

ORIGINAL RESEARCH

PERIOPERATIVE MEDICINE

Comparison of low dose ropivacaine plus dexmedetomidine vs. low dose bupivacaine for spinal anesthesia in transurethral resection of prostate

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ABSTRACT

Background & Objective: Spinal anesthesia (SA) has been preferred for transurethral resection of prostate (TURP) due to various advantages over general anesthesia. The most commonly used drug for SA is bupivacaine, but recently ropivacaine has been introduced with better hemodynamic profile. Dexmedetomidine is sedative-analgesic, and can be used through multiple routes. We compared low dose ropivacaine plus dexmedetomidine vs. low dose bupivacaine for SA in TURP.

Methodology: This comparative, cross-sectional study was conducted at Anesthesia Department of Combined Military Hospital, Lahore, from December 2021 to June 2022.

A total of 197 patients, planned to undergo TURP under SA were included in the study. The patients were randomly allotted to one of the two groups by lottery method and using concealed envelopes. Group RD took low dose ropivacaine (7.5 to 10 mg) plus dexmedetomidine (5 µg) and in Group B low dose bupivacaine (7.5 to 10 mg) was used for spinal anesthesia. Parameters of efficacy and safety were compared in both groups during and immediately after the surgery to look for better option among the two regimes.

Results: Out of 197 patients randomized into two groups, Group RD, 99 (50.2%) took low dose ropivacaine (7.5 to 10 mg) plus dexmedetomidine (5 µg) and 98 (49.8%) took low dose bupivacaine (7.5 to 10 mg) for spinal anesthesia. Mean age of patients who underwent TURP in our study was 61.66 ± 7.88 y. Hemodynamic instability and requirement of opiate analgesia was not significantly different in both the groups (P > 0.05) while all other efficacy parameters were better in patients who took low dose ropivacaine plus dexmedetomidine (P < 0.05) as compared to those who only took low dose bupivacaine.

Conclusion: Both groups showed no difference in safety parameters related to hemodynamic stability but the anesthesia profile was better in patients who took low dose ropivacaine plus dexmedetomidine as compared to the bupivacaine group.

Abbreviations: SA - Spinal anesthesia; TURP - Transurethral resection of prostate

Key words: Bupivacaine; Dexmedetomidine; Ropivacaine; Anesthesia, Spinal; Transurethral Resection of Prostate

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1. INTRODUCTION

Perineal surgeries have been commonly performed by general surgeons, urologist and ano-rectal surgeon in all part of the world.¹ Transurethral resection of prostate (TURP) is also procedure performed in routine in urology and surgery operation theaters.² Spinal anaesthesia (SA) is usually the anesthesia of choice in these patients. Most of the patients recover from anesthesia smoothly and have limited anesthesia related complications.³

General anesthesia has been replaced by regional anesthesia in most of the cases. SA is widely used for surgeries below thoracic level in various clinical fields.⁴ Various pharmacological agents have been used for this purpose depending upon time of surgery, anesthetist choice and safety of medication.⁵ Still a lot of research has been going on in this field to find safest and most efficacious option for this purpose and even a lot of combinations have also been tried to potentiate the effect of each other.⁶

Comparison of various single and combination agents have been performed to look for best option for SA for perineal surgeries. Shahverdi et al. published a study in Iran regarding SA used for TURP and came up with the findings that combination of 1 mg bupivacaine and 20 µg fentanyl was a safe and effective option for this purpose and provided better motor block during the procedure and analgesia after the surgery.⁷ Liu et al. published trial on female patients undergoing caesarean section and revealed that use of intrathecal dexmedetomidine can reduce the effective dose of bupivacaine and combination is more effective as compared to bupivacaine alone. Safety profile of combination was also not bad so they advocated use of intrathecal dexmedetomidine with bupivacaine.⁸ A study published in India in 2017 generated similar findings and concluded that quicker onset of action, better sensory and motor block and reduced rescue analgesic requirement were merits of combination of dexmedetomidine with bupivacaine as compared to bupivacaine alone in patients undergoing TURP.⁹

Regional anaesthesia techniques are gaining popularity in Pakistan as well as cost of the whole procedure and morbidity involved reduce to a great extent in these procedures as compared to general anaesthesia. Still a lot of research is going on in this regard to find best single or combination pharmacological agents which could be safe and effective in spinal anaesthesia. A local study published in 2020 concluded that 10 mg dexmedetomidine when used with bupivacaine is more effective as spinal anaesthesia as compared to 5 mg dexmedetomidine when used for similar purpose. Limited local data has been generated regarding efficacy

and safety of combination drugs used in spinal anaesthesia for commonly performed surgeries. We therefore planned this study with the rationale to compare low dose ropivacaine plus dexmedetomidine and bupivacaine as SA in TURP.

2. METHODOLOGY

This comparative cross-sectional study was conducted at the anesthesia department of combined military hospital Lahore from December 2021 to June 2022. Sample size was calculated by WHO Sample Size Calculator by using population prevalence proportion of good satisfaction level with bupivacaine in patients undergoing TURP as 92.3%. Non probability consecutive sampling technique was used to gather the sample and then all the patients were randomized into two groups via lottery method.

All patients between the age of 50 and 70 y who were planned to undergo TURP under SA were recruited for this study. Patients not falling in age bracket set for the study or those with redo surgeries were excluded. Patients using any opiate analgesia or illicit substance were not included. Those patients with any known allergy or serious adverse effects to any of the medications used in the analysis were also excluded. Patients with known malignant conditions of prostate (primary or secondary) were made part of exclusion criteria for this study. Those with uncontrolled medical conditions especially hemodynamic instability before the surgery were also not made part of the study.

Ethical approval was obtained and after giving description of study and taking written consent, patients undergoing TURP were included in the study. Routine antibiotics and pre-anesthetic medication were given to each patient as per the hospital protocol and condition of the patient. Lottery method was preferred to divide the patients into two groups to ensure randomization. One group received low dose (7.5 to 9 mg) bupivacaine (Group B), while another group (Group RD) received low dose ropivacaine (7.5 to 9 mg) plus dexmedetomidine (5 mg) for SA. Patients were observed closely during the surgery by consultant anesthetist in order to look for any hemodynamic instability which was main safety parameter used in our study for comparison between two groups. Efficacy parameters included time to reach T-10 sensory level, duration of sensory block by modified Bromage scale and post-operative opiate analgesic requirement (within 24 h after the surgery). All these parameters were studied and recorded by consultant anesthetist who was blind regarding the medication used for SA in the study participants. All the patients were followed up by the anesthesia team for this study for 24 h after the surgery.

All statistical analysis was performed by using the

Statistics Package for Social Sciences version 24.0 (SPSS-24.0). Frequency and percentages were calculated for all the qualitative variables included in the study. Mean and standard deviation for age in both the groups was also calculated for the study participants. Pearson Chi-square test was applied to look for difference in safety and efficacy parameters of both the groups. The $P \leq 0.05$ was considered as significant.

Table 1: Characteristics of patients undergoing TURP

Study parameters	N (%)
Age [Mean \pm SD (min-max)] in y	61.66 \pm 7.88 (41- 60)
Duration of symptoms	
< 2 y	64 (32.4)
> 2 y	133 (67.6)
Type of anesthesia	
Low dose bupivacaine	98 (49.8)
Low dose ropivacaine + dexmedetomidine	99 (50.2)
Bradycardia during surgery	34 (17.3)
Hypotension during surgery	30 (15.3)

Data presented as n (%) unless described

3. RESULTS

Out of 197 patients randomized into two groups, 99 (50.2%) took low dose ropivacaine plus dexmedetomidine and 98 (49.8%) took low dose bupivacaine for SA. Demographic characteristics of patients who underwent TURP in our department during the study period are given in Table 1. Mean age of patients put who underwent TURP in our study was 61.66 ± 7.88 y.

The frequency of complications during surgery is also given in Table 1. The frequency of bradycardia and hypotension was also equivalent in the two groups. Table 2 depicted the results of chi-square analysis.

Table 2: Difference in safety and efficacy of low dose bupivacaine and low dose ropivacaine plus dexmedetomidine

Parameters	Group RD (n = 99)	Group B (n = 98)	p-value
T-10 sensory level at 5 min	96 (96.9)	83 (84.7)	0.002
Sensory block at 120 min	92 (92.9)	79 (80.7)	0.009
Motor block at 220 min	89 (89.9)	76 (77.6)	0.018
Requirement of opiate analgesia within 24 h	41 (41.5)	43 (43.9)	0.727
Hemodynamic instability	28 (28.3)	36 (36.7)	0.205

Data presented as n (%); $P \leq 0.05$ considered as significant

Hemodynamic instability and requirement of opiate analgesia was not significantly different in both the groups ($P > 0.05$) while all other efficacy parameters were better in patients who took low dose ropivacaine plus dexmedetomidine ($P < 0.05$) as compared to those who only took low dose bupivacaine.

4. DISCUSSION

Both options turned out to be equally safe but low dose ropivacaine plus dexmedetomidine was more efficacious of the two as SA used in patients of TURP. TURP is a common surgical procedure performed usually in older adults with multiple comorbid conditions. Safety and efficacy of anesthetic agent used for SA in these patients is of utmost importance for anesthetic team. Surgical team also can perform better during surgery and in post-surgical period if anesthesia used is adequate and safe. Regional and SA has revolutionized in last two decades replacing general anesthesia in most of the commonly performed surgical procedures. We usually rely on data generated in western population with different resources therefore we conducted this study in our setup with an aim to compare low dose ropivacaine plus dexmedetomidine and bupivacaine as SA in TURP.

Kaur et al. in 2017 studied patients undergoing TURP for better anesthesia options which could reduce the need for early postoperative analgesia requirement. They came up with the findings that adding buprenorphine (60 μ g) or dexmedetomidine (5 μ g) to routine bupivacaine dose used for spinal anaesthesia reduce the need for early postoperative analgesia.¹⁰ We compared low dose ropivacaine plus dexmedetomidine with bupivacaine. Requirement for opiate analgesia was not different in both groups but other efficacy parameters were better in combination group.

Kim et al. studied elderly Chinese population undergoing TURP for effects of addition of intrathecal dexmedetomidine on low-dose bupivacaine.¹¹ They revealed that faster onset, prolonged duration of sensory block and less requirement of added postoperative analgesia was observed when intrathecal dexmedetomidine was added on low-dose bupivacaine. Our results supported their findings as combination of routine spinal anaesthesia with intrathecal dexmedetomidine was more effective and equally safe option in our study participants.

An earlier study summarized the impact of bupivacaine and a bupivacaine-lidocaine combination in trans-urethral resection of the prostate.¹² They

came up with the findings that combination they used was not effective as compared to single agent in their study participants. Our results were different as we used different combination and found that efficacy of anesthesia was better in patients who took low dose ropivacaine plus dexmedetomidine as compared to those who only took low dose bupivacaine for SA.

Zhang et al. in 2022 published a study and concluded that sedative and analgesic effects were better in patients who received combination of dexmedetomidine and bupivacaine for TURP and that had a positive impact on overall outcome of the procedure.¹³ Our results supported the findings generated by Zhang et al. as addition of dexmedetomidine had better outcome in our study participants as well.

5. LIMITATIONS

Controlling all various confounding pharmacokinetic and pharmacodynamics parameters and planning a study at multiple centers may generate better results and help clinicians in forming local guidelines about spinal anesthesia used in TURP.

6. CONCLUSION

Spinal anesthesia with low dose ropivacaine plus dexmedetomidine compared to low dose bupivacaine showed no difference in safety parameters related to hemodynamic stability but efficacy of anesthesia was better with ropivacaine plus dexmedetomidine.

7. Data availability

Numerical data generated in this study is available with the corresponding author.

8. Conflict of Interest

No conflict of interest declared by the authors.

9. Authors' Contribution Form

JH, EZ: Literature review, discussion

KA, AS: Data analysis

MA, MAS: Data collection, Manuscript editing

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