

Research Article

Spinal Anaesthesia for Endoscopic Urological Surgery: A Comparison of 2% Hyperbaric Prilocaine with 0,5% Hyperbaric Bupivacaine

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Abstract

Background and aims: Hyperbaric prilocaine is a short-acting local anaesthetic. The aim of this study is to compare the characteristics of subarachnoid block using hyperbaric prilocaine with that of bupivacaine in outpatients undergoing transurethral resection of bladder (T.U.R.B.).

Methods: In this prospective randomized controlled trial, 60 patients undergoing endoscopic urological surgery received subarachnoid anaesthesia with either 2% hyperbaric prilocaine 60 mg (Group P) or 0,5% hyperbaric bupivacaine 15 mg (Group B). Recovery time from motor block was defined as the primary outcome variable. Secondary outcomes considered were: onset of sensory and motor block and adverse events like hypotension, bradycardia, nausea, pruritus. Motor block was assessed using the Bromage scoring system. A global patient satisfaction score was also obtained using the five points Likert scale.

Results: Onset time of sensory and motor block was faster in the group that received prilocaine. The duration of sensory block was also shorter in the prilocaine. Time to full motor function recovery was shorter after prilocaine than bupivacaine. Incidence of side effects like hypotension and bradycardia was significantly higher in bupivacaine group.

Conclusion: This study demonstrated that intrathecal prilocaine is an alternative with a favourable recovery profile for use in transurethral resection of bladder.

ABBREVIATIONS

TNS: Transient Neurological Syndrome; TURB: Transurethral Resection of Bladder

INTRODUCTION

Spinal anesthesia (SA) is the most commonly used anesthetic technique for transurethral resection of bladder (TURB), which is reported to preserve cerebral function. Spinal anaesthesia for TURB provides excellent intraoperative analgesia, muscular relaxation, rapid onset of action, allows earlier determination of hyponatremia due to absorption of bladder irrigation fluids and reduces the possible hemodynamic and pulmonary adverse effects [1].

Spinal anaesthesia with short-acting local anaesthetics such as lidocaine and prilocaine can provide short times to discharge. However the association of lidocaine with transient neurologic symptoms (TNS) has limited the use of these agents in spinal anaesthesia. TNS was defined as pain or dysaesthesia in the buttocks, thighs, or lower limbs occurring after recovery from the anaesthetic and outside the surgical area. Bupivacaine is safe with a very low incidence of associated TNS, but the prolonged sensory and motor blocks are a disadvantage for a short procedure that requires a faster recovery of motor function. Prilocaine has a similar potency and duration of action to lidocaine and also has been reported to have a lower incidence of TNS [2].

The purpose of this study is to compare intrathecal prilocaine and bupivacaine for transurethral resection of bladder. The

primary outcome is recovery time from motor block. Secondary outcomes considered are: onset of sensory and motor block and adverse events like hypotension, bradycardia, nausea, pruritus.

MATERIALS AND METHODS

In this prospective randomized controlled trial, 60 patients with ASA I, II, III status undergoing transurethral resection of bladder (TURB) were enrolled. Inclusion criteria were age between 18 and 70 yr, a height of 1.60–1.90 m, and a BMI of 18.5–35 kg m⁻². Exclusion criteria were

- Patients with ASA score >III
- Known allergy to any of the trial agents
- Patients in whom spinal anaesthesia was contraindicated and those patients in whom informed consent would not be possible.

Written informed consent was obtained from all patients.

A 16 gauge cannula was placed in all patients and they received a pre-filling with Ringer's lactate (500 ml)

All patients were premedicated with i.v midazolam 0,015 mg/Kg.

Patients were randomly allocated into the study groups according to the list of random numbers.

The study groups were as follows:

- GROUP B (N 30); patients assigned to this group received subarachnoid anaesthesia with 2% hyperbaric prilocaine
- GROUP P (N 30): in this group 0,5% hyperbaric bupivacaine (15 mg) was administered with spinal anaesthesia.

Spinal block was performed in lateral position at either L3-4 or L4-5 interspaces, using a 25 G Whitacre spinal needle. After verifying free flow of clear cerebrospinal fluid, the prepared solution was injected into the intrathecal space in 15 seconds. The patients remained in this position for 2 minutes after the injection and were placed in the lithotomy position thereafter.

The highest dermatomal level of sensory block the time to reach this level and the motor blockade at the time of reaching highest dermatomal level of sensory block was recorded. Sensation block was checked using pin-prick test performed using a sterile needle. At 1 min intervals until the maximum block was achieved and at 15 min intervals thereafter until the block resolved.

Motor block was assessed by Bromage scores in which 0= no motor block, 1= hip blocked, 2= hip and knee blocked, 3= hip, knee and foot blocked. Patients were not put into lithotomy position until the desired level of analgesia (T10) had been reached.

Blood pressure, heart rate, arterial oxygen saturation was registered during the procedure.

All patients were contacted at home by telephone on days 1 and 10 after surgery. A structured interview using a questionnaire was conducted about adverse effects like possible signs and symptoms of TNS. Recovery time from motor block was

defined as the primary outcome variable. Secondary outcomes considered were: onset of sensory and motor block and adverse events like hypotension, bradycardia, nausea, pruritus,

A global patient satisfaction score (verbal) was also obtained, using the following Likert's scale:

1. Very dissatisfied;
2. Slightly dissatisfied;
3. Neither satisfied nor dissatisfied;
4. Satisfied;
5. Highly satisfied.

Data on age, weight, height, and BMI are given as mean (SD). Other continuous variables are reported as median (range). Continuous variables such as onset and recovery time from sensory and motor block were compared using the Mann-Whitney U-test. This test was also used if the data were not normally distributed. In the case of other continuous numeric values, the groups were compared using the t-test. Non-continuous numeric values, such as block height at 30 and 90 min, are expressed as medians (range), and were tested with the Mann-Whitney U-test. Binominal data were compared using the χ^2 or Fisher's exact test.

RESULTS

Patients were enlisted in six months, none of them was excluded neither abandoned the study before it was concluded.

The ages (years); (Group P 67.6 \pm 9; Group B 68.1 \pm 7.8), Height (cm) (Group P 160.9 \pm 9.1; Group B 165.8 \pm 9.3), the weights (Kg); (Group P 68.6 \pm 9; Group B 9 69.1 \pm 7.1) and surgery duration (min) (Group P 41.2 \pm 12.4; Group B 43.4 \pm 13.6) in both groups were similar.

Onset time of sensory block was faster in the group P than B (mean 6, 7 min vs 13 min respectively, $P < 0.05$). The two groups were comparable for the medians and the range of the maximum blocks after 30 min.

The median highest block level obtained in Group B was T9 and in Group P was T11. The total duration of sensory block was significantly shorter with prilocaine 154 min (range 97–211) compared with bupivacaine 280 min (range 233–328 respectively, $P < 0.05$) (Table 1).

The onset of motor block Bromage scale 3 was more rapid with prilocaine ($P = 0.020$). Median time to complete regression of motor block was 99 min (range 80–117) with prilocaine compared with 257 min (range 205–310) with bupivacaine ($P < 0.05$). In the prilocaine and bupivacaine groups, patients were discharged after 243 min (220–267) and 356 min (312–401), respectively ($P < 0.05$). The overall duration of motor block parameters was shorter in the prilocaine group and, notably, the difference in time until complete recovery was statistically significant (Table 2).

Motor blockade was significantly less important in patients receiving spinal prilocaine (median values for the Bromage scale at 2 in groups P, vs. 1 in Group B) (Figure 1).

Table 1: Onset time and duration of sensory block in the two groups (median values):

	Group P	Group B
Onset time of Sensory Block	6,7 min	13 min.
Duration of sensory block	99 min	257 min

*p < 0.05 Group B vs Group P.

Table 2: Onset time and duration of motor block in the two groups (median values):

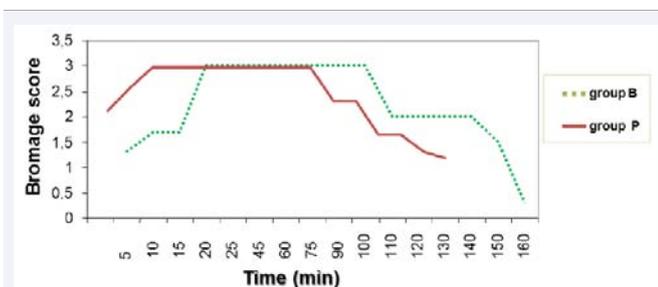
	Group P	Group B
Onset time of Motor Block	5,8min	9,5 min.
Duration of motor block	154 min	280 min

*p < 0.05 Group B vs Group P.

Table 3: AdverseEffects in Groups.

	Group B (n = 30)	Group P (n = 30)
Hypotension	6	0
Bradycardia	7	0
Pruritus	3	4
Nausea	1	5
Painduring procedure	0	0
Blockfailure	0	0

*p < 0.05 Group B vs Group P.

**Figure 1** Level of motor block evaluated with Bromage score.

Adverse effects during the procedure were shown in Table 3.

Hypotension was defined as a systolic blood pressure < 20% of preoperative value and bradycardia was defined as heart rate < 50 bpm. Four patients needed IV bolus ephedrine and 3 patients needed IV bolus atropine in Group B.

In Group B, hypotension was seen in 20% of patients (6 patients) and bradycardia was seen in 23% (7 patients) of patients. In none of the patients in Group P, hypotension and bradycardia were observed. These differences were significant between groups ($p = 0.010$, $p = 0.021$ respectively). Nausea was detected to a greater extent in Group P, this difference was not significant ($p = 0.195$). Other adverse effects were comparable in groups. None of the patients in either groups manifested block

failure or pain during the procedure. All satisfaction scores (SSs) were recorded as either 4 or 5. In Group P, seven subjects gave an SS of 4 and 23 subjects gave an SS of 5. In Group B, 10 subjects gave an SS of 4 and 20 subjects gave an SS of 5. As all SSs were either 4 or 5, results were analysed using a χ^2 test. Analysis did not demonstrate a significant difference in scores between the two groups ($P=0.10$). No patient in either group developed symptoms consistent with the occurrence of TNS.

DISCUSSION AND CONCLUSION

In literature, many different local anesthetics have been used in SA for TURB surgery. The most popular local anesthetic in day case surgical patients is lidocaine but high incidence of TNS after intrathecal lidocaine led to the search for an alternative to lidocaine [3]. The present study shows that prilocaine is an alternative to bupivacaine as a short-acting spinal anaesthetic. Prilocaine and bupivacaine produce a similar quality of spinal anaesthesia but hyperbaric prilocaine 60 mg resulted in significantly faster recovery from both motor and sensory block in comparison with hyperbaric bupivacaine 15 mg. Onset of both sensory and motor block are also faster [4]. Recent data indicate that TNS may be less frequent after prilocaine-induced spinal anaesthesia [5].

Prilocaine has a similar potency and duration of action to lidocaine and has been reported to have a lower incidence of TNS [6]. Bupivacaine (4 mg) with 25 μ g fentanyl was reported as providing adequate analgesia for TURP in the study of Karamaz et al [7]. In this study, they compared this low-dose bupivacaine usage with the conventional dose of bupivacaine (7.5 mg) bupivacaine carries a low risk of TNS,

In our study the administration of hyperbaric prilocaine at 2% (60 mg) produced adequate analgesia comparable to that following administration of 15mg of bupivacaine at 0.5%. The significant difference between the two groups was the duration of sensory and motor block.

Onset of sensory block peak height was faster in Group P than in Group B.

A previous study, a comparison of low-dose prilocaine and fentanyl with bupivacaine and fentanyl, found a median peak sensory block height of T4, compared with T11 in our study [8]. It may be that the addition of fentanyl contributed to this difference. Regression of sensory and motor block has been argued to be a marker for the ability to void. They were much faster in the prilocaine group.

In our study hypotension and bradycardia were not observed in Group P; but hypotension was observed in 20% and bradycardia was observed in 23% of patients in Group B, which is significantly more than Group P.

A previous study compared the use of 40 mg and 60 mg hyperbaric prilocaine doses with 60 mg plain prilocaine in ambulatory surgery [9]. The authors reported that hyperbaric prilocaine is superior to plain prilocaine in the ambulatory setting in terms of faster time to motor block resolution and shorter durations of surgical block [10].

The incidence of TNS for both local anaesthetics was

comparable during hospital admission and on days 1 and 10 post-discharge. The study population, however, was not large enough to discover any difference in the occurrence of rare side-effects such as TNS. A much larger study would be required to quantify this. Of note is the occurrence of a rare case of TNS after prilocaine use, reported on day 10 post-discharge.

We conclude that spinal anaesthesia with 60 mg of hyperbaric prilocaine results in a shorter duration of action than a spinal anaesthesia with 15 mg of hyperbaric bupivacaine of approximately 1 h duration. Prilocaine is an alternative with a favourable recovery profile for use intransurethral resection of bladder.

REFERENCES

- Ostgaard G, Hallaråker O, Ulveseth OK, Flaatten H. A randomised study of lidocaine and prilocaine for spinal anaesthesia. *Acta Anaesthesiol Scand.* 2000; 44: 436-440.
- Zaric d, Pace NL. Transient neurologic symptoms (TNS) following spinal anaesthesia with lidocaine versus other local anaesthetics. *Cochrane Database Syst Rev.* 2009.
- Vagts DA, Bley CH, Mutz CW. [Use of 2 % hyperbaric prilocaine for spinal anesthesia : sensitivity analysis in outpatient surgery]. *Anaesthesist.* 2013; 62: 271-277.
- Roxas MF, Talip BN, Crisostomo AC. Double-blind, randomized, placebo-controlled trial to determine the efficacy of eutectic lidocaine/prilocaine (EMLA) cream for decreasing pain during local anaesthetic infiltration for out-patient haemorrhoidectomy. *Asian J Surg.* 2003; 26: 26-30.
- Kumar CM, Corbett WA, Wilson RG. Spinal anaesthesia with a micro-catheter in high-risk patients undergoing colorectal cancer and other major abdominal surgery. *Surg Oncol.* 2008; 17: 73-79.
- Pacella E, Pacella F, Troisi F, Dell'edera D, Tuchetti P, Lenzi T, et al. Efficacy and safety of 0.5% levobupivacaine versus 0.5% bupivacaine for peribulbar anesthesia. *Clin Ophthalmol.* 2013; 7: 927-932.
- Akcaboy Zn, AkcaboyEy, Mutlu Nm, Serger N, Aksu C, Gogus N. Spinal anesthesia with low-dose bupivacaine-fentanyl combination: a good alternative for day case transurethral resection of prostate surgery in geriatric patients. *RevBrasAnesthesiol.* 2012; 62.
- Black AS, Newcombe GN, Plummer JL, McLeod DH, Martin DK. Spinal anaesthesia for ambulatory arthroscopic surgery of the knee: a comparison of low-dose prilocaine and fentanyl with bupivacaine and fentanyl. *Br J Anaesth.* 2011; 106: 183-188.
- Manassero A, Bossolasco M, Ugues S, Bailo C, Liarou C, Coletta G. Comparison of unilateral and bilateral spinal anesthesia with 2% hyperbaric prilocaine in day-case inguinal herniorrhaphy: a randomized controlled trial. *Minerva Anesthesiol.* 2014; 80: 685-691.
- Aguirre J, Borgeat A, Bühler P, Mrdjen J, Hardmeier B, Bonvini JM. Intrathecal hyperbaric 2% prilocaine versus 0.4% plain ropivacaine for same-day arthroscopic knee surgery: a prospective randomized double-blind controlled study. *Can J Anaesth.* 2015; 62: 1055-1062.

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