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Spinal Anesthesia Using Hyperbaric Prilocaine 2% versus Hyperbaric Bupivacaine 0.5% for Day case Surgery

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ABSTRACT

Background: Day-case spinal anesthesia with short-acting local anesthetics such as hyperbaric prilocaine, has a short duration of action and the transient neurological symptoms (TNS) incidence is low.

Objective: The present study aimed to compare spinal anesthesia using hyperbaric prilocaine 2% and hyperbaric bupivacaine 0.5% for day case surgery.

Patients and Methods: This Prospective randomized controlled double-blind clinical trial study was carried out on 66 patients of both sexes scheduled for day case surgery under spinal anesthesia, They were divided into two groups; group P: received 60mg hyperbaric prilocaine 2%; group C: received 15mg hyperbaric bupivacaine 0.5%.

Results: The prilocaine group showed a faster onset time of sensory (1.95 ± 0.36 min) and motor block (4.87 ± 0.7 min) and shorter time to reach maximal sensory block level($p<0.001$). Prilocaine group also provides a shorter duration time of sensory (92.4 ± 2.5min) and motor block (110.7 ± 8.8min) than that of the bupivacaine group (207.6 ± 10.9&253.9 ± 19.8 min) respectively). Prilocaine group showed a statistically significant shorter time to sit (113.3 ±7.7min), stand (121.8±10.5min), walk unassisted (130.7±7.8 min) and void spontaneously (256.4±21.5 min) compared to the corresponding times in the bupivacaine group, where the time to sit, stand, walk unassisted and void spontaneously were (279.1±14.0 min) (285.5±10.9min), (301.8±13.9min), (345.4±24.5min) respectively.

Conclusions: Hyperbaric prilocaine provides faster onset time, shorter duration of action, and earlier patient recovery in ambulatory surgery compared to hyperbaric bupivacaine in day-case surgery.

Keywords: Spinal Anesthesia, Hyperbaric, Prilocaine 2%, Bupivacaine 0.5%

INTRODUCTION

Spinal anesthesia has become increasingly popular for inpatient surgery, but, until recently, its use has been limited in ambulatory surgery due to the lack of a safe and licensed short-acting local anesthetic agent. An ideal intrathecal agent for ambulatory surgery should have a rapid onset of motor and sensory blockade, predictable regression within an acceptable time frame, and a low incidence of adverse effects[(1)].

Hyperbaric Bupivacaine is a long-acting local anesthetic from the amide group and has a low incidence of transient neurological symptoms (TNS). Because of its pharmacological profile, the recovery of motor and sensory blocks is delayed compared to short-acting local anesthetics. The incidence of postoperative urinary retention with long-acting local anesthetics like bupivacaine is higher than with short-acting local anesthetics [(2)].

Successful spinal anesthesia with low doses of bupivacaine between 5 and 10 mg without additives has been described for outpatients. The incidence of urinary retention was still 3.7–16%. Furthermore, with these low doses, block height becomes unpredictable and the risk of block failure is high [(3)]**.** Prilocaine is an amide local anesthetic with an intermediate duration of action after spinal administration. Recently, the old local anesthetics prilocaine was reintroduced in the market. It is available in the hyperbaric form and provides anesthesia for 75–90 min after spinal administration [(4)]. Hyperbaric prilocaine 2% is increasingly used for spinal anesthesia in the ambulatory setting [(5)], as it has the advantage of faster recovery times than hyperbaric bupivacaine [(6).] We aimed to compare spinal anesthesia using hyperbaric prilocaine 2% and hyperbaric bupivacaine 0.5% for day case surgery in terms of sensory block, and motor block resolution times.

The time for first spontaneous voiding and duration of stay in the PACU and time to home readiness.

PATIENTS AND METHODS

This Prospective randomized controlled double-blind clinical trial study was carried out on 66 patients of both sexes scheduled for day case surgery under spinal anesthesia to compare between intrathecal hyperbaric prilocaine 2% and hyperbaric bupivacaine 0.5% in the improvement of safety and efficacy of anesthesia and readiness for discharge after ambulatory surgery, they were admitted to Zagazig University Hospitals.

The following patient parameters were recorded: both sexes, ages from 21- 60 years, scheduled for day case surgery under spinal anesthesia. American Society of Anesthesiologists ASA class I&II. The time of surgery does not exceed 75 min.

Exclusion criteria were; Allergy to the studied drugs. Patients with contraindications to spinal anesthesia. Patients with advanced cardiac, renal, hepatic disease.

Patients were randomly allocated by computer randomization table into two equal groups according to the study drugs: Group C (hyperbaric bupivacaine group)[control group]; Included 33 patients were received intrathecal 3mL (15 mg) 0.5% hyperbaric

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bupivacaine (Marcaine, heavy hyperbaric bupivacaine 5mg/ mL 0.5%, glucose 8%, Astra Zeneca, Sweden). Group P (prilocaine group); Included 33 patients were received intrathecal 3mL (60 mg) 2% hyperbaric prilocaine (Prilotekal, prilocaine 20mg/mL 2%, glucose 6%, Mercury Pharma, UK).

Preoperative preparation:

All patients were visited in the ward before surgery. Full medical and surgical history was taken, general and airway examination was done and the laboratory investigations were checked. Patients were asked for the fasting hours. The anesthetic procedure was explained to the patients and written informed consent was taken from them. Every patient was asked to void just before surgery. An 18- gauge IV cannula was inserted; the patients were premedicated with 0.03 mg kg^{-1} midazolam IV.

Intraoperative preparation:

On arrival to the operating room, standard monitoring was applied to all patients, including pulse oximetry, electrocardiography (ECG), and non-invasive blood pressure (NIBP). The baseline readings of mean arterial blood pressure (MAP), heart rate (HR), and oxygen saturation (SpO_2) were recorded. Crystalloid infusion (7 mL /kg) was initiated as a preload. An anesthesia machine with oxygen supply, airway devices, and laryngoscope and resuscitation drugs were available in the theatre. The study drugs were prepared by a second anesthetist not involved in the investigations and data collection of the study. The patients were placed in the sitting position and their skin back was prepared with 10% betadine, then under sterile conditions 2 cc lidocaine 2% was injected to anesthetize the skin and subcutaneous tissues. Spinal anesthesia was performed at the L3-4, intervertebral space in the midline approach using a 25 G Quincke spinal needle with the bevel directed laterally. After verifying the free flow of clear cerebrospinal fluid, the prepared local anesthetic was injected into the intrathecal space in 15 seconds. The needle was extracted and the skin was dressed. Patients were then immediately turned to the supine position with an oxygen face mask.

Intraoperative Assessment and Treatments:

The sensory blockade was measured with a pinprick test (via a 25 gauge hypodermic needle) at the mid-clavicular line for the 1st 20 minutes and the maximum block level and time were recorded. Motor blockade was assessed by modified Bromage score every five minutes after spinal injection local anesthetic for the first 20 minutes. This score is graded as follows: (0=no motor block, 1=can flex the knee, move the foot, but can't raise the leg, 2= can move the foot only, 3= can't move the foot or the knee). The onset of the motor blockade is defined as the time from spinal injection of local anesthetic until a grade 3 Bromage score is achieved. Successful spinal anesthesia was defined as a target dermatome of T10 and a Bromage score of 3 was achieved at 20 min following the injection. If no sensory or motor block after 20 min from the spinal injection of local anesthetic, this was considered as failed spinal anesthesia, and general anesthesia was started and the patients were excluded from the study. The sensory and motor blockade was evaluated by an anesthesiologist blinded to group allocation. Midazolam (1–5 mg), was used for intraoperative sedation if necessary. The time of readiness for surgery from intrathecal injection of local anesthetic till block at a maximum sensory level. MAP, HR, and SpO_2 % were monitored continuously throughout the operation and were recorded every 5min in the 1st 15 min, then every 10 min till the end of the procedure. Hypotension (defined as a $\geq$ 20% decrease in the mean arterial blood pressure compared to the baseline values). It was treated with 250 mL crystalloid fluid boluses or 5 mg ephedrine IV if it occurred. Bradycardia (defined as decreased heart rate $\geq$ 20% compared to the baseline values) and was treated with 0.5 mg IV atropine, if it occurred. The duration of surgery was defined as the time between the surgical incision and wound closure.

Postoperative Assessment and Treatments:

At the end of the surgery, the patients were transferred to the PACU. The MAP, HR, and SpO_2 % were recorded every 15 min intervals during the post-anesthesia care unit (PACU) stay. They have received 1 gm paracetamol by intravenous infusion every 8 hours as a part of standard postoperative analgesia. Sensory block duration time was assessed by the time from the onset of sensory bock to S_3 regression. The motor block resolution time was assessed by the time from the onset of the motor block to the time at which Bromage score 0 is determined. The pain was measured with the visual analog scale (VAS) [7]. A scale ranges from 0 to 10; where 0: no pain and 10: is the worst imaginable pain). If VAS > 3; 30 mg ketorolac by intravenous infusion was given as rescue analgesia. The patients were assessed for their ability to sit, stand, walk unassisted, and urinate every 15-minute intervals. The postoperative urinary retention (POUR) was also evaluated in the PACU; ultrasonic bladder scanning was used for this purpose. If the bladder volume exceeded 500 mL and the patient had not voided spontaneously, urinary catheterization was planned. Patients were assessed for transfer from PACU to the ward using the-Modified-Aldrete-Postanesthesia-Score, also known as Post Anesthesia Recovery (PAR) score. The patients left the PACU after achieving a modified Aldrete score of at least 9, and the time spent in the PACU was recorded.

The time to home readiness was assessed by the time from intrathecal injection of local anesthetic till the patients reached a modified Post-Anesthetic-Discharge-Scoring-System-MPADSS of at least 9. Any adverse events were recorded and treated before discharge, including postoperative nausea and vomiting (PONV), voiding difficulty. All patients were contacted the next day by telephone and questioned regarding pain at the

puncture site, headache, use of analgesics, and complaints of transient neurologic symptoms (TNS), which is defined as pain, dysthyesia, or both in buttocks and/or lower extremities. TNS typically appears within 24 hours of spinal anesthesia, lasts 2–5 days, and resolves completely without sequelae[7].

Ethical consent:

Approval of the study was obtained from Zagazig University academic and ethical committee. Every patient signed informed written consent for the acceptance of the operation. This work has been carried out following The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Data collected throughout history, basic clinical examination, laboratory investigations, and outcome measures coded, entered, and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) **(**Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represented by mean ± SD, the following tests were used to test differences for significance; difference and association of qualitative variable by Chi-square test (X^2). Differences between quantitative independent groups by t-test. P-value was set at <0.05 for significant results and <0.001 for a highly significant result.

RESULTS

Patient characteristics and surgical data in the two studied groups were comparable, showing non statistically significant differences regarding age, gender, BMI, ASA classification, type, and duration of surgery (P-value > 0.05) **(Table 1).**

Table (1): Patient's characteristics and surgical data of the two studied groups

	Group (P) n = 33		Group (C) n = 33		Tests of significance	P-value
Age (years)						
Mean ± SD	35.1 ± 9.7		38.1 ± 13.1		t 1.06	0.28 NS
Range	19- 55		19- 60			
Gender	**n**	**%**	**n**	**%**	**X^2**	**P**
Male	14	42.4%	17	51.5%	0.55	0.45 NS
Female	19	57.6%	16	48.5		
BMI (kg/m^2)						
Mean ± SD	25.9 ± 1.0		25.1 ± 2.5		t 1.76	0.08 NS
ASA	**n**	**%**	**N**	**%**	**X^2**	**P**
I	33	100.0%	31	93.9%	0.52	0.47 NS
II	0	0.0	2	6.1%		
Type of surgery						
Hernia	10	30.3	11	33.3	0.07	0.7
Piles	6	18.2	5	15.2	0.11	0.74
Voricoceles	4	12.1	4	12.1	0.0	1.0
Knee arthroscopy	7	21.2	8	24.2	0.09	0.76
Hysteroscopy	6	18.2	5	15.2	0.11	0.74
Duration of Surgery (min)						
Mean ± SD	38.8 ± 16.30		36.5 ± 11.5		t 0.65	0.51 NS
Range	25- 75		25-70			

Group P : prilocaine group. Group C: bupivacaine group. BMI: body mass index. n: number NS: non-significant. SD: standard deviation. ASA: American Society of anesthesiologist X^2: Pearson's chi-squared test. T: student's t-test

There was a highly significant difference regarding the block characteristics, where group (P) shows faster onset time of sensory and motor block (1.95 ± 0.36 and 4.87 ± 0.7 min) respectively than in group C (2.8 ± 0.4 and 6.1 ± 1.0 min). The maximum sensory block level (dermatome) was comparable between the two groups, it was at T10 (T9-T11) in group P and at T9 (T8-T10) in group C**.** The maximum sensory block time was significantly shorter in group P (4.9±0.65 min) than in group C (6.2 ± 0.66 min). Also, the duration of readiness for surgery was shorter in group P (5.9 ± 0.7 min) than in group C (7.3 ± 0.8 min) **(Table 2).**

Table (2): Intraoperative block characteristics of the two studied groups.

	Group (P) n = 33	Group (C) n = 33	t	P-value
Onset time of sensory block (min):				
Mean± SD	1.95 ± 0.36	2.8 ± 0.4	8.8	< 0.001**
Range	1.5 - 2.5	2- 4		
Onset time of motor block (min):				
Mean ± SD	4.87 ± 0.7	6.1 ± 1.0	5.4	< 0.001**
Range	4 – 6	3 – 8		
Maximum sensory block level (dermatome)				
	T10 (T9 – T11)	T9 (T8 – T10)		
Time of maximum sensory block level (min):				
Mean ± SD	4.9 ± 0.65	6.2 ± 0.66	8.01	<0.001**
Range	4 – 6	5 – 8		
Time of readiness for surgery				
Mean ± SD	5.9 ± 0.7	7.3 ± 0.8	7.5	<0.001**
Range	5 – 7	6 – 9		

Group P: prilocaine group. Group C: bupivacaine group. **: highly significant.
SD: standard deviation. t: student's t-test . n: number

There was no significant difference in the two studied groups as regards the intraoperative total volume of fluid given **(Table 3).**

Table (3): The total volume of intraoperative fluid given to the patients in the two studied groups.

	Group (P) n = 33	Group (C) n = 33	t	P-value
Total fluid (min)				
Mean ± SD	560.6 ± 165.7	651.5 ± 233.3	1.82	0.07 NS
Range	500 – 1000	500 – 1000		

Group P: prilocaine group. Group C: bupivacaine group. SD: standard deviation t: student's t-test. NS: non-significant

Regarding intraoperative heart rate, there was no statistically significant difference between the studied groups at different time intervals**.** Whereas there was a statistically significant decrease in the heart rate within each group when compared to the baseline value (P<0.05) **(Table 4).**

Table (4): Intraoperative heart rate (beat/min) at different time intervals in the two studied groups.

Variables (beat/min)	Group (P) n = 33 Mean± SD	Group (C) n = 33 Mean± SD	t	P-value
Baseline (mean±SD)	94.5 ± 12.5	90.3 ±8.9	1.5	0.11 NS
5 min after drug injection	92.8 ± 11.4	90.0 ± 10.5	1.57	0.12 NS
10 min after drug injection	89.5 ± 9.1	85.8 ± 8.2*	1.65	0.1 NS
15 min after drug injection	86.4 ± 8.3*	82.8 ± 7.7*	1.8	0.07 NS
25 min after drug injection	81.9 ± 6.5*	78.4 ± 8.2*	1.97	0.053 NS
35 min after onset of SA	77.8 ± 8.3*	77.5 ± 6.4*	0.15	0.88 NS
45 min after drug injection	80.7 ± 1.0*	79.7 ± 5.9*	0.36	0.71NS
55 min after drug injection	76.7 ± 1.36*	76.0 ± 0.5*	0.22	0.83 NS
65 min after drug injection	75.8 ± 1.0*	75.9 ± 2.3*	0.22	0.82
75 min after drug injection	74.0 ± 1.1*	76.0 ± 5.6*	0.4	0.76 NS

Group P: Prilocaine group. Group C: Bupivacaine group. NS: non-significant
SD: standared deviation. t : student's t-test. P value < 0.05 is significant

There were no significant changes intraoperative in mean arterial blood pressure (MAP) in the two studied groups (p< 0.05). When compared with baseline within each group, there was a significant decrease in intraoperative mean arterial blood pressure in the same group (p< 0.05) **(Table 5).**

Table (5): Intraoperative mean arterial blood pressure (MAP) at different time intervals in the two studied groups.

Variables (mmHg)	Group (P) n = 33 Mean± SD	Group (C) n = 33 Mean± SD	t	P-value
Baseline	93.1 ± 9.45	89.5 ± 8.86	1.53	0.12
5 min after drug injection	90.1 ± 9.9	89.0 ± 9.5	0.46	0.6 NS
10 min after drug injection	87.8 ± 7.8	85.1 ± 7.5*	1.48	0.14 NS
15 min after drug injection	82.7 ± 7.3*	81.5 ± 7.6*	0.62	0.53 NS
25 min after drug injection	80.15 ± 6.8*	78.1 ± 7.5*	1.14	0.25 NS
35 min after drug injection	77.9 ± 6.2*	78.6 ± 7.6*	0.3	0.76 NS
45 min after drug injection	80.0 ± 7.3*	76.6 ± 7.4*	1.8	0.06 NS
55 min after drug injection	81.3 ± 6.7*	78.5 ± 7.9*	1.5	0.12 NS
65 min after drug injection	81.0 ± 6.5*	78.6 ± 6.8*	1.46	0.14 NS
75 min after drug injection	80.5 ± 5.9*	77.5 ± 4.9*	1.2	0.23 NS

Group P: Prilocaine group. Group C: Bupivacaine group. t : student's t-test. P-value < 0.05 is significant

Regarding recovery from the sensory and motor block, the duration of sensory block in group P was (92.4 ± 2.5 min) and motor block duration was (110.7 ±8.8min) which are shorter compared to group (C) that shows a sensory block duration (207.6 ± 10.9) min and motor block duration (253.9 ± 19.8 min) **(Table 6).** Group (P) showed a statistically significant shorter time to sit (113.3 ±7.7), stand (121.8±10.5), walk unassisted (130.7±7.8) and void spontaneously (256.4±21.5) compared to the corresponding times in group (C), where the time to sit, stand, walk unassisted and void spontaneously were (279.1±14.0), (285.5±10.9), (301.8±13.9) & (345.4 ± 24.5) respectively (p<0.001) **(Table 6).**

Concerning the VAS at the time of admission to and discharge from PACU, there was a statistically significant lower VAS score in group C compared to group P, where a score (<3) was recorded in 87.9% at the time of admission and 93.9% at the time of discharge in group C, compared to 51.5% and 75.8% in group P respectively.

Meanwhile, there was no statistically significant difference in the VAS score at 2 and 4 hours at the ward between the two groups (P > 0.05). Group P recorded a shorter time of stay in PACU (25±2.5min) compared to (50.9 ± 8.2min) in group C (p<0.001). The time to home readiness was also significantly shorter in group P(275±20min) compared to group C (390 ± 29.5min) **(Table 6)**.

Table (6): Postoperative outcome in the two studied groups.

	Group (P) n = 33		Group (C) n = 33		t	P-value
Duration of Sensory block (min):						
Mean ± SD	92.4 ± 2.5		207.6 ± 10.9		59.1	<0.001**
Range	88 – 95		185 – 220			
Duration of Motor block (min):						
Mean ± SD	110.7 ± 8.8		253.9 ± 19.8		37.8	< 0.001**
Range	95 – 125		220 – 300			
Time to sit						
Mean± SD	113.3 ±7.7		279.1 ± 14.0		71.6	<0.001**
Range	100-140		270 – 300			
Time to stand						
Mean± SD	121.8 ± 10.5		285.5 ± 10.9		51.6	< 0.001**
Range	100 – 145		265 – 310			
Time to walk unassisted						
Mean± SD	130.7 ± 7.8		301.8 ± 13.9		61.5	<0.001**
Range	115 – 150		280 – 325			
Time to void spontaneously.						
Mean± SD	256.4 ± 21.5		345.4 ± 24.5		15.7	<0.001**
Range	220 – 288		300 – 380			
VAS on admission to PACU						
	N	%	N	%		
< 3	17	51.5	29	87.9	10.3	0.0013**
> 3	16	48.5	4	12.1		
VAS at time of discharge from PACU						
< 3	25	75.8	31	93.9	4.24	0.03*
> 3	8	24.2	2	6.1		
VAS 2 hours at the ward						
< 3	30	90.9	33	100	0.52	0.47
> 3	3	9.1	0	0		
VAS 4 hours at the ward						
< 3	31	93.9	33	100	0.52	0.47
> 3	2	6.1	0	0		
Time of stay in PACU						
Mean± SD	25 ± 2.5		50.9 ± 8.2		11.3	< 0.001**
Range	20 – 30		40 – 60			
Time of readiness to discharge to home						
Mean± SD	275±20		390 ± 29.5		18.5	0.001**
Range	250 – 320		380 – 420			

Group P: Prilocaine group. Group C: Bupivacaine group. P-value < 0.05 is significant.
VAS: vigual analog score. PACU: postoperative care unit. t: student's t-test.

Table (7): Intraoperative sedation and postoperative analgesia

	Group (P) n = 33		Group (C) n = 33		X^2	P-value
	n	%	N	%		
Intraoperative						
Midazolam (5 mg)	10	30.3	12	36.4	0.27	0.07
Postoperative						
Paracetamol (1000 mg)	33	100.0	33	100	0.0	1.0
NSAID (mg) Diclofienac (75mg)	12	36.4	10	30.3	0.27	0.6

Group P: Prilocaine group Group. C: Bupivacaine group. The values are represented as numbers and percentages.
t : student's t-test. n: number. P-value > 0.05 is non-significant.

It was observed that there was no significant difference between the two groups as regards the need for intraoperative sedation and postoperative analgesia or HR, MAP, and SpO_2 in the postoperative period (P > 0.05) (**Tables 7, 8).**

Table (8): Postoperative hemodynamics and peripheral O_2 saturation

	Group (P) n = 33 Mean± SD	Group (C) n = 33 Mean± SD	t	P-value
HR (beat\min)	90.5 ± 10.5	89.9 ± 11.5	0.22	0.82
MAP (mmHg)	91.8 ± 9.5	90.9 ± 10.5	0.36	0.71
SpO_2 (%)	98 ± 1.0	98.1 ± 1.02	0.4	0.68

Group P: Prilocaine group. Group C: Bupivacaine group. MAP: mean arterial blood pressure. HR: heart rate. SpO_2: Peripheral oxygen saturation. t: student's t-test

DISCUSSION

The current study showed that patients' characteristics and surgical data in the two studied groups are comparable, regarding age, gender, BMI, ASA classification, type, and duration of surgery (P-value > 0.05).

The current study demonstrated that group (P) provides a faster onset time of sensory and motor block, shorter duration of sensory and motor block, faster time to reach the maximum sensory block, and readiness for surgery.

Following these results, the study done by **Cannata *et al.* [9],** in a prospective controlled randomized trial on patients undergoing endoscopic urological surgery. They demonstrated that the onset time of sensory block was faster in group prilocaine (P) than bupivacaine (B) mean 6,7 min versus 13 min respectively, The two groups were comparable for the medians and the range of the maximum blocks after 30 min.v 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 prilocaine154 min (range 97–211) compared with bupivacaine 280 min (range 233–328). The mean time to S3 resolution of sensory block was shorter for Group P than for Group B (133.8 ± 41.4 and 200.4 ± 64.8 min, respectively), although the doses used in their study were smaller than ours, they added 20 μg fentanyl to each group[9].

In contrast to our results, **Wesselink *et al.* [10],** in a study that included 150 patients were randomly allocated to receive intrathecal either 40 mg of 2-chloroprocaine or 40 mg of prilocaine reported that the use of 2-chloroprocaine is preferable over the use of prilocaine, as 2-chloroprocaine resulted in a shorter offset time from the motor blockade, a faster onset of sensory block and faster full regression of sensory block than prilocaine. Additionally, spontaneous voiding was facilitated in patients undergoing spinal anesthesia with 2-chloroprocaine than with prilocaine. 2-Chloroprocaine also showed faster onsets of sensory block, faster full regression of sensory block, and faster hospital discharge. Time to onset of motor block was shorter for chloroprocaine compared with prilocaine group, with 80.8% of patients in the chloroprocaine group reaching motor block within 5 min compared with 66.2% in the prilocaine group. This may be because of 2-Chloroprocaine which is an ester local anesthetic has a very short duration of action that is caused by very low protein binding and rapid metabolism by pseudocholinesterase[10].

The current study showed that there was a significantly shorter time to sit, stand, walk and void spontaneously in the group (P) and shorter time to home readiness in the hyperbaric prilocaine group than bupivacaine group (C).

Camponovo *et al.* [11], compared the use of 40mg and 60mg hyperbaric prilocaine doses with 60mg plain prilocaine in ambulatory surgery. They concluded 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 the surgical block. The time to home discharge was reported to be 256min with 60mg; which is comparable to ours (275min)**. Aguirre *et al.* [12],** found that the 2% prilocaine group showed a mean (±SD) discharge time of 334 (±55) min. **Manassero *et al.*[1],** recorded a discharge time of (308 min after hyperbaric 2% prilocaine 60 mg) which is longer than ours275 min(±SD). The differences in time may be explained by different techniques used for spinal anesthesia, dosages, and discharge criteria.

Regarding the VAS at the time of admission to PACU and discharge from PACU, there was a statistically significant lower VAS score in group C compared to group P. **Kaban *et al.* [8],** reported that the postoperative VAS scores for groups P and B were similar. The time to spontaneous voiding was also similar between the two groups**. Chapron *et al.* [13],** also didn't record a significant difference for postoperative VAS pain scores at the end of PACU stay, between the prilocaine group and bupivacaine group. This may be due to the intrathecal fentanyl added to the local anesthetic in both groups.

Hyperbaric prilocaine 2% was first compared by **Manassero *et al.*[1]** with 0.5% hyperbaric bupivacaine. Eighty-eight patients scheduled for lower limb surgery lasting a maximum of 45 min under spinal anesthesia

were randomly allocated to receive either 15 mg of 0.5% hyperbaric bupivacaine or 60 mg 2% hyperbaric prilocaine. Both groups were comparable in reaching the required analgesic level of T12, as well as in block intensity and onset times of maximum sensory block., They revealed that the regression of the motor block took 135 versus 210 min and the time for spontaneous micturition was 306 versus 405 min for prilocaine and bupivacaine, respectively. The two study drugs achieved the equivalent quality of sensory/motor blocks, allowing adequate surgical anesthesia for at least 1 h, as well as the comparable occurrence of undesired side effects. Nevertheless, 2% hyperbaric prilocaine was superior to 0.5% hyperbaric bupivacaine regarding faster offset, faster time to first spontaneous voiding, faster recovery-room, and home discharges[(1)].

The current study showed that there was no significant difference in the two studied groups as regards the intraoperative total volume of fluid given, intraoperative or postoperative mean HR and MAP, at different time intervals. There was no significant difference between the two groups as regards the intraoperative need for sedation or postoperative analgesia. **Camponovo *et al*. [(12)],** in their study, showed that 13% of patients received 40 mg of intrathecal hyperbaric 2% prilocaine and none of the patients received 60 mg of plain prilocaine needed supplementary analgesics before the end of surgery.

CONCLUSIONS

Hyperbaric prilocaine provides a shorter duration of action, faster spinal block onset, and voiding, offering a quality of surgical anesthesia and overall satisfaction and earlier patient recovery in ambulatory surgery compared to bupivacaine in day-case surgery, considering the potential advantage of faster rehabilitation, prilocaine may be a promising alternative to bupivacaine. Wider-scale comparative studies with a large number of patients with a long period of follow-up in multi-center studies are recommended to confirm our findings.

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REFERENCES

1. **Manassero A, Fanelli A (2017):** Prilocaine hydrochloride 2% hyperbaric solution for intrathecal injection: a clinical review. Local Reg Anesth., 10: 15-24.
2. **Rattenberry W, Hertling A, Erskine R (2019):** Spinal anesthesia for ambulatory surgery. BJA Education, 19(10): 321-26.
3. **Lemoine A, Mazoit J, Bonnet F (2016):** Modelling of the optimal bupivacaine dose for spinal anesthesia in ambulatory surgery based on data from a systematic review. Eur J Anaesthesiol., 33(11):846-852.
4. **Andlauer J, Ngatcha R, Gouwy J *et al*. (2019):** ESRA19-0189 Hyperbaric prilocaine for one-day spinal anesthesia: a large cohort retrospective study. Regional Anesthesia & Pain Medicine, 44: 160-164.
5. **Vagts D, Bley C, Mutz C (2013):** Use of 2% hyperbaric prilocaine for spinal anesthesia: sensitivity analysis in outpatient surgery. Der Anaesthesist, 62(4): 271-277.
6. **Kalra P, Jain P, Piyush Poddar S (2020):** Comparison of 0.5% Hyperbaric Bupivacaine Versus 1% Chloroprocaine in Spinal Anesthesia in an Ambulatory Setting; a Randomized Double-Blind Interventional Study. Int J Cur Res Rev., 18: 73-79.
7. **Viitanen H, Viitanen M, Heikkilä M (2005):** Single-shot spinal block for labour analgesia in multiparous parturients. Acta Anaesthesiologica Scandinavica, 49(7): 1023-1029.
8. **Kaban O, Yazicioglu D, Akkaya T *et al*. (2014):** Spinal anesthesia with hyperbaric prilocaine in day-case perianal surgery: a randomized controlled trial. The Scientific World Journal, 14:608372.
9. **Cannata F, Costantini M, Spinoglio A *et al.* (2016):** Spinal Anesthesia for Endoscopic Urological Surgery: A Comparison of 2% Hyperbaric Prilocaine with 0,5% Hyperbaric Bupivacaine. J Urol Res., 3(1): 1042-46.
10. **Wesselink E, Janssen-van den Hurk G, van der Vegt R *et al*. (2019):** Chloroprocaine versus prilocaine for spinal anesthesia in ambulatory knee arthroscopy: a double-blind randomized trial. Regional Anesthesia & Pain Medicine, 44(10): 944-949.
11. **Camponovo C, Fanelli A, Ghisi D *et al*. (2010):** A prospective, double-blinded, randomized, clinical trial comparing the efficacy of 40 mg and 60 mg hyperbaric 2% prilocaine versus 60 mg plain 2% prilocaine for intrathecal anesthesia in ambulatory surgery. Anesthesia & Analgesia, 111(2): 568-572.
12. **Aguirre J, Borgeat A, Bühler P *et al.* (2015):** Intrathecal hyperbaric 2% prilocaine versus 0.4% plain ropivacaine for same-day arthroscopic knee surgery: a prospective randomized double-blind controlled study. Canadian Journal of Anesthesia, 62(10): 1055-1062.
13. **Chapron K, Sleth J, Capdevila X *et al.* (2021):** Hyperbaric prilocaine vs. hyperbaric bupivacaine for spinal anesthesia in women undergoing elective cesarean section: a comparative randomized double-blind study. Anesthesia, 76(6): 777-784.