

Anestesia Peridural para Cesariana. Estudo Comparativo entre Bupivacaína Racêmica (S50-R50) e Bupivacaína com Excesso Enantiomérico de 50% (S75-R25) a 0,5% Associadas ao Sufentanil*

Epidural Block for Cesarean Section. A Comparative Study between 0.5% Racemic Bupivacaine (S50-R50) and 0.5% Enantiomeric Excess Bupivacaine (S75-R25) Associated with Sufentanil

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RESUMO

Braga AFA, Frias JAF, Braga FSS, Pereira RIC, Blumer MF, Ferreira MF - Anestesia Peridural para Cesariana. Estudo Comparativo entre Bupivacaína Racêmica (S50-R50) e Bupivacaína com Excesso Enantiomérico de 50% (S75-R25) a 0,5% Associadas ao Sufentanil.

JUSTIFICATIVA E OBJETIVOS: A bupivacaína racêmica a 0,5% associada a opioides por via peridural constitui técnica anestésica utilizada em cesariana, entretanto sua toxicidade é questionada. A bupivacaína com excesso enantiomérico de 50% apresenta menor cárdio e neurotoxicidade. Avaliou-se a eficácia da bupivacaína racêmica e da bupivacaína com excesso enantiomérico de 50% a 0,5%, associadas ao sufentanil, por via peridural, em gestantes submetidas à cesariana.

MÉTODO: Cinquenta gestantes a termo, submetidas à cesariana eletiva, sob bloqueio peridural, distribuídas em dois grupos, de acordo com o anestésico local empregado: Grupo I - bupivacaína racêmica a 0,5% com vasoconstritor; Grupo II - bupivacaína com excesso enantiomérico de 50% (S75-R25) a 0,5% com vasoconstritor. Nos dois grupos o anestésico local (100 mg) foi associado ao sufentanil (20 µg) e o volume total empregado da solução foi de 24 mL. Avaliaram-se: latência do bloqueio sensitivo; nível máximo do bloqueio sensitivo; grau do bloqueio motor; tempo para regressão do bloqueio motor; duração da analgesia; efeitos colaterais maternos e repercussões neonatais.

RESULTADOS: A latência, o nível máximo do bloqueio sensitivo, o grau do bloqueio motor e a duração da analgesia foram semelhantes nos dois grupos; o tempo para regressão do bloqueio motor foi significativamente menor no Grupo II. Os efeitos colaterais ocorreram com frequência semelhante em ambos os grupos. Ausência de alterações cardiocirculatórias maternas e repercussões neonatais.

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CONCLUSÕES: A bupivacaína racêmica e a bupivacaína com excesso enantiomérico de 50%, por via peridural, proporcionam anestesia adequada para realização de cesariana. A bupivacaína com excesso enantiomérico de 50% constitui alternativa promissora para esse tipo de procedimento, por apresentar menor tempo para regressão do bloqueio motor, desejável na paciente obstétrica.

Unitermos: ANESTESIA: peridural; ANESTÉSICOS, local: bupivacaína racêmica, mistura enantiomérica de bupivacaína (S75-R25); CIRURGIA, obstétrica: cesariana.

SUMMARY

Braga AFA, Frias JAF, Braga FSS, Pereira RIC, Blumer MF, Ferreira MF – Epidural Block for Cesarean Section. A Comparative Study Between 0.5% Racemic Bupivacaine (S50-R50) and 0.5% Enantiomeric Excess Bupivacaine (S75-R25) Associated with Sufentanil.

BACKGROUND AND OBJECTIVES: Epidural 0.5% racemic bupivacaine associated with opioids is a technique used in cesarean sections; however, its toxicity has been questioned. 50% Enantiomeric excess bupivacaine has lower cardio- and neurotoxicity. The efficacy of epidural 0.5% racemic bupivacaine and 0.5% enantiomeric excess bupivacaine associated with sufentanil in parturients undergoing cesarean sections was evaluated.

METHODS: Fifty gravida at term, undergoing elective cesarean section under epidural block, were divided in two groups according to the local anesthetic used: Group I – 0.5% racemic bupivacaine with vasoconstrictor; and Group II – 0.5% enantiomeric excess bupivacaine (S75-R25) with vasoconstrictor. In both groups, the local anesthetic (100 mg) was associated with sufentanil (20 µg), and a total of 24 mL of the solution was used. The following parameters were evaluated: latency of the sensitive blockade; maximal level of the sensitive blockade; degree for motor blockade; time of motor blockade regression; duration of analgesia; maternal side effects; and neonatal repercussions.

RESULTS: Latency, maximal level of sensitive blockade, degree of motor blockade, and duration of analgesia were similar in both groups; the mean time for regression of the motor blockade was significantly smaller in Group II. The incidence of side effects was similar in both groups. Maternal cardiocirculatory changes and neonatal repercussions were not observed.

CONCLUSIONS: Epidural racemic bupivacaine and 50% enantiomeric excess bupivacaine provided adequate anesthesia for cesarean sections. 50% Enantiomeric excess bupivacaine is a promising alternative for this procedure, since it has faster regression of the motor blockade, which is desirable in obstetric patients.

Keywords: ANESTHESIA: epidural; ANESTHETICS, local: racemic bupivacaine, enantiomeric excess bupivacaine (S75-R25); SURGERY, obstetric: cesarean section.

Epidural Block for Cesarean Section. A Comparative Study Between 0.5% Racemic Bupivacaine (S50-R50) and 0.5% Enantiomeric Excess Bupivacaine (S75-R25) Associated with Sufentanil

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INTRODUCTION

The advantages of the epidural block, widely used in obstetrics, include preserved maternal consciousness, participation at the moment of delivery, and preserved upper airways protective reflexes. The association of local anesthetics and opioids provide adequate anesthesia for the surgical procedure and greater postoperative maternal comfort. It also allows early ambulation, therefore reducing the risk of postoperative complications such as thromboembolism, ileus, and respiratory problems ¹.

The choice of bupivacaine in obstetric anesthesia was due to its increased potency and long duration of action; however, its use has been questioned because of its toxicity, especially during pregnancy ^{2,3}. The higher risk of cardiotoxicity culminated in the search for a local anesthetic (LA) with the advantages of racemic bupivacaine, regarding potency and duration of action, and decreased toxicity ⁴⁻⁶.

The enantiomeric manipulation of the components of racemic bupivacaine resulted in the formulation containing 25% of the R(+) isomer and 75% of the S(-) isomer, which produces anesthesia comparable to that of the racemic formulation without increasing the incidence of toxic effects ⁷⁻¹⁰.

The objective of this study was to evaluate comparatively in gravida undergoing epidural block for cesarean section the efficacy of racemic bupivacaine (S50-R50) and 50% enantiomeric excess bupivacaine (S75-R25), at a concentration of 0.5% associated with sufentanil, the blockade quality, and maternal and neonatal repercussions.

METHODS

This is a clinical, controlled, and randomized trial. After approval by the Ethics Committee of the Hospital and signing of the informed consent, 50 parturients at term, physical status ASA I and II, single gestation, undergoing elective cesarean section under epidural block, were included in this study. Exclusion criteria included: diagnosis of acute or chronic fetal distress, contraindications for regional block, history of hypersensitivity to the drugs used, prior administration of opioids and other central nervous system depressants, and body mass index (BMI) ≥ 40 .

The size of the study population was based on the results of Cortês et al.¹¹ and considered a 25-minute difference among mean analgesia duration (GI x GII) and 169 minutes (GI x GIII) in three study groups: Group I – racemic bupivacaine; Group II – enantiomeric excess bupivacaine; and Group III – ropivacaine. Assuming the difference in mean analgesia duration between Groups I and III, a level of significance of 5% ($\alpha = 0.05$), and a study power of 80% ($\beta = 20\%$), it was determined a study population of 25 patients in each group.

Patients were randomly divided in two groups of 25 each. Distribution was based on a computer-generated list and according to the local anesthetic used: Group I – 0.5% racemic bupivacaine with vasoconstrictor (100 mg); and Group II – 0.5% enantiomeric excess bupivacaine (S75-R25) with vasoconstrictor (100 mg). In both groups, the local anesthetic was associated with sufentanil (20 μg), and 24 mL of the solution was used.

Parturients were fasting and did not receive pre-anesthetic medication. In the operating room, all patients were continuously monitored with cardiocardiogram on the D_{II} derivation, pulse oximeter, and non-invasive blood pressure. After venoclysis with an 18G catheter, and before the blockade, 500 to 750 mL of Ringer's lactate was administered. With patients in the sitting position, a 16G Tuohy needle was introduced in the L₃-L₄ or L₂-L₃ space, and the anesthetic solution was injected over three minutes (8.0 mL/min⁻¹), followed by introduction of a 16G epidural catheter in the cephalad direction. After the blockade, patients were placed in horizontal dorsal decubitus, and the Crawford wedge was used to move the uterus to the left until delivery. Supplemental oxygen (2 to 5 L.min⁻¹) was routinely administered with a nasal catheter. Hydration consisted of the administration of Ringer's lactate (10 mL.kg⁻¹.h⁻¹). The characteristics of the spinal block were studied and other parameters were evaluated by an experienced anesthesiologist who was unaware of the local anesthetic used.

The following parameters were evaluated: 1) Maximal level of the sensitive blockade: evaluated by pin-prick every 5 minutes for 30 minutes after the injection of the anesthetic solution in the epidural space, sequentially on T₁₂, T₁₀, T₈, T₆, T₄, and T₂. In the case of partial or total block failure, a bolus of 2% lidocaine with vasoconstrictor (100 mg) was administered via the epidural catheter until the necessary level for surgery was achieved; 2) Latency of the sensitive blockade: time from the end of the injection of the anesthetic solution in the epidural space and loss of pain to pin-prick in T₁₀, which was evaluated every 5 minutes; 3) Degree of motor blockade: evaluated by the modified Bromage scale¹² (Chart I) every 5 minutes in the first 30 minutes after the injection of the anesthetic solution; 4) Duration of analgesia: Time between the blockade and the first spontaneous complaint of pain by the patient in the immediate postoperative (IPO) period. During the post-anesthetic recovery period, pain severity was evaluated by the numerical verbal scale (NVS) and, in case of a score of three or greater, analgesics were administered; 5) Time for regression of the motor blockade: length of time between the blockade and recovery of free lower limb movements (0 degree); 6) Maternal cardiocirculatory and respiratory parameters: systolic and diastolic blood pressure (SBP and DBP), heart rate (HR), and oxygen saturation (SpO₂) were evaluated at the following moments: before the blockade (M0), immediately after the administration of the local anesthetic (M1), every five minutes during the surgery (M2), at the end of the surgery (M3); and at the time of discharge from the post-anesthetic recovery room (M4); 7) Intraoperative maternal adverse effects: nausea, vomiting, pruritus, somnolence, respiratory depression (SpO₂ $\leq 90\%$ and respiratory rate below 10 breaths per minute); 8) Neonatal repercussions: Apgar index in the first and fifth minutes.

The time between the end of the administration of the anesthetic solution in the epidural space and skin incision was considered the beginning of the surgery (minutes); the time (minutes) between skin incision and the end of the procedure was considered the duration of the surgery; time for fetal extraction (minutes): time between the beginning of the surgery and delivery.

Urinary retention was not evaluated, since all patients had a urinary catheter in the postoperative period. Hypotension was defined as a reduction in systolic blood pressure $\geq 20\%$ of baseline levels or below 100 mmHg and, if present, it was treated with the fast infusion of crystalloids, and if it persisted, ephedrine (bolus IV administration of 5 to 10 mg); bradycar-

Chart I – Degree of Motor Blockade (Bromage scale¹²)

0	Moves lower limbs freely
1	Able to flex the knees and to move the feet
2	Can only flex the feet
3	Complete immobilization of the lower limbs

dia was defined as a heart rate below 50 beats per minute and treated with IV atropine (0.01 to 0.02 mg.kg⁻¹).

To study the latency, duration of analgesia, and time for regression of the motor blockade, the Mann-Whitney test was used; to analyze the degree of the motor blockade and level of sensitive blockade, Fisher's exact test was used; and Manova was used to analyze cardiocirculatory parameters. Moment M2 was considered the mean of the mean values obtained at 5-minute intervals during the surgery. A level of significance of 5% was adopted.

RESULTS

A case of block failure, which needed supplementation with lidocaine through the epidural catheter was seen in GI (S50-R50); in GII (S75-R25), one patient developed an obstetric complication requiring general anesthesia. Both cases were excluded from the study, and therefore 24 patients in each group were considered for analysis of the data.

Significant differences between both groups regarding patients' characteristics (Table I) and surgery (Table II) were not seen.

As for the characteristics of the epidural block (Table III), it presented a latency of 11.5 ± 4.8 minutes in GI (S50-R50) and

12.7 ± 3.3 minutes in GII (S75-R25), which did not represent a statistically significant difference ($p = 0.159$). The maximal level of sensitive blockade varied from T₈ to T₄ in both groups, also without a significant difference ($p = 0.256$). However, in GII the level varied from T₆ to T₄ in 20 patients (83.33%).

The duration of analgesia was similar in both groups. The degree of motor blockade varied from 1 to 3, with predominance of degree 2 in both groups. Time for regression of the motor blockade was significantly smaller in GII (Figure 1).

Table III – Characteristics of the Blockade

Parameters	Group I	Group II	p
Latency T ₁₀ (min) *	11.5 ± 4.8	12.7 ± 3.3	0.15
Maximal level of sensitive blockade (30 min) **			0.25
T ₈	9 (37.5%)	4 (16.7%)	
T ₆	9 (37.5%)	10 (41.7%)	
T ₄	6 (25.0%)	10 (41.7%)	
Duration of analgesia (min)*	345.1 ± 66.3	331.0 ± 77.1	0.38
Motor Blockade (30 min)**			0.20
Degree 1	6 (25.0)	8 (33.3)	
Degree 2	14 (58.3)	15 (62.50)	
Degree 3	4 (16.6)	1 (4.2)	
Time for Regression of the Motor Blockade (min)*	237.0 ± 101.0	187.6 ± 71.7	0.04

Results expressed as Mean ± SD and number of patients (%)

* Mann-Whitney test; ** Fisher exact test

Table I – Patients' Characteristics

Parameters	Group I	Group II	p
Age (years)*	28.0 ± 7.1	30.3 ± 6.0	0.22
Weight (kg)*	76.6 ± 10.4	75.3 ± 12.7	0.69
Height (m)*	1.6 ± 0.0	1.6 ± 0.1	0.29
BMC (kg.m ²)*	30.7 ± 3.5	30.8 ± 4.3	0.89
Physical status**			1.0
ASA 1	12	12	
ASA 2	12	12	
Number of pregnancies ***			0.84
Nullipara	8	6	
Multipara	16	18	

Results expressed as Mean ± SD and number of patients

* Student *t* test; ** Chi-square test; *** Mann-Whitney test

Table II – Characteristics of the Surgical Procedure

Parameters	Group I	Group II	p
Beginning of the surgery (min)	21.8 ± 5.1	26.5 ± 6.1	0.38
Duration of the surgery (min)	82.0 ± 20.7	84.9 ± 23.3	0.73
Fetal extraction (min)	16.7 ± 5.8	19.6 ± 7.7	0.21

Results expressed as Mean ± SD

Mann-Whitney test

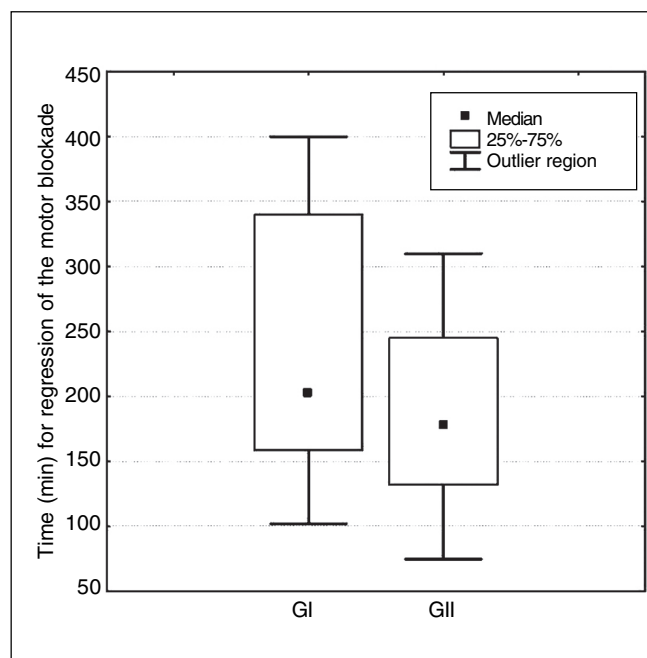


Figure 1 – Time Range for Regression of the Motor Blockade.

In both groups, hemodynamic changes were similar; mean SBP, DBP, and HR at the different study moments did not show significant differences (Figures 2, 3, and 4). Individual analysis of cardiocirculatory parameters showed hypotension in eight (33.33%) patients in GI and in eight (33.33%) patients in GII, in the interval between the 5th and 30th minute

after the end of the injection of anesthetic solution, which was reverted with ephedrine (mean dose of 12 mg) in five patients in each group.

The respiratory rate in all patients remained above 10 breaths per minute, and peripheral O₂ saturation between 95 and 100%.

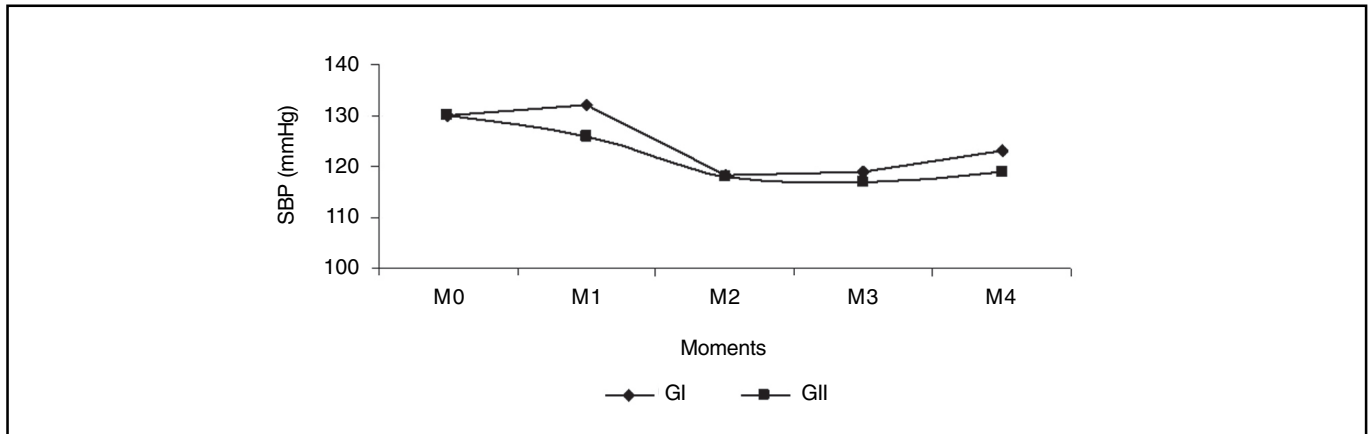


Figure 2 – Systolic Blood Pressure. Mean values.

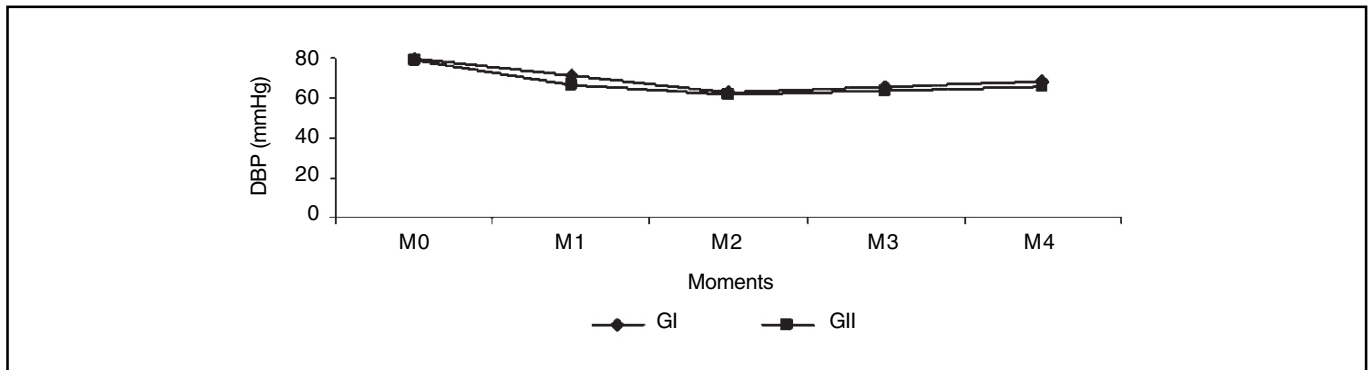


Figure 3 – Diastolic Blood Pressure. Mean values.

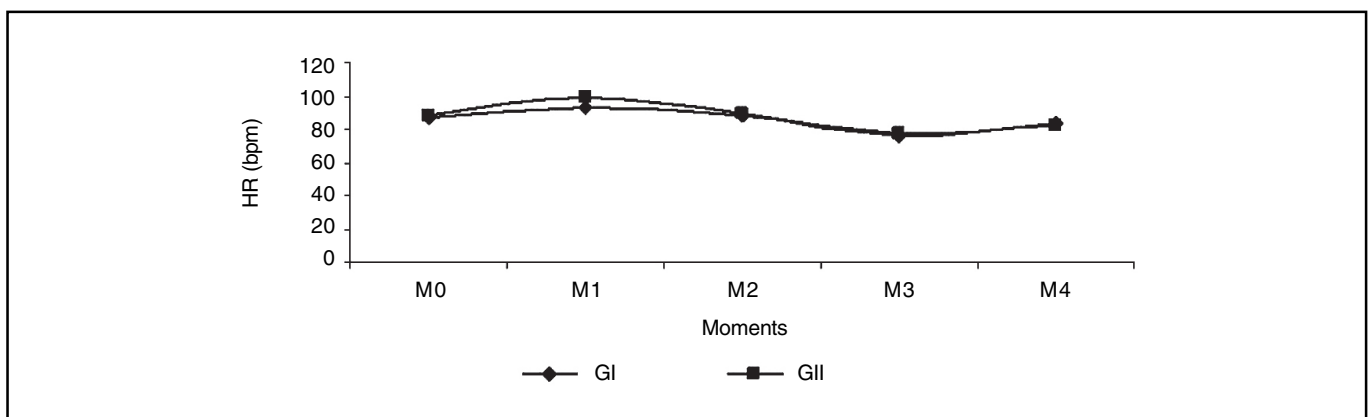


Figure 4 – Heart Rate. Mean values.

Table IV – Side Effects

Side effect	Group I	Group II
Nausea	5 (20.83)	6 (25.00)
Vomiting	3 (12.5)	2 (8.33)
Pruritus	4 (16.66)	5 (20.83)
Somnolence	8 (33.33)	6 (25.00)

Results expressed as numbers of patients and %

The Apgar index varied from 9 to 10 in the first and fifth minutes, respectively. As for side effects (Table IV), the behavior in both groups was similar.

DISCUSSION

Enantiomeric excess bupivacaine (S75-R25) is a local anesthetic derived from bupivacaine developed in Brazil during the last two decades of the XX Century⁸. Due to the concepts of optical isomery, it has a pharmacological profile that is unique and distinct from the racemic mixture (S50-R50), as well as from that of the pure enantiomers R(+) and S(-). Although widely used, it needs scientific subsidies to explain its pharmacology, which should have been done in the pre-clinical phase¹⁰.

In vivo experiments with mouse sciatic nerve, the enantiomeric mixture in the S90:R10, S80:R20, and S75:R25 proportions produced greater nerve block than the pure S(-) enantiomer. In other studies with animals with the intravenous use of the enantiomeric mixture in different proportions, pure S(-) and R(+) enantiomers, and the racemic mixture, the racemic form was associated with cardiac collapse in the majority of cases. The R isomer shows stronger binding to sodium channels and slower dissociation than the S isomer, which is responsible for its lower cardiotoxicity^{8,13}.

Among the experimental studies with bupivacaine (S75-R25), none reported neurological changes. As for racemic bupivacaine (S50-R50), it has been described that pregnant sheep are more sensitive to neurologic damage than non-pregnant sheep, developing seizures even when lower doses are used¹⁴. Recently, a study with guinea pigs on the neurotoxicity of the subarachnoid administration of local anesthetics showed that large volumes of levobupivacaine and bupivacaine (S75-R25) caused little damage to the central nervous system when compared with racemic bupivacaine. In guinea pigs that received racemic bupivacaine, morphologic changes in the spinal cord were significantly more severe than those observed with levobupivacaine and bupivacaine (S75-R25)¹⁵.

In the present study, neurologic or cardiovascular changes were not observed, which is similar to the results described when using 0.5% bupivacaine (S75-R25) in doses ranging from 100 to 200 mg in epidural or regional blocks^{11,16-20}. The level of the blockade during regional blocks is an important factor to determine adequate intraoperative analgesia in

cesarean section. However, it is fundamental to be aware that increasing the dose of the local anesthetic can be associated with a higher incidence of toxic effects, especially with racemic bupivacaine. Russel²¹, in a study with 220 grávida undergoing cesarean section with neuroaxis block without opioids, established T₅ as the ideal level of sensitive blockade to obtain adequate surgical analgesia. In epidural block, the reduction in the rate of failure is proportional to the volume of local anesthetic administered, being negligible above specific volumes. Therefore, 17 mL of racemic bupivacaine can block 13.7 dermatomes (T₈-T₇), while 30 mL only increases by four the number of segments blocked (T₆-T₃). The association of local anesthetic with epinephrine is advantageous, since it reduces its plasma levels and crossing of the placenta, besides intensifying the blockade, and improving the quality of anesthesia¹.

The use of adjuvant drugs especially liposoluble opioids, besides allowing the use of smaller doses of local anesthetics, improves the quality of intra- and postoperative analgesia^{22,23}. In this study to evaluate the dose/effect relationship of bupivacaine (S75-R25) by comparing it with racemic bupivacaine (S50-R50), the dose used was smaller than that of other investigators^{11,16,17}. As for the characteristics of the blockade, latency was similar in both groups, with a discrete tendency for longer latency in GII (S75-R25); however, this time differs from that reported by other authors¹¹ who described shorter latencies, which can be attributed to the use of larger doses (115 mg). At 30 minutes, the maximal level of sensitive blockade did not extend beyond T₄ in both groups, but in GII (S75-R25) the blockade reached T₆ and T₄ in a greater number of patients (83%). Time of analgesia was also similar between both groups.

The rate of administration of the anesthetic solution is associated with the distribution and dispersion of the solution and, consequently, with the quality of the blockade, especially regarding patient comfort and safety, with a lower risk of hypotension, besides increasing the duration of analgesia. Fast administration can cause greater dispersion of the local anesthetic with an extensive absorption area through the surface of the vessels and considerable loss through intervertebral foramina, which contribute for lower concentrations of the local anesthetic in contact with the nerve²⁴.

In both groups, a predominance of grade 2 motor blockade was observed 30 minutes after the injection of the local anesthetic, and the time for regression was significantly lower in GII (S75-R25), and those results are similar to those reported by other authors¹¹.

Maternal hypotension occurs frequently during regional blocks for cesarean section and can be aggravated by compression of the vena cava by the pregnant uterus. Repercussions on the cardiac output and peripheral vascular resistance secondary to the systemic absorption of the local anesthetic, associated or not with a vasoconstrictor, represent additional factors for this complication during epidural blocks¹. In the present study, 33.33% of the patients deve-

loped hypotension between the fifth and the 30th minute after the end of the injection of the anesthetic solution. The incidence was greater than that reported by other authors¹¹ who, although using higher volumes of epidural anesthetic solution for cesarean section, described only one case of hypotension. In other studies, the comparison of the pure S(-) isomer with the racemic mixture demonstrated that hypotension was the most common complication, affecting approximately 66.7% of the patients, and significant differences were not observed between both anesthetics^{4,24,25}. Pruritus and somnolence are inherent to the use of opioids and their incidence in the present study was similar to that reported by other authors^{4,24,26}. Nausea and vomiting are mainly due to hypotension secondary to the sympathetic blockade, manipulation of the abdominal cavity structures, and the use of opioids, and they can affect up to 80% of the patients undergoing cesarean section under regional block²⁷. In this study, the incidence of intraoperative nausea was considered low, which can be attributed to the opioid associated with the local anesthetic²⁸. The results allow us to conclude that epidural racemic bupivacaine and 50% enantiomeric excess bupivacaine, in the concentrations and doses used here, provide adequate anesthesia for cesarean section without maternal and neonatal consequences. 50% enantiomeric excess bupivacaine represents a promising alternative for this type of procedure since it has a shorter motor blockade regression time, which is desirable in obstetric patients by allowing early ambulation and better contact between mother and child.

REFERENCES

- Mathias RS, Carvalho JCA - Anestesia regional para cesárea. *Rev Bras Anesthesiol* 1993;43:43-56.
- Albright GA - Cardiac arrest following regional anesthesia with etidocaine or bupivacaine. *Anesthesiology* 1979;51:285-287.
- Simonetti MPB - Ropivacaína: estado atual e perspectivas futuras. *Rev Bras Anesthesiol* 1995;45:131-140.
- Garcia JBS, Oliveira JR, Silva EPA et al. - Estudo comparativo entre levobupivacaína a 0,5% e bupivacaína racêmica a 0,5% associadas ao sufentanil na anestesia peridural para cesariana. *Rev Bras Anesthesiol* 2001;51:377-384.
- Mather LE, Chang DH - Cardiotoxicity with modern local anaesthetics: is there a safer choice? *Drugs* 2001;61:333-342.
- Liguori GA, Chimento GF, Borow L et al. - Possible bupivacaine toxicity after intra-ocular injection for postarthroscopy analgesia of the knee: implications of the surgical procedure. *Anesth Analg* 2002;94:1010-1013.
- Simonetti MPB - A contribuição da quiralidade na qualidade total na anestesia regional. *Rev Bras Anesthesiol* 1997;47:86-88.
- Simonetti MPB, Ferreira FMC - Does the D-isomer of bupivacaine contribute to the improvement of efficacy in neural block? *Reg Anaesth Pain Med* 1999;24(Suppl):43.
- Gristwood R, Bardsley H, Baker H et al. - Reduced cardiotoxicity of levobupivacaine compared with racemic bupivacaine (Marcaine): new clinical evidence. *Exp Opin Invest Drugs* 1994;3:1208-1212.
- Simonetti MPB - Comparação entre os efeitos hemodinâmicos da intoxicação aguda com bupivacaína racêmica e a mistura com excesso enantiomérico de 50% (S75:R25). Estudo experimental em cães. *Rev Bras Anesthesiol* 2006;56:679-682.
- Côrtes CAF, Oliveira AS, Castro LFL et al. - Estudo comparativo entre bupivacaína a 0,5%, mistura enantiomérica de bupivacaína (S75-R25) a 0,5% e ropivacaína a 0,75% associadas ao fentanil em anestesia peridural para cesariana. *Rev Bras Anesthesiol* 2003;53:177-187.
- Bromage PR - A comparison of the hydrochloride and carbon dioxide salts of lidocaine and prilocaine in epidural analgesia. *Acta Anaesth Scand* 1965;(Suppl 16):55-69.
- Trachez MM, Zapata-Sudo G, Moreira OR et al. - Motor nerve blockade potency and toxicity of non-racemic bupivacaine in rats. *Acta Anaesthesiol Scand* 2005;49:66-71.
- Santos AC, DeArmas PI - Systemic toxicity of levobupivacaine, bupivacaine, and ropivacaine during continuous intravenous infusion to nonpregnant and pregnant ewes. *Anesthesiology* 2001;95:1256-1264.
- Vasconcelos Filho PO, Posso IP, Capelozzi M et al. - Comparação das alterações histológicas da medula espinhal e neurológicas de cobaias após anestesia subaracnóidea com grandes volumes de bupivacaína racêmica, de mistura com excesso enantiomérico de 50% de bupivacaína (S75-R25) e de levobupivacaína. *Rev Bras Anesthesiol* 2008;58:234-245.
- Gonçalves RF, Lauretti GR, Mattos AL - Estudo comparativo entre bupivacaína a 0,5% e mistura enantiomérica de bupivacaína (S75-R25) em anestesia peridural. *Rev Bras Anesthesiol* 2003; 53:169-176.
- Tanaka PP, Souza RO, Salvalaggio MFO et al. - Estudo comparativo entre a bupivacaína a 0,5% e a mistura enantiomérica de bupivacaína (S75-R25) a 0,5% em anestesia peridural em pacientes submetidos à cirurgia ortopédica de membros inferiores. *Rev Bras Anesthesiol* 2003;53:331-337.
- Sato RTC, Porsani DF, Amaral AGV et al. - Bupivacaína racêmica a 0,5% e mistura com excesso enantiomérico de 50% (S75-R25) a 0,5% no bloqueio do plexo braquial para cirurgia ortopédica. Estudo comparativo. *Rev Bras Anesthesiol* 2005;55:165-174.
- Soares LF, Barros ACM, Almeida GP et al. - Volume anestésico mínimo para bloqueio retrobulbar extraconal: comparação entre soluções a 0,5% de bupivacaína racêmica, de levobupivacaína e da mistura enantiomérica S75-R25 de bupivacaína. *Rev Bras Anesthesiol* 2005;55:263-268.
- Imbelloni LE, Beato L, Beato CC et al. - Analgesia pós-operatória com bloqueio bilateral do nervo pudendo com bupivacaína S75-R25 a 0,25%. Estudo piloto em hemorroidectomia sob regime ambulatorial. *Rev Bras Anesthesiol* 2005;55:614-621.
- Russell IF - Levels of anaesthesia and intraoperative pain at caesarean section under regional block. *Int J Obstet Anesth* 1995;4:71-77.
- Shapiro A, Fredman B, Olsfanger D et al. - Anaesthesia for caesarean delivery: low-dose epidural bupivacaine plus fentanyl. *Int J Obstet Anesth* 1998;7:23-26.
- King MJ, Bowden MI, Cooper GM - Epidural fentanyl and 0.5% bupivacaine for elective caesarean section. *Anaesthesia* 1990; 45:285-288.
- Bergamaschi F, Balle VR, Gomes MEW et al. - Levobupivacaína versus bupivacaína em anestesia peridural para cesarianas. Estudo comparativo. *Rev Bras Anesthesiol* 2005;55:606-613.
- Christelis N, Harrad J, Howell PR - A comparison of epidural ropivacaine 0,75% and bupivacaine 0,5% with fentanyl for elective caesarean section. *Int J Obstet Anesth* 2005;14:212-218.
- Delfino J, Vale NB - Levobupivacaína em volumes fixos e concentrações diferentes associada a opióides em anestesia peridural para cesarianas. *Rev Bras Anesthesiol* 2000;50:437-441.
- Balki M, Carvalho JC - Intraoperative nausea and vomiting during caesarean section under regional anesthesia. *Int J Obstet Anesth* 2005;14:230-241.

28. Dahlgren G, Hultstrand C, Jakobsson J et al. - Intrathecal sufentanil, fentanyl, or placebo added to bupivacaine for cesarean section. *Anesth Analg* 1997;85:1288-1293.

RESUMEN

Braga AFA, Frias JAF, Braga FSS, Pereira RIC, Blumer MF, Ferreira MF - Anestesia Epidural para Cesárea. Estudio Comparativo entre Bupivacaína Racémica (S50-R50) y Bupivacaína con Exceso Enantiomérico de 50% (S75-R25) a 0,5% Asociadas al Sufentanil.

JUSTIFICATIVA Y OBJETIVOS: La bupivacaína racémica a 0,5% asociada a opioides por vía epidural constituye una técnica anestésica utilizada en cesárea, sin embargo su toxicidad se pone en tela de juicio. La bupivacaína con exceso enantiomérico de 50%, presenta un menor cardio y neurotoxicidad. Se evaluó la eficacia de la bupivacaína racémica y de la bupivacaína con exceso enantiomérico de 50% a 0,5%, asociadas al sufentanil, por vía epidural en embarazadas sometidas a la cesárea.

MÉTODO: Cincuenta embarazadas a término, sometidas a la cesárea electiva bajo bloqueo epidural, distribuidas en dos grupos, de acuerdo con el anestésico local usado: Grupo I - bupivacaína

racémica a 0,5% con vasoconstrictor; Grupo II - bupivacaína con exceso enantiomérico de 50% (S75-R25) a 0,5% con vasoconstrictor. En los dos grupos el anestésico local (100 mg) estuvo asociado al sufentanil (20 µg) y el volumen total usado de la solución fue de 24 mL. Se evaluaron: la latencia del bloqueo sensitivo; nivel máximo del bloqueo sensitivo; grado del bloqueo motor; tiempo para la regresión del bloqueo motor; duración de la analgesia; efectos colaterales maternos y repercusiones neonatales.

RESULTADOS: La latencia, el nivel máximo del bloqueo sensitivo, el grado del bloqueo motor y la duración de la analgesia fueron similares en los dos grupos; el tiempo para la regresión del bloqueo motor fue significativamente menor en el Grupo II. Los efectos colaterales ocurrieron con frecuencia similar en los dos grupos. Hubo ausencia de alteraciones cardiocirculatorias maternas y repercusiones neonatales.

CONCLUSIONES: La bupivacaína racémica y la bupivacaína con exceso enantiomérico de 50%, por vía epidural, proporcionan una anestesia adecuada para la realización de la cesárea. La bupivacaína con exceso enantiomérico de 50%, es una alternativa promisorio para ese tipo de procedimiento, por presentar un menor tiempo para la regresión del bloqueo motor, lo que mucho se desea en la paciente obstétrica.