SCIENTIFIC ARTICLE

# Comparative evaluation of spinal anaesthesia and transrectal ultrasound guided peri-prostatic block for patients undergoing transurethral resection of the prostate

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**Keywords:** TURP, spinal, sedoanalgesia

**Abstract**

Background and Aim: Transurethral resection of the prostate (TURP) is the most common surgery performed in patients with benign prostatic hyperplasia. Patients undergoing TURP are usually elderly with associated co-morbidities, thus sedoanalgesia (local anaesthesia with sedation) can be a suitable alternative with early recovery and shorter hospital stays. Against this background, the present study aimed to compare the safety and efficacy of sedoanalgesia with conventionally used spinal anaesthesia for TURP.

Methods: This prospective randomized study was conducted in 100 patients (aged 50-80 years), with a prostatic volume of 30-70 cc and with duration of surgery less than 60 minutes undergoing TURP. Patients were randomly allocated into two groups: Group S (n=50): received spinal anaesthesia with 2ml of 0.5% hyperbaric bupivacaine; Group B (n=50): received sedatives along with prostatic block under transrectal ultrasound guidance by infiltrating of 20 ml of 1% lignocaine without adrenaline into the prostate and periprostatic area. VAS scores, hemodynamic parameters and patient satisfaction were recorded.

Results: Demographic profile, prostate volume and duration of surgery were comparable between the two groups. VAS scores were significantly lower in Group S as compared to Group B throughout the intraoperative period (p=0.01). The hemodynamic parameters were maintained better in Group B. All 50 patients were satisfied with the anaesthetic technique in Group S while 46 out of 50 patients were satisfied in Group B.

Conclusion: USG guided prostatic block is a promising option in elderly patients especially with various comorbidities and those with contraindications for spinal anaesthesia.

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## Introduction

Transurethral resection of the prostate (TURP) is the most common surgery performed in patients with benign prostatic hyperplasia (BPH). It involves inserting a resectoscope through the urethra and resecting prostatic tissue with an electrical metal loop using either coagulation or laser-vaporization [1]. Spinal anaesthesia has been the technique of choice in TURP [1]. Level of subarachnoid block up to T10 is sufficient for TURP as it interrupts sensory transmission from the prostate and bladder neck [2]. Also, the capsular sign (i.e., pain on perforation of the prostatic capsule) would be masked in cases of accidental perforation if sensory block level reaches above T9.

Day care procedures are rapidly gaining popularity because of shorter duration of hospital stay, fewer complications, early recovery and reduced costs which makes TURP under local anaesthesia a considerable option. Most of the patients undergoing surgery for BPH are elderly with co-morbidities and many are rendered unfit for general or regional anaesthesia. In those cases, sedoanalgesia (local anaesthesia with sedation) can be a suitable alternative with early recovery and shorter hospital stays [3].

The present study aimed to compare the safety and efficacy of sedoanalgesia with conventionally used spinal anaesthesia for transurethral resection of prostate.

## Materials and methods

This prospective randomized study was conducted from february 2019 to march 2020 in the Department of Anaesthesiology and Critical Care in a multispeciality hospital after obtaining institutional ethical clearance and informed written consent. Patients aged 50-80 years, belonging to American Society of Anaesthesiologists (ASA) physical status I-III, with a prostatic volume of 30-70 cc and with duration of surgery less than 60 minutes undergoing TURP were enrolled in the study. Patients having allergy to local anaesthetics or any contraindications to regional anaesthesia, history of prostate/bladder/urethral surgery, active urinary tract infection and neurogenic bladder dysfunction were excluded from the study.

Detailed history was taken and complete systemic examination was done in all patients before surgery. Demographic parameters and prostate volume were recorded. Patients were explained about Visual Analogue Scale (VAS) where 0 represents no pain while 10 represents worst pain imaginable. In the operating room, routine monitors including non-invasive blood pressure, ECG and pulse oximeter (SpO2) were attached. Intravenous line was secured with size 18G venous cannula and vital signs were recorded. Patients (n=100) were randomly allocated into two groups (figure 1) using computer generated random number table:

Group S (n=50): Spinal anaesthesia was administered with 2ml of 0.5% hyperbaric bupivacaine via 23 gauge Quincke's needle at L3-L4 intervertebral space. The surgery was started when the height of sensory block reached T10 dermatomal level.

Group B (n=50): Patients received sedatives alongwith prostatic block under transrectal ultrasound guidance by infiltrating of 20 ml of 1% lignocaine without adrenaline into the prostate and periprostatic area. Patients were given intravenous fentanyl (1 mcg/kg) and midazolam 1mg for sedation and anxiolysis. A TRUS guided prostatic block was given to the patients in lithotomy position. Aloka-SSD-1400 ultrasound machine with transvaginal probe (5-10 MHz) was used to administer the block. Aseptic preparation and lubrication of probe with 2% lignocaine jelly was done and probe was inserted transrectally to scan the prostate. Under ultrasound guidance, a 23 gauge, 7-inch spinal needle was placed through the biopsy guide channel into the area where the prostatic innervation enters the gland. To identify the above said area, the probe was angled laterally to visualize the notch between the prostate and the seminal vesicle. The needle was placed in this notch and 4ml of plain 1% lignocaine was injected on each side. Successful placement of the needle was confirmed by observing the injected drug displacing the seminal vesicle and the prostate away from the rectal wall. The rest of the solution was directly injected into the prostate at three locations in each lobe by inserting 23 gauge needle all the way to the anterior capsule at the base, mid-gland and the apex and as the needle was pulled back, 2 ml of anaesthetic was slowly infiltrated in the prostate parenchyma at each location.

Intraoperative pain was monitored using VAS (0-10) every 15 minutes and at the time of bladder catheterisation. If the VAS was >2, intravenous fentanyl (0.5 mcg/kg) was given. If VAS was >4 even after 5 minutes of fentanyl injection, surgery was continued under general anaesthesia and was recorded as a failure. Any discomfort during instrumentation/cautery and bladder distension were also noted. VAS was also assessed post-operatively at 1, 2, 4 and 6 hours after surgery. Duration of post-operative analgesia was recorded and analgesics were given as per surgical unit protocol when VAS ≥4.

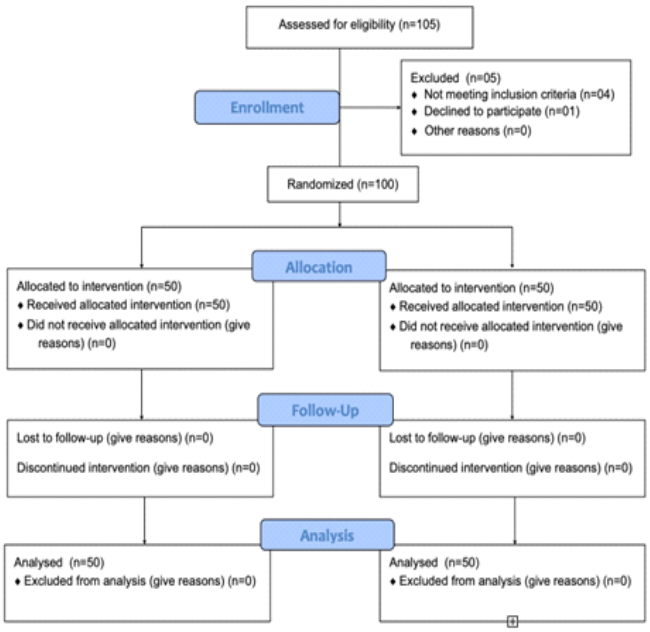


**Figure 1:** Consort diagram

Hemodynamic parameters were monitored continuously throughout the surgery. Heart Rate (HR) and Systolic blood pressure (SBP) were recorded before and after administration of the drug, every 5 minutes for first 30 minutes and then every 10 minutes for the next hour. Duration of surgery was calculated from the time of insertion of resectoscope till it was taken out at the end of surgery.

Perioperative complications such as hypotension and bradycardia were noted and treated according to the standard protocol. Hypotension (decrease in SBP more than 20% of the baseline value) was managed with 3 mg boluses of i.v. ephedrine. Number of patients having hypotensive episodes were recorded in both the groups. Bradycardia (HR <50 beats minute-1) was managed by inj atropine 0.6 mg i.v.

Patient's satisfaction was assessed subjectively by asking if he experienced any discomfort during the surgery and whether he will accept the same anaesthetic technique in future. Surgeon's satisfaction was based on three criterias i.e. the surgical field bleeding, patient immobility and degree of pelvic muscle relaxation which was assessed at the end of the surgery.

Sample size:

The primary objective of the study was to assess the intra-operative and post-operative pain by Numerical Rating Scale (Visual Analogue Scale) in the two groups. A clinically relevant difference of 1 in mean values of postoperative VAS between the two groups was defined for calculating the sample size. With an effect size of 0.67, power of 80% and type 1 error of 5%, the minimum required sample size was 47 patients in each group [4,5]. However, to compensate for dropouts we enrolled 50 patients in each group.

Statistical analysis:

Data were coded and recorded in MS Excel spreadsheet program. SPSS version 20 (IBM SPSS Statistics Inc., Chicago, Illinois, USA) Windows software program was used for analysis. Descriptive data was expressed as percentages, means and standard deviations. Quantitative data comparison of clinical indicators was done using unpaired t test (for quantitative data to compare two independent two groups) and paired t test (for quantitative data to compare before and after observations). Chi-square test was used for group comparisons for categorical data. A p value <0.05 was considered statistically significant.

## Results

Demographic profile, prostate volume and duration of surgery were comparable between the two groups (Table 1). VAS scores were significantly lower in Group S as compared to Group B throughout the intraoperative period (p=0.01) (Table 2). None of the patients in Group S experienced any discomfort on introduction of resectoscope while in Group B, 31 patients experienced mild pain (VAS=1,2) on introduction of resectoscope. In Group B, 9 patients complained of 'moderate pain' at various time intervals intraoperatively and were administered i.v. fentanyl to abate the pain so that surgery could be completed safely. Thus supplemental analgesia was required in 9 patients in Group B and none in in Group S (p value=0.04).

In Group S, the mean VAS score was zero at all time points intraoperatively. In Group B, the mean VAS score was <2 at all intervals during the surgery and the maximum mean VAS score observed was 1.2 at 30 minutes interval after the block. None of the patients in Group S experienced any discomfort on bladder catheterization while in Group B, 28 patients experienced mild pain (VAS=1,2) during the same.

The baseline values of HR were comparable between both groups. In Group B, no significant change in HR values was noted till 25 minutes after the block after which significant increase in HR was observed, with maximum being at 50 minutes after the block (p=0.001). In Group S, intraoperative HR values were significantly lower as compared with the baseline at all time intervals. However when compared between the two groups, HR values were significantly lower in Group S as compared to Group B intraoperatively. (Figure 2) Bradycardia was observed in 4 patients in Group S while none in Group B (p value=0.04).

**Table 1:** Demographic parameters

| | Group B (n=50) Mean ± SD | Group S (n=50) Mean ± SD | p-value |
|---|---|---|---|
| Age (years) | 66.98±9.12 | 66.24±8.82 | 0.68 |
| Weight (kg) | 64.64±6.95 | 65.78±7.93 | 0.44 |
| Height (cm) | 170.2±2.77 | 169.76±3.402 | 0.48 |
| BMI ($kgm^{-2}$) | 22.29±2.19 | 22.805±2.48 | 0.28 |
| ASA I/II/III | 3/44/3 | 4/44/2 | 0.84 |
| Prostate volume (cc) | 45.84±8.306 | 46.20±8.5 | 0.83 |
| Duration of surgery (minutes) | 44.78±9.26 | 46.32±6.88 | 0.34 |

p value <0.05 is considered to be significant

**Table 2:** Comparison of intra-operative pain score (VAS) between Group B and Group S

| | At introduction of resectoscope | | At 15 minutes | | At 30 minutes | | At 45 min | | At bladder catheterisation | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Group** | B | S | B | S | B | S | B | S | B | S |
| No pain (VAS=0) | 19 | - | 8 | 50 | 7 | 50 | 2 | 42 | 22 | 50 |
| Mild pain (VAS=1,2) | 31 | - | 40 | - | 38 | - | 26 | - | 28 | - |
| Moderate pain (VAS=3,4) | - | - | 2 | - | 5 | - | 2 | - | - | - |
| Severe pain (VAS >4) | - | - | - | - | - | - | - | - | - | - |
| Total | 50 | 50 | 50 | 50 | 50 | 50 | 30 | 42 | 50 | 50 |
| P value | **0.001** | | **0.001** | | **0.001** | | **0.001** | | **0.001** | |

p<0.001(Chi square test) when both groups were compared with each other at all time frames

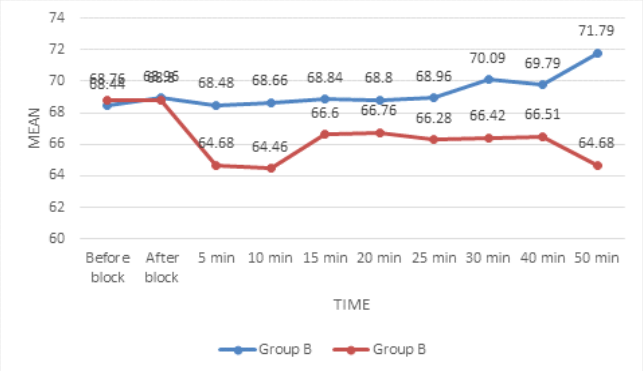


**Figure 2:** Comparison of HR (bpm) between the groups

The baseline values of SBP were comparable between both the groups. In Group S, a significant decrease in SBP values was noted at all time intervals intraoperatively while no such change was observed in Group B. (Figure 3) SBP values were significantly lower in Group S than Group B intraoperatively ($p<0.05$). Hypotension requiring ephedrine administration was observed in only 5 patients in Group S and none in Group B ($p=0.03$). Only one patient in Group S while no patient in Group B had vomiting (p value=0.31).

The duration of post-operative analgesia was found to be 98.40±38.125 minutes in Group B while it was 112.80±18.52 minutes in Group S (p value=0.01). VAS scores were lower in Group S as compared to Group B at 1,2,4 and 6 hours post-operatively (p value= 0.001) (Table 3).

All 50 patients were satisfied with the anaesthetic technique in Group S while 46 out of 50 patients were satisfied in Group B (p value=0.04). (Figure 19) Surgeons were satisfied with the anaesthetic technique in all 50 cases of Group S while in Group B, satisfaction was expressed in 48 out of 50 patients (p value=0.15). The dissatisfaction was mainly due to patient mobility.

**Table 3:** Comparison of Post-operative pain score (VAS) between Group B and Group S (Chi square test)

| | After 1 hour | | After 2 hours | | After 4 hours | | After 6 hours | |
|---|---|---|---|---|---|---|---|---|
| Groups | B | S | B | S | B | S | B | S |
| Mean±SD | 1.12± 0.898 | 0.10± 0.303 | 2.02± 0.86 | 1.04± 0.807 | 3.48± 0.76 | 2.28± 0.64 | 4.39± 0.75 | 3.56± 0.61 |
| p value | 0.001 | | 0.001 | | 0.001 | | 0.001 | |

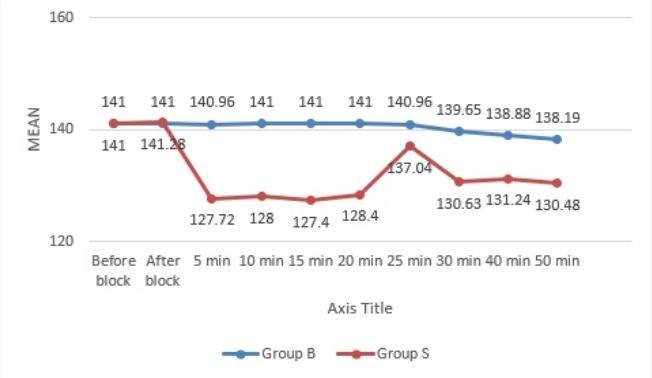


**Figure 3:** Comparison of SBP (mmHg) between the groups

**Discussion**

BPH is described as a quality of life disorder which develops with increasing age and hinders the normal activities and reduces the feeling of wellbeing [6]. 40% to 80% men develop moderate to severe symptoms at the age of 60-80. At the age of 90 years, most of the men develop microscopic BPH [7]. Multiple treatment modalities have been developed for the management, ranging from watchful waiting to open surgery, with TURP being the most common surgical intervention. The quest for ideal anaesthetic technique for TURP is still on as patients are mostly in the geriatric age group with multiple comorbidities.

Over decades, spinal anaesthesia has been the choice of anaesthesia for TURP. Though spinal anaesthesia technique has various advantages but it causes significant hemodynamic perturbations. The hemodynamic changes are gradual and of less magnitude with epidural technique, but there is a chance of sacral sparing which may produce incomplete sacral nerve root block leading to inadequate surgical anaesthesia.

Sedoanalgesia for TURP include analgesia by prostatic block along with sedation and has been successfully used for endourological procedures like TRUS-guided biopsy, flexible cystoscopy, percutaneous nephrostomy, percutaneous cyst aspiration, renal biopsy, optical urethrotomy, rigid cystoscopy, bladder biopsy, ureteroscopy, resection of bladder tumours and various scrotal procedures.[5] These procedures can be performed under sedoanalgesia on daycare basis and can curtail the cost as well as minimize the burden on the operating and recovery room. It can be considered as better option for elderly patients with comorbidities leading to fewer complications and early recovery [10]. In contrast to spinal anaesthesia, sedoanalgesia preserves detrusor function and sphincter coordination. In comparison with general anaesthesia, it allows immediate ambulation with resumption of a normal fluid and solid diet, thus leading to shorter hospital stay. Though sedoanalgesia may lead to some pain, discomfort and dissatisfaction of the patient intraoperatively, but it is safe, effective and cheaper. Thus sedoanalgesia can be a preferable alternative to general or spinal anaesthesia for daycare urological procedures in elderly patients [8,10].

We came across only one study in literature that compared neuraxial block with local anaesthesia for TURP [9]. Thus, we conducted this study to compare the hemodynamic changes, intra-operative and post-operative pain score, vasopressor requirement and adequate surgical condition between prostatic block and subarachnoid block for TURP.

Our results are similar to Sood et al who evaluated daycare bipolar transurethral resection vs photoselective vaporisation

under sedoanalgesia (prostatic block with sedation) in 78 patients with age >50 years and prostate volume of 20-50 ml [5]. In their study, 11 out of 78 patients had experienced moderate pain and were given supplemental analgesia in the form of i.v promethazine and pentazocine and surgery was completed safely with no discomfort. The mean VAS score during the intraoperative period was less than 2. No significant hemodynamic perturbations were observed in any patient. High satisfaction rate (88.46%) was reported among these patients. However, the duration of post-operative analgesia was little less than 1 hour after prostatic block for TURP. The lesser duration of analgesia as compared to our study may be attributed to the fact that they had given the prostatic block using anatomical landmark technique.

Aghamohammadi et al conducted a prospective randomized trial to compare and evaluate sedoanalgesia vs spinal anesthesia in 60 patients with prostate hypertrophy posted for TURP [9]. Intolerable pain was observed in 23.3% patients in sedoanalgesia group and 13.8% in those who received spinal anesthesia ($p>0.05$). Two patients in spinal group and 5 in local anesthetic group (3 due to severe pain and 2 for unsatisfaction) required conversion to general anesthesia or received additional drugs such as ketamine ($p=0.06$). The results are different from our study maybe because of the fact that the authors used anatomical landmarks for giving local anesthesia as opposed to ultrasound in our study. Also, we used inj fentanyl prior to the procedure while pethidine was used in this study.

Birch et al conducted a study to evaluate sedoanalgesia in 100 patients undergoing TURP [10]. They found that 58 out of 100 patients required supplementation of either fentanyl or ketamine. This may be because of the fact that they administered the block blindly and did not give any analgesic prior to surgery. In contrast, we used ultrasound guided technique which enhanced the success of the prostatic block.
The hemodynamic parameters were maintained better in patients who were given ultrasound guided prostatic block for TURP surgery in the present study which is one of the foremost priority in elderly age group who suffered from major cardiovascular comorbidities like hypertension and coronary artery disease.

Recently, Ayoub et al compared 30-day postoperative outcomes of TURP using the three types of anesthesia techniques i.e general (genTURP), spinal (spTURP), and MAC/sedation (macTURP) from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database [11]. The authors included a total of 53,182 patients who underwent TURP. macTURP was administered frequently in elderly patients (>80 years) with diabetes on insulin (7.9%), leukocytosis (7.4%), chronic obstructive pulmonary disease (7.8%), dyspnea (7.2%), and ASA grade>II (58.8%) as compared with genTURP ($p<0.013$). Postoperative complication rates were similar among the groups. The authors concluded that MAC/sedation is a suitable alternative in elderly patients with comorbidities undergoing TURP with a similar safety profile as compared to spinal or general anesthesia. In our study also, the hemodynamic parameters were maintained better in patients who were given ultrasound guided prostatic block for TURP surgery which is one of the foremost priority in elderly age group who suffered from major cardiovascular comorbidities like hypertension and coronary artery disease.

Our study was limited by the fact that we had a small sample size. Surgeons couldn't be blinded about the anaesthesia technique which would have lead to bias regarding surgeons satisfaction. Further trials with larger sample size are required to validate the findings.

**Conclusion**

Conventionally, spinal anaesthesia is the technique of choice for conducting TURP surgery but USG guided prostatic block is also a promising option in elderly patients especially with various comorbidities. We recommend large randomized controlled trials to evaluate USG guided prostatic block with further improvisation so that it can be used successfully in patients with various comorbidities and those with contraindications to spinal anaesthesia.

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