclofenac, 10 mg metoclopramide and 50 mg ranitidine, according to the guidelines of preoperative treatment in our centre. Before the surgical wound was closed, 10 ml bupivacaine 0.5% with epinephrine was administrated into the knee in all patients. Postoperative analgesics both at the ASU and at home were the same for all study groups: diclofenac, 50 mg/8 h; paracetamol, 500 mg/ 8 h; administered alternatively and diazepam 10 mg at night, all taken orally and for 2 days.

Results were measured in terms of recovery time (T_1), defined as the time from the patient comes into the operating room until the patient had completed the criteria for discharge from the PACU (as established by White et al. [22]) and the time to discharge from the ASU (T_2), defined as the time from the patient comes into the operating room until the patient had completed the criteria for discharge from the ASU (as established by Aldrete [23]). The following adverse postoperative events were also recorded: headache, urine retention, and nausea and vomiting. Pain intensity was assessed using a visual analogue scale (VAS) which ranged from 0 points (no pain) to 10 points (maximum pain intensity). Nurses who were unaware of the group, the patients belonged to measured these results every 20 min in the PACU and later in the DCU. In the PACU and the DCU, a written visual analogue scale measured pain, and in the 48 h control pain was measured by verbal analogue scale. A satisfaction questionnaire was given to the patients by phone 48 h after discharge. The questionnaire evaluated: “degree of satisfaction with the anaesthesia received, postoperative pain rating, level of information received on the anaesthetic procedure to be used, and incidence of adverse events (nausea, vomiting, headaches and urine retention)”.

A sample size of 40 patients per group, a total of 120 patients, was estimated to be needed to detect a difference of more than 30 min in recovery times, with a p value of 0.05 and an statistical power of 80%. The main characteristics of the study sample have been described as proportions for categorical variables and means and standard deviation for continuous variables. Analysis of variance (ANOVA) was used to compare mean times and the Kruskal-Wallis test to compare pain measures (VAS) between the three study groups. The χ^2-test was used to compare proportions between categorical variables. Statistical significance was accepted if p value was <0.05.

3. Results

During the study period, 152 patients were found to complete the selection criteria, of which 32 (21%) declined to participate. Reasons for refusal were patient preference for loco regional anaesthesia (59%), patient preference for general anaesthesia (22%) and unwillingness to participate in a clinical trial (19%). A total of 120 patients were finally enrolled. The main characteristics of the patients are presented in Table 1 and no significant differences were found between the three groups for any of the characteristics assessed.

The results of the times studied are presented in Table 2. No significant differences were found between the three study groups for duration of operation but there were significant differences between the PRILO group and the other two groups for time to discharge from the PACU (T_1); and significant differences between the LIDO and PRILO groups for time to discharge from the DCU (T_2).

No significant differences were found between the groups for mean pain rating scores (taken from VAS) in PACU and ASU; the scores were respectively 1.8 ± 2.0 and 0.9 ± 1.1 for the TIVA group, 1.3 ± 1.7 and 0.8 ± 0.9 for the PRILO group, and 1.5 ± 1.9 and 1.0 ± 1.0 for the LIDO group. Percentages of rescue analgesic use in PACU were 53% for the TIVA group, 25% for the PRILO group, and 40% for the LIDO group, not reaching the statistical significant level. In ASU, these percentages were 28% for the TIVA group, 25% for the PRILO group and 18% for the LIDO group, not reaching sig-

Table 1
Demographic data of the patients that agreed to participate in the study

Group	TIVA	LIDO	PRILO	*p*
No patients	40	40	40	
Sex (females, %)	28	38	43	0.41
Age mean (S.D.)	41.7 (11.0)	43.2 (13.7)	40.3 (15.6)	0.64
BMI mean (S.D.)	25.9 (3.1)	26.8 (4.1)	25.6 (3.9)	0.35
ASA				
I (%)	75	58	78	0.14
II (%)	25	42	22	
Previous arthroscopy (%)	20	18	28	0.53
Associated pathology				
Arterial hypertension (%)	10	5	8	0.77
Diabetes mellitus (%)	0	3	10	0.09
Respiratory disease (%)	10	3	10	0.39
Degenerative arthropathy (%)	8	10	23	0.15

BMI: kg/m^2; S.D., standard deviation.

nificant difference either. No differences were found between the groups for postoperative adverse events. The overall percentage of postoperative complications (nausea, vomiting, headache, urinary retention was 6% in the TIVA group, 5.5% in the PRILO group and 4.7% in the LIDO group, without any case of Transient Neurologic Syndrome. Two patients had to be hospitalized, one from the TIVA group due to intraoperative change in surgical indication and the other from the LIDO group due to hyperthermia. No patients had to be admitted after home discharge.

Results of the satisfaction questionnaire are presented in Table 3. Of note is the fact that 100% of the TIVA group stated that they would have the same type of anaesthesia if the operation were repeated, compared with 82% from the PRILO group and 85% from the LIDO group ($P = 0.03$). No significant differences were observed between the three groups in assessment of anaesthesia used, mean postoperative pain rated on a verbal scale, and adverse events.

4. Discussion

Best anaesthetic technique for day-case surgery is controversial [24]. Our hypothesis before the study was that TIVA reached shorter discharge time and gave higher satisfaction levels of the patients, but it has not been proved.

Table 2
Times studied

Mean times	Operation time (min)	T_1 (min)	T_2 (min)
TIVA	38.3 ± 12	106.2 ± 34	260.8 ± 53
LIDO	39.0 ± 11	109.5 ± 24	241.3 ± 36
PRILO	38.3 ± 8	125.4 ± 27	278.9 ± 37
Differences between groups			
TIVA–LIDO	−0.7	−3.3	19.5
PRILO–LIDO	0.7	15.9[#]	37.6[##]
PRILO–TIVA	0.0	19.2[#]	18.1

[#] $p < 0.05$.
[##] $p < 0.001$.

The results of our study show that the different anaesthesia techniques studied have similar efficacy and safety profiles and are all well accepted. Regarding recovery times, PRILO group patients needed between 15 and 19 min more than the other two groups to complete the criteria for PACU discharge (T_1). The differences between the mean times to discharge from ASU (T_2) were only significant between the PRILO and LIDO groups, the PRILO group staying 38 min longer because its effects last longer. No significant differences were found between the groups PRILO and TIVA or LIDO and TIVA for T_2. According to these results, the intradural anaesthesia with lidocaine best fulfils the criteria for discharge from DCU, although in our opinion, prilocaine could be a good spinal anaesthesia when the surgical procedure lasts between 90 and 120 min as the duration of the block is assured for the length of the surgery. TIVA procedure has shown excellent recovering times, that can be compared with those of spinal anaesthesia, and is a good alternative for the patients who reject spinal anaesthesia. We believe that the choice of anesthesia technique however should also include other criteria, such as safety and resource optimization. In this context, it is worth mentioning the current controversy over the relation between the use of intradural lidocaine and transient neurological syndrome [16,17]. In the present study, no transient neurological syndrome was observed in any group.

Good levels of post-operative analgesia were reached, probably related to the protocolization of the treatment and the surgical wound intraoperative infiltration. The overall percentage of adverse events (nausea, vomiting and headaches) was very similar to those documented in the literature [3,4]. No case of Transient Neurologic Syndrome was detected, which could be related to the low concentrations of local anaesthetic used, as several authors have recommended [16,17]. No differences were observed between groups as regards side effects. In spite of that, the statistical power of our study was not enough to achieve conclusive results in that way, specially regarding side effects with very low incidence.

Table 3
Telephone questionnaire results

Questions	Value	TIVA	PRILO	LIDO	*p*
If you had the operation again, would you accept the same kind of anaesthesia that you were given for this operation?	Yes	100	82.5	85	
	No		17.5	15	0.03[a]
How would you rate the kind of anaesthesia you were given?	Very good	60	37.5	40	
	Good	40	62.5	52.5	
	Average	0	0	5	0.14
	Bad	0	0	2.5	
	Very bad	0	0	0	
How would you rate the postoperative pain?	No pain	15	32.5	25	
	Mild pain	52.5	50	35	
	Moderate pain	25	17.5	25	0.35
	Severe pain	5	0	10	
	Unbearable pain	2.5	0	5	
How would you rate the information you were given about the anaesthesia you received?	Very good	30	37.5	32.5	
	Good	65	52.5	60	
	Average	2.5	7.5	7.5	0.86
	Bad	2.5	2.5	0	
	Very bad	0	0	0	
Adverse events	Nausea	5	0	5	0.66
	Vomiting	2.5	0	0	0.35
	Headaches	10	12.5	12.5	0.93

Expressed in percentage.
[a] Significant differences between groups TIVA vs. LIDO, and TIVA vs. PRILO.

The results of the satisfaction questionnaire show a high degree of acceptance of the ambulatory procedure patients had undergone rather than preferences for other anaesthesia techniques. All patients from the TIVA group declared they would accept the same type of anaesthesia if they had the same operation again, while patients from the intradural groups were more doubtful (PRILO 17.5% and LIDO 15% would not). The memory of the spinal puncture, the pain it caused and poor tolerance of the complete block of the lower extremities during the postoperative period could be the reasons for this rejection. Although patients with spinal anaesthesia did not receive supplemental sedation, we do not believe this could influence significantly patient satisfaction. Further studies on quality of recovery from general anaesthesia with the new drugs available compared with spinal anaesthesia would be of interest. Almost all patients in the study rated the quality of the anaesthesia very high, with only three patients from the LIDO group rating the anaesthesia as mild or bad. Finally, 90% of patients rated the clarity of the information received as good or very good. We would like to underline the importance of providing good pre-, per- and post-operative information for the success of ambulatory procedures.

Twenty one percent of the candidates to be enrolled in the study declined to participate, which could be considered as a limitation of the study. There were several reasons for refusing to participate, the main one being patient preference for a particular anaesthesia, usually intradural. People associate loco regional anaesthesia with local anaesthesia and therefore consider this technique to be safer than general anesthesia [20]. However, we do not think that the percentage of refusals caused a relevant selection bias.

In summary, the results obtained in this study suggested a shorter recovery time in the LIDO group, while more TIVA patients preferred to have the same anesthetic again. However, no differences were found between groups in the overall satisfaction. Moreover, the small differences observed between groups do not seem to have an important clinical relevance. Although lidocaine must be used with caution because of the transient neurological syndrome risk, due to the equivalent efficacy profile of the three anaesthetic procedures evaluated for low extremities ambulatory surgery, the choice to use one or another must be based on other criteria, such as patient's values and preferences.

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