Comparison of Two Different Spinal Anesthesia Techniques Using Levobupivacaine in Perianal Surgery

Perianal Cerrahide Levobupivakain Kullanılan İki Değişik Spinal Anestezi Tekniğinin Karşılaştırılması

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ABSTRACT Objective: General or spinal anesthesia, caudal block, local anesthesia or combination of these techniques may be used for anorectal surgery. The best anesthetic technique and medications are still debated. This study was performed to compare the feasibility of the two spinal anesthetic techniques, namely, saddle block and low spinal anesthesia using plain levobupivacaine in elective perianal surgery. **Material and Methods:** Fourty ASA (American Society of Anesthesiologists) I-III patients were randomized to receive either saddle block (Group 1) or low spinal anesthesia (Group 2) with 1.5 mL plain levobupivacaine. In both groups, the degree of motor and sensory block, peri- and postoperative side effects, patient and surgeon satisfaction, analgesic requirements as well as durations of anesthesia, surgery and postanesthesia care unit were recorded. **Results:** The median level of sensorial block was significantly higher in Group 2 (p= 0.007). The sensorial block remained at sacral dermatomes in 35 % of patients in Group 1 and in none of the patients in Group 2 (p= 0.008). Bromage scores were "0" in 70 % and 21.1 % of patients in Group 1 and Group 2, respectively (χ^2: 9.39, p= 0.002). Seventeen patients in Group 1 and seven patients in Group 2 achieved fast tracking criteria in the operating room and were able to bypass the postanesthesia care unit (χ^2: 11.493, p= 0.001). **Conclusion:** Saddle block with plain levobupivacaine used for perianal surgery resulted in absence or less motor block, less admission to postanesthesia care unit, faster recovery when compared to low spinal anesthesia; however side effects, patient and surgeon satisfaction were comparable between the groups.

Key Words: Anesthesia, conduction; anesthesia, spinal; levobupivacaine

ÖZET Amaç: Genel veya spinal anestezi, kaudal blok, lokal anestezi ya da bu tekniklerin kombinasyonu anorektal cerrahi için kullanılabilir. Hangi anestezi tekniği ve ilacın en iyi seçim olduğu hala tartışmalıdır. Bu çalışma elektif perianal cerrahide saf levobupivakain kullanarak yapılan iki spinal anestezi tekniğinin, yani saddle blok ve düşük seviyeli spinal anestezinin uygulanabilirliğinin karşılaştırılması amacıyla yapıldı. **Gereç ve Yöntemler:** Kırk ASA (Amerikan Anesteziyolojistler Derneği) I-III hasta 1.5 ml saf levobupivakain ile saddle blok (Grup 1) veya düşük seviyeli spinal anestezi (Grup 2) uygulanmak için randomize edildi. Her iki grupta da, motor ve duyusal blok düzeyleri, peri ve postoperatif yan etkileri, hasta ve cerrah memnuniyeti, analjezik gereksinimleri ve anestezi, cerrahi ve postanestezi bakım ünitesinde (PACU) kalım süreleri kaydedildi. **Bulgular:** Grup 2'de duyusal blok medyan düzeyi anlamlı derecede daha (p= 0.007) yüksekti. Grup 1'de hastaların %35'inde duyusal blok sakral dermatomlarda sınırlı kalırken Grup 2 hastaların hiçbirinde bu gözlenmedi (p= 0.008). Bromage skoru Grup 1 ve Grup 2 hastaların sırasıyla %70 ve %21.1'inde "0" idi (χ^2: 9.39, p= 0.002). Grup 1'den 17 hasta ve Grup 2'den yedi hasta operasyon salonunda fast-track kriterlerini sağladı ve postanestezi bakım ünitesini bypass edebildi (χ^2: 11.493, p= 0.001). **Sonuç:** Perianal cerrahide saf levobupivakain ile yapılan saddle blok düşük seviyeli spinal anestezi ile karşılaştırıldığında, daha az veya hiç motor blok, postanestezi bakım ünitesine daha az giriş, daha hızlı derlenme ile sonuçlandı; hasta ve cerrah memnuniyeti gruplar arasında karşılaştırılabilir düzeydeydi.

Anahtar Kelimeler: Anestezi, kondüksiyon; anestezi, spinal; levobupivakain

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The prevalence of benign minor anorectal diseases is 4-5% in adult population; approximately 10% of the cases require surgery which is performed on ambulatory or 24-hour stay basis.[1-3] Minor anorectal surgery may be performed with different anesthesia techniques including general or spinal anesthesia, caudal block, local anesthesia or combination of these techniques.[3] However, the best anesthetic technique and medication still remains unknown.[4-6]

Spinal anesthesia is a useful choice for minor anorectal procedures.[7,8] While low spinal anesthesia provides sensorial block about the level of the umbilicus, with partial or complete paralysis of the legs, saddle, as the name implies, is essentially perineal analgesia with some sensory changes in the legs and weakening but not loss of motor power.[9,10] The patients must remain at least 2-3 minutes in the sitting position for this technique because changing the patient's position will affect the level of the block.[3] This study was designed to investigate the feasibility of the two spinal anesthetic techniques, namely, saddle block and low spinal anesthesia using plain levobupivacaine in elective perianal surgery.

MATERIAL AND METHODS

After approval from the 9 Eylul University Hospital Drug Research Ethics Committee and obtaining informed consents of the patients, 40 ASA physical status I-III patients between 18-65 years of age scheduled for elective perianal surgery under spinal anesthesia were enrolled in this study.

Hypersensitivity to any local anesthetic drugs, history of coagulation defects or presence of clinically significant cardiac, renal, hepatic or metabolic disease, any psychiatric illness and other contraindications to spinal anesthesia were the exclusion criteria. Patients were randomly assigned to receive one of the two following spinal anesthesia techniques: saddle block (Group 1, n= 20) or low spinal anesthesia (Group 2, n= 20). Sealed envelope method was used for randomization.

During the preoperative visits, patients were instructed about the verbal rating scale (VRS) with 0= none to 10= most severe for pain scoring. Patients were not premedicated. Intraoperative monitoring included electrocardiography (ECG), peripheral oxygen saturation (SpO_2) and non-invasive systemic blood pressure (NIBP). All patients received 0.9 % NaCl 10 mL kg^{-1} to preload the circulation, followed by an infusion at 5-10 mL kg^{-1} h^{-1}. Spinal anesthesia was performed in the sitting position at the L_{3-4} or L_{4-5} interspaces using a 25-gauge Quincke needle with 1.5 mL (=7.5 mg) isobaric (plain) levobupivacaine HCl (Chirocaine 5.0 mg mL^{-1}; Abbott, Istanbul, Turkey). The patients in Group1 were kept in the sitting position with knees flexed for five minutes while the patients in Group 2 were asked to lie down after the injection. Then, all patients were immediately placed in the lithotomy position while their shoulders and heads were kept 30^0 higher than their bodies with a pillow and remained at the same position throughout the surgery.

Spinal anesthesia was performed and observations for sensorial and motor block before the lithotomy position were done by the same investigator. Afterwards, patients were observed by a blinded investigator who was unaware of the posture following injection throughout the surgery and in PACU.

Loss of sensation to pinprick with a 26-gauge insulin needle was used to determine the upper and lower dermatomal spread of the sensory block. Motor block was assessed using a modified Bromage scale: 0= full movement; 1= inability to raise an extended leg, can bend the knee; 2= inability to bend the knee, able to flex the ankle; 3= no movement.

Hemodynamic parameters were recorded before spinal anesthesia and with two-minute intervals thereafter. Levels of sensorial block were recorded at every five minutes following spinal anesthesia until the end of the surgery and after the legs were straightened following lithotomy position. The degree of motor block was evaluated at five and 10 minutes after local anesthetic injection and at the end of the surgery. Requirement for sedative and analgesic medications were recorded. Bradycardia (heart rate <50 beats min^{-1}) was treated

with 0.5 mg of intravenous (IV) atropine. Incremental doses of ephedrine was administered in patients whose systolic blood pressure decreased >30% from the baseline values.

Patients were discharged from the operating room (OR) directly to the surgical ward if Bromage scale was 0 and a fast tracking score of ≥12 was achieved at the end of the surgery (Table 1). Modified Aldrete discharge criteria and complete regression of motor block were used for discharge from the postanesthesia care unit (PACU).[11,12] The duration of anesthesia (from the spinal puncture to departure from the OR), surgery (from incision to placement of the dressing) and duration of stay at PACU were recorded. All patients were kept in the surgical ward for the night since anorectal operations were performed on a 24-hour stay basis.

Perioperative side effects (nausea, vomiting, headache, backache, and urinary retention) were assessed before leaving the operating room, at the night of surgery, and on the seventh postoperative day. Patient and surgeon satisfactions with the anesthetic technique were evaluated using a three-point scoring system, where 1= poor, 2= good, 3= excellent after the operation. Tenoxicam 20 mg was administered intravenously to all patients at the end of surgery. Patients reporting pain score of ≥5 any time in the postoperative period received an additional dose of tenoxicam 20 mg IV only for once. In case of insufficient pain relief, 50 mg of intramuscular pethidine HCl was given 30 minutes later. Analgesic medications were administered by a staff blinded to group allocation.

STATISTICS

Initial sample size estimation showed that 20 patients were required in each group to detect a 50% reduction in PACU time when based on the study of Sungurtekin et al.[6] with a power of 90% at the α 0.05 level of significance. Categorical variables were analyzed using Chi-square test or Fisher exact test 2-tailed where appropriate. The quantitative data are presented as mean ± standard error of the mean and the median. In nonparametric conditions Mann Whitney U test was used to compare the quantitative data.

Data were analyzed with the Statistical Package for the Social Sciences for Windows, version 11.0 (SPSS Inc, Chicago, IL, USA). Statistical significance was defined as $p< 0.05$.

TABLE 1: Fast-track score.

Consciousness		Hemodynamic stability	
Fully awake and orientated (name, place, date)	2	Blood pressure <15% of baseline MAP value	2
Arousable with minimal stimulation	1	Blood pressure 15%-30% of baseline MAP value	1
Responsive only to tactile stimulation	0	Blood pressure >30% below baseline MAP value	0
Physical activity		Oxygen saturation	
Moves all 4 extremities voluntarily or on command	2	SpO_2 >90% on room air	2
Some weakness in movement of extremities	1	Supplemental O_2 required to maintain SpO_2 >90%	1
Unable to move extremities	0	SpO_2 <90% with supplementation	0
Postoperative pain assessment			
None or mild discomfort	2	Postoperative emetic symptoms	
Moderate to severe pain controlled with		None or mild nausea with no active vomiting	2
IV analgesics	1	Transient vomiting or retching	1
Persistent severe pain	0	Persistent moderate to severe nausea and vomiting	0
Respiration			
Able to breathe deeply	2		
Tachypnea with good cough	1		
Dyspneic with weak cough	0	Total score	14

MAP: Mean arterial pressure.

RESULTS

Thirty-nine patients completed the study; one patient was withdrawn from Group 2 due to unsuccessful spinal anesthesia. There were no significant differences between groups in terms of patient demographics, type of surgery, durations of anesthesia and surgery. Duration of PACU was significantly longer in Group 2 (p= 0.043) (Table 2).

There were no differences between groups for achieving sensorial block at the S_1-S_3 level in two minutes (95% and 84.2% in Group 1 and 2, respectively). The upper level of sensorial block remained between S_1-S_3 in 35% of patients in Group 1 and the sensorial block reached T_5 level in one patient during the follow up period. In Group 2, the sensorial block was not limited to sacral dermatomes and was above L_2 in all patients (Table 3). The difference in the limitation of block to sacral dermatomes was significant between the two groups (p= 0.008). Additionally, in two patients in Group 2, sensorial block spread to $T_{3\text{-}4}$. The median level of upper sensorial block in Group 1 was S_5 whereas it was T_{12} in Group 2 (p= 0.007). Adequate intraoperative anesthesia was achieved in all patients in both groups. No additional sedative or analgesic medications were administered intraoperatively. Bromage scores were "0" in 70 % and 21.1% of patients in Group 1 and Group 2, respectively (p= 0.002) (Table 4). Three patients with Bromage score of "1" in Group 1 and two patients with Bromage scores of "1" and "2" in Group 2 showed complete regression of motor block at the end of surgery. Seventeen patients (85%) in Group 1 and seven patients (36.8%) in Group 2 achieved a fast tracking score of ≥12 and they were able to bypass PACU at the end of the surgery (χ^2: 11.493, p= 0.001).

Compared with the baseline values, intraoperative systolic arterial pressure decreased 30% in one patient in Group 2 while arrhythmia (premature ventricular contraction) developed in one patient in each group. Arrhythmias were treated with IV lidocaine in both patients. The decrease in blood pressu-

TABLE 2: Patient demographics. Type of surgery, anesthesia, operation, PACU times for the two anesthetic groups (mean ± SD; median for quantitative variables).

	Group 1 (n= 20)	Group 2 (n= 19)
Gender (M/F)†	16/4	11/8
Age (yrs)*	41.6 ± 2.8; 41.5	46.8 ± 3.0; 47.0
Height (cm)*	170 ± 2.0; 170.0	169 ± 1.0; 170.0
Weight (kg)*	74.5 ± 3.2; 73.5	72.3 ± 3.4; 76.0
Type of surgery (n)		
Hemorrhoidectomy†	8	13
Fistulotomy††	6	4
Sphincterotomy††	6	2
Duration of anesthesia (min)*	42.2 ± 4.1; 43.0	44.2 ± 3.6; 42.0
Duration of surgery (min)*	36.8 ± 4.0; 33.0	30.2 ± 3.0; 30.0
Duration of PACU (min)*	30.0 ± 5.8; 30.0	54.6 ± 7.1; 43.0**

† Chi square; †† Fisher Exact Test 2-tailed; * Mann Whitney U test; ** p= 0.043, M/F= Male/Female, PACU= Postanaesthesia Care Unit.

TABLE 3: Intraoperative upper level of the sensorial block (S1-3 compared to upper block).

Upper level of the sensorial Block	Group 1 (n= 20)	Group 2 (n= 19)
S1-3	7 (35.0%)	0 (0.0%)
Upper block	13 (65.0%)	19 (100.0%)
Subgroups of upper block		
L3	1 (5.0%)	-
L2	1 (5.0%)	3 (15.8%)
L1	4 (20.0%)	3 (15.8%)
T12	3 (15.0%)	2 (10.5%)
T11	1 (5%)	2 (10.5%)
T10	2 (10.0%)	-
T9	-	2 (10.5%)
T8	-	1 (5.3%)
T7	-	1 (5.3%)
T6	-	1 (5.3%)
T5	1 (5.0%)	2 (10.5%)
T4 and above	-	2 (10.5%)

p= 0.008 (Fisher Exact Test 2-tailed).

TABLE 4: Intraoperative motor block.

Bromage score	Group 1 (n= 20)	Group 2 (n= 19)
Absence of motor block (0)	14 (70%)	4 (21.1%)
Presence of motor block (1-2-3)	6 (30.0%)	15 (78.9%)
Subgroups of Bromage score		
1	3 (15.0%)	1 (5.3%)
2	1 (5.0%)	3 (15.8%)
3	2 (10.0%)	11 (57.9%)

p= 0.002 (Chi square test).

re in Group 2 recovered following lidocaine administration, and did not require ephedrine administration. Catheterization of the bladder was not necessary in three patients in Group 1 who had urinary retention. One patient in Group 1 and two patients in Group 2 had postdural puncture headache within the first three days after surgery and it regressed with peroral paracetamol and caffeine (Minoset plus, Roche, Turkey) in one patient whereas the others did not require any analgesics. No other side effects were observed. The frequency of side effects (nausea, vomiting, headache, backache, urinary retention, arrhythmia and hypotension) was comparable between groups. The satisfaction scores of all patients and surgeons were 3 except one patient in Group 1 (satisfaction score: 2), and no significant difference was found between groups. Postoperative analgesic requirement and type of analgesic medications were similar between two groups.

DISCUSSION

Results of this study indicated that acceptable consequences for perianal surgery were achieved with both low spinal anesthesia and saddle block. The saddle block provided restriction of sensorial block at the sacral dermatomes in a significant number of patients with minimal or no motor block and a small number of patients were admitted to PACU. To our knowledge, despite widespread use of saddle block in perianal surgery, this is the first study comparing saddle block and spinal anesthesia with plain levobupivacaine in these procedures.

Anesthetic requirements for anorectal surgery are rapid onset and recovery, lack of intraoperative and postoperative side effects and cost-effectiveness.[4] Advantages of spinal anesthesia include rapid onset of sensory and motor block, predictable efficacy and prompt regression.[12,13] In a randomized clinical trial of perianal surgery, Schmittner et al.[14] reported that saddle block was superior to total intravenous anesthesia in terms of analgesic consumption within 24 hours after surgery and aspects of postoperative recovery. Despite several advantages of spinal anesthesia, motor block, side effects such as hypotension and urinary retention may be the causes of delayed discharge from PACU and the hospital.[15] While spinal anesthesia has been used widely for these procedures, recently local anesthesia with sedation was appreciated more than spinal or general anesthesia due to delay in recovery of motor block, more side effects and higher hospital costs after spinal and general anesthesia.[4-6] On the other hand, many surgeons do not prefer an anesthetic technique that involves tissue manipulation within the surgical field.[6] Thus, after we used saddle block as an alternative to spinal anesthesia, we observed that both techniques yielded rapid onset and adequate intraoperative anesthesia without any significant side effects. Additionally, absence of motor block or complete recovery of minimal motor block at the end of surgery, early achievement of a fast tracking score of ≥12 and less admission to PACU were considered to be the advantages of saddle block. Similarly, Ozmen et al.[16] reported minimal or no motor block and fast recovery following saddle block in their comparison of epidural, spinal and saddle blocks in urological procedures.

Tuominen[17] and Becker et al.[18] indicated that the physical characteristics of the local anesthetic solution and the position of the patient were the most important factors that affect the distribution of the local anesthetics in cerebrospinal fluid. Performing the block in the sitting position and keeping the patient in this position might limit the block in the sacral and lower spinal roots. A single dose of 1.5-2 ml of 0.5% isobaric bupivacaine or 2% lidocaine was recommended by Atkinson et al.[19] for anorectal operations. However, they stated that the results of spinal anesthesia with isobaric solutions, especially with bupivacaine, was difficult to predict. In another study it was demonstrated that injection of a single dose of 5 mg isobaric bupivacaine resulted in a block from L_5 up to T_2 level. Injection of hypobaric local anesthetic solutions is an alternative when the operation is performed in knee-elbow or jack-knife position. The advantages of hypobaric solutions are the absence of motor block and stable hemodynamics; however, the rise in sensorial block level when the patient's head is elevated is the disadvantage of this method in the immediate postoperative period.[20]

The results of spinal anesthesia using hyperbaric solutions is a little more predictable. The block raises a few segments higher compared to isobaric solutions. Although in a recent study Wassef et al.[21] found that a very low dose (1.5 mg) bupivacaine used in saddle block could be successful for short perianal surgery, the usual recommended dose for perianal surgery is 1-1.5 ml of hyperbaric 0.5% bupivacaine or 5% lidocaine. The patient should be kept in the sitting position for at least one minute, and should lie down afterwards.[3] Levobupivacaine is the S-enantiomer of racemic bupivacaine and plain levobupivacaine behaves as a hyperbaric solution. Despite the fact that spinal anesthesia is achieved with small doses, the decreased cardiovascular and central nervous system toxicity make levobupivacaine a safe alternative to bupivacaine.[22,23]

As perianal surgery is performed in lithotomy position in our hospital, hypobaric or isobaric solutions were not suitable for our procedures. Therefore, we preferred levobupivacaine and kept the patients in the sitting position for five minutes and then the patients had lithotomy position while their shoulders and heads were 30^0 elevated. In this way, the upper level of sensorial block was restricted to sacral dermatomes in a significant number of patients. In addition, in patients who received low spinal anesthesia and were laid supine immediately, an extensive spinal block was experienced as reported in several studies.[23,24]

On the other hand, Wildsmith et al.[25] who studied the spread of sensorial block following subarachnoid administration could not demonstrate an effect of posture or dose in weight or volume on distribution of isobaric amethocaine. However, we clearly observed that sitting position provided isolated sacral block, significantly lower median upper level of sensorial block, and no change in motor block even after the legs were straightened at the end of surgery. When interpreting the results of the aforementioned study, it should be remembered that hyperbaric and isobaric solutions were compared to investigate the effect of gravity on spread of local anesthetic solutions. In contrast to our results, in a few number of previous studies using hyperbaric solutions it was shown that the level of sensorial block increased even 60 minutes following the injection when the patient laid supine.[26] In our study, the shoulders and head were 30^0 elevated when compared to the bodies in the postoperative period and this position might have an effect on the difference between the results of the two studies. Veering et al.[27] demonstrated that the period of sitting had little influence on sensorial block levels during spinal anesthesia with hyperbaric bupivacaine solution. However different from our study, they administrated higher volume of local anesthetic solution (3 mL) and the study was performed in elderly patients.

According to our results, comparability of the incidence of side effects does not demonstrate superiority of either method. The absence of a difference in side effects may be related to the small sample size, which was not calculated to detect the difference in side effects.

In conclusion, saddle block with plain levobupivacaine has provided comparable anesthetic consequences with low spinal anesthesia for perianal surgery. Besides, absence or less motor block, less admission to postanesthesia care unit and faster recovery of motor block are the advantages of this method. Thus, our results suggest that saddle block can be considered as an appropriate alternative to low spinal anesthesia in perianal surgery.

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