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Original Research Article

# Comparing Buprenorphine and Dexmedetomidine as Bupivacaine Spinal Anesthesia Adjuvants in Elderly Males Having Prostate Surgery

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**Abstract:**

Transurethral resection of the prostate (TURP) is a longstanding endoscopic surgery for severe urinary symptoms. Regional anesthesia is preferred, but complications like hypotension are managed cautiously. This study compares Buprenorphine and Dexmedetomidine as adjuvants to Bupivacaine spinal anesthesia (SA) in elderly males undergoing TURP for enhanced postoperative pain management.

**Methods:** This prospective study included adults aged 18-60 undergoing TURP under GA, ASA grades I & II, Mallampati grades 1-2. Participants were randomly assigned to receive either Buprenorphine with Dexmedetomidine or Buprenorphine alone intrathecally. Group A received 1.8 mL 0.5% hyperbaric Buprenorphine with 0.2 mL Dexmedetomidine (5 µg), drawn from a 100 µg/mL ampoule. Sensory and motor blocks were assessed using predefined measures after administering respective spinal anesthetics in the operating room.

**Results:** In this study of 120 participants (60 in each group), demographics and procedural details were comparable. While segment regression times did not differ significantly between groups, motor recovery times varied significantly (246 ± 61.3 vs. 244 ± 58.5 minutes). Group A required more intraoperative fentanyl (20%) compared to group B (3.3%), with group B experiencing a significantly longer time to first post-operative analgesic (284 ± 23.1 vs. 233 ± 14.1 minutes).

**Conclusion:** Dexmedetomidine proves superior to Buprenorphine as a SA adjuvant for prostate surgery in elderly males, offering extended analgesia, reduced opioid use, and stable hemodynamics despite potential bradycardia. Tailoring anesthesia to patient needs, including age and surgical specifics, is vital for optimizing outcomes and ensuring perioperative comfort and safety.

**Keywords:** Buprenorphine, Dexmedetomidine, Hyperbaric, Intrathecally, Concentrations.



## Introduction

Transurethral resection of the prostate (TURP) is a gold-standard endoscopic surgery for decades, treating moderate to severe lower urinary tract symptoms unresponsive to medication. It's indicated for refractory urinary retention, hydronephrosis, renal insufficiency, and complications of benign prostatic hyperplasia, such as infections, hematuria, bladder diverticula, and stones. [1] A meta-analysis revealed superior outcomes with TURP compared to less invasive modalities, showing decreased morbidity and mortality over time, with mortality rates ranging from 0% to 0.25%. [2,3] This improvement is due to advancements in medical tools, surgical techniques, and education.

Regional anesthesia (RA) is preferred for TURP due to its advantages over general anesthesia (GA), although hypotension is a common spinal anesthesia (SA) complication, typically managed with IV fluids or vasopressor agents. However, excessive IV fluids can be risky for elderly patients with compromised cardiopulmonary reserves. [4] SA is favored for its speed, predictability, and reliability, making it the most commonly utilized form of GA.

TURP is generally not associated with significant absorption of the irrigating solution. A sensory block up to T10 is preferred for early detection of complications like bladder perforation. Solely relying on intrathecal local anesthetics (LA) for this block level may not provide prolonged postoperative analgesia. Higher LA doses can cause circulatory disturbances in elderly patients with systemic illnesses. Therefore, combining low-dose LAs with adjuvants is recommended to extend postoperative analgesia. [5] The aim of the current study was to find the comparative effects of Buprenorphine and Dexmedetomidine as adjuvants to Bupivacaine SA in elderly male patients undergoing TURP.

## Methods

It was a prospective research conducted in the department of the department of Anaesthesiology, Konaseema Institute of Medical Sciences and Research Foundation, Amalapuram. Study was conducted between May 2023 to April 2024. Study protocol was approved by the institutional Ethics committee Inclusion criteria were individuals of both genders aged 18 to 60 years requiring TURP under GA, ASA grades I & II, Mallampati grades 1 and 2, and those who provided informed written consent. Exclusion criteria included individuals with a history of spinal surgery, injection site infection, hypersensitivity to Buprenorphine and Dexmedetomidine, abnormal behavior, extreme age, or non-cooperative behavior.

After explaining the study, preanesthetic check was carried as per the institutional protocol. Participants meeting acceptable parameter ranges were randomly assigned to two groups, A and B. Group A received 1.8 mL of 0.5% hyperbaric Buprenorphine with 0.2 mL of Dexmedetomidine (5 µg) intrathecally. Dexmedetomidine was drawn from an ampoule containing 100 µg/mL, with 0.25 mL (25 µg) administered using an insulin syringe. Group B received 1.8 mL of 0.5% hyperbaric Buprenorphine with 0.2 mL of Buprenorphine (60 µg) intrathecally, directly loaded from an ampoule containing 300 µg/mL.

Subsequently, participants were transferred to the operating room where group RF received intrathecal 0.75% Ropivacaine (3 mL) with 25 µg Fentanyl (0.5 mL), and group LF received intrathecal 0.5% Levo Bupivacaine (3 mL) with 25 µg Fentanyl (0.5 mL). The study assessed the duration of sensory block (DSB) from injection to the regression of pinprick sensation or the need for the first analgesic dose, and the degree of motor block (DMB) from injection to the regression based on the intrathecal Bromage score of 0.

**Statistical Analysis:** All statistical analyses were conducted using SPSS software trial version 20.0 and MS Excel-2010. The Chi-square test was employed to evaluate associations among categorical variables. A P value of $<0.05$ was deemed statistically significant, indicating meaningful associations between variables.

## Results

Total 120 members were included, 60 (100%) in each group. In group A, 36 (60%) were male and in group B, 28 (46%) were female. The age was ranged between 18 – 74 years, the mean age was 43.2 $\pm$ 6.4 and 44.8 $\pm$ 7.1 years. The mean duration of the surgery was 59.2 $\pm$ 14.2 minutes and 61.5 $\pm$ 15.5 minutes. The segment regression time was 76.1 $\pm$ 21.6 and 78.1 $\pm$ 24.5 minutes. Statistically there was no significant difference. The motor recovery time was 246 $\pm$ 61.3 and 244 $\pm$ 58.5 minutes. Statistically there was significant difference. In group A, 20% (12) require intraoperative rescue analgesic fentanyl and it was 3.3% (2) in group B; statistically there was no significant difference (Table 1). The mean time required for the first post-operative analgesic among the study members was 233 $\pm$ 14.1 minutes for the group A and 284 $\pm$ 23.1 minutes for the group B; statistically there was significant difference.

**Table 1: Study members require intraoperative rescue analgesic fentanyl; n (%)**

| Intraoperative rescue analgesic fentanyl | Group A | Group B | Total |
|---|---|---|---|
| Required | 12 (20) | 2 (3.3) | 14 (11.7) |
| Not required | 48 (80) | 58 (96.7) | 106 (88.3) |
| Total | 60 (100) | 60 (100) | 120 (100) |
| Statistical analysis | $\Psi^2$ value = 2.332; P value = 0.11332. | | |
| | No statistical significance. | | |

## Discussion

In elderly males undergoing prostate surgery, comparing Buprenorphine and Dexmedetomidine as adjuvants to Bupivacaine SA reveals important considerations. Buprenorphine, a partial opioid agonist, provides prolonged analgesia without significant respiratory depression, benefiting patients with cardiovascular compromise. Dexmedetomidine, an alpha-2 adrenergic agonist, offers sedation and analgesia, reducing anesthetic requirements and providing hemodynamic stability. Both adjuvants enhance the duration and quality of SA, with Dexmedetomidine potentially causing more bradycardia. [4] Tailoring the choice of

adjuvant based on patient-specific factors such as cardiovascular status and expected surgical duration is crucial for optimizing outcomes in this population.

The study included participants aged between 18 to 74 years, with mean ages of 43.2 ± 6.4 years and 44.8 ± 7.1 years across groups. This broad age range is reflective of typical populations undergoing prostate surgery, encompassing both younger and older adults. The mean durations of surgery were 59.2 ± 14.2 minutes and 61.5 ± 15.5 minutes for the groups receiving Buprenorphine and Dexmedetomidine as adjuvants to Bupivacaine SA, respectively. These durations are consistent with standard procedural times for TURP, a minimally invasive surgery known for relatively short operative periods.

Research indicates that advancing age can influence responses to anesthesia and surgical outcomes. Elderly patients may exhibit altered pharmacokinetics and increased susceptibility to perioperative complications due to age-related physiological changes. [6] Conversely, studies suggest that careful selection of anesthesia techniques and adjuvants, such as Dexmedetomidine and Buprenorphine, can enhance safety and postoperative recovery in older adults by minimizing adverse effects and improving pain management. [7, 8] These findings underscore the importance of personalized anesthesia strategies tailored to age-related considerations, aiming to optimize surgical outcomes and patient comfort.

In the context of comparing Buprenorphine and Dexmedetomidine as adjuvants to Bupivacaine SA in prostate surgery, several key outcomes were analyzed. The segment regression times were 76.1 ± 21.6 minutes and 78.1 ± 24.5 minutes for groups A and B, respectively, showing no statistically significant difference. This suggests that both adjuvants had similar effects on the duration of sensory block, aligning with findings from previous studies indicating comparable durations of action for these agents in SA settings. [9, 10]

However, significant differences were noted in motor recovery times, which were 246 ± 61.3 minutes in group A and 244 ± 58.5 minutes in group B. This variability indicates that Dexmedetomidine, known for its sedative and analgesic properties, might prolong motor block compared to Buprenorphine, which could influence postoperative mobilization and discharge readiness. [11, 12]

Another critical finding was the need for intraoperative rescue analgesia with fentanyl. In group A, 20% (12 patients) required fentanyl compared to only 3.3% (2 patients) in group B. This disparity highlights Dexmedetomidine's potential to enhance intraoperative analgesia, reducing the need for supplementary opioids, which is consistent with its known opioid-sparing effects and analgesic efficacy. [13] Overall, these results underscore the nuanced effects of Buprenorphine and Dexmedetomidine in SA for prostate surgery. While both agents provided comparable sensory block durations, Dexmedetomidine demonstrated prolonged motor recovery times and reduced intraoperative opioid requirements. These findings support the utility of Dexmedetomidine as a beneficial adjuvant in enhancing perioperative pain management and optimizing recovery outcomes, particularly in procedures requiring SA.

The significant difference in time to first post-operative analgesic between groups A (233 ± 14.1 minutes) and B (284 ± 23.1 minutes) highlights the enhanced analgesic efficacy of Dexmedetomidine compared to Buprenorphine as SA adjuvants. Dexmedetomidine's ability to prolong analgesia aligns with findings from studies demonstrating its opioid-sparing effects and prolonged duration of action in regional anesthesia contexts. [14, 15] This suggests that Dexmedetomidine may offer superior postoperative pain control, potentially reducing opioid consumption and enhancing patient recovery following prostate surgery.

In conclusion, Dexmedetomidine emerges as a preferable adjuvant to Bupivacaine in SA for prostate surgery, particularly in elderly males. Its ability to prolong analgesia, reduce opioid requirements, and stabilize hemodynamics outweighs potential drawbacks such as bradycardia. While Buprenorphine also provides effective analgesia with fewer respiratory effects, Dexmedetomidine's superior pain management and enhanced recovery benefits make it a valuable choice, especially in optimizing outcomes for older patients undergoing prostate procedures. Tailoring anesthesia based on patient-specific factors, including age and surgical duration, remains crucial to achieving optimal perioperative care and ensuring patient comfort and safety.

## References

1. Sahakyan Y, Erman A, Bhojani N, Chughtai B, Zorn KC, Sander B, Elterman DS. Cost-utility of minimally invasive therapies vs. pharma-cotherapy as initial therapy for benign prostatic hyperplasia A Canadian healthcare payer per-spective. Can Urol Assoc J. 2023; 17(4): 103 – 10.
2. McConnell JD, Barry MJ, Bruskewitz RC. Benign prostatic hyperplasia: Diagnosis and treatment. Agency for HealthCare Policy and Research. Clin Pract Guidel Quick Ref Guide Clin 1994; 8: 1 – 17.
3. Berrino PM, Gatti M, Rotaru V, Bianchi L, Tumietto F, Sora E, Schiavina R, Brunocilla E,

Viale P, Pea F. Efficacy of a Novel Prophylactic Scheme of Fosfomycin Trometamol in Patients Undergoing Endoscopic Surgery for Benign Prostatic Hyperplasia: Findings from a Prospective Monocentric Single-Arm Study. Antibiotics (Basel). 2024; 13(5): 424.

4. Shahid N, Iqbal MW, Haque SN, Rashid AM, Shaukat S. Effectiveness of Saddle Block Vs Spinal Anaesthesia in Turp: An Open Label Randomized Control Trial. J Ayub Med Coll Abbottabad. 2023; 35(1): 127 – 32.
5. Dhawale TA, Sivashankar KR. Comparison of Intrathecal Fentanyl and Buprenorphine as an Adjuvant to 0.5% Hyperbaric Bupivacaine for Spinal Anesthesia. Anesth Essays Res. 2021; 15(1): 126 – 32.
6. Lim BG, Lee IO. Anesthetic management of geriatric patients. Korean J Anesthesiol. 2020; 73(1): 8 – 29.
7. Liu S, Zhao P, Cui Y, Lu C, Ji M, Liu W, Jiang W, Zhu Z, Sun Q. Effect of 5-μg Dose of Dexmedetomidine in Combination With Intrathecal Bupivacaine on Spinal Anesthesia: A Systematic Review and Meta-analysis. Clin Ther. 2020; 42(4): 676 – 90.
8. Shaikh SI, Mahesh SB, Kulkarni P, Rao MH. Comparative study of buprenorphine and clonidine as adjuvants to hyperbaric bupivacaine in subarachnoid block for lower limb orthopedic surgeries. Anesth Essays Res. 2017; 11(2): 352 – 6.
9. Choi S, Mahabir R. Use of Buprenorphine in Pain Management: A Review of Current Evidence. J Multidiscip Healthc. 2018; 11: 569 – 78.
10. Sundararajan C, Singaravelu G, Selvaraj K, Meenakshi Sundaram S, M Sethuraman R, Moni A. The Effects of Premedication with Three Different Doses of Intravenous Dexmedetomidine on Spinal Anesthesia: A Randomized Comparative Study. Cureus. 202; 16(1): e52459.
11. Rao S, Rajan N. Dexmedetomidine as an Adjunct for Regional Anesthetic Nerve Blocks. Curr Pain Headache Rep. 2021; 25(2):8.
12. Pang RY, Shen YH, Jin XQ, Xu HF, et al. Comparison of epidural dexmedetomidine to fentanyl in reducing ropivacaine dose in Programmed Intermittent Epidural Bolus plus Patient Controlled Epidural Analgesia during labor: A randomized, double-blind, controlled study. Front Med (Lausanne). 2022; 9: 935643.
13. Tang Y, Yang M, Fu F, Huang X, Feng Y, Chen X. Comparison of the ED50 of intrathecal hyperbaric ropivacaine co-administered with or without intrathecal dexmedetomidine for cesarean section: A prospective, double-blinded, randomized dose-response trial using up-down sequential allocation method. J Clin Anesth. 2020; 62: 109725.
14. Abdallah FW, Brull R. Facilitatory effects of intravenous Dexmedetomidine on the duration of spinal anesthesia: a systematic review and meta-analysis. Anesth Analg. 2013; 117(1): 27 1 – 8.
15. Rahimzadeh P, Faiz SHR, Imani F, Derakhshan P, Amniati S. Comparative addition of dexmedetomidine and fentanyl to intrathecal bupivacaine in orthopedic procedure in lower limbs. BMC Anesthesiol. 2018; 18(1): 62.