Regional Anesthesia and Pain

Intrathecal lidocaine and sufentanil shorten post-operative recovery after outpatient rectal surgery

[L'administration intrathécale de lidocaïne et de sufentanil diminue le temps de récupération après une opération du rectum en chirurgie ambulatoire]

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Purpose: A short recovery time for same day surgery is important to the patient and the hospital. A prospective, randomized, double-blinded study in the postanesthetic care unit was designed to compare the recovery time from spinal anesthesia with low-dose intrathecal (IT) lidocaine and sufentanil to that with IT lidocaine alone. The incidence of adverse effects was also assessed.

Methods: Forty-nine patients (ASA I–III, age 20–69 yr) underwent spinal anesthesia for rectal surgery. The patients were randomized into two groups. One group ($n = 28$) received low-dose IT lidocaine (15 mg) and sufentanil (10 μg) and the other group ($n = 21$) received IT lidocaine (50 mg). The time to ambulation, the incidence of pruritus, and other variables were recorded. Statistical difference was assumed if $P < 0.05$.

Results: Our results show a significantly shorter ambulation time (120 ± 26 min) after IT low-dose lidocaine (15 mg) and 10 μg sufentanil *vs* 50 mg IT lidocaine (162 ± 32 min, $P < 0.0001$). Patients who received IT lidocaine and sufentanil recovered faster. Fifty percent of the patients who received IT sufentanil suffered from pruritus.

Conclusion: IT lidocaine (15 mg) and sufentanil resulted in a shorter time to ambulation compared to IT lidocaine (50 mg) alone and provided excellent anesthesia despite its disadvantage of pruritus.

Objectif : *Une récupération rapide en chirurgie ambulatoire est importante pour le patient et pour l'hôpital. Une étude prospective, randomisée et à double insu a été réalisée en sale de réveil pour comparer le temps de récupération d'une rachianesthésie avec de faibles doses intrathécales (IT) de lidocaïne et de sufentanil ou de lidocaïne IT seule. L'incidence d'effets indésirables a aussi été évaluée.*

Méthode : *Quarante-neuf patients (ASA I–III, de 20 à 69 ans) ont subi une opération du rectum sous rachianesthésie. Les patients ont été randomises en deux groupes. Dans un groupe ($n = 28$), ils ont reçu de faibles doses de lidocaïne (15 mg) et de sufentanil (10 μg) IT et dans l'autre ($n = 21$), ils ont reçu de la lidocaïne (50 mg) IT. Le temps requis avant de pouvoir marcher, l'incidence de prurit et d'autres variables ont été enregistrés. Une différence statistique était considérée si $P < 0,05$.*

Résultats : *Nos résultats montrent un temps significativement plus court avant l'ambulation (120 ± 26 min) suivant de faibles doses de lidocaïne (15 mg) et de 10 μg de sufentanil IT vs 50 mg de lidocaïne IT (162 ± 32 min, $P < 0,0001$). Les patients qui ont reçu la lidocaïne et le sufentanil IT se sont remis plus rapidement. Cinquante pour cent des patients qui ont eu du sufentanil IT ont souffert de prurit.*

Conclusion : *La lidocaïne (15 mg) et le sufentanil IT, comparés à la lidocaïne seule (50 mg), permettent une récupération plus rapide de la marche et fournissent une excellente anesthésie malgré l'inconvénient du prurit.*

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SPINAL anesthesia with lidocaine is commonly used for short rectal ambulatory procedures. The turnover time in the operating room (OR) is faster with spinal anesthesia than general anesthesia (GA) because GA in the jackknife position requires placement of an endotracheal tube, thus prolonging induction and emergence times. However, patients after spinal anesthesia generally recover more slowly than patients after GA.[1–3] Time to ambulation [difference between time of ambulation and time of intrathecal (IT) injection] after spinal anesthesia is the major factor that hinders rapid turnover in our postanesthetic care unit (PACU).

Many anesthesiologists are using conventional doses of IT lidocaine ranging between 30 to 75 mg for rectal surgery. When these doses are used, the patients may experience intraoperative hypotension and high sensory and motor blocks resulting in a longer stay in the PACU than patients with a lower dose of lidocaine.[4] Also, larger doses of IT lidocaine[4–6] have been associated with transient neurological symptoms (TNS). Previous investigators[4,7–9] have demonstrated the benefits of IT low-dose local anesthetics and opiates for ambulatory surgery including arthroscopy[8] and laparoscopy.[9] However, many patients suffer from pruritus induced by IT opiate.[10–12] The frequency of pruritus associated with IT opioids ranges between 20 and 80%.[7,10]

We hypothesized that low-dose IT lidocaine (15 mg) and sufentanil (10 μg) would shorten the time to ambulation when compared to IT lidocaine, at the conventional dose of 50 mg, for spinal anesthesia in patients undergoing short rectal surgery.

Methods

The Institutional Review Board approved the study, and written consent was obtained from each patient. The protocol was a prospective, randomized study of postoperative recovery time from IT lidocaine and sufentanil. All observations were double-blinded in the PACU where the key evaluations were made. Both the patient and the investigator (anesthesiologist) in the PACU were blinded to the type of anesthetic used. The study excluded patients with: ages younger than 18 yr or older than 75 yr, a history of an allergic reaction to opioids, current opioid use or abuse, psychiatric impairment, refusal of spinal anesthesia or participation in the study, coagulopathy, infection at the site of the proposed IT injection, symptoms of increased intracranial pressure, or current pregnancy.

Forty-nine ASA physical status I to III patients, 20 to 69 yr old, were scheduled for rectal ambulatory surgery (including hemorrhoidectomy, fistulotomy, excision of pilonidal cyst, fulguration of condylomata) under spinal anesthesia. Patients were randomized into two groups (with Statmate software, Graph Pad, San Diego, CA, USA) to receive low-dose IT 1.5% lidocaine (15 mg) in 7.5% dextrose (in water) and 10 μg sufentanil (n = 28) or IT 5% lidocaine (50 mg) in 7.5% dextrose in water (n = 21). The motor and sensory blocks were assessed at three, six, nine, and 15 min after the IT injection.

Spinal anesthesia was administered in the sitting position using a 25-gauge pencil point needle at the L3–4 intervertebral space with a sterile technique. After free flow of clear cerebrospinal fluid, the anesthetic mixture was injected at the rate of 1 mL per five seconds. Immediately after, the patient was placed in the prone position. Three minutes later, each patient was assisted into the jackknife position. Patients were monitored for the onset and level of sympathetic, motor and sensory blockade. The operation proceeded when adequate sensory and motor blocks were obtained.

In the OR, doses of 1 to 2 mg of midazolam were titrated intravenously to relieve anxiety. No *iv* narcotic was used in the OR unless the patient complained that he/she was uncomfortable [in which case, incremental doses of fentanyl (50 μg) were given until the patient felt comfortable]. No other *iv* sedation medications were used. No ketorolac was used in the OR.

Specific variables were evaluated at regular intervals in each patient. Evaluations were performed every three minutes for the first 15 min. The evaluations continued every 15 min in the OR or PACU (for the first 90 min) and then every 30 min. The following variables were evaluated: sympathetic, motor and sensory blockade, time to ambulation, pruritus, postoperative pain, nausea, or any other problems. Pain and pruritus scores were obtained with verbal analogue scores with 0 meaning none and 10 the worst pain or itching that the patient could imagine. Pruritus was treated with diphenhydramine first and then a serotonin inhibitor or naloxone (if necessary) if the patient wanted medication to relieve the itching.

From the OR, all patients went to the PACU. Another anesthesiologist (blinded about the IT injection the patient had received in the OR) evaluated each patient in the PACU. This anesthesiologist evaluated the patient at regular intervals (as described above) and measured the sympathetic level, sensory level, motor blockade (1 = no blockade, full flexion/extension, 2 = partial blockade, just able to move knees, 3 = almost complete blockade, able to move feet only, 4 = complete blockade, unable to move feet or knees), pruritus and pain scores, and any other

TABLE I Demographic and recovery characteristics

	IT lidocaine	*IT lidocaine and sufentanil*
Number (*n*)	*n* = 21	*n* = 28
Sex (M/F)	14/7	23/5
Mean age (yr)	42 ± 13	39 ± 13
Mean height (cm)	172 ± 10	173 ± 11
Mean weight (kg)	82 ± 23	84 ± 15
Maximal dermatomal level above T10 (%)	29	0*
Operation time < 30 min (%)	71	75
Pruritus (%)	0	50**
Mean time to ambulation (min)	162 ± 32	120±26**
Mean time to discharge from PACU	170 ± 32	123 ± 27**
Mean maximal pain score (VAS)	1.9 ± 2.9	1.6 ± 3.0
iv narcotic needed in PACU (%)	33	18

IT = intrathecal; PACU = postanesthetic care unit; VAS = verbal analogue score. *$P < 0.01$; **$P < 0.0001$. Values are mean ± SD unless otherwise specified.

TABLE II Adverse events

	IT lidocaine	*IT lidocaine and sufentanil*
Nausea/vomiting	1/21 (4.8%)	2/28 (7.1%)
Voiding problem	1/21 (4.8%)	1/28 (3.6%)
Postspinal headache	1/21 (4.8%)	0/28 (0%)
Abdominal discomfort	3/21 (14.3%)	0/28 (0%)

IT = intrathecal.

problems. Once a motor blockade score of 1 was achieved, the patient was assessed at regular intervals to see whether he/she could stand and walk. "Time to ambulation" was the difference between the time the patient was able to stand and walk and the time of the IT injection.

In the PACU, 30 mg of ketorolac *iv* were given if the patient complained of pain and there were no contraindications. Also, incremental doses of fentanyl were given to patients with pain scores greater than 4. Another *iv* narcotic (morphine or meperidine) was used if the patient's pain was not relieved by ketorolac and fentanyl. After outpatient surgery with spinal anesthesia, the patient was discharged (from the PACU) when the patient met our standard criteria: 1) the oxygen saturation (by pulse oximetry) on room air was greater than 92%; 2) the patient was able to breathe and cough freely; 3) the systolic blood pressure was 20% of the preanesthetic level; 4) the patient was fully awake; 5) the patient was able to stand and walk [to go to the same day surgery (SDS) unit, and home]; 6) the patient was free of itching (or pain) or did not request further medication for mild itching (or discomfort). "Time to discharge" was the difference between the time of discharge from the PACU and the time of the IT injection. After discharge from the PACU, all patients (except for one) went to the SDS unit (and then home).

Power analysis was performed with Statmate software (GraphPad) to calculate the minimum number of patients in each group. A power analysis calculated that the minimum number of patients to achieve 80% power was 16 per group (assuming 30 min as the minimum significant difference for the time of ambulation between the groups, and a standard deviation of 30 min per group). To accommodate for patient "drop out," at least 20 patients in each group were studied. Values are reported as mean ± SD or as percentage. Nonparametric data were analyzed with Fisher's exact test or Mann-Whitney U test as appropriate. Parametric data were analyzed with an unpaired Student's t test. All tests were two tailed. Statistical difference was assumed if $P < 0.05$.

Results

The ages, gender, height and weight of the two groups (Table I) were similar. Patients who received a lower dose of IT lidocaine with sufentanil had a significantly shorter time to ambulation than patients who received a higher dose of IT lidocaine only ($P < 0.0001$, Table I). All the criteria for discharge from the PACU were met at the same time that the patient was able to walk and stand in 89% of patients with IT lidocaine with sufentanil and in 62% of patients with IT lidocaine alone. Also, the mean time to discharge from the PACU was shorter in patients who received IT lidocaine and sufentanil compared to patients who received IT lidocaine alone ($P < 0.0001$, Table I).

The quality and duration of surgical anesthesia were similar in both groups. We observed pruritus in 50% of the patients who received IT sufentanil but none in patients anesthetized with lidocaine alone. The incidence of other complications (Table II) did not differ statistically in the two groups. Respiratory depression was not observed in either group. The use of *iv* narcotics for pain (in the PACU) was not statistically different in the two groups.

In the OR, all patients but two required 2 to 4 mg midazolam *iv* for sedation (with one needing none and another needing 1 mg). One patient (from the group with IT sufentanil) needed a small dose of *iv* fentanyl (50 μg) in the OR for discomfort. In the PACU, two patients (one from each group) needed *iv* narcotic in addition to fentanyl. Data points were missing in one patient, but the statistical results were similar whether he was included or not. Follow-up after leaving the

PACU was not possible in 12% of patients. Neither group had neurological problems (including TNS). One patient received diphenhydramine for itching in the SDS unit before he was discharged. (No medications were required for itching while in the PACU). One patient (who received IT lidocaine and sufentanil) also had multiple problems (including surgical issues) and was admitted to the hospital.

Discussion

We studied the recovery profile from IT low-dose lidocaine (15 mg) and sufentanil (10 μg) and from IT higher dose lidocaine (50 mg) in outpatients undergoing rectal surgery. We chose sufentanil (which is more lipophilic than fentanyl and morphine) because it rapidly penetrates the spinal cord and produces excellent segmental analgesia for short surgical procedures.[13–15] IT lidocaine and sufentanil provided anesthesia comparable to higher dose lidocaine for rectal ambulatory surgery and promoted earlier discharge when compared to IT lidocaine alone because of a shorter time to ambulation. The incidence of adverse effects was also assessed.

Our study demonstrates that the addition of 10 μg sufentanil to a small dose of lidocaine (15 mg) produces similarly adequate surgical conditions compared to 50 mg lidocaine for ambulatory rectal cases. Only one patient needed additional *iv* fentanyl in the OR. Sufentanil is a useful additive to local anesthetics.[14,15] Our results are consistent with the experimental effects of IT opioids, which show that combinations of opioids and local anesthetics are synergistic for somatic analgesia in animal models.[16] Subtherapeutic IT doses of local anesthetics produce marked analgesia when mixed with narcotics.[17]

Our study focused on the time to ambulation (as a marker for recovery time). A short recovery time for ambulatory surgery is important to the patient and to the hospital. In our study, time to ambulation was a reliable marker of recovery time. Patients, usually, were discharged soon after they could stand and walk. The shorter stay in the PACU of the patients who received low-dose IT lidocaine and sufentanil was due to the shorter time to ambulation. Other studies have also observed faster recovery after spinal anesthesia with lower doses of a local anesthetic agent and IT opioid.[4,7–9] In addition, the time to discharge from the PACU[1] can be influenced by many factors (including waiting for transportation to the SDS unit from the PACU). Discharge time from the SDS unit can also be influenced by the arrival time of the patient's family or friend to take the patient home.[1]

Itching, unfortunately, is a well-known side effect of IT narcotics.[10–12] IT lidocaine and sufentanil caused pruritus in 50% of patients in our study but did not delay discharge from the PACU. No other adverse events differed between the two groups. We did not see any respiratory depression[18] in our patients (less than 75 yr old). Most studies have reported such complications in special populations:[18,19] obstetrical or older patients (in their 80s).

In the medical literature, TNS has been associated with IT lidocaine.[4–6,20] TNS may be related to the total dose of IT lidocaine. Ben-David *et al.*[4] reports that TNS was seen in 32.7% of patients who received 50 mg of IT lidocaine *vs* 3.6% of patients who received 20 mg IT lidocaine and 20 μg fentanyl. However, none of our patients showed any sign or symptom compatible with TNS.

Difficulty in voiding has been reported with spinal anesthesia especially in patients with the following risk factors: 1) over 70 yr old; 2) hernia, rectal, or urological surgery; or 3) previous history of difficulty urinating.[21] The use of IT low-dose local anesthetics and opioid may reduce the incidence of urinary retention especially in patients with a lower risk of difficulty in voiding.[8,21] However, in our study, there was no difference in the incidence of difficulty in voiding between the two groups. Two patients (one from each group) required catherization.

In summary, our important findings are as follows: 1) the use of a low dose of IT lidocaine (15 mg) in combination with sufentanil (10 μg) provided anesthesia equally effective as a higher dose of IT lidocaine (50 mg) for short rectal ambulatory surgical cases; 2) this low dose of lidocaine (with sufentanil) allowed a shorter time of ambulation (and recovery time) compared to lidocaine (50 mg) alone; 3) IT lidocaine and sufentanil is an effective and inexpensive anesthetic mixture for these types of cases but, unfortunately, this technique caused mild to moderate pruritus.

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