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COMPARISON OF INTRATHECAL DEXMEDETOMIDINE AND BUPRENORPHINE AS ADJUVANT TO BUPIVACAINE FOR LOWER LIMB SURGERIES

Anaesthesiology

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ABSTRACT

Background: Spinal anaesthesia is apt for lower limb surgeries and various adjuvants are used in subarachnoid block owing to its benefits. In literature, the study comparing the effects of buprenorphine and dexmedetomidine are sparse. The better adjuvant among these two agents still needs to be explored.

Objectives: To compare the onset and duration of sensory and motor blockade, hemodynamic changes, sedative effects and incidence of side effects with dexmedetomidine versus buprenorphine as adjuvant to intrathecal bupivacaine.

Methodology: 60 patients undergoing lower limb surgeries under intrathecal anaesthesia were randomized into two groups of 30 patients each. Bupivacaine was combined with Burenorphine (Group B), with Dexmedetomidine (Group D) and their effects were compared.

Results: The duration of sensory and motor block was significantly($p < 0.05$) prolonged in dexmedetomidine group (373 min and 336 min) as compared to buprenorphine group (199.5 min and 172.5 min). Hemodynamic changes were similar in both the groups. No significant adverse effects between two groups.

Conclusion: The study concludes that combination of dexmedetomidine with bupivacaine offered an advantage of improved degree of motor block and prolonged duration of sensory block with less side effects as compared to buprenorphine with bupivacaine.

KEYWORDS

Dexmedetomidine, Buprenorphine, Intrathecal bupivacaine.

INTRODUCTION:

Spinal anaesthesia is the most suitable modality of anaesthesia for lower limb surgeries as is cost effective, has rapid onset of action and achieves autonomic, motor and sensory blockade depending on the level administered. However, it is limited by side effects such as hypotension, bradycardia and short duration of action. In most cases, the drug administered is hyperbaric bupivacaine (0.5%), a local anaesthetic (LA). The most common adjuvants used belong to opioid category which not only alleviates pain but also has beneficial effects of increasing duration of action and decreasing side effects. Buprenorphine is a centrally acting lipid soluble analogue of alkaline thebaine. It is a mixed agonist and antagonist with high affinity for μ and κ receptors. Its effects are similar to morphine. Dexmedetomidine is a highly selective α_2-agonist. It is a dextro-isomer of medetomidine and is more potent than clonidine and fentanyl. Comparative studies on effects of buprenorphine and dexmedetomidine are scanty which paves the way for the present study to compare the effects of these two drugs and to find out which provides better quality of anaesthesia.

MATERIALS AND METHODS:

After obtaining institutional ethics committee approval and written informed consent, a prospective randomized double blind study was conducted for 60 patients of either sex between 20 to 60 years of age scheduled for lower limb surgeries under intrathecal anaesthesia.

On arrival to the operating room, patient was randomly assigned into two groups by the sealed envelope technique.

Both dexmedetomidine and buprenorphine were measured in tuberculin syringe(1ml) for accuracy before being added to bupivacaine. The syringes were prepared by one researcher and administered by an anaesthetist not connected with the study to maintain blindness of the study.

Group D: Received 2.5ml of 0.5% hyperbaric bupivacaine (12.5mg) and dexmedetomidine 5mcg in 0.5ml normal saline

Group B: Received 2.5ml of 0.5% hyperbaric bupivacaine(12.5mg) and buprenorphine 60mcg in 0.5ml normal saline.

After administering anaesthesia the vital signs of the patients were recorded every 2min for the first 10min and then every 5 mins upto 20 mins and beyond 20 mins the vitals were recorded every 20 mins till the time of discharge from postoperative ward. Patient was discharged to the ward once sensory block regresses to S_2 level and motor block to bromage scale 0. The sensory dermatome levels were assessed by loss of pin prick sensation to a 23G hypodermic needle.

The quality of motor blockade was assessed according to Bromage scale and sedation was assessed by using Modified Ramsay sedation scale. Sensory, motor blockade and sedation, time to reach the sensory block to the highest dermatome level and motor blockade of bromage 3 were noted. The time of sensory blockade regression to dermatome S_2 and time to reach the bromage 0 were documented. Postoperatively pain was assessed by VAS every 20 mins for first 2 hours and then every 4hours for 24 hours along with sedation and vitals in the ward. Any patient showing VAS equal to or greater than 4 was administered with injection Diclofenac 75mg intramuscular (IM) as rescue analgesia. Time for first rescue analgesia and total number of analgesic doses were noted. Hypotension and bradycardia (HR<40bpm) were treated with mephentermine 3mg i.v and atropine 0.6mg. Side effects like nausea, vomiting, bradycardia, hypotension, pruritis, respiratory depression, urinary retention, shivering etc were assessed both intraoperatively as well as postoperativelY

OBSERVATION AND RESULTS

Sixty subjects aged between 20 and 60 years belonging to ASA class I and II were randomly divided into two groups of 30 patients each (n=30).

Patients demographic data and duration of surgery shows that there was no significant difference in both the groups ($p > 0.05$) with respect to age, sex, height, weight and duration of surgery.

Characteristics of sensory block and its duration

Characteristics	Buprenorphine (n=30)	Dexmedetomidine (n=30)	p value
Time to T10 (mins)	3.267 ± 0.4686	3.9 ± 0.5477	<0.001#
Time for maximum sensory level (mins)	6.63±0.964	6.6±0.964	0.892
Two segment sensory regression (mins)	102.67 ± 5.208	179.03 ± 10.915	<0.001#
Time to S2 (mins)	199.5 ± 16.679	373.67 ± 13.954	<0.001#

Values are in mean ± SD

#p value < 0.001 is highly significant

There was statistically significant ($p<0.001$) difference between the

two groups regarding onset of sensory block (time to reach T10) which is prolonged in Group D (3.9± 0.5477 min) when compared to Group B (3.267 ±0.4686min). There was no statistically significant *(p> 0.05)* difference between the two groups in relation to time taken to attain maximum sensory level and maximum motor block

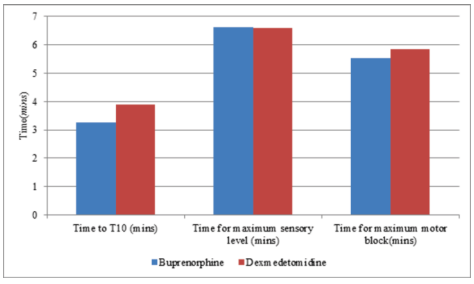

Figure : Onset of sensory and motor block characteristics

The mean time taken for two segment sensory regression is (102.67± 5.208 min) in Group B and (179.03 ± 10.915 min) in Group D. There was a highly statistically significant *(p < 0.001)* difference between the groups with faster regression of sensory block in Group B. Group B 66.7% (20/30) and in Group D 56.7% (17/30) attained maximum level of sensory block at T8, however 13 cases in Group D attained maximum level at T6 as compared to nil in Group B.

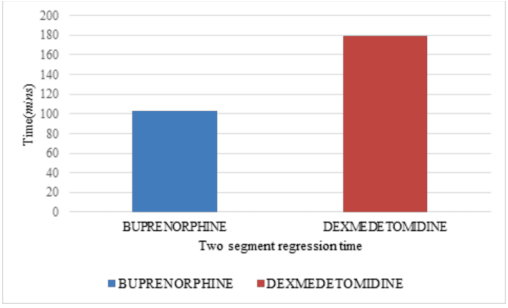

Figure : Two segment regression time

The mean duration of sensory block to reach S2 indicating the duration of analgesia is (199.5 ± 16.679 min) in Group B and (373.67 ± 13.954 min) in Group D and shows statistically highly significant *(p < 0.001)* difference. There was statistically significant *(p < 0.001)* difference between the two groups regarding duration of motor block with mean duration of motor block in Group B being (172.5 ± 9.537min) and (336.93 ± 6.297 min)in Group D.

The intraoperative mean heart rate values were significantly *(p < 0.05)* lower in Group D than in Group B at 15min, 20 min, 25 min, 50 min and 70 min and it ranged between 67-74bpm. The postoperative mean heart rate values were significantly *(p < 0.05)* lower in Group D than in Group B at 110min, 130 min, 150 min, 190 min, 270 min, 300 min, 660 min and 1440 min . Significant bradycardia was not seen in the heart rate intraoperatively and postoperatively in any of the drug groups.

Overall, the intraoperative mean systolic blood pressure decreased in both the groups after anesthesia. However, there is no statistically significant difference in Intraoperative mean systolic blood pressure between groups at various time intervals. There was no statistically significant difference in mean postoperative systolic blood pressure between groups at various time intervals.

The Intraoperative and postoperative mean diastolic blood pressure values did not differ significantly between the two groups. The fall in DBP was noted in both the groups following subarachnoid block. After subarachnoid block, fall in MAP was noted in both the groups. There was no statistically significant difference in intraoperative mean arterial pressure. There was statistically significant difference in Ramsay sedation score between two groups at 2 min interval, Group B (1.9± 0.403) and Group D (1.55 ± 0.506).

There was statistically significant *(p<0.05)*difference in VAS between two groups noted at 190 min and 210 min intervals wherein group B showed higher VAS than Group D. Overall group B had higher VAS value as compared to group D.

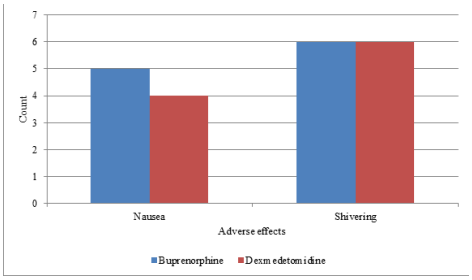

Figure : Adverse effects seen in two groups

There wasn't any significant difference in side effects seen in both groups and wasn't statistically significant. Among the adverse effects shivering was seen more in dexmedetomidine group.

DISCUSSION

In our study, onset of sensory block was taken as the time required for sensory block level to reach T10 dermatome. In the buprenorphine group, the mean onset of sensory block was at 3.267 minutes and in dexmedetomidine group it was 3.9 minutes. This difference between the groups was statistically significant (*p <0.05*). Our values regarding the onset of sensory block will correlate well with that obtained by the study conducted by kaur *et al*., (4mins) and Gupta *et al*., which is 3.26 minutes and 3.52 minutes respectively in buprenorphine and dexmedetomidine group. Values regarding sensory blockade with dexmedetomidine are similiar with the study conducted by Kishore*et al*., and buprenorphinewith Shaikh and Kiran[4]. However its different from study conducted by Gupta R *et al*., the reason could probably be due to higher dermatome (T7) taken as reference.

Comparison of the time for maximum motor block between the two groups shows that it is 5.53 ± 1.224 minutes in buprenorphine group as compared to 5.83 ± 0.913minutes in dexmedetomidine group. The values are similar to the study conducted by Gupta *et al.,*[2] which shows time of 3.9mins for buprenorphine and 4mins for dexmedetomidine group respectively. Bojaraaj *et al.,*[7] shows similar results as compared to our study. Kishore*et al.,*[6] study shows dexmedetomidine group had mean onset time of modified bromage 3 of 7.72 mins.

In a study by Kaur *et al.,*[1] the two segment regession of buprenoprhine group was between 39-133mins whereas dexmedetomidine group was 30-183mins which is equal to our study which shows time of 102.67 mins in buprenorphine and 179.3mins in dexmedetomidine which is statistically significant. Our results also correlate with values seen in study by Patro *et al*[8] and Naaz *et al*[9].

Safiya *et al.,*[9] received 15 mg of heavy bupivacaine (0.5%) with 1 µg/kg buprenorophine intrathecally upto a maximum of 50µg, produced a less intense motor block of shorter duration . In our study also, bupivacaine with buprenorphine group demonstrated less intense motor blockade with a faster recovery from motor blockade in comparison to bupivacaine with dexmedetomidine group.

The mean duration of sensory and motor block in our study was 199.5mins and 172.5mins respectively for buprenorphine group which is in agreement to study conducted by Gupta M *et al.*, Shaikh and Kiran, Arora *et al*[10]., Singh *et al.*

Whereas for dexmedetomidine group, sensory block was for373.67mins and 336.93mins for motor blockwhich was similar to study done by Naaz *et al.,* Kaur *et al*., Mahendru *et al.* However the duration is low as compared to the study done by Shukla *et al.,* the most probable reason could be due to the higher dose of both local anaesthetic and dexmedetomidine in their study.

There was no significant difference between the two groups in terms of hemodynamic parameters like systolic blood pressure, diastolic blood pressure, pulse oximetry, and heart rate with a p value *>0.05* stating indirectly that the pharmacological profile of both the drugs was almost the same. This is comparable with studies by Bojaraaj *et al*., Kaur *et al*., Gupta *et al*., Amitha and Pradeep.

The heart rate was higher in buprenorphine group when compared with the dexmedetomidine group but was statistically insignificant. This shows that dexmedetomidine intrathecally does not cause significant

bradycardia but a lower heart rate which is in accordance with Naaz *et al*.

In our study, median Ramsay sedation score, of buprenorphine is 2.6 as compared to Dexmedetomidine which is 3.1. It is similar to study conducted by Samal S *et al* and Bojaraaj *et al.* The highest pain score in study by Naaz *et al*., was 4 for dexmedetomidine group which is similar to our study. Ravindran *et al*., had lower VAS score in buprenorphine group in their study when compared to control group. In our study the quality of analgesia assessed by VAS score was significantly better with dexmedetomidine group. Even though there was incidence of post operative nausea and vomiting, it wasn't statistically significant. Limitation of this study might be the relative low sample size. Especially the frequency of the adverse effects could have altered if conducted on a large study group.

CONCLUSION

Based on the study, we conclude that both bupivacaine with dexmedetomidine and bupivacaine with buprenorphine regimes were effective in providing surgical anaesthesia and hemodynamic stability, but dexmedetomidine group offered an advantage of improved degree of motor block and prolonged duration of sensory block, with less side effects. Significant bradycardia was observed in dexmedetomidine group, that was not deleterious to the patient and there were no other significant side effects

REFERENCES

1. Höhener D, Blumenthal S, Borgeat A. Sedation and regional anaesthesia in the adult patient. Br J Anaesth. 2008;100:8-16
2. Gupta M, Shailaja S, Hegde KS. Comparison of intrathecal dexmedetomidine with buprenorphine as adjuvant to bupivacaine in spinal anaesthesia. J Clin Diagn Res. 2014;8:114-7
3. Borse Y, Thorat S, Dighe J, Patil P. A comparative study of intrathecal bupivacaine and bupivacaine with buprenorphine for post-operative analgesia in orthopaedic surgeries. Indian Journal of clinical Anaesthesia. 2015;2:92-6
4. Mahendru V, Tewari A, Katyal S, Grewal A, Singh MR, Katyal R. A comparison of intrathecal dexmedetomidine, clonidine, and fentanyl as adjuvants to hyperbaric bupivacaine for lower limb surgeries: A double blind controlled study. J Anaesthesiol Clin Pharmacol. 2013;29:496-502
5. Gupta R, Verma R, Bogra J, Kohli M, Raman R, Kushwaha JK. A Comparative study of intrathecal dexmedetomidine and fentanyl as adjuvants to Bupivacaine. J Anaesthesiol Clin Pharmacol. 2011;27:339-43
6. Rabiee SM, Alijanpour E, Jabbari A, Rostami S. Benefits of using intrathecal buprenorphine. Caspian Journal of Internal Medicine. 2014;5:143-47.
7. Ravindran R, Sajid B, Ramadas KT, Susheela I. Intrathecal Hyperbaric Bupivacaine with Varying Doses of Buprenorphine for Postoperative Analgesia after Cesarean Section: A Comparative Study. Anesth Essays Res. 2017;11:952-7.