

Low Dose Hypobaric Bupivacaine in Unilateral Spinal Anesthesia for Endovenous Radiofrequency Ablation

Mini Doz Hipobarik Unilateral Spinal Anestezi İle Endovenöz Radyofrekans Tedavisi

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Özet

Amaç: Bu çalışma ile alt ekstremitte yüzeysel venöz yetmezlik ve buna bağlı gelişen varislerin RFA (radyofrekans ablasyon) ile tedavisinde unilateral spinal anestezi sırasında kullanılan mini doz hipobarik bupivacainin gününbirlik cerrahideki etkinliğini araştırmayı hedefledik.

Yöntem: Bu çalışma 2012-2013 yılları arasında Çanakkale Onsekiz Mart Üniversitesi Tıp Fakültesi Hastanesi Anesteziyoloji ve Reanimasyon Anabilim Dalı bünyesinde Kalp ve Damar Cerrahisi ameliyathanesinde elektif endovenöz radyofrekans ablasyon yöntemi ile tek taraflı varis tedavisi yapılan hastaların dosya bilgilerinin retrospektif olarak incelenmesi ile gerçekleştirildi. Çalışmaya ASA I-II risk grubundaki 18-55 yaş aralığında 40 hasta dahil edildi. Çalışmaya alınan hastalara 1,5 mL %1 izobarik bupivacain "Marcaine® %0,5 flakon, Eczacıbaşı" + 3,5 mL distile su karışımının 3 mL'si 4,5 mg olarak intratekal verildi. Bu dozdaki ilacın son hali 37 °C'de hipobarik olduğu(1) literatür bilgileri ile doğrulandı. Spinal anestezinin duyuşal blok seviyesi, motor blok derecesi ve hemodinamik göstergelerden olan kalp atım hızı (KAH), ortalama arter basıncı (OAB) ve SpO2 değerleri spinal anestezi yapıldıktan sonra 15 dk boyunca her 2,5 dk'da bir, daha sonra ameliyat bitimine kadar her 5 dk'da bir kaydedildi.

Bulgular: Çalışmamıza 18'erkek 22'si kadın olmak üzere 40 hasta dahil edildi. Hastaların 2'sinde bulantı/kusma, 2'sinde de bradikardi gözlemledik. Maksimum duyuşal blok oluşma süresi 9,18 dk iken maksimum motor blok oluşma süresi 11,3 dk olarak gözlemlendi.

Sonuç: Sonuç olarak elektif endovenöz radyofrekans ablasyon yöntemi ile tek taraflı varis tedavisi yapılan hastalarda unilateral spinal anestezinin etkin bir anestezinin yanında minimal düzeyde yan etki oluşturup ve hasta memnuniyetini artırarak erken taburculuk süresi sağlar.

Anahtar Kelimeler: Hipobarik, düşük doz, spinal anestezi.

Abstract

Objective: We aimed to investigate the effects of low dose hypobaric bupivacaine usage in unilateral spinal anesthesia for the treatment of varicose veins with RFA (radiofrequency ablation).

Method: This retrospective study was performed by Çanakkale 18 Mart Medical Faculty Department of Anesthesiology and Reanimation with the method of elective endovenous radiofrequency catheter ablation, scanning the file information of patients retrospectively. 40 patients in the 18-55 year old range and who are in the ASA I-II risk group were included in the study. Patients intrathecally received 4,5 mg (3 ml) hypobaric bupivacaine (0.5% plain bupivacaine 1.5mL+3.5 ml of distilled water). This final dose of bupivacaine at 37°C (1) was confirmed as hypobaric by literature. Motor blockade, sensorial blockade and hemodynamic parameters were assessed every 2.5 minutes during the first 15 minutes after spinal injection and then every 5 minutes until the end of operation. The side effects during the operation time, such as hypotension, bradycardia, nausea, vomiting, pain, respiratory depression were also documented. The operative time was recorded.

Results: Of the patients included in our study 18 were male and 22 were females. We observed bradycardia in 2 patients and nausea/vomiting in 2 patients. While the mean duration of achieving maximum sensorial block was observed as 9,18 min, the average time to reach the maximum motor block was observed as 11.3 min.

Conclusion: In conclusion, unilateral spinal anesthesia performed in patients undergoing elective endovenous radiofrequency catheter ablation treatment of bilateral varicose veins provides early hospital discharge by creating effective anesthesia and minimal side effects and increases patients' satisfaction.

Keywords: Hypobaric, low dose, spinal anesthesia.

Introduction

The difference in density between cerebrospinal fluid (CSF) and the local anesthetic solutions is an important factor affecting the distribution within the subarachnoid space. In outpatient surgery spinal anesthesia preference may not be appropriate. In that case, the spinal anesthesia techniques which have faster block recovery and less side effects can be applied (1,2).

In outpatient surgery, unilateral spinal anesthesia has many advantages such as faster block recovery, less hypotension, patient satisfaction and early discharge period (3-5). The low-dose local anesthetics usage for unilateral spinal anesthesia induces shorter recovery time of motor blockade, provides hemodynamic stability and reduces the risk of urinary retention. In addition, the effectiveness of uni-



lateral spinal anesthesia is increased by the lateral decubitus position, slow speed of local anesthetic administration (2,6,7). The hypobaric or hyperbaric local anesthetic agents can be used for unilateral spinal anesthesia application in lateral position. The anesthesia tends to form a layer above the injected line with hypobaric solutions and below the injected line with hyperbaric solutions.

In this study, we aimed to investigate the effects of low dose hypobaric bupivacaine usage in unilateral spinal anesthesia for the treatment of varicose veins with RFA (radiofrequency ablation).

Materials and Methods

This retrospective study was performed by Çanakkale 18 Mart Medical Faculty Anesthesiology and Reanimation Department with the method of elective endovenous radiofrequency catheter ablation, scanning the file information of patient's retrospectively. 40 patients in the 18-55 year old range and who are in the ASA I-II risk group were included in the study.

Patients intrathecally received 4,5 mg (3 ml) hypobaric bupivacaine (0.5% plain bupivacaine 1.5mL+3.5 ml of distilled water). This final dose of bupivacaine at 37°C (1) was confirmed as hypobaric by literature. The following information's were achieved by examining the anesthesia case files; preoperative intravenous cannulas were inserted on the forearm and given the intravenous infusion of 6-8 mL/kg of 0.9 % NaCl solutions, monitorization of EKG, SpO₂ and non-invasive blood pressure were done for the patients in the operating room (GE DASH 5000, SN:SHQ11403111SA, USA). The patients also received oxygen via a nasal cannula (4 L/min). Patients were placed in the lateral position lying on the nonoperated side. Dural punctures were performed at the L3-L4 or L4-L5 intervertebral space, using a 20-gauge 35mm introducer and 26-gauge atraumatic spinal needle (Atraucan®, B.Braun, Melsungen AG) with the orifice directed toward the non-dependent side. The correct position was verified by visualisation of cerebrospinal fluid (CSF). Patients intrathecally received 4,5 mg (3 ml) hypobaric bupivacaine. Patients were

maintained in this position for 15 minutes and then placed in the supine position. Sensory and motor blocks were evaluated bilaterally. Motor blockade, sensorial blockade and hemodynamic parameters were assessed every 2.5 minutes during the first 15 minutes after spinal injection and then every 5 minutes until the end of operation. The level of sensory block was assessed by pinprick testing and the sympathetic block was assessed by cold warm discrimination. Motor blockade was assessed using a modified Bromage scale (0=no motor block; 1=hip blocked; 2=hip and knee blocked; 3=hip, knee and ankle blocked) Two-segment regression time of sensory block was recorded as the duration of sensory blockade. Clinically relevant hypotension (decrease in systolic blood pressure 20% from start value or below 60 mmHg in mean blood arterial pressure) was initially treated with a rapid intravenous infusion of (50 mL/min) of isotonic solutions, and if that was ineffective for three minutes, intravenous bolus of ephedrine 5–10 mg was given and doses of ephedrine were recorded until discharging the patients from post anesthesia care unit (PACU). Clinically relevant bradycardia (decrease in heart rate to less than 50 bpm) was treated with 0.5 mg of intravenous atropine (Atropine sulfate, 0.5 mg, 1 mL, DROGSAN/Ankara).

The side effects during the operation time, such as hypotension, bradycardia, nausea, vomiting, pain, respiratory depression were also documented. The operative time was recorded.

After the operation the patients and the surgeons were asked whether they were satisfied with anesthesia. Satisfaction scores of patient and surgeon were reported (using any number from 0 to 5, where 0 is the bad and 5 is the perfect). Heart rate(HR), systolic blood pressure(SBP), diastolic blood pressure(DBP), mean arterial blood pressure(MAP), blood oxygen saturation by pulse oximetry (SpO₂), the levels of sensory and motor blockade were documented every 10 minutes in PACU.

The patients within normal post-anesthesia follow up were discharged from PACU. The



discharging periods of patients have been reported from post-anesthesia follow up reports.

Results

18 men and 22 women were included in our study and the demographic characteristics of the patients are shown in Table 1.

Table 1. The demographic characteristics of patients

Age (year)	46,7 (21-65)
Height(cm)	159,7(155-187)
Weight (kg)	74,3(60-116)
ASA I/II	14/26
Interference level (L3-L4/L4-L5)	16/24
Right leg/ left leg	21/19

Patients achieving maximum motor block was observed and the mean duration was 11.3 min. The average time to reach the maximum motor block was observed as 11.3 min. The blocking properties of study are shown in Table2.

Table 2. The blocking properties of study.

Maximum extent of sensory block (T12/L1/L2)	3/20/17
Time to reach maximum sensory block level (min)	9,18
Time to reach maximum motor block level (min)	11,3
Two-segment regression time (min)	37,5
Time to motor block termination (min)	82,4
Time to sensory block termination (min)	105
Time to mobilization (min)	157

We observed bradycardia in 2 patients and nausea/vomiting in 2 patients. The side effects after spinal anesthesia and postoperative periods are shown in Table 3. The patients and surgeons satisfaction are shown in Table 4. The patient's hemodynamic characteristics are shown in Table 5.

Table 3. The side effects after spinal anesthesia and postoperative periods

Side effects	%
Bradycardia (%)	5
Hypotension (%)	2,5
Nausea/vomitting (%)	5
Respiratory depression (%)	0
Urinary retention (%)	0
Headache(%)	2,5

Table 4. The patients and surgeons satisfaction

	good	great	perfect
Surgeons satisfaction (%)	10	10	80
Patients satisfaction (%)	0	15	85

Table 5. The patients hemodynamic characteristics

	HR(average)	MAP(mm/hg)
Basal	73±12	88±8
2,5. min	76±11	90±7
5. min	78±9	85±10
10. min	77±7	89±6
15. min	71±10	90±5
30. min	74±8	94±8
1. hour	75±7	91±5

Discussion

In our study we used 4.5mg (1.5ml) hypobaric bupivacaine during unilateral spinal anesthesia and we have achieved sufficient sensory and motor block with hemodynamic stability. In addition, just minimal side effects were seen and early discharge period was observed.

The incidence of complications is increasing according to the increasing doses of local anesthetic used during spinal anesthesia. Therefore, due to the potential hemodynamic benefits interest in unilateral spinal anesthesia is increasing day by day (8). In a study the same doses of local anesthetic (hyperbaric bupivacaine 8mg) were used in unilateral and bilateral spinal anesthesia and the incidence of hypotension evaluated for both techniques. The incidence of hypotension was observed 22.4% in bilateral spinal anesthesia group and the



rate has remained at 5% in unilateral spinal anesthesia group (4).

Esmaoglu et al (9) reported that complication rates were lower, patient tolerance was better and hospital stay was shorter in unilateral spinal anesthesia when compared with bilateral spinal anesthesia in patients undergoing knee arthroscopy.

Unilateral spinal anesthesia provides a better hemodynamic stability alongside faster recovery of motor and sensory block, besides the incidence of urinary retention is also reduced in these patients. The incidence of cardiovascular complications were decreased related to the less sympathetic block in unilateral spinal anesthesia when compared with bilateral spinal anesthesia. Also patient satisfaction observed more favorable in unilateral spinal anesthesia (1.10 to 13).

There are factors that reduce the success of unilateral spinal anesthesia. Among these are patient's position, the size of the spinal needle, speed of injection and the amount and density of local anesthetic being used (14). With higher doses of bupivacaine (12-20 mg), spread of block is limited in an hour after lateral decubitus position, however if low doses of bupivacaine (5-8 mg) administered, after lateral decubitus position only 10-15 min later the block spread is limited (15,16). In a study low-dose hyperbaric bupivacaine (5mg) was used and attainment of sufficient anesthesia was observed at least 20 min waiting after the lateral decubitus position (17).

Vann et al. (18) found that when 2.5 ml of 0.5% isobaric levobupivacaine used for spinal anesthesia compared to 2.5 ml of 0.5% hyperbaric bupivacaine the onset time of sensory block was 10 min for the first and 7.3 min for the second procedure. The regression time of sensory level by two segments was 101 min and 111.7 min, sensory regression to T12 level was 139.5 min and 133.3 min, the time of motor block onset was 7.5 min. and 4.9 min, the time to recovery of block was 232.1 min and 192.9 min, respectively. In our study we have achieved an effective anesthesia and analgesia with unilateral spinal anesthesia in the lateral decubitus position with mini dose (4.5mg/3ml)

of bupivacaine. In addition, hemodynamic stability alongside the rapid recovery of sensory and motor block was achieved, thus we observed that patients with any complication discharged on the same day. Patient and surgeon satisfaction was evaluated as 90%. In our retrospective study we observed 2 patients with inadequate anesthesia and surgical procedures completed with sedoanalgesia in these patients.

In conclusion, unilateral spinal anesthesia performed in patients undergoing elective endovenous radiofrequency catheter ablation treatment of bilateral varicose veins provides early hospital discharge by creating effective anesthesia and minimal side effects and increases patients' satisfaction.

References

- 1-Imbelloni LE, Gouveia MA, Vieira EM, Cordeiro JA. A randomised, double-blind comparison of three different volumes of hypobaric intrathecal bupivacaine for orthopaedic surgery. *Anaesth Intensive Care*. 2009 Mar;37(2):242-7.
- 2-Imbelloni LE, Gouveia MA, Carneiro AF, Grigorio R. Reducing the concentration to 0.4% enantiomeric excess hyperbaric levobupivacaine (s75: r25) provides unilateral spinal anesthesia. Study with different volumes. *Rev Bras Anesthesiol*. 2012 Sep;62(5):654-64.
- 3-Casati A, Fanelli G, Aldegheri G et al – Frequency of hypotension during conventional or asymmetric hyperbaric spinal block. *Reg Anesth Pain Med*, 1999;24:214-219.
4. Imbelloni LE. O uso racional da raquianestesia. Em: Imbelloni LE, Tratado de Anestesia Raquidiana, Medidática Informática Ltda, Curitiba, 2001, Capítulo 8, p. 74.
- 5- Kaya M, Oztürk I, Tuncel G, Senel GO, Eskiçirak H, Kadioğullari N. A comparison of low dose hyperbaric levobupivacaine and hypobaric levobupivacaine in unilateral spinal anaesthesia. *Anaesth Intensive Care*. 2010 Nov;38(6):1002-7.
- 6-Tanasichuk MA, Schultz EA, Matthews JH et al – Spinal hemianalgesia: An evaluation of a method, its applicability, and influence of the incidence of hypotension. *Anesthesiology*, 1961;22:74-85.
7. Casati A, Fanelli G, Cappelleri G et al – Low dose hyperbaric bupivacaine for unilateral spinal anaesthesia. *Can J Anaesth*, 1998;45:850-854.
- 8- Carpenter RL, Caplan RA, Brown DL, Stephenson C, Wu R. Incidence and risk factors for side effects of spinal anesthesia. *Anesthesiology* 1992; 76:906-916.



- 9- Esmaglu A. Bilateral vs. unilateral spinal anesthesia for outpatient knee arthroscopies. *Knee Surg Sports Traumatol Arthrosc* 2004;12:155–8.
- 10-Tanasichuk MA, Schultz EA, Matthews JH, Van Bergen FH. Spinal hemianalgesia: an evaluation of a method, its applicability, and influence on the incidence of hypotension. *Anesthesiology* 1961; 22:74-85.
- 11-Ben-David B, Maryanovsky M, Gurevitch A, Lucyk C, Solosko D, Frankel R et al. A comparison of minidose lidocaine-fentanyl and conventional-dose lidocaine spinal anesthesia. *Anesth Analg* 2000; 91:865-870.
- 12-Kuusniemi KS, Pihlajamaki KK, Pitkanen MT, Korkeila JE. A low-dose hypobaric bupivacaine spinal anesthesia for knee arthroscopies. *Reg Anesth* 1997; 22:534-538.
- 13-Pittoni G, Toffoletto F, Calcarella G, Zanette G, Giron G P. Spinal anesthesia in outpatient knee surgery: 22-gauge versus 25-gauge Sprotte needle. *Anesth Analg* 1995; 81:73-79.
- 14-Casati A, Fanelli G. [Unilateral spinal anesthesia. State of the art]. *Minerva Anesthesiol* 2001; 67:855-862.
- 15-Povey HMR, Jacobsen J, Westergaard-Nielsen J. Subarachnoid analgesia with hyperbaric 0.5% bupivacaine: Effect of 60-min period of sitting. *Acta Anaesthesiol Scand* 1989; 33:295-297.
16. Esmaglu A, Boyaci A, Ersoy O, Guler G, Talo R, Tercan E. Unilateral spinal anaesthesia with hyperbaric bupivacaine. *Acta Anaesthesiol Scand* 1999; 42:1083-1087.
- 17- Imbelloni LE, Beato L, Gouveia MA. [Low hypobaric bupivacaine doses for unilateral spinal anesthesia]. *Rev Bras Anesthesiol* 2003; 53:579-585.
- 18- Vanna O, Chumsang L, Thongmee S. Levobupivacaine and bupivacaine in spinal anesthesia for transurethral endoscopic surgery. *J Med Assoc Thai* 2006;89:1133-1139.

