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A COMPARATIVE STUDY OF THE ADJUVANT EFFECTS OF INTRATHECAL DEXMEDETOMIDINE WITH LOW DOSE OF BUPIVACAINE VS A HIGHER DOSE OF BUPIVACAINE IN PATIENTS UNDERGOING TRANSURETHRAL RESECTION OF PROSTATE

Anaesthesiology

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ABSTRACT

Introduction:- Transurethral resection of prostate and bladder tumours are routinely performed procedures. Spinal anaesthesia is the most routinely used procedure for transurethral resection of prostate (TURP). Bupivacaine, has high potency, slow onset and long duration of action is commonly employed for spinal anaesthesia. Small doses of Dexmedetomidine used in combination with bupivacaine, has been shown to produce a shorter onset of motor block and a prolongation in the duration of motor and sensory block with preserved hemodynamic stability and lack of sedation. Our study plans to compare the characteristics of spinal block, haemodynamic changes and total analgesia requirements, following administration of intrathecal 5µg Dexmedetomidine combined with a low dose of 7.5mg of 0.5% hyperbaric bupivacaine versus a higher dose of 10 mg of 0.5% hyperbaric bupivacaine in patients undergoing TURP. **Material and methods:-** This study was conducted at Govt Medical College and Associate group of Hospitals, Kota from june.2019 to jan.2020. We conducted a Hospital based Randomized double blind controlled observational study of 60 adult cases of both sex. We divided the cases into 2 groups of 30 each, as Group A: Patients was received 10mg (2ml) of 0.5% hyperbaric bupivacaine. Group B: Patients was received 7.5mg (1.5ml) of 0.5% hyperbaric bupivacaine + 5µg Dexmedetomidine (1 ml of Dexmedetomidine diluted to 10 ml with normal saline then 0.5 ml is taken in insulin syringe and added in 7.5mg of 0.5% hypebaric bupivacaine) intrathecally. Standard protocol followed to administering spinal anaesthesia. All data were collected and analysed with the help of suitable statistical parameters.**Results:-** Our study results in that Dexmedetomidine intrathecally with hyperbaric bupivacaine significantly prolongs duration of sensory and motor blockade and duration of analgesia in TURP surgery.

KEYWORDS

TURP surgery, spinal anaesthesia, Dexmedetomidine, bupivacaine

INTRODUCTION

Transurethral resection of prostate and bladder tumours are routinely performed procedures. Most of these patients are elderly with associated co-morbidities. Subarachnoid block (SAB) is the most commonly used anesthetic technique in these patients as it has the advantages of rapid onset, superior blockade, less failure rates and cost effectiveness. However postoperative pain control remains a concern as SAB using only local anestheticis associated with relatively short duration of action and thus early analgesic intervention is needed in the postoperative period1. Postoperatively, these patients often suffer from bladder spasm associated with the use of a transurethral balloon to prevent bleeding from the prostatic bed or capsule. Therefore, there is a need to develop anesthetic techniques that extend postoperative analgesia without compromising patient safety.[2]

Spinal anaesthesia is the most routinely used procedure for transurethral resection of prostate (TURP). Sensory block up to T10 is considered favourable to abolish the discomfort caused by bladder distension. Sensory block cephalad to this hides the capsular signs associated with bladder perforation and may hamper its early diagnosis and treatment. Moreover, because of the restricted cardiovascular and respiratory reserves in older patients undergoing TURP, it is important to limit the cephalad spread to lessen haemodynamic changes.

Therefore, the small dose of intrathecal local anaesthetic in combination with additives provide the required sensory level with appropriate analgesia. Combined additives can induce their own side effects such as bradycardia, hypotension, vomiting, nausea.[3]

Sometimes these low-dose local anaesthetics may not provide an adequate anaesthetic level for surgery. Intrathecal opioids enhance analgesia from subtherapeutic dose of local anaesthetic and make it possible to achieve successful spinal anaesthesia using otherwise inadequate doses of local anaesthetic.[4] In recent years, use of intrathecal adjuvants such as clonidine, fentanyl, Dexmedetomidine, opioids, magnesium sulphate, midazolam etc. has gained popularity with the aim of prolonging the duration of block, better success rate, patient satisfaction, faster recovery and prolonged postoperative analgesia.[5]

Bupivacaine, an amide type of local anaesthetic, has high potency, slow onset and long duration of action is commonly employed for spinal anaesthesia.[6]

Dexmedetomidine is a selective alpha2-adrenoreceptor agonist with a α2/α1selectivity ratio up to 8 times higher than clonidine.7 Its analgesic and sedative properties were found when intrathecal, epidural or intravenous Dexmedetomidine were used as an adjuvant on previous studies. Dexmedetomidine does cause a manageable hypotension and bradycardia but the striking feature of this drug is the lack of opioid-related side effects like respiratory depression, pruritus, nausea, and vomiting.8-9 Small doses of Dexmedetomidine used in combination with bupivacaine, in humans, for spinal anaesthesia, has been shown to produce a shorter onset of motor block and a prolongation in the duration of motor and sensory block with preserved hemodynamic stability and lack of sedation.[10]

The study was planned to compare the characteristics of spinal block, haemodynamic changes and total analgesia requirements, following administration of intrathecal 5µg Dexmedetomidine combined with a low dose of 7.5mg of 0.5% hyperbaric bupivacaine versus a higher dose of 10 mg of 0.5% hyperbaric bupivacaine in patients undergoing TURP.

MATERIAL AND METHOD

Study Area: This study was conducted at Govt Medical College and Associate group of Hospitals, Kota from june.2019 to jan.2020. This study included Sixty (60) adult patients of either sex scheduled for transurethral resection of prostate, were included in the study. Due permission from the institutional ethical committee was obtained.

Study Design: Hospital based Randomized double blind controlled observational study.

Study Groups: The study was conducted in following two groups of patients. The study was conducted in following two groups of patients. Each group was consist of 30 patients (n =30/group). Both the groups was receive 2ml of study drug by 2ml syringe intrathecally.

Group A: Patients was received 10mg (2ml) of 0.5% hyperbaric bupivacaine.

Group B: Patients was received 7.5mg (1.5ml) of 0.5% hyperbaric bupivacaine + 5µg Dexmedetomidine (1 ml of Dexmedetomidine diluted to 10 ml with normal saline then 0.5 ml is taken in insulin syringe and added in 7.5mg of 0.5% hypebaric bupivacaine) intrathecally.

Inclusion Criteria:
- Adult patients posted for TURP surgery.
- ASA grade I, II & III.

Exclusion Criteria:
- Patients not willing to participate in the study.
- History of spine surgery, hepatic failure, neuromuscular disorders.
- Chronic history of headache and backache, infection in the back.
- Any absolute or relative contraindication to study drug.
- Uncooperative patients.

METHODS

Pre-anaesthetic assessment:

Standard protocol was followed for Pre-anaesthetic assessment of patients. Informed written consent was obtained after complete explanation about the study protocol and the procedure from all the patients and attendants.

Monitoring: Monitoring included precordial stethoscope, pulse-oximetry, NIBP, respiratory rate, CO2 level by capnograph and ECG. Anaesthesia technique: Standard procedure was followed. and provision was made for recording and treatment of following side effects-Hypotension, Hypertension, Bradycardia.

After surgery, the following parameters were recorded every hour for the first 6hours and then at 12 hours and 24 hours post operatively in the ward.HR, MAP, SPO2, time to first analgesic demand, VAS (pain score) and total post operative analgesic requirement in 24hours was also noted and recorded.

Sedation was assessed at 0, 15, 30, 60 to 120 min post-operatively using Ramsay sedation score. Sensory blockade: This was assessed by pinprick test bilaterally at the midclavicular line by using 25 G needle. The highest level of the block and the time to achieve the same is also noted. Motor blockade:-was assessed by using Modified Bromage scale.

Statistical analysis: Results were tabulated and statistically analysed using SPSS (Statistical Package for Social Sciences) Software version 15.0. The difference between the two groups was assessed by student's - t test and chi-square test. The results were expressed as mean±standard deviation. For all the tests a 'p' value of 0.05 and less was considered for statistical significance.

RESULTS

Table: 1 Time (minutes) from injection to achieve highest sensory block level

Time (minutes) from injection to highest sensory level	Group A (2ml)	Group B (1.5ml)	P value
T6	5.8±0.7	3.9±0.69	0.001
T8	7.0±0.68	4.8±0.51	0.0001
T9	7.1±0.9	4.6±0.7	0.0001
T10	6.2±0.6	4.6±0	0.001

Table exhibit that in group A the mean time to reach T6 sensory block level was 5.8±0.7 min, T8 sensory block level was 7.0±0.68 min, T9 sensory block level was 7.1±0.9 min, T10 sensory block level was 6.2±0.6 min. In group B the mean time to reach T6 sensory block level was 3.9±0.69 min, T8 sensory block level was 4.8±0.51 min, T9 sensory block level was 4.6±0.7 min, T10 sensory level was 4.6±0 min. The difference was statistically significant.

Table: 2 Time (minutes) to achieve Modified Bromage Scale 3

Time (minutes) to achieve Modified Bromage Scale 3	Mean ±SD
Group A (2ml)	5.5±0.6
Group B (1.5ml)	3.9±0.58
P-value	< 0.0001

Table exhibit that mean time to achieved modified bromage score was 5.5±0.6 min in group A and 3.9±0.58 min in group B. On analysing the data statistically, the p value was calculated as <0.0001, hence the difference was statistically significant.

Table:3 Time to 1st post-operative analgesic requirement

Time to 1st post-operative analgesic requirement(minutes)	Group-A		Group-B	
	Mean	SD	Mean	SD
	172	75.1	244	66.7
P-value	0.0002			

Table exhibit that time to 1st post-operative analgesic requirement is longer in group B as campare to group A, mean time of 1st post-operative analgesic requirement in group A was 172±75.1min and 244±66.7min in group B. The result was statistically significant as p value 0.0002.

Table: 4 No. of rescue analgesic in 24hr

No. of rescue analgesic in 24 hours	Group A (2ml)		Group B(1.5 ml)		P-value
	N	%	N	%	
1	1	3.3%	6	20%	0.045
2	6	20%	17	56.7%	0.0037
3	14	46.7%	5	16.7%	0.0133
4	5	16.7%	2	6.6%	0.2266
5	4	13.3%	0	0%	0

Table exhibit that in group A 3.3% patients require 1 rescue analgesic in 24hr, 20% patients require 2 rescue analgesic in 24hr, 46.7% patients require 3 rescue analgesic in 24hr, 16.7%patients require 4 rescue analgesic in 24hr, 13.3% patients require 5 rescue analgesic in 24hr. In group B 20%patients require 1 rescue analgesic in 24hr, 56.7%patients require 2 rescue analgesic in 24hr,16.7%patients require 3 rescue analgesic in 24hr, 6.6%patients require 4 rescue analgesic in 24hr. The difference was significant in 1,2,3,5 rescue analgesic doses as p value <0.05.

DISCUSSION

Spinal anaesthesia is the most routinely used procedure for transurethral resection of prostate (TURP). Sensory block up to T10 is considered favourable to abolish the discomfort caused by bladder distension. Sensory block cephalad to this hides the capsular signs associated with bladder perforation and may hamper its early diagnosis and treatment. Moreover, because of the restricted cardiovascular and respiratory reserves in older patients undergoing TURP, it is important to limit the cephalad spread to lessen haemodynamic changes. The results from our study show that the duration of sensory and motor blockade was significantly prolonged in Dexmedetomidine group.

SENSORY BLOCK CHARACTERISTICS

Time from injection to achieve T10 level sensory block (minutes)- In our study time from injection to achieve T10 level sensory block was significantly earlier in group B.(Table 1) A similar study conducted by Ipsita Chattopadhyayet al (2017)3 concluded the mean time from injection to achieve T10 level sensory block was 10.7±3.5 min in group II (dexmedetomidine) and 12.7±3.9 min in group I which was statistically significant (p value 0.041).

MOTOR BLOCK CHARACTERISTIC-

Time (minutes) to achieve Modified Bromage Scale 3 -In our study the mean time to achieve modified bromage scale 3 for group A was 5.5±0.6 min and for group B was 3.9±0.58 min, which was statistically significant. (Table 2)

Mehmooda Akhter et.al (2017)1 concluded that the mean time to achieve modified bromage scale 3 in group I was 10.1 ± 2.9 min and in group II (10 µg Dexmedetomidine) was 7.8 ± 1.9 min which was statistically significant.

ANALGESIA

Time to 1st post-operative analgesic requirement- In our study the time to 1st post-operative analgesic requirement was prolong in group B as campare to group A.(Table 3) The mean time to 1st post-operative analgesic requirement in group A was 172±75.1min and 244±66.7min was in group B, Dexmedetomidine prolongs duration of analgesia when added to bupivacaine and the result was statistically significant. Ipsita Chattopadhyay et al (2017)3 concluded that group II experience better analgesia as campare to group I as mean time to 1st post-operative analgesic requirement in group I was 220±15.1min and 300±25.3 min in group II, the results were statistically significant.

No. of rescue analgesia in 24 hr- In our study No. of rescue analgesia in 24 hr was higher in group A as compare to group B. (Table 4) Mean no. of rescue analgesic in 24hr was 3.16±1.01 in group A and 2.1±0.8 in group B, results was statistically significant which is similar to study done by Ipsita Chattopadhyay et al (2017)3.

VAS SCORE- Post-operatively all the patients were assessed for 10 point visual analogue scale. When VAS reached ≥3, rescue analgesic was administered. Time to first analgesic requirement was longer in group B 244±66.7min as compared to group A 172±75.1 min.

SEDATION SCORE-In our study postoperative and intraoperative sedation score was non-significant as p value >0.05. The study conducted by Al-Mustafa et al (2009)10, Ipsita Chattopadhyay et al (2017)3 and Ji Eun Kim et al (2013)11 shows that sedation score was <2 at every point of observation.

HEMODYNAMIC PARAMETERS

In our study systolic blood pressure, diastolic blood pressure, heart rate, respiratory rate and SpO2 was comparable in both groups but the difference is non-significant in both the groups as the p value is >0.05. Al-Mustafa et al (2009)10 concluded that the dose of 5 µg and 10 µg of intrathecal Dexmedetomidine added to 12.5 mg of bupivacaine compared with bupivacaine alone did not cause a significant decrease in blood pressure or the heart rate intraoperatively or postoperatively.

CONCLUSION:

Our study concluded that 5 µg of Dexmedetomidine added to 7.5 mg bupivacaine produced a faster onset and longer duration of sensory and motor block as well as prolonged perioperative analgesia without significant haemodynamic alterations, as compared to 10 mg bupivacaine alone, in patients undergoing TURP surgery.

CONFLICT OF INTEREST: there is no conflict of interest between authors.

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