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Comparative Assessment of Bupivacaine and Levobupivacaine in Elective Cesarian Section Cases

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Abstract

The anesthetist is held responsible for ensuring a stable and safe operative and post-operative environment so as to aid in the faster and uneventful recovery of the patient. Spinal anesthesia in obstetric surgeries has been gaining rapid acceptance as a choice method but the agent of choice for anesthesia must be such that it can provide a stable state for both the mother and child. The present study was done to ascertain the comparative efficacy of two agents levobupivacaine and bupivacaine in elective cesarian surgery cases. The results showed that levobupivacaine had a shorter duration of sensory and motor block as well as statistically significant lower levels of side effects as compared to bupivacaine. The authors concluded that levobupivacaine may be a more feasible alternative in such surgeries as compared to bupivacaine.

Keywords: Bupivacaine; Cesarian section; Levobupivacaine.

Introduction

Spinal Anesthesia has been now made a part of almost all routine elective surgeries and has been awarded the distinction of being a safer and superiorly effective modality in surgical analgesia and anesthesia. During elective cesarian sections, using a subarachnoid block has been documented and evidentiarily proved to be the most effective technique owing to its quick initiation and effect of sensory-motor blocks.[1] In these procedures the commonly used agent is bupivacaine. This drug is a mixture of a combination of two isomeric forms, namely dextro and levo- bupivacaine. This innate combination renders the anesthetic agent a hypobaric property in contrast to cerebrospinal fluid which is isobaric. The bupivacaine is thus rendered in a hyperbaric state by mixing with 8 per cent dextrose that provides a more stable compound capable of providing a regular and low level block sustaining a analgesic atmosphere conducive to the surgery.[2]

Despite its widely advocated use in spinal anaesthesia, the compound bupivacaine does suffer from its share of adversities, namely, the incidence of sudden cardiac arrest, which can be found to occur along with bradycardia and hypotension in the operative period if the block is extended.[3] This conundrum has driven studies that have eluded the so called best spinal agent and yielded a promising drug from bupivacaine itself, namely levobupivacaine. This enantiomeric drug has provided better results in many studies owing to its stable and isomeric, isobaric nature that displays lower toxicities in the central nervous systems as well as the cardiac functions. It has been reported that a more rapid rate of protein binding has effectively lowered the adverse manifestations in

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case of levobupivacaine as were encountered with its parent drug bupivacaine.[4,5]

In the region of southern Rajasthan, literature review did not yield any study that assessed the comparative effects of these two drugs on expecting mothers who were posted for elective cesarian sections. The present study was conducted to compare and report the features of spinal block, adverse reactions and general features of these subjects when administered bupivacaine and levobupivacaine.

Materials and Methods

The study was a prospective, randomized double blind study conducted in Pacific Institute of Medical Sciences, Udaipur over a period of 8 months. The authors submitted a proposal for the study to the Institutional Ethical Clearance Committee and obtained a permission prior to commencement of the study. The study included willing volunteers who were expectant mothers and were scheduled to be posted for elective cesarian section. All the subjects were explained the details of the study and written informed consent was obtained before their inclusion. The subjects were free to recuse themselves from the study at any stage. The inclusion criteria included expectant mothers with no premorbidities and who were preoperatively assessed to fall under ASA-I or II category. The subjects were assessed preoperatively to ascertain if the mother and fetus were normal and had no complications. The subjects were divided in two categories by a randomized method and only one author was aware of the distinction. The subjects were attended to along routine preoperative management guidelines. The subjects were counselled and made aware of the methods for sensory and motor testing as well as the procedure of the surgery. The subjects in group A were administered 2 ml of 0.5% isobaric levobupivacaine (10 mg) and those in Group B received 2 ml of 0.5% hyperbaric bupivacaine (10 mg) intrathecally. The anaesthesiologist administering the study drugs as well as the patients were blinded to the group allocation. The patients were placed supine with a left lateral tilt following the subarachnoid block. Surgery was allowed to start once T6 or above level of sensory block was achieved. Non invasive monitoring of vital parameters was continued from the pre op period till discharge from recovery room. Parameters were recorded every 2 mins till first 20 minutes thereafter recorded every 5 mins till end of caesarean section. Sensory block was assessed using pin prick method over the anterior axillary line, while motor block was recorded using modified bromage scale.

Results

The study pool comprised of 40 adult females having no pre morbidities and no pregnancy related complications. All the subjects were having a single non complicated intrauterine pregnancy. The demographics of the subjects showed no variations and no significant differences were seen in their data (Table 1).

Table 1: Patient Demographics.

	Group A	Group B
Age (Yrs)	22.9	22.4
Height (cms)	147	151
Weight(Kgs)	59.2	58.6
Duration of Surgery (mins)	41.3	42.1

Sensory block duration was recorded for both the groups and revealed that there was no significant difference in the time taken for onset of sensory block and in achieving complete sensory block in the selected subjects. However a statistically significant difference was observed in the time taken for regression of the sensory block as well as the total duration of the sensory block among the two groups. (Table 2).

The data showed that the subjects who received levobupivacaine were having a lower duration of sensory block duration as well as a shorter duration of sensory block as compared to the bupivacaine group.

Table 2: Sensory Block Comparison (Minutes).

	Group A	Group B	P Value
Onset of Sensory Block	2.9 ± 0.65	3.1 ±0.76	NS
Complete Sensory Block	7.54 ± 1.23	7.66 ± 1.87	NS
Removal of Block	49 ± 3.66	57 ± 4.87	P< 0.05
Duration of Sensory Block	78 ± 5.77	84 ± 2.99	P< 0.05

In terms of motor block durations, both the groups showed statistically significant differences between the time taken for onset as well as complete motor blockage in the selected sample. The time was considerably shorter in the bupivacaine group as compared to levobupivacaine, however in the measurement of total duration of motor block, we observed that the regression of motor block took significantly longer in the bupivacaine group as compared to the levobupivacaine group. (Table 3).

Table 3: Motor Block Comparison (Minutes).

	Group A	Group B	P Value
Onset of motor Block	3.1 ± 1.12	2.97 ± 0.78	P < 0.05
Complete Motor block	7.88 ± 1.19	5.88 ± 1.76	P < 0.05
Duration of Motor block	68 ± 9.87	96 ± 8.14	P < 0.05

Subjects reported a statistically significant lower incidence of unfavourable effects in the post operative period in the levobupivacaine group as compared to the bupivacaine group. (Table 4).

Table 4: Adverse Effects in Post Operative Period.

	Group A	Group B	P Value
Hypotension	1 (5 %)	4 (20 %)	P < 0.05
Bradycardia	1 (5 %)	4 (20 %)	P < 0.05
Nausea	2 (10%)	5 (25%)	P < 0.05
Vomiting	0	3 (15%)	P < 0.05

Discussion

The present study provided us with observations that stated that it was the use of isobaric levobupivacaine that rendered a more stable operative anesthetic and analgesic state as compared to the older bupivacaine component. Both the agents were effective in providing a stable environment in the operating room but the relative and comparative efficacy of levobupivacaine was higher in terms of sensory and motor block as well in reduced incidence of post-operative adverse effects. The patient compliance was absolute and none of the subjects had any major effects. All the deliveries were uneventful.

Our study finds concurrence with studies by various authors[6-7] wherein they have mentioned the relative efficiency of levobupivacaine in spinal anesthesia and abdominal surgeries. In terms of elective cesarian sections, a study on Indian population by Goyal et al[7] and a western study by Gautier et al[15] concluded that using levobupivacaine singularly may not provide an effective analgesia and that fentanyl may be used as an additive, however, our study found that the use of any opioid analgesic may not be required as the operative analgesia was well managed by using levobupivacaine singularly. In the study by Gautier et al,[15] the dosages of levobupivacaine used were approximately 2 mg lower than those in the present study and could be the responsible to lower analgesic effects.

This is in concurrence with a study done by Duggal R et al[8] wherein the authors conducted a similarly planned study and reported that use of a opioid analgesic was not warranted nor needed in their sample pool in the intra-operative period, but recommended that this be done on a case to case basis rather than using it as a standard protocol. The subjects in our study were regularly assessed for their pain scores in the post-operative period.

We observed that in terms of achieving sensory block, the group A or levobupivacaine group showed a faster incidence and faster regression as compared with group B or bupivacaine group. This is inclement on the idea that levobupivacaine can be a better alternative for faster or rapid induction and easier regression as compared to traditional bupivacaine. This is similar to findings done in studies by a number of authors[9-11] who stated that in spinal anesthesia cases, using a levobupivacaine agent proved to have a better outcome. The study by Glaser C et al[10] also stated that the exit from anaesthesia was only marginally better in levobupivacaine group of patients but was still significant statistically.

In observations related to motor block, it was seen that bupivacaine or group B subjects had a faster onset of motor block as well as a longer motor block duration as compared to Group A or levobupivacaine group subjects. This is in concurrence with studies by Duggal R et al and Gori et al[8,12], wherein the authors reported similar findings. The rationale behind this is stated to be the fact that levobupivacaine being an isobaric agent has the stability to provide a block lower than the segment along which it is introduced thus making it slightly longer in onset and rapid in regression. In contrast, it has been stated that bupivacaine is a hyperbaric agent and has been known to provide a higher level of block. This works actually as a disadvantage to the anesthetist as it can mitigate circumstances in the operating room which can cause unfavorable outcomes.[12,13] The findings of this observation are not in agreement with the findings by Gautier et al,[15] wherein the authors found the use of traditional bupivacaine as a better option, however the authors also stated in their conclusion that addition of sufentanil was a factor in declaring superiority of traditional bupivacaine in their study.

The side effects observed in the study sample were higher in the bupivacaine group. The prone nature of bupivacaine to cause hypotension leads to a fall in placental perfusion which can cause decreased blood flow to the foetus. This is grossly lower when levobupivacaine is used. The other

aspect of nausea and vomiting stems from the fact that hypotension can also cause a reduced blood flow to the cerebral circulation. This is also significantly lower in levobupivacaine cases in our study as well as many reported studies.[8,13–14] Sundarathiti P et al stated that they found a more superior block in cases of hyperbaric bupivacaine, the results showed that levobupivacaine was a effective alternative. The side effects observed were non significant in their study.[15]

Conclusion

The present study and its observations led us to the conclusion that in surgical practice, both the agents bupivacaine and levobupivacaine provide us with an effective anesthetic and analgesic cover. The duration of block observed was lower in levobupivacaine cases as well as the incidence of hypotension and side effects. This can be helpful for the anesthetist in deciding to use levobupivacaine as a viable and safer alternative in short duration surgeries like the cesarian section. The study is limited by its small sample size and lack of in depth diagnostic monitoring during the surgery, but the authors are confident that larger scale studies will yield positive results in favor of using levobupivacaine in routine short term surgeries.

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Conflict of Interest: Nil.

References

1. McDonald SB, Liu SS, Kopacz DJ, Stephenson CA. Hyperbaric spinal ropivacaine a comparison to bupivacaine in volunteers. Anesthesiology: The Journal of the American Society of Anesthesiologists. 1999 Apr 1;90(4):971–7.
2. Richardson MG, Wissler RN. Densities of dextrose-free intrathecal local anesthetics, opioids, and combinations measured at 37 degrees C. Anesthesia and Analgesia. 1997 Jan 1;84(1):95–9.
3. Morrison SG, Dominguez JJ, Frascarolo P, Reiz S. A comparison of the electrocardiographic cardiotoxic effects of racemic bupivacaine, levobupivacaine, and ropivacaine in anesthetized swine. Anesthesia and Analgesia. 2000 Jun 1;90(6):1308–14.
4. Huang YF, Pryor ME, Mather LE, Veering BT. Cardiovascular and central nervous system effects of intravenous levobupivacaine and bupivacaine in sheep. Anesthesia and Analgesia. 1998 Apr 1;86(4):797–804.
5. Povey HM, Jacobsen J, Westergaard-Nielsen J. Subarachnoid analgesia with hyperbaric 0.5% bupivacaine: effect of a 60-min period of sitting. Acta anaesthesiologica scandinavica. 1989 May;33(4):295–7.
6. Guler G, Cakir G, Ulgey A, Ugur F, Bicer C, Gunes I, Boyaci A. A comparison of spinal anesthesia with levobupivacaine and hyperbaric bupivacaine for cesarean sections: A randomized trial.
7. Goyal A, Shankaranarayan P, Ganapathi P. A randomized clinical study comparing spinal anesthesia with isobaric levobupivacaine with fentanyl and hyperbaric bupivacaine with fentanyl in elective cesarean sections. Anesthesia, Essays and Researches. 2015 Jan;9(1):57.
8. Duggal R, Kapoor R, Moyal G. A comparison of intrathecal levobupivacaine with hyperbaric bupivacaine for elective cesarean section: A prospective randomized double-blind study. J Obstet Anaesth Crit Care 2015;5:78–83.
9. Fattorini F, Ricci Z, Rocco A, Romano R, Pascarella MA, Pinto G. Levobupivacaine versus racemic bupivacaine for spinal anaesthesia in orthopaedic major surgery. Minerva Anestesiol 2006;72:637–44.
10. Glaser C, Marhofer P, Zimpfer G, Heinz MT, Sitzwohl C, Kapral S, et al. Levobupivacaine versus racemic bupivacaine for spinal anesthesia. Anesth Analg 2002;94:194–8.
11. Lee YY, Muchhal K, Chan CK. Levobupivacaine versus racemic bupivacaine in spinal anaesthesia for urological surgery. Anaesth Intensive Care 2003;31:637–41.
12. Gori F, Corradetti F, Cerotto V, Peduto VA. Influence of positioning on plain levobupivacaine spinal anesthesia in cesarean section. Anesthesiol Res Pract 2010;2010. pii: 212696.
13. Carpenter RL, Caplan RA, Brown DL, Stephenson C, Wu R. Incidence and risk factors for side effects of spinal anesthesia. Anesthesiology 1992;76:906–16.
14. Sundarathiti P, Sangdee N, Sangasilpa I, Prayoonhong W, Papoun S. Comparison of intrathecal bupivacaine, levobupivacaine for cesarean section. J Med Assoc Thai 2014;97:710–6.
15. Gautier P, De Kock M, Huberty L, Demir T, Izydorczic M, Vanderick B. Comparison of the effects of intrathecal ropivacaine, levobupivacaine, and bupivacaine for Caesarean section. Br J Anaesth 2003;91:684-9.