ORIGINAL ARTICLE

COMPARISON OF INTRATHECAL MEPERIDINE AND LIDOCAINE IN TRANSURETHRAL RESECTION OF THE PROSTATE

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ABSTRACT

The anaesthetic effect of 2 ml of 5% lidocaine or 5% meperidine in water were evaluated and compared in 64 ASA class 1 or 2 patients. Patients were randomly assigned to one of the two groups (32 patients in each) according to the anaesthetic agent, which was injected into the lumbar subarachnoid space in the sitting position. The patients remained sitting for 5 min before being placed in the supine position. Times of onset of sensory blockade were significantly more rapid with Lidocaine. The extent of maximum cephalad spread of analgesia and the time to maximum height of analgesia in the two groups were not different. Duration of analgesia at the T-7 (48.96 +/- 6.64 min with Lidocaine, 44.74 +/- 6.14 min with meperidine; means +/- SEM) and L-1 (94.37 +/- 7.42 min with Lidocaine, 76.19 +/- 5.64 min with meperidine) dermatomes was not different in the two groups but was statistically longer at the T-10 dermatome with Lidocaine (66.83 +/- 6.72 min) than with meperidine (46.66 +/- 6.26 min). Complications in both groups included decrease in blood pressure and nausea and vomiting intraoperatively, and urinary retention, nausea and vomiting, and mild headache postoperatively. Complications that occurred only in the meperidine group were intraoperative drowsiness, respiratory depression, and itching. The frequency of complications was greater with meperidine.

KEYWORDS: Intrathecal, Meperidine, Lidocaine, TRUP

INTRODUCTION

Meperidine, known to have local anaesthetic properties,[1] has been used successfully for spinal anesthesia although associated with a number of complications.[2,3] The extent and duration of sensory and motor blockade obtained from intrathecal injection of meperidine in a dose of 1 mg/kg body weight were adequate for surgery on the lower abdomen, perineum, and lower limbs, and postoperative analgesia was prolonged.[4]

However, the effectiveness of meperidine for spinal anesthesia has been compared with a local anaesthetic agent just in few studies,[5-9] no one has done such a comparison in transurethral rsection of the prostate (TURP). Over the last 70 years TURP has been used in the surgical treatment of benign prostatic hyperplasia (BPH) and is still considered the gold standard.[10-11] We therefore con-

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ducted this study to make a comparison of lidocaine and meperidine for spinal anesthesia in TRUP.

METHODS

Sixty four ASA class I and II patients between the ages of 50 and 80, without history of cardiopulmonary disease, drug allergy or narcotic abuse, and scheduled to have transurethral resection of the prostate were assigned randomly to receive either 2ml of 5% lidocaine (Xylocaine 5% Heavy, Astra) or 0.5 mg/kg of 5% meperidine in 10% dextrose water (2 ml) as the spinal anaesthetic agent for surgery. The specific gravity of meperidine measured by total solid meter refractometry (American Optical Corp., Buffalo, NY) was about 1.026. This study was approved by the Hospital Committee for research and written consent was obtained from all the patients.

In the operating room, an intravenous catheter was inserted and 500ml of normal saline was infused within 20-30 min. Baseline levels of blood pressure and heart rates were recorded. Subarachnoid puncture was performed using a 23-gauge spinal needle at the 4-5 interspace with the patient in the sitting position. After either lidocaine or meperidine was injected intrathecally and the spinal needle withdrawn the patient remained sitting for 5 min before being placed in the supine position. Measurements of blood pressure, heart rate, sensory and motor blockade were made every 1 min for the first 15 min after the injection was completed, then every 5 min until the sensory blockade declined below the L1 dermatome.

The patients were tested for analgesia to pinprick and the upper and lower limits of segmental analgesia were charted on graph paper. Times to initial onset or analgesia and to maximum spread were determined from the data plotted as described by Bromage.[12] Patients who failed to achieve analgesia above the L-1 dermatome within 30 min after the injection were considered spinal block failures and general anesthesia was generally given.

Decreases in systolic blood pressure greater than 30% below baseline levels and assumed to be due to sympathetic blockade were treated with infusion of lactated Ringer's solution and with vasopressors. Respiratory depression caused by meperidine was treated with intravenous naloxone. Nausea and vomiting associated with hypotension were treated with oxygen inhalation, intravenous fluid infusion and small doses of vasopressor agents. If nausea and vomiting persisted after hypotension had been corrected, 10mg of metoclopramide were given intravenously with, if the patient was in the meperidine group, small doses of naloxone. All patients were followed throughout their hospital stay and all complications were recorded. During the first 24 hours after surgery, the patients were initially treated with 1 g of oral acetaminophen whenever analgesic medications were required. If this was inadequate, analgesic doses of narcotics were used.

In the statistical treatment of the study results, intergroup differences were tested for significance by comparing data by means of a two-tailed Student's t-test. $P < 0.05$ was considered statistically significant. All values are given as means $\pm$ SEM.

RESULTS

Thirty two patients received lidocaine and 20 received meperidine as the spinal anaesthetic. All the patients in both groups received 5mg diazepam about 1 hour before surgery.

Sensory Blockade

The time to initial onset of sensory blockade was significantly shorter ($p < 0.01$) in the lidocaine group than in the meperidine group. The cephalad spread of analgesia to the L-1 dermatome was significantly more rapid ($p < 0.05$) in the lidocaine group than in the meperidine group. The maximum cephalad spread of analgesia and the time of maximum spread were not different in the two groups. No difference was found in caudal spread between the two groups. (Table 1)

Table 1: Latencies and Spread of Sensory Blockade

	Lidocaine	Meperidine
Time of onset of analgesia (min)	2.4 ± 0.24	4 ± 0.48
Time to spread of analgesia to L-1 (min)	10.74 ± 0.85	17.83 ± 3.10
Time to maximum cephalad level of analgesia (min)	29.37 ± 3.28	34.17 ± 3.71
Segmental maximum level of analgesia	T-7.4 ± 0.5	T-7.2 ± 0.7

Duration of analgesia was significantly longer with lidocaine than with meperidine at the T-10 ($p < 0.05$) but not at the T-7 and L-1 dermatome levels (Table 2).

Table 2: Duration of Analgesia at Different Segmental Levels

	Lidocaine (min)	N	Meperidine (min)	N
T-7	48.96 ± 6.64	10	44.74 ± 6.14	8
T-10	66.83 ± 6.72	17	46.66 ± 6.26	15
L-1	94.37 ± 7.42	19	76.19 ± 5.64	18

Postoperative Analgesia

Frequency with which postoperative analgesics were needed ranged in both groups from 0 to 4 during the first 24 hr after surgery. The number of patients in whom pain was relieved with oral acetaminophen alone was significantly greater ($p < 0.025$) in the meperidine group (11 patients) than in the lidocaine group (four patients). Three patients in each of the groups required neither oral medication nor narcotic analgesics.

Intraoperative Complications

Decreases in blood pressure of more than 30% below baseline levels were seen in 1 patient, who had maximum cephalad spread of analgesia to T-4 in the lidocaine group and in 2 patients, with cephalad spread of analgesia to T-8 in one and T-2 in another, in the meperidine group. They responded well to rapid intravenous fluid infusion and small doses of vasopressors. The incidence of hypotension was not significantly different in the two groups.

Intraoperative nausea and vomiting occurred in 3 patients in the lidocaine group; in one it was associated with a decrease in blood pressure. In the meperidine group nausea and vomiting with severe retching were seen in 11 patients, one of whom also had associated hypotension. The symptoms were not relieved by restoration of blood pressure and oxygen inhalation. All were treated with 10mg intravenous metoclopramide, an antiemetic with actions on both the gastrointestinal tract and the central nervous system.[13-14] In the lidocaine group nausea and vomiting were successfully treated. In the meperidine group nausea and vomiting were completely relieved in seven patients within a few minutes after initiation of treatment, in three patients relief was only partial, and one patient needed 0.04 mg intravenous naloxone to relieve nausea and vomiting. The incidence of intraoperative nausea and vomiting was significantly higher in the meperidine group ($p < 0.005$).

All the patients in the lidocaine group were alert during operation. Fourteen patients in the meperidine group were drowsy and all those who had intraoperative nausea and vomiting became drowsy after the symptoms were relieved. The incidence of intraoperative drowsiness was significantly higher in the meperidine group ($p < 0.0001$).

Postoperative Complications

Urinary retention on the first postoperative day occurred significantly more frequently in the meperidine group than in the lidocaine group ($p < 0.05$). Urinary catheterization was not needed more than twice during the 24 hr period in any patient. Five patients in each of the groups had mild headache on the first postoperative day. No postspinal headache was seen.

Other complications were postoperative nausea and vomiting. The itching in the two patients in the meperidine group involved the anterior

thigh and the face (see Table 3).

Table 3: Frequency of Complications

	Lidocaine	Meperidine
Intraoperative B.P decrease >30% of control value from sympathetic blockade	1	2
Nausea, vomiting	3	11
Drowsiness	0	14
Respiratory Depression	0	1
Postoperative		
Urinary retention	1	6
Mild headache	5	5
Nausea, vomiting	4	6
Itching	0	2

DISCUSSION

Meperidine, one of the phenylpiperidine derivatives of the opioids, is closer in several ways to local anaesthetics than other opioids, with, for example, similar molecular weight and pKa (MW 247 and pKa 8.5 for meperidine hydrochloride, and MW 234 and pKa 7.9 for lidocaine hydrochloride).[15] Meperidine has been reported to produce peripheral nerve block (1), a reflection of its local anaesthetic action. It has also been shown in many studies to have the properties of local anaesthetic, both in sensory and motor blockade, after intrathecal injection.[2,3] The present study shows that meperidine and lidocaine in the same dosage, volume, and concentration produced comparable effects on neural structures within the subarachnoid space. Although the onset and duration of both the sensory and motor block were significantly more rapid and longer with lidocaine, the extent of maximum spread, which indicated their distribution in the cerebrospinal fluid, was similar. However, meperidine also had the other properties typical of narcotics in the form of higher frequency of both intraoperative and postoperative complications, which are attributable to its action on the central nervous system.

In the study of 20 patients reported by Famewo and Neguib,[3] spinal meperidine in a dose of 1mg/kg produced a mean maximum cephalad spread of sensory blockade to the T-7 dermatome level and was associated with complications that included decreases in arterial pressure more than 20% below the control levels (three patients), nausea and vomiting (six patients), pruritus (five patients), and difficulty in micturition (two patients). Fifteen of their patients did not require postoperative analgesic medication. In our study the level of mean maximum cephalad spread of sensory blockade, which was limited by the sitting position, was not different from that reported by Famewo and Naguib but the incidence of complications in our patients was somewhat higher. This increase may be attributable to the higher dosage of meperidine used in our study, but it is surprising that the proportion of pain-free patients did not correspond to the increase in dosage.

Intrathecal morphine at one-tenth to one-twentieth of its systemic dose generally produced a duration of analgesia between 12-24 hours in patients with either postoperative or chronic pain. The duration of analgesia produced by intrathecal meperidine at systemic dose, was much shorter in our study because it blunted the surgical pain, which was much more intense than other types of pain. The effects of intrathecal meperidine are also made shorter by its high lipid solubility, which causes rapid efflux into venous and lymphatic clearance channels.[15]

The cost of meperidine, a local product in our country, is less than half the cost of lidocaine, which is imported. Even with the addition of one ampoule of metoclopramide necessitated by the high incidence of intraoperative nausea and vomiting the costs are still less than three-fourths the price of lidocaine glucose.

CONCLUSION

Meperidine as the sole intrathecal anaesthetic agent for surgery may be useful because of its lower expense but this is offset by the higher inci-

dence of complications with which it is associated.

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